ROHDE&SCHWARZ

SERVICE DOCUMENTS

AF-Generator

819.3260.02

Contents

5 Service Manual "AF Generator"

5.1 Function Description

(See circuit diagram 819.3260 S and Fig. 5-1)

The module "AF generator" consists of the following function units:

- *AF synthesizer*
- *Fixed-frequency generators*
- *AM/FM input selection circuits*
- *Diagnostics*

5.1.1 AF Synthesizer

This contains a digital waveform generator which generates output frequencies from 1 Hz to 100 kHz with a resolution of 1 Hz. The main part is the gate array D16. This contains a 10:1 divider for the clock frequency, a 20-bit adder and an interface for the serial data transmission. In the adder, an increment I read in via the serial interface is added cyclically to an internal clock frequency of 1.04858 MHz. The most significant 12 bits of the total represent an addresses in the waveform EPROM D5. The amplitudes for one period of sinewave, squarewave and sawtooth-wave are stored in the EPROM with a 12-bit resolution. Following intermediate storage of the data in D6, the DAC D9 generates a staircase signal whose transient response is suppressed by the subsequent sample-and-hold circuit. The active lowpass with a selectable cutoff frequency of 20 kHz/100 kHz smooths the output signal and suppresses the clock frequency. The adder increment I is a function of the desired AF frequency Faf and is given by the following equation: $I = Faf(Hz)$.

5.1.2 Fixed-frequency Generators

The two fixed frequencies of 1.024 kHz and 409.6 Hz (usually stated as 1 kHz and 400 Hz) are obtained by dividing the adder clock (2^{10} for 1.024 kHz, $2^8 * 10$ for 409.6 Hz). Active lowpasses (N10, N15) filter the fundamental out of the square-wave signal.

The sinewave signal, and also that of the AF synthesizer if required, is applied to the AF level attenuator via switch D14 and buffer stage N15. This is implemented using a 10-bit DAC and a selectable 1:1/10:1 divider and enables the level at the output AF OUT to be set from 0 to 2 Vp which in turn can also be connected to the internal modulation outputs.

5.1.3 AM/FM Input Selection Circuits

The AM and FM input circuits are of almost identical design. The following text describes the AM circuit, the corresponding components for the FM circuit are shown in brackets. The input selectors D40 to D42 (D30 to D32) are used to distinguish between AM EXT AC, AM EXT DC, AM EXT SQUARE and AM INT (FM EXT AC, FM EXT DC, FM EXT FSK and FM INT).

The EXT signal is applied via the plug connection X6A1 (X6A9). An input impedance of 600 or 100 kΩ can be selected with jumper X3 (X2). The diodes V40 and V41 (V30 and V31) are used for overvoltage protection. The EXT signal is applied via the input amplifier N30 (N20) and C135 (C100) to the input selection switch D40 (D30). C135 (C100) is bypassed with AM EXT DC (FM EXT DC). A signal with a logic level and a selectable phase of 0° or 180° is generated from the EXT signal via D40-A with AM EXT SQUARE (D30-B with FM EXT FSK) by means of D45 (D33). An offset is added using N33 (N22) and the level adjusted for max. AM (FM).

For AM-INT (FM-INT), the AF synthesizer can be switched either via D41-A (D32-D) for an adjustable level or via D42-C (D31-D) for a fixed level. The same applies to the two fixed frequencies of 1 kHz and 400 Hz, these having a fixed level via D41-D (D31-A).

The selected modulation signal is applied to further modules via X6A3 (X6A7) by means of the following amplifier N32 (N21). The gain is dimensioned for maximum AM (FM). The corresponding modulation signal is also applied to a window comparator via an analog switch D46. This is required for level monitoring. Voltages above or below the threshold voltage trigger the monostable D47 (D36) whose pulse width is selected such that T is 1/Fmin, where Fmin is the minimum modulation frequency. The four items of data AM LOW, AM HIGH, FM LOW and FM HIGH are applied to the parallel input of the shift register D52. They are ORed and generate an interrupt signal. When read in serial mode, they are latched in D52 and output via driver D52 to X6A15.

5.1.4 Diagnostics

Multiplexer D50 can be used to switch various module voltages to the "TST" line, for example the supply voltages, reference voltage, AM/FM output voltages.

The subassembly is driven via a serial data bus. The data are read into the latch modules D10, D16 (gate array), D20, D31, D51, D44, D34 with two strobes which are decoded from the subassembly addresses BA0 to BA2.

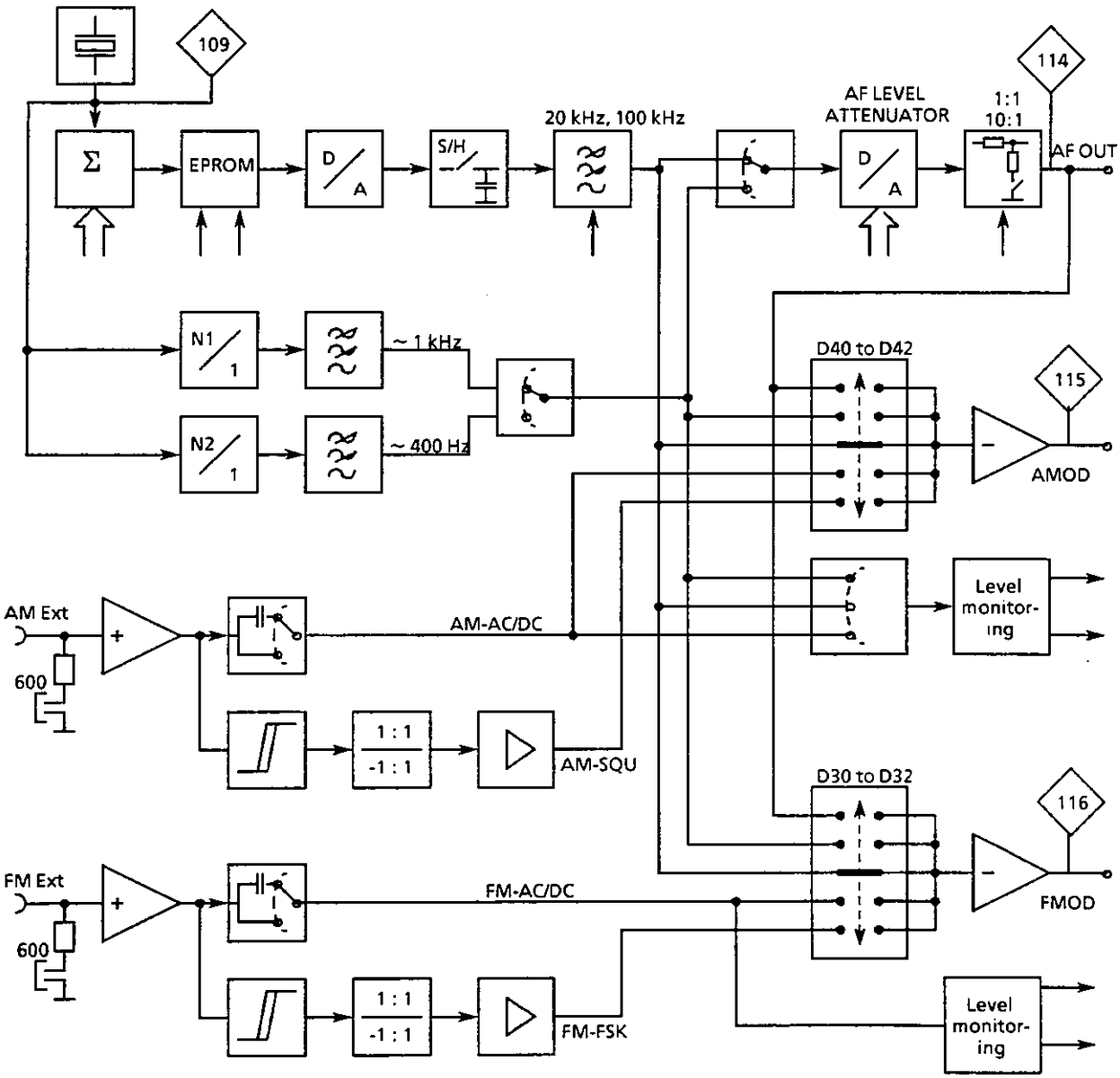


Fig. 5-1 Block diagram "AF generator"

5.2 Testing and Adjustment

- Setting: SHIFT PRESET

5.2.1 Adjustment of 5-V Reference

- Connect DC voltmeter to P31B1.
- Adjust the reference voltage to 5.00 V using R166.

5.2.2 Level/Offset Adjustment of AF Synthesizer

- Connect AC/DC voltmeter to P31 via 1:1 probe.
- Adjust AC voltage to 1 Vp ± 2 mV using R11.
- Adjust DC voltage to 0 V ± 1 mV using R19.

5.2.3 Level Adjustment of Fixed Frequencies

- Connect AC voltmeter to P11 3 via 1:1 probe.
- Setting: SHIFT AF 400 Hz.
- Adjust to 1 Vp ± 2 mV using R59.
- Setting: SHIFT AF 1 kHz.
- Adjust to 1 Vp ± 2 mV using R71.

5.2.4 Level Adjustment at AF Output

- Setting: SHIFT PRESET
- Connect AC voltmeter to AF OUT socket.
- Adjust to 1.00 V ± 1 mV using R99.
- Check the sawtooth and square curve shapes at an AF of 2 kHz.
  The overshoots should be < 10%.

5.2.5 Measurements at AMOD Output X6A3

5.2.5.1 Testing the Signal Path "Internal Modulation"

- Setting: SHIFT PRESET, AM INT ON

5.2.5.2 Sinewave Signal Level

- Connect AC voltmeter to P32.
- Check nominal value of level: 6 Vp ± 1 %, and at the following settings as well: SHIFT AF 1 kHz, SHIFT AF 400 Hz.

