



ROHDE & SCHWARZ

Measuring Instruments
and Systems Division

Service Manual

SIGNAL GENERATOR

SMHU

0.1 to 4320 MHz

835.8011.52

VOLUME 1

The service manual consists of 2 volumes

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4 Service Manual for Complete Instrument

4.1 Function Description

(See function diagram 835.8011 F5)

The Signal Generator SMHU uses indirect synthesis to generate the output signal. All oscillators are synchronized in the unmodulated state to the (internal or external) reference frequency by means of phase locked loops so that the output signal has the same stability.

This type of synthesis generates frequencies from 1000 to 2160 MHz. Lower frequencies are generated by dividing or mixing with a synchronous fixed frequency.

Frequencies above 2.61 GHz are generated by means of a frequency doubler.

The output level is held constant by a fast control circuit which also generates the amplitude modulation. The control voltage is stored for the pulse modulation so that there are no limitations on the pulse width.

A frequency-modulated LC oscillator is used for frequency modulation instead of a crystal oscillator. The centre frequency of the LC oscillator is also synchronized to the reference frequency by means of a control circuit. This circuit also makes a drift-free FM DC mode possible.

4.1.1 RF Synthesis

The three oscillators which generate the frequency band of 1000 to 2160 MHz (module A 11, RF oscillators) are synchronized with the 25th to 54th harmonics of a reference signal of approx. 40 MHz which can be adjusted such that the changeover from the first harmonic used (the 25th) to the second used (the 26th) is continuous.

This reference signal is generated at 320 to 333 MHz, divided by 8 and used to generate the harmonics.

The reference frequency is synthesized in two stages in order to achieve high spectral purity.

The fine resolution is generated in a synthesis circuit with a fractional division factor with 8 places after the decimal point (module A 7, FRN synthesis). An 8:1 frequency division increases their spectral purity but limits the range of variation such that a further synthesis stage is required whose step size corresponds to the divided variation range (module A 8, step synthesis/FM stage). An initial summing loop (module A 10, summing loops) combines these signals and generates a frequency band of approx. 20 to 33 MHz. In a second summing loop (module A 10, summing loops), a fixed frequency of 300 MHz is added (from module A 9, fixed frequencies) which is generated in the unmodulated state by crystal oscillators. With FM, a frequency-modulated 40-MHz signal is also included (from module A 8, step synthesis/FM stage).

In order to retain the complete output frequency band, the RF oscillators are followed by an RF divider chain (in module A 13, output unit) which can set divider factors from 2 to 64 in steps of 2. Frequencies up to approx. 15 MHz can then be generated. A filter bank (module A 12) is provided because of the square-wave output signal of the dividers and contains lowpass filters at intervals of half an octave.

The filter bank applies the signal to the doubler (A163) which contains a level control element and three bandpass filters for suppressing harmonics and subharmonics.

The frequencies below 15 MHz are generated by mixing with a fixed frequency of 130 MHz from a crystal oscillator (on module A 9, fixed frequencies). There is a special function for switching over to a fixed frequency of 520 MHz. Thus frequencies up to 125 MHz can be generated by mixing. An FM deviation four times as large is thus possible in this band as a result of the smaller divider factor for generation of the RF frequency for the mixer.

4.1.2 Level Control and Amplitude Modulation

The level control and amplitude modulation functions are linked, the AM represents the AC voltage component of the target voltage for the amplitude control loop.

The level control element is an attenuator with PIN diodes which is driven by a PI controller (module A 13, output unit). The respective control voltage can be measured and stored digitally in order to obtain an exact output level with pulse modulation as well.

The output level is measured with a resistive directional coupler at the output of the 4.4 GHz RF Amplifier (A162). This ensures that level and output impedance are correct.

4.1.3 Frequency Modulation

The centre frequency of the modulated 40-MHz oscillator on module A 8 (step synthesis/FM stage) is stabilized by a slow control circuit so that the modulation contents are not influenced with FM AC. In the case of FM DC, the modulation contents are connected to the integrator of the control with the opposite phase to the measured value of the discriminator so that a correction signal is only generated if there is a deviation from the target value. The control loop remains closed and enables drift-free FM DC.

4.1.4 Internal Modulation Sources

The module A 6, AF synthesis, contains two generators, an AF synthesizer from 1 Hz to 100 kHz with a resolution of 1 Hz and a fixed-frequency generator which is switchable from 409.6 to 1024 Hz. Both generators can be used for both modulation modes and as an output signal at the AF connector. Thus e.g. simultaneous AM and FM with different modulation frequencies or internal two-tone modulation are possible.

4.1.5 Controller

The module A 5 (controller) controls all routines in the SMHU. The microprocessor calculates the settings for the modules from the data input from the keyboard/display (A 3) or from the IEC 625/IEEE 488 interface. It then passes them on via an internal serial data bus. All functions except the AC power switch can be remote-controlled. The device status can be polled using the talker function.

4.1.6 Self-monitoring and Diagnostics

All control loops trigger an alarm if the control voltages are out of range. The module A 5 (controller) contains an analog/digital converter with which 70 internal test points can be interrogated, thus enabling the fault to be limited to one particular module even before opening the instrument.

4.2 Mechanical Design

The front panel, rear panel with power supply and a motherboard are fitted in a die-cast frame. The motherboard establishes the signal connections between the various modules which are inserted into it from above and held by guide rails. A locking assembly accessible from below prevents the modules from sliding out in transit. The RF connections are also located at the bottom. The RF amplifier (A162), the doubler (A163) and the precision attenuator (A18) are accommodated in a space at the side.

The Service Kit SMGU-Z2 contains all parts required to access the modules for servicing.

4.2.1 List of Modules

A 2	Motherboard
A 3	Keyboard/display
A 4	Power supply
A 5	Controller
A 6	AF generator
A 7	FRN synthesis
A 8	Step synthesis/FM
A 9	Fixed frequencies
A 10	Summing loops
A 11	RF oscillators
A 12	Filter bank
A 13	Output section
A 162	RF amplifier 4.4 GHz
A 163	Doubler
A 18	Precision attenuator

4.3 Testing and Adjustment

4.3.1 Summary of Adjustment Points and Calibration Routines for the Complete Instrument

Adjustment	On module	S. Section
Pulse amplitude	RF oscillators (A11)	4.4.1
AM 100 %	Output section (A13)	4.4.2
500-MHz detector linearity	RF amplifier (A162)	4.4.3
4-MHz detector linearity	Output section (A13)	4.4.4
Level below 5 MHz	Output section (A13)	4.4.5
Calibration routine for RF level		4.4.6
Internal reference frequency	Fixed frequencies (A9)	4.4.7
FM deviation	Step synthesis/FM (A8)	4.4.8
Calibration routine for presetting of summing loop 1		4.4.9
Calibration routine for special function 7		4.4.10
Calibration routine for the level before the doubler		4.4.11

4.3.2 Adjustments and Calibration Routines following Module Repair or Replacement

The calibration routine for the special function 7 (4.4.10) should be used each time a repair is made (instrument warmed-up), especially after work on the controller and on the modules from A11 onwards (RF oscillators).

Replacement of module	Adjustment/calibration	S. Section
A 5 Controller	Calibration routine for RF level	4.4.6
	Calibration routine for A10	4.4.9
A 6 AF generator	AM 100 %	4.4.2
	Calibration routine for RF level	4.4.6
A 8 Step synthesis/FM	FM deviation	4.4.8
A 9 Fixed frequencies	Internal reference frequency	4.4.7
A 10 Summing loops	Pulse amplitude	4.4.1
	Calibration routine for A10	4.4.9
A 11 RF oscillators	Pulse amplitude	4.4.1
	Calibration routine for the level before the doubler	
A 12 Filter bank	Calibration routine for the level before the doubler	4.4.11
A 13 Output section	AM 100 %	4.4.2
	4-MHz detector linearity	4.4.4
	Level below 5 MHz	4.4.5
	Calibration routine for RF level	4.4.6
	Calibration routine for the level before the doubler	
A 162 RF amplifier	500-MHz detector linearity	4.4.3
	Calibration routine for RF level	4.4.6
A 163 Doubler	Calibration routine for the level before the doubler	4.4.11

4.4 Adjustment Points and Calibration Routines

Caution!

Always switch the instrument off before removing or inserting modules. Replacing modules with the power switched on may lead to destruction of the data transfer modules.

4.4.1 Pulse Amplitude

- Make module A11 (RF oscillators) accessible using service adapter.
- Using special function 155 (diagnostics), measure the pulse amplitude at a frequency setting of 1020 MHz.
- Adjust for maximum voltage using potentiometer R106. It should be more than 3 V.

4.4.2 AM 100 %

This adjustment need only be carried out if the high modulation depths are inaccurate when AM is selected or if the dynamic range is insufficient when AM-square, 100 % is used.

- Make module A 13 (output unit) accessible using service adapter.
- Open cover on component side (opposite to front panel).
- Connect oscilloscope to test point P43.
- Set AM 100 % and AF 1 kHz on the SMHU.
- Use R403 to adjust the DC component such that the minimum of the sinewave signal touches the zero line. To achieve a high accuracy, use the complete screen or even better only display lower half of signal.

4.4.3 500-MHz Detector Linearity

The adjustment is made at the RF amplifier (A162). The tuning elements are accessible after removing the carrying handle.

First adjust AM distortion using potentiometer R72 (AM linear):

- Connect a power meter and a modulation analyzer with distortion meter to the RF output of the SMHU via a 6-dB power divider.
- Select an RF of 500 MHz and set a level of 1 dBm on the SMHU power meter.
- Switch on AM INT with 80% modulation depth at 1 kHz AF.
- Switch on special function 1 (uninterrupted level adjustment).
- Note the level on the power meter as the reference value.
- Adjust the AM distortion to a minimum (< 2%).
- Reduce the level on the SMHU by 10 or 20 dB. Check the reduction on the power meter and correct in the case of deviations > 1 dB, using R85 (U-DET linear). After both reductions repeat the distortion adjustment. Now set the linearity of the electronic level adjustment using potentiometer R85 (U-DET linear):
- Connect power meter to RF output connector.
- Set 500 MHz, 13 dBm, unmodulated on the SMGU and adjust the electronic level setting to 0 dB using special function 76. Measure the output level and note it as the reference value.
- Adjust the electronic level setting for -25 dB using special function 77 and measure the level again.
- Adjust the level to 25 ± 0.1 dB below the reference using R85. Repeat the adjustment until a difference in level of 25 ± 0.2 dB is achieved.

4.4.4 4-MHz Detector Linearity

- Make module A 13 (output unit) accessible using service adapter.
- Connect power meter to RF output connector.
- Set 4 MHz, 13 dBm, unmodulated on the SMHU and adjust the electronic level setting to 0 dB using special function 76. Measure the output level and note it as the reference value.
- Adjust the electronic level setting to -25 dB using special function 77 and measure the level again. If necessary, adjust the level to 25 ± 0.1 dB below the reference value using R314.

Repeat the adjustment until a difference in level of 25 ± 0.2 dB is achieved.

4.4.5 Level at Frequencies below 5 MHz

- Expose module A 13 (output unit) using service adapter.
- Connect power meter to RF output connector.
- Set 5.1 MHz, 0 dBm, unmodulated on the SMHU and switch off the level correction using special function 55.
- Measure the output level and note it.
- Reduce the frequency to 4.9 MHz and set the same level again ± 0.1 dB using potentiometer R362.
- **Caution:** following this adjustment, always carry out the RF level calibration routine as in 4.4.6.

4.4.6 Calibration Routine for RF Level

This calibration routine generates a correction table in the EEPROM of the controller by means of which the inaccuracies of the electronic level setting can be kept to a minimum by specifying a corresponding setpoint. The controller specifies the test points at which the setpoint is set using an accurate power meter.

- Connect power meter to RF output connector.
- Select calibration routine on SMHU using special function 51.
- Vary the level at each test point using the spinwheel until the power meter also displays the value shown on the left in the level display as accurately as possible. The correction value is then shown in the right half of the level display. The value is stored by pressing an ENTER/UNITS key; the next test point set. The bottom STEP key can be used to repeat the last test point is selected. The top STEP key can be used to skip a test point if a correction is unnecessary.

87 calibration points are gone through. The routine is automatically left after the last calibration point, or at any time using SHIFT PRESET.

4.4.7 Internal Reference Frequency

- Switch on internal reference on SMHU (RF INT/ON).
- Connect calibrated frequency counter to REF connector at rear of instrument.
- After a warm-up time of half an hour, set the nominal frequency using the trimmer INT. REF. 10 MHz on module A 9 (fixed frequencies). The adjustment can be carried out with the module fitted.

4.4.8 FM Deviation

Set RF 100 MHz, LEV 0 dBm, FM INT 55.2 kHz, AF 10 kHz on the SMHU. Connect a spectrum analyzer to the RF output connector and display the signal with a 50-kHz span. Measure the carrier with the FM switched off and note it as the reference. The carrier must be suppressed by at least 35 dB with the FM switched on. If necessary, adjust the carrier to a minimum using R30 on A8 (step synthesis/FM). Expose the module using Service Kit SMHU-Z2.

4.4.9 Calibration Routine for Presetting of Summing Loop 1

The VCO in the first summing loop is synchronized using a presetting. This is read from a table in the EEPROM of the controller (A5) where it can also be restored using a calibration routine. This is carried out by calling special function 67. The routine must be called following a repair or module replacement A9 (summing loops) and A5 (controller) or if the error message 67 appears when the STATUS key (with flashing LED) is pressed.

4.4.10 Calibration Routine for Special Function 7

In the case of level settings without control (special function 5, pulse modulation), special function 7 selects the control voltages from a table in the EEPROM of the controller. These values can be regenerated using special function 68 without additional instruments. This calibration routine should always be called following repairs on the controller (A5) and on all modules from A11 upwards (RF oscillators).

4.4.11 Calibration routine for level before the doubler

Since the doubler comprises a level control element, the control element in the output section is set via a separate D/A converter such that the doubler is driven at a constant input level. For this purpose, a table is provided in the controller EEPROM. It can be overwritten with the calibration routine which uses the internal diagnostics facility, by calling up special routine 66. During the call, SPECIAL 66 appears in the left display, then the previous display is restored.

4.5 Troubleshooting

4.5.1 Self-monitoring

An alarm is triggered on the controller - indicated by a flashing status LED - if the control voltage in a loop is out of range. One or more error codes are then displayed by pressing the status key. The error codes have the following meanings:

Error number	Meaning
40	40-MHz crystal oscillator (A9) asynchronous
41	130-MHz crystal oscillator (A9) asynchronous
42	FRN synthesis (A7) asynchronous
43	Step synthesis (A8) asynchronous
44	1st summing loop (A10) asynchronous
45	FM oscillator (A8) asynchronous
46	2nd summing loop (A10) asynchronous
47	RF oscillators (A11) asynchronous
48	Level control (A13) faulty
61	Data error in EPROM
62	Error in RAM
63	Error in a stored instrument setting
64	Error in a memory for special function 45
65	Error in the EEPROM level correction table
67	Error in the EEPROM table for presetting of A10
66	Error in the EEPROM table for level before the doubler
68	Error in the EEPROM table for special function 7
70	Triggering of overvoltage protection
71	Calibration routine cannot be executed
72	Fault in ADC used for diagnostics

Error messages 61 to 68 and 72 indicate faults in the controller (A5) if they cannot be eliminated by restoring or by calling the associated calibration routine. If a calibration routine cannot be executed because of a hardware error (error 71), the error must be looked for in the associated modules.

4.5.2 Built-in Diagnostics

In order to localize the errors more precisely, the following test points can be selected using special functions 101 to 199. The voltages listed are approximate values for a fault-free instrument. They are output in the right-hand display and can be read by a controller via the IEC 625/IEEE 488 interface.

SF-No.	Test point	V _{min}	V _{max}	Unit
A 5 Controller				
101	Voltmeter	-40	+ 40	V
102	RAM battery	3.3	3.8	V
103	X voltage for sweep	0	10	V

A 6 AF synthesis				
109	Oscillator level	1.4	2.6	V
110	5-V reference	4.9	5.1	V
111	5-V supply	4.5	5.3	V
112	15-V supply	14.0	15.5	V
113	-15-V supply	-15.5	-14.0	V
114	AF output	-2	2	V
115	AMOD output	-6	6	V
116	FMOD output	-1.45	1.45	V

A 7 FRN synthesis				
117	PI controller output	-8	+ 8	V
118	VCO control voltage	2.0	18.0	V
119	Presetting voltage	-4.2	-3.5	V
120	Oscillator level	0.4	0.7	V
121	Output level 3 to 3.6 MHz	0.2	0.5	V
122	40-MHz input	0.7	1.5	V
123	IF level	1.1	2.7	V
124	Supply	23	25	V

A 8 Step/FM				
125	Alarm (low-active)	2.5	5	V
126	Step tuning voltage	1	18	V
127	FM tuning voltage	2	13	V
128	Step synthesizer level	0.2	0.6	V
129	FM output level	0.2	0.6	V
130				V
131				V
132				V

A 9 Fixed frequencies				
133	OEXO thermostat	5.5	6.5	V
134	40-MHz tuning voltage	1.2	19	V
135	135-MHz tuning voltage	1.2	19	V
136	130/520-MHz signal	0.3	0.7	V
137	300-MHz signal	0.3	0.8	V
138	40-MHz signal to FRN	0.3	1.2	V
139	40-MHz signal to FM	0.3	1.2	V
140	40-MHz signal to OPT	0.3	1.2	V

A 10 Summing loops				
141	SUM 1 presetting	1.6	21.6	V
142	SUM 1 tuning voltage	1.6	21.6	V
143	SUM 1 oscillator signal	0.3	1	V
144	SUM 2 tuning voltage	1.6	21.6	V
145	SUM 2 oscillator signal	0.05	0.3	V
146	SUM 2 sync signal	-0.5	1.5	V
147	SUM 2 IF signal	0.5	1.5	V
148	Pulse blanking divider signal	0.4	1.2	V

A 11 RF oscillators				
149	Oscillator control voltage	1	22	V
150	RF level before sampler	0.05	0.15	V
151	RF amplifier supply	7.0	7.6	V
152	Frequency detector (adj.)	-3.5	3.5	V
153	Sampler reference level	0.8	2.5	V
154	Sampler offset (adj.)	0.8	2.5	V
155	Sampler pulse level	3	10	V
156	Output level	20	220	mV

A 12 Filter bank				
157	-15-V supply	-15.5	-13.5	V
158	Output amplifier (N320)	13	15	V
159	Input amplifier (V4)	13	15	V
160	Mixer amplifier (V400)	13	15	V
161	5-V supply	4.5	5.3	V
162	Output level X123	0	250	mV
163	+15-V supply	14.0	15.5	V
164	Output level X122	0	250	mV

A 13 Output section				
165	Alarm signal (low-act.)	2.5	5	V
166	Modulator control voltage	-15	3	V
167	Detector >5 MHz	0	6	V
168	Output level X121	0	120	mV
169	Output level X131	0	600	mV
170	AM control value	-5	-0.4	V
171	Detector <5 MHz	0	6	V
172	Input voltage, pin modulator	-15	3	V

A 164 Driver				
181	Doppler identification	0.8	1.2	V
182	10 V internal	9.8	10.2	V
183	Control voltage, modulator	-0.7	10	V
184	Level before the doubler	1.0	5.0	V
185	Level after the doubler	0.5	2.0	V

4.6 Checking Modules with the Built-in Diagnostics Facility

4.6.1 Troubleshooting at the Module Level

Before setting the SMHU, the instrument should be set to a defined status without using special functions by pressing SHIFT PRESET. Diagnostics test points not referred to below should be within the limits specified in 4.5.2 independent of the settings. More information on troubleshooting at the modules can be found in Section 5 of the relevant module description.

4.6.1.1 A 3 Keyboard/Display

If the instrument does not react to keyboard entries even though the displays indicate an entry, first check that the instrument is not locked up by the remote control (IEC/IEEE bus) (best of all by removing the cable) or that a key is not stuck. If these are not the causes, refer to the service manual, modules A3 and A5.

4.6.1.2 A 4 Power Supply

The power supply has an independent self-monitoring facility and switches over to standby mode if overloading or internal faults (LED on front panel) occur.

In this case it is advisable to remove all modules apart from the controller and front panel and to switch the instrument on again. If the power supply again switches over to standby, check the power supply, controller and front panel (see Section 5). If the instrument can be switched on successfully, insert the modules again singly (with the instrument switched off) until one particular module causes the instrument to be switched off when it is switched on again. This module must then be examined more closely (see Section 5).

Caution!

Switching the set on and off without removing the fault may cause further damage.

In the case of modules inserted right at the front in the motherboard, test points 111, 112, 113 and 124 can be used to check whether the supply voltages still reach these modules.

4.6.1.3 A 5 Controller

Test point 101 is a voltmeter with autoranging. Voltages up to ± 40 V can be measured. The Service Kit SMHU-Z2 contains a probe for measuring voltages at test points in the modules which are not connected to the diagnostics system. The nominal values for the various modules are listed in the service manuals.

Test point 102 gives the voltage of the battery which supplies the RAM. If the voltage is below 3.3 V, the data may not be stored when the set is switched off.

Test point 103 gives the voltage for the output connector X-AXIS at the rear.

- ▶ Set any sweep with approx. 100 steps on the SMHU. Vary from the start frequency to the stop frequency in MAN mode and observe the displayed voltage. It must be proportional to the sweep steps, i.e. from 0 to 10 V.

4.6.1.4 A 6 AF Generator

Test points 114 to 116 are used for function checks.

- ▶ Set AF to 1 Hz, select squarewave, set AF LEVEL to 2 V, AM INT 100 % and FM INT to maximum deviation, e.g. 800 kHz at RF 600 MHz. The result display must now vary between the values given.

4.6.1.5 A 7 FRN Synthesis

Check the tuning of the oscillator using special function 118:

- ▶ Set RF 1070.0625 MHz on the SMHU, the displayed voltage should be 2.0 ± 1 V.
- ▶ Set RF 1072.0925 MHz on the SMHU, the displayed voltage should now be 18.0 ± 1.5 V.
- ▶ The voltage should have a ramp response when the frequency is varied between these limits.

4.6.1.6 A 8 Step Synthesis/FM

Check the tuning of the step synthesis oscillator using special function 126:

- ▶ First set 1001 MHz on the SMHU and then 1000.2 MHz. The displayed voltage should now be $4.0 + 1/-2$ V.
- ▶ Set RF 1019.2 MHz on the SMHU. The displayed voltage should now be 17 ± 1 V.
- ▶ The voltage should increase in 15 steps when varying the frequency from the bottom to the top limit.

4.6.1.7 A 10 Summings

Check the VCO in the first loop using special function 142:

- ▶ Set RF 1000.5 MHz on the SMHU, the displayed voltage should be 2.5 ± 1 V.
- ▶ Set RF 1019.5 MHz on the SMHU, the displayed voltage should now be 17 ± 1 V.
- ▶ Set RF 1020.5 MHz on the SMHU, the displayed voltage should now be 5 ± 1 V.
- ▶ Set RF 1039.5 MHz on the SMHU, the displayed voltage should now be 20 ± 1 V.

Check the presetting:

- ▶ For all the following frequencies, first measure the preset voltage using special function 141 and then the tuning voltage using special function 142. The values should not differ by more than 0.3 V. If the difference is greater, a new calibration can be attempted using special function 67. If this leads to error message 71, the module must be examined more closely (see Section 5).

Test frequencies (in MHz):

1000.250,	1001.367,	1003.320,	1005.273,
1007.227,	1009.180,	1011.133,	1013.086,
1015.039,	1016.992,	1018.945,	1020.117,
1022.070,	1024.023,	1025.977,	1027.930,
1029.883,	1031.836,	1033.789,	1035.742,
1037.695,	1039.648,		

Check the VCO of the second summing loop using special function 144:

- ▶ Set RF 1000.5 MHz on the SMHU, the displayed voltage should be 2.5 ± 1 V.
- ▶ Set RF 1039.5 MHz on the SMHU, the displayed voltage should now be 19.5 ± 1 V.

4.6.1.8 A 11 RF Oscillators

Check the VCOs using the special function 149:

- ▶ Set RF 1000.5 MHz on the SMHU, the displayed voltage should be 1.5 ± 1 V.
- ▶ Set RF 1399.5 MHz on the SMHU, the displayed voltage should now be 21.5 ± 1 V.
- ▶ Set RF 1400.5 MHz on the SMHU, the displayed voltage should now be 1.5 ± 1 V.
- ▶ Set RF 1799.5 MHz on the SMHU, the displayed voltage should now be 21.5 ± 1 V.
- ▶ Set RF 1800.5 MHz on the SMHU, the displayed voltage should now be 1.5 ± 1 V.
- ▶ Set RF 2160 MHz on the SMHU, the displayed voltage should now be 20.5 ± 1 V.

4.6.1.9 A 12 Filter Bank

- ▶ To obtain an exact display for test points 162 and 164, disconnect cable W 162 from connector X162 on A13 (output section). The PLL is then interrupted and the maximum level can be measured at these test points.

A voltage >50 mV should be measured at test point 162 at RF 500 MHz and at test point 164 at RF 4 MHz.

4.6.1.10 A 13 Output Section

- ▶ Set RF 500 MHz, unmodulated, on the SMHU. At a level of 13 dBm, enter special functions 1 (interruption-free level setting) and 55 (switch off level correction).

The following voltages (± 0.05 V) must be found at test point 170:

Level	Voltage at test point 170
13 dBm	3,00 V
8 dBm	1,69 V
3 dBm	0,95 V
-2 dBm	0,53 V
-7 dBm	0,30 V

The same voltages must be found at test point 167, repeat the measurement there with RF 4 MHz.

- ▶ Set 13 dBm, unmodulated, on the SMHU and vary the RF over the complete range.

The voltage must remain within the defined limits at test point 166.

- ▶ To obtain a valid display for test points 168 and 169, disconnect cable W 162 from connector X162 on A13 (output section). The PLL is then interrupted and the maximum level can be measured at these test points.

A voltage >50 mV should be measured at test point 168 with RF 500 MHz and at test point 169 with RF 4 MHz.

4.6.1.11 A 163 Doubler

To check the doubler

- ▶ set frequencies from 2160 MHz to 4320 MHz, 0 dBm, unmodulated on the SMHU.

Voltages at test points 184 and 185 must be within the limits specified in 4.5.2.

The voltage at test point 183 is typically 1 to 3 V. If considerable deviations are noticed in one of the frequency ranges 2160 to 2720, 2720 to 3440, 3440 to 4320 Mz, it can be assumed that the bandpass filter for this range is defective.

4.6.2 Troubleshooting According to Type of Fault

For each type of fault, proceed in the given order, tracing the subassembly that may be causing the fault along the signal path. Troubleshooting may be done in the opposite direction.

4.6.2.1 Frequency Errors

A 9	Fixed frequencies
A 7	FRN synthesis
A 8	Step synthesis/FM
A 10	Summing loops
A 11	RF oscillators
A 13	Output section
A 12	Filter bank

The nominal frequency for each synthesis stage can be displayed using special functions 78 to 84 (see 4.6.2.7).

4.6.2.2 Level Errors

A 11	RF oscillators
A 13	Output section
A 12	Filter bank
A 163	Doubler
A 162	RF amplifier 4.4 GHz
A 18	Precision attenuator

4.6.2.3 AM Errors

A 6	AF generator
A 13	Output section
A 163	Doubler

4.6.2.4 FM/ΦM Errors

A 6	AF generator
A 8	Step synthesis/FM
A 9	Fixed frequencies
A 11	RF oscillators

4.6.2.5 Harmonics Level Too High

A 12	Filter bank
A 13	Output unit (RF <15 MHz)
A 163	Doubler
A 162	RF amplifier 4.4 GHz

4.6.2.6 Poor Spectral Purity (SSB Noise, residual FM)

See 4.6.2.1 if this error occurs when there is no modulation, or see 4.6.2.4 with FM/ΦM.

4.6.2.7 List of Special Functions for Service Purposes

71	Display of firmware version number 2)
72	Display test (including LED test)
73	RAM test
74	EPROM test 1)
75	EEPROM test 1)
76	Set electronic level setting to 0 dB (do not change setting of mechanical precision attenuator in process). Special display in level/memory display 2)
77	Set electronic level setting to -25 dB, otherwise as in 76
78	Displays FRN frequency (A7) 2)
79	Displays step frequency (A8) 2)
80	Displays frequency of summing loop 1 (A10) 2)
81	Displays frequency of summing loop 2 (A10) 2)
82	Displays sampler frequency (A10) 2)
83	Displays harmonics of RFO synchronization (A11) 2)
84	Displays RF divider factor (A13) 2)
85	Displays undivided synthesis frequency 2)
86	Displays iterations with ALC OFF 2)

- 1) The display only occurs if the ENTER/UNITS key is held down.
- 2) The display (and module setting) is cancelled as soon as any key is pressed.



ROHDE & SCHWARZ

Liste mechanischer Teile

List of mechanical parts

Bilder zur Liste mechanischer Teile

Figures pertaining to list of mechanical parts



Liste mechanischer Teile

List of Mechanical Parts

Der SMHU ist in *R&S-Kompaktbauweise 90* aufgebaut.

The SMHU is designed in accordance with the *R&S design 90*.

Gehäusegröße:
4E, 1/1, T460

Cabinet size:
4E, 1/1, T460

Maße über alles:
426,7 × 176,5 × 460 (B × H × T)

Overall dimensions:
426.7 × 176.5 × 460 (width × height × depth)

Ergänzungen:
19"-Adapter ZZA-94
Tragegriff, Nachrüstsatz
(falls ein zweiter Tragegriff gewünscht wird)

Accessories:
19"-Adapter ZZA-94
Carrying handle, retrofit set
(if a second carrying handle is desired)

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
1		1	Haube, oben 4E 1/1 T460 Cover, top	819.0426
2		1	Haube, unten 4E 1/1 T460 Cover, bottom	396.3815
3		1	Führungsschiene, rechts Guide rail, right	396.4757
4		1	Führungsschiene, links Guide rail, left	396.4763
5		1	Bedienhinweiskarte 1 User guide card 1	
6		1	Bedienhinweiskarte 2 User guide card 2	
7		1	Bedienhinweiskarte 3 User guide card 3	
8		2	Gerätefuß, vorne Instrument foot, front	396.4534
9		2	Aufstellfuß, unten Foot, bottom	396.4540
11		2	Gerätefuß, hinten Instrument foot, rear	396.4586
15		2	Seitenleiste T460 Side strip	396.3080

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
16		4	M3 x 6 DIN 965 A4	081.9378
17		1	Rückwandfuß, links 4E Rear-panel foot, left	396.4363
18		1	Rückwandfuß, rechts 4E Rear-panel foot, right	396.4157
19		4	Ansatzschr. M4 K.D 7985 Screw	396.4492
21		1	Tragegriff T... Carrying handle	396.3221
22		2	Griffbuchse Washer	396.3321
23		2	M4 x 10 DIN 965 A4	081.9478
24		2	Abdeckung, Griffseite Cover, handle side	396.3338
25		2	Abdeckung, Leerseite Cover, blank side	396.3344
30		1	Frontrahmen 4E 1/1 Front frame	396.2131
31		4	Seitenfuß Side foot	396.4692
32		2	Stapelnutabdeckung Cover for groove	396.4711
33		2	Frontgriff Front grip	
34		4	M4 x 8 DIN 965	396.1087
35		1	Rückrahmen 4E 1/1 Rear frame	396.2377
36		4	Rahmenschiene T460 Frame rail	396.2377
37		16	M3 x 8 DIN 965 A4	081.9384
40		4,95 m	HF-Dichtschnur RF seal	396.1035
50		1	Deckel Netzteil Cover for Power Supply Unit	819.1697
51		1	DIN 7985 - M2,5 x 6	088.0030

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
52		1	DIN 137 - A2,6 - A2	005.0280
53	A41	1	Gleichrichtung VAR 02 Rectification	819.1716.02
54		10	DIN 7985 - M3 x 6 - A4	081.9061
55		10	DIN 137 - A3 - A2	005.0296
56		10	DIN 125 - A3,2 - A4	082.4670
57		4	Mutter für Rückrahmen M3 Nut for rear frame	396.3167
58	A42	1	Schaltregler VAR 02 Switching regulator	819.1916.02
59		1	Deckel oben Cover, top	819.2070
60		2	DIN 7985 - M2,5 x 5 - A4	088.1543
61		2	DIN 137 - A2,6 - A2	005.0280
62		2	DIN 125 - A2,7 - A4	082.4663
65		1	Deckel unten Cover, bottom	819.2087
66		2	DIN 7985 - M2,5 x 10 - A4	088.0053
67		2	DIN 137 - A2,6 - A2	005.0280
70		1	Netzteilrahmen Frame for Power Supply Unit	819.1639
71		4	Zyl. Schr. M 2,5 x 5 A2 Screw	088.7693
72		4	DIN 137 - A2,6 - A2	005.0280
73		1	Winkel mit Haltefeder Angle with spring	819.1874

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
74		1	Winkel links Angle, left	819.1897
75		2	DIN 927 M 3 x 4	032.4447
76		2	DIN 137 - A3 - A2	005.0296
77		2	Durchf. Tülle 8 x 10 x 15 Feedthrough	099.3536
80	22	1	Netzfilter Chassis power plug with filter	819.1739
81		1	Kabelbinder Rd 1,6 bis 76 B 3,6 Cable clamp	015.9044
82		1	Schirmung Netzeingang Shielding power input	819.1651
83		4	DIN 7985 - M2,5 x 6 - A4	088.0030
84		4	DIN 137 - A2,6 - A2	005.0280
90		1	Kühlprofil Heat sink	819.1674
91		3	DIN 7985 M3 x 10 - A4	081.9084
92		3	DIN 137 - A3 - A2	005.0296
93		3	DIN 125 - A3,2 - A4	082.4670
94		8	Kombischraube M 2,5 x 8 Screw	071.5705
95		2	DIN 965 - M 3 x 6 - A4	081.9378
100		1	Rückplatte, engl. Rear plate	819.1597
101		2	Sicherungshalter GR Fuse holder	087.5022
102	S2	1	Spannungsumschalter 115/220 Voltage selector	292.5387

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
103		2	DIN 7985 - M 3 x 8 - A4	081.9078
104		4	DIN 125 - A3,2 - A4	082.4670
105		2	DIN 137 - A3 - A2	005.0296
106		2	DIN 934 - M3 - A4	016.4398
110	Z1	1	Einbaust. mit Netzfilter 3A Power plug with filter	006.0977
111		2	DIN 965 - M3 x 8 - A4	081.9384
112		2	DIN 137 - A3 - A2	005.0296
113		2	DIN 125 A3,2 - A4	082.4670
114		2	DIN 934 - M3 - A4	016.4398
115	S1	1	Wippschalter 2polig Aus SW Rocker switch 2pole	553.2925
117		1	Flachstecker GR 6,3 Flat connector	543.6705
118		1	DIN 7985 - M4 x 8 - A4	081.9178
119		1	DIN 137 - A4 - A2	005.0315
120		1	DIN 433 - 4,3 - A4	082.4586
121		1	DIN 6797 - A4,3 - A2	016.2837
122		1	DIN 934 - M4 - A4	016.4400
124		1	Schutzkappe f. BNC-Buchse Protective cover for BNC socket	250.3840
125		1	Kombischraube M2,5 x 8 Screw	071.5705

