

Instruction Book

SELEKTOMAT

Type USWV

BN 15221/2/50

BN 15221/2/60

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Note: Always quote the Type and Order Number (BN) in addition to the Serial Number (FNr.) of the set when asking for technical information and, in particular, when ordering replacements.

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Table of Contents

<u>1.</u>	<u>General</u>	5
1.1	Uses	5
1.2	Specifications	6
1.3	Accessories	9
1.4	Recommended Accessories	9
1.5	Description	10
<u>2.</u>	<u>Preparation for Use and Operating Instructions</u>	10
2.1	Adjusting for the Local AC Supply Voltage and Switching On	10
2.2	Calibration of Gain	11
2.3	Selecting the Type of Operation	11
2.3.1	MANUAL or AUTOMAT. Operation	12
2.3.2	LOG. or LIN. Operation	12
2.3.3	METER or POLYSKOP Operation	12
2.3.4	POLYSKOP, LIN. and POLYSKOP LIN. -20 dB Operation	12
2.4	NOT TUNED Indication	13
2.5	Start of Tracking	13
2.6	Measuring Examples	13
2.6.1	Point-by-point Measurement on a 4-terminal Network	13
2.6.1.1	Manual Operation	13
2.6.1.2	TRACKING	14
2.6.1.3	Automatic Operation	15
2.6.1.4	Drop of Signal Voltage Below 10 μ V	16
2.6.1.5	Overdriving	16
2.6.2	The SELEKTOMAT used as Preamplifier for the POLYSKOP.	16
2.6.2.1	Test Assembly	17

2.6.2.2	Failure to Track	18
2.6.2.3	Changing the Sweep Width or Centre Frequency of the POLYSKOP	20
2.6.3	Swept-frequency Measurement on Superhet Receivers . .	20
2.6.4	Interfering Fixed Frequencies in the Sweep Range . .	21
2.6.5	Use of Other Sweep Generators	21
2.6.6	Use of Other Oscilloscopes	21
2.6.7	Measuring Reflection Coefficients	22
2.6.8	Reflection-coefficient Measurement on Antennas . . .	23
2.6.9	Point-by-point Measurement on Transmission Links . .	23
2.6.10	Swept-frequency Measurement on Transmission Links . .	24
<u>3.</u>	<u>Maintenance and Repair</u>	<u>24</u>
3.1	Circuit Description	24
3.1.1	Input Attenuator	24
3.1.2	Mixer	24
3.1.3	Local Oscillator.	25
3.1.4	Amplifier	25
3.1.5	Limiter and Control Circuit	26
3.1.6	Tracking Control	26
3.1.6.1	Frequency Indication	27
3.1.6.2	Pulse Section	27
3.1.6.3	Scanning Circuit	28
3.1.6.4	Automatic Gain Control	28
3.1.6.5	Pilot Lamp	29
3.1.6.6	Reference Line	29
3.1.6.7	Blanking Stage	29
3.1.7	Standardizing Oscillator	30
3.1.8	Stabilized Anode-supply Voltage	30
3.1.9	Electronic Heater Regulation	30

3.2	Maintenance and Repair	31
3.2.1	Level Plan	31
3.2.2	Replacement of the Mixer Diodes	32
3.2.3	Replacement of Valves	32
3.2.3.1	Oscillator Rö12	32
3.2.3.2	IF Amplifier Valves Rö1 to Rö5, Rö24	32
3.2.3.3	Limiter Valve Rö6	32
3.2.3.4	Valves Rö7 and Rö8	32
3.2.4	Calibration of the Logarithmic Indication Range	33
3.2.5	Pass-band Characteristic	33
3.2.6	Control Circuit	34
3.2.7	Pulse Section	34
3.2.8	Standardizing Oscillator	35
3.2.9	Power Supply	35
3.2.10	Reference Lines	35
	<u>Translations for Drawings and Diagrams</u>	37
	<u>Translations for Parts List</u>	44
	<u>Figs. 1 to 17</u>	47

1. General

1.1 Uses

The SELEKTOMAT is used mainly for frequency-response measurements on two- and four-terminal networks of all kinds; measurement of the far-off selectivity of filters and amplifiers; measurement of the input reflection of four-terminal networks (with a reflectometer); measurement on broadband modulators (modulation depth, upper and lower sidebands), and the like; measurement of the reflection coefficient of antennas (with a reflectometer).

All measurements can be made either point by point with a suitable signal generator or by the swept-frequency method using the POLYSKOP.

Fig. 1, page 47, indicates the characteristics of the SELEKTOMAT as well as the locations of the outer connections and control knobs. Section 1.2 contains further information on the technical characteristics. Recommended accessories are listed in section 1.4.

1.2 Specifications

Frequency range	30 - 400 MHz
in 6 subranges	30 - 60 MHz
	50 - 100 MHz
	75 - 150 MHz
	110 - 200 MHz
	170 - 270 MHz
	250 - 330 MHz
	330 - 400 MHz
Input	R&S connector Dezifix B
Input impedance	50 Ω for BN 15221/2/50
	60 Ω for BN 15221/2/60
	75 Ω using matching pad;
	see "Recommended Accessories"
	on page 9.
VSWR	
at 0 dB setting of input attenuator .	< 2
at -10 to -60 dB setting of input attenuator	< 1.15
Smallest indicated input voltage and response threshold for frequency tracking	approx. 10 μV_{rms}
Max. permissible input voltage with respect to power-handling capacity of attenuator	approx. 3 V_{rms}
Max. permissible input voltage with respect to overdrive limit (input attenuator set to 0 dB)	
for linear indication	100 μV
for logarithmic indication	100 mV
Frequency response	$\leq +0.3$ dB over 10 MHz
	$\leq +0.5$ dB from 30 - 40 MHz
	$\leq +0.8$ dB in respective subrange
	≤ 4 dB over total range (30 - 400 MHz)
Input attenuator	0 - -60 dB in 10-dB steps
Error limits of input attenuator . .	± 0.2 dB from 30 - 400 MHz
RF input circuit	high-pass filter for frequencies above 25 MHz

Intermediate frequency	10.5 MHz	
IF bandwidth	approx. 300 kHz for response down 3 dB	
	approx. 2 MHz for response down 80 dB	
IF gain	switch-selected, linear or logarithmic	
Tuning, switch-selected		
manual	coarse	
	fine, continuous over approx. ± 1 MHz	
automatic	to strongest signal of selected subrange	
Frequency tracking (can be switched off)	> 100 MHz, but only in selected subrange	
Maximum tracking speed	> 10 MHz/msec, tracking from low to high frequencies (in swept- frequency measurements)	
Voltage indication, switch-selected .	on panel meter of scope screen (POLYSKOP)	
linear	+1 to -20 dB	
error limits	+0.1 dB down to -10 dB ± 0.3 dB down to -20 dB referred to indicated value	
logarithmic	0 to -70 dB	
error limits	± 1 dB referred to indicated value	
Sensitivity	adjustable by approx: 2 dB in the indication range "log." 3 dB in the indication range "lin."	
logarithmic indication	0 dB = 100 mV -70 dB = 30 μ V	} at 0 dB setting of input attenuator a sensitivity of 10 μ V is attainable in most cases
linear indication	0 dB = 100 μ V -14 dB = 20 μ V	
Voltage calibration	by built-in standardizing oscillator at approx. 80 MHz; calibration referred to sensitivity at 80 MHz; stability $\pm 2\%$	

AF outputs	for measured and reference-line voltages; adaptable 13-mm coaxial sockets 4/13 DIN 47284; see screw-in connectors page 9
Measured voltage	for 0 dB approx. -5.5 V into > 100 k Ω
Reference-line voltage	for 0 dB approx. -5.5 V into > 100 k Ω
Reference line	for measurements with POLYSKOP, continuously adjustable, scale calibrated in dB
Accuracy of relative level measurement	same as accuracy of panel-meter indication
Frequency indication	on panel meter
Error limits	$\pm 2\%$ of indicated frequency
Pilot lamp	lights when no signal is received
Scanning frequency	approx. 1 Hz for indication on POLYSKOP approx. 10 Hz for indication on panel meter
Automatic gain control	increases continuously within 10 sec from minimum to maximum value; ganged with scanning process
Power supply	115/125/220/235 V, $\pm 10\%$ 47 to 63 Hz; 135 VA
Valves, etc.	1 valve E 86 C 1 valve E 88 CC 1 valve EC 92 3 valves ECC 81 2 valves ECF 80 5 valves EF 183 3 valves EF 95 2 valves EL 95 2 valves EL 803 1 valve 6 BN 6 1 valve 6080 1 reference tube 85 A 2 1 reference tube 108 C 1 2 miniature glow lamps RL 210 + RL 210 B 1 1-A fuse M 1 C DIN 41571 (for 220/235 V)
Dimensions (W x H x D)	540 x 234 x 378 mm R&S Standard Cabinet 56
Weight	27 kg

1.3 Accessories

supplied with the set 1 power cord LK 333 (2 m)
 2 patch cords (60 cm) with
 13-mm plugs

1.4 Recommended Accessories

to be ordered separately

- (a) Matching Pad Type DAF, BN 18083, for impedance transformation from 60 to 75 Ω and vice versa.
- (b) Reflectometer Type ZUP, BN 3569/50 for 50 Ω , BN 3569/60 for 60 Ω , BN 3569/75 for 75 Ω .
- (c) Screw-in connectors

Order Number	Mating Connector
FMU 10990	R&S connector Dezifix B
FID 90990	Siemens 13-mm connector
FHD 10990	UHF connector (e.g. Amphenol)
FHD 20990	N connector (e.g. Amphenol)
FHD 30990	C connector (e.g. Amphenol)
FHD 40990	BNC connector (e.g. Amphenol)
FLA 20990	874 B (General Radio)

1.5 Description

The SELEKTOMAT is a measuring receiver with an electronically-controlled local oscillator. The input signal passes via an attenuator to a broadband mixer where it is converted to the intermediate frequency. Either linear or logarithmic IF amplification is possible. Amplitude and frequency of the signal are indicated on panel meters.

Tuning can be carried out by hand, as on a conventional measuring receiver, or automatically. The automatic scanning circuit, the automatic gain control and the automatic frequency tracking permit searching for and tuning to the input signal as well as practically inertia-free tracking of the SELEKTOMAT when the input frequency changes.

The possibility of practically inertia-free frequency tracking permits the SELEKTOMAT in conjunction with a POLYSKOP to be used for direct linear or logarithmic representation of the frequency response of a test item. For this purpose, the SELEKTOMAT delivers two output voltages: the signal voltage and a variable calibrated reference value (reference-line voltage) which permits parallex-free amplitude measurements on the screen of the POLYSKOP.

2. Preparation for Use and Operating Instructions (see Fig. 2, page 48)

2.1 Adjusting for the Local AC Supply Voltage and Switching On

The SELEKTOMAT leaves our factory adjusted for operation from 220 V AC. To adapt it for 115 V, 125 V or 235 V, loosen the cheese-head screws on the left- and the right-hand side of the front panel, remove the chassis from its cabinet and insert the proper fuse into the clips on the fuse panel that are marked with the local AC supply voltage. The fuse panel is located above the power transformer. The fuse rating is 1 A for 220 and 235 V, 2 A for 115 and 125 V.

The power cord LK 333 fitted with an appliance plug and an earthing-contact type plug is supplied with the set. It is connected to the rear of the SELEKTOMAT.

Put the toggle switch (7) of the SELEKTOMAT up for on. The pilot lamp (6) serves as voltage indicator. Allow a few minutes for warming up. The set is now ready for operation.

2.2 Calibration of Gain

The SELEKTOMAT comprises a standardizing oscillator which delivers a constant voltage of about 80 MHz for calibration of the gain. This voltage is fed to the mixer via the attenuator. Switch (13) for the standardizing oscillator and control (14) for the gain are located behind the flap on the front panel. After the standardizing oscillator has been switched on, set the input attenuator (24) to -60 dB. The Dezifix input (19) remains free. Set the frequency range switch (18) to 50 - 100 MHz and press buttons (23) AUTOMAT., (10) METER and (16) LIN. Set the TRACKING switch (17) to ON.

The pointer of the frequency indicator (1) will, after a few oscillations, come to a standstill at the calibration frequency identified by a red mark. Meter (3) for amplitude indication reads approximately 0 dB (red mark) in linear operation. The gain can then be accurately adjusted to the nominal value of 0 dB.

The calibration of the logarithmic indication should be carried out as follows:

Set input attenuator (24) to -10 dB and press the LOG. button (15). The gain is set to -10 dB. The logarithmic indication can be checked down to -60 dB by increasing the input attenuation in steps of 10 dB.

After completion of the adjustment switch the standardizing oscillator off. The set is now ready for operation.

2.3 Selecting the Type of Operation

Using the 6 buttons select the type of operation necessary for the measurement.

2.3.1 MANUAL or AUTOMAT. Operation

Button (22) serves for manual tuning of the SELEKTOMAT to the test signal. Button (23) permits the SELEKTOMAT to be automatically tuned to the test signal. By pressing the MANUAL button (22) you can tune the SELEKTOMAT in the same way as any conventional selective measuring receiver. The COARSE (21) and FINE (20) controls serve to adjust the frequency. Meter (1) for frequency indication has 7 scales corresponding to the 7 subranges of the range switch (18). Find the desired signal by slowly rotating the COARSE control. For accurate tuning use the FINE control.

2.3.2 LOG. or LIN. Operation

With the LOG. button (15) depressed the SELEKTOMAT has a logarithmic gain over a range of approx. 80 dB; if the LIN. button (16) is depressed, the gain is linear over approx. 20 dB.

2.3.3 METER or POLYSKOP Operation

Use button (10) for a point-by-point measurement with amplitude indication on the panel meter (3) or button (11) for a swept-frequency measurement with indication on an oscilloscope (POLYSKOP). The output sockets and controls on the right-hand side of the front panel of the SELEKTOMAT are used only in swept-frequency measurements. The SIGNAL OUTPUT (9) delivers a voltage corresponding to the amplitude characteristic of the test item, while the REF. LINE output (8) delivers a reference voltage which is calibrated and adjustable by means of the dial (4). The CALIBRATE button (5) serves to adjust both deflection amplifiers of the POLYSKOP for equal gain in order to ensure an exact relationship between the signal level and the reference line.

2.3.4 POLYSKOP, LIN. and POLYSKOP LIN. -20 dB Operation

For swept-frequency measurements using the POLYSKOP, the SELEKTOMAT is switched on by means of the pushbuttons (11) and (16). The amplitude indication is linear. With the switch (13) on POLYSKOP LIN. -20 dB a gain reduction of 20 dB occurs provided (11) and (16) are depressed.

To obtain the same voltage indication, the input attenuation must be reduced by 20 dB, which corresponds to a maximum input voltage of 1 mV. As a result the signal-to-noise ratio is so good that no noise voltage occurs at the output of Type USWV. This ensures an interference-free indication on the scope.

2.4 NOT TUNED Indication

Pilot lamp (2) between the two panel meters lights up when the SELEKTOMAT is not tuned.

2.5 Start of Tracking

For swept-frequency measurements, vary the START OF TRACKING control (12) until the frequency at which tracking is supposed to start appears at the left-hand edge of the screen. In point-by-point measurements this control is not used.

2.6 Measuring Examples

The operation of the SELEKTOMAT is best understood by referring to a few typical measurements.

2.6.1 Point-by-point Measurement on a 4-terminal Network

(See Fig. 3, page 49)

Feed the test item from a signal generator, such as Type SMLM, and connect its output via a cable to the input of the SELEKTOMAT.

2.6.1.1 Manual Operation

Necessary adjustments: set the input attenuator to -10 dB, the frequency range switch to the respective range, the TRACKING switch to OFF and press the buttons MANUAL, LOG. and METER. Find the signal with the TUNING knobs (21) and (20); turn the COARSE knob slowly to be sure that the signal is

found in spite of the narrow bandwidth of the IF amplifier. The SELEKTOMAT is not immune from image frequencies in this type of operation. Every signal is measured again at a distance of twice the IF = $2 \times 10.5 \text{ MHz} = 21 \text{ MHz}$. Note that in the logarithmic range an input signal as low as $20 \mu\text{V}$ is indicated. External interference voltages of this order of magnitude may leak in via the test item or defective cable connections and thus make it difficult to find the signal. For easier distinction it is advisable to switch over to linear indication and to reduce the sensitivity of the SELEKTOMAT by means of the input attenuator so far that the signal just produces a sufficient meter deflection. During the measurement, the SELEKTOMAT must be retuned manually after each variation of the test frequency. It cannot be expected that a signal once tuned in remains in the reception range for any particular length of time, since the frequency stability of the electronically-controlled local oscillator is not high enough.

2.6.1.2 TRACKING

When the TRACKING switch (17) is in position ON, manual adjustment of the SELEKTOMAT to the test signal is replaced by automatic tracking, and any variation of the test frequency is permissible within the limits of the reception range selected. Turn the COARSE TUNING control (21) fully counterclockwise to ensure automatic tracking over the entire subrange.

Automatic tracking makes the SELEKTOMAT immune from image frequencies, i.e. reception is maintained only if the local oscillator operates above the test frequency; otherwise a decrease in the indicated amplitude shows that the image frequency has been adjusted for. If the signal generator is disconnected from the test item for a short time, e.g. by operating the input attenuator of the SELEKTOMAT, which in its intermediate positions may effect interruptions, or by changing the range of the signal generator, the SELEKTOMAT goes off tune and the pilot lamp (2) lights. Readjustment to the test frequency becomes necessary.

When automatic tracking is used, the operating principle of the SELEKTOMAT requires that manual tuning is always carried out from the low frequencies towards the high frequencies. Tuning from high frequencies towards low

frequencies causes the tracking circuit to lock to the first signal received and tuning to any lower frequencies by means of control (21) is no longer possible.

2.6.1.3 Automatic Operation

Necessary adjustment: same as described in section 2.6.1.1, but press AUTOMAT. instead of MANUAL button. Frequency tuning by means of the COARSE and FINE controls is replaced by automatic scanning and automatic gain control requiring no manipulations. The pointer of the frequency indicator on the left-hand side oscillates several times (once per second) over the full scale. In logarithmic operation the pointer of the meter on the right-hand side (amplitude indication) goes once to the right stop and returns slowly (in about 10 seconds) to the left stop. The pilot lamp (2) lights up. After a few seconds the lamp goes out, the left-hand meter indicates the frequency to which the SELEKTOMAT has been tuned automatically, and the right-hand meter indicates the amplitude. During these few seconds, the automatic gain control has weighted all input signals with respect to their amplitude and the SELEKTOMAT has locked to the strongest signal. Tuning is maintained even if the frequency of the signal varies. After any short interruption that may occur the scanning process recommences. For example, retuning is ensured within a few seconds after band-switching of the signal generator. Check the frequency indication to see whether the tuning frequency agrees with the signal-generator frequency, taking into account the accuracy of frequency indication. Particularly in logarithmic operation tuning to harmonics or spurious frequencies is possible. In this case, switch off TRACKING for a short time, then switch it on again so that the scanning process is repeated. With linear amplification, the automatic gain control is not indicated by a deflection on the right-hand meter as mentioned above. The pointer remains in its zero position as long as the scanning process continues. The SELEKTOMAT indicates the measured value only after tuning has been completed.

Using the method described, any active and passive 4-terminal networks can be measured. The input frequency need not be equal to the output frequency. For example, an RF voltage may be applied to the input of a receiver and the SELEKTOMAT measures the IF voltage at the output of the IF amplifier. Harmonics of the test frequency can also be measured.

2.6.1.4 Drop of Signal Voltage Below 10 μ V

The sensitivity of the SELEKTOMAT is 20 μ V (in most cases it is even 10 μ V). If in a point-by-point measurement the input voltage of the SELEKTOMAT drops below this value, the automatic tuning does not work. This becomes apparent when the pilot lamp (2) lights and the pointer of the frequency meter oscillates. If it is impossible to obtain more than 10 μ V by increasing the signal-generator output, slowly vary the test frequency until the signal voltage is sufficient for automatic tuning of the SELEKTOMAT.

2.6.1.5 Overdriving

If an RF signal of more than 100 mV is applied to the mixer of the SELEKTOMAT its operation may be disturbed by overdriving of the mixer. The automatic tuning may then respond to harmonics or cross-modulation products. The resistors of the input attenuator do not withstand RF voltages that are considerably higher than 3 V. Higher input voltages must be reduced by suitable attenuator pads before being applied to the input of the SELEKTOMAT.