5.2.5.3 Checking the "AM SQUARE" Mode

- Input: AM SQU 100 %
- Connect the pulse generator to the AMEXT socket
- Set square pulses, pulse duty factor 1:1, amplitude +5 V_{peak} with a repetition frequency of 5 kHz.
- Connect oscilloscope to P32.
- Measure the overshoots of the output signal. Nominal value: ≤ 10 %.

5.2.5.4 Checking the "External Modulation" Signal Branch

- Setting: SHIFT PRESET, AM EXT AC
- Connect AF sinewave generator, 1 kHz, 1 Vp ± 0.2 % to AM EXT socket.

Output level

- Connect AC voltmeter to P32.
- Measure and check the level.
  Nominal value: 6 Vp ± 1 %.

Checking the level monitoring

Measure the input level at the AM EXT socket using an AC voltmeter. "EXT HIGH" should be displayed with levels over 1.03 ± 0.01 V_{peak} and "EXT LOW" with levels below 0.97 ± 0.01 V_{peak}, respectively.

5.2.6 Measurements at FMOD Output X6A7

5.2.6.1 Testing and Adjustment of the "Internal Modulation" Signal Branch

- Setting: SHIFT PRESET, FM INT ON

5.2.6.2 Output Level with Sinewave Signal

- Connect AC voltmeter to P60.
- Check nominal value of level: 1 V_{rms} ± 1 %, and at the following settings as well: SHIFT AF 1 kHz, SHIFT AF 400 Hz

5.2.6.3 Testing the "FSK" Mode

- Input: FSK 1 kHz
- Connect oscilloscope to P60.
- Connect the pulse generator to the FM/ΦM EXT socket
- Set square pulses, pulse duty factor 1:1, amplitude +5 V_{peak} with a repetition frequency of 5 kHz.
- Measure output signal overshoots. Nominal value: ≤ 10 %.

5.2.6.4 Testing and Adjustment of the "External Modulation" Signal Branch

- Input: SHIFT PRESET, FM EXT AC, FM/ΦM EXT
- Connect AF sinewave generator, 1 Vp ±0.2 % to connector FM/ΦM EXT.

Output level

- Connect AC voltmeter to P60.
- Measure and check the level. Nominal value: 1 V_{rms} ± 1 %

Offset adjustment

- Connect DC voltmeter to P60.
- Input: SHIFT PRESET
- Short-circuit FM/AM EXT input.
- Adjust the offset to 0 V ± 1 mV using R260.
- Input: FM EXT DC 1 kHz
- Adjust the offset to 0 V ± 1 mV using R125.

Testing the level monitoring

Measure the input level at the FM/ΦM EXT socket using an AC voltmeter. "EXT HIGH" should be displayed with levels over 1.03 ± 0.01 V_{peak} and "EXT LOW" with levels below 0.97 ± 0.01 V_{peak}, respectively.

5.2.7 Testing the Diagnostics Interface

- Connect DC voltmeter to P41.
- Input: SHIFT PRESET
- After having entered the following special functions measure the voltage at P41 and check the indication in the right-hand display.

Special function	Nominal value	Display
109	0.75 to 1.25 V	1.5 to 2.5 V
110	1.63 to 1.7 V	4.9 to 5.1 V
111	2.25 to 2.6 V	4.5 to 5.3 V
112	3.5 to 3.9 V	14.0 to 15.5 V
113	-3.9 to -3.5 V	-15.5 to -14 V

5.3 Troubleshooting

5.3.1 Checking the Clock Frequency

- Input: SHIFT PRESET
- Measure using frequency counter at the defined test points.
  Test point: Frequency (TTL level)
  P13 1.048 MHz
  P10B 1.024 kHz
- Input: SHIFT AF 400 Hz
  P10A 409.6 Hz

5.4 Interfaces

5.4.1 Digital Interfaces

Test point	Meaning	
X6 A21 X6 A20 X6 A19	BA0 BA1 BA2	Reference impedance
X6 A22	G1	Group line
X6 A11 X6 A13 X6 A15	TF.CLK TM.DAT RC.DAT	Serial data transmission
X6 A4	INT.AF	Interrupt signal

5.4.2 Analog Interfaces

Test point	Level	Input/output	Meaning
X6 A28 X6 A26 X6 A30 X6 A2, 4, 6, 8, 10, 12, 14, 16, 23, 25, 27, 28, 31	+5 V +15 V –15 V GND		Power supply
X6 A5	0 to 2 Vp	A	AF.OUT
X6 A1	1 Vp, HC-TTL	E	AM.IN Ext. mod. input
X6 A3	0 to 6 Vp	A	AMOD Mod. output
X6 A9	1 Vp, HC-TTL	E	FM.IN Ext. mod. input
X6 A7	1 V_{rms}	A	FMOD Mod. output
X6 A17	–5V to +5V	A	TST Diagnostics circuit

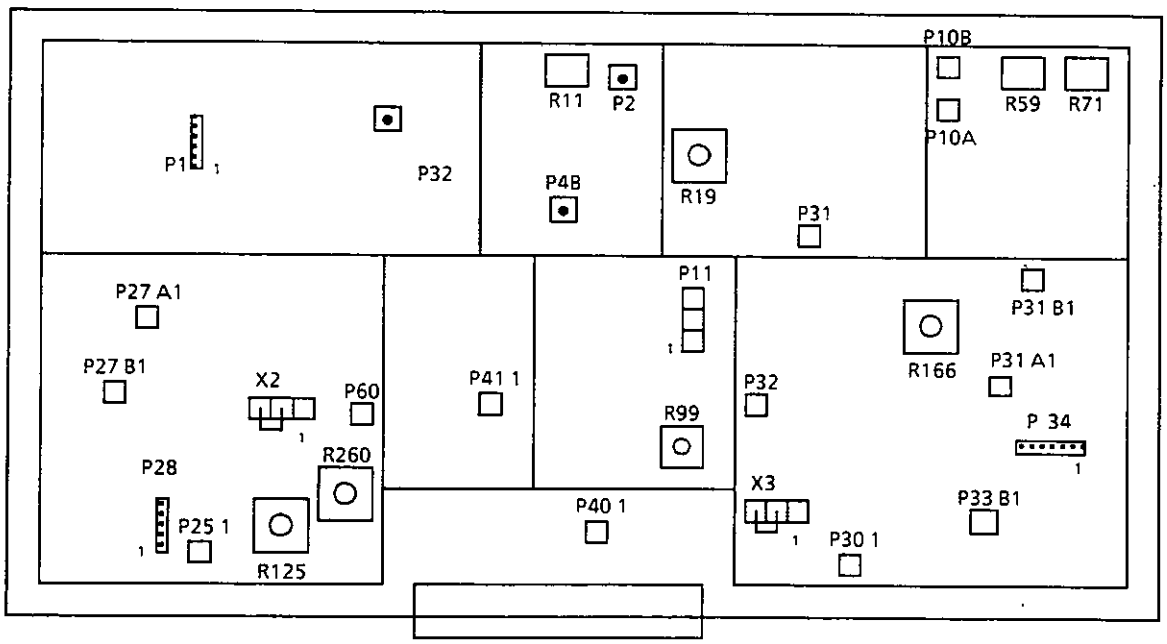


Fig. 5-2 Layout of test points and adjustment points

5.5 List of Required Test Equipment

- AC/DC voltmeter ($R_i \geq 100\,k\Omega$ AC: 10 Hz to 3 MHz, 5 V_{rms} DC: 0 to 30 V) eg R&S UDS 4
- Oscilloscope
- AF generator (1 kHz, 0 to 2 V_{rms}) eg R&S APN
- Frequency counter (up to 20 MHz)