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
126	A4	1	Netzteil (Pos. 50... 125) VAR 02 Power Supply Unit	819.1568.02
127		6	DIN 7985 - M3 x 8 - A4	081.9078
128		6	DIN 137 - A3 - A2	005.0296
129		6	DIN 125 - A3,2 - A4	082.4670
130		2	DIN 965 - M3 x 10 - A4	081.9390
131		2	Mutter für Rückrahmen M3 Nut for rear frame	396.3167
135		1	Buchsenträger hinten Socket support, rear	819.0326
136		4	DIN 965 - M3 x 8 - A4	081.9384
137	E1	1	Lüftereinheit Blower set	819.0332
138		4	DIN 7340 - B4 x 6 - MS - E1D	031.2805
139		4	DIN 125 - A4,3 - A4	082.4686
140		4	DIN 7985 - M3 x 16 - A4	081.9103
141	X131 - X434	4	Einbaubuchse Syst. BNC Panel mounting socket BNC	099.9186
142		1	Lötöse 18 x 10 Solder tag	035.0813
145		1	Verschlußstopfen Stopper	528.8598
146		7	Verschlußstopfen Stopper	528.8500
147		1	Verschlußstopfen Stopper	681.744
148	W43	1	DX HF-Kabel W43 RF cable	820.3102

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
149		2	Verriegelungsschraube Lock screw	099.2830
155		1	Führungspl. links BL Guide panel, left	396.7185
156		1	Führungspl. rechts sw Guide panel, right	396.7179
157		20	Massefeder 4E Earth clip	396.7233
158		1	Stützplatte 4E Supporting plate	396.7779
159		2	DIN 965 - M3 x 10 - A4	081.9390
160		1	Sicherung für Führungsleisten Securing for guide rails	819.0484
161		2	DIN 7985 - M2,5 x 10 - A4	088.0053
162		2	DIN 137 - A2,6 - A2	005.0280
165	A2	1	Motherboard VAR 02	819.0910.02
166		2	Schiene Rail	819.0278
167		1	Zahnstange links Toothed rack, left	819.0284
168		1	Zahnstange rechts Toothed rack, right	819.0290
169		4	DIN 923 - M2,5 x 3 - 5,8 - A3P	088.0976
170		6	DIN 7985 - M3 x 6 - A4	081.9061
171		6	DIN 137 - A3 - A2	005.0296
172		6	DIN 125 - A3,2 - A4	082.4670
173		2	Querwand Transverse panel	819.0261

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
174		4	DIN 7985 - M2,5 x 6 - A4	088.0030
175		4	DIN 137 - A2,6 - A2	005.0280
176		4	Abstandsrohr Spacer	302.7740
177		4	DIN 7985 - M2,5 x 8 - A4	088.0047
178		4	DIN 137 - A2,6 - A2	005.0280
179		4	DIN 965 - M3 x 10 - A4	081.9390
180		4	DIN 7985 - M2,5 x 10 - A4	088.0053
181		4	DIN 137 - A2,6 - A2	005.0280
185	W17	1	DX-Kabel W17 Cable	820.3077
186	W18	1	DX-Kabel W18 Cable	820.3083
187	W1E	1	DX-Kabel W1E Cable	819.2158
188	X4		DX-Kabel X4 Cable	819.2135
189	W16		DX-Kabel W16 Cable	843.4040
191	A5	1	Rechner ohne Software Controller w/o software	819.2164.02
192	A6	1	NF-Generator AF generator	819.3260.02
193	A7	1	FRN-Synthese FRN synthesis	819.3860.02

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
194	A8	1	Stepsynthese Step synthesis	819.4944.02
195	A9	1	Festfrequenzen Fixed frequencies	819.6060.02
196	A10	1	Summierschleifen Summing Loops	819.7166.02
197	A11	1	RF-Oszillator RF oscillator	819.8262.02
198	A12	1	Filtersatz Filter set	819.9369.02
199	A13	1	Ausgangsteil Output section	820.0461.02
200		1	Luftleitblech Cooling baffle	819.0461
205	W121	1	DX HF-Kabel W121 RF cable	820.2941
206	W41	1	DX HF-Kabel W41 RF cable	820.2987
207	W111	1	DX HF-Kabel W111 RF cable	820.2929
208	W122	1	DX HF-Kabel W122 RF cable	820.2958
209	W93	1	DX HF-Kabel W93 RF cable	820.2870
210	W162	1	DX HF-Kabel W162 RF cable	820.3002
211	W131	1	DX HF-Kabel W131 RF cable	820.2993
212	W123	1	DX HF-Kabel W123 RF cable	820.2964
213	W71	1	DX HF-Kabel W71 RF cable	820.2787
214	W81	1	DX HF-Kabel W81 RF cable	820.2812

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
215	W94	1	DX HF-Kabel W94 RF cable	820.2887
216	W101	1	DX HF-Kabel W101 RF cable	820.2906
217	W83	1	DX HF-Kabel W83 RF cable	820.2835
218	W72	1	DX HF-Kabel W72 RF cable	820.2793
219	W82	1	DX HF-Kabel W82 RF cable	820.2829
220	W91	1	DX HF-Kabel W91 RF cable	820.2858
224		1	Längswand Side panel	819.0255
225		8	DIN 965 - M3 x 8 - A4	081.9384
226		19	Führungsleiste f. GS 4E GR Guide rail	396.7427
227		20	DIN 965 - M3 x 8 - A4	081.9384
229		1	Buchsenträger vorne Socket support, front	819.0226
230		4	DIN 965 - M3 x 8 - A4	081.9384
231		1	Federplatte Spring plate	819.0249
232	X171 X172 X173	3	Einbaubuchse Syst. BNC Panel mounting socket BNC	099.9186
233		3	Lötöse 18 x 10 Solder tag	035.0813
235		1	Schirmwand Shielding panel	819.0232
236		6	DIN 965 - M2,5 x 6 - A4	088.0101

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/Comp.No	Qty	Designation	Stock No.
240		1	Halteblech Retaining plate	819.0384
241		1	Haltebügel Bracket	819.0378
242		2	DIN 965 - M2,5 x 6 - A4	088.0101
243		1	Versteifungsplatte Reinforcing plate	819.0361
244		3	DIN 7985 - M2,5 x 8 - A4	088.0047
245		3	DIN 137 - A2,6 - A2	005.0280
246		3	DIN 125 - A2,7 - A4	082.4663
247	A163	1	Verdopplermodul Doubler PCB	835.8763.02
248		11	DIN 7985 - M2,5 x 25 - A4	088.0099
249		11	DIN 137 - A2,6 - A2	005.0280
250	A162	1	HF-Verstärker 4,4 GHz RF Amplifier 4.4 GHz	836.0766.02
253	A164	1	Ansteuerplatte Control PCB	836.2269.02
254		3	DIN 7985 - M2,5 x 10 - A4	088.0053
255		3	DIN 137 - A2,6 - A2	005.0280
256		3	DIN 125 - A2,7 - A4	082.4663
257		1	Kühlklotz Heat sink	836.2317
258		2	Kombischraube M2,5 x 6 Screw	071.5040

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/ Comp.No	Qty	Designation	Stock No.
260	W163	1	DX HF-Kabel W163 RF cable	836.3465
261	W164	1	DX HF-Kabel W164 RF cable	836.3459
262	A16	1	Erweiterung 4 GHz (Pos. 240 - Pos. 261) Extension 4 GHz	835.8711.02
263	W10	1	DX Kabel W10 Cable	836.1056
264	W30	1	DX Kabel W30 Cable	835.9318
265		3	DIN 965 - M2,5 x 6 - A4	088.0101
266		3	DIN 7985 - M2,5 x 10 - A4	088.0053
267		3	DIN 137 - A2,6 - A2	005.0280
268		3	DIN 125 - A2,5 - A4	082.4657
269		1	DIN 7985 - M2,5 x 6 - A4	088.0030
270		1	DIN 137 - A2,6 - A2	005.0280
271	A18	1	Eichleitung SMHU Precision Attenuator SMHU	835.8234.02
272		1	Bügel für Eichleitung Bracket for Precision Attenuator	819.0310
273		3	DIN 7340 - B4 x 6 - M5 - E1P	031.2805
274		3	DIN 125 - A4,3 - A4	082.4686
275		3	DIN 7985 - M3 x 10 - A4	081.9084
276		2	DIN 7985 - M2,5 x 6 - A4	088.0030
277		2	DIN 137 - A2,6 - A2	005.0280

Lfd. Nr.	Kennzeichen	Menge	Benennung/Beschreibung	Sachnummer
No	Unit/ Comp.No	Qty	Designation	Stock No.
278		2	DIN 965 - M2,5 x 6 - A4	088.0101
279	W181	1	DX HF-Kabel W181 RF cable	820.3060
280	W161	1	DX HF-Kabel W161 RF cable	820.3048
282	A3	1	Anzeige / Tastatur Display/ Keyboard	819.1122.02
283		1	Montageplatte Mounting plate	819.1239
284		13	DIN 965 - M2 x 16 - A4	081.9290
285		1	Beschriftungsplatte Identification plate	819.1168
286		2	Senkschraube M1,6 x 3 lichtgr. Screw	396.1070
287		4	DIN 965 - M3 x 8 - A4	081.9384
288		4	Schei. Rd 3,1/7,2 H 1,8 CR Washer	396.5518
289		1	Führungskragen Guide frame	396.0897
290		1	Dreh. M. Mulde Rd 37 Rd 6 Rotary knob	078.1192
291		3	Fenster Window	801.1466
292	X1	1	Flachbandkabel Ribbon cable	820.3019



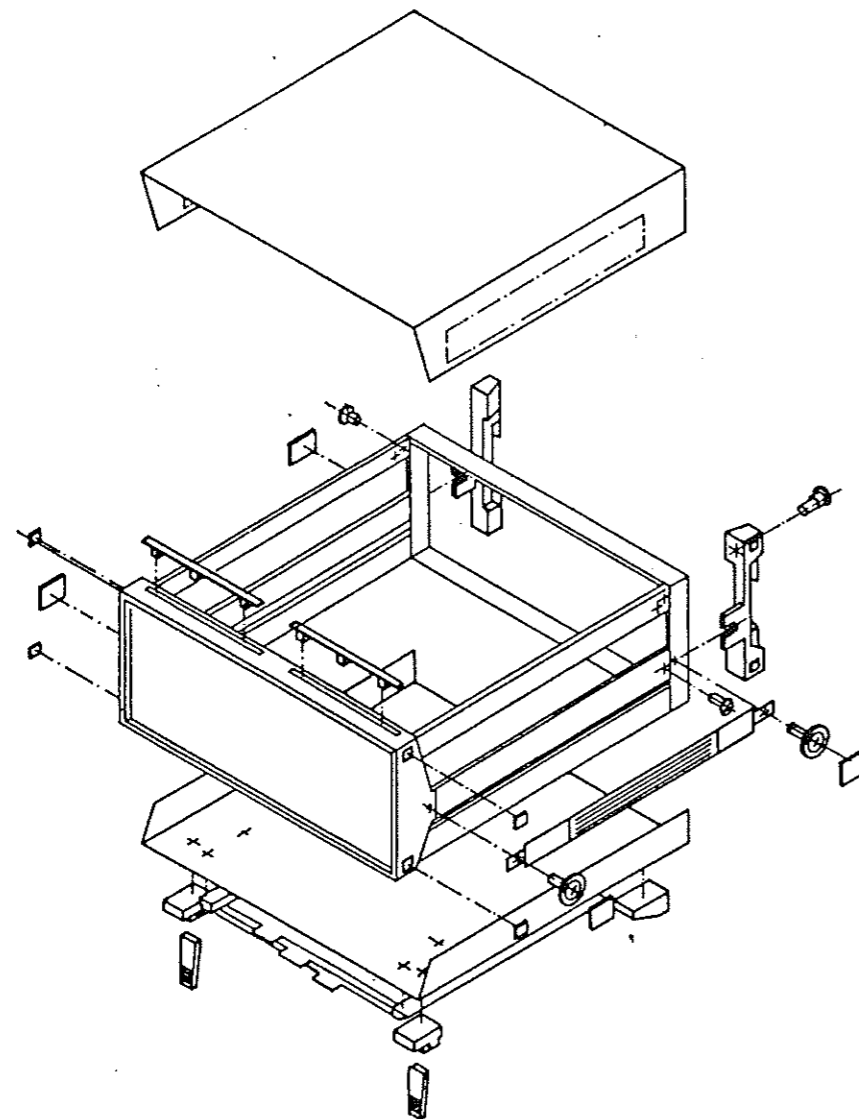
Gehäuse

Casing

Aufbau

Der Aufbau besteht aus einer tragenden Aluminium-Druckguß-Rahmenkonstruktion mit gerätespezifischer Front-, Montage- und Rückplatte, die mit einer Ober- und Unterhaube (= Beplankung) ummantelt ist.

Rahmen und Beplankung:



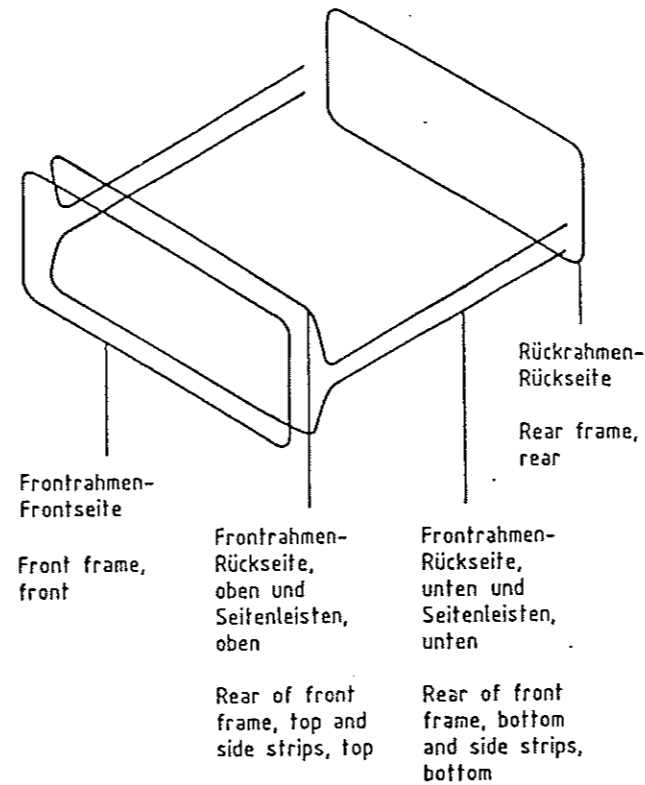
Construction

The construction consists of a self-supporting aluminium-cast frame with front, mounting and rear panel, top and bottom covers (= panelling).

Frame and panelling:

Dichtschnur (nur bei Geräten mit erhöhtem Schirmdämpfungsbedarf vorhanden) jeweils in die umlaufende Nut einlegen.

Insert the braided cord (provided only for instruments requiring a high degree of shielding) into the respective groove.



Öffnen und Schließen des Gehäuses

Opening and closing the cabinet

Die gute Schirmdämpfung der Kompaktbauweise 90 erfordert häufige Kontaktstellen und hohe Paßgenauigkeit. In Verbindung mit einem leichten Anlagedruck, der mit dem Festziehen der Rückwandfußschrauben erreicht wird, erhält man einen straffen Sitz der Ober- und Unterhaube auf dem Rahmen.

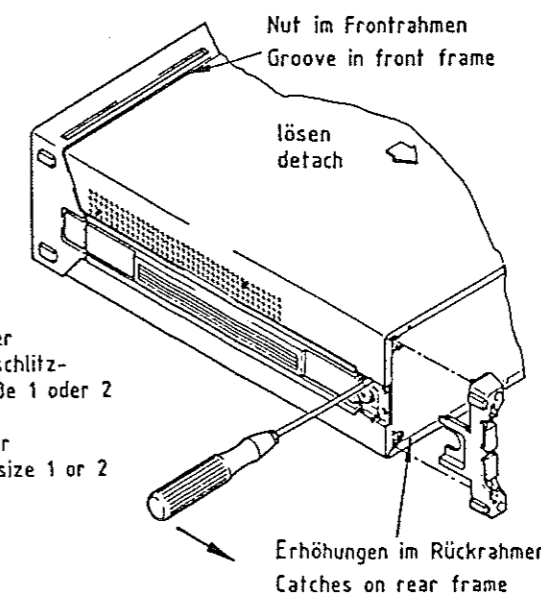
To obtain the high degree of shielding of design 90, many points of contact and accurate fitting are employed. When exerting a slight pressure by tightening the rear-panel feet, tight fitting of the top and bottom covers is ensured.

Zum Öffnen muß man die Rückwandfußerschraubung lösen und die Füße nach rückwärts abziehen (Schrauben bleiben im Fuß haften). Je nach Bedarf läßt sich nun Ober- bzw. Unterhaube ebenfalls nach rückwärts abnehmen. Sitzen die Hauben sehr fest, erleichtert man das Abziehen durch abwechselndes Hebeln in Pfeilrichtung mit einem Schraubenzieher an beiden Geräteseiten (siehe Bild).

To open the cabinet, first undo the rear panel feet screws and withdraw the feet (captive screws). It is now possible to detach top and bottom cover if required. If the fitting of these cover plates is very tight, removal can be facilitated by alternately levering on both sides of the instrument using a screwdriver (see illustration).

Zum Schließen des Gehäuses werden erst die Frontkanten der Hauben in die umlaufende Nut des Frontrahmens und der Seitenleisten eingeführt und dann in die Erhöhungen am Rückrahmen eingerastet. Das Gerät ist wieder geschlossen, wenn die Rückwandfüße eingeschoben und die Schrauben festgezogen sind.

To close the cabinet, insert the front edges of the covers into the groove of the front frame and the side strips and lock them into the catches on the rear frame. The cabinet is closed when the rear-panel feet are inserted and the screws tightened.



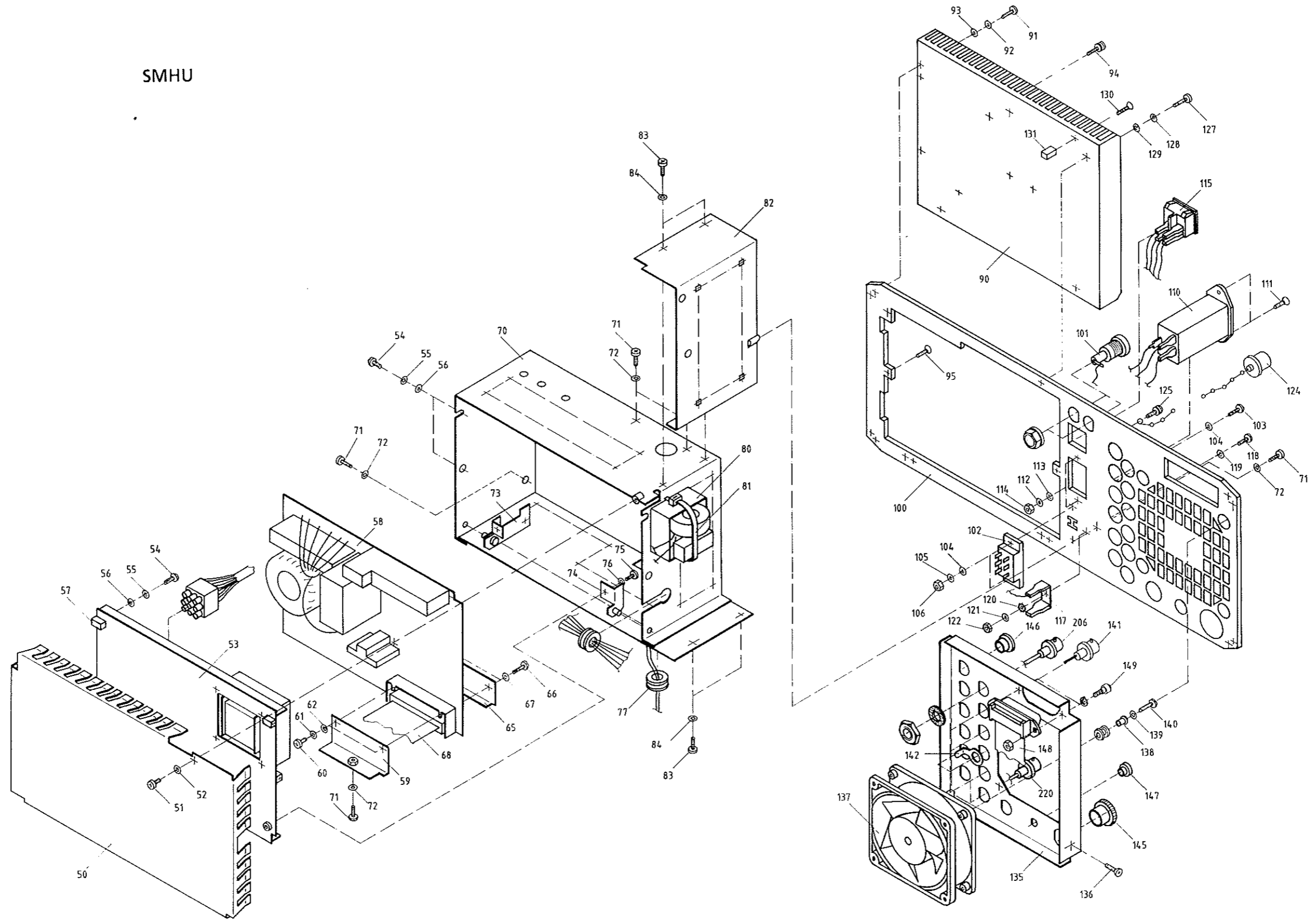
Schlitzschraubenzieher Größe 2 oder Kreuzschlitzschraubenzieher Größe 1 oder 2

Screwdriver size 2 or Phillips screwdriver size 1 or 2

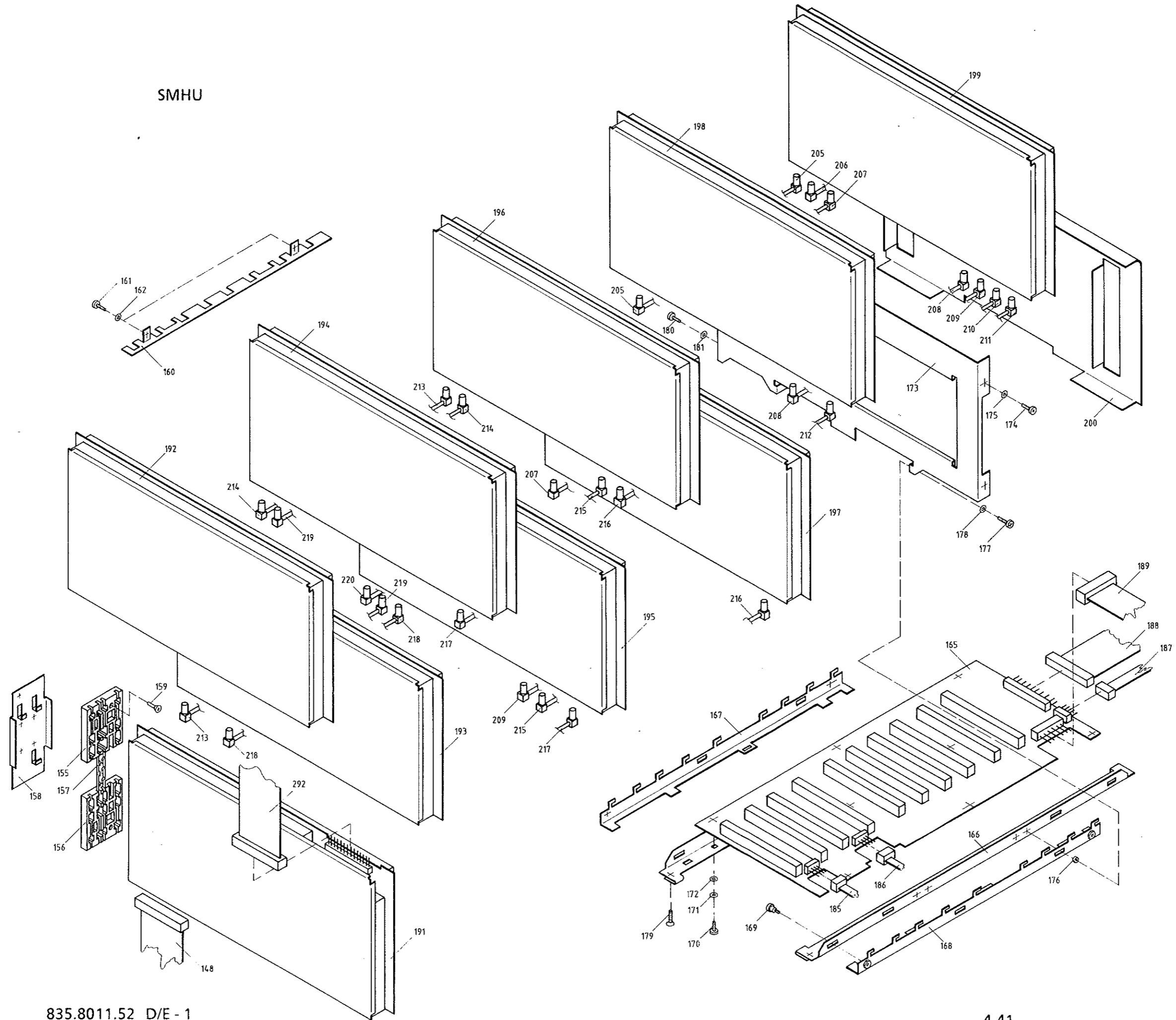
Ober- und Unterhaube werden durch die Rückwandfußerschraubung befestigt.

Top and bottom covers are fixed by screwing feet to rear panel.

SMHU



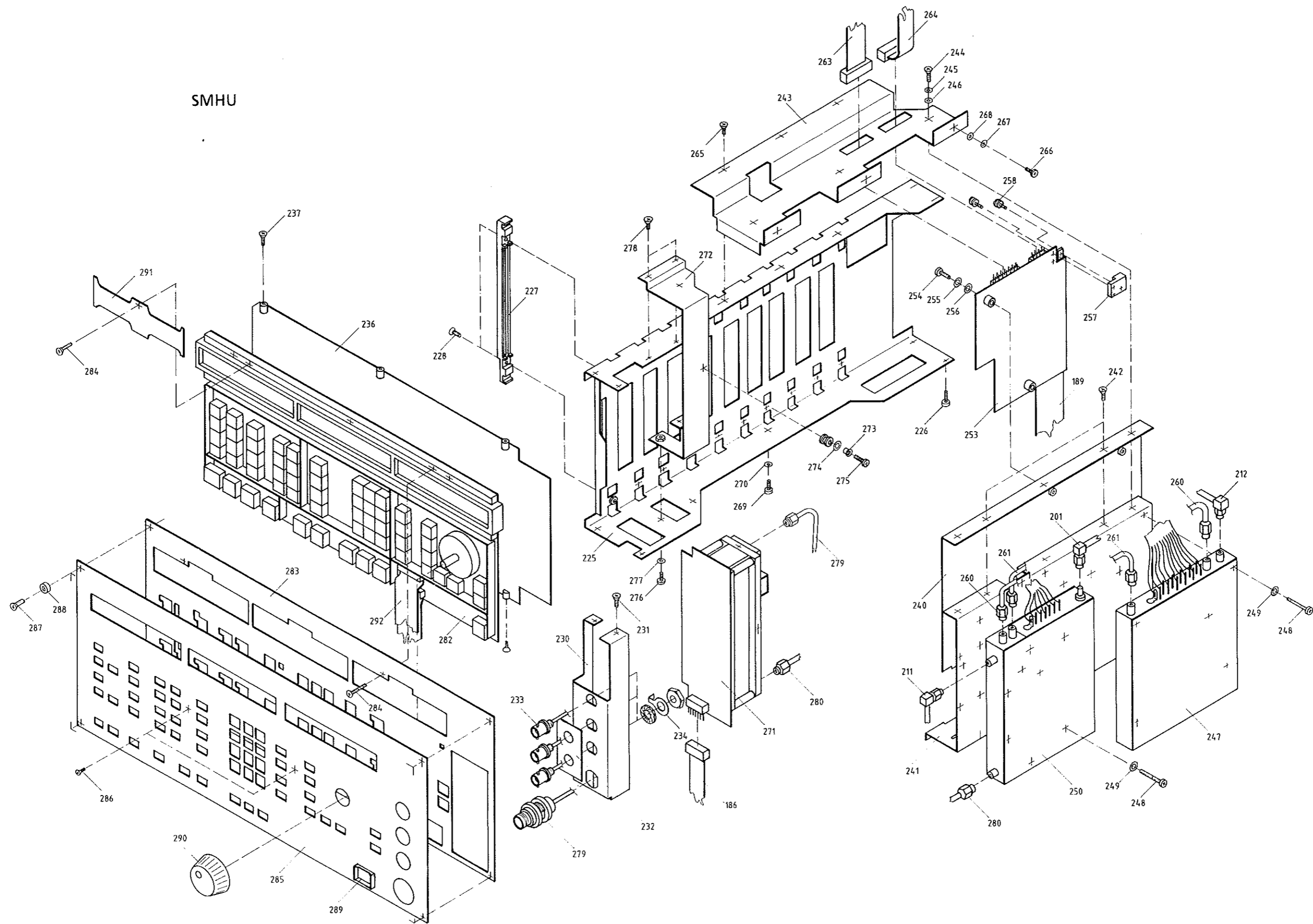
SMHU



835.8011.52 D/E - 1

4.41

Bild 4 - 11
Fig. 4 - 11



SMHU



ROHDE & SCHWARZ

Schalteillisten

Stromläufe

Bestückungspläne

Part lists

Circuit diagrams

Components plans

Listes des pièces détachées

Schémas de Circuit

Plans des composants

Für diese Unterlage behalten wir uns alle Rechte vor

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
A2	ED MOTHERBOARD	819.0932.02			819.0055.01
A3	ED ANZEIGE/TASTATUR DISPLAY/KEYBOARD NUR VAR/ONLY MOD: 52 56	819.1122.02			835.8040.01
A3	ED ANZEIGE/TASTATUR DISPLAY/KEYBOARD NUR VAR/ONLY MOD: 58	819.1122.04			835.8040.01
A4	ZE NETZTEIL POWER SUPPLY	819.1568.02			819.0055.01
A5	EE RECHNER OHNE SOFTWARE PROC.WITHOUT SOFTWARE NUR VAR/ONLY MOD: 52	819.2164.02			835.8040.01
A5	EE RECHNER OHNE SOFTWARE NUR VAR/ONLY MOD: 56 58	1002.5258.02			835.8040.01
A6	EE NF-GENERATOR AF-GENERATOR	819.3260.02			819.0055.01
A7	EE FR-N-SYNTHESE FRN-SYNTHESIS	819.3860.02			819.0055.01
A8	ZE STEPSYNTHESE/FM STEPSYNTHESIS/FM	819.4944.02			819.0055.01
A9	EE FESTFREQUENZEN REFERENCE FREQUENCIES	819.6060.02			819.0055.01
A10	EE SUMMIERSCHLEIFEN SUMMING LOOPS	819.7166.02			819.0055.01
A11	EE RF-OSZILLATOR RF-OSCILLATORS	819.8262.02			819.0055.01
A12	EE FILTERSATZ FILTER-MODULE	819.9369.02			819.0055.01
A13	EE AUSGANGSTEIL OUTPUT-MODULE	820.0461.02			819.0055.01
A14	EE BREITBANDMODULATOR NUR VAR/ONLY MOD: 58	1002.4251.02			835.8040.01
A15	ED UMSETZER NUR VAR/ONLY MOD: 58	1002.3755.02			835.8040.01
A16	ZE ERWEITERUNG 4GHZ EXTENSION UNIT	835.8711.02			835.8040.01
A18	ZE EICHLITUNG SMHU ATTENUATOR	835.8234.02			835.8040.01
A19	ED FAST MODE NUR VAR/ONLY MOD: 56 58	1002.5558.02			835.8040.01
E1	ZM LUEFTEREINHEIT BLOWER-UNIT	819.0332			819.0055.01
W17	DX KABEL W17 CABLE	820.3077			836.3320.01
W41	DX HF KABEL W41 RF-CABLE	820.2987			836.3265.01
W43	DX HF-KABEL W43 RF-CABLE	820.3102			836.3320.01
W71	DX HF KABEL W71 RF-CABLE	820.2787			836.3265.01
W72	DX HF KABEL W72 RF-CABLE	820.2793			836.3265.01
W81	DX HF KABEL W81 RF-CABLE	820.2812			836.3265.01
W82	DX HF KABEL W82 RF-CABLE	820.2829			836.3265.01
W83	DX HF KABEL W83 RF-CABLE	820.2835			836.3265.01
W91	DX HF-KABEL W91 RF-CABLE	820.2858			836.3265.01
W93	DX HF KABEL W93 RF-CABLE	820.2870			836.3265.01
W94	DX HF KABEL W94 RF-CABLE	820.2887			836.3265.01
W101	DX HF KABEL W101 RF-CABLE	820.2906			836.3265.01
W111	DX HF KABEL W111 RF-CABLE	820.2929			836.3265.01
W121	DX HF KABEL W121 RF-CABLE	820.2941			836.3265.01
W122	DX HF-KABEL W122 RF-CABLE	820.2958			836.3265.01
W123	DX HF KABEL W123 RF CABLE	836.3271			836.3265.01
W131	DX HF KABEL W131 RF CABLE	836.3288			836.3265.01

ROHDE & SCHWARZ

Äl Datum
Date

18 1089

Schaltteilliste für
Parts list for

SMHU SIGNALGENERATOR

Sachnummer
Stock Nr.