2.6.2 The SELEKTOMAT used as Preamplifier for the POLYSKOP

The sensitivity of the POLYSKOP is governed by the broadband diode rectifier circuits in its diode probes. RF signals of the order of 10 mV can be measured satisfactorily with the POLYSKOP without accessory equipment. Because of the non-linearity of the rectifier diodes the display on the POLYSKOP screen is not proportional to the voltage. Thus it is not possible to judge the level differences directly. A level measurement must be made by comparison, using the POLYSKOP attenuators.

The SELEKTOMAT offers the possibility of increasing the sensitivity of the POLYSKOP by about 60 dB, by amplifying the RF signals derived from the test item. The SELEKTOMAT tracks the swept frequency of the POLYSKOP and converts it to a narrow-band IF. It provides for a high gain, which may be linear or cover 80 dB logarithmically. At the signal output a rectified voltage proportional to the attenuation characteristic of the test item is available. The reference-line output delivers a reference voltage, variable

in calibrated attenuation values, which appears in dual-trace display on the POLYSKOP screen together with the measured value and ensures high accuracy of the amplitude measurement.

2.6.2.1 Test Assembly (see Fig. 4, page 50)

Connect the SIGNAL OUTPUT (9) to the left-hand AF input of the POLYSKOP and the REF. LINE output (8) to the right-hand AF input, using the two short cables supplied with the SELEKTOMAT. Insert the test item between the RF output of the POLYSKOP and the RF input of the SELEKTOMAT.

For first-time operation, proceed as follows: connect the RF output of the POLYSKOP directly to the RF input of the SELEKTOMAT without inserting the test item. Select the frequency range and sweep width on the POLYSKOP. The input voltage should not exceed 100 mV to prevent overdriving. It is best to set the output attenuator of the POLYSKOP to 10 dB and the input attenuator of the SELEKTOMAT to -20 dB. Then switch off TRACKING on the SELEKTOMAT (switch (17) in OFF position) and press the buttons MANUAL, LOG., and POLYSKOP.

Adjust the POLYSKOP as follows: function selectors Y_1 and Y_2 to NEG.; turn vertical-gain controls Y_1 and Y_2 clockwise about $1/3$ of the way. The display on the POLYSKOP can be seen from Fig. 5, page 51. By varying the tuning control (21) two narrow curves are displayed. The left-hand curve (f_1) is the passband characteristic of the SELEKTOMAT, the local oscillator operating above the reception frequency; the right-hand curve (f_2) is spaced away twice the IF ($2 \times 10.5 \text{ MHz} = 21 \text{ MHz}$) and represents the image frequency. Adjust the frequency on the SELEKTOMAT so that curve f_1 is close at the left-hand side of the screen. Put the TRACKING switch to ON. Tracking begins at the selected frequency f_1 and proceeding to the right-hand side of the screen produces a straight line as shown by the dotted line in Fig. 5. The second curve at f_2 disappears when the tracking circuit is switched on.

Adjust the two deflection amplifiers in the POLYSKOP for equal sensitivity. Press the CALIBRATE button (5) and adjust the vertical-gain controls of the POLYSKOP so that the displayed curves coincide on line 10 of the transparent chart. Make this adjustment with the reference-line adjustment

(14) on 0 dB. Leave the vertical-gain controls of the POLYSKOP in the same position for all further measurements; do not change their settings. Only under this condition will the exact relationship between the reference line and the measured value be maintained. To vary the vertical gain, if desired, adjust the attenuators of the POLYSKOP or of the SELEKTOMAT; small corrections may be made with the gain knob (14) of the SELEKTOMAT.

In this short-circuit measurement, the accuracy of the reference-line calibration may be checked by alternately varying the input attenuator and the reference-line adjustment.

After the test assembly has been checked in the short-circuit condition, connect the test item between the POLYSKOP and the SELEKTOMAT. If the test item is a passive 4-terminal network, there is no risk of overdriving the SELEKTOMAT. For the measurement of amplifiers, it is advisable to set the input attenuator of the SELEKTOMAT to -60 dB and then to reduce the attenuation until a suitable picture height is obtained.

Linear-scale measurements at full gain often result in a display exhibiting a deflection of about 2 to 5 mm due to noise. A display unaffected by noise is obtainable by increasing the input voltage of the SELEKTOMAT by 20 dB with the input attenuator of the SELEKTOMAT or the output attenuator of the POLYSKOP and by setting the rotary switch (13) to the position POLYSKOP LIN. -20 dB, thus decreasing the gain of the set by 20 dB.

If the input level is too low to permit this decrease of gain, the signal-to-noise ratio can be improved by increasing the input voltage of the SELEKTOMAT and by backing off the gain control until the original picture height is obtained.

2.6.2.2 Failure to Track

Tracking is ensured only as long as the input voltage at the mixer of the SELEKTOMAT is greater than 20 μ V (greater than 10 μ V is sufficient in most cases). If the test item has a very high attenuation, it is possible that within the swept range the attenuation becomes so high that the output voltage of the test item is no longer sufficient for tracking. The display

on the screen of the POLYSKOP can be seen from Fig. 6, page 52. Failure to track becomes apparent by the fact that the reference line ends at the same point where the measured value drops to the zero line. Erroneous measurements are thus eliminated. The SELEKTOMAT does not resume tracking at a higher frequency with a higher signal voltage. The measurement must be taken in two steps, one from the lowest frequency to the attenuation peak and the second from the attenuation peak to the end of the range (see Fig. 7, page 53). In logarithmic operation the dynamic range of 80 dB should be sufficient to permit measurement in one step even if the test item exhibits high attenuation. In linear operation the signal voltage must not vary by more than 20 dB, otherwise tracking may not be maintained over the entire range. Test items that vary considerably in attenuation can be measured only stepwise in linear operation.

Failure to track may also be due to the frequency-marker oscillators of the POLYSKOP. Although the frequency markers are generated inside the POLYSKOP bypassing the test item, small residual voltages of the frequency-marker oscillators will reach the RF output. To produce the zero reference line, the range oscillators are switched off during the flyback, but the marker oscillators continue to operate. Their signals pass from the output of the POLYSKOP through the test item on to the input of the SELEKTOMAT. During flyback, i.e. during the period in which the range oscillators are switched off, the SELEKTOMAT returns also to its initial frequency position, reaching its highest sensitivity in logarithmic operation. An input voltage greater than 20 μ V (greater than 10 μ V in most cases) will effect automatic tuning of the SELEKTOMAT. In logarithmic operation, unwanted frequency-marker signals arriving with a level higher than about 30 mV may cause the SELEKTOMAT to tune to a spectrum line of the marker frequency. The probability for this to occur is greater in the lower than in the higher frequency ranges, since the energy of the marker-frequency oscillators decreases as the frequency increases. This can be remedied by lowering the input voltage of the SELEKTOMAT with the aid of a 10- or 20-dB pad connected in series with its input. If this remedy is undesirable for the sake of the measurement, the frequency-marker oscillator of the POLYSKOP must be switched out of circuit.

Similar trouble will occur if after the basic adjustment of the SELEKTOMAT the standardizing oscillator is not switched out of circuit.

2.6.2.3 Changing the Sweep Width or Centre Frequency of the POLYSKOP

Changing the sweep width or centre frequency of the POLYSKOP makes it necessary to readjust the starting frequency of the SELEKTOMAT in order to cover the full display width of the screen. Manual adjustment becomes tiresome if the sweep width or centre frequency is frequently changed and can be avoided by automatic operation. In automatic operation manual shifting of the starting frequency of the SELEKTOMAT is replaced by automatic shifting. The starting frequency is close at the left-hand side of the screen and is shifted accordingly if sweep width and centre frequency of the POLYSKOP are changed. The START OF TRACKING control (12) serves to correct the position of the starting frequency in automatic operation. Automatic operation functions satisfactorily only under the following conditions:

- (a) The frequency range scanned by the POLYSKOP must be within a subrange of the SELEKTOMAT.
- (b) Within the range selected, the test item should have no attenuation peaks causing tracking to fail.

Automatic operation can be utilized only if these requirements are met and if tracking is possible from the left to the right side of the screen. For more particulars see section 3.1.6.3.

2.6.3 Swept-frequency Measurement on Superhet Receivers

After IF conversion of the test signal in the test item (superhet receiver) the sweep on the screen of the POLYSKOP takes the opposite direction depending on the frequency of the local oscillator. Suppose a signal derived from the POLYSKOP and swept in frequency from 200 to 220 MHz is fed to a TV receiver. The local oscillator operating at 250 MHz, the resulting IF signal is swept in frequency from 50 to 30 MHz, i.e. from high to low frequencies. The SELEKTOMAT, however, does not permit tracking from high to low frequencies.

A switch has been provided at the rear of POLYSKOP II for the selection of the proper sweep direction. In the above case this SWEEP DIRECTION selector of POLYSKOP II would have to be set to DOWNWARD to ensure sweeping from

low to high frequencies at the IF output of the TV receiver.

2.6.4 Interfering Fixed Frequencies in the Sweep Range

Non-shielded test items may pick up extraneous signals which affect the tracking capability of the SELEKTOMAT. This is evidenced by intermittent interruptions in frequency tracking and possibly by permanent tuning of the SELEKTOMAT to the interfering frequency. Tuning and locking to an interfering signal is possible while the POLYSKOP sweep generator, which is on for 10 msec and off for another 10 msec for producing the zero reference line, is off.

Steps must also be taken to prevent the SELEKTOMAT from picking up unwanted signals from oscillators incorporated in the test item.

2.6.5 Use of Other Sweep Generators

The SELEKTOMAT will operate in conjunction with practically any commercial sweep generator producing sine-wave, saw-tooth, triangular or similar signals. Only the frequency sweep of the generator must rise with time. Some sweep generators allow the blanking facility provided for producing the zero reference line during the flyback period of the oscilloscope to be switched off. The SELEKTOMAT can readily be used also in unblanked operation.

2.6.6 Use of Other Oscilloscopes

The SELEKTOMAT offers optimum accuracy and simplicity of operation in conjunction with the POLYSKOP, but other good oscilloscopes may also be used for the display of the measured values. It is recommended that oscilloscopes with DC amplifiers for vertical deflection be employed to ensure a stationary pattern independent of the amplitude. As in the case of the POLYSKOP, reference line and measured value can be displayed at the same time when using a dual-trace oscilloscope. But a satisfactory level measurement can be made also with a single-trace oscilloscope if the CALIBRATE button (5) is operated so as to display the measured value and reference line alternately. The frequency markers, which can generally

be derived from the sweep generator, must be superimposed on the input of the oscilloscope as required.

2.6.7 Measuring Reflection Coefficients

The reflection coefficient of a 4-terminal or 2-terminal network can be measured with a directional coupler, which consists of a straight-through coaxial inner conductor with two separate output loops. A voltage proportional to the incident wave develops in one output loop and one proportional to the reflected wave in the other. By feeding a test item via such a directional coupler, it is possible to make a comparison measurement of the incident and reflected voltages to obtain the

$$\text{reflection coefficient in \%} = \frac{\text{reflected voltage}}{\text{incident voltage}}$$

or the

$$\text{return loss} = \text{level of incident voltage minus level of reflected voltage.}$$

To prevent the characteristic impedance of the coaxial inner conductor from being affected, the coupling loops will pick up only a small portion of the measured voltage. When measuring reflection coefficients with a directional coupler, it is therefore necessary to obtain a reliable reading of low RF signal levels. The SELEKTOMAT is excellent for this purpose both for point-by-point and swept-frequency measurements. The required test setup is shown in Fig. 8, page 54. The test item is fed with the maximum permissible RF voltage. In the case of passive test items where overdriving need not be feared, the full output voltage of the POLYSKOP, 0.5 V_{rms}, is applied to the test item. The output voltage of the POLYSKOP applied to, say, a receiver should be reduced by 20 to 30 dB depending upon the permissible maximum. The SELEKTOMAT can then be used to measure the incident and reflected voltages, the ratio of which permits the reflection coefficient to be determined at any frequency.

The sensitivity obtainable with this test setup can be judged from the following examples: the directional coupler for the range 30 to 600 MHz of Type ZUP has a coupling attenuation of about 30 dB at 200 MHz. If a voltage of $0.5 V_{\text{rms}}$ is applied to the test item the reflected voltage with 100% mismatch is 30 dB below 0.5 V, which is 15 mV. With a reflection coefficient of 1%, a voltage of $15 \text{ mV} : 100 = 150 \text{ } \mu\text{V}$ is obtained. This voltage is largely sufficient for operation of the SELEKTOMAT. If only 50 mV is applied in order to prevent overdriving of the test item (e.g. receiver input), a signal voltage of 15 μV is obtainable at the SELEKTOMAT if the reflection coefficient is 1%. The sensitivity of the measurement thus mainly depends on the quality of the directional coupler, which is described in the data sheet of Type ZUP. The logarithmic gain characteristic of the SELEKTOMAT ensures that major matching variations in the measurement range can be clearly observed.

2.6.8 Reflection-coefficient Measurement on Antennas

The SELEKTOMAT is used to advantage for reflection-coefficient measurements on antennas. It should be borne in mind that antennas are apt to pick up noise voltages which may be of the order of the signal voltage and affect the operation of the SELEKTOMAT. In the case of directional antennas, rotation of the antennas may overcome this trouble.

The phase of the reflection coefficient cannot be determined with a test setup consisting of the SELEKTOMAT and the POLYSKOP. Impedance measurements with respect to magnitude and phase can be carried out with our Z-g Diagrams Type ZDU and ZDD.

2.6.9 Point-by-point Measurement on Transmission Links

For point-by-point measurements on transmission links a conventional signal generator is used at the transmitter location. Its frequency is varied over the measurement range according to a scheme previously agreed upon. At the receiving end the SELEKTOMAT indicates the frequencies adjusted for at the transmitter location and measures the respective attenuation values. In the case of automatic tuning, the measured value simply needs to be read and recorded.

2.6.10 Swept-frequency Measurement on Transmission Links

Apply the output voltage of a POLYSKOP to the transmitter and use a SELEKTOMAT at the receiving end. The SELEKTOMAT automatically tracks the swept frequency of the POLYSKOP. The measured value may be indicated on a good oscilloscope, the time base of the oscilloscope being synchronized with the squarewave signal derived from the REF. LINE output of the SELEKTOMAT. A second POLYSKOP can be used for indication at the receiving end provided both POLYSKOPs are fed from the same power line. This condition is generally not fulfilled when the transmitter and receiver locations are distant from each other. Frequency determination at the receiving end is impossible without special arrangements since the frequency markers generated in the POLYSKOP are not available. We recommend use of an absorption-type frequency meter which, connected to the SELEKTOMAT input, causes a dip in the displayed curve, serving as a frequency marker.

3. Maintenance and Repair

3.1 Circuit Description

(see block diagram page 55 and circuit diagram)

3.1.1 Input Attenuator

The signal passes from the input socket to the input attenuator, which is switchable in 10-dB steps from 0 to 60 dB. The individual sections are so proportioned that an exact input impedance of 50 Ω or 60 Ω is ensured at any point. The output signal of the attenuator passes through an IF rejection filter (high-pass filter) to the mixer of the SELEKTOMAT.

3.1.2 Mixer

The mixer comprises two silicon diodes (G1 1 and G1 2); their circuit arrangement affords low conversion loss and high permissible RF input

voltage. Transformer section L1-C41-C42/L2-C43-C44 matches the mixer stage to the subsequent IF amplifier.

3.1.3 Local Oscillator

The mixer is fed from the local oscillator via capacitor C4. The local oscillator is switchable; it comprises 7 oscillator coils mounted on small ferrite-rod cores. The coil switched into circuit lies in the air gap of a ferrite magnet whose field strength is controlled by the anode current delivered by the control valves R613 and R614. When unmagnetized the local oscillator operates at the lowest frequency of the respective subrange; with increasing field strength of the magnet the reception frequency increases up to the saturation point.

3.1.4 Amplifier

After conversion in the mixer, the input signal is applied to the 6-stage IF amplifier R61 to R65 and R624. The input stage, R61, is a cascode circuit and exhibits a noise figure of about 4 dB. The following stages use variable-mu valves. Apart from the last stage, which feeds rectifier G1 4 via a resonant circuit, all stages are coupled by band-pass filters. The grid bias of the six IF amplifier valves is fixed during linear operation. The GAIN control R126 serves to calibrate the sensitivity for both linear and logarithmic operation. It forms with R62 a variable voltage divider at which the signal obtained from rectifier G1 4 falls off. The signal is then simultaneously applied to the test output, where it is available for vertical deflection of the picture tube in swept-frequency operation, and to the panel meter I2 which is calibrated in dB for linear and logarithmic operation. In logarithmic operation, all IF amplifier valves are controlled by the rectified voltage derived from rectifier G1 4. The IF amplifier valves, R62 to R65 and R624, draw the full control voltage while the cascode input stage R61 draws only a portion of the control voltage, which is adjusted with R16. The combination of five variable-mu IF valves with a partly regulated cascode stage affords an almost strictly logarithmic indication over a range of approximately 70 dB.

3.1.5 Limiter and Control Circuit

The IF signal present at rectifier G1 4 passes through C65 to the limiter R66, whose anode circuit comprises the control circuit producing the frequency tracking voltage. The control circuit is so tuned that the centre of the slope of its characteristic coincides with the centre of the IF pass-band. The pass-band characteristic of the IF amplifier and the resonance curve of the control circuit are shown in Fig. 10, page 56. The IF voltage across the control circuit is rectified by diode G1 5 and amplified about 20 times by R67. It serves to drive the pulse section and to generate the tracking control current in R614.

3.1.6 Tracking Control

Tracking can be best explained by referring to a given operating condition. The SELEKTOMAT is connected, without test item, to the RF output of the POLYSKOP. The POLYSKOP delivers an RF voltage which is varied within 10 msec from low towards high frequencies (see Fig. 11, page 57). For another 10 msec, the generator section of the POLYSKOP is disabled and the signal voltage is generated again starting from low frequencies. If the SELEKTOMAT tracks the swept frequency of the POLYSKOP, the voltage rectified at the output of the IF amplifier has the shape of a squarewave (Fig. 12) of 50 Hz repetition frequency. To ensure the control of the local oscillator of the SELEKTOMAT, the signal must change by a certain amount in the IF range during the tracking process so that a varying control voltage is obtained at the control circuit. The voltage rectified in the control circuit can be checked across point (1) after amplification in R67; the voltage curve is shown in Fig. 13. Tracking starts with a voltage peak due to the fact that the coil of the magnet core acts as an inductive load impedance with respect to R614. From then on the control voltage increases slowly, thus varying the current of the magnet coil; the current curve is shown in Fig. 14. At the moment where the signal generator section of the POLYSKOP is disabled, the voltage at the control circuit collapses and the current in the magnet coil becomes zero. The local oscillator goes back to the lowest frequency adjusted for, where it remains until the process is repeated after the POLYSKOP signal generator is again switched into circuit. R614 is so adjusted by means of R123 that the noise components, which are superimposed on the control voltage when the POLYSKOP is switched

off, cannot drive the valve. The variable negative feedback circuit R118 and C9⁴ suppresses control oscillations in this control circuit. Röl3 is connected in parallel with Röl4, enabling the local oscillator to be adjusted to any frequency within the respective subranges. By varying the grid bias of Röl3 with the COARSE and FINE frequency controls R113 and R114, the current applied to the magnet coil can be varied and any desired reception frequency can be obtained within the respective subranges. It is obvious that the total current flowing through the magnet coil is the sum of the two valve currents (Röl3 and Röl4), so that frequency tracking via Röl4 is possible only from the frequency determined by Röl3 towards higher frequencies.

3.1.6.1 Frequency Indication

The total current flowing from Röl3 and Röl4 through the magnet coil is a direct measure of the reception frequency. This current is indicated on meter I1 which is calibrated in frequency for all subranges. The voltage-dependent resistor R110 ensures linearity of the scale.

3.1.6.2 Pulse Section

The pulse section of the SELEKTOMAT comprises the valves R88 to Röl1. It has the following functions:

- (a) As long as the SELEKTOMAT does not receive a signal, the local oscillator is tuned over the entire reception range by means of a sawtooth generator operating at 1 Hz⁺). When a signal is received, the sawtooth generator is immediately disabled.
- (b) In conjunction with this scanning process the pulse section generates a control voltage varying the sensitivity of the SELEKTOMAT within 10 sec from minimum to maximum; the amplitude of the input signal is thus weighted. This amplitude control is disabled when a signal is received.
- (c) A DC voltage is produced which can be applied to the POLYSKOP to give a variable calibrated reference line in swept-frequency operation.

