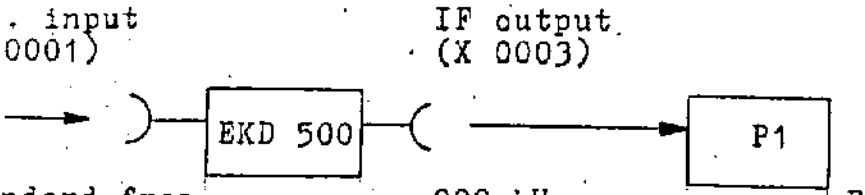
7.1. Frequency accuracy

7.1.1. Measuring and correcting with standard test conditions

Temperature	+15 °C to +35 °C
Relative air humidity	45 to 75 %
Before testing the receiver is to be operated on the a.m. conditions for	≙ 4 hours
Voltage variations of power supply	≙ ± 2 %



f_N = 10 MHz

$\frac{\Delta f}{f_N} \triangleq 1.10^{-8}$

$\frac{\Delta f}{f} \triangleq 5.10^{-7}$

Receiver setting:

F	10 000.00 kHz
B	1
MOD	4
GC	1

IF_{ref} = 200 kHz ≙ ± 5 Hz

In case of greater frequency fault:
Correction of the receiver frequency standard (TCXO) with R2410 (reference frequency) on the plug-in rear.
For this, operate the receiver plug-in via a 30-core adapter cable (accessories) outside the casing.

7.1.2. Check and correction on service conditions

- Before testing, the receiver is to be operated at least 2 hours under the a.m. conditions.
- Connect the aerial for receiving a standard frequency transmission 10 MHz or 20 MHz to receiver input socket (29).

- Receiver setting:

F	according to standard frequency f_N
MOD	4
B	1
GC	5

Control ≈ (4)

Control ≈ (6)

- A noise signal changing its volume in the rhythm of the frequency fault is audible in the loudspeaker.

- Admissible frequency fault: $\frac{\Delta f}{f_N} \leq 1.10^{-6}$/year

i.e. with f_N = 10 MHz $\Delta f \leq$ 10 Hz

= 20 MHz $\leq$ 20 Hz

- Correction of the frequency fault:

Minimise the beat frequency by balancing with R 2419 (reference frequency) on the plug-in rear.
For this, operate the receiver plug-in outside the casing via a 30-core adapter cable (accessories).

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7.2. Sensitivity

7.2.1. Classes of emission A1A and F1B

- RF generator (P4) to receiver input socket (29)
  emf (75 ohm) = 0.5 µV (f_G ≧ 150 kHz)
  = 3 µV (f_G ≦ 150 kHz)

- AF millivoltmeter (P3) to AF output socket (28)
  (measuring range 0.5 V)

- Receiver setting:

F	according to test frequency
MOD	1
B	1
GC	5
SEL	0 and 1

- Tune to maximum with RF generator (P4) at millivoltmeter (P3)
- Adjust level to 250 mV with control ⊳≈ (6) at millivoltmeter (P3).
- Measure display decrease (interference voltage spacing in dB) at millivoltmeter after disconnecting the RF generator (P4).

$$\left[\frac{S + R}{R} = 10 \text{ dB}\right]$$

- Repeat measurements for class of emission F1B with MOD 7.

7.2.2. Class of emission A3E

- RF generator (P4) to receiver input socket (29), emf (75 ohm) = 5 µV (m = 0.5 f_{MOD} = 1000 Hz).
- AF millivoltmeter to AF output socket (28), (1.5-V range)

- Receiver setting:

F	according to test frequency
MOD	2
B	6
GC	5
SEL	0 and 1

- Tune with RF generator (P4) to 1000 Hz (noise minimum)
- Adjust level to 0,775 V (0 dB) with ≈ at AF millivoltmeter (P 3)
- Disconnect modulation on RF generator (P4) and measure display decrease (noise voltage spacing in dB)

$$\left[\frac{S + R}{R} \cong 10 \text{ dB} \right]$$

7.2.3. Classes of emission J3E, R3E, B8E, B_R8E

- RF generator (P4) to receiver input socket (29),
  emf (75 ohm) = 1.5 µV (EKD 511)
  = 2.2 µV (EKD 512)
- AF millivoltmeter (P3) to AF output (28), 1.5-V range

  Observe position A (+ SB) or B (-SB) of the monitoring changeover switch (3).

- Receiver setting:

F	according to test frequency
MOD	3,4,5,6
B	7,8
GC	5
SEL	1 and 2

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- Tune with RF generator (P4) to 1000-Hz tone

- Adjust level to 0.775 V (0 dB) with ≈ at AF millivoltmeter (P3)

- Disconnect RF generator and measure display decrease (noise voltage spacing in dB) at millivoltmeter

$$\left[\frac{S + R}{R} = 10 \text{ dB}\right]$$

7.2.4. Check of the residual carrier synchronization (R3E and B_R8E)

- RF generator (P4) to receiver input socket (29)
  emf (75 ohm) = 1 µV

- Receiver setting:

F	according to test frequency
MOD	5, 6
GC	5
≈	
≈	

- Tune to zero beat with RF generator (P4)

- Check display (11) for residual carrier synchronization shall light in the detuning range $\Delta f = \pm 50$ Hz.