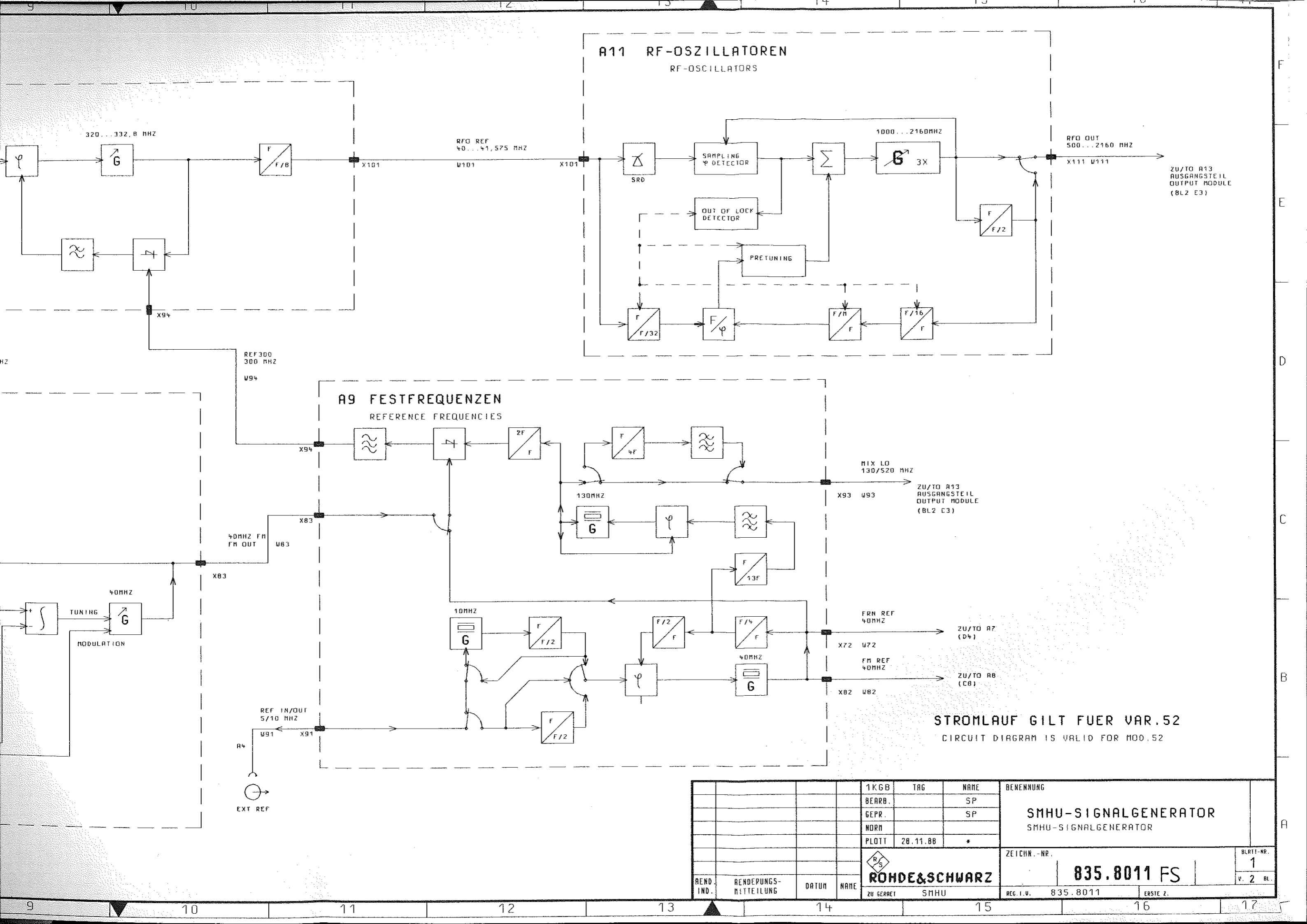
835.8011.01 SA


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Page

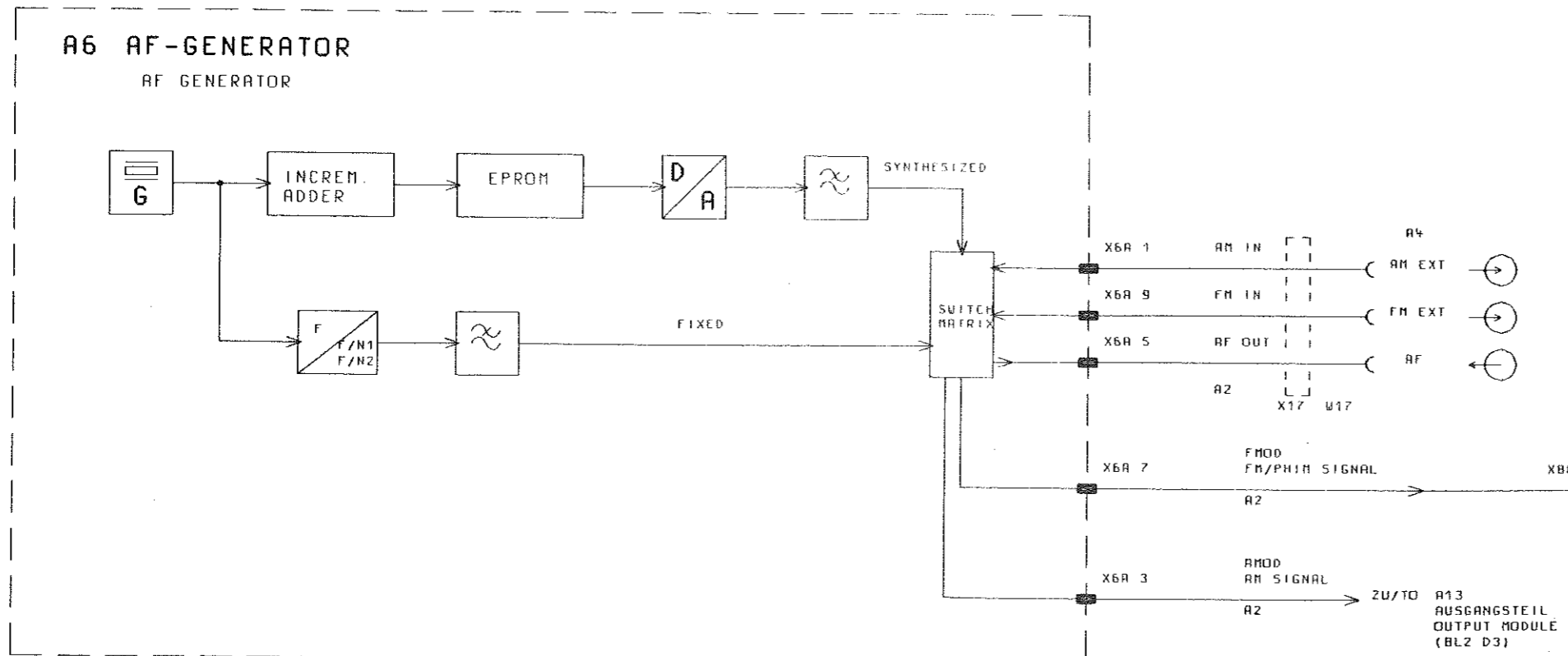
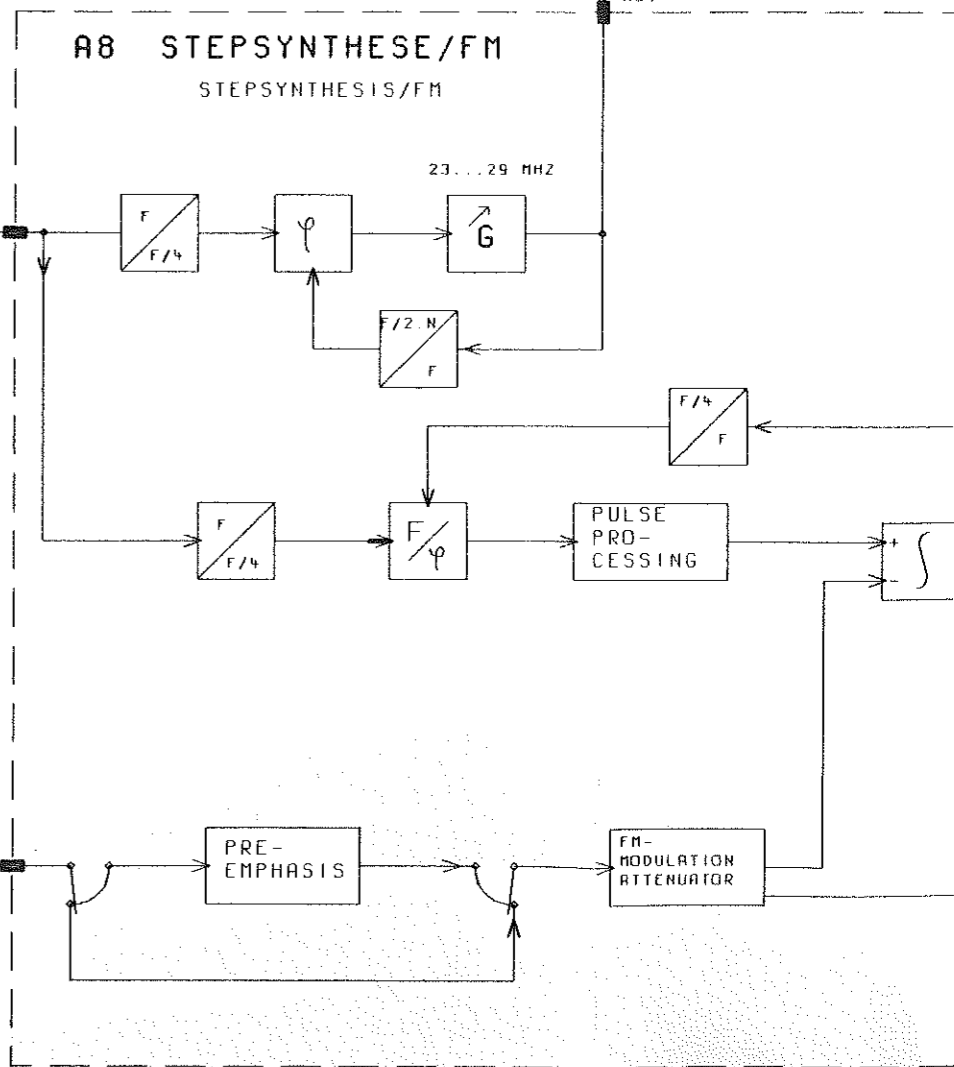
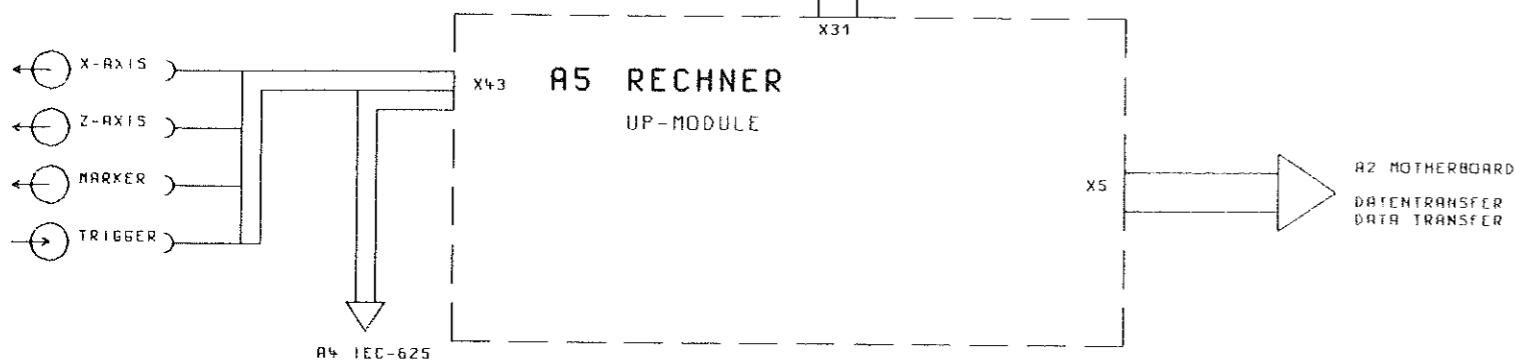
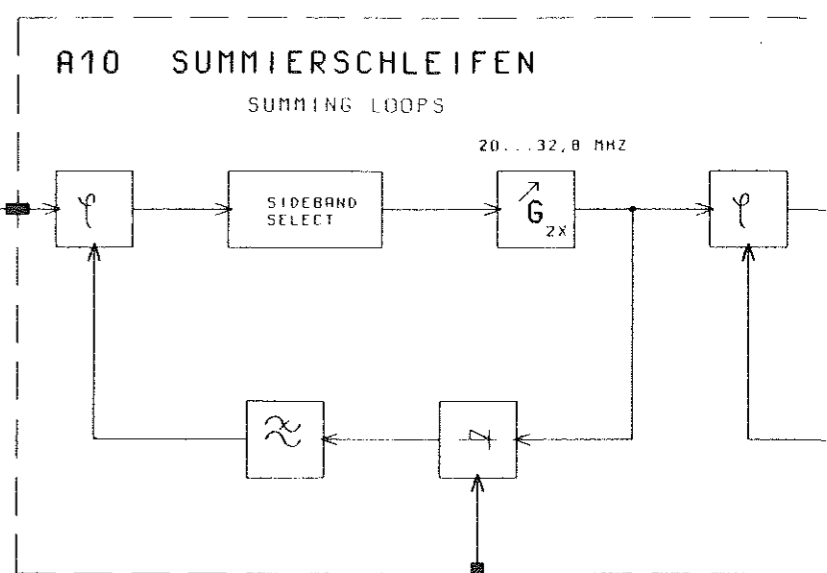
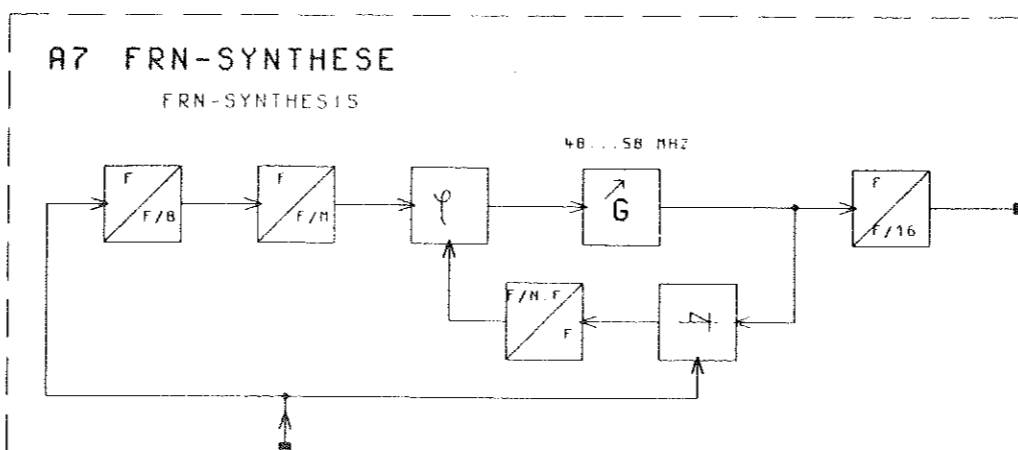
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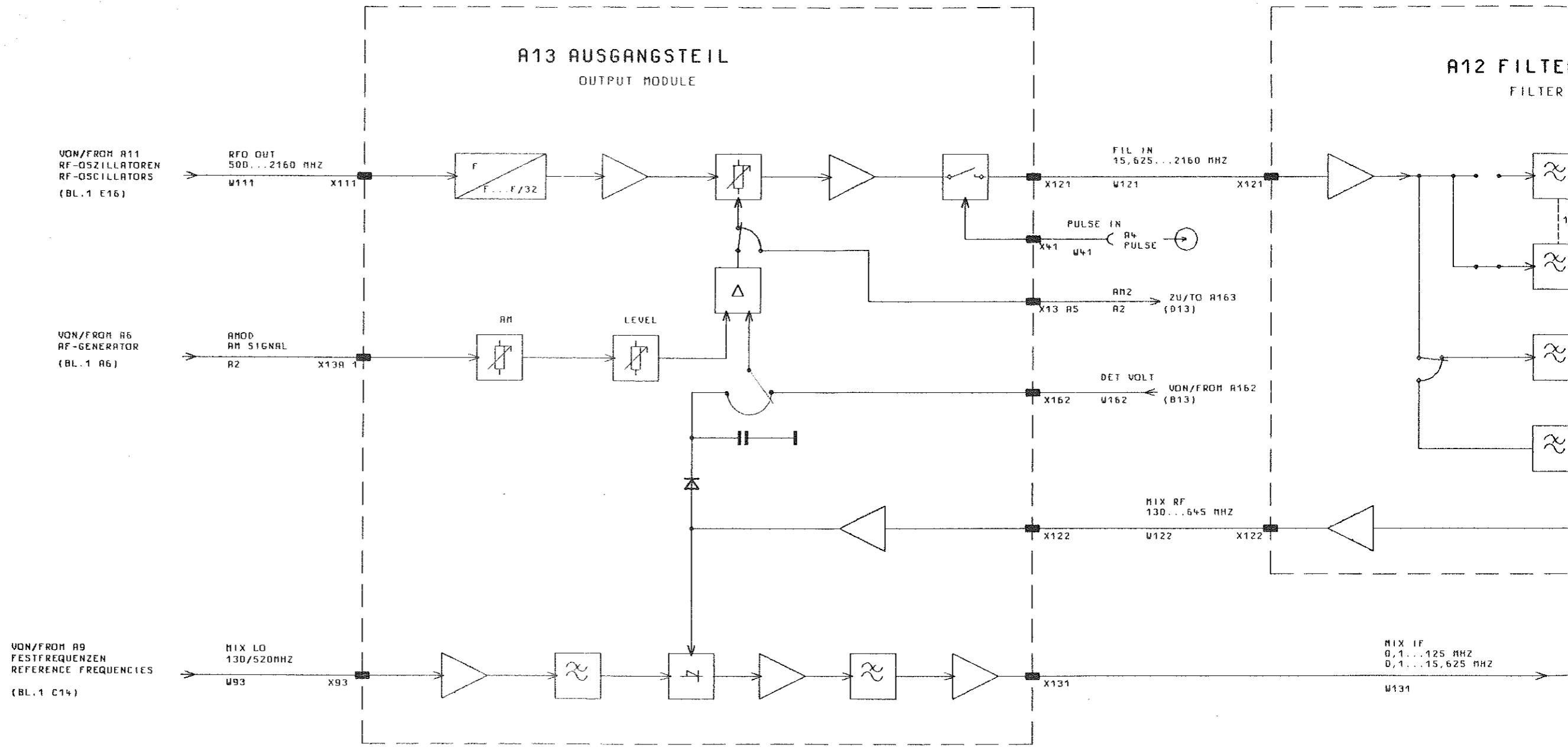
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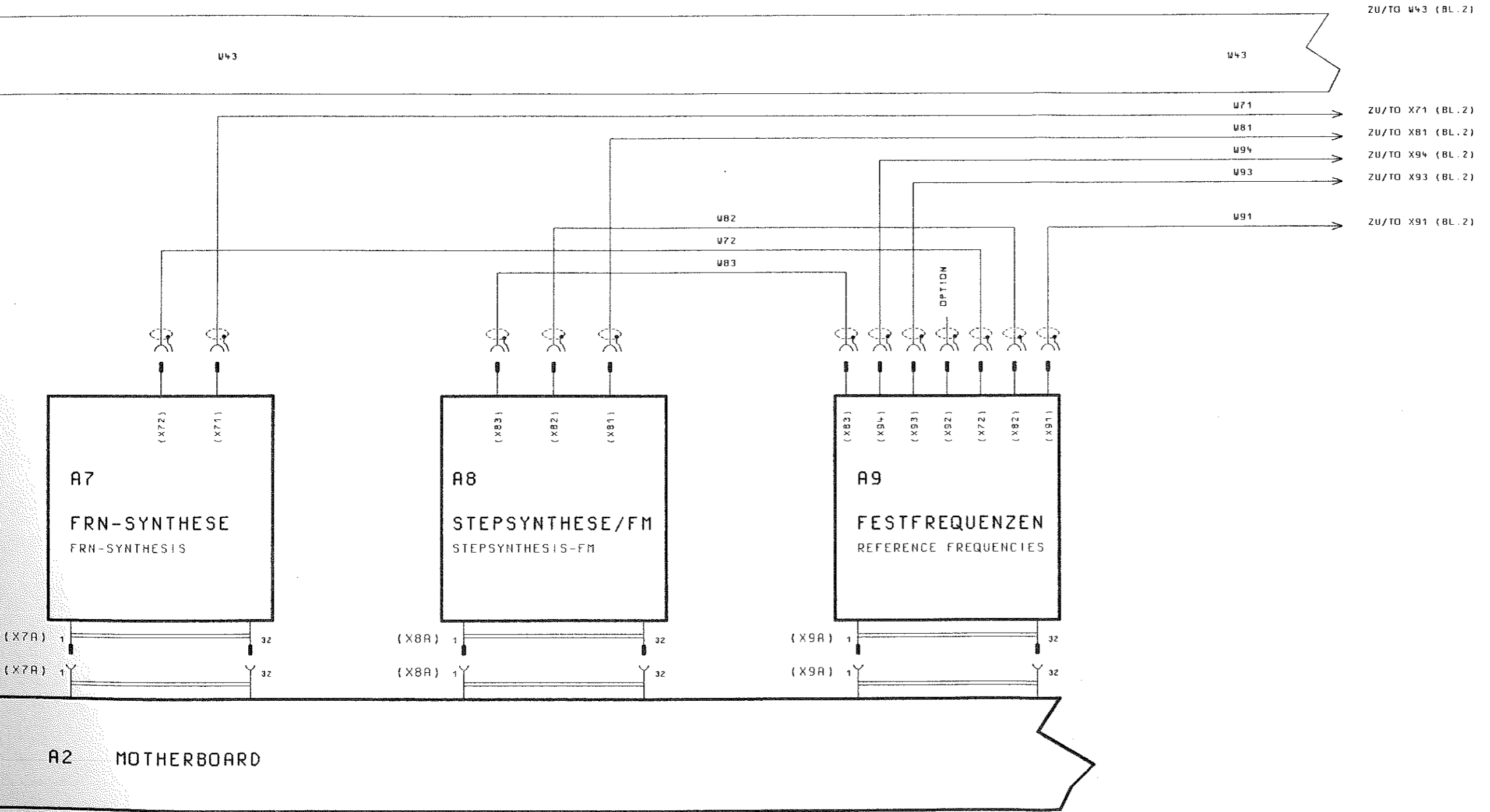
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W161	DX HF KABEL W161 RF CABLE	836.3313			836.3336.01	
W162	DX HF KABEL W162 RF CABLE	836.3294			836.3265.01	
W181	DX HF KABEL W181 RF-CABLE	820.3060			836.3336.01	
X171	FJ EINBAUBUCHSE SYST.BNC BNC-CONNECTOR UG 625CIU	FJ 099.9186	ROSENBERG.	51K-503-200-P4	819.0055.01	
X172	FJ EINBAUBUCHSE SYST.BNC BNC-CONNECTOR UG 625CIU	FJ 099.9186	ROSENBERG.	51K-503-200-P4	819.0055.01	
X173	FJ EINBAUBUCHSE SYST.BNC BNC-CONNECTOR UG 625CIU	FJ 099.9186	ROSENBERG.	51K-503-200-P4	819.0055.01	
X431 .434	FJ EINBAUBUCHSE SYST.BNC BNC-CONNECTOR UG 625CIU	FJ 099.9186	ROSENBERG.	51K-503-200-P4	819.0055.01	
					- ENDE -	
ROHDE & SCHWARZ		Äl	Schaltteilliste für Parts list for		Sachnummer Stock Nr.	Blatt Page
		18	Datum Date	SMHU SIGNALGENERATOR	835.8011.01 SA	2-




1 KGB	TAG	NAME	BENENNUNG
BEARB.		SP	SMHU-SIGNALGENERATOR SMHU-SIGNALGENERATOR
GEPR.		SP	
NORM			
PLOTT	28.11.88	*	
			ZEICHN.-NR.
ROHDE & SCHWARZ			835.8011 FS
REND. IND.	RENDERUNGS-NITTEILUNG	DATUM	NAME
ZU GERÄT SMHU		REG. I.V.	835.8011
		ERSTE Z.	
			BLATT-NR. 1 V. 2 BL.

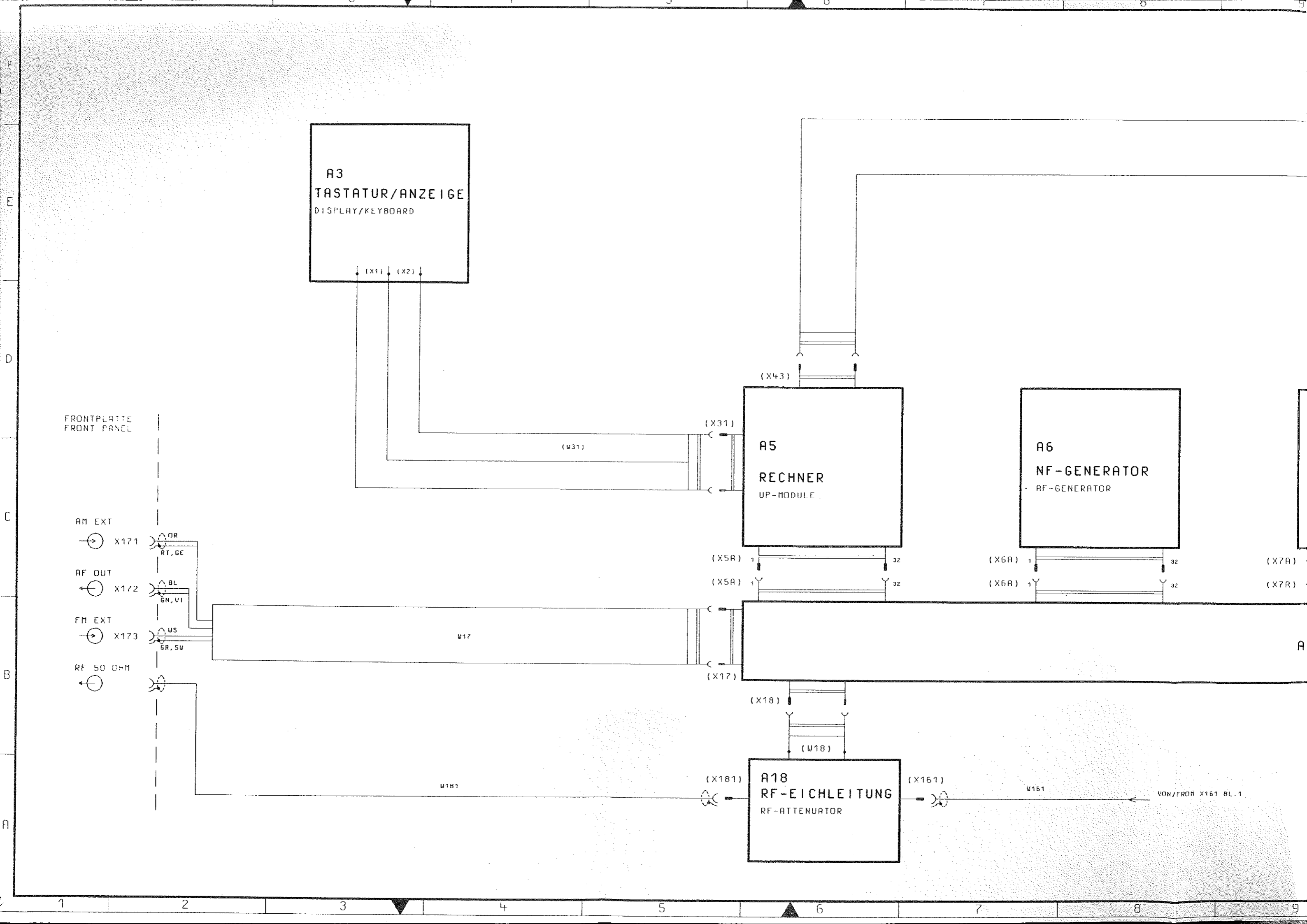


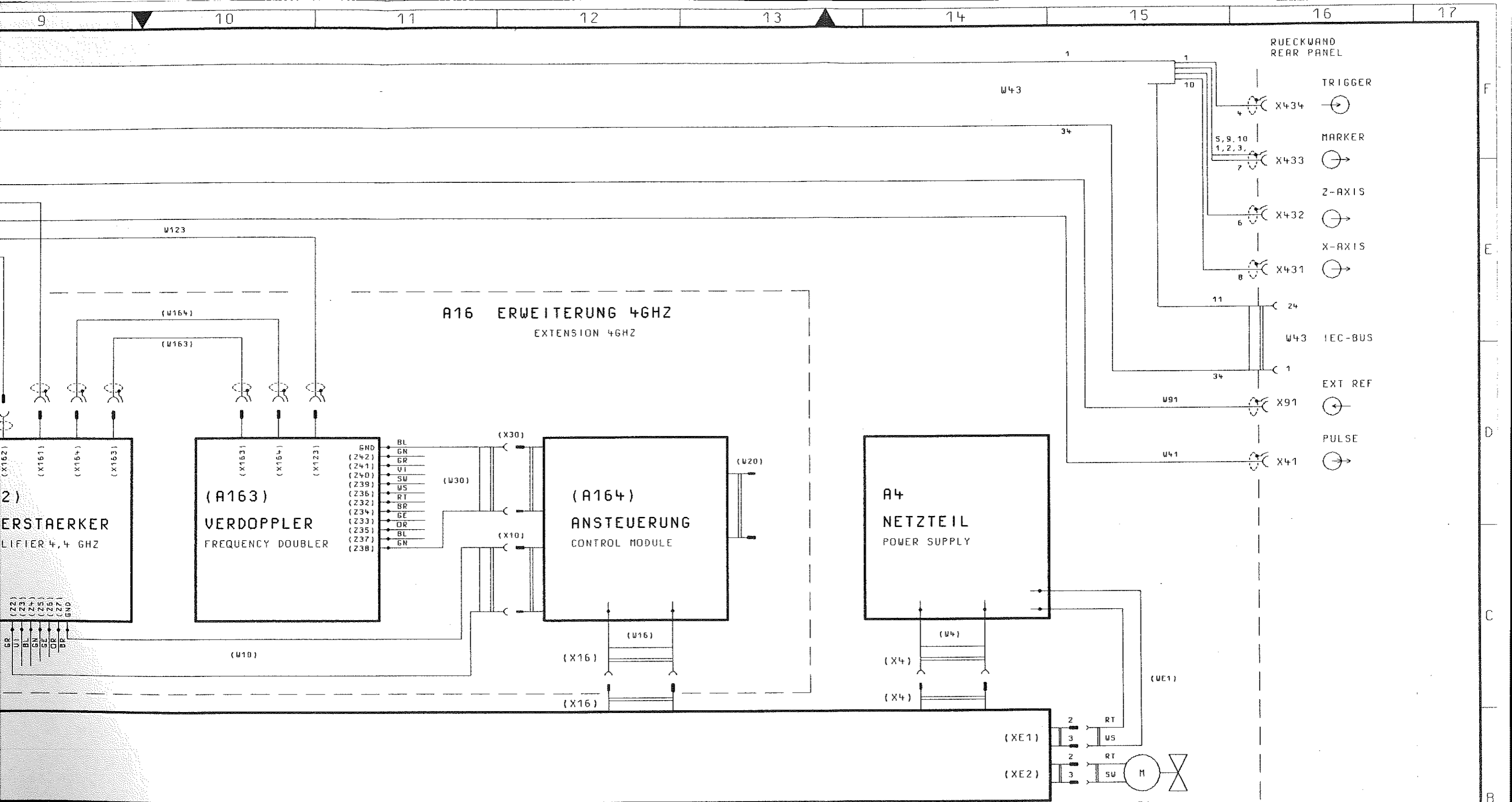





STROMLAUF GILT FUER VAR. 52
 CIRCUIT DIAGRAM IS VALID FOR MOD. 52

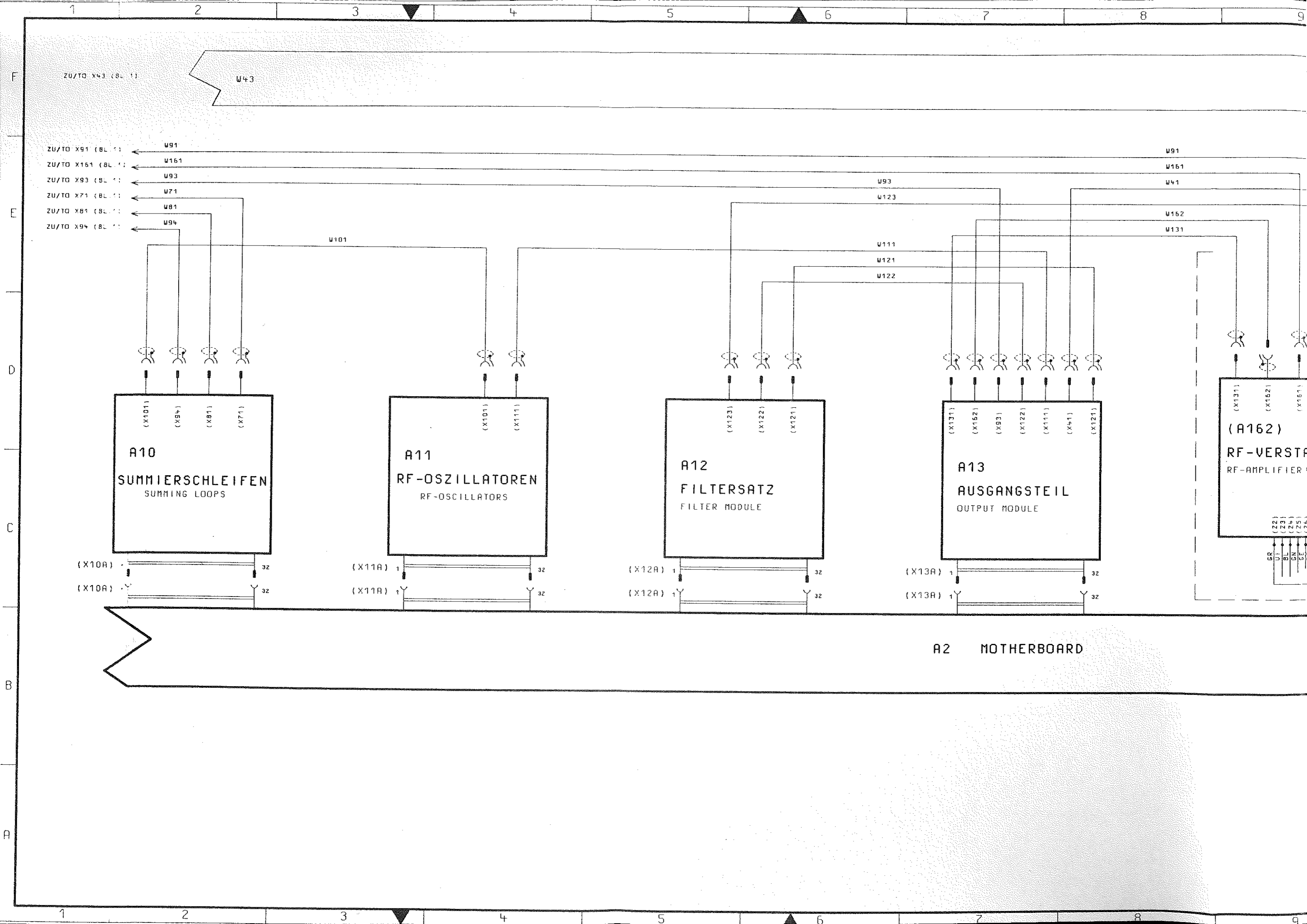
				1KGB	TAG	NAME	BENENNUNG
				BEARB.		LS	SMHU-SIGNALGENERATOR SMHU-SIGNALGENERATOR
				GEPR.		SP	
				NORN			
				PLOTT	11. 4. 89	*	
				 ROHDE & SCHWARZ			ZEICHN.-NR.
							835.8011.01S
REND. IND.	ÄNDERUNGS- MITTEILUNG	DATUM	NAME	ZU GEHÖRT SMHU	REG. I. V.	835.8011	ERSTE Z. 17





STROMLAUF GILT FUER VAR.52
CIRCUIT DIAGRAM IS VALID FOR MOD.52

1KGB	TRG	NAME	BENENNUNG			
BEARB.		LS	SMHU-SIGNALGENERATOR SMHU-SIGNALGENERATOR			
GEPR.		SP				
NORN						
PLOTT	11. 4. 89	*				
REND. IND.	ÄNDERUNGS-MITTEILUNG	DATUM	NAME	 ROHDE & SCHWARZ	ZEICHN.-NR. 835.8011.015	BLATT-NR. 2
ZU GERÄT	SMHU	REG. I. V.	835.8011	ERSTE Z.		