⁺) 1 Hz for POLYSKOP operation or 10 Hz for METER operation.

for accurate measurement of attenuation values.

- (d) A pilot lamp lights up when no signal is received.
- (e) In swept-frequency operation with a POLYSKOP, the tracking range of the SELEKTOMAT is automatically controlled in such a way that always the full width of the screen is utilized even after the swept range has been changed.

All the processes described above are triggered by the voltage taken from the control circuit; this voltage changes abruptly when the SELEKTOMAT receives a signal.

3.1.6.3 Scanning Circuit

In automatic operation of the SELEKTOMAT, a sawtooth control current is applied to the magnet coil via R613 and thus the local oscillator is tuned once per second over the entire subrange. The sawtooth voltage required for driving R613 is generated in the sawtooth generator consisting of R69 and R610. R69 is a free-running blocking oscillator with a frequency of 1 Hz⁺). Capacitor C84 is charged to a high positive voltage within a few microseconds and discharged via R610 with constant current flow. R69 serves as recharging valve for capacitor C84. It influences the discharging current of R610 by a uniform opposite current in such a way that the potential across C84 remains nearly constant. This is necessary for automatic control of the starting frequency of the SELEKTOMAT in swept-frequency operation. In point-by-point measurements using a signal generator this recharging valve disables the sawtooth generator when a signal is received.

3.1.6.4 Automatic Gain Control

As long as no signal is received, the automatic gain control is operating in addition to the automatic scanning circuit. It is controlled by a relay. By this relay, capacitors C86 and C87, which are charged to -8 V, are connected to the control line for all IF amplifier valves and are slowly discharged to zero. The discharging process takes about 10 seconds.

⁺) or 10 Hz

During this time the gain of the IF amplifier becomes a minimum and slowly increases to the normal value while the automatic scanning circuit tunes the receiver ten times through the entire subrange. Each time the sensitivity is increased by a certain amount; if several signals of different amplitude are applied to the SELEKTOMAT, the strongest one will be received first. When a signal is received, the automatic scanning circuit and the automatic gain control are disabled. Capacitors C86 and C87 are charged to -8 V from the power section via a rectifier arrangement.

3.1.6.5 Pilot Lamp

The relay that controls the automatic gain control also operates pilot lamp R1 1. This lamp lights to indicate that no signal is received and that the respective subrange is scanned.

3.1.6.6 Reference Line

In swept-frequency operation the panel meter for amplitude indication is inoperative. Instead, a calibrated variable reference line can be derived from the SELEKTOMAT and displayed on the screen of the POLYSKOP, together with the measured value. Thus an amplitude measurement is possible with the same accuracy as in a point-by-point measurement. The reference line represents a voltage step of accurately-known level which occurs only during frequency tracking of the SELEKTOMAT.

3.1.6.7 Blanking Stage

In swept-frequency operation using the POLYSKOP, the test voltage and the reference-line voltage are available at the output sockets of Type USWV during frequency tracking. The sweep generator is switched off during flyback of the POLYSKOP. Type USWV is now not tuned. It delivers the constant forward voltage of diode G1 7 which constitutes the reference line. Without blanking, the rectified noise voltage is present at the test output, which fluctuates little between LIN. and LOG. operation but considerably in switch position POLYSKOP LIN. -20 dB where the gain is reduced by 20 dB.

Since the POLYSKOP uses for indication the potential which is present at the AF input during flyback, the noise voltage of Type USWV must be switched off or shorted out in order to prevent erroneous measurements. The transistor T1, which serves for this purpose, is so wired that it draws current during reception intervals (flyback of POLYSKOP) causing the diode G1 22 to conduct. With R186 it forms a voltage divider; at the output of the voltage divider (test output Bu3) the constant forward voltage of the diode appears. During frequency tracking of Type USWV a voltage for reference-line display is available which cuts off the transistor. Since the diode G1 22 is also cut off, the unattenuated voltage is available at the output.

3.1.7 Standardizing Oscillator

The standardizing oscillator R616 and regulator valve R615 serve to calibrate the SELEKTOMAT for absolute sensitivity. R616 operates at approximately 80 MHz and is largely insensitive to fluctuations of the operating voltages and temperature. An accurately-known portion of the oscillator voltage is applied to the input of the attenuator and serves for adjustment of the gain and for checking the logarithmic indication from -10 dB to -60 dB.

3.1.8 Stabilized Anode-supply Voltage

All anode and screen-grid voltages are taken from the electronically stabilized power section of conventional design, comprising the valves R617, R618, R619.

3.1.9 Electronic Heater Regulation (see circuit diagram)

All valves of the set (with the exception of R619, R621 and R622) are heated by a stabilized AC voltage of approximately 6.3 V; thus AC supply fluctuations up to +10% have no influence on the valve heating. This stabilized voltage is produced by the heater regulator circuit consisting of valves R620, R621 and R622, and the regulating transformer Tr2.

The heater regulator system functions as follows:

The secondary winding of Tr2 is connected to the filament winding (taps 10 and 11) of the power transformer (Tr3) as series inductance of the heater wires. The internal resistance of the regulating valves R621 and R622 connected in push-pull is stepped down by Tr2 and appears as low-resistance parallel load of this inductance. A change of the heater voltage delivered by Tr3 results in a change of the operating point of R621/R622, which in turn causes their internal resistance to change and thus the impedance and the voltage drop at the secondary winding of Tr2. The regulated heater voltage is rectified by G1 13 and G1 14 and compared with a DC voltage adjustable with R161. The difference voltage is applied to the preamplifier stage R620, the operating point of R621/R622 thus being shifted as required.

If the AC supply frequency is higher than 50 Hz, only 2 to 3 V are available for valve heating after the set has been switched on, because of the higher inductive voltage loss across Tr2. Since valve R620 of the heater regulator circuit is also operated with stabilized heater voltage, and due to the spread between the valves, such a low voltage is always sufficient to initiate the emission of this valve; in such a case, R620 would be cut off and there would be no regulation. To avoid this, a silicon diode (G1 3) is connected between the juncture of the anode of R620 with the cathode of R621/R622 and the stabilized voltage of +85 V. Thus the potential of the cathodes of R621/R622 decreases to +85 V (range of regulation 90 to 140 V), and the resulting shift of the operating point of these valves causes the heater voltage to increase to 3.5 to 4 V immediately after switching on.

3.5 to 4 V are sufficient to initiate the cathode emission. The cathode potential of R621/R622 now decreases to 30 - 70 V; the diode is cut off and has now no influence on the heater regulation.

3.2 Maintenance and Repair

3.2.1 Level Plan

The IF and RF levels of the stages can be taken from the level plan given in Fig. 15, page 58.

3.2.2 Replacement of the Mixer Diodes

The mixer diodes G1 1 and G1 2 are accessible after removal of the base plate and can be withdrawn from their sockets. The replacement diodes must be of the type specified in the parts list. Replacement of the mixer diodes is necessary when the overall sensitivity of the set has decreased considerably although the IF amplifier operates satisfactorily.

3.2.3 Replacement of Valves

When replacing valves, proceed as follows:

3.2.3.1 Oscillator R612

This valve (E 86 C) should have a transconductance greater than 15 mA/V to ensure that the oscillator operates satisfactorily also in the range 330 to 400 MHz.

3.2.3.2 IF Amplifier Valves R61 to R65, R624

Replacement of these valves may require the calibration of the logarithmic indication (see section 3.2.4). Detuning of the IF pass band is not likely to occur.

3.2.3.3 Limiter Valve R66

We recommend that only an American valve (Type 6 BN 6) be used.

3.2.3.4 Valves R67 and R68

Replacement of R67 and R68 may require calibration of the pulse section and of the bias for R613 (see section 3.2.7).

3.2.4 Calibration of the Logarithmic Indication Range

The logarithmic indication depends on the total portion of control voltage used for the cascode input stage R01 and the IF stages R02 to R05 and R024. The required control voltage can be adjusted with potentiometers R16 and R02. After replacement of one of the valves R01 to R05 or R024, recalibration is necessary to obtain the original logarithmic indication. Proceed as follows: feed a signal of 100 μ V and 80 MHz derived from a good signal generator to the SELEKTOMAT. Switch to LIN. INDICATION and fully advance the GAIN control for checking the overall gain of the tuned SELEKTOMAT. The meter should indicate full-scale deflection (+1 dB). The gain can be corrected with trimmer C18 (see section 3.2.5). Turn the GAIN control back until the meter indicates 0 dB. After switching over to LOG. INDICATION calibrate the logarithmic range. Apply a 100- μ V signal (-60 dB) and a 10-mV signal (-20 dB) alternately to the input. Adjust with potentiometer R02 to the scale mark -60 dB and with potentiometer R16 to the scale mark -20 dB. Since these adjustments are interdependent they should be repeated several times.

The series resistor R09 of the panel meter is factory-adjusted to a fixed value and must not be varied in any case.

3.2.5 Pass-band Characteristic

The pass-band filters between the mixer and R01, R01 and R02, R02 and R03, R03 and R04, R04 and R05 are coupled critically, while that between R05 and R024 is coupled somewhat overcritically in order to obtain a flat pass-band characteristic with the single tuned circuit following R024. The transformer circuit L28-C1 between the mixer and R01 practically does not affect the pass-band characteristic. The gain of the IF amplifier is variable with the front-panel control R126 and inside the set with trimmer C18 at the grid of R02; it can be so adjusted that in linear operation with 100 μ V input and the GAIN control fully advanced, the meter reads full-scale deflection (+1 dB). The overall characteristic of the IF amplifier in linear operation is shown in Fig. 16, page 59. It should be flat over at least 250 kHz at both sides of the centre frequency of 10.5 MHz. Should a slight sag occur as a result of a valve replacement, C59 provided in the single tuned circuit following R024 permits a correction to be made.

3.2.6 Control Circuit

The tuning of the control circuit following R66 is of decisive importance for satisfactory tracking. The required pass-band characteristic can be seen from Fig. 16.

3.2.7 Pulse Section - Recalibration after Tracking Failure

For adjustment of the various potentials in the pulse section refer to Fig. 17, page 60. The adjustment can be made without a change in the set, using the test sockets (1) to (7). Use a good oscilloscope with a DC amplifier and an input impedance greater than 1 M Ω .

Connect the SELEKTOMAT to a POLYSKOP as described in section 2.6.2.1. The most important adjustment is that of potentiometer R123 for the operating point of R614. Since the control voltage applied to the control grid of R614 has a relatively strong noise component, the operating point should be so chosen that the noise peaks still lie in the stop band of R614. If R67 or R614 is replaced, adjustment of the potentiometer may become necessary. Set the GAIN control for full gain and switch to logarithmic operation. Turn potentiometer R123 clockwise until a curve as shown in Fig. 17 is obtained at check point (1). Insufficient negative bias of R614 (potentiometer R123 turned too far clockwise) results in noise peaks that extend into the grid sweep of the valve and affect tracking. Too high a negative bias (potentiometer R123 turned too far counterclockwise) causes tracking to fail at low input voltages. The voltage difference between the noise level and the start of tracking should be about 10 V. Potentiometer R118, for the adjustment of negative feedback, need generally not be adjusted after replacement of valves. If readjustment should be necessary, carry it out at great sweep width and adjust the negative feedback so that the curve does not show dips at check point (1). When the potentiometer is turned fully counterclockwise, a high-frequency oscillation is superimposed upon the curve; this oscillation disappears slowly when the potentiometer is turned clockwise. The negative feedback should be increased only until the curve is completely free from high-frequency oscillations. Further increase of the feedback impairs the tracking properties, particularly at great sweep width.

If the operating point of R514 has been adjusted (with R123), a readjustment of potentiometer R75 (operating point of R581) may also become necessary. Misadjustment of this potentiometer causes faulty operation of the relay and of the pilot lamp.

3.2.8 Standardizing Oscillator

Checking and readjustment, if necessary, of the control voltage generated by the standardizing oscillator is made using a good signal generator which delivers an output voltage of exactly 100 mV. In the -60 dB position of the input attenuator vary R129 until the standardizing oscillator voltage gives the same deflection on the amplitude indication meter as the signal generator output voltage.

3.2.9 Power Supply

Potentiometer R161 serves for accurate adjustment of the heater voltage; an rms voltmeter connected to check point 8 must indicate a voltage of 6.6 V_{rms}.

The anode supply voltage can be corrected to the rated value of 180 V, which is measured at the capacitors C116/C117, using R145.

3.2.10 Reference Lines

After replacement of the Zener diode G1 8 or G1 20 - G1 21 the reference-line potential can be corrected with R97. Proceed as follows:

Measure the voltage across the signal output of the untuned SELEKTOMAT, using a valve voltmeter. This voltage lies between 0 and -1.5 V, depending on the setting of the GAIN control R126. Feed the SELEKTOMAT from a signal generator and tune in the usual way. Adjust the signal-generator output so that the meter of the SELEKTOMAT indicates 0 dB. The voltage at the signal output is then about -5.5 V. Determine and record the difference of the voltages measured with and without signal. Measure the voltage across the

reference-line output with the reference-line potentiometer in its 0-dB position. Adjust R97 so that with and without signal applied to the input of the SELEKTOMAT the same voltage difference is obtained as at the signal output. This measurement is necessary because both output voltages have DC components which are not displayed on the screen in swept-frequency measurements.

Translations for Drawings and Diagrams

Abgleich	Adjustment
Abstimmung	Tuning
Amplitudenanzeige	Amplitude indication
Anzeige) Anzeigebereich)	Indication
Arbeitspunkt	Operating point
Aus	Off
Aussetzen des Frequenzmitlaufes	Failure to track
automatisch	Automatic
autom. Empfindlichkeitsregelung	Automatic gain control
Bandfilter	Band-pass filter
Bedienungsorgane an der Front- platte	Front-panel controls
Begrenzer	Limiter
Bei beiden Messungen (Pkt.2 u. Pkt.3) müssen Toleranzen er- füllt sein	In measurements 2 and 3 these tolerances must be observed
Bei Betrieb mit Polyskop stetig verschiebbar, Einstellung in dB geeicht	In operation with the POLYSKOP continuously adjustable, calibrated in dB
Betriebsart) Betriebszustand)	Type of operation
Betriebsart für Abstimmung wahlweise automat. oder von Hand	Automatic or manual tuning selectable
bezogen mit LJS	Covered with LJS
bzw.	Or
bis	To
Blockschaltbild	Block diagram
Bild	Figure

Translations for Drawings and Diagrams (contd.)

Die Eintragung der elektrischen Werte von Bauelementen ist unverbindlich. Genaue Werte siehe Schalteilliste.

No responsibility can be accepted for possible errors in this drawing as regards the electrical values of circuit components. These values are given accurately in the parts list.

dunkel

Off

Durchlaßkurven des ZF-Verstärkers und des Steuerkreises

Pass-band characteristics of the IF amplifier and the control circuit

Eichen

Calibrate

Eichgenerator

Standardizing oscillator

Eichoszillator bei 80 MHz einschaltbar, Amplitudenkonstanz $\pm 2\%$

Standardizing oscillator; can be switch-selected at 80 MHz; stability of amplitude $\pm 2\%$

Eichspannung

Calibration voltage

Eichteiler

Attenuator

Ein

On

Eingang

Signal input

Eingangsteiler

Input attenuator

Einspeisung

Feeding

Einstellung bei autom. Betrieb und Wobbelmessung auf Frequenzmitlauf über Gesamtschirmbreite

In automatic operation and swept-frequency measurement adjustment of tracking over full screen width

Elektromagnet

Electromagnet

Empf.-Frequenz
(Beispiel)

Reception frequency
(example)

f. Messungen mit Polyskop, stetig verschiebbar, Einstellung in dB geeicht

For measurements with the POLYSKOP, continuously adjustable, calibrated in dB

fein

Fine

Frequenz

Frequency

Frequenzablauf

Sweep direction

Frequenzanstieg

Frequency rise

Frequenzanzeige

Frequency indication

Translations for Drawings and Diagrams (contd.)

Frequenzbereich	Frequency range
Frequenzgangsmessung mit dem Polyskop	Frequency-response measurement with the POLYSKOP
Frequenzmitlauf	Tracking
Frequenzmitlaufautomatik	Automatic tracking circuit
Frequenzmitlauf ein	Tracking on
gedrückt	Depressed
Gegenkopplung	Negative feedback
Genauigkeit	Accuracy
Genauigkeit $\pm 2\%$ der angezeigten Frequenz	Accuracy $\pm 2\%$ of indicated frequency
Gerätestahlkasten	Steel cabinet
geregelte Anodenspannung	Stabilized anode-supply voltage
grob	Coarse
Grundverst.) Grundverstärkung)	Gain
Gruppe	Assembly
hell	On
HF-Ausgangsspannung des Polyskop	RF output voltage of POLYSKOP
HF-Spannung am Eingang	RF input voltage
HF- und ZF-Pegelschema bei Verstärkung "lin."	RF and IF levels in linear operation
Heizregelung	Heater regulator circuit
Heizspannung	Heater voltage
Hochpaß	High-pass filter
in Stufen zu 10 dB	10-dB steps
Genauigkeit $\pm 0,2$ dB je Stufe	Accuracy ± 0.2 dB per step
Instr.) Instrument)	Meter

Translations for Drawings and Diagrams (contd.)

> 100 MHz, jedoch nur im jeweiligen Teilbereich, abschaltbar, max. Mitlaufgeschwindigkeit > 10 MHz/ms, Mitlauf von tiefen nach hohen Frequenzen	> 100 MHz, but only in selected subrange; can be switched off; max. tracking speed > 10 MHz/msec; tracking from low to high frequencies
Kontr. Nr. Kontrollampe	Contact No. Pilot lamp
Magn. Strom	Magnetic current
Meßobjekt	Test item
Meßpunkt	Check point
Meßsender	Signal generator
Meßsender über 100 pF an Sockelpunkte 1 und 9 der Röl2 anschließen	Connect signal generator via 100 pF to contacts 1 and 9 of base of Röl2
Messung	Measurement
Messung des Reflexionsfaktors in Abhängigkeit von der Frequenz	Measuring reflection coefficient as a function of frequency
Messung vom Dämpfungspol f_2 bis zum Bereichende f_3	Measurement from attenuation peak f_2 to range limit f_3
Messung von unterster Frequenz f_1 bis zum Dämpfungspol f_2	Measurement from lowest frequency f_1 to attenuation peak f_2
Meßverfahren bei extremen Dämpfungspolen im Meßbereich	Measuring method with extreme attenuation peaks present in the measurement range
Meßwert) Meßwertausgang)	Signal output
Mischstufe	Mixer
Mitlaufeinsatz	Start of tracking
Mitlaufsteuerspg.	Control voltage for tracking
ms	msec
Netz	AC supply
Netzschalter	Power switch
nicht gedrückt	Not depressed
Oszillatorspannung	Oscillator voltage

Translations for Drawings and Diagrams (contd.)

Pegellinie	Ref. line
Pegellinienverschiebung	Reference-line adjustment
Punktweise Messung eines Vierpols	Point-by-point measurement on a four-terminal network
Rauschen	Noise
regelbar	Adjustable
Regelbereich	Range of stabilization
Relais	Relay
Rö12 entfernt	Rö12 withdrawn
Sägezahn	Sawtooth
Schalter von oben gesehen	Switch seen from above
sehr flach abgebogen	Very flat bend
siehe	See
Signal: Nicht abgestimmt	NOT TUNED
Sockel von unten gesehen	Base seen from below
Spannung am Meßpunkt 1 bei Normalpegel	Voltage at check point 1 at normal level
Spannung am Meßpunkt 1 mit um 20 dB herabgesetzter Meßspannung	Voltage at check point 1 with signal voltage reduced by 20 dB
Spannung an Relais-Kontakt 7	Voltage at relay contact 7
Spannung sinkt unter 10 μ V	Voltage drops below 10 μ V
Spannungsverlauf am Ausgang des ZF-Verstärkers	Voltage curve at the output of the IF amplifier
Spannungsverlauf am Meßpunkt	Voltage curve at check point
Spannungswerte	Voltage values
Spulenenden mit Silikonschlauch ... überzogen	Coil ends covered with silicon tubing ...
statische Messung	Point-by-point measurement
Steuerkreis	Control circuit
Steuerkreis (am Meßpunkt 1 mit Röhrenvoltmeter gemessen)	Control circuit (measured at check point 1 with a valve voltmeter)

Translations for Drawings and Diagrams (contd.)