7.3. Amplification control

7.3.1. Manual control 'basic amplification'

- RF generator (P4) to receiver input socket (29),
  emf (75 ohm) = 1 µV

- AF millivoltmeter (P3) to line outputs A (25) or B (26) terminated with 600 ohm, 1,5-V range.

- Receiver setting:

F	4 500.00 kHz
MOD	6
B	6
GC	5
SEL	0

≈

- Tune with RF generator (P4) to 1000-Hz tone in AF channel B or A and read test values on AF millivoltmeter.

  Setpoint values: 0.775 V ± 1 dB

- Correction of the AF output level

  Channel A : with R 3847
  Cahnnel B : with R 3617

  } cassette 'signal path 2'

- Check of the display 'U ≈ ' on LED row (12).
  Monitoring changeover switch (3) → 'U ≈ '

7.3.2. Manual control 'synchronism, control volume'

(Test arrangement as with Section 7.3.1.)

- Increase emf of the RF generator from 1 µV to 1V in 20-dB steps, level at AF line output B (26) to 0 dBm each by means of and compare level with AF line output A (25) → 2-kHz step.

- Setpoint values: synchronism $\frac{U_{AF\ 'A'}}{U_{AF\ 'B'}} \leq \pm 2$ dB

control volume ≙ 120 dB (setting to 0 dBm)

- Correction of synchronism ($U_{AF\ 'A'}$) with R 3734 (signal path 2).

7.3.3. Automatic control 'synchronism, control volume'

(Test arrangement as with Section 7.3.1. GC 1)

- Increase emf of the RF generator from 2 µV to 200 mV in 20-dB step and measure AF level at every time at line output A (25) and B (26).

- Setpoint values: synchronism $\frac{U_{AF\ 'A'}}{U_{AF\ 'B'}} \leq \pm 2$ dB

control volume = 0.775 V ± 3 dB

- Correction: $U_{AF\ 'A'}$ with R 3801
  $U_{AF\ 'B'}$ with R 3616
  } signal path 2

7.3.4. Automatic control 'digital display of the receiving signal'

- Receiver setting:

F 4 500.00 kHz

MOD 1

B 2

GC 1

SEL 0

Changeover switch 'LED row' ⟶ E

A-D converter test A 3 (EXT EXT ⟶ 1.5 s ⟶

- Tune LED row to maximum with RF generator (emf = 100 µV)

- Increase emf values from 1 µV (≙ 0 dB µV) to 1 V (≙ 120 dB µV) in 10-dB steps.

- Doubly indicated digit value ≙ dB µV (tolerance: ± 2)

  (e.g.: 30 ≙ 60 dB µV ≙ 1 mV)

- Simultaneously with that: Check display value on LED row

  (tolerance: ± 1 LED)

8. Components selected by the manufacturer

Repair work on some circuits of the receiver requires particularly pretested or prepared (programmed) components which can be ordered from the manufacturer of the equipment.

V3304	Si-Schottky diode quartette 4 KAS 34 ($\triangle U_F \leqq$ 20 mV at I_F= 1...7mA, $\triangle C_o \leqq$ 0,2 pF)
V3305, V3306 V3309, V3310 V3311, V3312 V3402, V3403	Transistor pairs SF235 acc. to 1340.041-$^{01353}_{01354}$ Pv 2 ($\triangle I_C \leqq$ 10 % at I_B= constant, U_{CE}= 4.5 V, I_C= approx. 5 mA)
V3405, V3406	FET KP307 A acc. to 1340.041-01354 Pv 3 ($U_{pinch-off}$= -0.8 ... -1.3 V at I_D= 100 µA, U_{DS}= 10 V)
N3602, N3704	Circuit pair A281 D acc. to 1340.037-$^{01356}_{01357}$ Pv 2 ($\triangle V \leqq$ 2 dB within the control range)
V3601, V3701, V3704	FET KP307 A acc. to 1340.041-01345 Pv 3 (I_D > 100 µA at U_{DS} = 10 V, $U_{pinch-off}$=-1.3 V)
V2209...V2212	Si diode quartette SAY17 acc. to 1340.037-01253 Pv 2 ($C_o \leqq$ 1.5 pF at 10 MHz)
V2104, V2106, V2108, V2113, V2115, V2301, V2312, V2504 V2506, V2508, V2513	FET KP307 A acc. to 1340.037-01251 Pv 2 Group 3...7, (I_D= 3 mA, U_{GS}= 0.33 ... 1.1 V $/Y_{21S}/$ ≥ 3.5 mS at 20 kHz)
V2105, V2505	FET KP307 A acc. to 1340.037-01251 Pv 2 Group 9...11 (I_D= 3 mA, U_{GS}= 2...4 V $/Y_{21S}/$ ≥ 3.5 mS at 20 kHz)
D4408...D4411	Circuit U2716C 65 (EPROM) programmed acc. to 1340.041-01454 Ev Indicate program-No., e.g. progr. 2/1...4.