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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in	
.	ZUGEH. STROML./CIRC. DIAGR. 835.8011 S					
A162	ZE HF-VERSTAERKER 4,4 GHZ RF AMPLIFIER	836.0766.02				
A163	ZE VERDOPPLERMODUL FREQUENCY DOUBLER	835.8763.02				
A164	ED ANSTEUERPLATTE CONTROL/MODUL	836.2269.02				
W163	DX HF KABEL W163 RF CABLE	836.3465			836.3442.01	
W164	DX HF KABEL W164 RF CABLE	836.3459			836.3442.01	
					- ENDE -	
ROHDE & SCHWARZ		Äl Datum Date	Schaltteilliste für Parts list for		Sachnummer Stock Nr.	Blatt Page
		03 0489	ZE ERWEITERUNG 4GHZ EXTENSION UNIT		835.8711.01 SA	1-

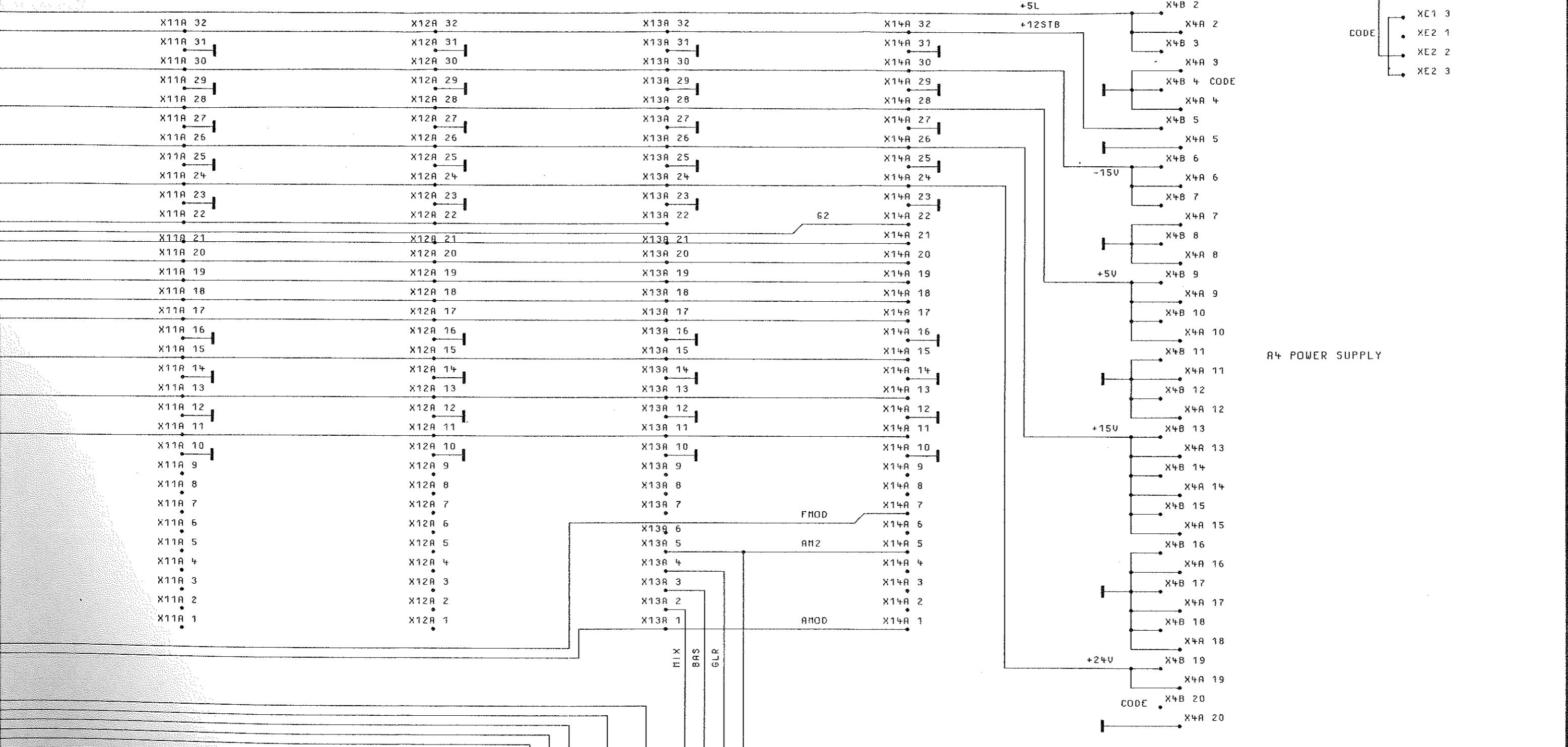
Für diese Unterlage behalten wir uns alle Rechte vor

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
XE1	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR	FP 243.3578	BINDER	742-5-11-0187-00-36	
XE2	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR	FP 243.3578	BINDER	742-5-11-0187-00-36	
X1A	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR 6-POLIG/PINS	FP 243.3578	BINDER	742-5-11-0187-00-36	
X10A	FP BUCHSENLEISTE 32POL FEMALE MULTIPOINT CONNECT	FP 514.4120	PANDUIT	100-232-433/999	
X11A	FP BUCHSENLEISTE 32POL FEMALE MULTIPOINT CONNECT	FP 514.4120	PANDUIT	100-232-433/999	
X12A	FP BUCHSENLEISTE 32POL FEMALE MULTIPOINT CONNECT	FP 514.4120	PANDUIT	100-232-433/999	
X13A	FP BUCHSENLEISTE 32POL FEMALE MULTIPOINT CONNECT	FP 514.4120	PANDUIT	100-232-433/999	
X14A	FP BUCHSENLEISTE 32POL FEMALE MULTIPOINT CONNECT	FP 514.4120	PANDUIT	100-232-433/999	
X16A	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR 13-POLIG/PINS	FP 243.3578	BINDER	742-5-11-0187-00-36	
X16B	FP STECKERL.ABGEW.36-POL. ANGLE PIN CONNECTOR NUR VAR/ONLY MOD: 02 13-POLIG/PINS	FP 087.9105	BINDER	742-5-11-0191-00-36	
X17A	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR 5-POLIG/PINS	FP 243.3578	BINDER	742-5-11-0187-00-36	
X17B	FP STECKERL.ABGEW.36-POL. ANGLE PIN CONNECTOR NUR VAR/ONLY MOD: 02 5-POLIG/PINS	FP 087.9105	BINDER	742-5-11-0191-00-36	
X18A	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR 8-POLIG/PINS	FP 243.3578	BINDER	742-5-11-0187-00-36	
X18B	FP STECKERL.ABGEW.36-POL. ANGLE PIN CONNECTOR NUR VAR/ONLY MOD: 02 8-POLIG/PINS	FP 087.9105	BINDER	742-5-11-0191-00-36	
X4A	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR 20-POLIG/PINS	FP 243.3578	BINDER	742-5-11-0187-00-36	
X4B	FP STECKERL.ABGEW.36-POL; ANGLE PIN CONNECTOR NUR VAR/ONLY MOD: 02 20-POLIG/PINS	FP 087.9105	BINDER	742-5-11-0191-00-36	
X5A	FP BUCHSENLEISTE 32POL FEMALE MULTIPOINT CONNECT	FP 514.4120	PANDUIT	100-232-433/999	
X6A	FP BUCHSENLEISTE 32POL FEMALE MULTIPOINT CONNECT	FP 514.4120	PANDUIT	100-232-433/999	
X7A	FP BUCHSENLEISTE 32POL FEMALE MULTIPOINT CONNECT	FP 514.4120	PANDUIT	100-232-433/999	
X8A	FP BUCHSENLEISTE 32POL FEMALE MULTIPOINT CONNECT	FP 514.4120	PANDUIT	100-232-433/999	
X9A	FP BUCHSENLEISTE 32POL FEMALE MULTIPOINT CONNECT	FP 514.4120	PANDUIT	100-232-433/999	

- ENDE -

ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	04	0988	ED MOTHERBOARD MOTHERBOARD	819.0910.01 SA	1-

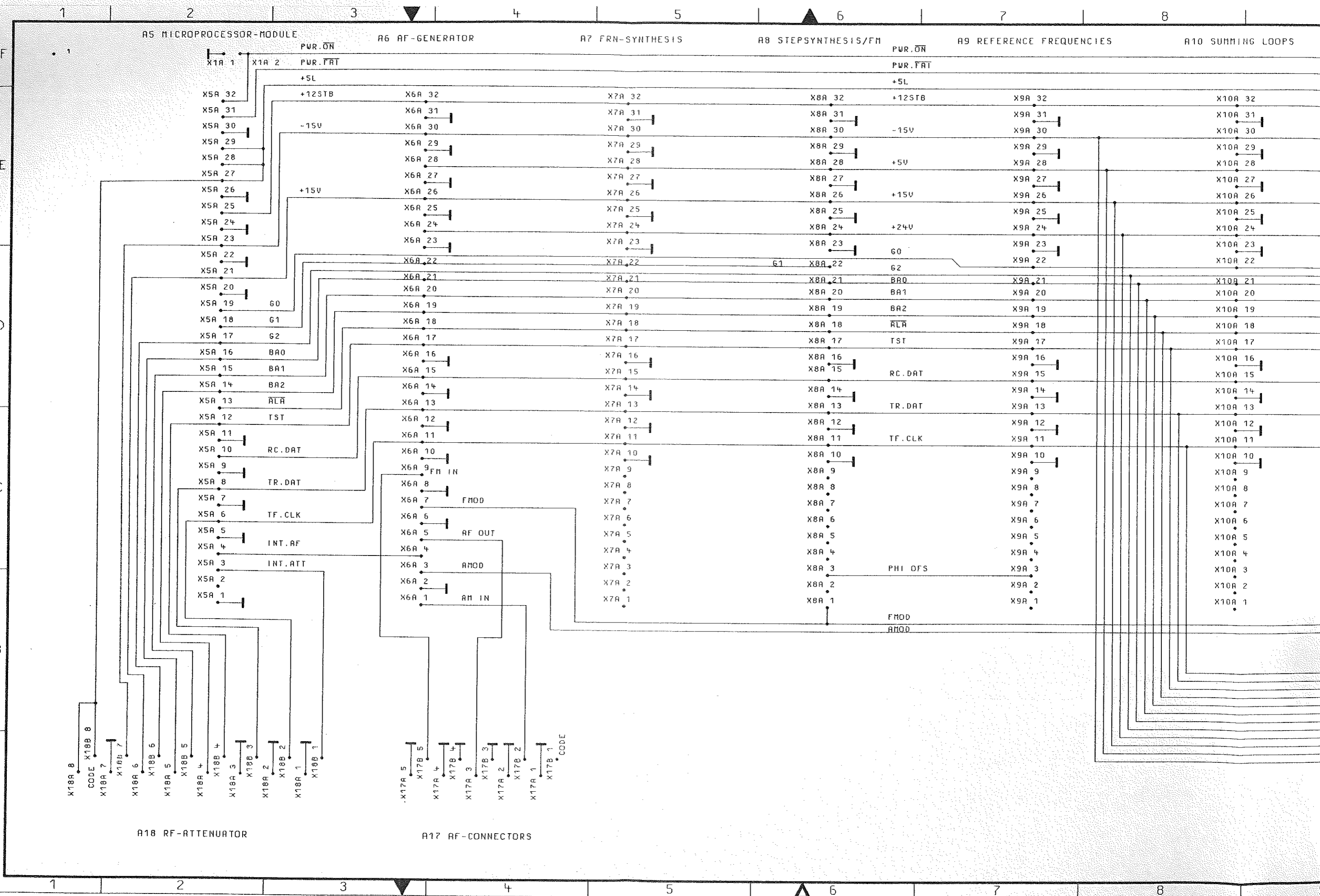
A11 RF-OSCILLATORS A12 FILTER MODULE A13 OUTPUT MODULE A14 OPTION PWR.ON PWR.FAT +5L +12STB X4B 1 X4A 1 X4B 2 X4A 2 X4B 3 X4A 3 X4B 4 X4A 4 X4B 5 X4A 5 X4B 6 X4A 6 X4B 7 X4A 7 X4B 8 X4A 8 X4B 9 X4A 9 X4B 10 X4A 10 X4B 11 X4A 11 X4B 12 X4A 12 X4B 13 X4A 13 X4B 14 X4A 14 X4B 15 X4A 15 X4B 16 X4A 16 X4B 17 X4A 17 X4B 18 X4A 18 X4B 19 X4A 19 X4B 20 X4A 20 FAN CODE XE1 1 XE1 2 XE1 3 XE2 1 XE2 2 XE2 3

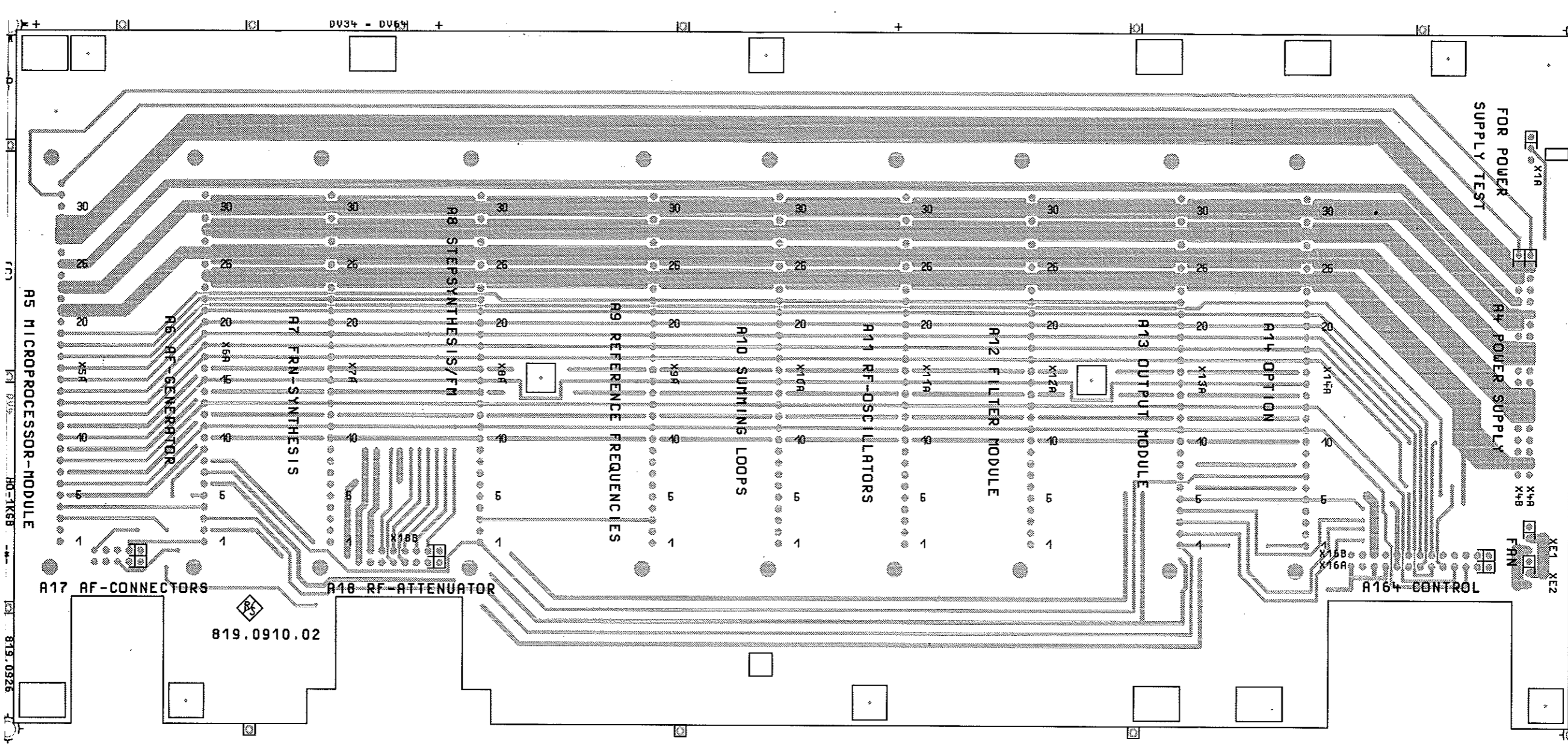


A4 POWER SUPPLY

STROMLAUF GILT FUER VAR.02 CIRCUIT DIAGRAM IS VALID FOR MOD.02

1KGB	TAG	NAME	BENENNUNG
BEARB.		HO	MOTHERBOARD MOTHERBOARD
GEPR.		HO	
NDRN			
PLOTT	27. 7.88	*	
			ZEICHN.-NR.
			819.0910.015
REND. IND.	RENDERUNGS- ABTEILUNG	DATUM	NAME
ZU GERÄT		SMGU	REG. I. V.
			819.0010
			ERSTE Z.
			BLATT-NR.
			1
			V. 1. BL.

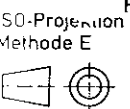


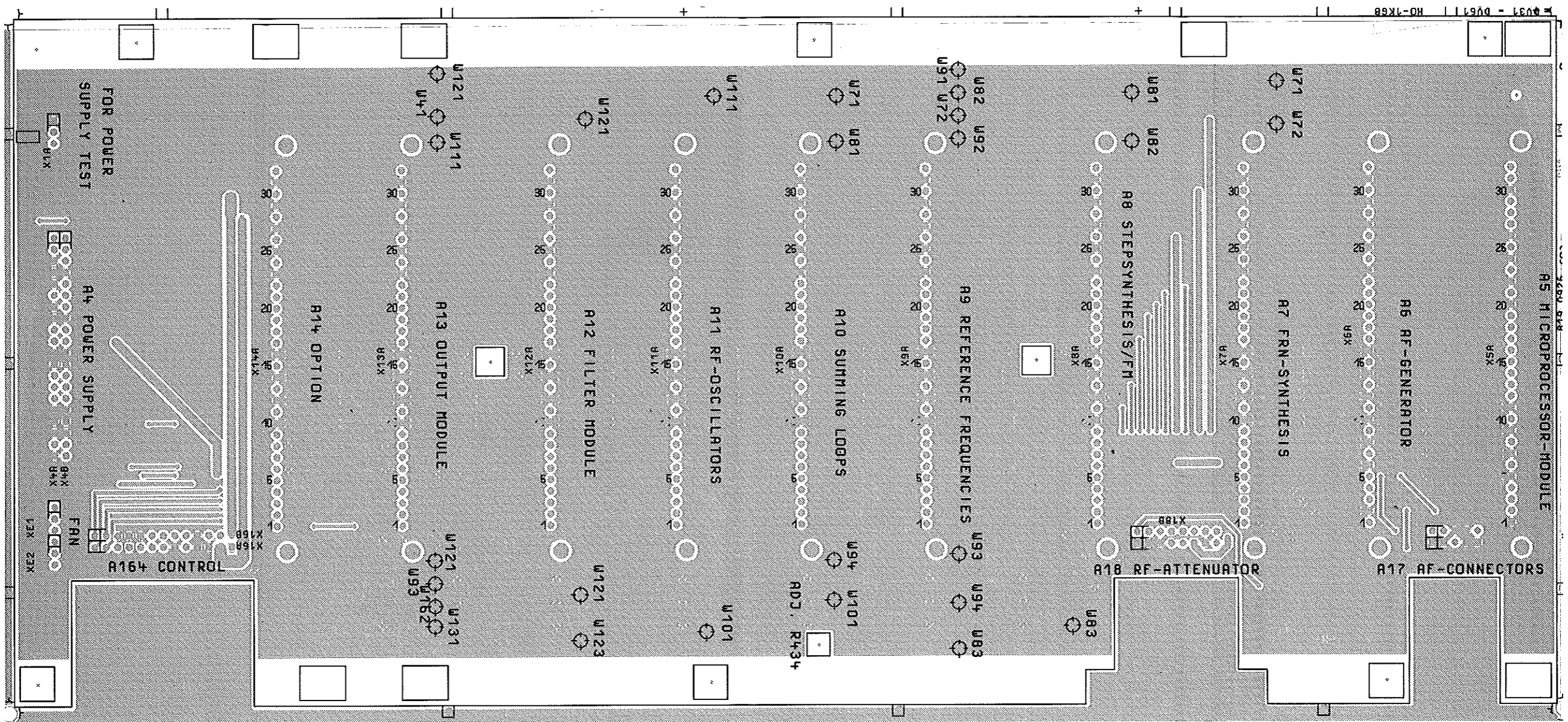


Ansicht und Leitungsführung Bauteilseite
View of tracks on component side

Für diese Unterlage behalten wir uns alle Rechte vor.

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			1KGB Tag Name	Benennung
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			Gepr.	
			Norm	
			 zu Gerät SMGU	Zeichn.-Nr. 819.0910
				reg. i. V. 819.0010V
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	v. Bl.

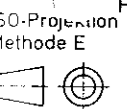




Ansicht und Leitungsführung Lötseite
View of tracks on solder side

Für diese Unterlage behalten wir uns alle Rechte vor.

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					Halbzeug, Werkstoff	
			1KGB	Tag	Name	Benennung
			Bearb.	08.88	HO	MOTHERBOARD
			Gepr.			
			Norm			
					ROHDE & SCHWARZ	Zeichn.-Nr.
					zu Gerät SMGU	819.0910
Änd. Zust.	Änderungs-Mitteilung	Tag	Name			Blatt-Nr. 3
				reg. i. V. 819.0010V		v. Bl.
				erste Z.		





ROHDE & SCHWARZ

SERVICE DOCUMENTS

Display/Keyboard

819.1122.02

Contents

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5	Service Manual "Display / Keyboard" 5.1	
5.1	Function Description 5.1	
5.1.1	LCD Drive Control	5.1
5.1.2	LED Drive Control	5.1
5.1.3	Display Matrix	5.1
5.1.4	Tachogenerator	5.1
5.1.5	Standby	5.1
5.2	Testing and Adjustment 5.2	
5.2.1	Adjustment of Contrast	5.2
5.2.2	Testing the LCD and LED Functions	5.2
5.3	Troubleshooting 5.2	
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5.4.1	Analog Interfaces	5.3
5.4.2	Digital Interfaces	5.3

Circuit diagrams
Parts lists
Components plans

5 Service Manual "Display / Keyboard"

5.1 Function Description

(See circuit diagram 819.1122 S and Fig. 5-1)

The circuit of the subassembly comprises the following blocks:

- ▶ *LCD drive circuit*
- ▶ *LED drive circuit*
- ▶ *Keyboard matrix*
- ▶ *Spinwheel*
- ▶ *Standby*

5.1.1 LCD Drive Circuit

The three liquid-crystal displays (frequency, modulation, level) are each driven by a driver module in multiplex mode. The segment voltage can be varied using potentiometer R16 in order to adjust the contrast of the segments. Data transfer between the controller subassembly and the drive modules is in serial mode.

5.1.2 LED Drive Circuit

The LEDs are controlled by means of shift registers (D30, D40, D50, D60, D70, D80, D100) connected in series which are loaded serially via a data line (DIS.DAT) and which output the data by means of a common strobe connection.

One output bit is used to program the LCD backlighting.

The timer module D105 generates a flashing signal for the status LED H105. Two bits are also used to program the operating states "On" and "Off".

5.1.3 Keyboard Matrix

The 58 keys are arranged in an 8x8 matrix whose row and column lines are connected to the controller subassembly.

Pressing a key connects the corresponding row line to the column line. The interface module on the controller subassembly recognizes the code characteristic for this key.

5.1.4 Tachogenerator

The tachogenerator is a magnetized ferrite ring on the spinwheel shaft. The ring is split up into segments whose magnetic field direction alternates. Two Hall sensors offset from one another about the rings's circumference provide information on the direction and angle of rotation.

5.1.5 Standby

The standby LED H110 is powered by the +12 V standby voltage when the instrument is switched on. When the instrument is in operation, the +15 V supply prevents a flow of current through H110 (standby lamp goes out).

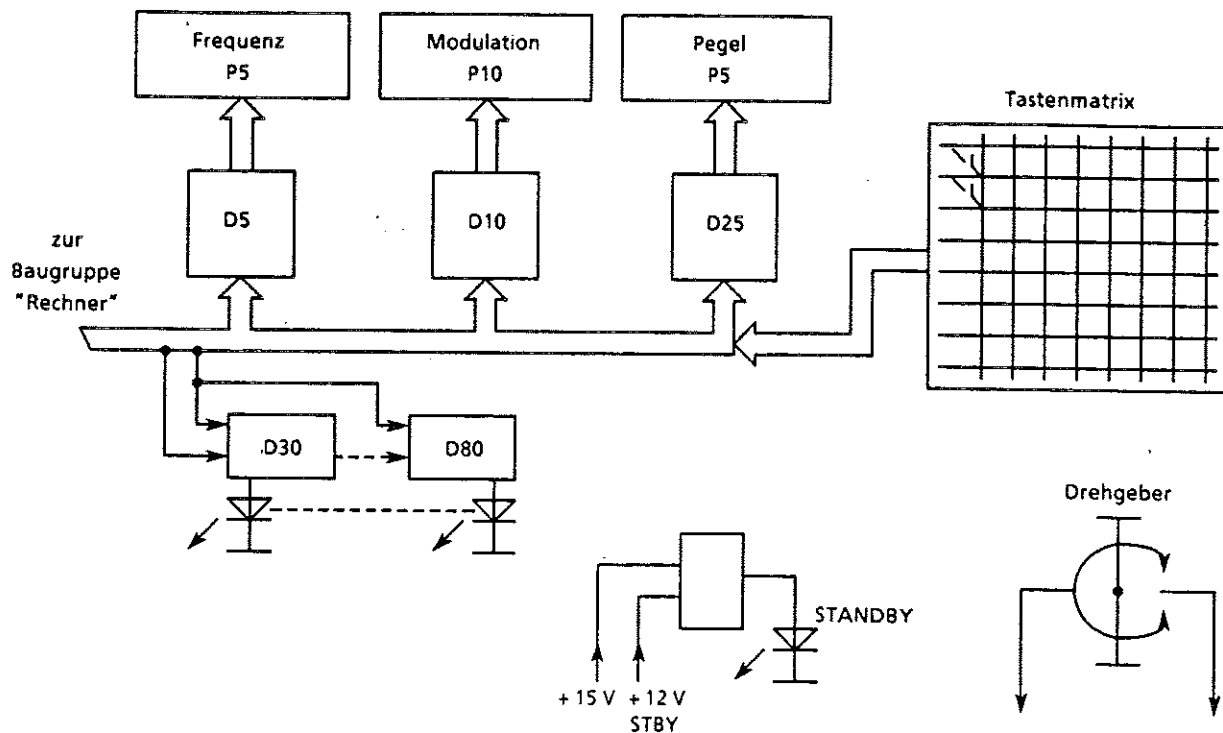


Fig. 5-1 Block diagram "Display/keyboard"

5.2 Testing and Adjustment

5.2.1 Adjustment of Contrast

When viewed directly from the front, the contrast between the segments of the LCDs that are on and off can be adjusted using potentiometer R16. R16 is accessible through a cutout in the front panel after removing the lettered panel (see Fig. 5-2).

5.2.2 Testing the LCD and LED Functions

Input: SHIFT SPEC. 72.

All segments of the LCDs are on and all LEDs light up for approx. 1 s. Following brief off period, each LED goes on for approx. 0.5 s in a cyclic sequence.

5.3 Troubleshooting

- There is nothing on the display:
Check operating voltage.
- LCD contrast unsatisfactory:
Adjust according to 5.2.1
- No tachogenerator reaction:
Check the two pulse sequences at X1,13 and X1,14: approx. 90° difference in phase between the TTL signals.
- No reaction when a key is pressed:
Check that key is making proper contact. If need be, check if other keys have stuck.

5.4 Interfaces

5.4.1 Analog Interfaces

Supply voltage	+ 5 V	X1.17	X2.17
GND (ground)	⊥	X1, 1, 2, 10, 15, 18, 19, 20	X2, 2
	+ 12 V STBY	X2, 20	
	+ 15 V	X2, 19	

5.4.2 Digital Interfaces

Signal name	Meaning	I = input O = output	Test point	Level
DIS.CLK	Serial data	I	X1, 3	TTL
DIS.DAT	transmission	I	X1, 4	TTL
DIS.BUSY	Display handshake output	O	X1, 11	TTL
DIS.C/D	Display control	I	X1, 8	TTL
DIS.RES	Display reset	I	X1, 16	TTL
DIS.STB1	Display strobe 1 (FREQ.)	I	X1, 5	TTL
DIS.STB2	Display strobe 2 (MODUL.)	I	X1, 6	TTL
DIS.STB3	Display strobe 3 (LEVEL)	I	X1, 7	TTL
LED.STB	LED.strobe	I	X1, 9	TTL
KEYB.COL 1	Keyboard matrix column 1	O	X2, 10	TTL
KEYB.COL 2	Keyboard matrix column 2	O	X2, 7	TTL
KEYB.COL 3	Keyboard matrix column 3	O	X2, 8	TTL
KEYB.COL 4	Keyboard matrix column 4	O	X2, 5	TTL
KEYB.COL 5	Keyboard matrix column 5	O	X2, 6	TTL
KEYB.COL 6	Keyboard matrix column 6	O	X2, 3	TTL
KEYB.COL 7	Keyboard matrix column 7	O	X2, 4	TTL
KEYB.COL 8	Keyboard matrix column 8	O	X2, 1	TTL
KEYB.ROW 1	Keyboard matrix row 1	O	X2, 18	TTL
KEYB.ROW 2	Keyboard matrix row 2	O	X2, 15	TTL
KEYB.ROW 3	Keyboard matrix row 3	O	X2, 16	TTL
KEYB.ROW 4	Keyboard matrix row 4	O	X2, 13	TTL
KEYB.ROW 5	Keyboard matrix row 5	O	X2, 14	TTL
KEYB.ROW 6	Keyboard matrix row 6	O	X2, 11	TTL
KEYB.ROW 7	Keyboard matrix row 7	O	X2, 12	TTL
KEYB.ROW 8	Keyboard matrix row 8	O	X2, 9	TTL
DREHG. PULS		O	X1, 14	TTL
DREHG. DIR		O	X1, 13	TTL
PWR.ON		O	X1, 12	

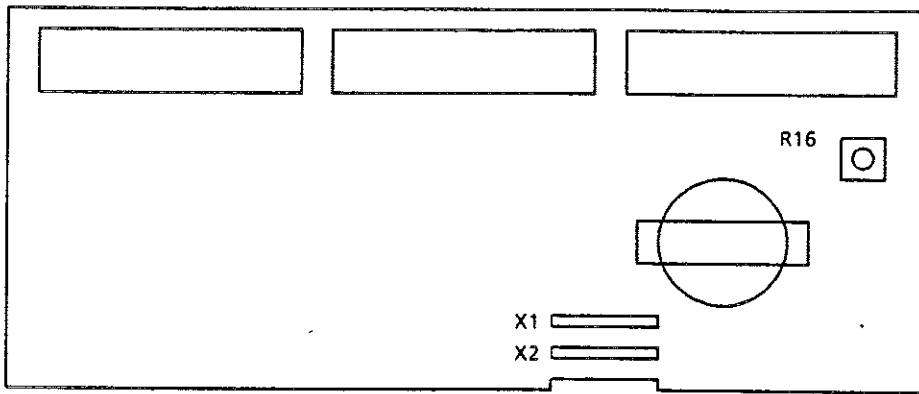


Fig. 5-2 Layout of adjustment points



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Schaltteillisten

Stromläufe

Bestückungspläne

Part lists

Circuit diagrams

Components plans

Listes des pièces détachées

Schémas de Circuit

Plans des composants

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
B115	BS UGN3020T HALL-EFF.SW. HALL-EFF.SWITCH	BJ 336.4750	SPRAGUE	UGN3020T	
B116	BS UGN3020T HALL-EFF.SW. HALL-EFF.SWITCH	BJ 336.4750	SPRAGUE	UGN3020T	
C1	CE 1UF+-20%40V SAL ELECTR.CAPACITOR	CE 007.3905	VALVO	2222 122 37108	
C2	CE 1UF+-20%40V SAL ELECTR.CAPACITOR	CE 007.3905	VALVO	2222 122 37108	
C5	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C6	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C7	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C10	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C11	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C12	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C15	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C20	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C25	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C26	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C27	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C105	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C107	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C110	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C111	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
D5	BJ UPD7225G00 LCD DRIV ALPHANUM.LCD CONTR/DRIVER	BJ 392.5320	NEC ELECTR	UPD7225G	
D10	BJ UPD7225G00 LCD DRIV ALPHANUM.LCD CONTR/DRIVER	BJ 392.5320	NEC ELECTR	UPD7225G	
D25	BJ UPD7225G00 LCD DRIV ALPHANUM.LCD CONTR/DRIVER	BJ 392.5320	NEC ELECTR	UPD7225G	
D30	BL PC74HC4094T 8ST.BUSREG BUS REGISTER	BL 804.0977	VALVO	PC74HC4094I	
D40	BL PC74HC4094T 8ST.BUSREG BUS REGISTER	BL 804.0977	VALVO	PC74HC4094I	
D50	BL PC74HC4094T 8ST.BUSREG BUS REGISTER	BL 804.0977	VALVO	PC74HC4094I	
D60	BL PC74HC4094T 8ST.BUSREG BUS REGISTER	BL 804.0977	VALVO	PC74HC4094I	
D70	BL PC74HC4094T 8ST.BUSREG BUS REGISTER	BL 804.0977	VALVO	PC74HC4094I	
D80	BL PC74HC4094T 8ST.BUSREG BUS REGISTER	BL 804.0977	VALVO	PC74HC4094I	
D105	BO NE555V TIMER	BO 418.1383	NSC	LM555CN	
H31	AF HLMP1790 LED GN RD3	AF 007.5250	QTC	HLMP1790C31	
..38	LED				
H41	AF HLMP1790 LED GN RD3	AF 007.5250	QTC	HLMP1790C31	
..48	LED				
H52	AF HLMP1790 LED GN RD3	AF 007.5250	QTC	HLMP1790C31	
..58	LED				
H61	AF HLMP1790 LED GN RD3	AF 007.5250	QTC	HLMP1790C31	
..67	LED				
H74	AF HLMP1790 LED GN RD3	AF 007.5250	QTC	HLMP1790C31	
..78	LED				
H81	AF HLMP1790 LED GN RD3	AF 007.5250	QTC	HLMP1790C31	
..84	LED				
H85	AF HLMP1790 LED GN RD3	AF 007.5250	QTC	HLMP1790C31	
..84	LED				
H86	AF HLMP1790 LED GN RD3	AF 007.5250	QTC	HLMP1790C31	
..84	LED				

ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	04	0489	ED ANZEIGE/TASTATUR DISPLAY/KEYBOARD	819.1122.01 SA	1+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
H87	AF HLMP1790 LED GN RD3 LED N.BESTUECKT/NOT FITTED	AF 007.5250	QTC	HLMP1790C31	
H90 .93	EF 5V OHNE SOCKEL LAMP	EF 063.6906	MGG	1150-00	
H105	AF HLMP1700 LED RT RD3 LED	AF 099.9134	QTC	HLMP1700C31	
H110	AF HLMP1790 LED GN RD3 LED	AF 007.5250	QTC	HLMP1790C31	
L1	LD 0,33UH10%, 220HMO, 830A CHOKE	LD 067.2805	DELEVAN	DROSSEL1025--08	
N20	BO CA3240AE 2XMOS. OPAMP OPERATIONAL AMPLIFIER	302.7040	RCA	CA3240AE	
P5	BP LCD10X 7SEGM. 10MM TFL LC DISPLAY	801.1414	VIDELEC	R&S-ZCHNG. 801.1414	
P10	BP LCD 8X 7SEGM. 10MM TFL LC DISPLAY	801.1420	VIDELEC	R&S-ZCHNG. 801.1420	
P25	BP LCD 7X 7SEGM. 10MM TFL LC DISPLAY	801.1437	VIDELEC	R&S-ZCHNG. 801.1437	
R1	RN 9X47 KOHM+-2% SIL10 H5 RESISTOR NETWORK	RN 341.9286	BOURNS	4310R-101-473	
R2	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R3	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R5	RG 182KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5989	DALE	CRCW1206-10 182K F-T	
R6	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R7	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R8	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R10	RG 182KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5989	DALE	CRCW1206-10 182K F-T	
R11	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R12	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R13	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R15	RG 46,4KOHM+-2%TK200 1206 CHIP RESISTOR	007.1860	DRALORIC	CGB 3216 46,4KOHM 2%	
R16	RS 0,5W5KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7890	BOURNS	3386F-1-502	
R17	RG 5,62KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0735	DALE	CRCW1206-10 5K62 F-T	
R20	RG 21,5KOHM+-2%TK200 CHIP RESISTOR	007.0906	DRALORIC	CGB 3216 21,5KOHM 2%	
R21	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R22	RL 0,35W 681 KOHM+-1%TK50 RESISTOR	RL 083.2735	DRALORIC	SMA0207/381K-F-C	
R25	RG 182KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5989	DALE	CRCW1206-10 182K F-T	
R26	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R27	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R28	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R30	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R31	RN 4X1,0KOHM+-2%SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R35	RN 4X1,0KOHM+-2%SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R40	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R41	RN 4X1,0KOHM+-2%SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R45	RN 4X1,0KOHM+-2%SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	

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Äl Datum
Date

04 0489

Schaltteilliste für
Parts list for

ED ANZEIGE/TASTATUR
DISPLAY/KEYBOARD

Sachnummer
Stock Nr.