Steuerröhre	Control valve
Steuersp. für Frequenzmitlauf	Control voltage for tracking
Strom durch Magnetspule	Current through magnet coil
Suchen	Scanning
Suchautomatik	Automatic scanning circuit
Such-Sägezahn	Scanning sawtooth
Taststufe	Blanking
Technische Daten	Technical features
7 Teilbereiche	7 subranges
Teiler	Attenuator
Toleranzangaben	Tolerances
Umschalter Vorlauf-Rücklauf	Incid.-Refl. switch
Verminderung der Grundverstärkung um 20 dB bei Polyskopbetrieb und lin. Anzeige	20-dB gain reduction in POLYSKOP operation and with linear indica- tion
... vom angezeigten Wert	... of indicated value
von Hand	Manual
Vorwiderstand	Series resistor
wahlweise Anzeige des Meßwertes am Instrument oder an einem Polyskop	Indication of measured value on panel meter or on POLYSKOP, switch-selected
wahlweise log. oder lin.	Log. or lin., switch-selected
Werte in () für 60 Ω -Ausführ.	Values in () for 60- Ω model
Wirkungsweise bei Wobbelmessung	Swept-frequency measurement
$z = 50 \Omega$ bzw. 60Ω max. Eingangsspannung $3 V_{\text{eff}}$	$Z = 50 \Omega$ or 60Ω max. input voltage $3 V_{\text{rms}}$
z. Polyskop	To POLYSKOP
Zeit	Time
Zeimaßstab	Time scale

Translations for Drawings and Diagrams (contd.)

ZF-Durchlaß (am Meßwertausgang mit
Voltmeter gemessen)

IF pass-band (measured at signal
output with a voltmeter)

ZF-Verstärker

IF amplifier

Translations for Parts List

Achs-L	Length of shaft
Anschlußkabel	Power cord
Ausf.	Model
bearb. nach	According to
Begrenzer Pentode	Pentode, limiting
bei 220 V zusätzl. 1 Stck. Res.	At 220 V, 1 additional spare fuse
Bemerkungen	Remarks
Benennung	Designation
Bereichschalter	Switch, range
Buchsenleiste, 16-pol.	Connector, 16-pole, female
Df-Kondensator	Capacitor, feed-through
Doppel-Triode	Triode, twin
Draht-Drehwiderstand	Resistor, wire-wound, variable
Drahtwiderstand	Resistor, wire-wound
Drehspul-Strommesser	Meter, moving-coil
Drossel	Choke
Drucktaste	Push button
(eingeschweißt in Polyäthylen- beutel)	Sealed in polyethylene bag)
Elko	Capacitor, electrolytic
End-Pentode	Pentode, output
enth. in) enthalten in)	Included in
Ge-Diode	Diode, germanium
Gerätestecker	Receptacle
Gr.	Assembly
HF-Kabel	Cable, RF
hierzu Stückliste	See parts list

hierzu bes. Stückliste	See separate parts list
Hochpaßspule	Coil, high-pass filter
Je nach Auftrag	Depending on order
Kf-Kondensator	Capacitor, synth. foil
Kennzeichen	Ref. No.
Keramik-Kondensator	Capacitor, ceramic
Kleinstufenschalter	Switch, rotary, midget
Koppel-Kondensator	Capacitor, coupling
Ks-Kondensator	Capacitor, lacquer-type
Leistungs-Doppel-Triode	Triode, twin, power
Leistungspentode	Pentode, power
Lüfter	Blower
Lufttrimmer	Trimmer, air
Magnetisierungssp.	Coil, magnet
MP-Kondensator	Capacitor, MP
Netzschalterkombinat.	Power switch assembly
Netztrafo	Transformer, power
Oszillatorspule	Coil, oscillator
Papierkondensator	Capacitor, paper
Pentode	Pentode
Regeltrafo	Transformer, regulating
Relais	Relay
Sach-Nr.	Stock No.
Schalteraggregat	Switch assembly
Schicht-Drehwiderstand	Resistor, depos. carbon, variable
Schichtwiderstand	Resistor, depos. carbon
Schmelzeinsatz	Fuse
Si-Diode	Diode, silicon
Si-Gleichrichter	Rectifier, silicon

Siehe	See
Skala nach	Scale according to
Spannungswähler	Tapping panel
Sperrschwingertrafo	Transformer, oscillator, blocking
Stabilisator	Reference tube
13er-Stecker	Plug, 13 mm
Steckerleiste, 16-pol.	Connector, 16-pole, male
Stückzahl	Quantity
Teilerschalter	Switch, attenuator
Telefonbuchse	Telephone jack
Trimmwert	Factory-adjusted
Triode	Triode
Triode-Pentode	Triode-pentode
U' Gr.	Subassembly
Umrüst-Präzisions-Dezifix B	Dezifix B, precision, adaptable
Varistor	Varistor
Verbindungskabel	Patch cord
Zener Diode	Diode, Zener
ZF-Spule	Coil, IF
zweiter Kondensator verwendet für C115	Second capacitor referred to as C115
Zwerg-Glimmlampe	Lamp, glow, miniature

Genauigkeit $\pm 2\%$ der angezeigten Frequenz

in Stufen zu 10 dB
Genauigkeit $\pm 0,2$ dB je Stufe

Betriebsart für Abstimmung
wahlweise automat. oder von Hand

$Z = 50 \Omega$ bzw. 60Ω
max. Eingangsspannung $3V_{eff}$

7 Teilbereiche
30...400 MHz
30...60/50...100/75...150/
110...200/170...270/250...330/
330...400 MHz

>100 MHz, jedoch nur im jeweiligen Teilbereich, abschaltbar
max. Mitlaufgeschwindigkeit
>10 MHz/ms, Mitlauf von tiefen nach hohen Frequenzen

wahlweise log oder lin.
log. 0...-80 dB = 100 mV...10 μ V
lin. 0...-20 dB = 100 μ V...10 μ V
Genauigkeit
log. ± 1 dB vom angezeigten Wert

lin. $\pm 0,1$ dB bis -10 dB
 $\pm 0,3$ dB bis -20 dB
vom angezeigten Wert

Frequenzanzeige

Eingangsteiler 0-60 dB

automat.

von Hand

Abstimmung

grob

fein

Eingang

Frequenzbereich

Frequenzmitlauf

log

Anzeige

lin

Signal: Nicht abgestimmt

Amplitudenanzeige

Pegellinierverschiebung f. Messungen mit Polyskop, stetig verschiebbar, Einstellung in dB geeicht

Eichen

bei Betrieb mit Polyskop zur Einstellung gleicher Verstärkung beider Anzeigeverst.

Kontrolllampe

Messwert

Pegellinie z. Polyskop

Netzschalter

Polyskop

wahlweise Anzeige des Meßwertes am Instrument oder an einem Polyskop

Anzeige

Instrument

Einstellung bei autom. Betrieb und Wobbelmessung auf Frequenzmitlauf über Gesamtschirmbreite

Mitlaufeinsatz

Grundverstärkung

regelbar

Anzeigebereich „lin.“ 3 dB

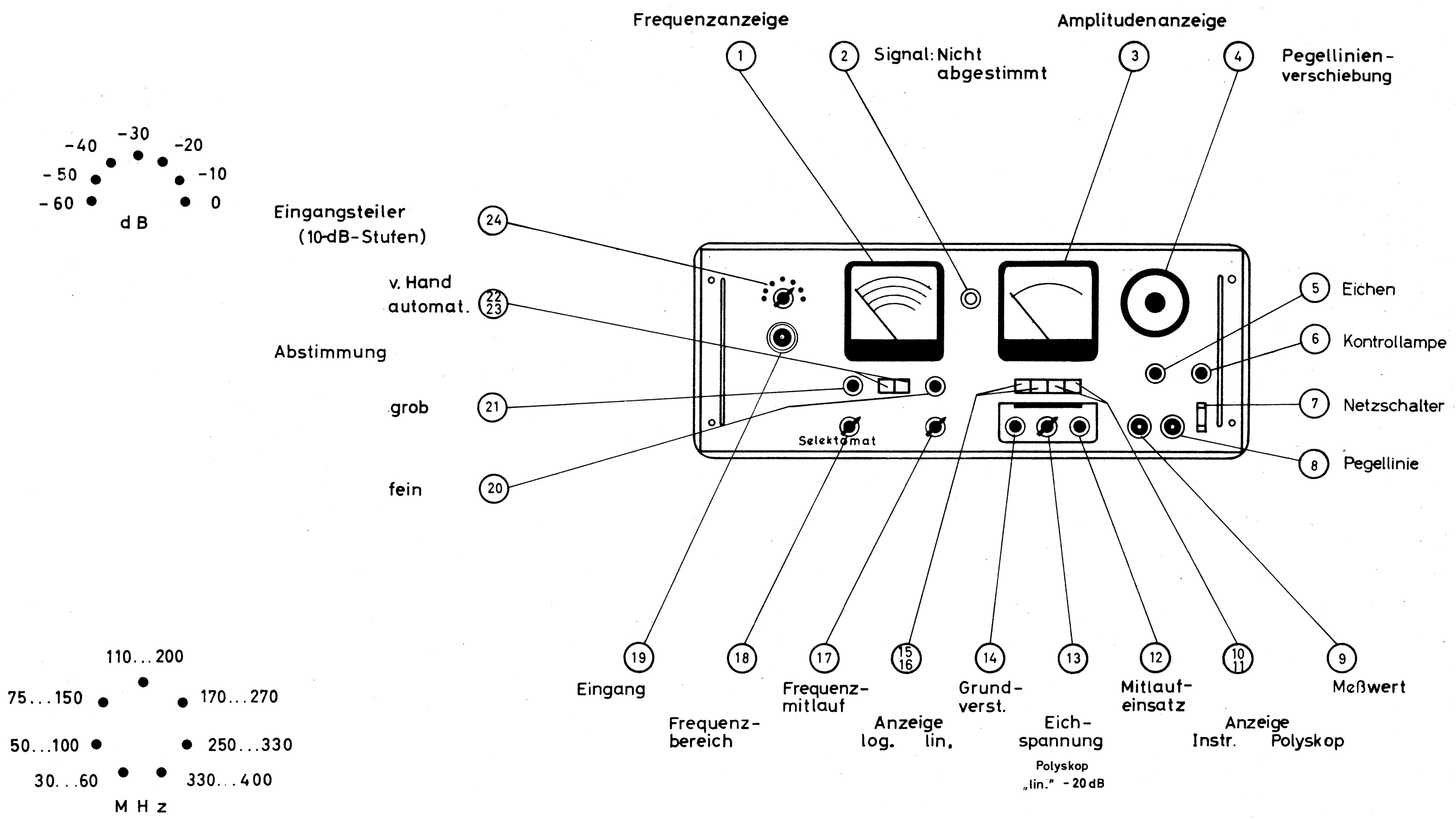
Anzeigebereich „log.“ 2 dB

Eichspannung

Polyskop „lin.“ -20 dB

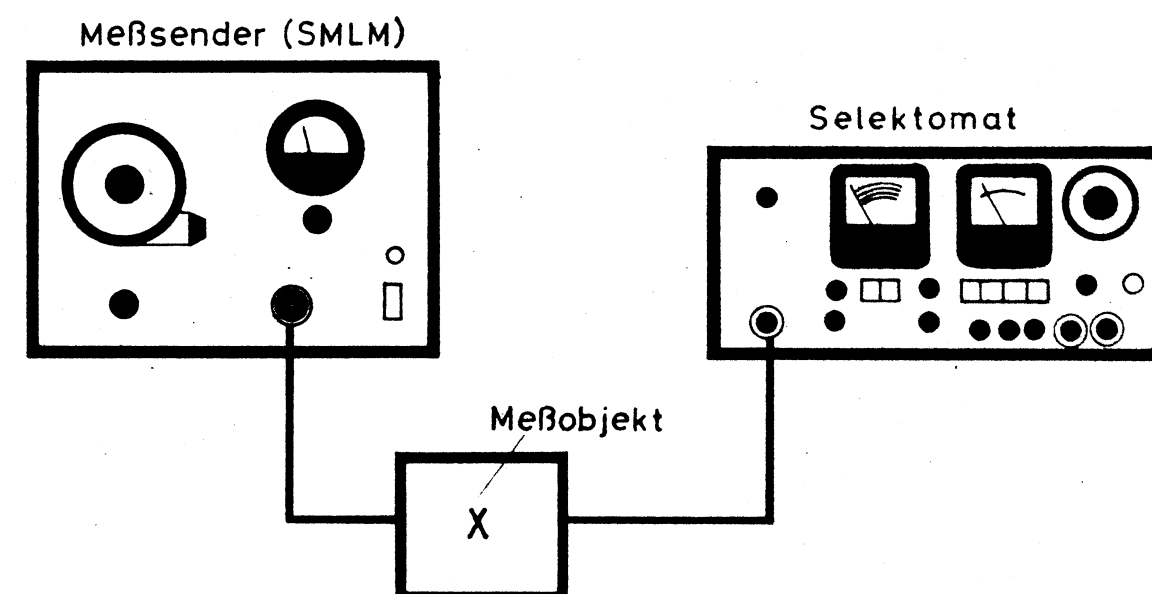
Eichoszillator bei 80 MHz einschaltbar Amplitudenkonstanz $\pm 2\%$

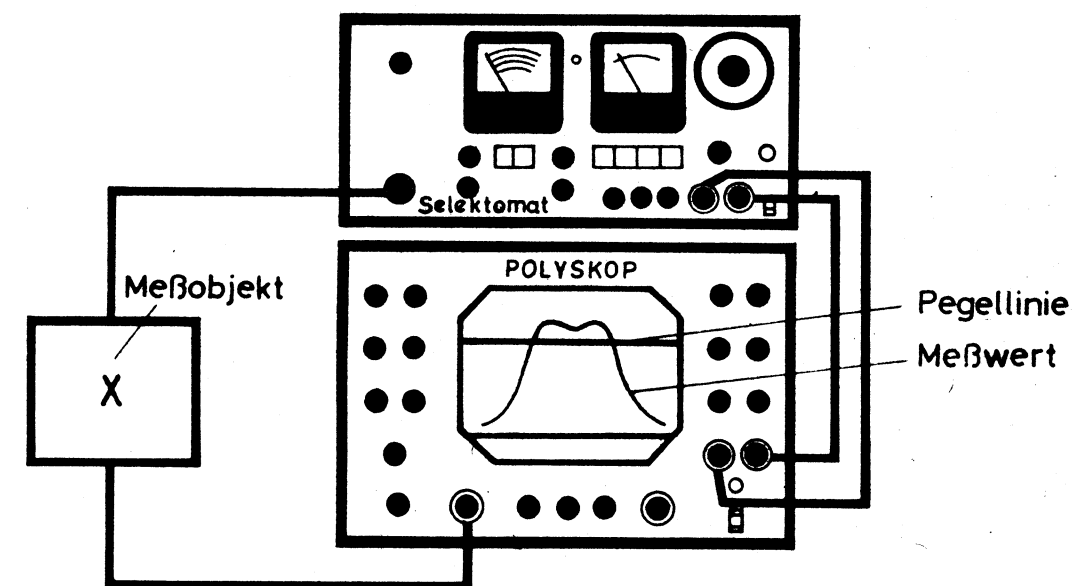
Verminderung der Grundverstärkung um 20 dB bei Polyskopbetrieb und lin. Anzeige

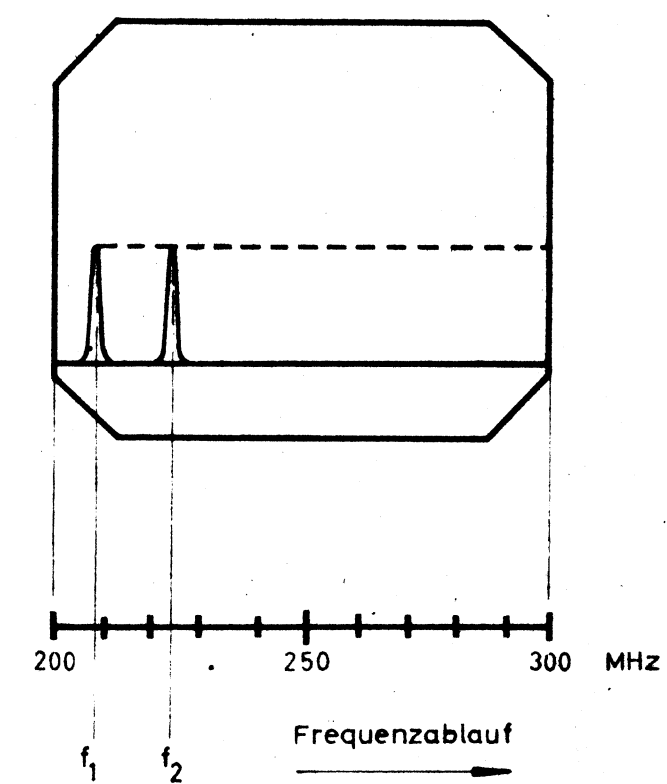


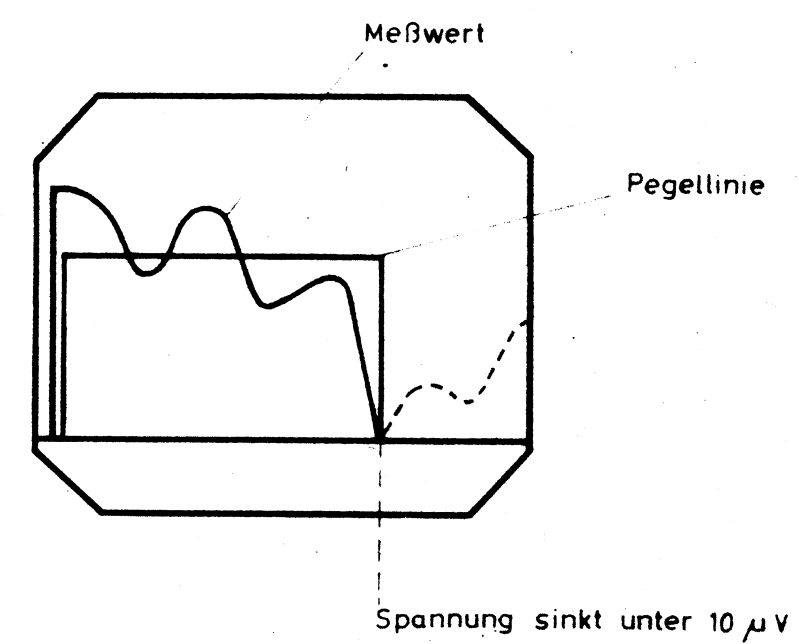
Bedienungsorgane an der Frontplatte

Bild 2.