ROHDE&SCHWARZ

Schaltteillisten
Stromläufe
Bestückungspläne

Part lists
Circuit diagrams
Components plans

Listes des pièces détachées
Schémas de Circuit
Plans des composants

(R 29500 BI 2)
095.1008 BL 2

Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
B1	EQ 10,485800MHZ CL30HC43U QUARTZ CRYSTAL UNIT	0091.8345.00	PHILIPS	N. R&S SACHNUMMER	
C1	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C2	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C3	CC 100PF+-2%6X9NP0 CAPACITOR	CC 0087.6541.00	PHILIPS_CO	2222 678	
C4	CC 100PF+-2%6X9NP0 CAPACITOR	CC 0087.6541.00	PHILIPS_CO	2222 678	
C5	CC 56PF+-2%5X6NP0 CAPACITOR	CC 0087.6512.00	PHILIPS_CO	2222 678	
C6	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C7	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 0087.7525.00	VALVO	2222 640 51103	
C9	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 0007.3940.00	VALVO	2222 128 34229	
C10	CE 100UF+-20%35V RM5 ELECTROLYTIC CAPACITOR	0008.7510.00	PHILIPS_CO	2222 116 90042	
C12	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C13	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C14	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C15	CC 10PF+-0,25PF3X4NP0 CAPACITOR	CC 0087.6429.00	PHILIPS_CO	2222 678 10109	
C16	CC 150PF+-2%5X6N750 CAPACITOR	CC 0087.6929.00	PHILIPS_CO	2222 678 58151	
C17	CC 8,2PF+-0,25PF3X4NP0 CAPACITOR	CC 0087.6412.00	VALVO	2222 678	
C20	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C21	CC 6,8PF+-0,25PF3X4NP0 CAPACITOR	CC 0087.6406.00	PHILIPS_CO	2222 678	
C30	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C31	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C32	CK 4,7NF +-1% 63V RM5 KP POLYPROPYLENE CAPACITOR	0007.7630.00	ROEDERSTEI	KP1830-247 06 1 3 W	
C33	CK 4,7NF +-1% 63V RM5 KP POLYPROPYLENE CAPACITOR	0007.7630.00	ROEDERSTEI	KP1830-247 06 1 3 W	
C34	CK 18NF+-1%63V7,50AX13 KP CAPACITOR	CK 0099.1933.00	SIEMENS	B33531-A5183-F	
C35	CK 18NF+-1%63V7,50AX13 KP CAPACITOR	CK 0099.1933.00	SIEMENS	B33531-A5183-F	
C36	CK 330PF +-1% 100V RM5 KP POLYPROPYLENE CAPACITOR	CK 0007.7569.00	ROEDERSTEI	KP1830-133 01 1 3 W	
C37	CK 330PF +-1% 100V RM5 KP POLYPROPYLENE CAPACITOR	CK 0007.7569.00	ROEDERSTEI	KP1830-133 01 1 3 W	
C50	CK 470NF+-5%63V RD5H10MKT CAPACITOR	CK 0099.2975.00	ROEDERSTEI	MKT 1826-447-06-4	
C51	CK 68NF+-1%63V12X12X12 PP CAPACITOR	CK 0303.7067.00	SIEMENS	B33531-A5683-F	
C52	CK 470NF+-5%63V RD5H10MKT CAPACITOR	CK 0099.2975.00	ROEDERSTEI	MKT 1826-447-06-4	
C53	CK 330NF+-5%63VRD4,5H10 CAPACITOR	CK 0099.2969.00	ROEDERSTEI	MKT 1826-433-06-4	
C54	CK 820PF+-1%63V6,3QUX11KP CAPACITOR	CK 0340.6748.00	SIEMENS	B33531-A5821-F	
C55	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C56	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C57	CK 68NF+-1%63V12X12X12 PP CAPACITOR	CK 0303.7067.00	SIEMENS	B33531-A5683-F	
C58	CK 470NF+-5%63V RD5H10MKT CAPACITOR	CK 0099.2975.00	ROEDERSTEI	MKT 1826-447-06-4	
C59	CK 330NF+-5%63VRD4,5H10 CAPACITOR	CK 0099.2969.00	ROEDERSTEI	MKT 1826-433-06-4	
C60	CK 820PF+-1%63V6,3QUX11KP CAPACITOR	CK 0340.6748.00	SIEMENS	B33531-A5821-F	
C61	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	

Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C62	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C63	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C66	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 0022.0784.00	PHILIPS_CO	2222 630	
C70	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C71	CK 18NF+-1%63V7,50AX13 KP CAPACITOR	CK 0099.1933.00	SIEMENS	B33531-A5183-F	
C72	CK 150NF+-5%63VRD3,5H9MKT CAPACITOR	CK 0099.2946.00	ROEDERSTEI	MKT 1826-415-06-4	
C74	CK 200PF+-1%63V6,3QUX11KP CAPACITOR	CK 0341.8515.00	SIEMENS	B33531-A5201-F	
C77	CK 18NF+-1%63V7,50AX13 KP CAPACITOR	CK 0099.1933.00	SIEMENS	B33531-A5183-F	
C78	CK 150NF+-5%63VRD3,5H9MKT CAPACITOR	CK 0099.2946.00	ROEDERSTEI	MKT 1826-415-06-4	
C80	CK 200PF+-1%63V6,3QUX11KP CAPACITOR	CK 0341.8515.00	SIEMENS	B33531-A5201-F	
C86	CK 1UF+-5%50V7,5X5,5X10,5 CAPACITOR	CK 0099.2998.00	ERO	MKT 1826-510/054-R	
C91	CC 22PF+-2%4X5NP0 CAPACITOR	CC 0087.6464.00	PHILIPS_CO	2222 678	
C92	CC 22PF+-2%4X5NP0 CAPACITOR	CC 0087.6464.00	PHILIPS_CO	2222 678	
C93	CC 22PF+-2%4X5NP0 CAPACITOR	CC 0087.6464.00	PHILIPS_CO	2222 678	
C94	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C95	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C96	CC 22PF+-2%4X5NP0 CAPACITOR	CC 0087.6464.00	PHILIPS_CO	2222 678	
C100 ..107	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C108	CC 6,8PF+-0,25PF3X4NP0 CAPACITOR	CC 0087.6406.00	PHILIPS_CO	2222 678	
C109	CE 47UF+-20%50V RM5BIPOL ELECTROLYTIC CAPACITOR	CE 0008.9688.00	FROLYT	EKS28DC247H	
C110	CC 2,2PF+-0,25PF3X4NP0 CAPACITOR	CC 0087.6341.00	PHILIPS_CO	2222 678	
C112	CC 330PF+-2%6X9N750 CERAMIC CAPACITOR	CC 0087.6964.00	PHILIPS_CO	2222 678 58331	
C113	CC 470PF+-10%3X4R2000 CAPACITOR	CC 0087.6993.00	PHILIPS_CO	2222 630 51471	
C117	CK 1UF+-5%50V7,5X5,5X10,5 CAPACITOR	CK 0099.2998.00	ERO	MKT 1826-510/054-R	
C118	CK 1UF+-5%50V7,5X5,5X10,5 CAPACITOR	CK 0099.2998.00	ERO	MKT 1826-510/054-R	
C130 ..133	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C135	CE 10UF+-20% 63V RM5BIPOL ELECTROLYTIC CAPACITOR	CE 0008.9742.00	PHILIPS_CO	2222 036 92103	
C136	CC 2,7PF+-0,25PF3X4NP0 CERAMIC CAPACITOR	CC 0087.6358.00	PHILIPS_CO	2222 678	
C137	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C138	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C140	CE 10UF+-20%63V RD9XH12 ELECTROLYTIC CAPACITOR	0008.7910.00	PHILIPS_CO	2222 036 90362	
C141	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C142	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C143	CK 1UF+-5%50V7,5X5,5X10,5 CAPACITOR	CK 0099.2998.00	ERO	MKT 1826-510/054-R	
C144	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C145	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C146	CC 3,3PF+-0,25PF3X4NP0 CAPACITOR	CC 0087.6364.00	PHILIPS_CO	2222 678	
C147	CK 1UF+-5%50V7,5X5,5X10,5 CAPACITOR	CK 0099.2998.00	ERO	MKT 1826-510/054-R	
C148	CK 1UF+-5%50V7,5X5,5X10,5 CAPACITOR	CK 0099.2998.00	ERO	MKT 1826-510/054-R	

Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C150 ..153	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C154	CC 4,7NF+-10%6X9R2000 CAPACITOR	CC 0087.7102.00	PHILIPS_CO	2222 630 01 472	
C160	CE 100UF+-20%35V RM5 ELECTROLYTIC CAPACITOR	0008.7510.00	PHILIPS_CO	2222 116 90042	
C161	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C164	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C165	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 0007.3940.00	VALVO	2222 128 34229	
C166	CE 100UF+-20%35V RM5 ELECTROLYTIC CAPACITOR	0008.7510.00	PHILIPS_CO	2222 116 90042	
C167	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C168	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 0007.3940.00	VALVO	2222 128 34229	
C173	CE 100UF+-20%35V RM5 ELECTROLYTIC CAPACITOR	0008.7510.00	PHILIPS_CO	2222 116 90042	
C194	CC 4,7NF+-10%6X9R2000 CAPACITOR	CC 0087.7102.00	PHILIPS_CO	2222 630 01 472	
C195	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C196	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C230 ..233	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 0087.7525.00	VALVO	2222 640 51103	
C235	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C300	CE 47UF+-20%63V RM5 ELECTROLYTIC CAPACITOR	0008.7440.00	PHILIPS_CO	2222 116 90112	
C301	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C302	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C305	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C306	CE 47UF+-20%63V RM5 ELECTROLYTIC CAPACITOR	0008.7440.00	PHILIPS_CO	2222 116 90112	
C308	CC 47PF+-2%5X6NP0 CAPACITOR	CC 0087.6506.00	PHILIPS_CO	2222 678	
C309	CC 47PF+-2%5X6NP0 CAPACITOR	CC 0087.6506.00	PHILIPS_CO	2222 678	
C310	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C319	CK 100NF+-5%63VRD2,5H7MKT CAPACITOR	CK 0099.2930.00	ROEDERSTEI	MKT 1826-410-06-4W	
C382	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 0087.7525.00	VALVO	2222 640 51103	
D1	BL MM74HC00N 4X2IN.NAND QUAD 2-INPUT NAND GATE	0571.3194.00	PHILIPS_SE	(PC)74HC00N(P)	
D5	HS 27C256 PROGRAM (D5)	0819.3760.00			
D6	BL MM74HC175N 4XD-FF CL. QUAD D-FLIP-FLOP	0099.9528.00	PHILIPS_SE	(PC)74HC175N(P)	
D7	BL MM74HC175N 4XD-FF CL. QUAD D-FLIP-FLOP	0099.9528.00	PHILIPS_SE	(PC)74HC175N(P)	
D8	BL MM74HC273N 8XD-FF/REG OCTAL D-FLIPFLOP	0099.9611.00	PHILIPS_SE	(PC)74HC273N(P)	
D9	BJ DAC80-CPI-I 1X12B-DAC D/A-CONVERTER	0300.6330.00	BURR_BROWN	DAC80CBI-I	
D10	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	0099.9711.00	PHILIPS_SE	(PC)74HC4094N(P)	
D12	BL MM74HC4040N 12ST.B.CTR 12 STAGE BINARY COUNTER	0394.8784.00	PHILIPS_SE	(PC)74HC4040N(P)	
D13	BL MM74HC390N 2X4B.COUNT DUAL 4-BIT DECADE COUNTER	0099.9640.00	PHILIPS_SE	(PC)74HC390N(P)	
D14	BS DG211CJ 4X ANALOGSCH ANALOG SWITCH	0801.8260.00	SILICONIX	DG211CJ	
D15	BL MM74HC00N 4X2IN.NAND QUAD 2-INPUT NAND GATE	0571.3194.00	PHILIPS_SE	(PC)74HC00N(P)	
D16	BG CLA2116 ADDER1 ASIC GATE ARRAY	0801.8183.00	PLESSEY	CLA2116	
D17	BL PC74HCT08P 4X2IN AND QUAD 2-INPUT AND GATE	0571.3413.00	PHILIPS	(PC)74HCT08N(P)	
D20	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	0099.9711.00	PHILIPS_SE	(PC)74HC4094N(P)	

Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
D21	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	0099.9711.00	PHILIPS_SE	(PC)74HC4094N(P)	
D22	BJ AD7533CQ 1X10B-DAC D/A-CONVERTER	BJ 0300.8740.00	ANALOG_DEV	AD7533CQ(CD)	
D23	BS TL604CP 2X ANALOGSCH ANALOG SWITCH	BJ 0300.6199.00	TEXAS	TL604CP	
D30	BS DG211CJ 4X ANALOGSCH ANALOG SWITCH	0801.8260.00	SILICONIX	DG211CJ	
D31	BS DG211CJ 4X ANALOGSCH ANALOG SWITCH	0801.8260.00	SILICONIX	DG211CJ	
D32	BS DG211CJ 4X ANALOGSCH ANALOG SWITCH	0801.8260.00	SILICONIX	DG211CJ	
D33	BL MM74HC132N 4X2IN.NAND QUAD 2INP.NAND SCHMITT TR	0099.9557.00	PHILIPS_SE	(PC)74HC132N(P)	
D34	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	0099.9711.00	PHILIPS_SE	(PC)74HC4094N(P)	
D35	BL MM74HC00N 4X2IN.NAND QUAD 2-INPUT NAND GATE	0571.3194.00	PHILIPS_SE	(PC)74HC00N(P)	
D36	BL PC74HC123 2XMULTIVIB DUAL MONOST.MULTIVIBRATOR	0099.9540.00	PHILIPS_SE	(PC)74HC123N(P)	
D40	BS DG211CJ 4X ANALOGSCH ANALOG SWITCH	0801.8260.00	SILICONIX	DG211CJ	
D41	BS DG211CJ 4X ANALOGSCH ANALOG SWITCH	0801.8260.00	SILICONIX	DG211CJ	
D42	BS DG211CJ 4X ANALOGSCH ANALOG SWITCH	0801.8260.00	SILICONIX	DG211CJ	
D43	BL MM74HC00N 4X2IN.NAND QUAD 2-INPUT NAND GATE	0571.3194.00	PHILIPS_SE	(PC)74HC00N(P)	
D44	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	0099.9711.00	PHILIPS_SE	(PC)74HC4094N(P)	
D45	BL MM74HC132N 4X2IN.NAND QUAD 2INP.NAND SCHMITT TR	0099.9557.00	PHILIPS_SE	(PC)74HC132N(P)	
D46	BS TL604CP 2X ANALOGSCH ANALOG SWITCH	BJ 0300.6199.00	TEXAS	TL604CP	
D47	BL PC74HC123 2XMULTIVIB DUAL MONOST.MULTIVIBRATOR	0099.9540.00	PHILIPS_SE	(PC)74HC123N(P)	
D50	BL MM74HC4051N 8CH.AN.MUX 8CH.ANALOG MUX/DEMUX	0099.9670.00	PHILIPS	(PC)74HC4051N(P)	
D51	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	0099.9711.00	PHILIPS_SE	(PC)74HC4094N(P)	
D52	BL MM74HC165N 8B.SH.REG. 8 BIT SHIFT REGISTER	0641.7128.00	PHILIPS_SE	(PC)74HC165N(P)	
D53	BL MM74HC126N 4XBUFF. 3S QUAD BUFFER TRISTATE	0099.9792.00	PHILIPS_SE	(PC)74HC126N(P)	
D54	BL PC74HCT86P 4X2IN EXOR QUAD 2-INPUT EXOR GATE	0266.7228.00	PHILIPS	(PC)74HCT86N(P)	
D55	BL PC74HCT4075P 3X3IN ORG OR GATE	0811.7780.00	RCA	CD74HCT4075E	
D60	BL PC74HC238P 3TO8 L.DEC DECODER/DEMULTIPLEXER	0620.0847.00	PHILIPS	(PC)74HC238N(P)	
L1	LD 10 UH 10% 3R3 144 MA CHOKE	LD 0026.4184.00	DALE	IM2	
L17	LD 15,0UH10%2,800HMO,157A CHOKE	LD 0067.3001.00	DALE	IM2	
L18	LD 15,0UH10%2,800HMO,157A CHOKE	LD 0067.3001.00	DALE	IM2	
L160	LD 15,0UH10%2,800HMO,157A CHOKE	LD 0067.3001.00	DALE	IM2	
L161	LD 15,0UH10%2,800HMO,157A CHOKE	LD 0067.3001.00	DALE	IM2	
L162	LD 15,0UH10%2,800HMO,157A CHOKE	LD 0067.3001.00	DALE	IM2	
L300	LD 10 UH 10% 3R3 144 MA CHOKE	LD 0026.4184.00	DALE	IM2	
L301	LD 10 UH 10% 3R3 144 MA CHOKE	LD 0026.4184.00	DALE	IM2	
N1	BO LF411CN FET OPAMP OPERATIONAL AMPLIFIER	0349.3058.00	NSC	LF411CN	
N2	BO LF411CN FET OPAMP OPERATIONAL AMPLIFIER	0349.3058.00	NSC	LF411CN	
N3	BO LT318AJ8 OPAMP OPERATIONAL AMPLIFIER	0805.1454.00	LINEAR_TEC	LT 318 AJ8 /SL 30001	
N4	BO MC1558JG 2X OPAMP OPERATIONAL AMPLIFIER	0275.0816.00	TEXAS	MC1558JG	
N10	BO TL074IN LN 4XFET OPAMP OPERATIONAL AMPLIFIER	0568.7528.00	TEXAS	TL074IN	

Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
N15	BO LF411CN FET OPAMP OPERATIONAL AMPLIFIER	0349.3058.00	NSC	LF411CN	
N16	BO SE5534AFE LN OPAMP OPERATIONAL AMPLIFIER	BO 0301.3335.00	SIGNETICS	SE5534AFE	
N17	BO SE5534AFE LN OPAMP OPERATIONAL AMPLIFIER	BO 0301.3335.00	SIGNETICS	SE5534AFE	
N20	BO HA7-2525-5 OPAMP OPERATIONAL AMPLIFIER	0352.7544.00	HARRIS	HA7-2525-5	
N21	BO HA7-2525-5 OPAMP OPERATIONAL AMPLIFIER	0352.7544.00	HARRIS	HA7-2525-5	
N22	BO LF411CN FET OPAMP OPERATIONAL AMPLIFIER	0349.3058.00	NSC	LF411CN	
N23	BO LM119J 2X COMPAR COMPARATOR	0007.5337.00	LINEAR_TEC	LM119J (AJ)	
N30	BO LF411CN FET OPAMP OPERATIONAL AMPLIFIER	0349.3058.00	NSC	LF411CN	
N31	BO LF411CN FET OPAMP OPERATIONAL AMPLIFIER	0349.3058.00	NSC	LF411CN	
N32	BO LF411CN FET OPAMP OPERATIONAL AMPLIFIER	0349.3058.00	NSC	LF411CN	
N33	BO LF411CN FET OPAMP OPERATIONAL AMPLIFIER	0349.3058.00	NSC	LF411CN	
N34	BO LM119J 2X COMPAR COMPARATOR	0007.5337.00	LINEAR_TEC	LM119J (AJ)	
P1	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 4 PINS	FP 0242.3600.00	BINDER	742-11-0179-00-36	
P11	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR	FP 0242.3600.00	BINDER	742-11-0179-00-36	
P28	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 6 PINS	FP 0242.3600.00	BINDER	742-11-0179-00-36	
P34	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 5 PINS	FP 0242.3600.00	BINDER	742-11-0179-00-36	
R1	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R2	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R3	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R4	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 0082.2477.00	RESISTA	MK2	
R6	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 0082.1764.00	RESISTA	MK2	
R7	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 0082.1764.00	RESISTA	MK2	
R8	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 0082.1764.00	RESISTA	MK2	
R9	RL 0,60W 10,0 OHM+-1%TK50 RESISTOR	RL 0082.8852.00	RESISTA	MK2	
R11	RS 0,5W200 OHM+-10%10X10X CERMET POTENTIOMETER	RS 0247.7949.00	BI_TECHNOL	72X-R	
R12	RL 0,60W 909 OHM+-1%TK50 RESISTOR	RL 0083.0584.00	RESISTA	MK2	
R13	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R14	RL 0,60W 301 OHM+-1%TK50 RESISTOR	RL 0083.0210.00	RESISTA	MK2	
R15	RL 0,60W 332 OHM+-1%TK50 RESISTOR	RL 0083.0255.00	RESISTA	MK2	
R16	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 0082.6543.00	RESISTA	MK2	
R17	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R18	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R19	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 0087.7577.00	SPECTROL	63 M ... TO 10	
R20	RL 0,60W 681 OHM+-1%TK50 RESISTOR	RL 0083.0490.00	RESISTA	MK2	
R21	RL 0,35W2,05KOHM+-0,1%T25 RESISTOR	RL 0083.9746.00	DRALORIC	SMA0207	
R22	RL 0,35W1,87KOHM+-0,1%T25 RESISTOR	RL 0083.9669.00	DRALORIC	SMA0207	