819.1122.01 SA

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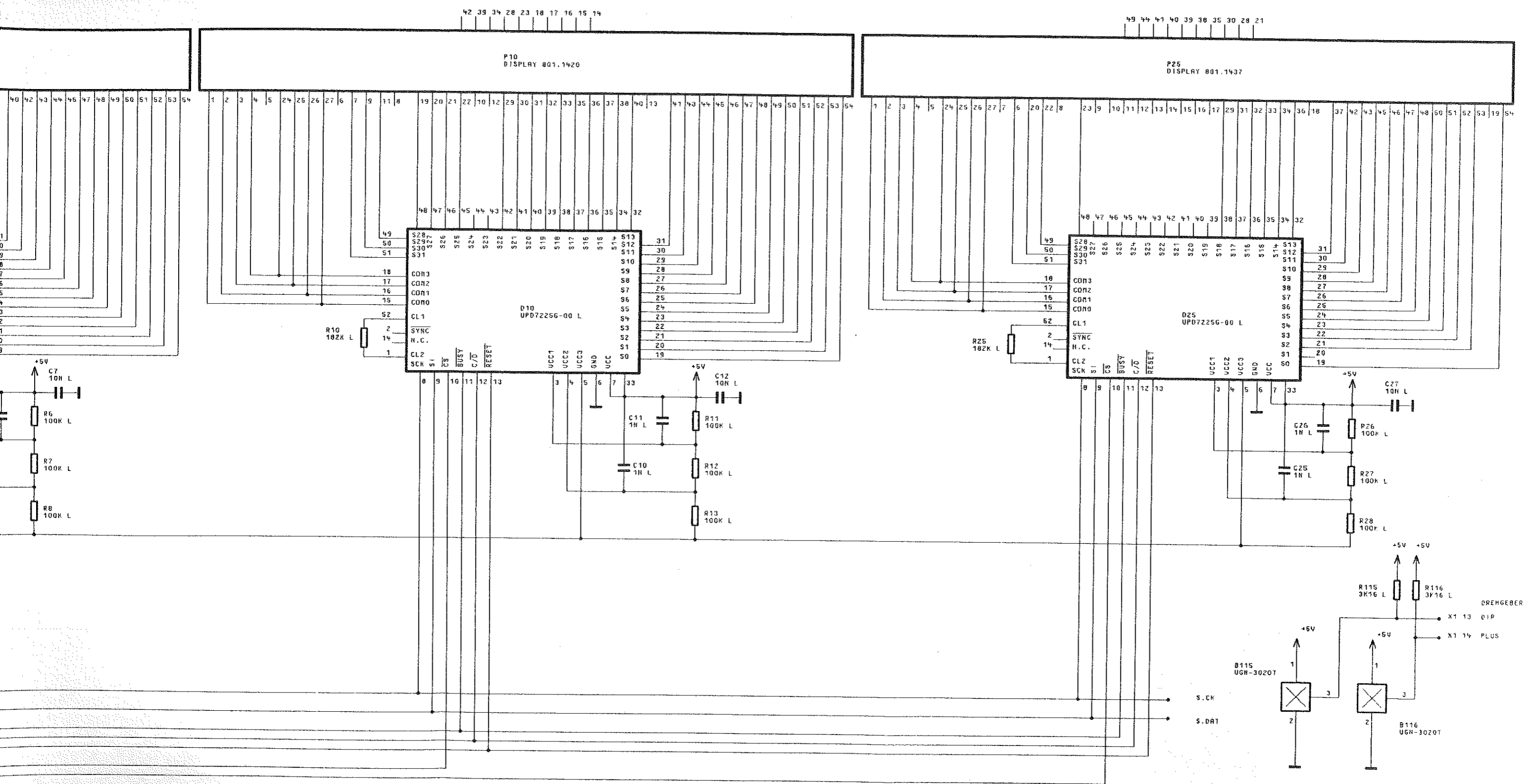
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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R50	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R51	RN 4X1,0KOHM+-2% $\frac{1}{2}$ SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R55	RN 4X1,0KOHM+-2% $\frac{1}{2}$ SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R60	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R61	RN 4X1,0KOHM+-2% $\frac{1}{2}$ SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R65	RN 4X1,0KOHM+-2% $\frac{1}{2}$ SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R70	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R71	RN 4X1,0KOHM+-2% $\frac{1}{2}$ SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R75	RN 4X1,0KOHM+-2% $\frac{1}{2}$ SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R80	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R81	RN 4X1,0KOHM+-2% $\frac{1}{2}$ SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R85	RN 4X1,0KOHM+-2% $\frac{1}{2}$ SIL 8 H5 RESISTOR NETWORK	RN 291.4370	BOURNS	4308R-102-102	
R90	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMA0207/3320HM-F-D	
R105	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R106	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R107	RG 475 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6079	DALE	CRCW1206-10 475K F-T	
R108	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R109	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R110	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R111	RG 5,62KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0735	DALE	CRCW1206-10 5K62 F-T	
R112	RG 3,16KOHM+-2%TK200 1206 CHIP RESISTOR	007.0670	DRALORIC	CGB 3216 3,16KOHM 2%	
R115	RG 3,16KOHM+-2%TK200 1206 CHIP RESISTOR	007.0670	DRALORIC	CGB 3216 3,16KOHM 2%	
R116	RG 3,16KOHM+-2%TK200 1206 CHIP RESISTOR	007.0670	DRALORIC	CGB 3216 3,16KOHM 2%	
S1	SB TASTER 1XA OHNE KNOPF PUSHBUTTON SWITCH	SB 238.3850	SIEMENS	STB11 M.LED-LOECHERN	
..8					
S11	SB TASTER 1XA OHNE KNOPF PUSHBUTTON SWITCH	SB 238.3850	SIEMENS	STB11 M.LED-LOECHERN	
..18					
S21	SB TASTER 1XA OHNE KNOPF PUSHBUTTON SWITCH	SB 238.3850	SIEMENS	STB11 M.LED-LOECHERN	
..28					
S31	SB TASTER 1XA OHNE KNOPF PUSHBUTTON SWITCH	SB 238.3850	SIEMENS	STB11 M.LED-LOECHERN	
..38					
S41	SB TASTER 1XA OHNE KNOPF PUSHBUTTON SWITCH	SB 238.3850	SIEMENS	STB11 M.LED-LOECHERN	
..48					
S51	SB TASTER 1XA OHNE KNOPF PUSHBUTTON SWITCH	SB 238.3850	SIEMENS	STB11 M.LED-LOECHERN	
..58					
S61	SB TASTER 1XA OHNE KNOPF PUSHBUTTON SWITCH	SB 238.3850	SIEMENS	STB11 M.LED-LOECHERN	
..67					
S68	SB TASTER 1XA OHNE KNOPF PUSHBUTTON SWITCH	SB 238.3850	SIEMENS	STB11 M.LED-LOECHERN	
S71	SB TASTER 1XA OHNE KNOPF PUSHBUTTON SWITCH	SB 238.3850	SIEMENS	STB11 M.LED-LOECHERN	
S72	SB TASTER 1XA OHNE KNOPF PUSHBUTTON SWITCH	SB 238.3850	SIEMENS	STB11 M.LED-LOECHERN	
S90	N.BESTUECKT/NOT FITTED SB TASTER 1XA OHNE KNOPF PUSH BUTTON SWITCH	834.9020	SIEMENS	V42263-00011-A009	
V20	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	VALVO	BCY59IX	
V90	AL BD139 N 80V 1AO TRANSISTOR	AL 274.8994	VALVO	BD139	
V108	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	VALVO	BCY59IX	

ROHDE & SCHWARZ	Äl	Datum	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
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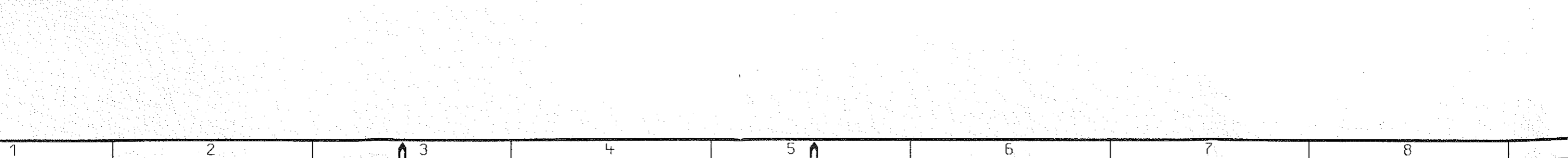
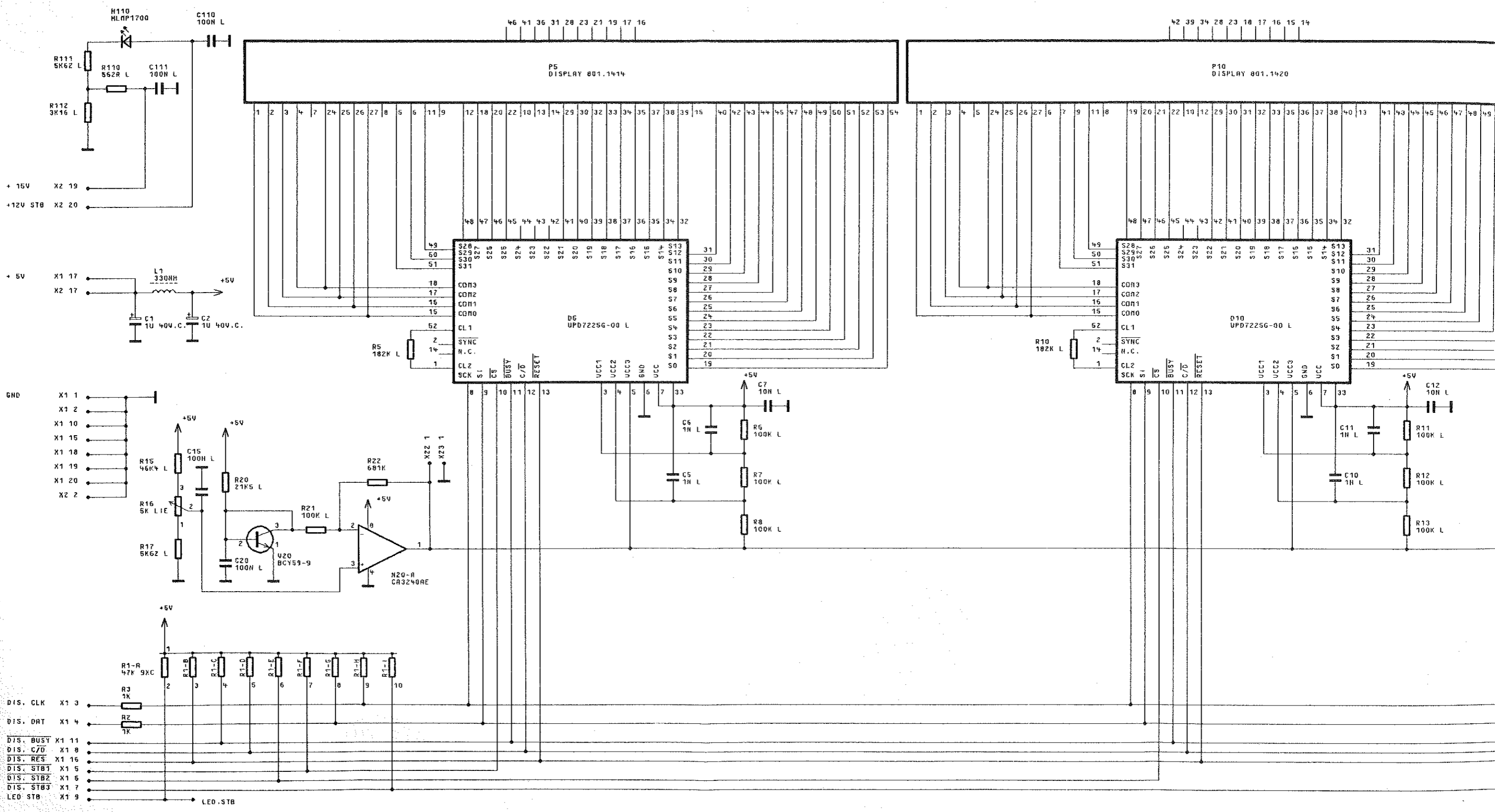
Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
X1	DX BUCHSEINHEIT CONNECTOR UNIT	820.3019			
X2	ENTHALTEN IN/INCLUDED IN X1"				
X22	FP INDIREKT. STECKERL. 36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X23	FP INDIREKT. STECKERL. 36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X90	FP INDIREKT. STECKERL. 36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X105	FP INDIREKT. STECKERL. 36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
					- ENDE -

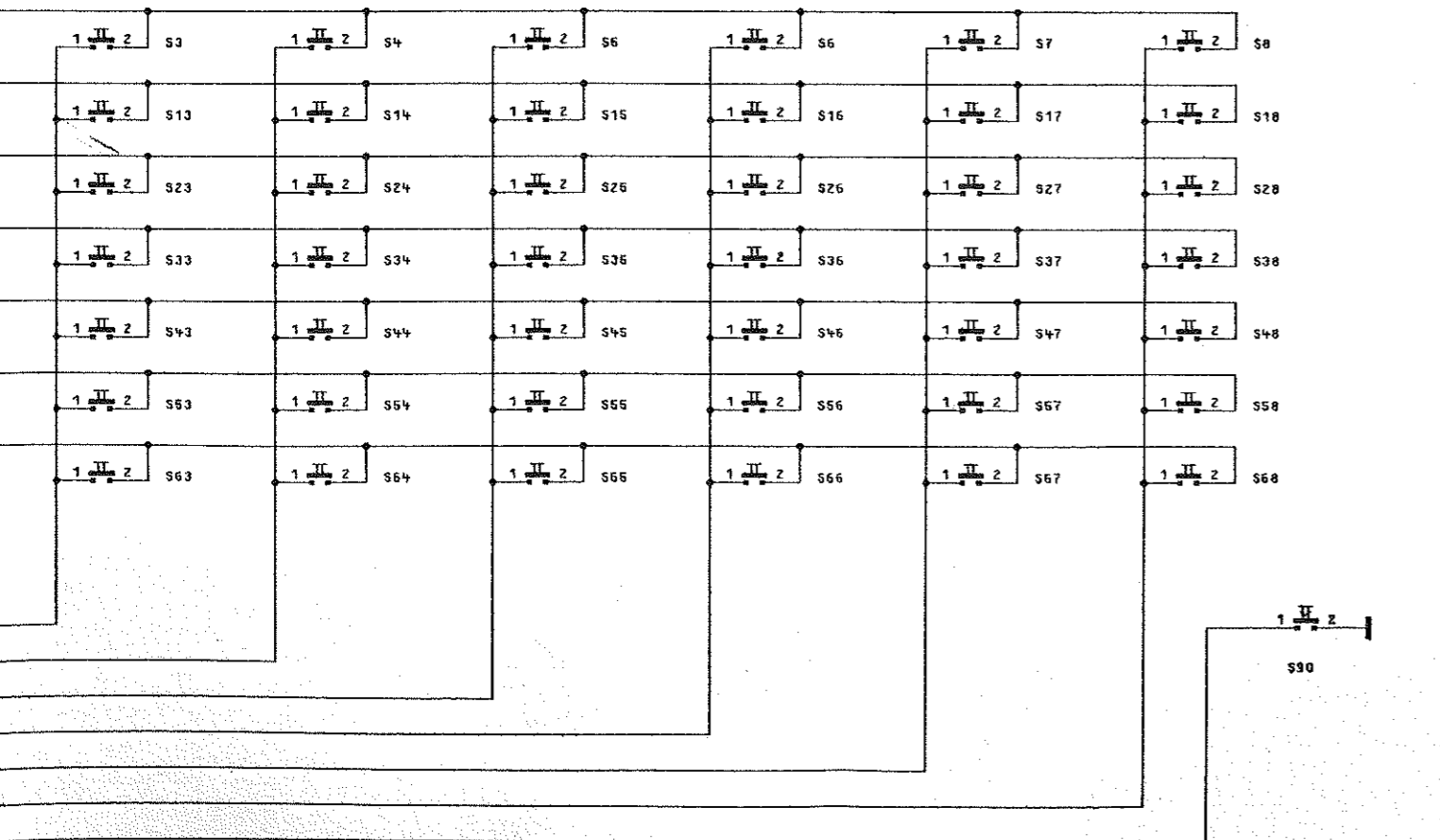
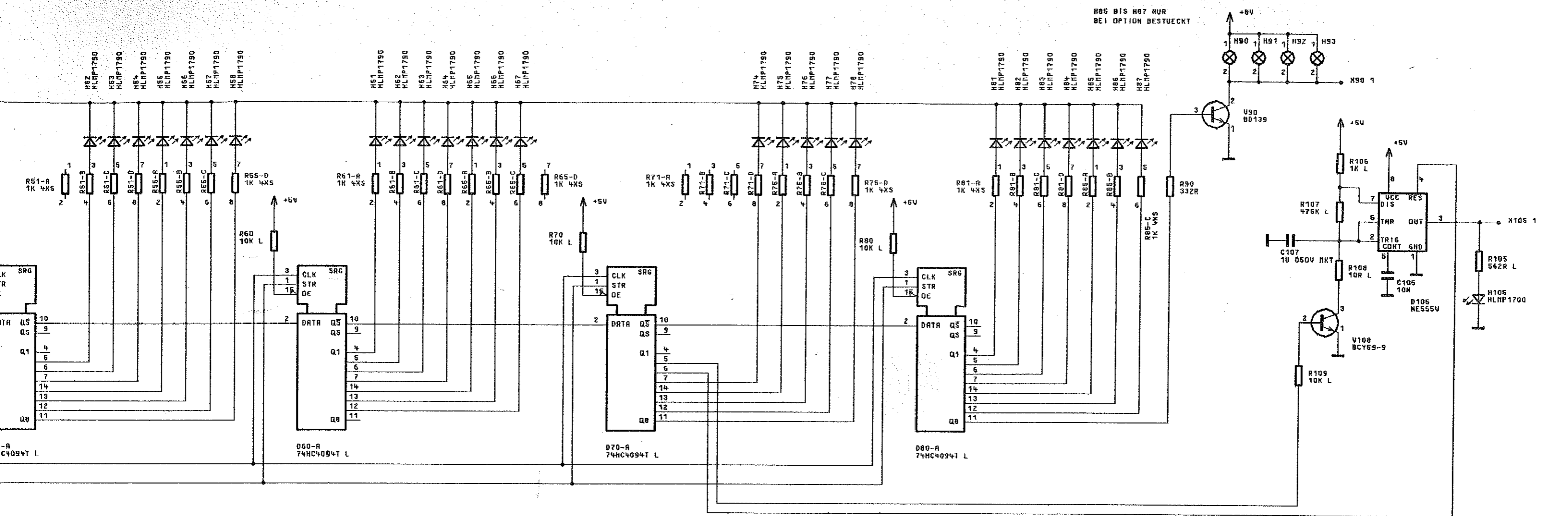
ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	04	0489	ED ANZEIGE/TASTATUR DISPLAY/KEYBOARD	819.1122.01 SA	4-



1 KGB	TAG	NAME	BENENNUNG		
BEARB.		BT	ANZEIGE/TASTATUR DISPLAY/KEYBOARD		
GEPP.		ROO			
NORM					
PLOTT	6. 5. 88	*			
 ROHDE & SCHWARZ			ZEICHN.-NR.		
REND. IND.	ÄNDERUNGS-NITTEILUNG	DATUM	NAME	819.1122.015	BLATT-NR. 1
ZU GERÄT		SMGU	RES. I. V.	819.0010	ERSTE Z.

DIESE ZEICHNUNG IST EINE REPRODUKTION VON EINEM ORIGINAL, WELCHES BEI DER HERSTELLUNG DES DATENSATZES ERFOLGEN
FÜR DIESE ZEICHNUNG BEHALTEN WIR UNS ALLE RECHTE VOR
RECHNERSUDUCK, ÄNDERUNGEN KOENNEN NUR DURCH VERÄNDERUNG DES DATENSATZES ERFOLGEN

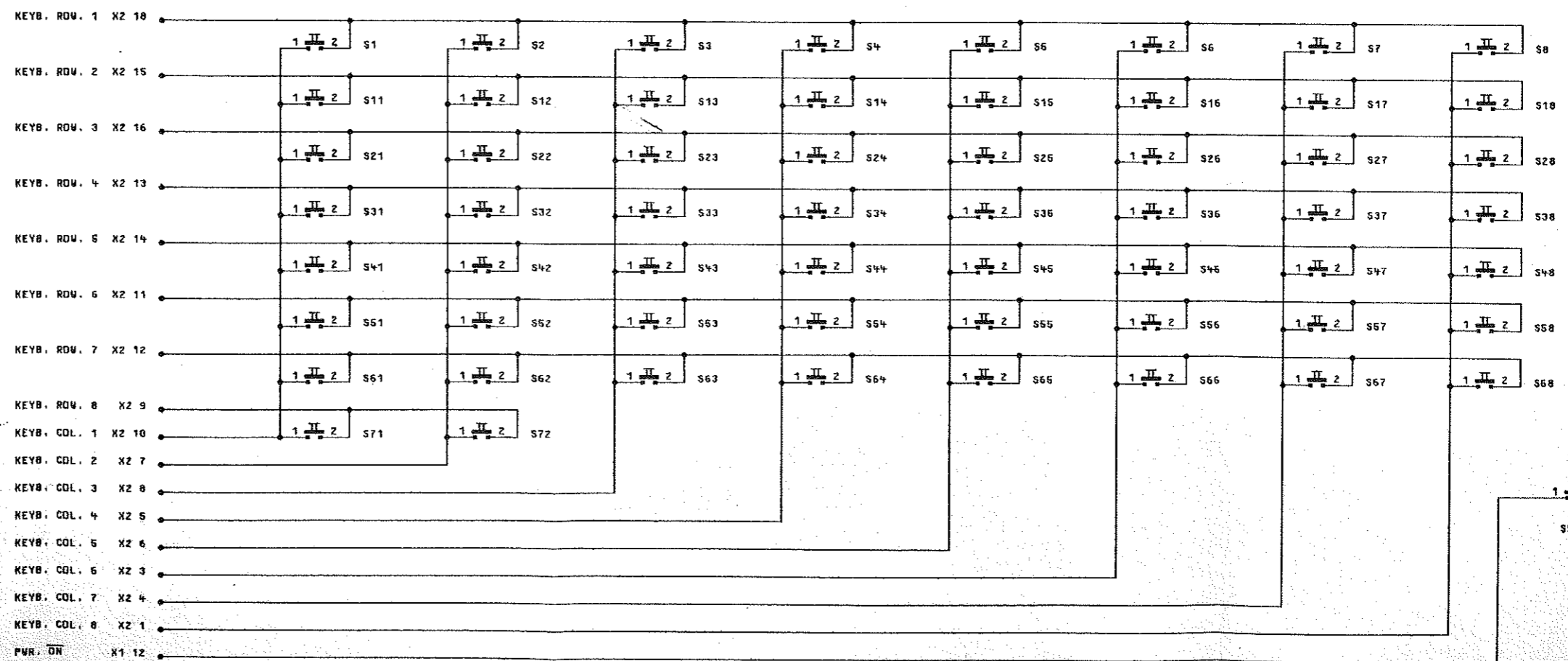
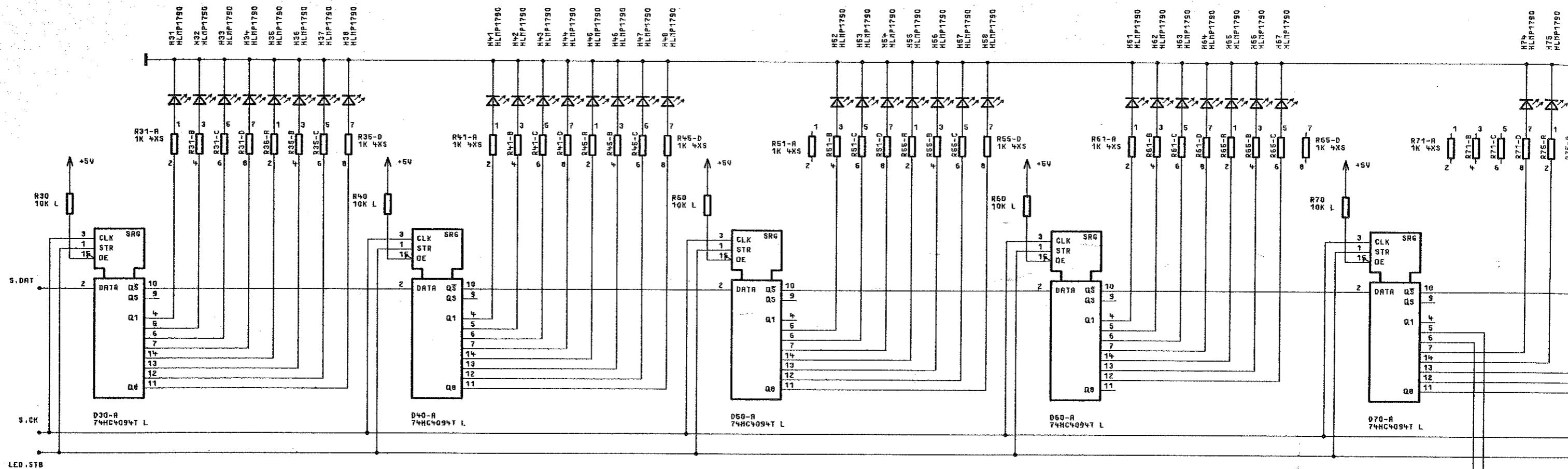




TKG#	TAG	NAME	BENENNUNG
BEARB.		BT	ANZEIGE/TASTATUR DISPLAY/KEYBOARD
GEPR.		ROD	
NDRM			
PLOTT	6. 5. 88	*	
REN. IND.	BENDERUNGS- MITTEILUNG	DATUM	NAME
ZU GERÄT		SMGU	
ZEICHN.-NR.			BLATT-NR.
819.1122.015			2
REG. I. V. 819.0010			U. 2. BL.

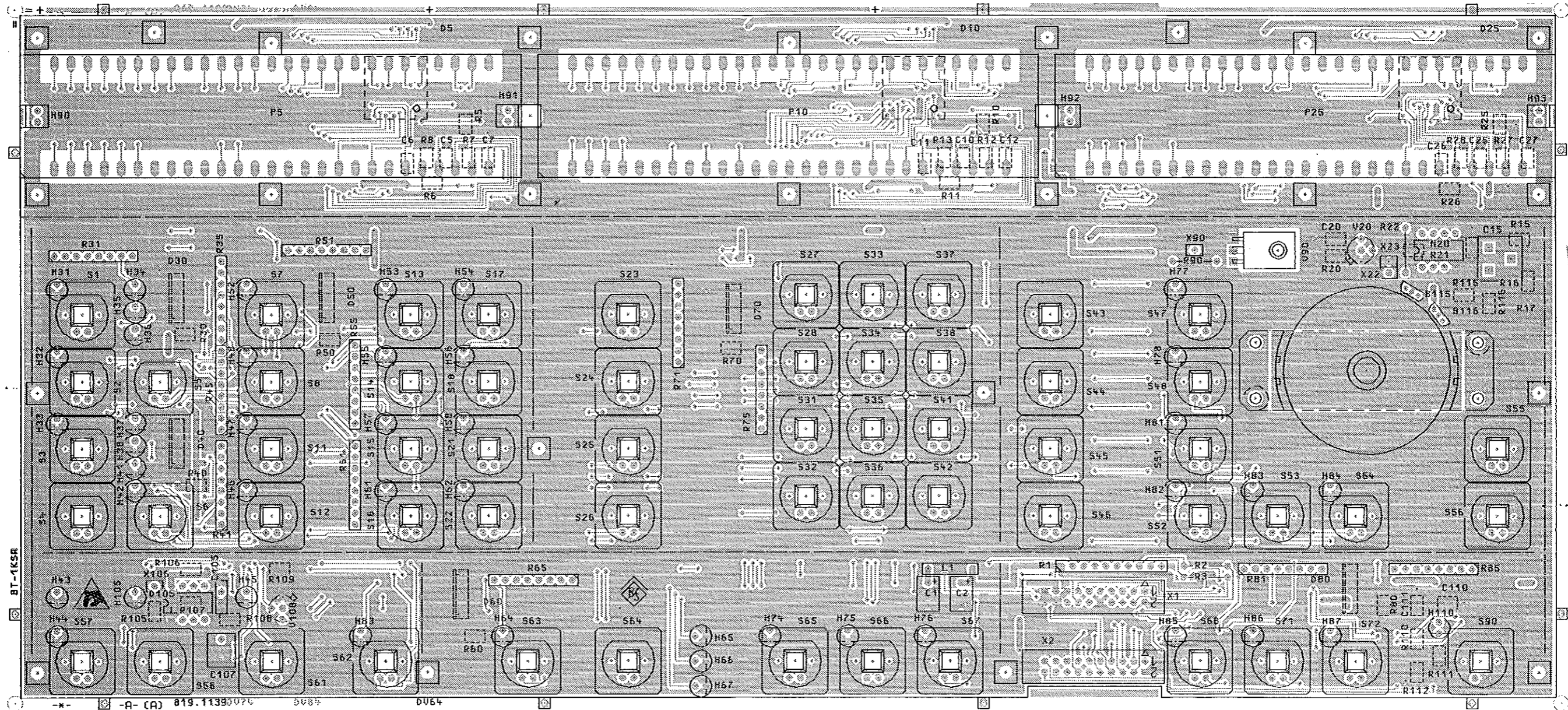
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FÜR DIESE ZEICHNUNG BEHALTEN WIR UNS ALLE RECHTE VOR
DIESE ZEICHNUNG IST EIN RECHNERAUSDRUCK. VERÄNDERUNGEN KÖNNEN NUR DURCH RENDERN DES DATENSATZES ERFOLGEN



S90

Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



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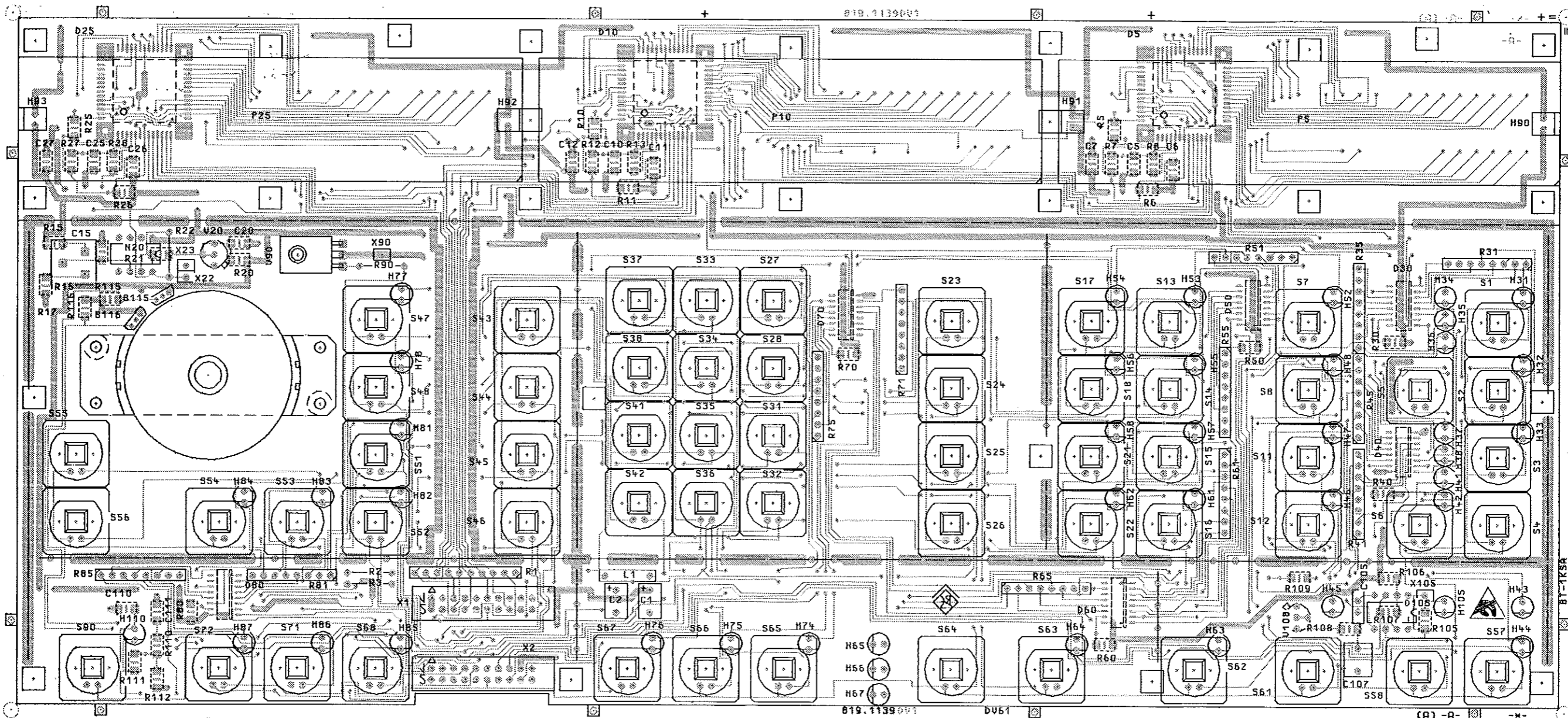
VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

Maße ohne Toleranzangabe		Maßstab 1 : 1	
		Halbzeug, Werkstoff	
1KGA	Tag	Name	Benennung
Bearb.	06.88	BT	ANZEIGE / TASTATUR
Gepr.			DISPLAY / KEYBOARD
Norm			
		Zeichn.-Nr. 819.1122.01 ED	
		Blatt-Nr. 3	
		v. 4 Bl.	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name
		zu Gerät SMGU	
		reg. i. V. 819.0010 V erste Z.	



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

Ansicht und Leitungsführung Lötseite
View of tracks on solder side



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VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

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		Blatt-Nr.	
		4	
		v. 4 Bl.	
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		reg. i. V. 819. 00 10 V	
		erste Z.	



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Hierzu HVC 2501



ROHDE & SCHWARZ

SERVICE DOCUMENTS

Switched-mode Power Supply

819.1568.02

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	Component layout plans

5 Service Manual "Switched-mode Power Supply"

5.1 Function Description

(See circuit diagrams 819.1568 S, 819.1716 S and 819.1916 S)

The module is a primary switched-mode power supply. Five secondary voltages are generated:

+ 24 V, + 15 V, -15 V, + 5 V for analog circuits and + 5 V for digital circuits.

The power supply also contains a mains transformer, rectifier and linear regulator so that the crystal reference of the SMGU can still be operated when in standby mode. The power supply has a power fail circuit to detect AC power brought-outs and failures.

5.1.1 Description of AC Power Input Circuit

The AC voltage is applied via fuses F1 and F2, AC filter, AC power switch and voltage selector to the input of circuit board A41.

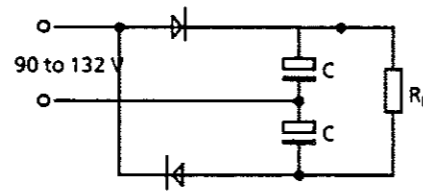
The AC power supply ranges are 90 to 132 V or 190 to 260 V.

5.1.2 Description of PCB A41

Following the EMI suppression filter containing L100 and C100, the AC voltage is applied to the AC transformer T100 and also via the NTC resistor V101 (inrush current limiting) to rectifier V110.