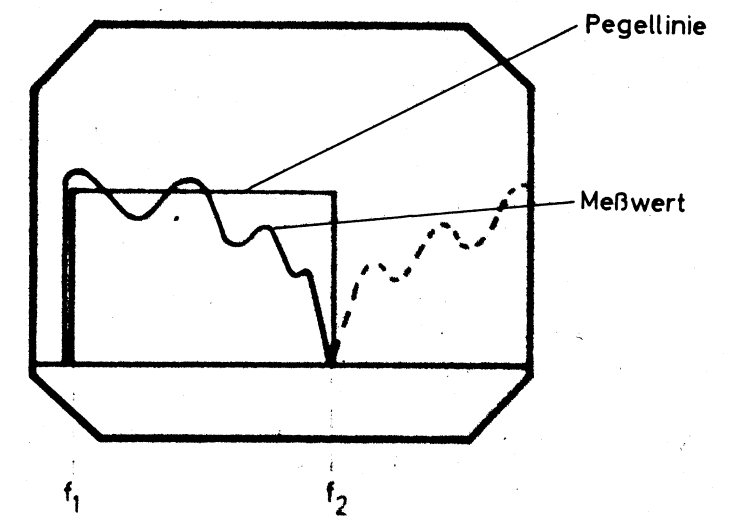




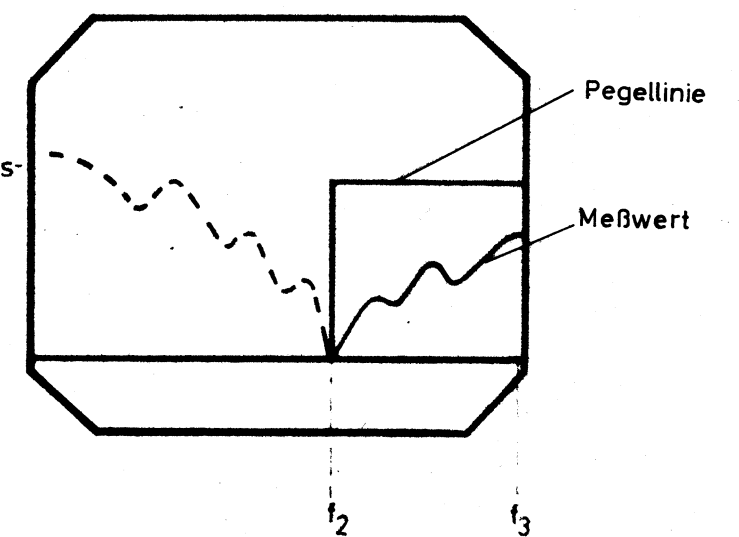


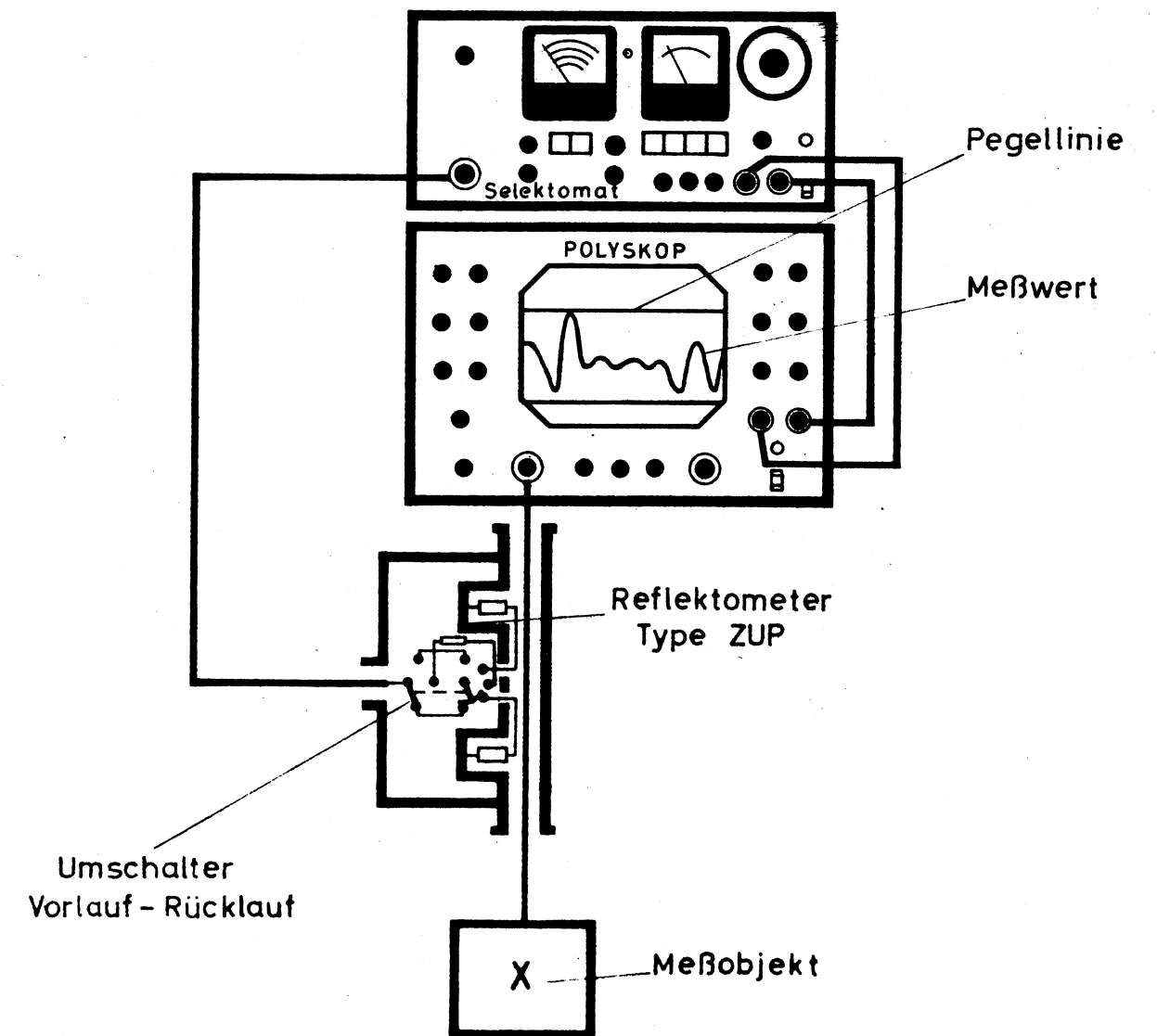


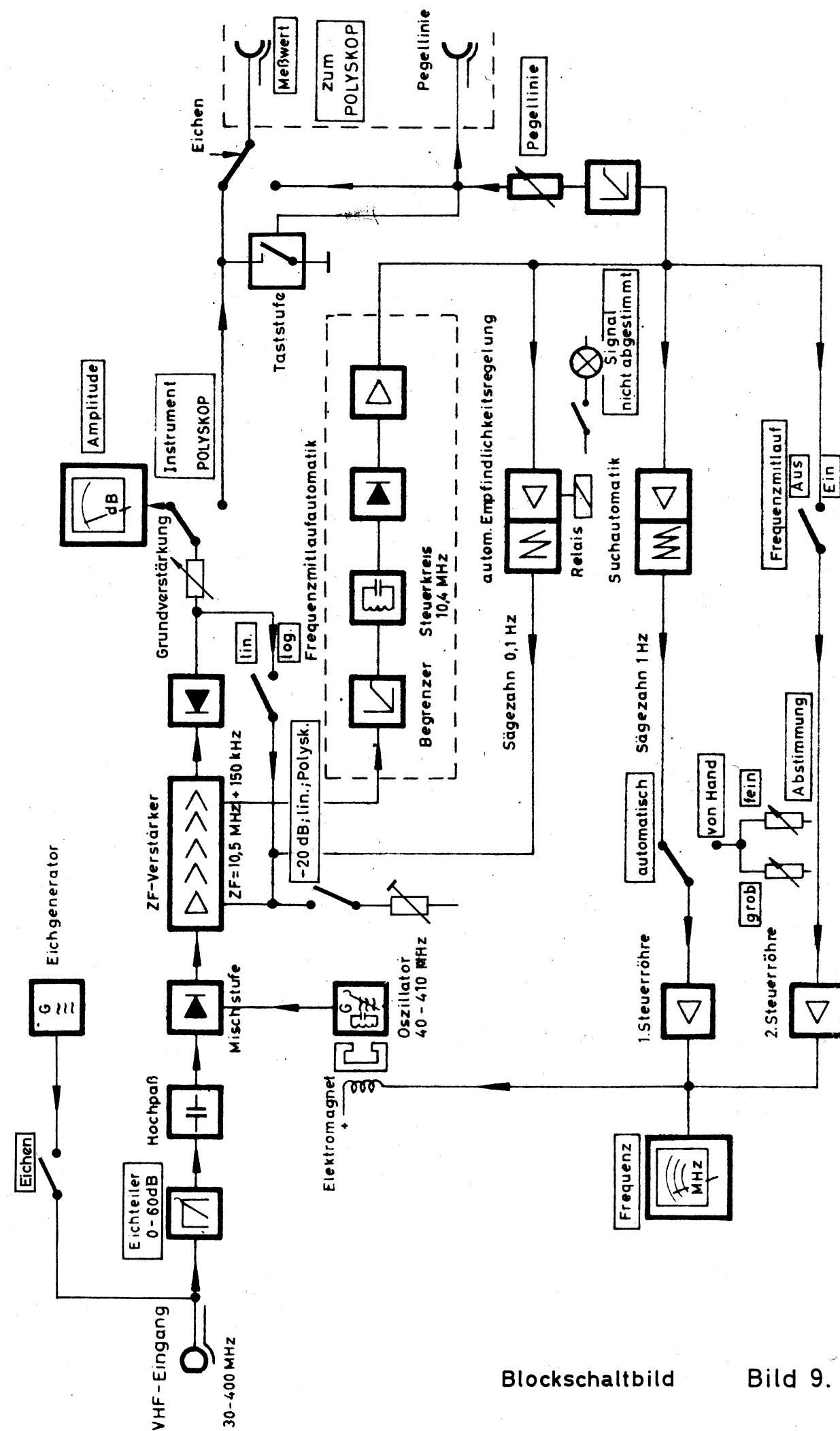
- 1) Messung von unterster Frequenz f_1 bis zum Dämpfungspol f_2



- 2) Messung vom Dämpfungspol f_2 bis zum Bereichende f_3







Blockschaltbild

Bild 9.

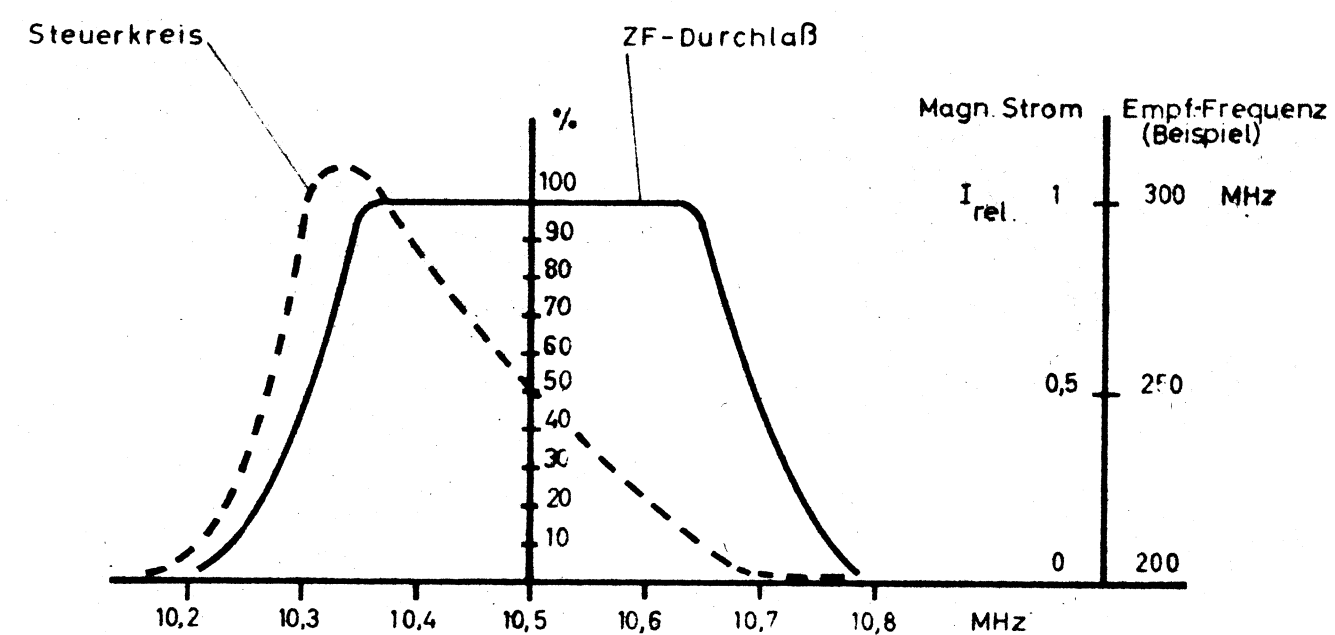


Bild 10. Durchlaßkurven des ZF-Verstärkers und des Steuerkreises

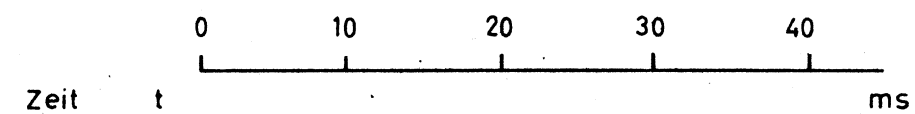


Bild 11. HF-Ausgangsspannung
des POLYSKOP



Bild 12. Spannungsverlauf am Ausgang
des ZF-Verstärkers

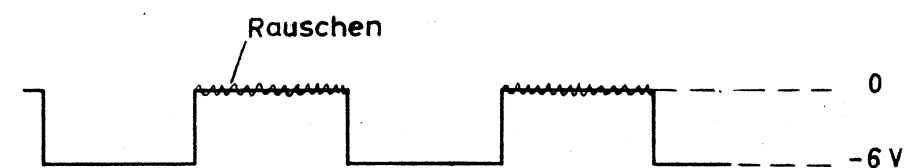


Bild 13. Spannungsverlauf am
Meßpunkt ①

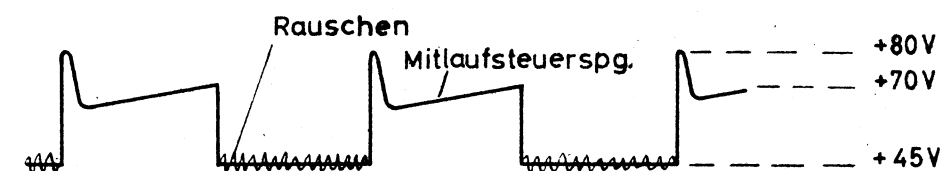


Bild 14. Strom durch Magnetspule

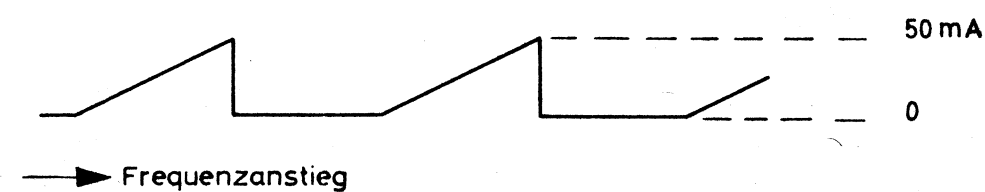
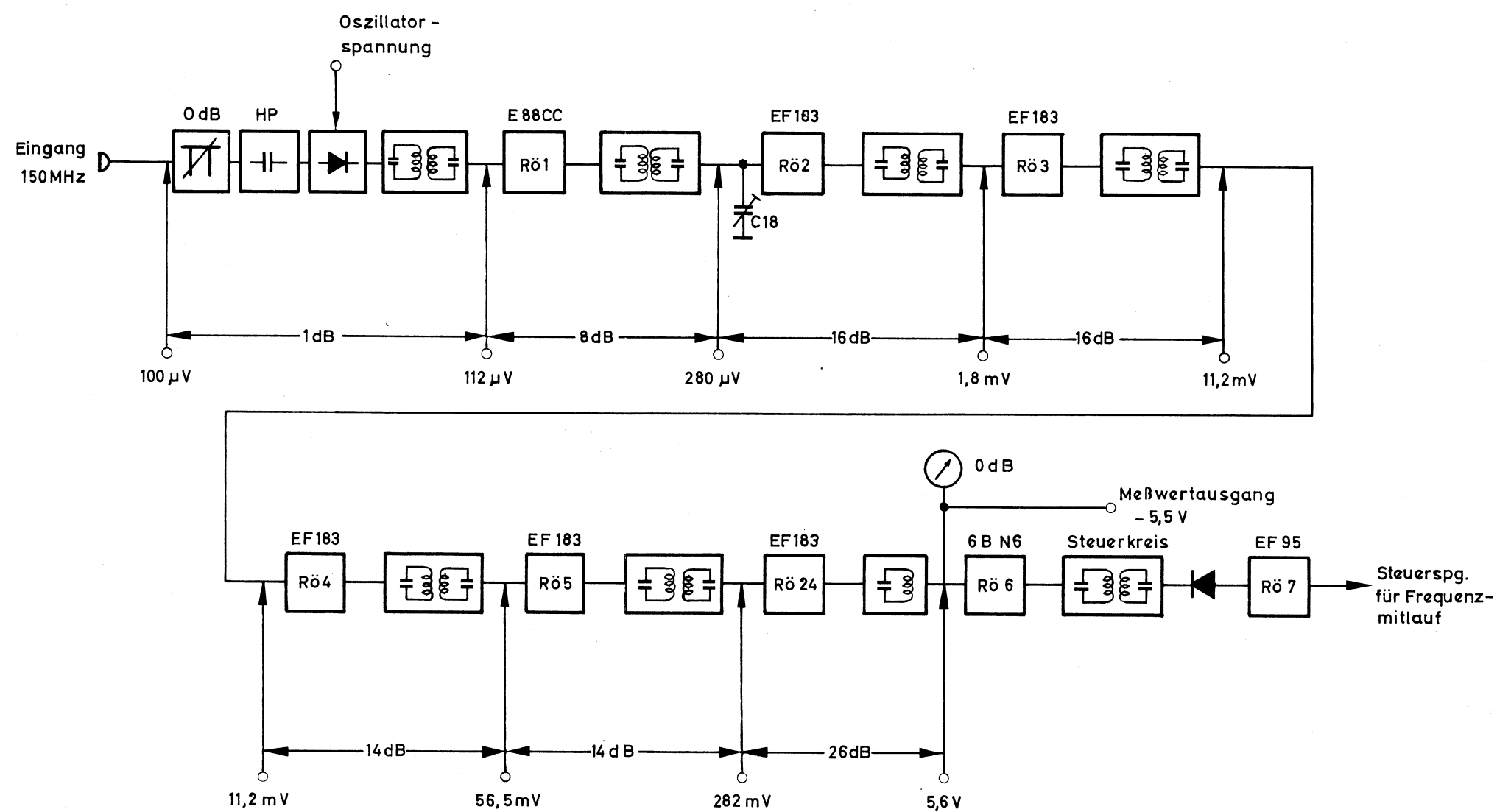
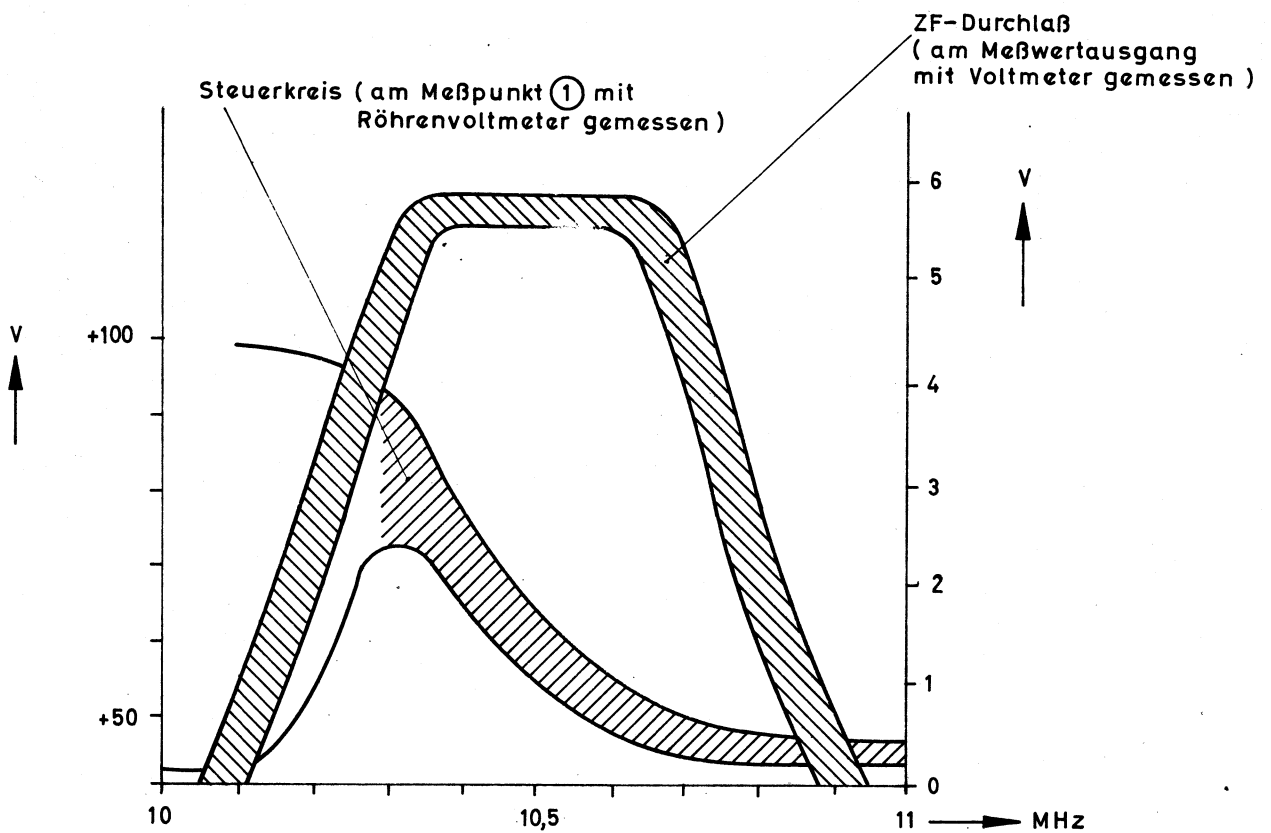


Bild 11
bis
Bild 14.