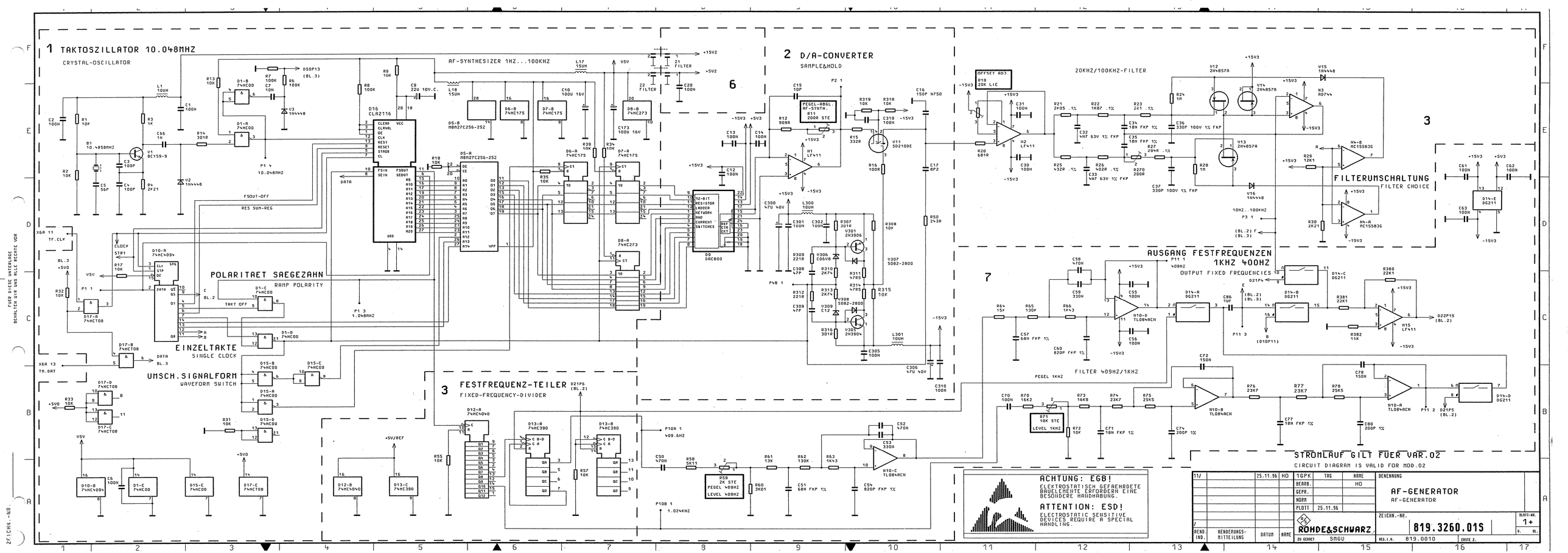
Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R23	RL 0,35W2,10KOHM+-0,1%T25 RESISTOR	RL 0083.9769.00	DRALORIC	SMA0207	
R24	RL 0,60W 1MOHM+-1%TK50 RESISTOR	RL 0082.7862.00	RESISTA	MK2	
R25	RL 0,35W432 OHM+-0,1%TK25 RESISTOR	RL 0083.8440.00	DRALORIC	SMA0207	
R26	RL 0,35W402 OHM+-0,1%TK25 RESISTOR	RL 0083.8385.00	DRALORIC	SMA0207	
R27	RL 0,35W294 OHM+-0,1%TK25 RESISTOR	RL 0083.8127.00	DRALORIC	SMA0207	
R28	RL 0,60W 1MOHM+-1%TK50 RESISTOR	RL 0082.7862.00	RESISTA	MK2	
R29	RL 0,60W 12,1KOHM+-1%TK50 RESISTOR	RL 0083.1351.00	RESISTA	MK2	
R30	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 0082.2477.00	RESISTA	MK2	
R31	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R32 ..35	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R39	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R50	RL 0,60W 243 OHM+-1%TK50 DEPOS.-CARBON RESISTOR	RL 0083.0126.00	RESISTA	MK2	
R55	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R57	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R58	RL 0,60W 5,11KOHM+-1%TK50 RESISTOR	RL 0082.2348.00	RESISTA	MK2	
R59	RS 0,5W2KOHM+-10%10X10X5 CERMET POTENTIOMETER	RS 0247.7961.00	SPECTROL	63X ... T010	
R60	RL 0,60W 3,01KOHM+-1%TK50 RESISTOR	RL 0083.0961.00	RESISTA	MK2	
R61	RL 0,60W 13,0KOHM+-1%TK50 RESISTOR	RL 0083.1368.00	RESISTA	MK2	
R62	RL 0,60W 130 KOHM+-1%TK50 RESISTOR	RL 0083.2093.00	RESISTA	MK2	
R63	RL 0,60W 1,43KOHM+-1%TK50 RESISTOR	RL 0083.0710.00	RESISTA	MK2	
R64	RL 0,60W 15,0KOHM+-1%TK50 RESISTOR	RL 0083.1400.00	RESISTA	MK2	
R65	RL 0,60W 130 KOHM+-1%TK50 RESISTOR	RL 0083.2093.00	RESISTA	MK2	
R66	RL 0,60W 1,43KOHM+-1%TK50 RESISTOR	RL 0083.0710.00	RESISTA	MK2	
R70	RL 0,60W 16,2KOHM+-1%TK50 RESISTOR	RL 0083.1439.00	RESISTA	MK2	
R71	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 0247.7526.00	SPECTROL	63X ... T010	
R72	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R73	RL 0,60W 16,9KOHM+-1%TK50 RESISTOR	RL 0083.1451.00	PHILIPS_CO	MRS 25	
R74	RL 0,60W 23,7KOHM+-1%TK50 RESISTOR	RL 0083.1568.00	RESISTA	MK2	
R75	RL 0,60W 25,5KOHM+-1%TK50 RESISTOR	RL 0083.1580.00	RESISTA	MK2	
R76	RL 0,60W 23,7KOHM+-1%TK50 RESISTOR	RL 0083.1568.00	RESISTA	MK2	
R77	RL 0,60W 23,7KOHM+-1%TK50 RESISTOR	RL 0083.1568.00	RESISTA	MK2	
R78	RL 0,60W 25,5KOHM+-1%TK50 RESISTOR	RL 0083.1580.00	RESISTA	MK2	
R90	RL 0,35W10,9KOHM+-0,1%T25 RESISTOR	RL 0084.3135.00	DRALORIC	SMA0207	
R91	RL 0,35W1,21KOHM+-0,1%T25 RESISTOR	RL 0083.9300.00	DRALORIC	SMA0207	
R92	RL 0,60W4,75 OHM+-1%TK50 METALFILMRESISTOR	RL 0099.8021.00	ROEDERSTEI	MK2	
R93	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R94	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R95	RL 0,60W 3,32KOHM+-1%TK50 RESISTOR	RL 0083.0990.00	RESISTA	MK2	
R96	RL 0,60W 5,11KOHM+-1%TK50 RESISTOR	RL 0082.2348.00	RESISTA	MK2	

Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R97	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R98	RL 0,60W 4,32KOHM+-1%TK50 RESISTOR	RL 0082.6572.00	RESISTA	MK2	
R99	RS 0,5W2KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 0247.7884.00	SPECTROL	63 M ... TO 10	
R100	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 0082.1764.00	RESISTA	MK2	
R101	RL 0,60W 604 OHM+-1%TK50 RESISTOR	RL 0082.2425.00	RESISTA	MK2	
R102	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R103	RL 0,60W 33,2KOHM+-1%TK50 RESISTOR	RL 0083.1674.00	RESISTA	MK2	
R104	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 0084.3729.00	DRALORIC	SMA0207	
R105	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 0084.3729.00	DRALORIC	SMA0207	
R106	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 0084.3729.00	DRALORIC	SMA0207	
R107	RL 0,60W 11,0KOHM+-1%TK50 RESISTOR	RL 0083.1322.00	RESISTA	MK2	
R109	RL 0,35W31,2KOHM+-0,1%T25 RESISTOR	RL 0084.4019.00	DRALORIC	SMA0207	
R111	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 0082.1764.00	RESISTA	MK2	
R112	RL 0,60W 8,25KOHM+-1%TK50 RESISTOR	RL 0083.1239.00	RESISTA	MK2	
R113	RL 0,60W 2,74KOHM+-1%TK50 RESISTOR	RL 0083.0926.00	RESISTA	MK2	
R116	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R119	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 0084.3729.00	DRALORIC	SMA0207	
R125	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 0087.7577.00	SPECTROL	63 M ... TO 10	
R126	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 0082.6543.00	RESISTA	MK2	
R127	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 0082.6543.00	RESISTA	MK2	
R128	RL 0,60W 475 OHM+-1%TK50 RESISTOR	RL 0083.0390.00	RESISTA	MK2	
R129	RL 0,60W 475 OHM+-1%TK50 RESISTOR	RL 0083.0390.00	RESISTA	MK2	
R130	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 0082.1764.00	RESISTA	MK2	
R132	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R136	RL 0,35W10,0KOHM+-0,1%T25 RESISTOR	RL 0084.3064.00	DRALORIC	SMA0207	
R137	RL 0,35W4,99KOHM+-0,1%T25 RESISTOR	RL 0084.2480.00	DRALORIC	SMA0207	
R138	RL 0,35W4,99KOHM+-0,1%T25 RESISTOR	RL 0084.2480.00	DRALORIC	SMA0207	
R139	RL 0,35W 1 KOHM+-0,1%TK25 RESISTOR	0083.9146.00	DRALORIC	SMA0207	
R140	RL 0,60W 12,1KOHM+-1%TK50 RESISTOR	RL 0083.1351.00	RESISTA	MK2	
R141	RL 0,35W10,0KOHM+-0,1%T25 RESISTOR	RL 0084.3064.00	DRALORIC	SMA0207	
R145	RL 0,35W39,7KOHM+-0,1%T25 RESISTOR	RL 0084.4219.00	DRALORIC	SMA0207	
R146	RL 0,35W412 OHM+-0,1%TK25 RESISTOR	RL 0083.8404.00	DRALORIC	SMA0207	
R147	RL 0,35W9,76KOHM+-0,1%T25 RESISTOR	RL 0084.3041.00	DRALORIC	SMA0207	
R148	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R149	RL 0,60W 274 KOHM+-1%TK50 RESISTOR	RL 0083.2364.00	RESISTA	MK2	
R150	RL 0,60W 274 KOHM+-1%TK50 RESISTOR	RL 0083.2364.00	RESISTA	MK2	
R151	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R160	RL 0,60W 100KOHM+-1%TK50 RESISTOR	RL 0082.1764.00	RESISTA	MK2	
R161	RL 0,60W 604 OHM+-1%TK50 RESISTOR	RL 0082.2425.00	RESISTA	MK2	

Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R162	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R163	RL 0,60W 33,2KOHM+-1%TK50 RESISTOR	RL 0083.1674.00	RESISTA	MK2	
R164	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 0084.3729.00	DRALORIC	SMA0207	
R165	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 0084.3729.00	DRALORIC	SMA0207	
R166	RS 0,3W 1KOHM+-10%CERMET TRIMMING POTENTIOMETER	RS 0006.6681.00	BECKMAN	67 W	
R167	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 0084.3729.00	DRALORIC	SMA0207	
R170	RL 0,35W100KOHM+-0,1%TK25 RESISTOR	RL 0084.4983.00	DRALORIC	SMA0207	
R171	RL 0,35W32,4KOHM+-0,1%T25 RESISTOR	RL 0084.4048.00	DRALORIC	SMA0207	
R174	RL 0,60W 11,0KOHM+-1%TK50 RESISTOR	RL 0083.1322.00	RESISTA	MK2	
R179	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R180	RL 0,60W 1,21KOHM+-1%TK50 RESISTOR	RL 0083.0655.00	RESISTA	MK2	
R181	RL 0,60W 15,0KOHM+-1%TK50 RESISTOR	RL 0083.1400.00	RESISTA	MK2	
R182	RL 0,60W 11,0KOHM+-1%TK50 RESISTOR	RL 0083.1322.00	RESISTA	MK2	
R185	RL 0,60W 2,21KOHM+-1%TK50 RESISTOR	RL 0082.2477.00	RESISTA	MK2	
R187	RL 0,60W 1,50KOHM+-1%TK50 RESISTOR	RL 0083.0732.00	RESISTA	MK2	
R188	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 0084.3729.00	DRALORIC	SMA0207	
R192	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R193	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 0082.6543.00	RESISTA	MK2	
R194	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R208	RL 0,35W10,0KOHM+-0,1%T25 RESISTOR	RL 0084.3064.00	DRALORIC	SMA0207	
R209	RL 0,35W4,99KOHM+-0,1%T25 RESISTOR	RL 0084.2480.00	DRALORIC	SMA0207	
R210	RL 0,35W4,99KOHM+-0,1%T25 RESISTOR	RL 0084.2480.00	DRALORIC	SMA0207	
R211	RL 0,35W 1 KOHM+-0,1%TK25 RESISTOR	0083.9146.00	DRALORIC	SMA0207	
R212	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 0084.3729.00	DRALORIC	SMA0207	
R215	RL 0,35W39,7KOHM+-0,1%T25 RESISTOR	RL 0084.4219.00	DRALORIC	SMA0207	
R216	RL 0,35W417 OHM+-0,1%TK25 RESISTOR	RL 0083.8410.00	DRALORIC	SMA0207	
R217	RL 0,35W9,76KOHM+-0,1%T25 RESISTOR	RL 0084.3041.00	DRALORIC	SMA0207	
R218	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R219	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R220	RL 0,60W 274 KOHM+-1%TK50 RESISTOR	RL 0083.2364.00	RESISTA	MK2	
R221	RL 0,60W 274 KOHM+-1%TK50 RESISTOR	RL 0083.2364.00	RESISTA	MK2	
R230	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R231	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R233	RL 0,60W 20,0KOHM+-1%TK50 RESISTOR	RL 0083.1522.00	RESISTA	MK2	
R234	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R235	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R236	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R237	RL 0,60W 2,74KOHM+-1%TK50 RESISTOR	RL 0083.0926.00	RESISTA	MK2	
R238	RL 0,60W 8,25KOHM+-1%TK50 RESISTOR	RL 0083.1239.00	RESISTA	MK2	

Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R241	RL 0,60W 8,25KOHM+-1%TK50 RESISTOR	RL 0083.1239.00	RESISTA	MK2	
R242	RL 0,60W 2,74KOHM+-1%TK50 RESISTOR	RL 0083.0926.00	RESISTA	MK2	
R243	RL 0,60W 2,74KOHM+-1%TK50 RESISTOR	RL 0083.0926.00	RESISTA	MK2	
R244	RL 0,60W 8,06KOHM+-1%TK50 RESISTOR	RL 0083.1222.00	RESISTA	MK2	
R245	RL 0,60W 1,21KOHM+-1%TK50 RESISTOR	RL 0083.0655.00	RESISTA	MK2	
R246	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R248	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R250	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R251	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R252	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R260	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 0087.7577.00	SPECTROL	63 M ... TO 10	
R261	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R270	RS 0,3W 200 OHM+-10%CERM. TRIMMING POTENTIOMETER	RS 0006.6669.00	BECKMAN	67 W	
R271	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 0082.6543.00	RESISTA	MK2	
R272	RL 0,60W 475 OHM+-1%TK50 RESISTOR	RL 0083.0390.00	RESISTA	MK2	
R273	RL 0,60W 475 OHM+-1%TK50 RESISTOR	RL 0083.0390.00	RESISTA	MK2	
R274	RL 0,60W 100 OHM+-1%TK50 RESISTOR	RL 0082.6543.00	RESISTA	MK2	
R275	RL 0,60W 8,25KOHM+-1%TK50 RESISTOR	RL 0083.1239.00	RESISTA	MK2	
R276	RL 0,60W 2,74KOHM+-1%TK50 RESISTOR	RL 0083.0926.00	RESISTA	MK2	
R307	RL 0,60W 301 OHM+-1%TK50 RESISTOR	RL 0083.0210.00	RESISTA	MK2	
R308	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R309	RL 0,60W 221 OHM+-1%TK50 RESISTOR	RL 0083.0084.00	RESISTA	MK2	
R310	RL 0,60W 2,74KOHM+-1%TK50 RESISTOR	RL 0083.0926.00	RESISTA	MK2	
R311	RL 0,60W 47,5 OHM+-1%TK50 RESISTOR	RL 0082.9507.00	RESISTA	MK2	
R312	RL 0,60W 221 OHM+-1%TK50 RESISTOR	RL 0083.0084.00	RESISTA	MK2	
R313	RL 0,60W 2,74KOHM+-1%TK50 RESISTOR	RL 0083.0926.00	RESISTA	MK2	
R314	RL 0,60W 47,5 OHM+-1%TK50 RESISTOR	RL 0082.9507.00	RESISTA	MK2	
R315	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R316	RL 0,60W 301 OHM+-1%TK50 RESISTOR	RL 0083.0210.00	RESISTA	MK2	
R318	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R319	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R338	RL 0,60W 1KOHM+-1%TK50 RESISTOR	RL 0082.2160.00	RESISTA	MK2	
R343	RL 0,60W 10,0KOHM+-1%TK50 RESISTOR	RL 0083.1297.00	RESISTA	MK2	
R344 ..347	RL 0,60W 3,32KOHM+-1%TK50 RESISTOR	RL 0083.0990.00	RESISTA	MK2	
R380	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 0083.1545.00	RESISTA	MK2	
R381	RL 0,60W 22,1KOHM+-1%TK50 RESISTOR	RL 0083.1545.00	RESISTA	MK2	
R382	RL 0,60W 11,0KOHM+-1%TK50 RESISTOR	RL 0083.1322.00	RESISTA	MK2	
R383	RL 0,60W 4,75KOHM+-1%TK50 RESISTOR	RL 0083.1097.00	RESISTA	MK2	

Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V1	AK BCY59IX N 45V 200MA TRANSISTOR	AK 0010.5163.00	VALVO	BCY59IX	
V2	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V3	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V11	AM SD210DE N-E 30V MOSF MOS-FET	0844.7637.00	SILICONIX	SD210DE	
V12	AM 2N4857A N-D 40V JFET FET	0092.9422.00	PHILIPS_SE	2N4857A(LV3683)	
V13	AM 2N4857A N-D 40V JFET FET	0092.9422.00	PHILIPS_SE	2N4857A(LV3683)	
V14	AM 2N4857A N-D 40V JFET FET	0092.9422.00	PHILIPS_SE	2N4857A(LV3683)	
V15	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V16	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V25	AE BZX55/B8V2 0,5W ZDI ZENER DIODE	AE 0012.2178.00	VALVO	BZX79B8V2	
V26	AE BZX55/B8V2 0,5W ZDI ZENER DIODE	AE 0012.2178.00	VALVO	BZX79B8V2	
V30	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V31	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V40	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V41	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V42	AE 1N827 6,2V REFDI REFERENCE DIODE	AE 0418.0029.00	COMPENSATE	1N827(A)	
V43 ..46	AE BZX55/B8V2 0,5W ZDI ZENER DIODE	AE 0012.2178.00	VALVO	BZX79B8V2	
V50	AE BZX55/B4V7 0,5W ZDI ZENER DIODE	AE 0080.4014.00	VALVO	BZX79B4V7	
V97	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V98	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V260	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V261	AD 1N4448 75V UDI DIODE	AD 0012.0700.00	PHILIPS_SE	1N4448 "	
V301	AK 2N3906 P 40V 200MA TRANSISTOR	0010.3225.00	MOTOROLA	2N3906	
V305	AK 2N3904 N 40V 200MA TRANSISTOR	0010.4996.00	FAIRCHILD	2N3904	
V306	AE BZX79/B6V8 0,5W ZDI ZENER DIODE	AE 0586.9906.00	PHILIPS	BZX79B6V8	
V307	AE 5082-2800 SCHOTTKY DIODE	AE 0012.9066.00	HEWLETT_PA	5082-2800	
V308	AE 5082-2800 SCHOTTKY DIODE	AE 0012.9066.00	HEWLETT_PA	5082-2800	
V309	AE BZX55/B12 0,5W ZDI ZENER DIODE	AE 0218.8940.00	VALVO	BZX79B12	
X2	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR	FP 0242.3600.00	BINDER	742-11-0179-00-36	
X3	FP STIFTLEISTE 36P.R2,54 PIN CONNECTOR 3 PINS	FP 0242.3600.00	BINDER	742-11-0179-00-36	
X6	FP STECKERLEISTE 32POL. MULTIPOINT CONNECTOR	FP 0514.4550.00	SIEMENS	V42254-B1200-B641	
Z1	LD 10GHZ 50DB100V10A4RDX9 LEAD-THROUGH FILTER	LD 0451.4636.00	SPECTRUM	51-713-036	
Z2	LD 10GHZ 50DB100V10A4RDX9 LEAD-THROUGH FILTER	LD 0451.4636.00	SPECTRUM	51-713-036	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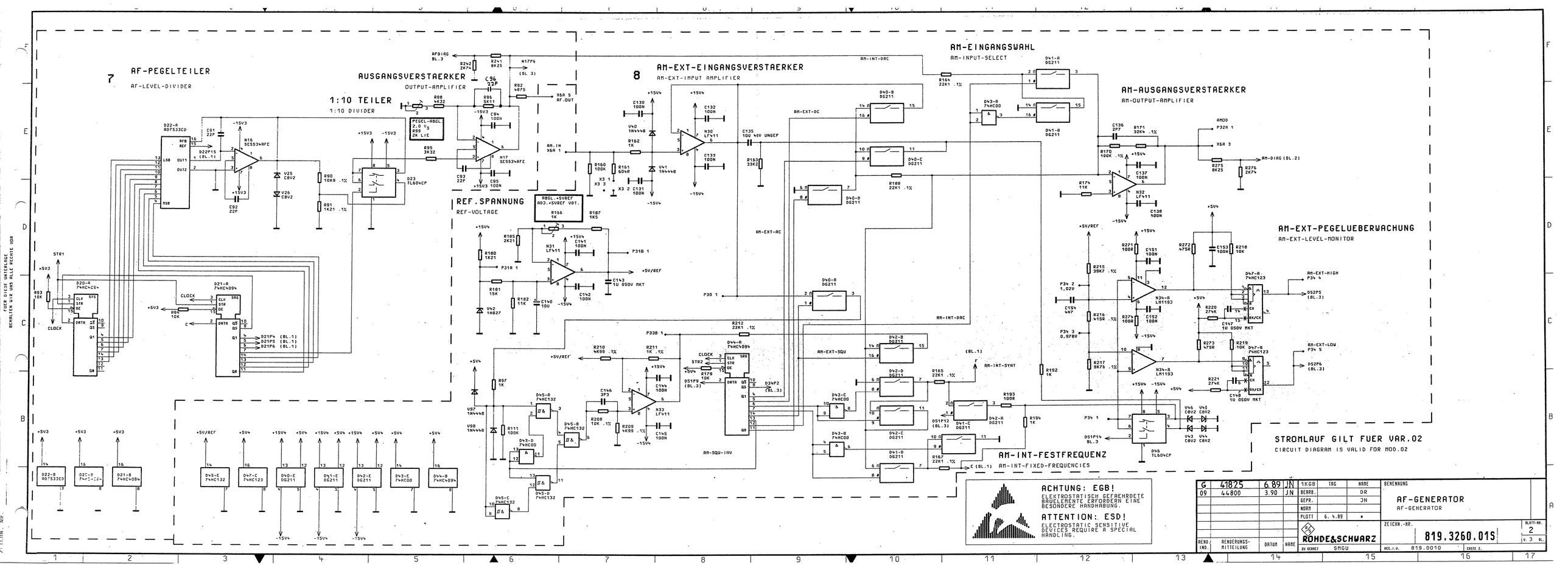
CRYSTAL-OSCILLATOR
10.048MHZ
FSOUT-OFF
RES SUN-REG
POLARITAET SAEGEZAHN
RAMP POLARITY
EINZELTAKTE
SINGLE CLOCK
UMSCH.SIGNALFORM
WAVEFORM SWITCH
AF-SYNTHESIZER 1HZ...100KHZ
2 D/A-CONVERTER
SAMPLE&HOLD
PEGEL-ABGL. AF-SYNTH.
12-BIT RESISTOR LADDER NETWORK AND CURRENT SWITCHES
DAC800
20KHZ/100KHZ-FILTER
FILTERUMSCHALTUNG
FILTER CHOICE
AUSGANG FESTFREQUENZEN 1KHZ 400HZ
OUTPUT FIXED FREQUENCIES
FILTER 409HZ/1KHZ
PEGEL 1KHZ
3 FESTFREQUENZ-TEILER
FIXED-FREQUENCY-DIVIDER
PEGEL 409HZ
LEVEL 409HZ
LEVEL 1KHZ
ACHTUNG: EGB!
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING.
STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02
AF-GENERATOR
AF-GENERATOR
ROHDE&SCHWARZ
819.3260.01S
819.0010
SNGU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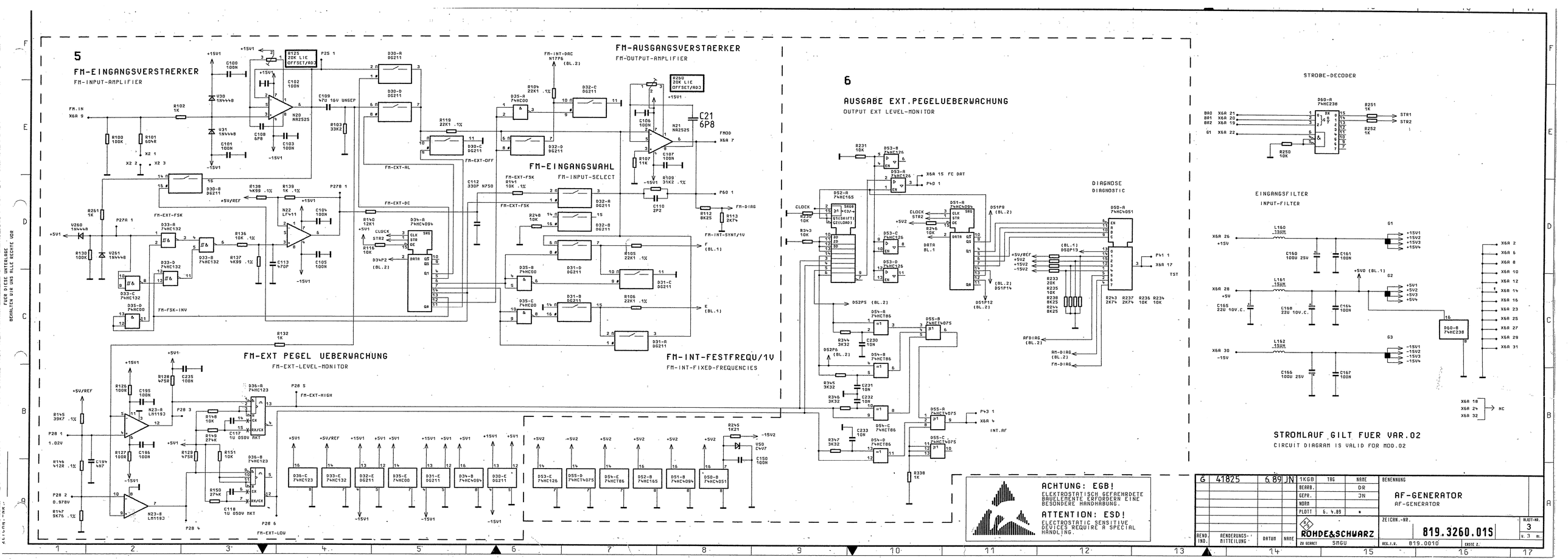
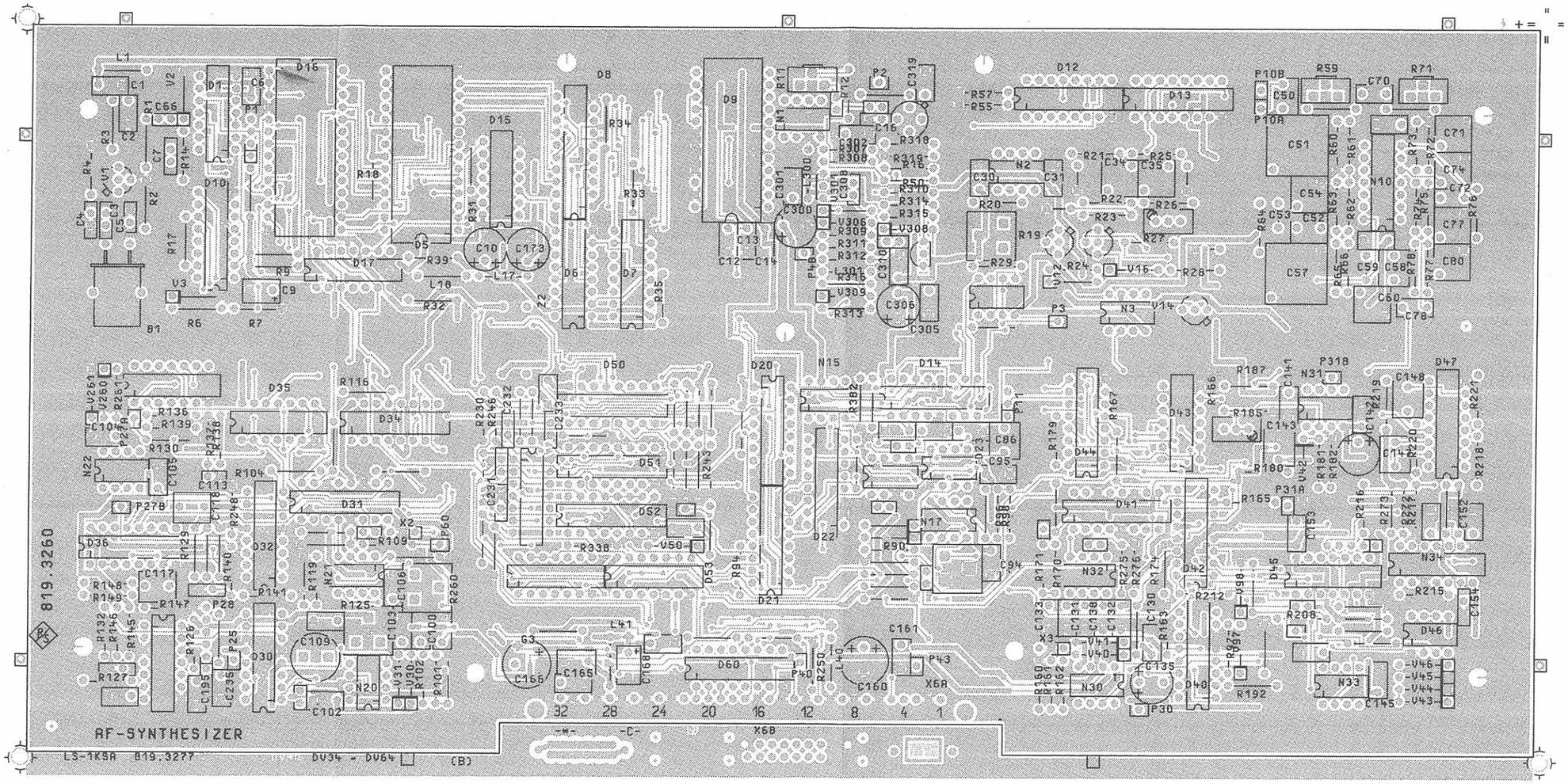
AF-PEGELTEILER
AF-LEVEL-DIVIDER
AUSGANGSVERSTAERKER
OUTPUT-AMPLIFIER
1:10 TEILER
1:10 DIVIDER
8
AM-EXT-EINGANGSVERSTAERKER
AM-EXT-IMPUT AMPLIFIER
AM-EINGANGSWAHL
AM-INPUT-SELECT
AM-AUSGANGSVERSTAERKER
AM-OUTPUT-AMPLIFIER
REF.SPANNUNG
REF-VOLTAGE
AM-EXT-PEGELUEBERWACHUNG
AM-EXT-LEVEL-MONITOR
AM-INT-FESTFREQUENZ
AM-INT-FIXED-FREQUENCIES
AM-SQU-INV
STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02
ACHTUNG: EGB!
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING.
AF-GENERATOR
AF-GENERATOR
ROHDE&SCHWARZ
819.3260.01S
819.0010
SMGU
FUER DIESE UNTERLAGE BEHALTEN WIR UNS ALLE RECHTE VOR