Rectification of the AC supply is by means of a bridge rectifier for the voltage range from 190 to 260 V and as a voltage doubler in the range from 90 to 132 V. The magnitude of the hum voltage is the same in both cases as a result of the electrolytic capacitors switched over in the process.

Range from 90 to 132 V:



Range from 190 to 260 V:

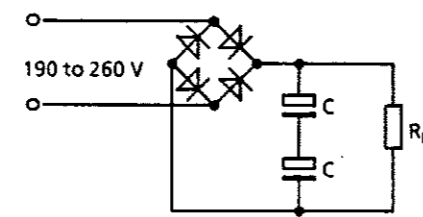


Fig. 5-1 Rectifier principle

The rectified AC supply voltage is then applied to connector X20 via the noise suppression inductor L102.

The VDR (V102) prevents spikes from reaching the switching transistor.

The mains transformer T100 has two primary windings and two secondary windings.

The two primary windings are selected according to the AC voltage ranges.

One of the secondary windings powers the components connected to the AC supply potential, the second winding is connected to the instrument ground (earth) and is used to supply the power supply and the crystal oven in the SMGU.

The secondary voltages are applied to the bridge rectifiers V111 and V112 via fuses F100 and F101. + 12 V are then generated by each of the linear regulators N101 and N102. The function of the component D100 and the associated parts of the circuit is described in Section 5.1.3.1.

5.1.3 Description of PCB A42

The rectified AC voltage applied to PCB A42 via connector X20 is connected to the primary winding of the transformer T200. The primary current is switched at 100 kHz by the switching transistor V220. The transformer core is magnetized by a direct current which is reduced again by the demagnetization winding when the primary current is switched off.

The duty factor of the 100-kHz pulse must therefore be <0.5 . The 100-kHz pulses generated in this manner are transmitted to four secondary windings with the respective transmission ratio.

The secondary voltages are each rectified by two diodes.

A voltage V_{out} results on the electrolytic capacitor by means of a storage inductor and a charging capacitor according to the following equation:

$$V_{out} = V_p \times v_t$$

where V_{out} = output voltage
 V_p = peak voltage
 v_t = duty factor

Three secondary voltages have their chokes on a common core (triple choke) and are therefore coupled together via the magnetic flux. It is then sufficient to load one of the three voltages under open-circuit conditions in order to prevent a rapid increase of the voltage on the electrolytic capacitor.

The fourth secondary voltage has its own choke.

As can be seen from the equation for the voltage on the charging capacitor, the output voltage can be set using the duty factor. A secondary voltage is thus regulated at 6 V using a control loop. The other secondary voltages are controlled at the same time by means of the duty factor and the respective turns ratio of the transformer.

5.1.3.1 Function of Control IC

Central functions of the control loop are handled by the control IC D100 on the PCB A41. It implements the following functions:

- ▶ Generation of pulse-width modulated drive signal for the power transistor (PWM signal)
- ▶ Hum precontrol of PWM signal
- ▶ Slow start-up, of duty factor limiting
- ▶ Switching on/off of power supply
- ▶ Current limiting for power transistor

● Oscillator

R105 and C112 determine the switching frequency, which is approx. 100 kHz.

● Sawtooth generator

The capacitor C115 is charged via a current mirror circuit whose input current is derived from the rectified AC supply by means of the series resistors R105 and R106.

The oscillator discharges C115 at the end of the period so that a sawtooth voltage results at pin 10.

● Generation of pulse-width modulated squarewave signal

Fig. 5-2 explains the principle:

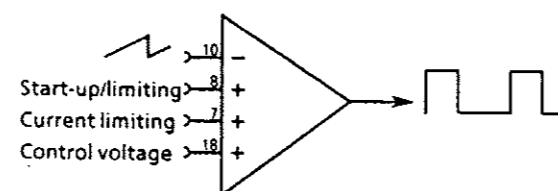


Fig. 5-2

The 100-kHz sawtooth voltage is therefore basically connected to the input of a comparator and compared with the voltages at three other inputs.

The three inputs fulfil the following tasks:

- ▶ Pin 8, slow start-up, hum precontrol and limiting of duty factor

Duty factor limiting is implemented in conjunction with the hum precontrol.

A voltage is derived from the rectified AC supply voltage by means of the divider R110, R111 and R107. This voltage is then smoothed by C116. The voltage at pin 8 together with the hum modulation of the sawtooth voltage at pin 10 results in hum precontrol and therefore compensation of the secondary hum voltage.

The time constant for C115 is dimensioned such that the voltage at pin 10 with the minimum AC supply voltage cannot rise to more than half the period of the oscillator frequency. A maximum duty factor of 0.5 is therefore not exceeded.

- ▶ Pin 7, current limitation for power transistor

The voltage between pins 6 and 7 is compared using an internal comparator. R117 and R118 define the voltage for the switch-off threshold. The precision resistor R202 is connected between the source of V220 and ground. The voltage drop across this resistor is applied to pin 7 via X20. The maximum current in the power transistor is then calculated as follows:

$$I_{pmax} = V_p(\text{Pin 6}) / R202$$

where I_{pmax} = max. peak current
 $V_p(\text{Pin 6})$ = voltage at pin 6 (approx. 1 V)
 $R202 = 0.15 \Omega$

The power supply is switched off if the peak current exceeds 6.6 A.

- ▶ Pin 18, control voltage input

Pin 18 is the input of a voltage follower. The control voltage of the switching controller is connected to this input. The control voltage comes from the module A42 via the opto isolator U101 and X20.

The duty factor v_t can be adjusted from 0 to v_{tmax} by means of the control voltage.

- Switching the power supply on and off

A switching signal generated by the standby switch and the following circuit on PCB 842 is applied to the opto isolator U100 via plug connector X20.

This opto isolator switches pin 2 of D100 either to approx. 6 V (= on) or 0 V (= off).

5.1.3.2 Design of Control Loop

The following block diagram represents the control loop for controlling the +6 V of the switched-mode power supply:

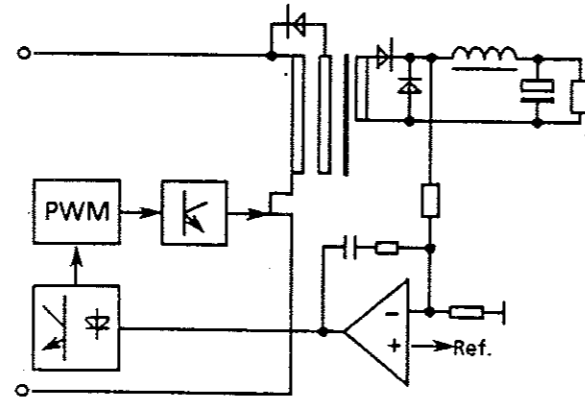


Fig. 5-3 Control of switched-mode power supply

5.1.3.3 Generation of Output Voltages

All voltages after the storage inductors are subject to further regulation from the linear regulators.

The regulators (some of which are of discrete design) and the switching controller have a common reference voltage of +5 V (V300, N300, adjustment using R304).

- +5 V controller for supplying the digital circuit

This consists of an integrated linear regulator N290.

- +5 V controller for supply of analog circuit

The regulator is a series regulator and has N300-B as an amplifier.

L281 and C287 are the noise suppression filter for 100 kHz.

- -15-V controller

This is implemented with the positive controller N270. The output voltage is generated by applying the positive voltage output of the controller to ground. The negative reference point serves as the output.

L270 and C275 are the EMI suppression filter for 100 kHz.

- +15-V controller

This is designed with V241 as the control element and N240-A, V242 and V243 as the control amplifier. The output voltage is set using R260, R261 and R262. R255 is used as a shunt. A fold-back characteristic at load currents > 6 A with N240-B.

L240 and C245 are the EMI suppression filter for 100 kHz.

- +24-V controller

This is designed using V212 as a series regulator and with N210-A as a control amplifier. The output voltage is set using R222, R223 and R224.

N210-B and the shunt R234 provide the fold-back characteristic.

L211 and C217 form the 100 kHz EMI suppression filter.

5.1.3.4 Further Circuits

- Fan supply

The fan is supplied by the unregulated voltage of the 24-V controller via R212, R213 and R214. A thermostat bypasses resistor R212 at temperatures > +45 °C and increases the speed of the fan. The fan is switched off again by the thermostat at temperatures < +35 °C.

- Voltage monitoring

The voltages of +6 V, +5 V (analog) and -15 V are monitored for overvoltage and undervoltage by means of the window comparator N320-A and N320-B.

The voltages of +15 V, +5 V (digital) and +24 V are monitored for undervoltage by means of N320-D.

The power supply is switched off if a fault occurs.

During power-up, the voltage monitoring is disabled for approx. 500 ms by means of C350, C351 and R350.

- Power fail

The microprocessor receives a power fail pulse to save the data when the unit is switched off or if there is a power failure. The pulse is generated by comparator N320-C.

- Standby switch

Transistor V353 is switched on by the standby switch via V350 and the RS flip-flop (N350-C and N350-B). The power supply is then switched on via the opto isolator U100. The LED V352 indicates the "On" status of the power supply.

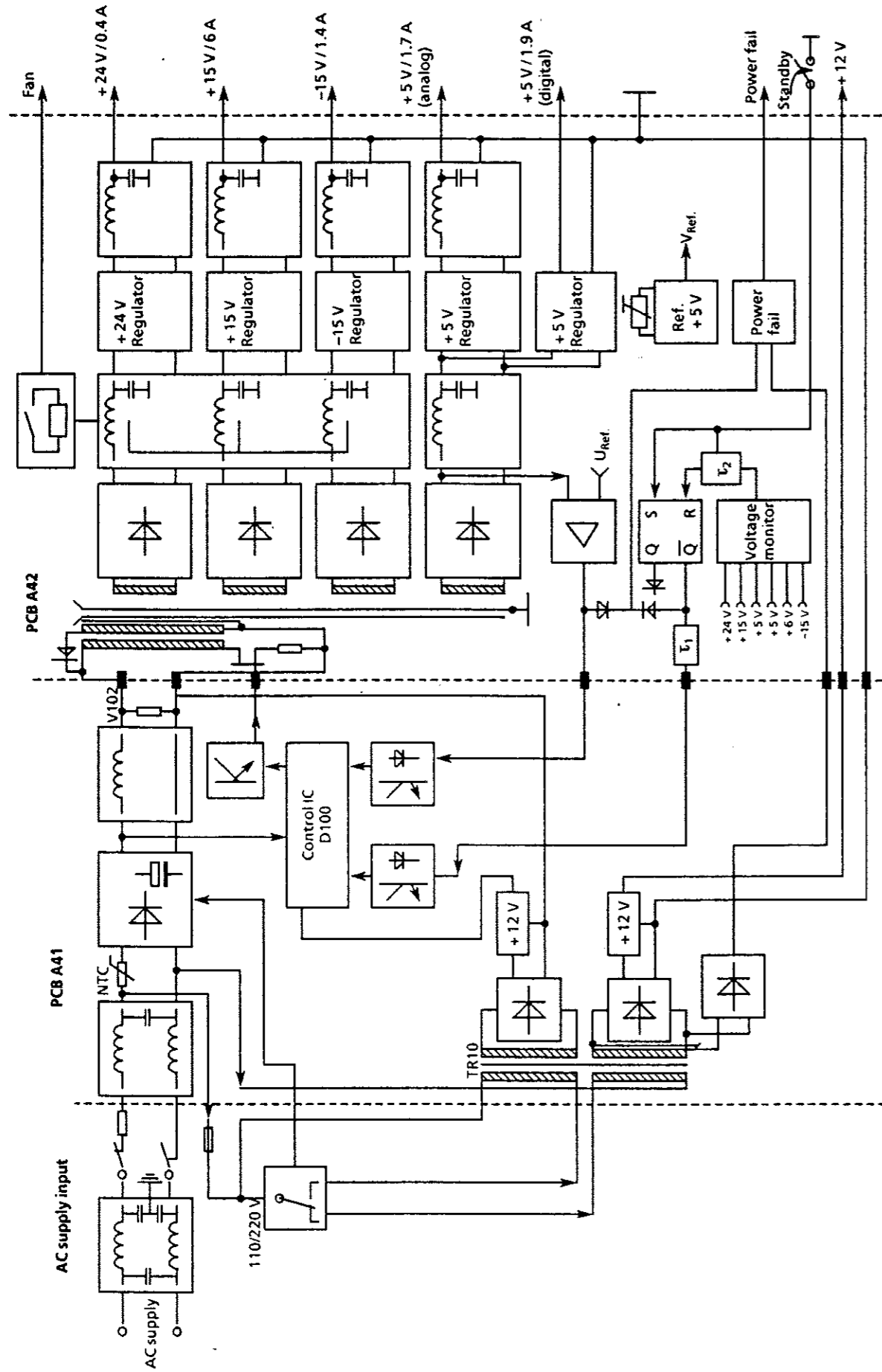


Fig. 5-4 Block diagram of switched-mode power supply

5.2 Testing and Adjustment

The power supply is automatically switched off if there is no load at the output. If not otherwise specified, at least 1 A must be taken at +5 V.

Caution: Both PCBs contain components connected to the AC supply voltage. An isolating transformer must therefore be used when using oscilloscopes because of the danger of a short-circuit with the oscilloscope ground.

5.2.1 Testing the Rectifier PCB A41

5.2.1.1 Testing the AC Rectification and the Standby Power Supply

Open up power supply and fold out PCB A41. With the AC power plug disconnected, remove X20. Connect power supply to isolating transformer and switch on.

Set voltage selector to 190 to 240 V. Check using the following table:

Test point	DC voltage	± Tol.
P12-P13	264 to 335 V	10 V
P1-P2	12 V	0.5 V
P3-P4	12 V	0.5 V

Set voltage selector to 90 to 132 V.

Check using the following table:

Test point	DC voltage	± Tol.
P12-P13	250 to 362 V	10 V
P1-P2	12 V	0.5 V
P3-P4	12 V	0.5 V

Reconnect X20.

5.2.1.2 Brief Power Supply Test

Switch on the SMGU on the isolating transformer with a 220-V supply and check the following data on the power supply:

- The control voltage at test point P303 must be between 9 and 11 V.
- Check that the reference voltage at P301 is $5.00\text{ V} \pm 0.01\text{ V}$.
- Check the unregulated voltage and output voltages using Table 5-1.
- Also check the noise voltages according to Table 5-1.
- Connect oscilloscope ground to P13 and check pulse at P10:
Amplitude: $10\text{ V}_{pp} \pm 1\text{ V}_{pp}$
Pulse width: 0.5 to 4 μs
Period: 8.9 to 11.5 μs

If all data are correct, the main functions of the power supply are OK.

The following sections describe further tests.

5.2.2 Testing and Adjustment of PCB A42

5.2.2.1 Adjustment of Reference Voltage

- Connect DC voltmeter to P301.
- Operate power supply in standby mode and adjust voltage at P301 to $5.00\text{ V} \pm 0.01\text{ V}$ using R304.

5.2.2.2 Testing the Unregulated and Output Voltages of the Regulators

Check according to Table 5-1.

5.2.2.3 Checking Spurious Voltages

Check the spurious voltages using Table 5-1 with an AF voltmeter with a bandwidth from 15 Hz to 100 kHz.

5.2.2.4 Testing the Control Voltage Monitoring

Check the power supply using the following table:

Test point	DC voltage	± Tol.
P322	2.18 V	0.1 V
P323	1.75 V	0.1 V
P327	3.75 V	0.1 V
P324	11.5 V	1.0 V

Short-circuit the voltages at the output one after the other:
the power supply must cut out each time.

5.2.2.5 Testing the Power Fail Circuit

Connect DC voltmeter to P325. Set AC power selector to 90 to 132 V. The voltmeter must indicate a voltage between 4 and 5 V.

Slowly reduce the AC supply using the transformer:

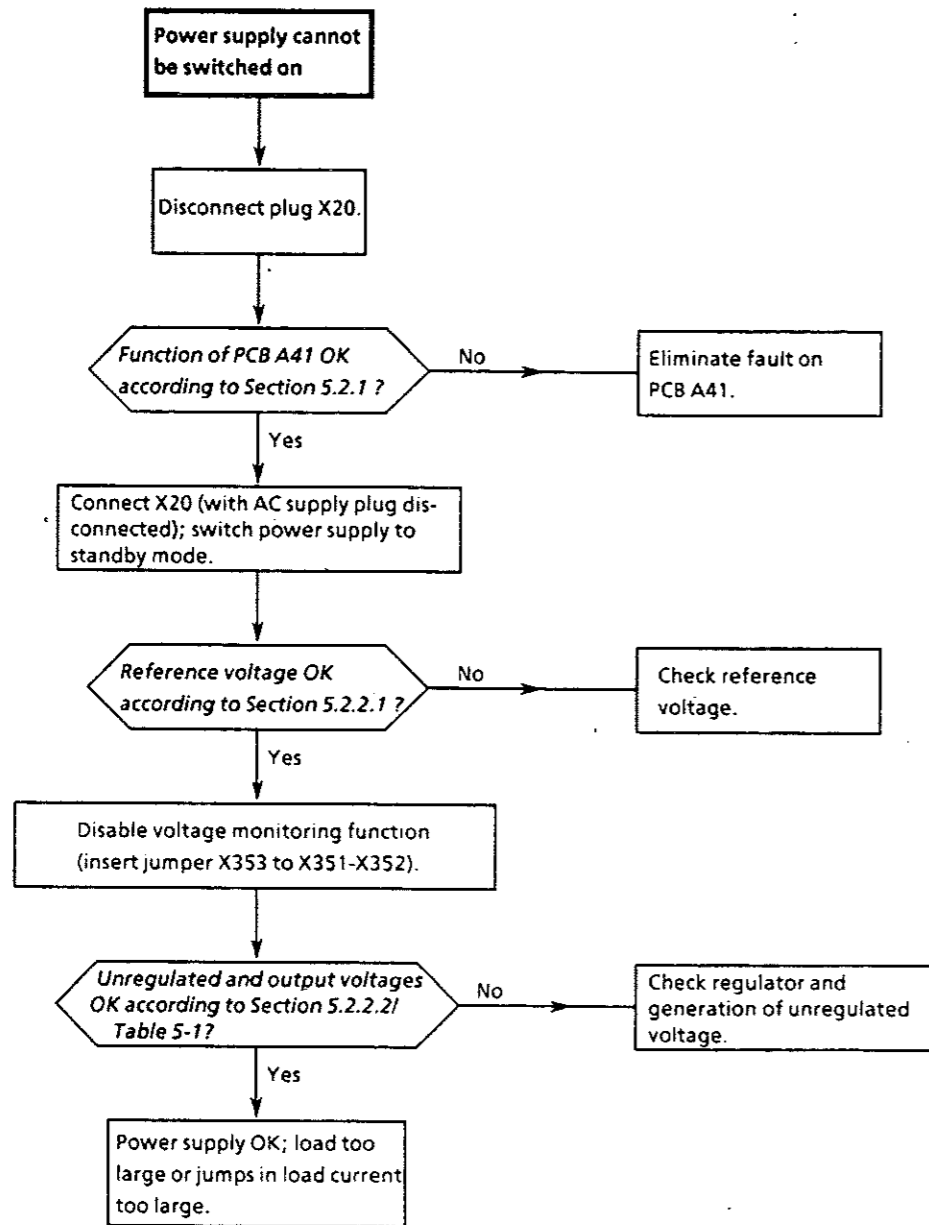
the voltage at P325 must drop to 0 V at <90 V.

Table 5-1 Checking the unregulated and output voltages of the regulators

Voltage	Test point/ unregulated voltage	Test point/ output voltage	Noise voltage 15 Hz to 100 kHz
+24 V	P210: +26 to +28 V	P213: +23.5 to +24.6 V	X4.19 <1 mV
+15 V	P240: +16.5 to +17.5 V	P242: +14.9 to +15.3 V	X14.14 <2 mV
-15 V	P271: +1.8 to +2.5 V	P271: -15.25 to -14.5 V	X4.6 <2 mV
+5.2 V	P280: +5.7 to +6 V	P290: +5.1 to +5.4 V	X4.2 <4 mV
+5.1 V	P280: +5.7 to +6 V	P292: +5.0 to +5.2 V	X4.9 <1 mV
+12 V		Z300: +11.0 to +12.1 V	X4.85 <30 mV

5.3 Troubleshooting

The power supply is switched off automatically by a voltage monitoring circuit if there is a fault. A possible cause of the fault can be located using the following troubleshooting diagram.



5.4 Interfaces

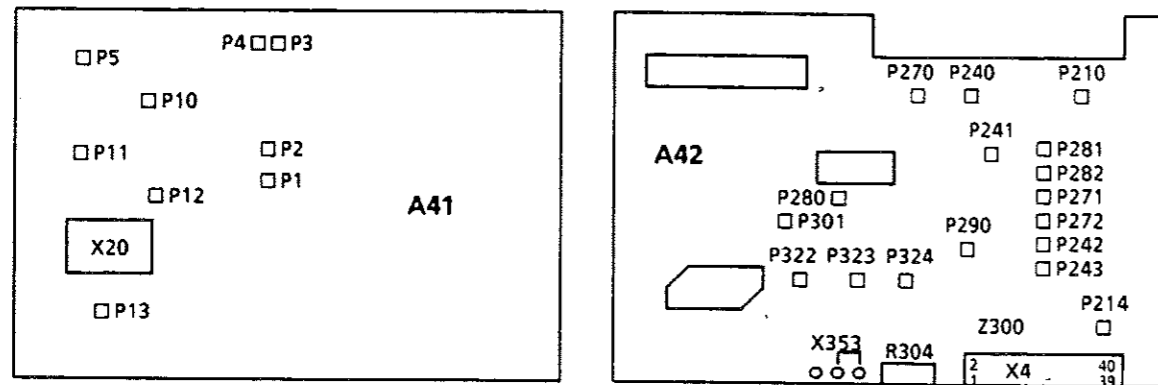


Fig. 5-5 Layout of test points and trimmers

Analog Interfaces

Test point	Voltage	max. output current	Test point
X4-37, X4-38	+24 V	0.4 A	P214
X4-25, X4-26, X4-27	+15 V	6.0 A	P243
X4-28, X4-29, X4-30			
X4-11, X4-12, X4-13	-15 V	1.4 A	P272
X4-3, X4-4, X4-5	+5.2 V	1.9 A	P290
X4-17, X4-18, X4-19	+5.1 V	1.7 A	P282
X4-20			
X4-6, X4-8, X4-10,	Ground		
X4-14, X4-16, X4-22,	Ground		
X4-24, X4-32, X4-34,	Ground		
X4-7, X4-15, X4-21,	Ground		
X4-23, X4-31, X4-33,	Ground		
X4-35, X4-36, X4-39,	Ground		
X4-40	Ground		
X4-9	+12 V	0.15 A	Z300

Digital Interfaces

Test point	Voltage	Function	Test point
X4-1	0 V	Standby ON	X355-1
X4-1	7 to 8 V	Standby OFF	X355-1
X4-2	4.75 V	Power fail OFF	P325
X4-2	0 V	Power fail ON	P325

Schaltteillisten
Stromläufe
Bestückungspläne
Part lists
Circuit diagrams
Components plans
Listes des pièces détachées
Schémas de Circuit
Plans des composants

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in	
A41	ED GLEICHRICHTUNG RECTIFIER	819.1716.02				
A42	ED SCHALTREGLER SWITCHED REGULATOR	819.1916.02				
C2	CS 1.0UF+-10% 630/250V CAPACITOR ENTHALTEN IN/INCLUDED IN Z2	811.2542	SIEMENS	B81121-C-B132	819.1739	
F1	SS SCHMELZS.T2 D DIN41571 FUUSE	SS 020.7546	WICKMANN	T2D DIN 41571 TROP		
F2	SS SCHMELZS.T100 DIN41662 FUUSE	SS 020.7146	WICKMANN	TO,1 DIN 41662 TROP		
L2	LD STROMKOMPENS.DROSSEL COMPENSATION INDUCTOR ENTHALTEN IN/INCLUDED IN Z2	811.2571			819.1739	
R2	RL 1W 182 KOHM+-1%TK100 METAL FILM RESISTOR ENTHALTEN IN/INCLUDED IN Z2	RL 006.5927	RESISTA	MK5 182 KOHM 1%TK100	819.1739	
S1	SK WIPPSCH.2POL.AUS SW SWITCH	SK 553.2925	MARQUARDT	1802.1102		
S2	SK SPANNUNGSUMSCH.115/220 VOLTAGE SWITCH	292.5387	MARQAURDT	4021.0501		
X1	ENTHALTEN IN/INCLUDED IN Z1					
Z1	FN EINBAUST.M.NETZFILT.3A POWER LINE FILTER	FN 006.0977.	SCHAFFNER	FN328-3/05		
Z2	LD NETZFILTER POWER LINE FILTER	819.1739				
					- ENDE -	
ROHDE & SCHWARZ		Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
		15	0489	ZE NETZTEIL POWER SUPPLY	819.1568.01 SA	1-

FÜR DIESE ZEICHNUNG BEHALTEN WIR UNS ALLE RECHTE VOR
 DIESE ZEICHNUNG IST EIN "HERRUSDRUCK", ÄNDERUNGEN KÖNNEN NUR DURCH RENDEFES DATENSATZES ERFOLGEN

1 2 3 4 5 6 7 8

F

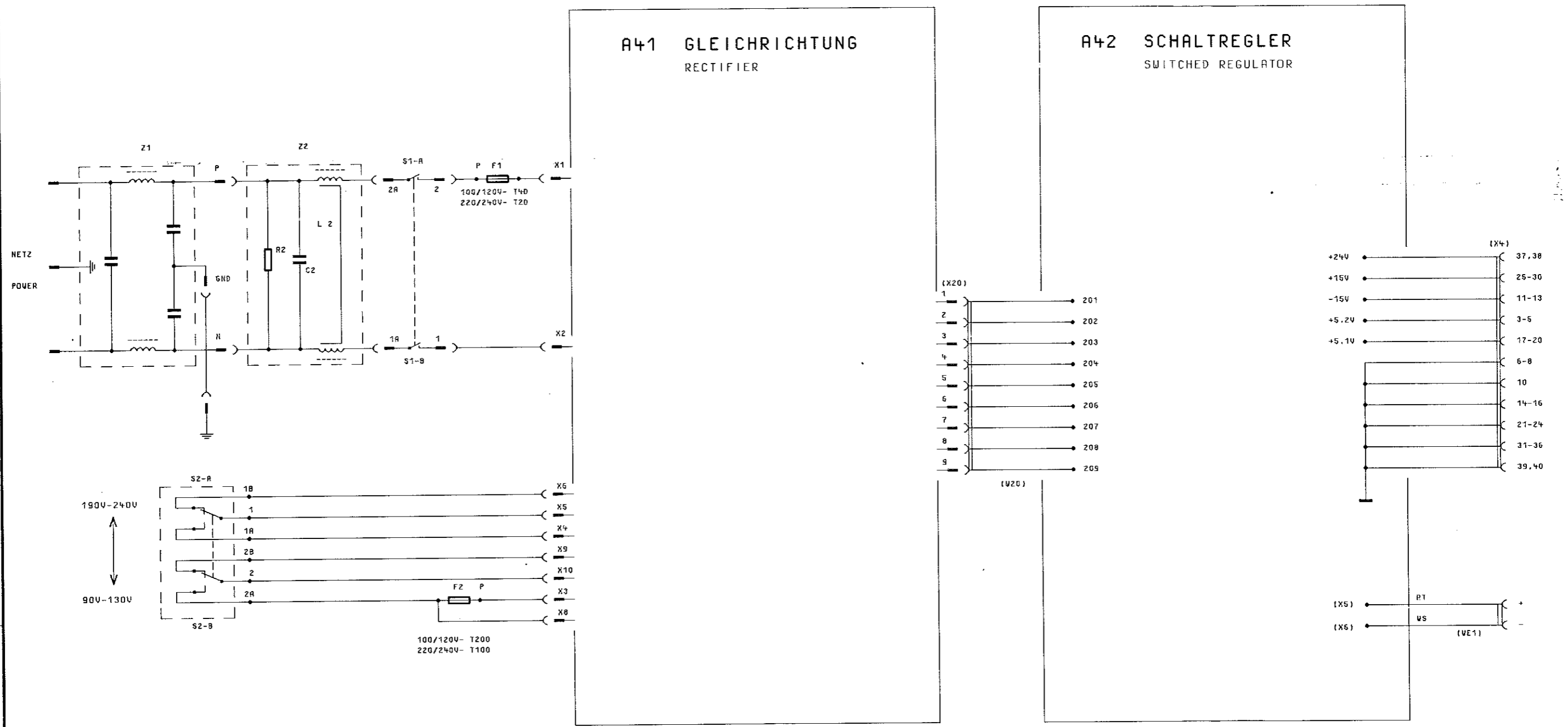
E

D

C

B

A



A41 GLEICHRICTUNG
 RECTIFIER

A42 SCHALTREGLER
 SWITCHED REGULATOR

1KSB	TAG	NAME	BENENNUNG		
BERPB.		LS	SCHALTNETZTEIL POWER-SUPPLY		
GEPR.		*			
NDRM					
PLOTT	12. 4. 89	*			
RENDR. IND.	RENDEFUNGS-MITTEILUNG	DATUM	NAME	ZEICHN.-NR. 819.1568.01S	BLATT-NR. 1
ZU GEPR.	SMGU	REG.-I.V.	819.0010	ERSTE Z.	V. 1 BL.

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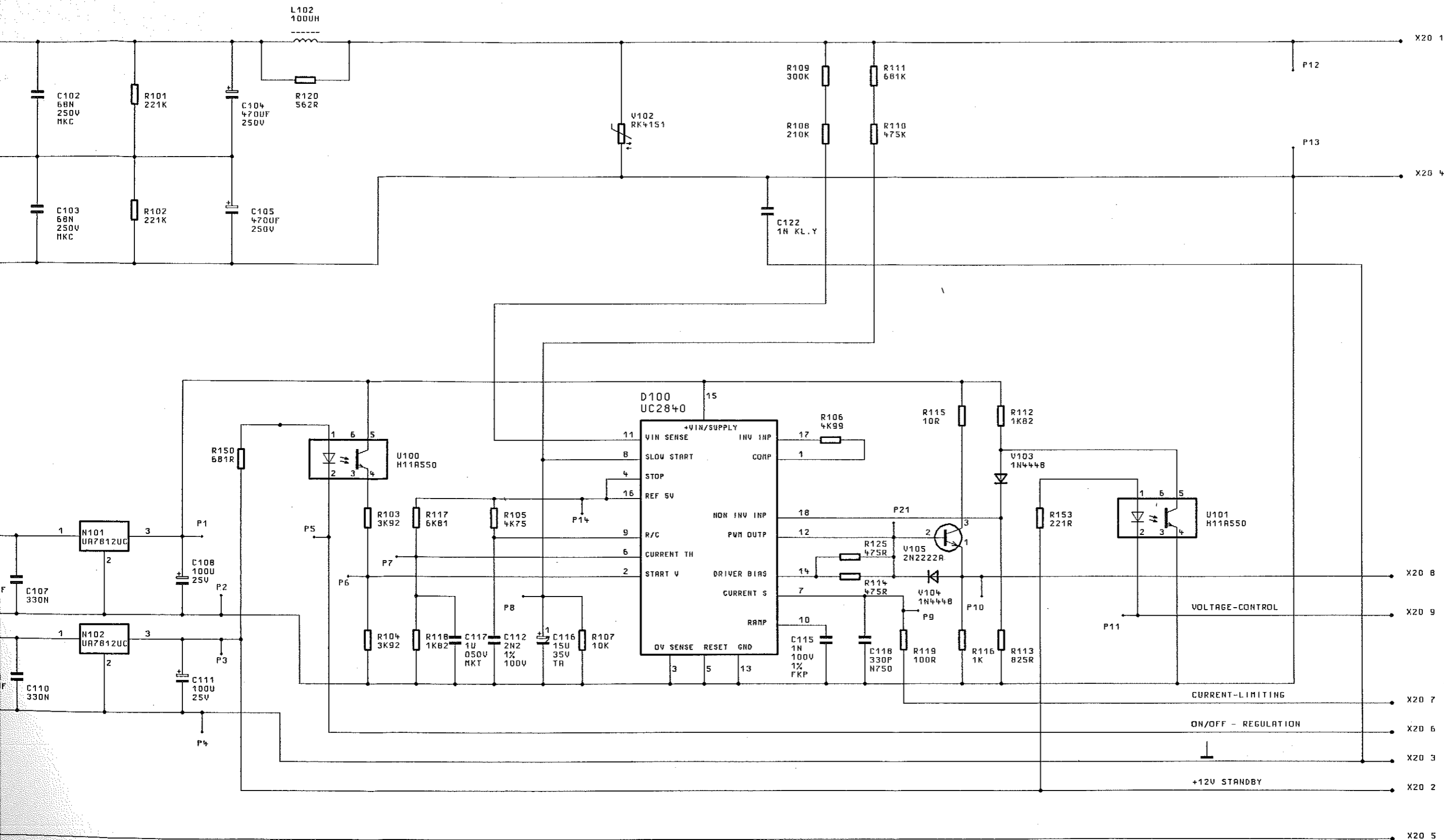
Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C100	CS 1,0UF+-10% 630/250V CAPACITOR	811.2542	SIEMENS	B81121-C-B132	
C102	CK 68NF+-20%250V QUADER CAPACITOR	CK 087.4184	ERO	MKC1862 368/25+-20%	
C103	CK 68NF+-20%250V QUADER CAPACITOR	CK 087.4184	ERO	MKC1862 368/25+-20%	
C104	CE 470UF-10+30%250V40X45 ELECTROLYTIC CAPACITOR	CE 006.9939	VALVO	2222-052-43471	
C105	CE 470UF-10+30%250V40X45 ELECTROLYTIC CAPACITOR	CE 006.9939	VALVO	2222-052-43471	
C106	CE 470UF-10+50% 40V 15X30 ELECTROLYTIC CAPACITOR	CE 087.0572	ROEDERST	ELKO EK470/40	
C107	CK 330NF+-5%63V5RM MKT CAPACITOR	CK 099.2969	WIMA	MKS2/63/0,33UF/5%	
C108	CE 100UF-10+50% 25V 13X13 ELECTROLYTIC CAPACITOR	CE 208.4007	ROEDERST	ELKOEK100/25	
C109	CE 470UF-10+50% 40V 15X30 ELECTROLYTIC CAPACITOR	CE 087.0572	ROEDERST	ELKO EK470/40	
C110	CK 330NF+-5%63V5RM MKT CAPACITOR	CK 099.2969	WIMA	MKS2/63/0,33UF/5%	
C111	CE 100UF-10+50% 25V 13X13 ELECTROLYTIC CAPACITOR	CE 208.4007	ROEDERST	ELKOEK100/25	
C112	CK 2,2NF +-1% 100V RMS KP POLYPROPYLENE CAPACITOR	CK 007.7617	ROE	KP1830-222/011-R	
C115	CK 1,0NF +-1% 100V RMS KP POLYPROPYLENE CAPACITOR	CK 007.7598	ROE	KP1830-210/011-R	
C116	CE 15 UF+-20%16V 7X 5X11 ELECTROLYTIC CAPACITOR	CE 087.9328	ROEDERST	ETR 3 15/16	
C117	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C118	CC 330PF+-2%6X9N750 CERAMIC CAPACITOR	CC 087.6964	VALVO	2222 678 58331	
C122	CS 1NF+-20%250V/50HZ VDE Y-CAPACITOR (DISC)	834.9143	ROEDERST	Y8102 MCMBFOK	
C123	CK 10NF+-20%630V QUADER CAPACITOR	CK 024.7763	ROEDERST	MKT1822-310/6	
C124	CK 10NF+-20%630V QUADER CAPACITOR	CK 024.7763	ROEDERST	MKT1822-310/6	
D100	BD UC2840J OA2 SCH.REGL REG.PULSE WIDTH MODULATOR	374.9904	UNITRODE	UC2840J	
F100	SS SCHMELZS.T 0,5A YTR5-T FUSE TR5T 0,5A	SS 815.8239	WICKMANN	TR5-T500MA NR.19372K	
F101	SS SCHMELZS.T 0,5A YTR5-T FUSE TR5T 0,5A	SS 815.8239	WICKMANN	TR5-T500MA NR.19372K	
L100	LD STROMKOMPENS.DROSSEL COMPENSATION INDUCTOR	811.2571			
L102	LD 100UH 20% 1A 0,6500HM CHOKE	LD 155.9446	SIEMENS	B82111-E-C25	
N101	BD LM7812CT+12V1AO VREGL VOLTAGE REGULATOR	BD 344.9641	NSC	LM7812CT	
N102	BD LM7812CT+12V1AO VREGL VOLTAGE REGULATOR	BD 344.9641	NSC	LM7812CT	
P1 ..14	VL WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
P21	VL WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
P31 ..34	VL WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
R101	RL 0,35W 221 KOHM+-1%TK50 RESISTOR	RL 083.2270	DRALORIC	SMA0207/221K-F-C	
R102	RL 0,35W 221 KOHM+-1%TK50 RESISTOR	RL 083.2270	DRALORIC	SMA0207/221K-F-C	
R103	RL 0,35W 3,92KOHM+-1%TK50 RESISTOR	RL 083.1039	RESISTA	MK2	
R104	RL 0,35W 3,92KOHM+-1%TK50 RESISTOR	RL 083.1039	RESISTA	MK2	
R105	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R106	RL 0,35W 4,99KOHM+-1%TK50 RESISTOR	RL 083.1116	DRALORIC	SMA0207/4,99K-F-D	
R107	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	