Betriebsart: „lin.“, „v. Hand“, „Instrument“,
„Frequenzmitlauf ein“, „Eingangsteiler -60 dB“

Einspeisung: RÖ12 entfernt. Meßsender über 100 pF an Sockel-
punkte 1 und 9 der RÖ12 anschließen.
(Frequenz 10...11 MHz)

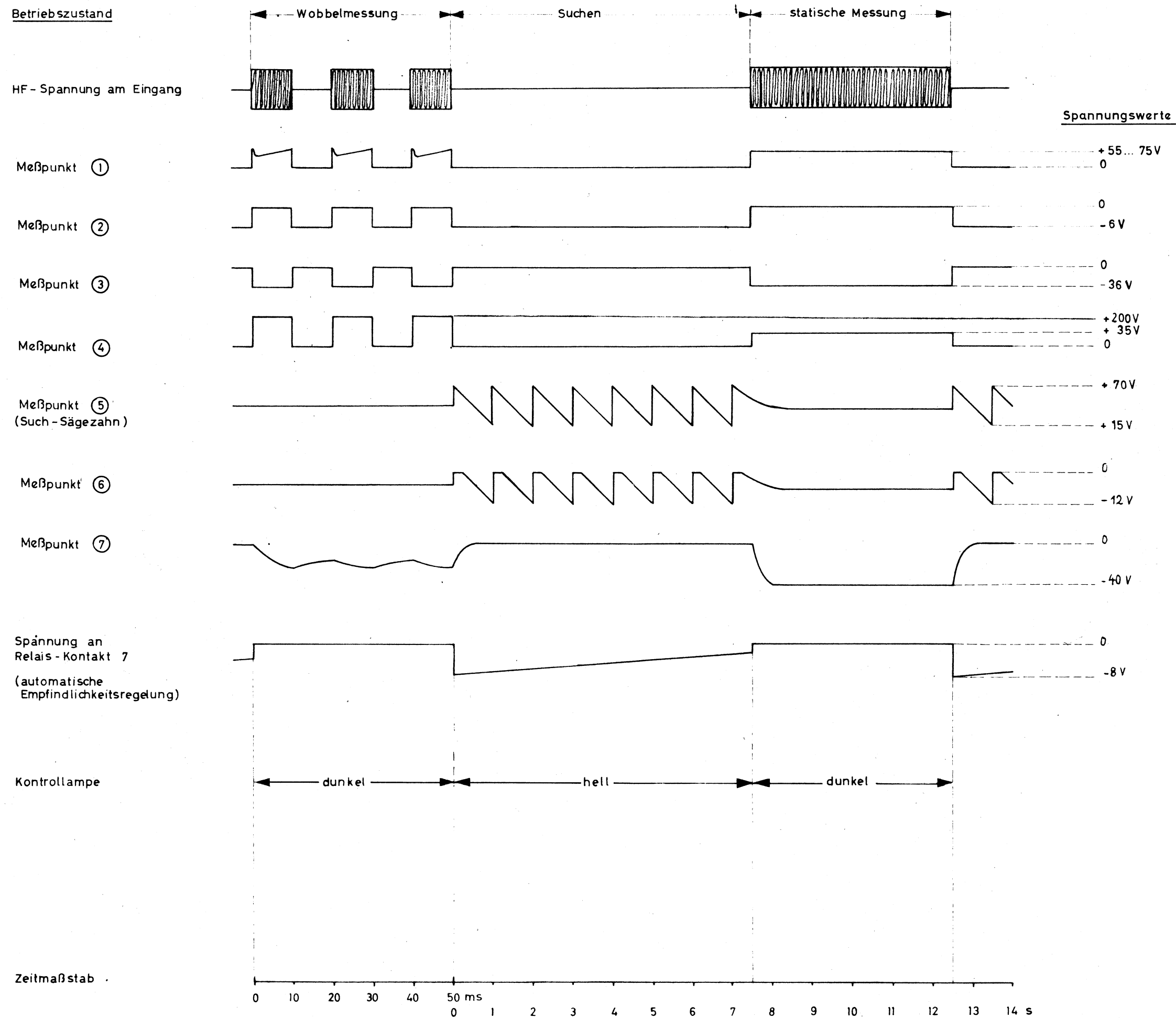
Messung:

1. ZF-Durchlaß
2. Spannung am Meßpunkt ① bei Normalpegel
3. Spannung am Meßpunkt ① mit um 20 dB herab-
gesetzter Meßspannung.

Bei beiden Messungen (Pkt.2 und Pkt.3) müs-
sen Toleranzen erfüllt sein.

ZF-Durchlaß und Steuerkreis (Toleranzangaben)


Bild 16.



Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
Bu 1		Umrüst-Präzisions- Dezifix B			enthalten in 15221 - 68/50 15221 - 68/60
Bu 2		Umrüstbuchse	FMU 90100		
Bu 3		Umrüstbuchse	FMU 90100		
Bu 4		Telefonbuchse			enth. in 15221/2
Bu 5		Buchsenleiste, 16-pol.			enth. in KB 55-3
C 1		Keramik-Kondensator	CCH 68/68		
C 2		Keramik-Kondensator	CCG 11/2		
C 3		Keramik-Kondensator	CCH 68/15		
C 4		Keramik-Kondensator	CCG 11/3		
C 5		Koppel-Kondensator			enthalten in 15221 - 68/50 15221 - 68/60
C 6		Keramik-Kondensator	CCG 94/2200		
C 7		Df-Kondensator	CFR 1/500/500		
C 8		Keramik-Kondensator	CCG 94/2200		
C 9		Keramik-Kondensator	CCG 94/2200		
C10		Df-Kondensator	CFR 1/5000/500		
C11		Lufttrimmer	CV 61509		
C12		Keramik-Kondensator	CCH 31/27		
C13		Keramik-Kondensator	CCH 31/27		
C14		Lufttrimmer	CV 61509		
C15		Keramik-Kondensator	CCG 11/1,5		
C16		Keramik-Kondensator	CCG 94/470		
C17		Df-Kondensator	CFR 1/500/500		
C18		Lufttrimmer	CV 8025		
C19		Keramik-Kondensator	CCG 94/2200		

rviofält.-Pause Nr.

Arbeitspause Nr.


 ROHDE & SCHWARZ MÜNCHEN		Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus 20 Blatt Blatt Nr. 1
		b	10093	30.9.64	Schu		
		e	10911	11.65	Schu		
		f	11103	2.66	Wsh		
EKE	Tag	Name	Ersatz für Zeichnung				ersetzt durch
geschrieben	20.1.64	Wü					
bearbeitet		Schu					
geprüft	20.1.66	W					
normgeprüft							

Selektomat Type USWV

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und Schadensersatzpflichtig.

Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
C20		Df-Kondensator	CFR 1/5000/500		
C21		Keramik-Kondensator	CCH 68/100 CCH 68/120		60 Ω-Ausf. 50 Ω-Ausf.
C22		Keramik-Kondensator	CCH 68/68 CCH 68/82		60 Ω-Ausf. 50 Ω-Ausf.
C23		Keramik-Kondensator	CCH 68/68 CCH 68/82		60 Ω-Ausf. 50 Ω-Ausf.
C24		Keramik-Kondensator	CCH 68/100 CCH 68/120		60 Ω-Ausf. 50 Ω-Ausf.
C25		Keramik-Kondensator	CCG 94/2200		
C26		Lufttrimmer	CV 61509		
C27		Keramik-Kondensator	CCH 31/27		
C28		Keramik-Kondensator	CCH 31/27		
C29		Lufttrimmer	CV 61509		
C30		Df-Kondensator	CFR 1/500/500		
C31		Keramik-Kondensator	CCG 94/470		
C32		Keramik-Kondensator	CCG 94/2200		
C33		Df-Kondensator	CFR 1/5000/500		
C34		Keramik-Kondensator	CCG 94/2200		
C35		Lufttrimmer	CV 61509		
C36		Keramik-Kondensator	CCH 31/27		
C37		Keramik-Kondensator	CCH 31/27		
C38		Lufttrimmer	CV 61509		
C39		Keramik-Kondensator	CCH 11/10		
C40		Keramik-Kondensator	CCG 94/470		
C41		Lufttrimmer	CV 8025		
C42		Keramik-Kondensator	CCH 68/39		
C43		Keramik-Kondensator	CCH 68/39		
C44		Lufttrimmer	CV 8025		
C45		Df-Kondensator	CFR 1/500/500		
C46		Keramik-Kondensator	CCH 11/10		

Vervielfältig.-Pause Nr.

		Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name
ROHDE & SCHWARZ MÜNCHEN		b	10093	30.9.64	Schu
EKE	Tag	Name			
geschrieben	20.1.64	Wü			
bearbeitet		Schu			
geprüft		Eg			
normgeprüft					


Arbeitspause Nr.

Liste Nr.	Liste besteht aus Blatt
15221/2 Sa	2
Ersatz für Zeichnung	
ersetzt durch	
Schaltteilliste zu	
Selektomat Type USWV	

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und Schadensersatzpflichtig.

Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
C47		Keramik-Kondensator	CCG 94/2200		
C48		Df-Kondensator	CFR 1/5000/500		
C49		Keramik-Kondensator	CCG 94/2200		
C50		Lufttrimmer	CV 61509		
C51		Keramik-Kondensator	CCH 31/27		
C52		Keramik-Kondensator	CCH 31/27		
C53		Lufttrimmer	CV 61509		
C54		Df-Kondensator	CFR 1/500/500		
C55		Keramik-Kondensator	CCG 94/470		
C56		Keramik-Kondensator	CCG 94/2200		
C57		Df-Kondensator	CFR 1/5000/500		
C58		Keramik-Kondensator	CCG 94/2200		
C59		Lufttrimmer	CV 61509		
C60		Keramik-Kondensator	CCH 31/12		Trimmwert
C61		Keramik-Kondensator	CCG 68/6		
C62		Keramik-Kondensator	CCG 94/2200		
C63		Keramik-Kondensator	CCG 94/2200		
C64		Keramik-Kondensator	CCG 68/10		
C65		Lufttrimmer	CV 61509		
C66		Keramik-Kondensator	CCH 68/100		
C67		Df-Kondensator	CFR 1/500/500		
C68		Df-Kondensator	CFR 1/5000/500		
C69		Keramik-Kondensator	CCG 94/2200		
C70		Keramik-Kondensator	CCG 94/2200		
C71		Df-Kondensator	CFR 1/500/500		
C72		Keramik-Kondensator	CCG 94/470		
C73		Keramik-Kondensator	CCG 68/6		

Vervielfält.-Pause Nr.

 ROHDE & SCHWARZ MÜNCHEN			Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus Blatt	
			b	10093	30.9.64	Schu		Blatt Nr. 3	
EKE	Tag	Name	Ersatz für Zeichnung ersetzt durch Selektomat Type USWV						
geschrieben	20.1.64	Wü							
bearbeitet		Schu							
geprüft		El							
normgeprüft									


Arbeitspause Nr.

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
C75		Df-Kondensator	CFR 1/5000/500		
C76		Keramik-Kondensator	CCG 94/2200		
C77		Lufttrimmer	CV 61509		
C78		Keramik-Kondensator	CCH 31/33		
C79		Keramik-Kondensator	CCH 31/33		
C80		Lufttrimmer	CV 61509		
C81		Keramik-Kondensator	CCH 68/150		
C82		Df-Kondensator	CFR 1/5000/500		
C83		Papier-Kondensator	CPK 58003 n 22		
C84		Ks-Kondensator	CKL 50343 u 0,22		
C85		Papier-Kondensator	CPK 66003 n 4,7		
C86		Elko	CED 21/100/35		
C87		Elko	CED 21/100/35		
C88		Keramik-Kondensator	CCG 94/2200		
C89		Papier-Kondensator	CPK 66003 n 47		
C90		Keramik-Kondensator	CCG 41/8		
C91		Df-Kondensator	CFR 1/5000/500		
C92		Ks-Kondensator	CKL 50443 u 0,47		
C93		Elko	CEG 21/32+32/350		32 µF; zweiter Kondensator ver- wendet für C115
C94		Keramik-Kondensator	CCH 68/220		
C95		Keramik-Kondensator	CCH 68/56		
C96		Keramik-Kondensator	CCH 68/270		
C98		Keramik-Kondensator	CCG 11/3		Trimmwert
C99		Keramik-Kondensator	CCH 68/68		Trimmwert
C100		Df-Kondensator	CFR 1/5000/500		

Vervielfält.-Pause Nr.

Arbeitspause Nr.



 ROHDE & SCHWARZ MÜNCHEN		Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus Blatt Blatt Nr. 4
		b	10093	30.9.64	Schu		
EKE	Tag	Name	c	10415	15.2.65	Schu	
geschrieben	20.1.64	Wü	e	10911	11.65	Schu	
bearbeitet		Schu					
geprüft		El					
normgeprüft							
Ersatz für Zeichnung						ersetzt durch	
DSM/DEK/Schaltteilliste zu							
Selektomat Type USWV							

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

MA KZ Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
C101		Keramik-Kondensator	CCG 94/330		
C102		Df-Kondensator	CFR 1/5000/500		
C103		Keramik-Kondensator	CCG 68/10		
C104		Keramik-Kondensator	CCG 94/1000		
C105		Keramik-Kondensator	CCG 68/10		
C106		Keramik-Kondensator	CCH 68/27		
C108		Df-Kondensator	CFR 1/5000/500		
C109		Keramik-Kondensator	CCG 94/1000		
C110		Lufttrimmer	CV 61509		
C111		Keramik-Kondensator	CCH 31/27		
C112		Keramik-Kondensator	CCH 31/27		
C113		Papier-Kondensator	CPK 58003 n 47		
C114		Papier-Kondensator	CPK 58003 n 10		
C115		Elko			32 µF; siehe C93
C116	}				
C117		Elko	CEG 21/100+100/350		
C118		Lufttrimmer	CV 61509		
C120		Ks-Kondensator	CKL 50343 u 0,22		
C121		Ks-Kondensator	CKL 50343 u 0,22		
C122		Ks-Kondensator	CKL 50343 u 0,22		
C123		Papier-Kondensator	CPK 66003 n 4,7		
C124		Ks-Kondensator	CKL 50343 u 0,22		
C125	}				
C126		Elko	CEG 21/100+100/350		
C127		MP-Kondensator	CMR 0,5/250/2		

Vervielfält.-Pause Nr.

Arbeitspause Nr.


 ROHDE & SCHWARZ MÜNCHEN		Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus: Blatt Blatt Nr. 5	
		b	10093	30.9.64	Schu			
		c	10415	15.2.65	Schu			
EKE	Tag	Name						
geschrieben	20.1.64	Wü					Ersatz für Zeichnung	ersetzt durch
bearbeitet		Schu					Schaltteilliste zu	
geprüft							Selektomat Type USWV	
normgeprüft								

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und Schadensersatzpflichtig.


XLV. XSE Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
C128		Elko	CED 21/8/350		
C129		Kf-Kondensator	CKS 2500/250		
C130		Df-Kondensator	CFR 1/5000/500		
C131		Df-Kondensator	CFR 1/5000/500		
C132		Df-Kondensator	CFR 1/5000/500		
C133		Df-Kondensator	CFR 1/5000/500		
C134		Df-Kondensator	CFR 1/5000/500		
C135		Df-Kondensator	CFR 1/5000/500		
C136		Df-Kondensator	CFR 1/5000/500		
C137		Df-Kondensator	CFR 1/5000/500		
C138		Df-Kondensator	CFR 1/5000/500		
C139		Df-Kondensator	CFR 1/5000/500		
G1 1		Si-Diode	GK/1011 C		
G1 2		Si-Diode	GK/1011 C		
G1 3		Si-Diode	GK/OA 202		
G1 4		Ge-Diode	GK/OA 73		
G1 5		Ge-Diode	GK/OA 73		
G1 6		Si-Diode	GK/OA 202		
G1 7		Ge-Diode	GK/AAZ 18		
G1 8		Zener-Diode	GK/Z 6		
G1 9		Si-Gleichrichter	GK/0307		
G111		Ge-Diode	GK/OA 73		

ervielfält.-Pause Nr.

Arbeitspause Nr.


 ROHDE & SCHWARZ MÜNCHEN			Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus Blatt Blatt Nr. 6	
			c	10415	15.2.65	Schu			
EKE	Tag	Name					Ersatz für Zeichnung		ersetzt durch
geschrieben	20.1.64	Wü					Schaltplan/Schaltteilliste zu		
bearbeitet		Schu					Selektomat		Type USWV
geprüft		El							
normgeprüft									

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und Schadensersatzpflichtig.


 Kennzeichen	Stückzahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
G112		Ge-Diode	GK/OA 73		
G113		Si-Diode	GK/OA 202		
G114		Si-Diode	GK/OA 202		
G115		Si-Gleichrichter	GK/V 23212-B 0180		
G116		Si-Gleichrichter	GK/V 23212-B 0180		
G117		Si-Gleichrichter	GK/V 23212-B 0180		
G118		Si-Gleichrichter	GK/0307		
G119		Si-Gleichrichter	GK/0307		
G120		Si-Diode	GK/OA 202		
G121		Si-Diode	GK/OA 202		
G122		Ge-Diode	GK/AAZ 18		
G123		Ge-Diode	GK/AAZ 18		
J 1		Drehspul-Strommesser	JNS 30505		Skala nach 15221 - 51
J 2		Drehspul-Strommesser	JNS 30203		Skala nach 15221 - 50
K 1		Verbindungskabel	15221 - 71/50 15221 - 71/60		bearb. nach LKF 52873/158 LKF 62573/158 } je nach hierzu Stückliste Auftrag
K 2		Verbindungskabel	15221 - 69/50 15221 - 69/60		bearb. nach LKF 52873/240 LKF 62573/240 } je nach hierzu Stückliste Auftrag
K 3		Anschlußkabel	LK 333		
K 4		HF-Verbindungskabel	9111405/62 9111406/62		für 50-Ω-Ausf. für 60-Ω-Ausf.
K 5		HF-Verbindungskabel	9111405/62 9111406/62		für 50-Ω-Ausf. für 60-Ω-Ausf.
K 6		HF-Kabel	LKK 92220		
K 7		HF-Kabel	LKK 92220		
K 8		HF-Kabel	LKK 92220		
K 9		HF-Kabel	LKK 92220		
K10		HF-Kabel	LKK 92220		
K11		HF-Kabel	LKK 92220		

ervielfält.-Pause Nr.

Arbeitspause Nr.

 ROHDE & SCHWARZ MÜNCHEN		Änd.-zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus Blatt Blatt Nr. 7	
		b	10093	30.9.64	Schu			
EKE	Tag	Name	c	10415	15.2.65	Schu		
geschrieben	20.1.64	Wü	e	10911	11.65	Schu		
bearbeitet		Schu	f	11103	2.66	Wsh	Ersatz für Zeichnung ersetzt durch	
geprüft	20.1.64	Ed					Stückliste/Schaltteilliste zu	
normgeprüft							Selektomat Type USWV	

XL XX Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
K12		HF-Kabel	LKK 92220		
K13		HF-Kabel	LKK 92220		
L 1		ZF-Spule (Gr.)	15221 - 73.1		hierzu bes.Stückliste
L 2		ZF-Spule (Gr.)	15221 - 73.2		hierzu bes.Stückliste
L 3		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste
L 4		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste
L 5		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste
L 6		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste
L 7		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste
L 8		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste
L 9		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste
L10		ZF-Spule (U'Gr.)	15221-- 18.4		hierzu bes.Stückliste
L11		ZF-Spule (U'Gr.)	15221 - 22.1		hierzu bes.Stückliste
L13		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste.
L14		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste
L15		Oszillatorsp. (Gr.)	15221 - 74		hierzu bes.Stückliste
L16		Magnetisierungssp. (Gr.)	15221 - 54		hierzu bes.Stückliste
L17		Oszillatorsp.(U'Gr.)	15221 - 28.3		hierzu bes.Stückliste
L18		Oszillatorsp.(U'Gr.)	15221 - 28.4		hierzu bes.Stückliste
L19		Oszillatorsp.(U'Gr.)	15221 - 28.5		hierzu bes.Stückliste
L20		Oszillatorsp.(U'Gr.)	15221 - 28.6		hierzu bes.Stückliste
L21		Oszillatorsp.(U'Gr.)	15221 - 28.7		hierzu bes.Stückliste

 ROHDE & SCHWARZ MÜNCHEN		Änd.- zusf.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus Blatt Blatt Nr. 8
		c	10415	15.2.65	Schu		
EKE	Tag	Name					
geschrieben	20.1.64	Wü				Ersatz für Zeichnung	ersetzt durch
bearbeitet		Schu				28.1.65 Schaltteilliste zu	
geprüft						Selektomat Type USWV	
normgeprüft							

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

Vervielfält.-Pause Nr.