5
FM-EINGANGSVERSTAERKER
FM-INPUT-AMPLIFIER
FM-AUSGANGSVERSTAERKER
FM-OUTPUT-AMPLIFIER
FM-EINGANGSWAHL
FM-INPUT-SELECT
FM-EXT PEGEL UEBERWACHUNG
FM-EXT-LEVEL-MONITOR
FM-INT-FESTFREQU/1V
FM-INT-FIXED-FREQUENCIES
6
AUSGABE EXT.PEGELUEBERWACHUNG
OUTPUT EXT LEVEL-MONITOR
DIAGNOSE
DIAGNOSTIC
STROBE-DECODER
EINGANGSFILTER
INPUT-FILTER
STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02
ACHTUNG: EGB!
ELEKTROSTATISCH GEFAEHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING.
AF-GENERATOR
AF-GENERATOR
ROHDE&SCHWARZ
819.3260.015
819.0010

Ansicht und Leitungsführung Bauteilseite
View of tracks on component side

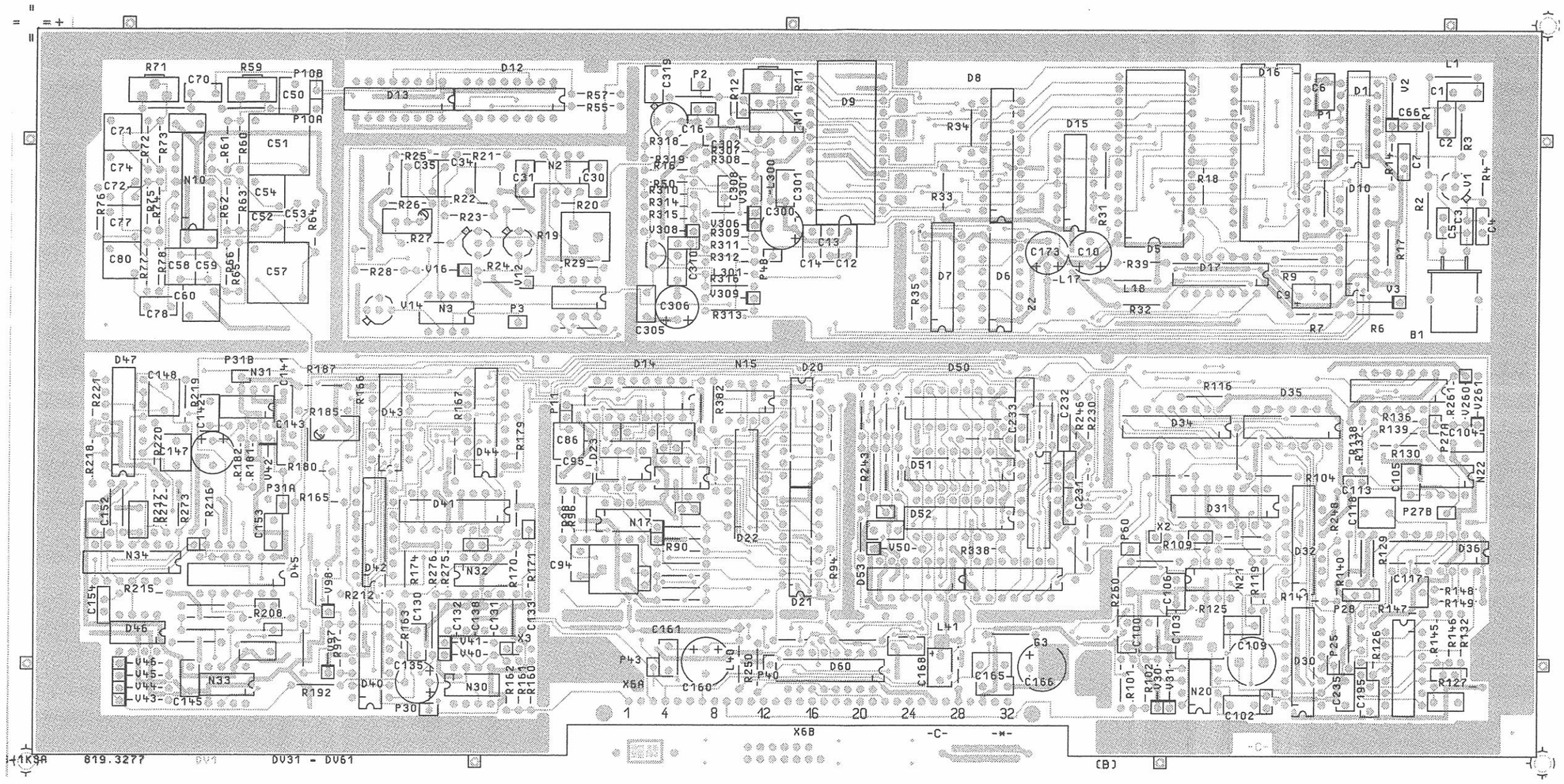


ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION ESD!
Electrostatic sensitive devices require a special handling.
(hierzu HVC250)

I	41825	6.89	JN	Maße ohne Toleranzangabe		Maßstab 1 : 1
						Halbzeug, Werkstoff
				1KGB	Tag	Name
				Bearb.	04.89	JN
				Gepr.		
				Norm		
				ROHDE&SCHWARZ		Zeichn.-Nr. 819.3260
				zu Gerät SMGU		reg. i. V. 819.0010 V
And. Zust.	Änderungs-Mitteilung	Tag	Name			erste Z.

Benennung: AF - GENERATOR
Z
Blatt-Nr. 2 v. Bl.

Ansicht und Leitungsführung Lötseite
View of tracks on solder side



I	41825	6.89	JN	Maße ohne Toleranzangabe		Maßstab 1 : 1
						Halbzeug, Werkstoff
				1KGB	Tag	Name
				Bearb.	04.89	JN
				Gepr.		
				Norm		
				ROHDE & SCHWARZ		Zeichn.-Nr. 819.3260
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU		reg. i. V. 819.0010 V

Benennung: AF - GENERATOR | Z

Blatt-Nr. 3 v. Bl

erste Z.

ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION ESD!
Electrostatic sensitive devices require a special handling.
(hierzu HVC 250)