ROHDE & SCHWARZ	Äl	Datum	Schaltteilliste für	Sachnummer	Blatt
		Date	Parts list for	Stock Nr.	Page
	01	0989	ED GLEICHRICHTUNG RECTIFIER	819.1716.01 SA	1+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R108	RL 0,35W 210 KOHM+-1%TK50 RESISTOR	RL 083.2258	DRALORIC	SMA0207/210K-F-C	
R109	RL 0,35W 300KOHM+-1%TK50 RESISTOR	RL 082.7840	DRALORIC	SMA0207/300K-F-D	
R110	RL 0,35W 475 KOHM+-1%TK50 RESISTOR	RL 083.2593	DRALORIC	SMA0207/475K-F-C	
R111	RL 0,35W 681 KOHM+-1%TK50 RESISTOR	RL 083.2735	DRALORIC	SMA0207/381K-F-C	
R112	RL 0,35W 1,82KOHM+-1%TK50 RESISTOR	RL 082.2277	DRALORIC	SMA0207/1,82K-F-C	
R113	RL 0,35W 825 OHM+-1%TK50 RESISTOR	RL 082.2502	DRALORIC	SMA 0207/825OHM-F-C	
R114	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R115	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R116	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R117	RL 0,35W 6,81KOHM+-1%TK50 RESISTOR	RL 082.2560	DRALORIC	SMA 0207/6,81K-F-C	
R118	RL 0,35W 1,82KOHM+-1%TK50 RESISTOR	RL 082.2277	DRALORIC	SMA0207/1,82K-F-C	
R119	RL 0,35W 825 OHM+-1%TK50 RESISTOR	RL 082.2502	DRALORIC	SMA 0207/825OHM-F-C	
R120	RL 0,35W 562 OHM+-1%TK50 RESISTOR	RL 083.0461	DRALORIC	SMA0207/562OHM-F-D	
R125	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R127	RL 0,35W 511 KOHM+-1%TK50 RESISTOR	RL 083.2629	DRALORIC	SMA0207/511K-F-C	
R128	RL 0,35W 511 KOHM+-1%TK50 RESISTOR	RL 083.2629	DRALORIC	SMA0207/511K-F-C	
R150	RL 0,35W 681 OHM+-1%TK50 RESISTOR	RL 083.0490	DRALORIC	SMA0207/681OHM-F-D	
R153	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/221OHM-F-D	
R185	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
T100	LT NETZTRANSFORMATOR LINE TRANSFORMER	819.1851			
U100	BP H11A550 OPTOCOUPLER OPTO COUPLER	BP 006.0948	GEN-ELECTR	H11A550	
U101	BP H11A550 OPTOCOUPLER OPTO COUPLER	BP 006.0948	GEN-ELECTR	H11A550	
V101	RK HEISSEL 4.7 OHM, 10% 1.5W THERMISTOR	820.3319	SIEMENS	Q63023-S1479-M	
V102	RK VARISTOR 300V 1W VARISTOR	820.3348	SIEMENS	BEST.-NR.Q69-X3234	
V103	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V104	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V105	AK 2N2222A N 40V 800MA TRANSISTOR	AK 010.5405	VALVO	2N2222A	
V110	AG KBU4K 560V 4AO BRGL RECTIFIER	820.3302	GEN.INSTR.	KBU4K	
V111	AG B80C800 BRGL RECTIFIER	AG 013.2042	AEG-TELEF.	B80C800SI	
V112	AG B80C800 BRGL RECTIFIER	AG 013.2042	AEG-TELEF.	B80C800SI	
V115	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V116	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
X1 ..6 X8 ..18 X20	FV FLACHSTECKER 2,8X0,8 FLAT PLUG 2,8X0,8 FV FLACHSTECKER 2,8X0,8 FLAT PLUG 2,8X0,8 FP EINLOETSTECKER 9POL CONNECTOR 9POL	FV 279.1998 FV 279.1998 681.1150	VOGT VOGT AMP	3775A/0,8/MS-S18 3775A/0,8/MS-S18 350712-1	

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ROHDE & SCHWARZ	Äl	Datum	Schaltteilliste für	Sachnummer	Blatt
		Date	Parts list for	Stock Nr.	Page
	01	0989	ED GLEICHRICTUNG RECTIFIER	819.1716.01 SA	2-



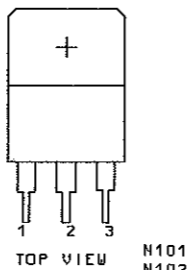
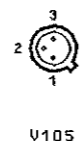
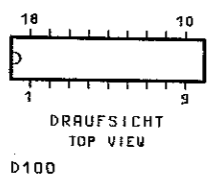
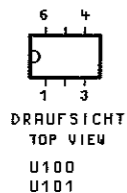
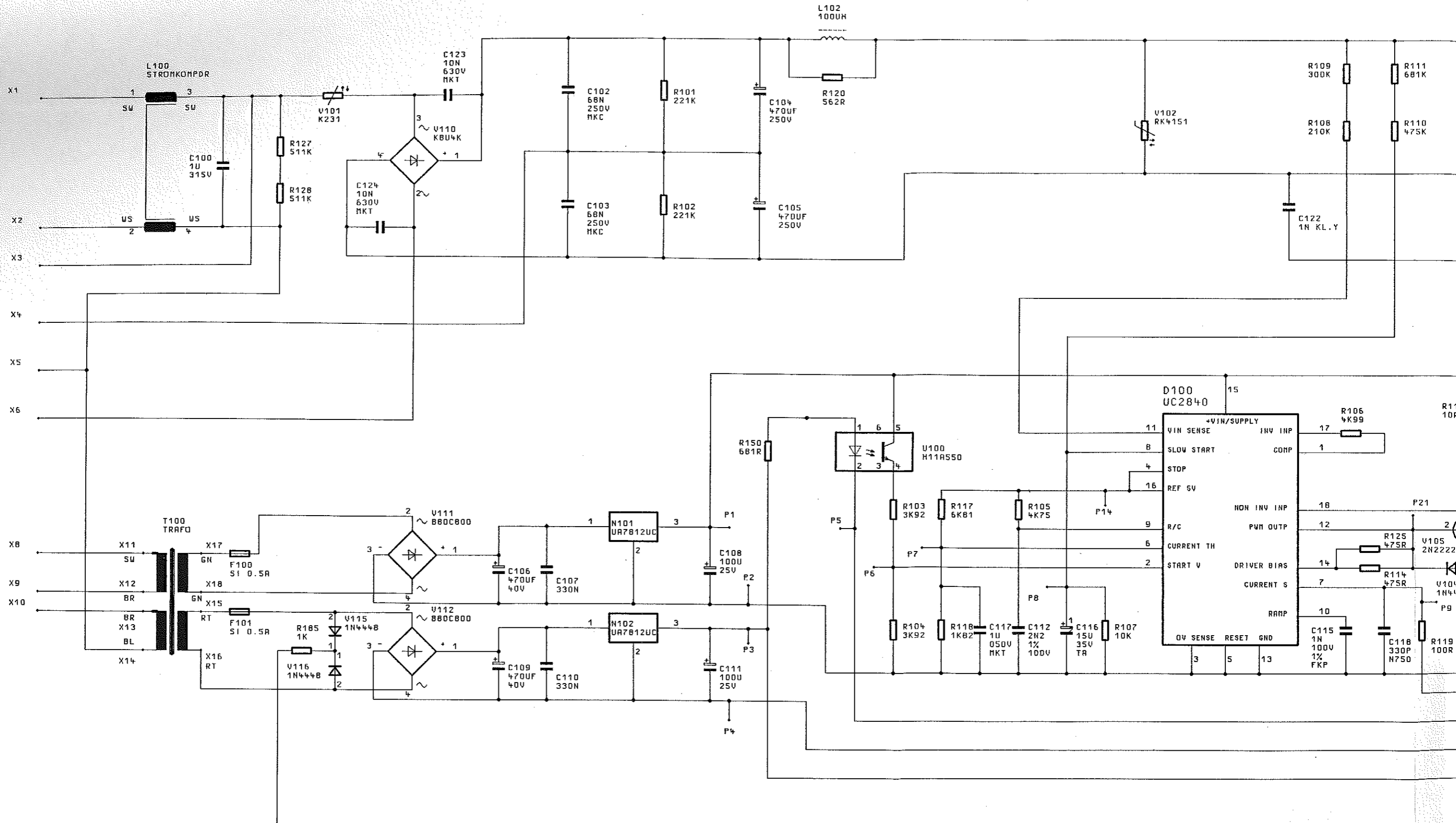
ZU/TO SCHALTNETZTEIL-A2/POWERSUPPLY-A2

STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

				1KGB	TAG	NAME	BENENNUNG	
				BEARB.		JN	GLEICHRICHTUNG RECTIFIER	
				GEPR.		JN		
				NORM				
				PLOTT	2. 9.88	*		
				 ROHDE & SCHWARZ			ZEICHN.-NR.	BLATT-NR.
							819.1716.015	1
REND. IND.	RENDERUNGS- MITTEILUNG	DATUM	NAME	ZU GERÄT	SM6U	REG.-I.V.	819.0010	ERSTE Z.

BEHALTEN WIR UNS ALLE RECHTE VOR

ZU/TO 21

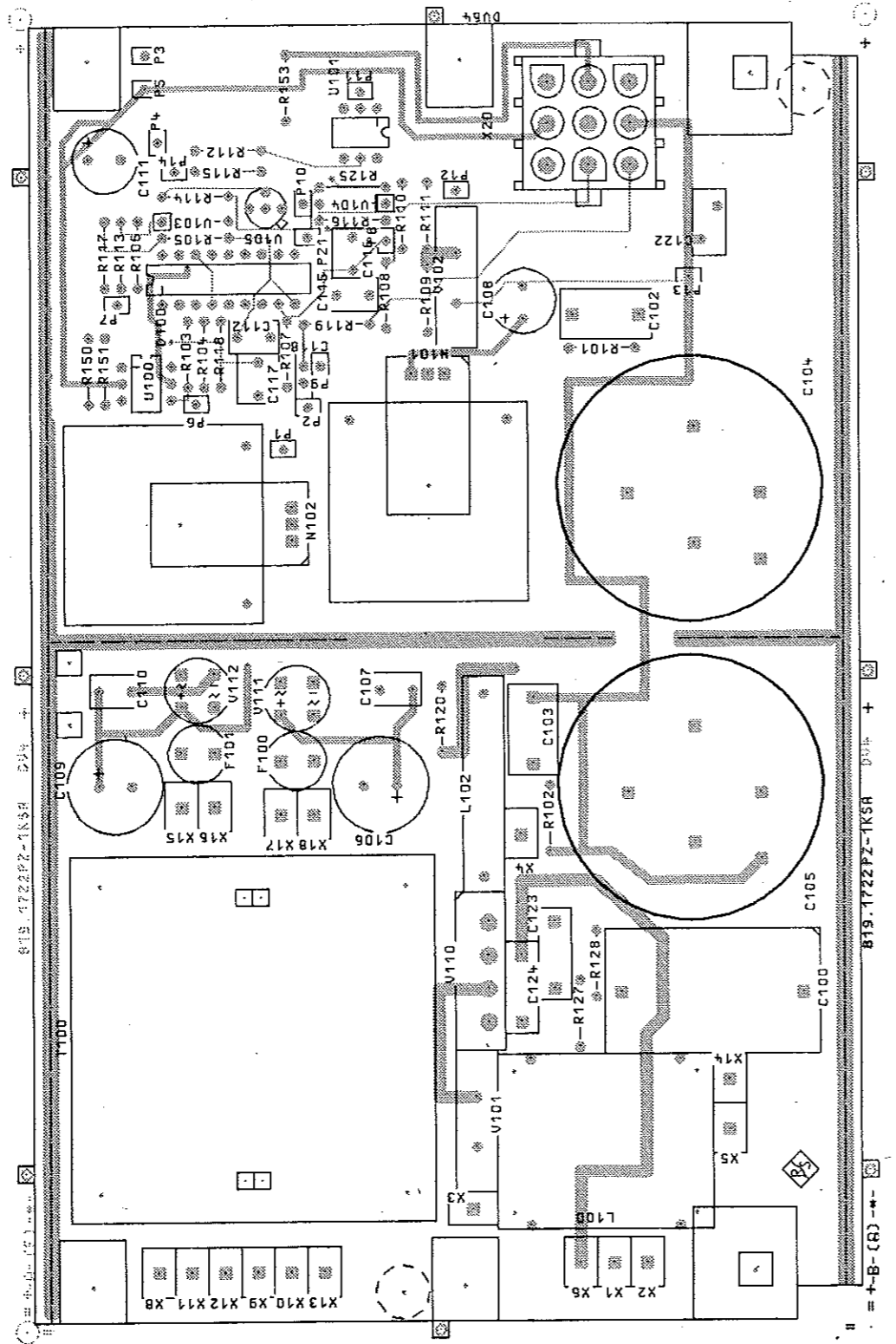


STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

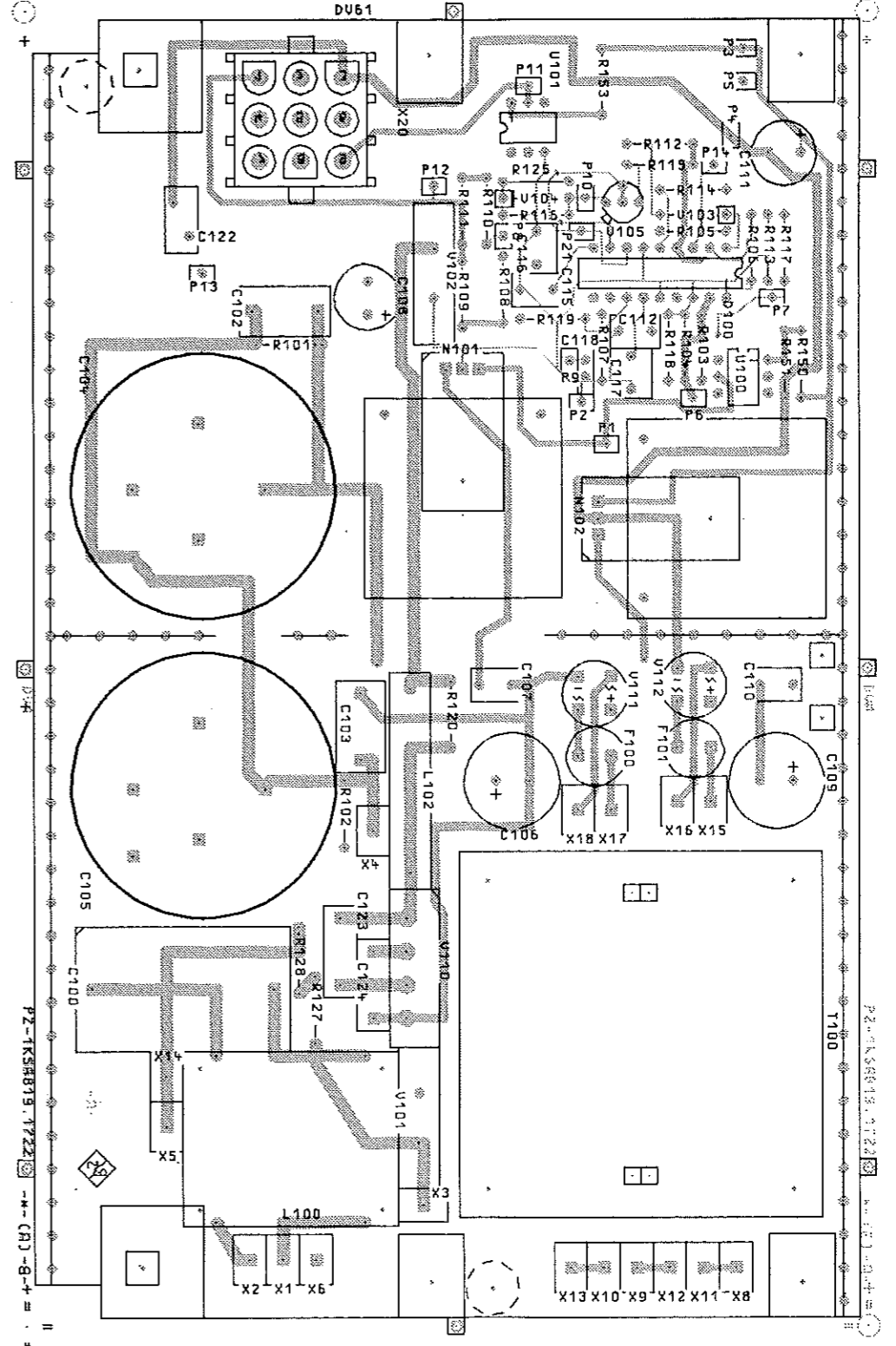
REND. IND. AENDERUNG MITTEILUN

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Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



Ansicht und Leitungsführung Lötseite
View of tracks on solder side



ISO-Projektion
Methode E



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

Maße ohne Toleranzangabe				Maßstab 1 : 1	
				Halbzeug, Werkstoff	
1 KGB		Tag	Name	Benennung	
Bearb. 08.88			JN		
Gepr.					
Norm					
				Zeichn.-Nr.	
				819.1716	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	reg. i. V. 819.0010V	erste Z.
				zu Gerät SMGU	
				Blatt-Nr.	2
				v. 2 Bl.	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C200	CK 2,2UF+-5%400V RM27,5 FILM-CAPACITOR	681.2133	SIEMENS	B32650-K4225-J	
C210	CC 150PF+-20% HDK700 RD5 CERAMIC CAPACITOR	006.0448	VALVO	2222 655 53151	
C211	CC 100PF+-20% HDK700 RD5 CERAMIC CAPACITOR	006.0431	VALVO	2222 655 53101	
C212	CE 470UF-10+50%40V15RDX26 ELECTROLYT CAPACITOR	629.9776	ROEDERSTEI	EKROOHG347G	
C213	CE 470UF-10+50%40V15RDX26 ELECTROLYT CAPACITOR	629.9776	ROEDERSTEI	EKROOHG347G	
C214	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C215	CK 10NF+-5%63V5RM MKT CAPACITOR	CK 099.2869	WIMA	FKS 2/100/0,01UF/5%	
C216	CE 2,2UF+-20%40V SAL ELECTR.CAPACITOR	CE 007.3911	VALVO	2222 122 37228	
C217	CE 470UF-10+50%40V15RDX26 ELECTROLYT CAPACITOR	629.9776	ROEDERSTEI	EKROOHG347G	
C218	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C219	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C240	CC 1 NF+50-20%5HDK4000 CERAMIC CAPACITOR	006.0490	VALVO	2222 655 53102	
C241	CC 1 NF+50-20%5HDK4000 CERAMIC CAPACITOR	006.0490	VALVO	2222 655 53102	
C242	CE 1000UF 40V 16RDX30 ELECTROLYTIC CAPACITOR	573.9931	SIEMENS	B 41293-B7108-T	
C243	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C244	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C245	CE 470UF-10+50%40V15RDX26 ELECTROLYT CAPACITOR	629.9776	ROEDERSTEI	EKROOHG347G	
C246	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C247	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C270	CC 100PF+-20% HDK700 RD5 CERAMIC CAPACITOR	006.0431	VALVO	2222 655 53101	
C271	CC 100PF+-20% HDK700 RD5 CERAMIC CAPACITOR	006.0431	VALVO	2222 655 53101	
C272	CE 470UF-10+50%40V15RDX26 ELECTROLYT CAPACITOR	629.9776	ROEDERSTEI	EKROOHG347G	
C273	CK 330NF+-5%63V5RM MKT CAPACITOR	CK 099.2969	WIMA	MKS2/63/0,33UF/5%	
C274	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C275	CE 470UF-10+50%40V15RDX26 ELECTROLYT CAPACITOR	629.9776	ROEDERSTEI	EKROOHG347G	
C280	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C281	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C282	CE 1000UF-10+50%25V 17X26 ALUMINIUM CAPACITOR	565.9513	ROEDERST.	EKROOJG410E	
C284	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C285	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C286	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C287	CE 470UF-10+50%40V15RDX26 ELECTROLYT CAPACITOR	629.9776	ROEDERSTEI	EKROOHG347G	
C290	CK 330NF+-5%63V5RM MKT CAPACITOR	CK 099.2969	WIMA	MKS2/63/0,33UF/5%	
C291	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C292	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C300	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C301	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C302	CK 10NF+-5%63V5RM MKT CAPACITOR	CK 099.2869	WIMA	FKS 2/100/Q,01UF/5%	
C303	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	

ROHDE & SCHWARZ	AI	Datum	Schaltteilliste für	Sachnummer	Blatt
		Date	Parts list for	Stock Nr.	Page
	04	0789	ED SCHALTREGLER SWITCHED REGULATOR	819.1916.01 SA	1+

Kennz. Comp.No	Benennung Designation	Sachnummer Stock No	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C304	CK 10NF+-5%63V5RM MKT CAPACITOR	CK 099.2869	WIMA	FKS 2/100/0,01UF/5%	
C305	CC 3,3NF+-10%6X7R2000 CAPACITOR	CC 087.7083	VALVO	2222 63051 332	
C306	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C320	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C321	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C322	CC 47PF+-2%3X4N750 CAPACITOR	CC 087.6864	VALVO	2222 678 58479	
C323	CC 47PF+-2%3X4N750 CAPACITOR	CC 087.6864	VALVO	2222 678 58479	
C324	CK 220NF+-5%63V5RM MKT CAPACITOR	CK 099.2952	WIMA	MKS2/63/0,22UF/5%	
C350	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C351	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C352	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C353	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C354	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
L210	LD DREIFACHDR.650UH/4A STORAGE CHOKER	820.3377	VAC	ZKB 419/864...	
L211	LD 100UH 20% 1A 0,6500HM CHOKER	LD 155.9446	SIEMENS	B82111-E-C25	
L212	LD 680 UH10%60,00HMO,030A CHOKER	LD 067.3201	DELEVAN	DROSSEL1025-88	
L240	LD 9UH 6A 0,0120HM CHOKER	LD 026.4826	SIEMENS	B82111-B-C22	
L241	LD 680 UH10%60,00HMO,030A CHOKER	LD 067.3201	DELEVAN	DROSSEL1025-88	
L270	LD 56UH 1,5A 0,30HM CHOKER	LD 099.5197	SIEMENS	B 82111-E-C24	
L280	LD SPEICHERDR.63UH/10A CHOKER	686.9565	VAC	ZKB 419/407-02-H2	
L281	LD 25UH 3A 0,0460HM CHOKER	LD 026.4849	SIEMENS	B82111-B-C24	
L300	RL 0-OHM-WIDERST. 0204 0-OHM RESISTOR	RL 069.0000	DRALORIC	OMA 0204	
N210	BO LM358P 2X OPAMP OPERATIONAL AMPLIFIER	BO 377.3813	TEXAS	LM358P	
N240	BO LM358P 2X OPAMP OPERATIONAL AMPLIFIER	BO 377.3813	TEXAS	LM358P	
N270	BO SI3152V +15V2AO VREGL VOLTAGE REGULATOR	803.0615	SANKEN	SI3152V	
N290	BO SI3052V + 5V2AO VREGL VOLTAGE REGULATOR	641.8553	SANKEN	SI3052V	
N300	BO TLO74IN 4XFET OPAMP OPERATIONAL AMPLIFIER	568.7528	TEXAS INST	TLO74IN	
N320	BO LM339N 4X COMPAR COMPARATOR	BO 342.2062	NSC	LM339N	
N350	BL CD4025BF 3X3INP.NORG NOR GATE	086.8111	RCA	CD4025BF	
P200	FP INDIREKT.STECKERL.36P. PIN CONNECTOR P202 2-POLIG/PINS	FP 242.3600	BINDER	742-5-11-0178-00-36	
P201	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P210	FP INDIREKT.STECKERL.36P. PIN CONNECTOR P212,P213 3-POLIG/PINS	FP 242.3600	BINDER	742-5-11-0178-00-36	
P211	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P214	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P240	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	

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	04	0789	ED SCHALTREGLER SWITCHED REGULATOR	819.1916.01 SA	2+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
P241	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P270	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P280	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P281	FP INDIREKT.STECKERL.36P. PIN CONNECTOR P243, P271, P272, P242, P282 6-POLIG/PINS	FP 242.3600	BINDER	742-5-11-0178-00-36	
P283	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P290	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P300	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P301	FP INDIREKT.STECKERL.36P. PIN CONNECTOR P302 2-POLIG/PINS	FP 242.3600	BINDER	742-5-11-0178-00-36	
P303	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 11X1-POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	
P322	FP INDIREKT.STECKERL.36P. PIN CONNECTOR P323-P325 4-POLIG/PINS	FP 242.3600	BINDER	742-5-11-0178-00-36	
P326	FP INDIREKT.STECKERL.36P. PIN CONNECTOR P321, P351 3-POLIG/PINS	FP 242.3600	BINDER	742-5-11-0178-00-36	
P327	FP INDIREKT.STECKERL.36P. PIN CONNECTOR P350, X350-X356 8-POLIG/PINS	FP 242.3600	BINDER	742-5-11-0178-00-36	
R200	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56,20HM-F-D	
R201	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R202	RD 0,8W 0,15 OHM+-3% WIRE-WOUND RESISTOR	RD 087.5222	SAGE	1000S0,150HM+3%	
R210	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/4750HM-F-D	
R211	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/4750HM-F-D	
R212	RD 0,8W 100 OHM+-3% WIRE WOUND RESISTOR	RD 082.6420	SAGE	1000S/1000HM/3%	
R213	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMA0207/47,50HM-F-D	
R214	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMA0207/47,50HM-F-D	
R220	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R221	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R222	RL 0,35W 18,2KOHM+-1%TK50 RESISTOR	RL 083.1480	DRALORIC	SMA/207/18,2K-F-C	
R223	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R224	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R225	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R230	RG 221 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6004	DALE	CRCW1206-10 221K F-T	
R231	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R232	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R233	RG 47,5KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5950	DALE	CRCW1206-10 47K5 F-T	
R234	RD 0,8W 0,33 OHM+-3%TK80 WIRE WOUND RESISTOR	RD 450.6670	SAGE	1000S/0,330HM03%	
R235	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R240	RD 0,8W 47 OHM+-3% WIRE-WOUND RESISTOR	RD 082.0680	SAGE	1000S/470HM/3%	

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		04 0789	ED-SCHALTREGLER SWITCHED REGULATOR	819.1916.01 SA	3+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R241	RD 0,8W 47 OHM+-3% WIRE-WOUND RESISTOR	RD 082.0680	SAGE	1000S/47OHM/3%	
R245	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R246	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R247	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R248	RG 2,74KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5766	DALE	CRCW1206-10 2K74 F-T	
R249	RG 5,62KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0735	DALE	CRCW1206-10 5K62 F-T	
R250	RG 8,25KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0770	DALE	CRCW1206-10 8K25 F-T	
R251	RL 0,35W 909 KOHM+-1%TK50 RESISTOR	RL 083.2858	DRALORIC	SMA0207/909K-F-C	
R252	RL 0,35W 909 KOHM+-1%TK50 RESISTOR	RL 083.2858	DRALORIC	SMA0207/909K-F-C	
R253	RG 1,1KOHM+-1%TK100 1206 CHIP RESISTOR	006.9951	DALE	CRCW1206-10 1K1 F-T	
R254	RG 47,5KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5950	DALE	CRCW1206-10 47K5 F-T	
R255	RD 2,4 W 0,05 OHM+-3% RESISTOR	RD 069.1964	SAGE	1200S/080200HM/3%	
R260	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R261	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T	
R262	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R263	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R270	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMA0207/332OHM-F-D	
R271	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMA0207/332OHM-F-D	
R280	RD 0,8W 15 OHM+-3% WIRE-WOUND RESISTOR	RD 087.5316	SAGE	1000S150HM+3%	
R281	RD 0,8W 15 OHM+-3% WIRE-WOUND RESISTOR	RD 087.5316	SAGE	1000S150HM+3%	
R283	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R285	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R286	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R287	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R288	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R290	RG 162 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8932	DALE	CRCW1206-10 162R F-T	
R291	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R292	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R300	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R301	RG 15,0KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5843	DALE	CRCW1206-10 15K F-T	
R302	RG 33,2KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5914	DALE	CRCW1206-10 33K2 F-T	
R303	RG 3,32KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5789	DALE	CRCW1206-10 3K32 F-T	
R304	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7526	BOURNS	3386X1-103	
R305	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R306	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R307	RL 0,35W 5,23KOHM+-1%TK50 RESISTOR	RL 083.1122	DRALORIC	SMA0207/5,23K-F-D	
R308	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R309	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R310	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R311	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R312	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56,2OHM-F-D	
R320	RL 0,35W 6,04KOHM+-1%TK50 RESISTOR	RL 082.6089	DRALORIC	SMA 0207/6,040HM-F-C	
R321	RL 0,35W 5,11KOHM+-1%TK50 RESISTOR	RL 082.2348	DRALORIC	SMA0207/5,11K-F-C	
R322	RL 0,35W 15,0KOHM+-1%TK50 RESISTOR	RL 083.1400	DRALORIC	SMA0207/15K-F-D	
R323	RL 0,35W 14,3KOHM+-1%TK50 RESISTOR	RL 083.1380	DRALORIC	SMA0207/14,3K-F-D	
R324	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R325	RG 130 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5966	DALE	CRCW1206-10 130K F-T	
R326	RG 82,5KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1925	DALE	CRCW1206-10 82K5 F-T	
R327	RG 82,5KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1925	DALE	CRCW1206-10 82K5 F-T	
R328	RG 3,01KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5772	DALE	CRCW1206-10 3K01 F-T	
R329	RG 511 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9051	DALE	CRCW1206-10 511R F-T	
R330	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R331	RG 12,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0841	DALE	CRCW1206-10 12K1 F-T	
R332	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R333	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R334	RG 82,5KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1925	DALE	CRCW1206-10 82K5 F-T	
R335	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R336	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R337	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R338	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R339	RL 0,35W 33,2KOHM+-1%TK50 RESISTOR	RL 083.1674	DRALORIC	SMA0207/33,2K-F-C	
R340	RL 0,35W 24,3KOHM+-1%TK50 RESISTOR	RL 083.1574	DRALORIC	SMA/207/24,3K-F-C	
R341	RL 0,35W 15,0KOHM+-1%TK50 RESISTOR	RL 083.1400	DRALORIC	SMA0207/15K-F-D	
R342	RL 0,35W 4,99KOHM+-1%TK50 RESISTOR	RL 083.1116	DRALORIC	SMA0207/4,99K-F-D	
R343	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R350	RG 1,00MOHM+-1%TK100 1206 CHIP RESISTOR	RG 815.7532	DALE	CRCW1206-10 1M F-T	
R351	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R352	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R353	RG 5,62KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0735	DALE	CRCW1206-10 5K62 F-T	
R354	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R355	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R356	RG 1,00MOHM+-1%TK100 1206 CHIP RESISTOR	RG 815.7532	DALE	CRCW1206-10 1M F-T	
R357	RG 1,21KOHM+-1%TK100 1206 CHIP RESISTOR	006.9968	DALE	CRCW1206-10 1K21 F-T	
R358	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R359	RG 68,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1902	DALE	CRCW1206-10 68K1 F-T	
S3	ST TEMP.SCHALT.45GRSCHL TEMPERATURE SWITCH	801.8325	HAMLIN	TS-A/45 GRD C	
T200	LU SCHALTTRAFO TRANSFORMER	819.2112			