Arbeitspause Nr.

Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
L22		Oszillatorsp.(U'Gr.)	15221 - 28.8		hierzu bes.Stückliste
L23		Oszillatorsp.(U'Gr.)	15221 - 28.9		hierzu bes.Stückliste
L24		Drossel	DUF 311/20		
L25		Drossel	DUF 311/20		
L26		Drossel	DUF 311/20		
L27		Drossel	DUF 311/20		
L28		Drossel	DUK 134/1		
L29		Drossel	DUF 311/20		
L30		Drossel	DUF 311/20		
L32		Drossel	DUF 311/20		
L33		Drossel	DUF 311/20		
L34		Drossel	DUF 311/20		
L35		Drossel	DUF 311/20		
L36		Drossel	DUF 311/20		
L37		Drossel	DUF 311/20		
L38		Drossel	DUF 312/6		
L39		Drossel	DUF 311/20		
L40		Drossel	DUF 312/6		
L41		Drossel	DUF 312/6		
L42		Drossel	DUF 311/20		
L43		Drossel	DUF 312/6		
L44		Drossel	DUF 311/20		
L45		Drossel	DUF 311/20		
L46		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste
L47		ZF-Spule (U'Gr.)	15221 - 18.4		hierzu bes.Stückliste
L48		Drossel (Gr.)	15221 - 66		hierzu bes.Stückliste

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

Vervielfält.-Pause Nr.

Arbeitspause Nr.

 ROHDE & SCHWARZ MÜNCHEN		Änd.- zust.	Änd.-Mitgl. Nr.	Tag	Name	Liste Nr.	Liste besteht aus Blatt	
		a	-	5.5.64	Schu	15221/2 Sa	Blatt Nr. 9	
EKE	Tag	Name	b	10093	30.9.64	Schu		
geschrieben	20.1.64	Wü	c	10415	15.2.65	Schu		
bearbeitet		Schu	Ersatz für Zeichnung					
geprüft			ersetzt durch					
normgeprüft			Stückliste/Schaltteilliste zu					
Selektomat Type USWV								

Arbeitspause Nr.Scanned by peer.d

1

für 50-Ω-Ausführung	
für 60-Ω-Ausführung	

WFE	221	E	50
WFE	221	E	60

WFE 221 E 10

WFE 221 E 40

WFE 221 E 40

WFE 321 k 400

WFE 321 k 400

WFE 321 k 60

WFE 321 k 50

WFE 221 k 12,5

WFE 321 k 50

WFE 321 k 2

WFE 221 k 12.5

WFE 321 E 400

WFE 221 k 50

WFE 221 E 10

WFE 221 k 10

WFE 321 k 16

WFE 321 k 2.5

WFE 221 k 50

WFE 221 k 10

WFE 321 E 400

WFE 221 k 12.5

WFE 321 k 16

WFE 321 k 2,5


WFE 221 k 12,5

Liste besteht
aus Blatt
Blatt Nr. 11

Ersatz für Zeichnung	ersetzt durch
3000000 / Schaffteilliste zu	
Selektomat Type USWV	

XX. XX Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
R44		Schichtwiderstand	WFE 221 E 40		
R45		Schichtwiderstand	WFE 221 k 50		
R46		Schichtwiderstand	WFE 221 E 40		
R47		Schichtwiderstand	WFE 221 E 10		
R48		Schichtwiderstand	WFE 221 E 40		
R49		Schichtwiderstand	WFE 221 E 40		
R50		Schichtwiderstand	WFE 321 E 400		
R51		Schichtwiderstand	WFE 221 k 20		
R52		Schichtwiderstand	WFE 321 k 16		
R53		Schichtwiderstand	WFE 321 k 2,5		
R54		Schichtwiderstand	WFE 221 k 50		
R55		Schichtwiderstand	WFE 221 k 20		
R56		Schichtwiderstand	WFE 321 E 400		
R57		Schichtwiderstand	WFE 321 k 125		
R58		Draht-Drehwiderstand	WR 1 F/500		
R59		Schichtwiderstand	WFE 221 k 12,5		
R60		Schichtwiderstand	WFE 321 k 16		
R61		Schichtwiderstand	WFE 321 k 2,5		
R62		Schicht-Drehwiderst.	WS 9122 F/10 k		
R63		Schichtwiderstand	WFE 321 k 50		
R64		Schichtwiderstand	WFE 321 k 80		
R65		Schichtwiderstand	WFE 321 k 50		
R66		Schichtwiderstand	WFE 321 k 2		
R67		Schichtwiderstand	WFE 221 k 12,5		
R68		Schichtwiderstand	WFE 321 k 100		
R69		Schicht-Drehwiderst.	WS 9122 F/100 k		
R70		Schichtwiderstand	WFE 321 k 50		

Diese Zeichnung ist unser Eigentum. Vervielfältigung, Verbreitung, Verwertung, Mitteilung an andere ist strafbar und Schadensersatzpflichtig.

 ROHDE & SCHWARZ MÜNCHEN		Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr.	Liste besteht aus Blatt	
		b	10093	30.9.64	Schu	15221/2 Sa	Blatt Nr. 12	
		c	10415	15.2.65	Schu			
EKE	Tag	Name					Ersatz für Zeichnung	
geschrieben	20.1.64	Wü					ersetzt durch	
bearbeitet		Schu					Schaltteilliste zu	
geprüft		EL					Selektomate Type USWV	
normgeprüft								

Vervielfält.-Pause Nr.


Arbeitspause Nr.

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilug an andere ist strafbar und schadenersatzpflichtig.


Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
R71		Schichtwiderstand	WFE 321 k 125		
R72		Schichtwiderstand	WFE 321 k 125		
R73		Schichtwiderstand	WFE 521 k 25		
R74		Schichtwiderstand	WFE 321 k 160		
R75		Schicht-Drehwiderst.	WS 9122 F/1 M		
R76		Schichtwiderstand	WFE 321 k 200		
R77		Schichtwiderstand	WFE 321 M 1		
R78		Schichtwiderstand	WFE 321 k 200		
R79		Schichtwiderstand	WFE 321 k 100		
R80		Schichtwiderstand	WFE 221 E 10		
R81		Schicht-Drehwiderst.	WS 9122 F/1 M		
R82		Schichtwiderstand	WFE 321 k 1		
R83		Schichtwiderstand	WFE 321 M 1		
R84		Schichtwiderstand	WFE 321 M 1,6		
R85		Schichtwiderstand	WFE 321 M 1		
R86		Schicht-Drehwiderst.	WS 9126/250 k		Achs-L = 15
R87		Schichtwiderstand	WFE 321 k 200		
R88		Schichtwiderstand	WFE 321 k 20		
R89		Schichtwiderstand	WFE 321 k 50		
R90		Schichtwiderstand	WFE 321 k 8		
R91		Schicht-Drehwiderst.	WS 9122 F/500 k		
R92		Schichtwiderstand	WFE 321 M 5		
R93		Schichtwiderstand	WFE 321 k 500		
R94		Schichtwiderstand	WFE 321 k 200		
R95		Schichtwiderstand	WFE 321 k 40		
R96		Schichtwiderstand	WFE 321 k 100		
R97		Schicht-Drehwiderst.	WS 9122 F/25 k		

Verfäll.-Pause Nr.

Arbeitspause Nr.


 ROHDE & SCHWARZ MÜNCHEN		Änd.- zust.	Änd.-Mittig. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus Blatt Blatt Nr. 13	
		c	10415	15.2.65	Schu			
EKE	Tag	Name				Ersatz für Zeichnung		
geschrieben	20.1.64	Wu				ersetzt durch		
bearbeitet		Schu				WEDER/Schaltteilliste zu		
geprüft		EL				Selektomat Type USWV		
normgeprüft								

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

 Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.	Bemerkungen	
1	2	3	4	5	6
R98		Draht-Drehwiderstand	WRP 10302 k 20		
R99		Schichtwiderstand	WFE 321 E 10		
R100		Schichtwiderstand	WFE 321 E 100		
R101		Schichtwiderstand	WFE 321 k 60		
R102		Schichtwiderstand	WFE 321 k 10		
R103		Schichtwiderstand	WFE 321 k 250		
R104		Schichtwiderstand	WFE 321 M 2		
R105		Schichtwiderstand	WFE 221 E 40		
R106		Schichtwiderstand	WFE 221 k 30		
R107		Schichtwiderstand	WFE 321 k 2,5		Trimmwert
R108		Schichtwiderstand	WFE 221 E 40		
R109		Schichtwiderstand	WFE 521 k 1,6		
R110		Varistor	WUC 41031		
R111		Schichtwiderstand	WFE 321 k 20		Trimmwert
R112		Schichtwiderstand	WFE 321 k 5		
R113		Schicht-Drehwiderst.	WS 9126/50 k		Achs-L = 17
R114		Schicht-Drehwiderst.	WS 7126/2,5 k		Achs-L = 17
R115		Schichtwiderstand	WFE 321 k 500		
R116		Schichtwiderstand	WFE 221 k -1		
R117		Schichtwiderstand	WFE 521 E 200		
R118		Schicht-Drehwiderst.	WS 9122 F/500 k		
R119		Schichtwiderstand	WFE 321 k 5		
R120		Schicht-Drehwiderst.	WS 9122 F/5 k		
R121		Schichtwiderstand	WFE 321 k 16		
R122		Schichtwiderstand	WFE 321 k 100		
R123		Schicht-Drehwiderst.	WS 9122 F/100 k		
R124		Schichtwiderstand	WFE 321 k 200		

Vervielfält.-Pause Nr.


Arbeitspause Nr.

 ROHDE & SCHWARZ MÜNCHEN			Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr.	Liste besteht aus Blatt
			a	-	5.5.64	Schu	15221/2 Sa	Blatt Nr. 14
			e	10911	11.65	Schu		
EKE	Tag	Name					Ersatz für Zeichnung	
geschrieben	20.1.64	Wii					ersetzt durch	
bearbeitet		Schu					Schaltteiliste zu	
geprüft	20.1.64	El					Selektomat Type USW	
normgeprüft								

Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
R125		Schichtwiderstand	WFE 321 k 80		
R126		Schicht-Drehwiderst.	WS 9126/5 k		Achs-L = 15
R127		Schichtwiderstand	WFE 321 k 2,5		
R128		Schichtwiderstand	WFE 321 k 80		
R129		Schicht-Drehwiderst.	WS 9122 F/25 k		
R130		Schichtwiderstand	WFE 321 k 16		
R131		Schicht-Drehwiderst.	WS 9122 F/5 k		
R132		Schichtwiderstand	WFE 321 k 2,5		
R133		Schichtwiderstand	WFE 321 k 3		
R134		Schichtwiderstand	WFE 321 k 500		
R135		Schichtwiderstand	WFE 321 k 1		
R136		Schichtwiderstand	WFE 221 k 20		
R137		Schichtwiderstand	WFE 221 k 1		
R138		Schichtwiderstand	WFE 321 k 1		
R139		Schichtwiderstand	WFE 321 k 2,5		
R140		Schichtwiderstand	WFE 321 k 500		
R141		Schichtwiderstand	WFE 221 k 12,5		
R142		Schichtwiderstand	WFE 221 k 12,5		
R143		Schichtwiderstand	WFE 221 E 10		
R144		Schichtwiderstand	WFE 321 k 30		
R145		Schicht-Drehwiderst.	WS 9122 F/10 k		
R146		Schichtwiderstand	WFE 321 k 40		
R147		Schichtwiderstand	WFE 321 k 500		
R148		Schichtwiderstand	WFE 321 k 1		
R149		Schichtwiderstand	WFE 221 k 50		
R150		Schichtwiderstand	WFE 321 k 800		
R151		Schichtwiderstand	WFE 321 k 1		

Vervielfält.-Pause Nr.

Arbeitspause Nr.



 ROHDE & SCHWARZ MÜNCHEN			Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus Blatt
								Blatt Nr. 15
EKE	Tag	Name	Ersatz für Zeichnung					
geschrieben	20.1.64	Wü	ersetzt durch					
bearbeitet		Schu	Stütze/Schalttailliste zu					
geprüft		EL	Selektomat Type USWV					
normgeprüft								

Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
R152		Schichtwiderstand	WFE 321 k 1		
R153		Schichtwiderstand	WFE 321 k 50		
R154		Schichtwiderstand	WFE 321 k 200		
R155		Schichtwiderstand	WFE 321 k 600		
R156		Schichtwiderstand	WFE 321 k 100		
R157		Schichtwiderstand	WFE 221 E 40		
R158		Schichtwiderstand	WFE 221 E 40		
R159		Schichtwiderstand	WFE 321 E 200		
R160		Schichtwiderstand	WFE 321 k 500		
R161		Schicht-Drehwiderst.	WS 9122 F/25 k		
R162		Schichtwiderstand	WFE 321 k 60		
R163		Schichtwiderstand	WFE 321 M 1		
R164		Schichtwiderstand	WFE 321 k 10		
R165		Schichtwiderstand	WFE 321 M 1		
R166		Schichtwiderstand	WFE 321 k 50		
R167		Schichtwiderstand	WFE 321 k 40		
R168		Schichtwiderstand	WFE 321 k 200		
R169		Schichtwiderstand	WFE 221 k 500		
R170		Schichtwiderstand	WFE 321 k 125		
R171		Schicht-Drehwiderst.	WS 9122 F/50 k		
R172		Schichtwiderstand	WFE 321 k 80		
R173		Schichtwiderstand	WFE 321 k 50		
R174		Schichtwiderstand	WFE 321 k 50		
R175		Drahtwiderstand	WD 5/4		
R176		Drahtwiderstand	WD 100/4		
R177		Drahtwiderstand	WD 4 k/2		
R178		Schichtwiderstand	WFE 321 E 10		

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.


ervielfält.-Pause Nr.

Arbeitspause Nr.


 ROHDE & SCHWARZ MÜNCHEN			Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus Blatt
			c	10415	15.2.65	Schu		Blatt Nr. 16
EKE	Tag	Name	Ersatz für Zeichnung ersetzt durch Selektomat Type USWV					
geschrieben	20.1.64	Wü						
bearbeitet		Schu						
geprüft								
normgeprüft								

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und Schadensersatzpflichtig.

Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.	Bemerkungen	
1	2	3	4	5	6
R179		Schichtwiderstand	WFE 321 M 5		
R180		Drahtwiderstand	WD 5/4		
R181		Drahtwiderstand	WD 4 k/2		
R182		Schichtwiderstand	WFE 321 k 3		
R183		Schichtwiderstand	WFE 321 k 3		
R184		Schichtwiderstand	WFE 321 k 100		
R185		Schichtwiderstand	WFE 321 k 50		
R186		Schichtwiderstand	WFE 321 k 16		
R187		Schichtwiderstand	WFE 321 E 400		
R188		Schichtwiderstand	WFE 321 k 160		
R189		Schichtwiderstand	WFE 321 k 25		
R190		Schichtwiderstand	WFE 321 k 50		
R1 1		Zwerg-Glimmlampe	RL 210 B		
R1 2		Zwerg-Glimmlampe	RL 210		
Rö 1		Doppel-Triode	E 88 CC		
Rö 2		Pentode	EF 183		
Rö 3		Pentode	EF 183		
Rö 4		Pentode	EF 183		
Rö 5		Pentode	EF 183		
Rö 6		Begrenzer Pentode	6 BN 6		
Rö 7		Pentode	EF 95		
Rö 8		Doppel-Triode	ECC 81		
Rö 9		Doppel-Triode	ECC 81		
Rö10		Triode-Pentode	ECF 80		
Rö11		Doppel-Triode	ECC 81		
Rö12		Triode	E 86 C		
Rö13		Leistungs-Pentode	EL 803		
Rö14		Leistungs-Pentode	EL 803		

 ROHDE & SCHWARZ MÜNCHEN	Änd.- zust.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa ersetzt durch	Liste besteht aus Blatt 17
	b	10093	30.9.64	Schu		
	c	10415	15.2.65	Schu		
EKE	Tag	Name				
geschrieben	20.1.64	Wü				
bearbeitet		Schu				
geprüft		EL				
normgeprüft						
Ersatz für Zeichnung			erschützt durch			
CS004018/Schaltteilliste zu			Selektomat Type USWV			

Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
Rö15		Triode-Pentode	ECF 80		
Rö16		Triode	EC 92		
Rö17		Pentode	EF 95		
Rö18		Stabilisator	85 A 2		
Rö19		Leistungs-Doppel-Triode	6080		
Rö20		Pentode	EF 95		
Rö21		End-Pentode	EL 95		
Rö22		End-Pentode	EL 95		
Rö23		Stabilisator	108 C 1		
Rö24		Pentode	EF 183		
Rsa		Relais	RSS 230041		
S 1		Teilerschalter (Gr.)			enthalten in 15221/2
S 2		Bereichschalter			enthalten in 15221/2
S 3		Schalteraggregat	SRA 10221		
S 4		Kleinstufenschalter	SRW 07120		Achs-L = 26
S 5		Schalteraggregat	SRA 10423		
S 6		Kleinstufenschalter	SRW 07220		Achs-L = 11
S 7		Drucktaste	SR 63604		
S 8		Netzschalterkombinat.	SRK 1		

			Änd.- zusf.	Änd.-Mittlg. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus Blatt	
EKE	Tag	Name						Blatt Nr. 18	
geschrieben	20.1.64	Wü						Ersatz für Zeichnung	
bearbeitet		Schu						ersetzt durch	
geprüft		Ed						Schaltteilleiste zu	
normgeprüft								Selektomat Type USWV	

ervielfält.-Pause Nr.


Arbeitspause Nr.

MX Kenn- zeichen	Stück- zahl	Benennung	Sach-Nr.		Bemerkungen
1	2	3	4	5	6
S 9		Spannungswähler	FD 60515		
Si 1		Schmelzeinsatz	M 1 C DIN 41571 M 2 D DIN 41571		bei 220 V zusätzl.1 Stck Res. bei 110 V zusätzl.2 Stck Res. (eingeschweißt in Polyäthylenbeutel)
St 2		13er-Stecker			enthalten in K4
St 3		13er-Stecker			enthalten in K5
St 5		Steckerleiste, 16-pol.	FS 916/2		
St 6		Gerätestecker			enthalten in KB 55-3
St 7		13er-Stecker			enthalten in K4
St 8		13er-Stecker			enthalten in K5
T 1		Transistor	GT/OC 450 k		

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

vielfält.-Pause Nr.

Arbeitspause Nr.

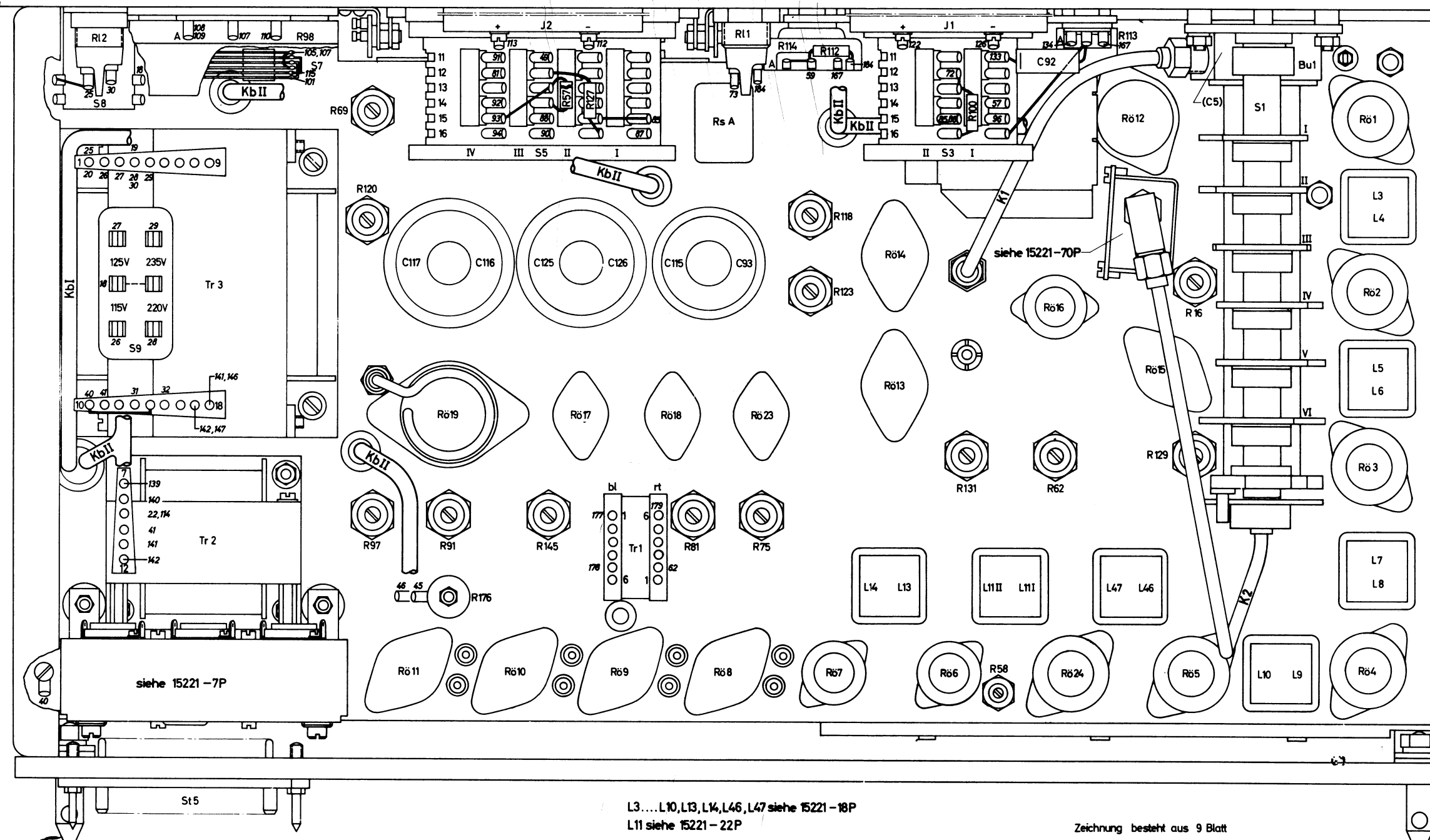
 ROHDE & SCHWARZ MÜNCHEN		Änd.- zust.	Änd.-Mitgl. Nr.	Tag	Name	Liste Nr. 15221/2 Sa	Liste besteht aus Blatt Blatt Nr. 19
		a	-	5.5.64	Schu		
		c	10415	15.2.65	Schu		
		d	10619	10.6.65	Schu		
EKE	Tag	Name			Ersatz für Zeichnung		ersetzt durch
geschrieben	20.1.64	Wü			Ersatz für Zeichnung		
bearbeitet		Schu			Ersatz für Zeichnung		
geprüft		Ek			Ersatz für Zeichnung		
normgeprüft					Ersatz für Zeichnung		
						Selektomat Type USWV	

Diese Zeichnung ist unser Eigentum.
Vervielfältigung, Verbreitung, Weiter-
leitung, Mitteilung an andere ist strafbar
und schadenersatzpflichtig.

Vervielfältigungs-Pause
Nr.

Arbeitspause Nr.

201; 0962; 2000 S

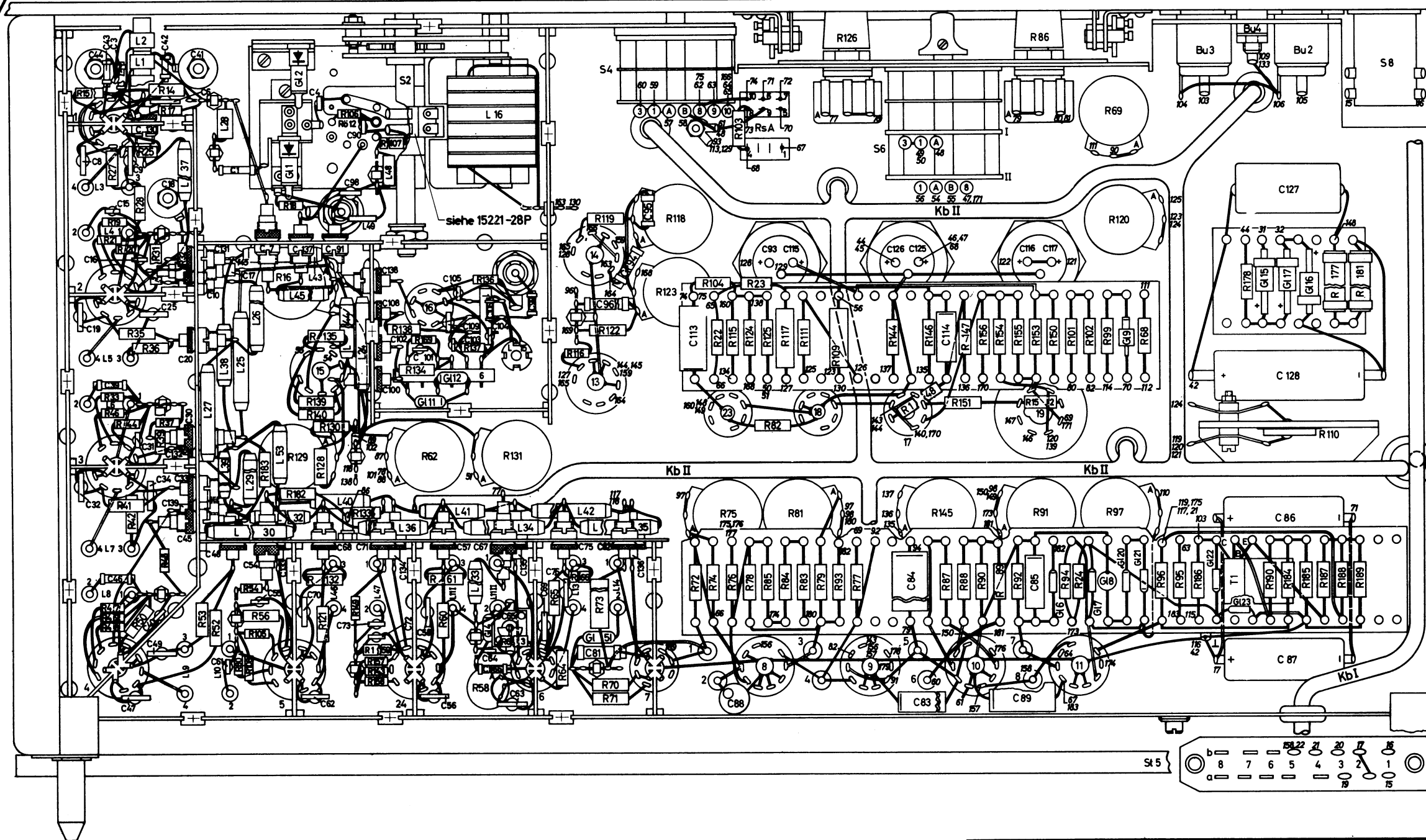


L3, ..., L10, L13, L14, L46, L47 siehe 15221-18P
L11 siehe 15221-22P

Zeichnung besteht aus 9 Blatt

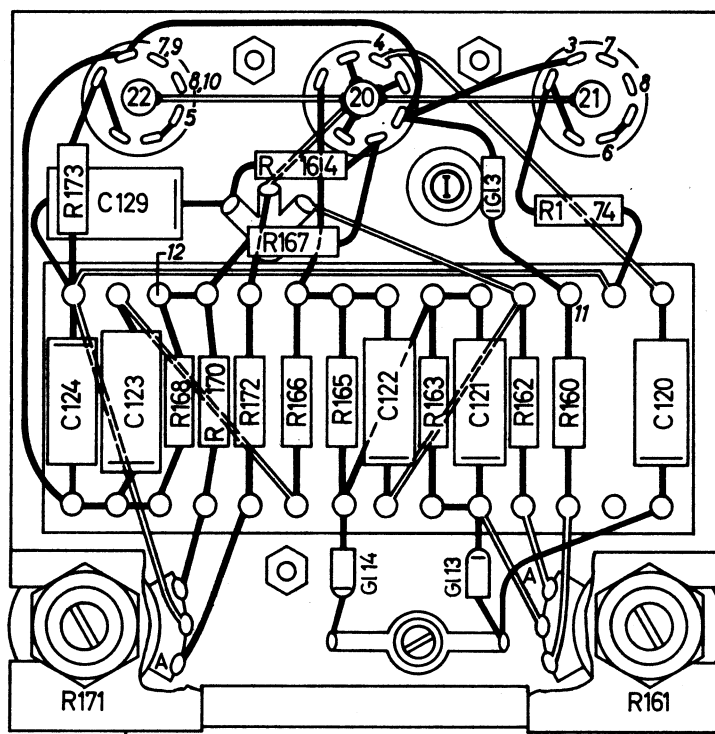
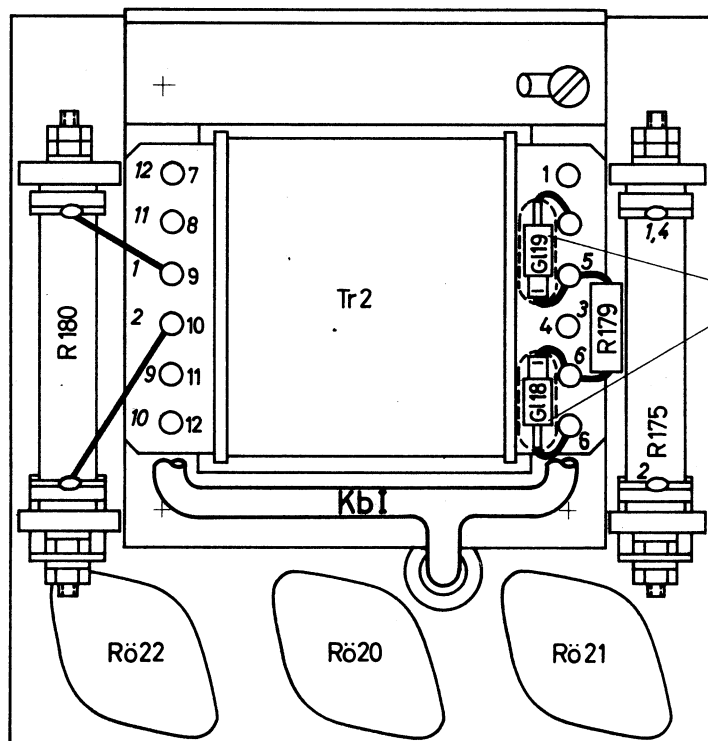
ROHDE & SCHWARZ MÜNCHEN				Halbzeug, Werkstoff		Untolerierte Maße		Zeichn. Nr.			
EKE	Tag	Name	And.- zust.	And.-Mittlg. Nr.	Tag	Name	Maßstab	15221/2P Bl.1			
gezeichnet	7.9.64		a	10415	9.3.65	Wn	1:1	Ersatz für Zeichnung			
bearbeitet		Ka					Selektomat Type USWV				
geprüft											
normgepr.											

Diese Zeichnung ist unser Eigentum.
Verbreitung, Vervielfältigung, Nachdruck,
Fotografieren, Kopieren, Verbreiten,
Fälschung, Nachahmung ist strafbar
und wird rechtlich verfolgt.





ROHDE & SCHWARZ MÜNCHEN			Halbzeug, Werkstoff			Unfertierte Maße		Zeichn. Nr.
EKE			Tag	Name	And.-Anfert.- zahl.	Tag	Name	15221/2P Bl.2
gezeichnet			7.9.64		a	10.15	10.3.65	Wn
bearbeitet				Ka	b	10.11	10.11.65	Wn
geprüft					c	11.103	18.2.66	Wn
normgepr.								
Maßstab							1:1	Erstellt für Zeichnung
Selektomat Type USWV								

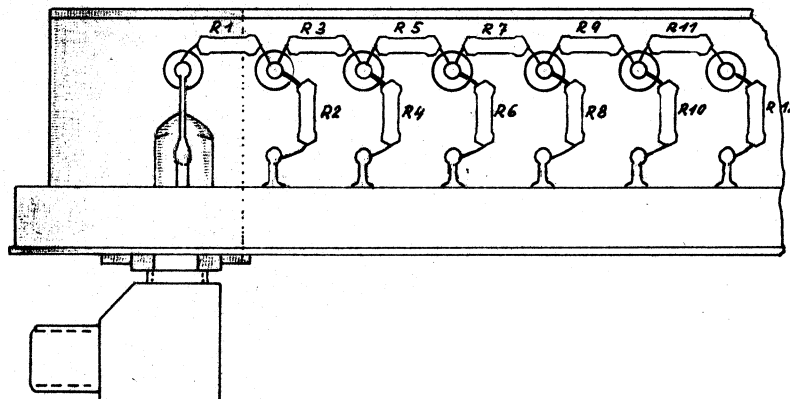
Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und Schadensersatzpflichtig.



Zeichnung besteht aus 2 Blatt


<div> ROHDE & SCHWARZ MÜNCHEN</div>			Halbzeug, Werkstoff				Untolerierte Maße		Zeichn. Nr. 15221 -7P Bl.1	
							Maßstab 1 : 1			
EKE	Tag	Name	Änd. zust.	Änd.-Mittlg. Nr.	Tag	Name	Ersetz f. Zeichn.			
gezeichnet	19.8.64		d	10093	19.8.64	Ka	Heizregelung (Gr.)			
bearbeitet		Kg	e	10415	9.3.65	Wn				
geprüft										
normgepr.										

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

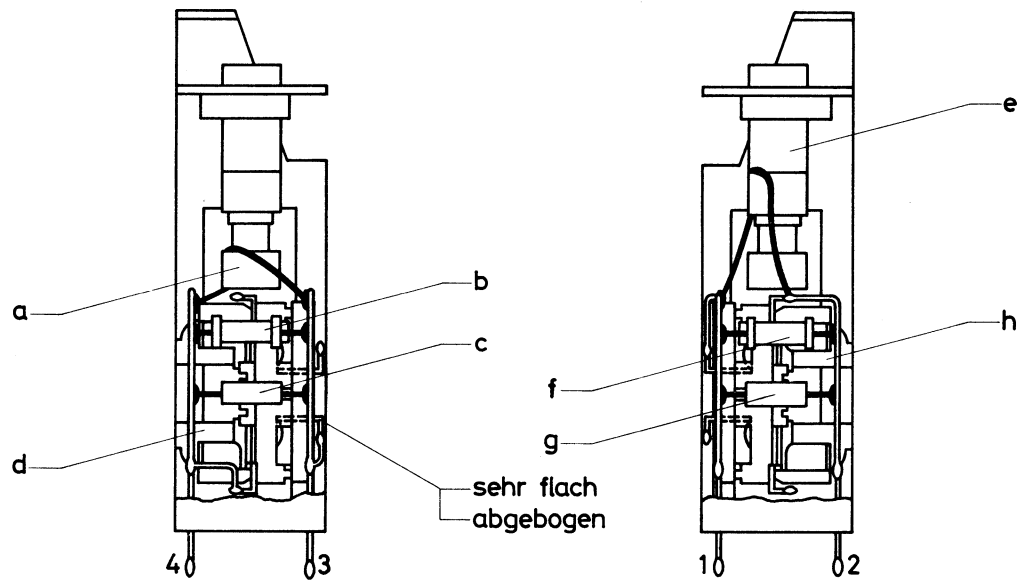


Vervielfält.-Pause
Nr.

Arbeitspause Nr.


 ROHDE & SCHWARZ MÜNCHEN		Halbzeug, Werkstoff		Untolerierte Maße		Zeichn. Nr. 15221 - 8 P
				Maßstab		
EKE	Tag	Name	Änd. zust.	Änd.-Mittlg. Nr.	Tag	Name
gezeichnet	2. 3. 60	ms				
bearbeitet						
geprüft						
normgepr.						
						Teiler (Gruppe)

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und Schadensersatzpflichtig.



Spulendenen mit Silikonschlauch LJW00501 ... überzogen.

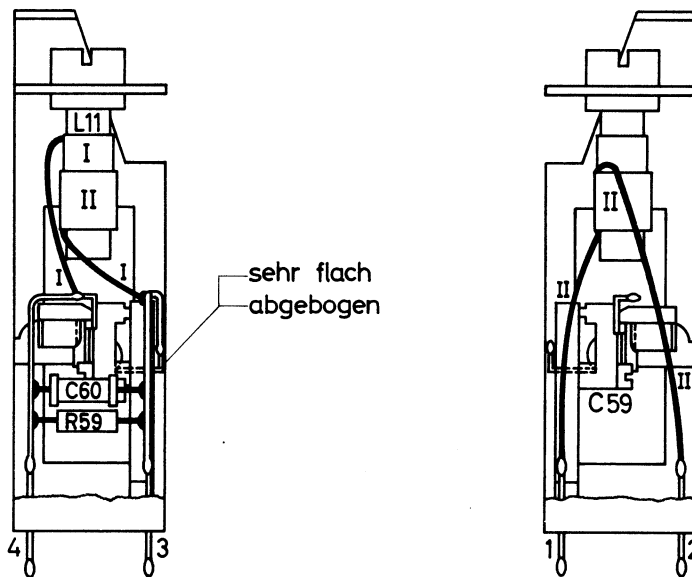
	a	b	c	d	e	f	g	h
15221 - 18	L3	C12	R26	C11	L4	C13	R29	C14
15221 - 19	L5	C27	R34	C26	L6	C28	R38	C29
15221 - 20	L7	C36	R40	C35	L8	C37	R43	C38
15221 - 21	L9	C51	R51	C50	L10	C52	R55	C53
15221 - 23	L13	C78	R67	C77	L14	C79	—	C80
15221 - 72	L46	C111	R141	C110	L47	C112	R142	C118

 ROHDE & SCHWARZ MÜNCHEN			Halbzeug, Werkstoff				Untolerierte Maße		Zeichn. Nr. 15221 - 18P	
							Maßstab 1:1			
EKE	Tag	Name	Änd. zust.	Änd.-Mittlg. Nr.	Tag	Name	Ersatz f. Zeichn.			
gezeichnet	7.9.64	Ka	d	10093	7.9.64	Ka	Bandfilter (Gr.)			
bearbeitet										
geprüft										
normgepr.										


Vervielfält.-Pause

Arbeitspause Nr.

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und Schadensersatzpflichtig.



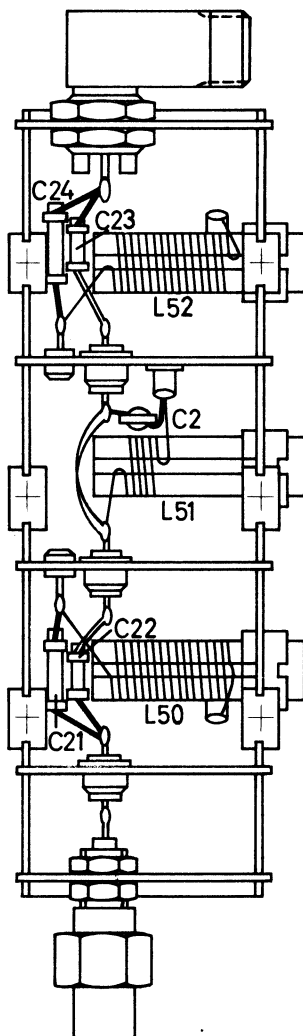
Spulenden mit Silikonschlauch LJW 00501... überzogen.


 ROHDE & SCHWARZ MÜNCHEN		Halbzeug, Werkstoff				Untolerierte Maße		Zeichn. Nr. 15221-22P
						Maßstab 1 : 1		
EKE	Tag	Name	Änd. zust.	Änd.-Mittlg. Nr.	Tag	Name	Ersatz f. Zeichn.	
gezeichnet	7.9.64	Ka	c	10093	7.9.64	Ka		
bearbeitet							Bandfilter (Gr.)	
geprüft								
normgepr.								

Vervielfält.-Pause

Arbeitspause Nr.

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und Schadensersatzpflichtig.



 ROHDE & SCHWARZ MÜNCHEN			Halbzeug, Werkstoff				Untolerierte Maße		Zeichn. Nr. 15221 - 70P
							Maßstab 1:1		
EKE	Tag	Name	Änd. zust.	Änd.-Mitgl. Nr.	Tag	Name	Ersatz f. Zeichn.		
gezeichnet	7.9.64	Ka					Hochpaß (Gr.)		
bearbeitet									
geprüft		<i>Mur</i>							
normgepr.									

Vervielfält.-Pause

Arbeitspause Nr.