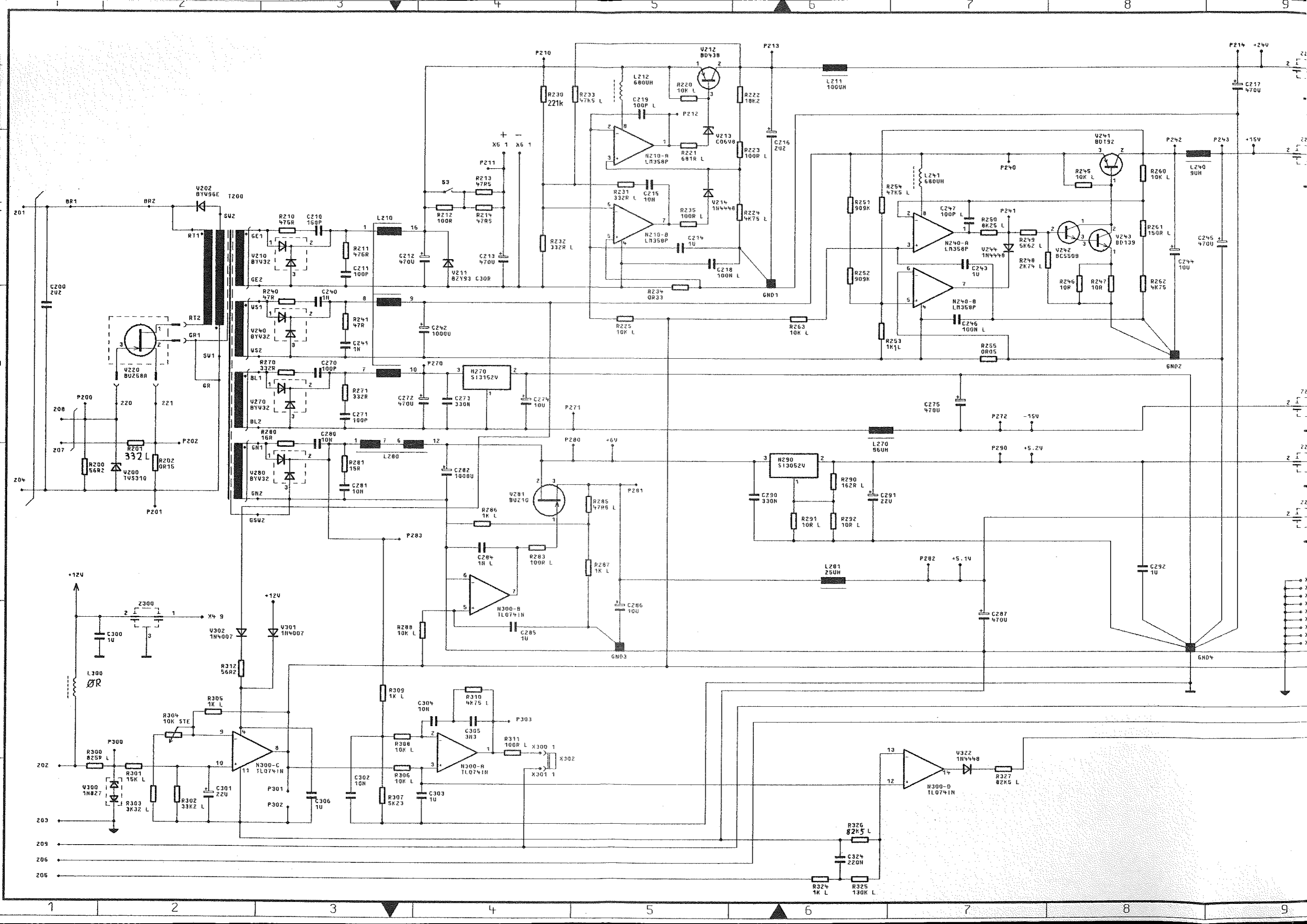
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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V200	AE TVS310 10V SUPPR SUPPRESSOR	811.2594	UNITRODE	TVS310	
V202	AG BYV96E GL1000V OAB RECTIFIER	099.9034	VALVO	BYV96E	
V210	AG BYV32/200 2GL200V10AO RECTIFIER	803.0644	VALVO	BYV32/200	
V211	AE BZY93/C3OR 20W ZDI# ZENER DIODE (SUPPR.)	464.9160	VALVO	BZY93/C3OR	
V212	AL BD438 P 45V 4AO TRANSISTOR	AL 010.0403	VALVO	BD438	
V213	AE BZX79/C6V8 0,5W ZDI ZENER DIODE	AE 012.2478	VALVO	BZX79/C6V8	
V214	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V220	AM BUZ58 N-E1000V MOSF POWER MOSFET	820.3354	SIEMENS	BUZ58	
V240	AG BYV32/200 2GL200V10AO RECTIFIER	803.0644	VALVO	BYV32/200	
V241	AL BDT92 P 60V 10AO TRANSISTOR	803.0650	VALVO	BDT92	
V242	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT, POL. CBE	
V243	AL BD139 N 80V 1AO TRANSISTOR	AL 274.8994	VALVO	BD139	
V244	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V270	AG BYV32/200 2GL200V10AO RECTIFIER	803.0644	VALVO	BYV32/200	
V280	AG BYV32/200 2GL200V10AO RECTIFIER	803.0644	VALVO	BYV32/200	
V281	AM BUZ10 N-E 50V MOSF MOS-FET	AM 608.9490	SIEMENS	BUZ10	
V300	AE 1N827 6,2V REF DI REFERENCE DIODE	AE 418.0029	CDI	1N827	
V301	AG 1N4007 GL1000V 1AO RECTIFIER	AG 013.0310	AEG-TELEF	1N4007	
V302	AG 1N4007 GL1000V 1AO RECTIFIER	AG 013.0310	AEG-TELEF	1N4007	
V320	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V321	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V322	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V350	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT, POL. CBE	
V351	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V352	AF HLMP1503 LED GN RD3 LED	AF 252.5570	QTC	HLMP1503 L1819	
V353	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT, POL. CBE	
V354	AE BZX79/C3V9 0,5W ZDI ZENER DIODE	AE 086.8234	VALVO	BZX55/C3V9 BZX79...	
W20	DX KABEL (W20) CABLE	819.2106			
WE1	DX KABEL WE1 CABLE	819.2158			
X4	DX BUCHSEINHEIT CONNECTOR UNNIT	819.2135			
X5	VL LOETOESE 11,5 X 1,4 SOLDERING PIN	VL 082.5247	VOGT	N.ZEICHNUNG 082.5247	
X6	VL LOETOESE 11,5 X 1,4 SOLDERING PIN	VL 082.5247	VOGT	N.ZEICHNUNG 082.5247	
X300	FP INDIREKT. STECKERL. 36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X301	2-POLIG/PINS				
X302	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	
X353	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	
X357	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	

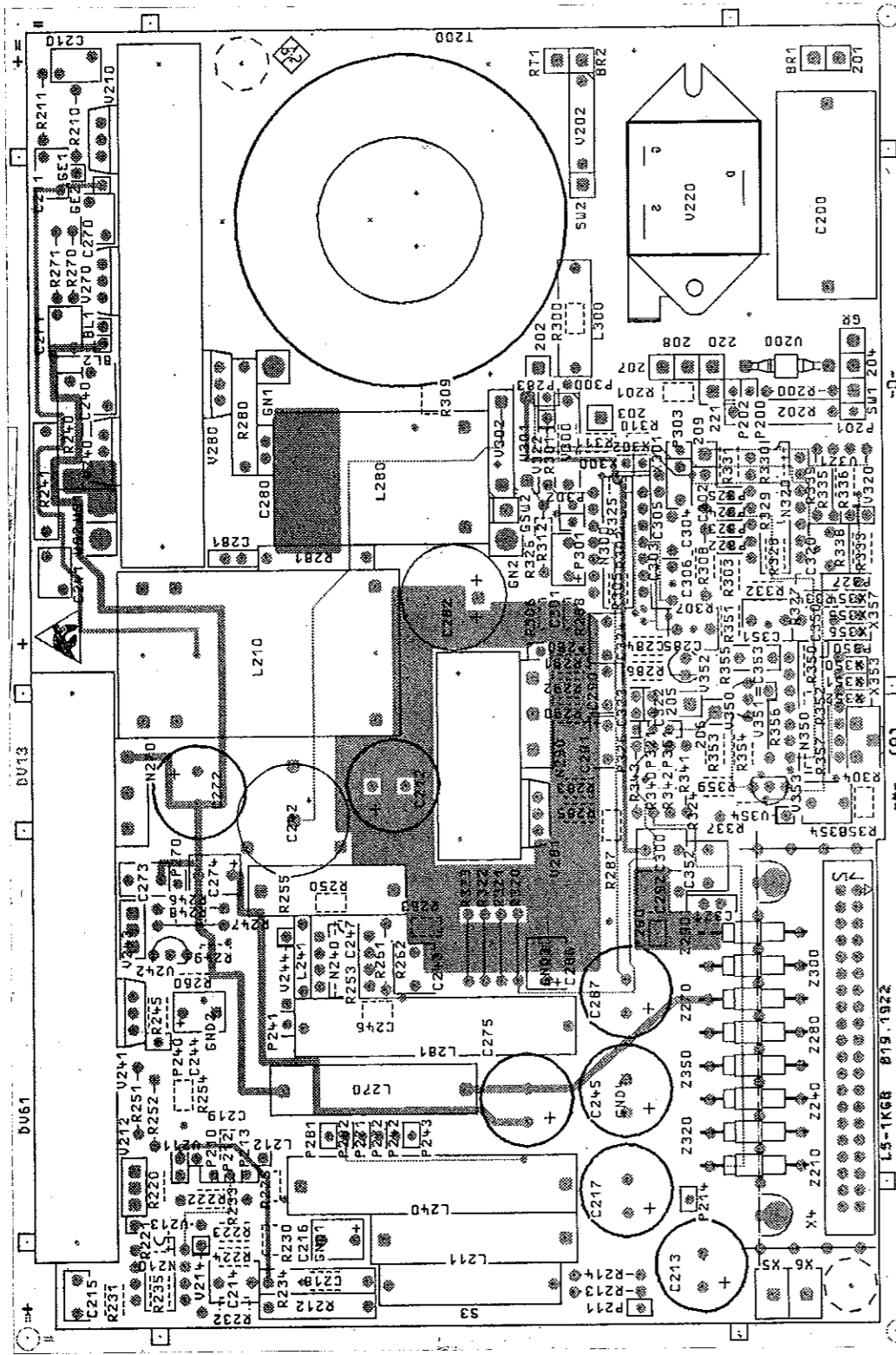
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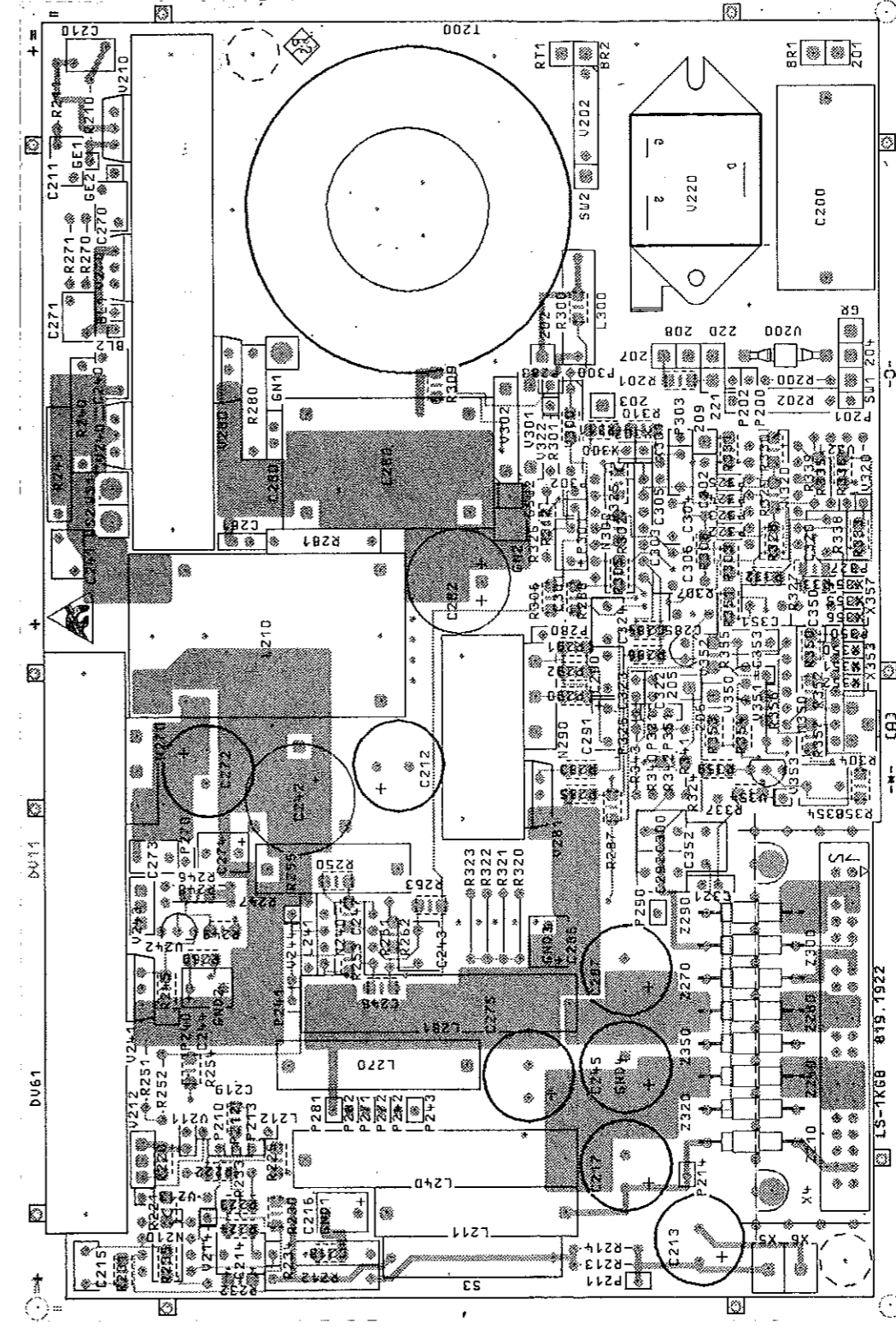
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Z210	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z240	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z270	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z280	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z290	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z300	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z320	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z350	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
					- ENDE -	
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DV13



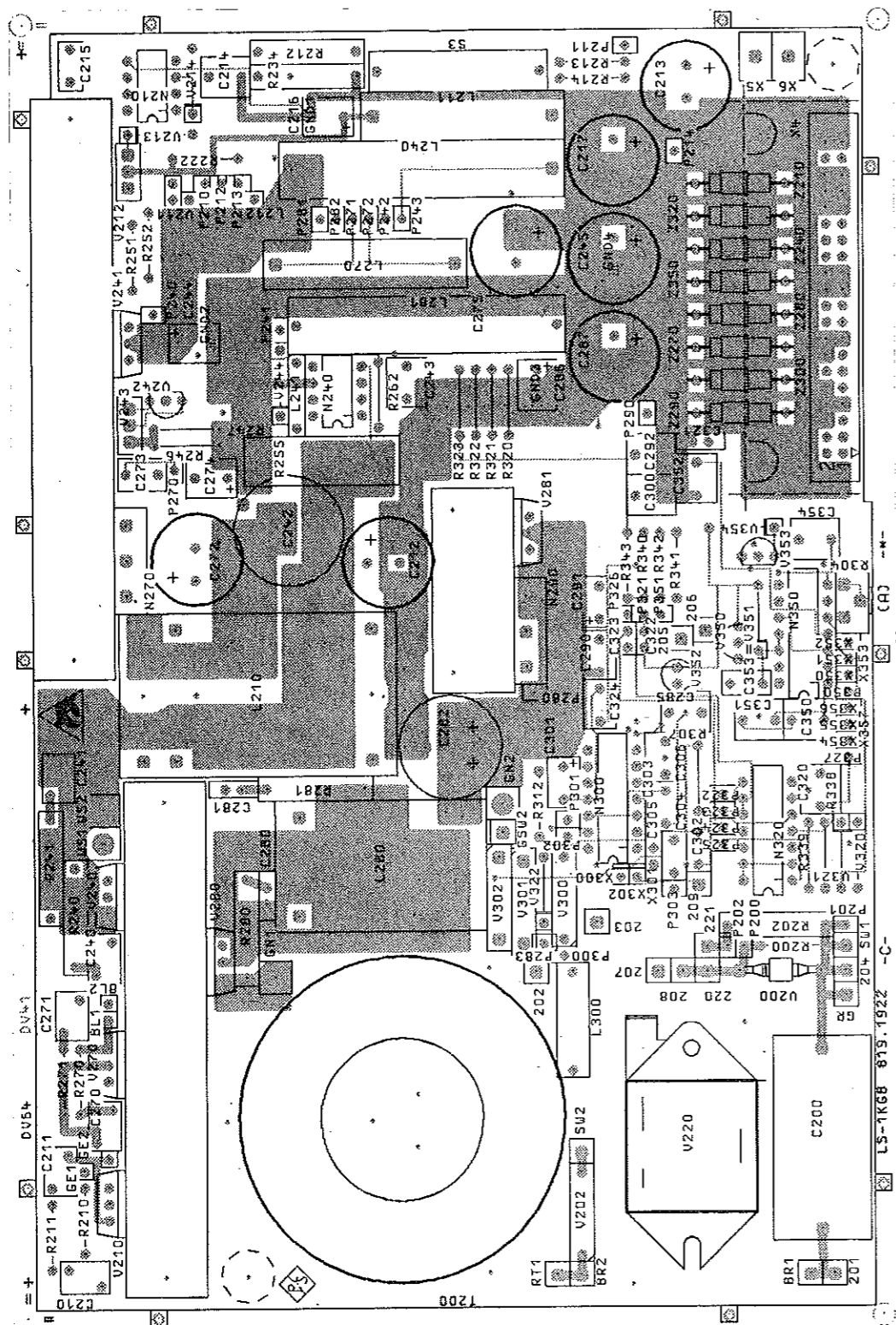
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Ansicht und Leitungsführung Lötseite
View of tracks on solder side

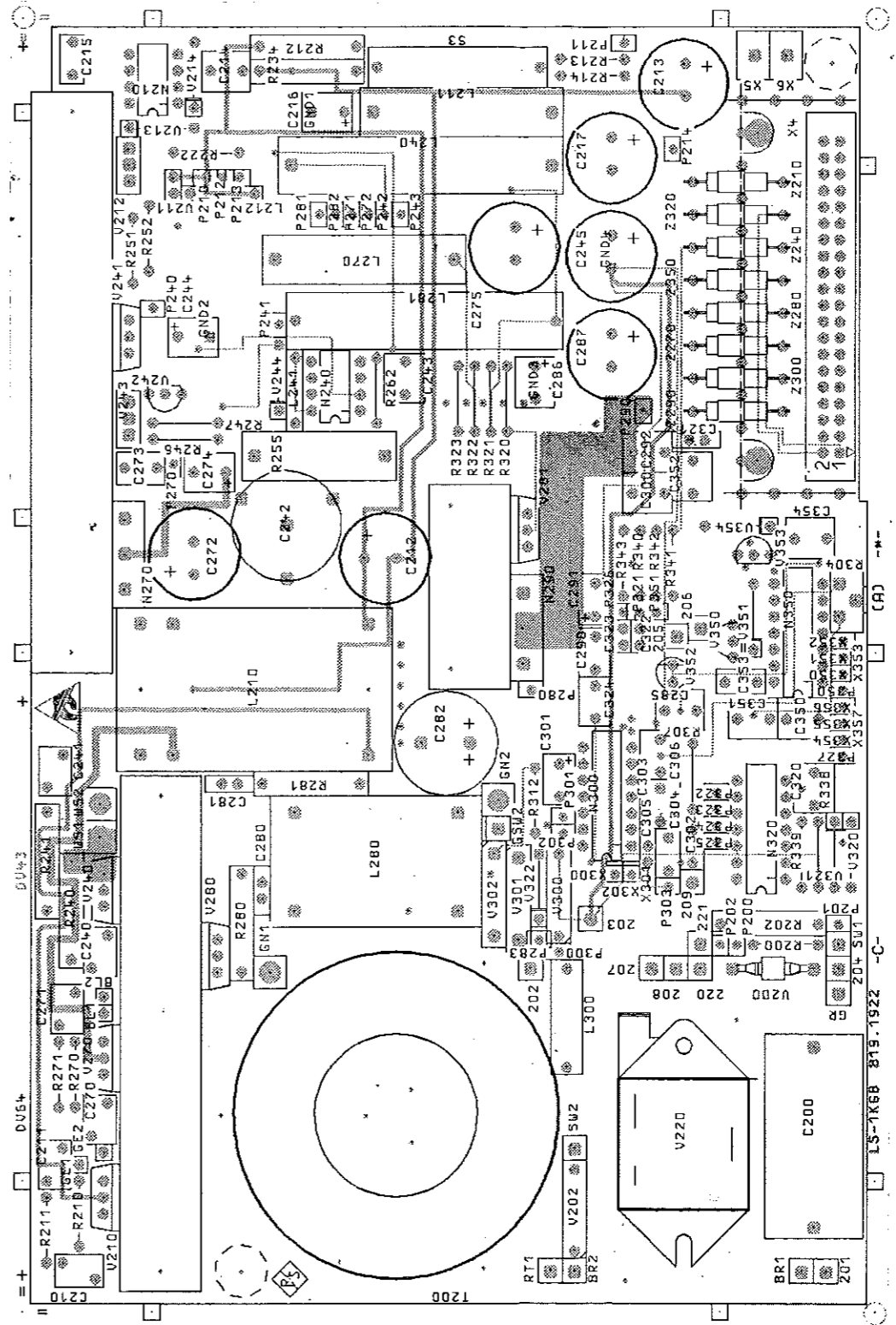


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Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION ESD!
Electrostatic sensitive devices require a special handling.

Maße ohne Toleranzangabe		Maßstab 1 : 1	
1KGB		Halbzeug, Werkstoff	
Bearb.	Tag	Name	Benennung
Gepr.	09.88	LS	SCHALTREGLER SWITCHED REGULATOR
Norm			
Änd. Zust.		Tag	Name
Änderungs-Mitteilung			
		zu Gerät SMGU	
		reg. i. V. 819.0010 V	
		erste Z.	
ROHDE & SCHWARZ			Blatt-Nr.
819.1916			3
			v. 4 Bl.



DV41



DV43

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.

Maße ohne Toleranzangabe		Maßstab 1 : 1	
		Halbzeug, Werkstoff	
1KGB	Tag	Name	Benennung
Bearb.	09.88	LS	SCHALTREGLER
Gepr.			SWITCHED REGULATOR
Norm			
			Zeichn.-Nr.
			819.1916
Änd. Zust.	Änderungs-Mitteilung	Tag	Name
			zu Gerät SMGU
reg. i. V.		819.0010 V	
erste Z.			
			Blatt-Nr.
			2
			v. 4 Bl.

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ROHDE & SCHWARZ

SERVICE DOCUMENTS

Controller

819.2164.02

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5.1.2	Interface to "Display/Keyboard" subassembly and for Data Transmission .
5.1.3	Diagnostics Circuit
5.1.3.1	Analog Diagnostics Circuit
5.1.3.2	Digital Diagnostics Circuit
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5.4.4	Display/Keyboard Interface

Circuit diagrams
Parts lists
Component layout plans



5 Service Manual "Controller"

5.1 Function Description

(See circuit diagram 819.2164 S and Fig. 5-1)

The module comprises the following function units:

- ▶ CPU with program and data memories
- ▶ Interface to module "Display/keyboard" and for data transmission
- ▶ Diagnostics circuit
- ▶ X output
- ▶ IEC interface

5.1.1 CPU with Program and Data Memories

The CPU is an 80186 operated at 8 MHz. To ensure correct starting of the program, N101 generates a RESET signal for the CPU. A total of 128 kbytes (D135, D140) is provided for the program memories. The RAMs D170, D175 with battery back-up are used as data memories and for storing instrument settings. The EEPROMs D145, D150 contain correction tables determined from instrument-specific parameters (e.g. level and modulation frequency response flatness).

5.1.2 Interface to "Display/Keyboard" subassembly and for Data Transmission

The custom gate array "IFPAS" (D225) contains three independent circuits:

- *Interface for tachogenerator (RMK)*

The tachogenerator signals ("Display/keyboard" subassemblies) 90° out of phase, are applied to the input pins RMK.PLS and RMK.DIR. The pulses are added internally, the direction of rotation detected, and the CPU informed by means of an interrupt (RMK.INT).

- *Interface for the key matrix*

The outputs KC1 to KC8 at low potential are connected via the key matrix (column lines) of the "Display/keyboard" subassembly to the high-impedance CMOS inputs KR1 to KR8 (row lines). With the keys open, C210 to C217 are at high potential. Pressing a key combines one row line with one column line, and the corresponding input KR1 to KR8 is set to Low. The interrupt generated (KEY.INT) requests the CPU to read the key code. To generate it, the pins KC1 to KC8 become inputs and thus go into a high-impedance state. The "open" column lines now rapidly go high.

The appropriate capacitor (C210 to C217) must first be charged via the column line of the pressed key. A 1-out-of-64 code is generated from this signal status shortly before the end of the read access.

- *Interface to serial bus*

This serial bus consists of the three unidirectional lines TFR.CLK (transfer clock), TR.DAT (transmit data) and RC.DAT (receive data). The data (TR.DAT) are loaded into shift registers (of the other subassemblies) by means of TRF.CLK. The transfer to the "Display/keyboard" subassembly is made via the gates D250. The data are either accepted for the LCD controller with the strobe (DIS.STB) generated by D275, or they are accepted for the LEDs with the LED strobe (LED.STB) and applied to the outputs of the shift registers. Group lines and address lines (G0 to G2, BA0 to BA2) are output via D270 in order to generate the strobes on the remaining modules. Each module decodes the required strobes from this binary code.

The input shift register of the IFPAS is linked to TRF.CLK and TR.DAT and accepts all transmitted data.

5.1.3 Diagnostics Circuit

5.1.3.1 Analog Diagnostics Circuit

Various sources can be connected to the input of the 12-bit analog/digital converter N320 using the multiplexer D300:

- Voltages of various subassemblies on TST
- Vacant input as voltmeter
- Battery voltage
- Frequency-proportional voltage of X output

Each voltage can be provided with a gain of 1 or 10 by means of N304, N308 prior to conversion. The ADC module has its own reference voltage. Its measuring range is ± 5.12 V and is set using R323 (gain) and R321 (offset).

5.1.3.2 Digital Diagnostics Circuit

The external hardware status can be sent to the CPU via the 8-bit input port D265 to indicate for example whether interrupt requests are present or whether the overvoltage protection is still active. In addition, the status signal of the EEPROMs is monitored during programming, as is an external trigger signal.

5.1.4 X Output

The 12-bit DAC N355 generates a voltage ramp from 0 to 10 V proportional to the start and stop frequencies of the sweep. The converter is programmed via the latches D360, D365.

A signal "PEN LIFT" (Z output) is output by D365 to control the recorder. A MARKER signal whose polarity is software selectable can be selected using the software can be output for observations on an oscilloscope.

5.1.5 IEC Interface

The IEC/IEEE bus interface consisting of the modules D370, D375, D380 is based on the remote-control interface to IEC 625/IEEE 488. The interface can write data directly to the data memory or read data from it via the lines DRQ0, DACK and a DMA channel of the microprocessor. The handshake on the IEC/IEEE bus is handled automatically by the interface. Service requests are passed on to the CPU via the interrupt input INT1.

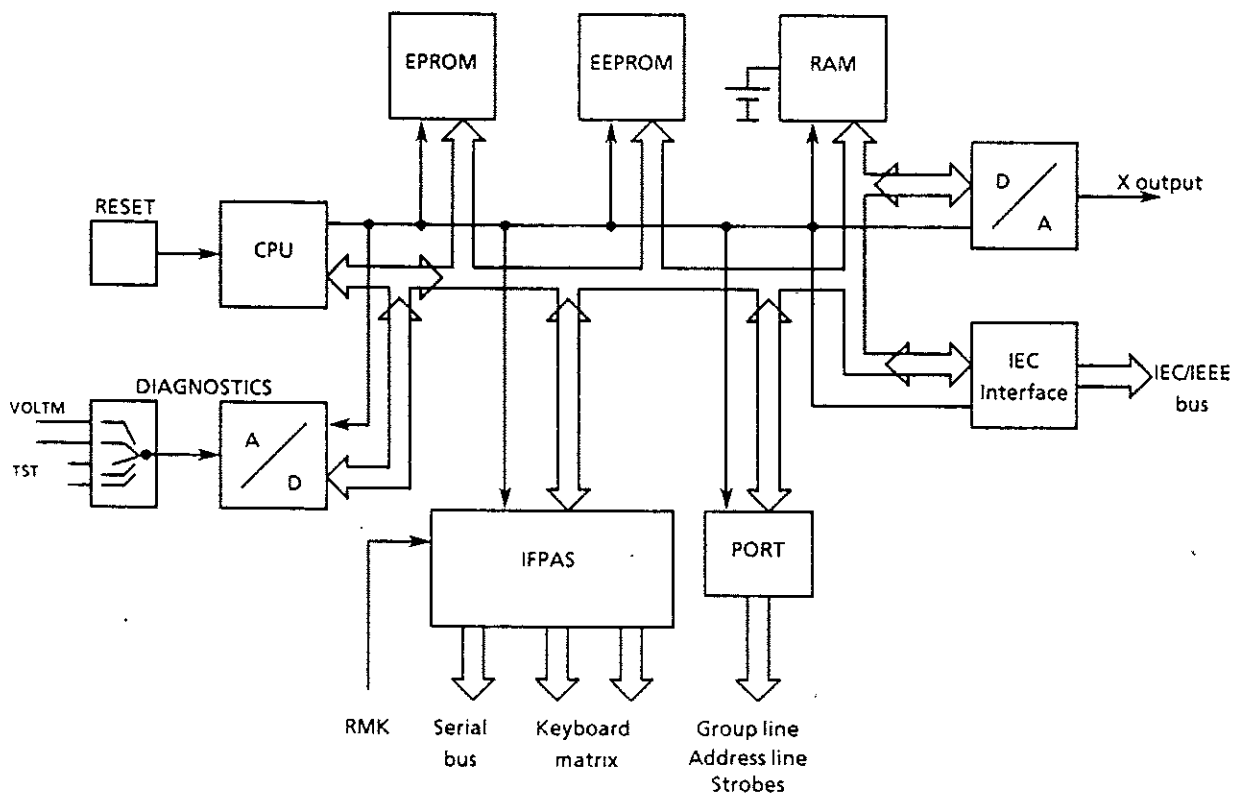


Fig. 5-1 Block diagram "Controller"

5.2 Testing and Adjustment

5.2.1 Checking the RAM Back-up Voltage

The battery voltage must be 3.2 V to 3.5 V at test point P160 without the supply voltage of the module.

5.2.2 Checking the Reference Voltage for the X Output

A reference voltage of 10.0 V to 10.4 V for the DAC should be measured at test point P350.

5.2.3 Adjusting the ADC (Diagnostics)

- Input: SHIFT SPEC 109
- Connect a DC voltage source of 0 to 5 V to plug X5A 12 (TST).

a) Offset adjustment

0 V: adjust display to 0.0 mV using R321.

b) Gain adjustment

5.000 V: adjust display to 5.000 V using R323.

5.4 Interfaces

5.4.1 Motherboard Interface

Test point	Type of line	Signal direction	Meaning	
X5, 1, 2, 5, 7, 9, 11, 20, 22, 24, 26, 30	⊥		GND	
3	TTL	I	INT ATT	Interrupt precision attenuator
4	TTL	I	INT AF	Interrupt AF
6	CMOS	O	TF.CLK	Serial data transmission
8	CMOS	O	TR.DAT	
10	TTL	I	RC.DAT	
12	DC	I	TST	Test input (-5V to +5V)
13	TTL	I	ALA	LOOP OK
14	CMOS	O	BA2	Subassembling address
15	CMOS	O	BA1	Subassembling address
16	CMOS	O	BA0	Subassembling address
17	CMOS	O	G2	Group line
18	CMOS	O	G1	Group line
19	CMOS	O	G0	Group line
21	DC		+15 V	Power supply
23	DC		-15 V	Power supply
25	DC		+12 V STB	STANDBY
27, 28, 29	DC		+5 L	Power supply
31	TTL	I	PWR.FAIL	Power fail
32	DC	O	PWR.ON	Power on following standby

5.4.2 IEC bus/X Output Interface

Test point	Type of line	Signal direction	Meaning		
X43A 1, 5, 6 B 1, 2, 3, 5 to 12	⊥		GND		
A14...17 B14...17	TTL TTL	I/O I/O	IEC/IEEE data bus IEC/IEEE data bus		
A12	TTL	I/O	DAV	IEC/IEEE control signals	
A11	TTL	I/O	NRFD		
A10	TTL	I/O	NDAC		
A7	TTL	I/O	ATN		
A9	TTL	I/O	IFC		
A8	TTL	I/O	SRQ		
B13	TTL	I/O	REN		
A13	TTL	I/O	EOI		
A4	DC: 0 to +10 V	O	X OUTPUT		Voltage ramp (0 to +10 V)
B4	CMOS	O	MARKER		
A3	CMOS	O	Polarity	Programmable Z output	
A2	TTL	I	Ext. trigger		

5.4.3 Voltmeter Interface

X300, 1 -40 V to + 40 V input Voltmeter input
 X300, 2 ⊥

5.4.4 Display/Keyboard Interface

Test point	Type of conductor	Signal direction	Meaning	
X31.A1, 5, 9, 10, 11 B1, 8, 10	⊥		GND	
X31.A6	DC	E	PWR.ON	Power on following standby
B19, 9	DC	A	+ 5 L	
B20	DC	A	+ 15 V	
A20	DC	A	+ 12 V STB	
A8	CMOS	A	DIS.RES	Reset
B2	CMOS	A	DIS.CLK	Serial data
A2	CMOS	A	DIS.DAT	transmission
A4	CMOS	A	C/D	Control of
B3	CMOS	A	DIS.STB1	LCD controller
A3	CMOS	A	DIS.STB2	
B4	CMOS	A	DIS.STB3	
B5	CMOS	A	LED.STB	Strobe for LED
B6	CMOS	E	DIS.BUSY	Handshake signal of LCD controller
A7	CMOS	E	DREHG.PULS	Tachogenerator
B7	CMOS	E	DREHG.DIR	information
B11 to B14		E		
A12 to A15	DC	E	KEYB.COL	Key matrix
B15 to B18		E		
A16 to A19	DC	E	KEYB.ROW	

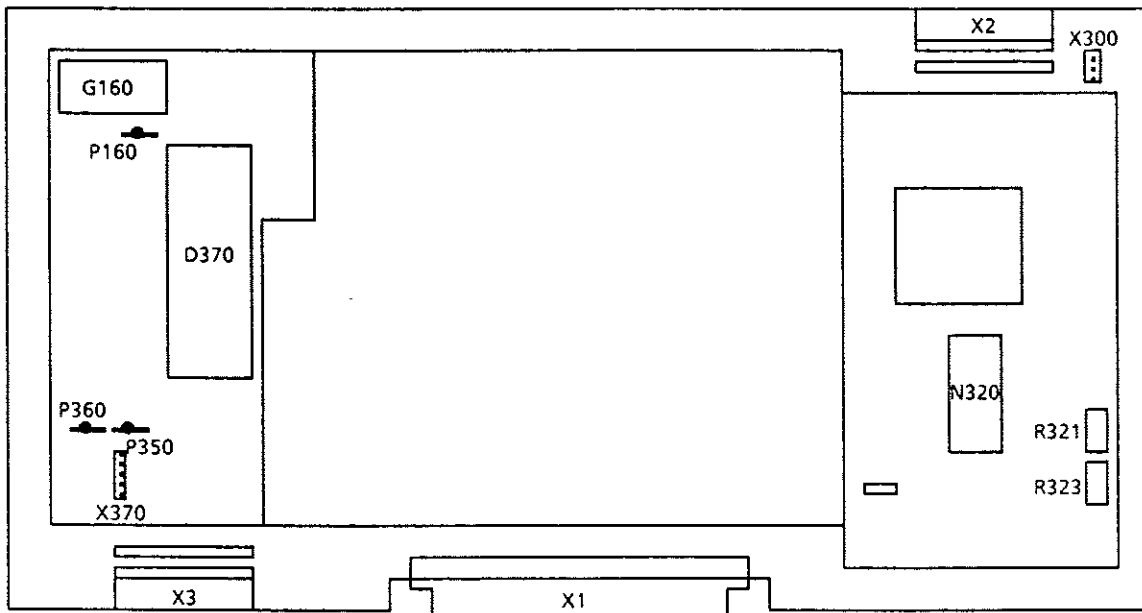


Fig. 5-2 Layout of test points and adjustment points



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Schaltteillisten

Stromläufe

Bestückungspläne

Part lists

Circuit diagrams

Components plans

Listes des pièces détachées

Schémas de Circuit

Plans des composants

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
B100	EQ 16,00000MHZ CL30HC43U CRYSTAL 16MHZ	EQ 091.0321	KRISTALLVE	N. R&S SACHNUMMER	
C43	CC 2,2NF+-10%5X6R2000 CAPACITOR	CC 087.7060	VALVO	2222 63051 222	
C100	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C101	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C102	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C103	CE 4,7UF+-20%10V 5X 4X 7 ELECTROLYTIC CAPACITOR	CE 022.8056	ROEDERSTEI	ETR 1 4,7/10 20%	
C110	CC 22PF+-2%4X5NPD CAPACITOR	CC 087.6464	VALVO	2222 678 10229	
C111	CC 22PF+-2%4X5NPD CAPACITOR	CC 087.6464	VALVO	2222 678 10229	
C117	CC 47PF+-2%5X6NPD CAPACITOR	CC 087.6506	VALVO	2222 678 10479	
C120	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C125	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C130	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C135	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C140	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C145	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C150	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C160	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C170	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C175	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C180	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C181	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C190	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C191	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C200	CC 100PF+-2%6X9NPD CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
..207	..207				
C210	CK 10NF+-5%63V5RM MKT CAPACITOR	CK 099.2869	WIMA	FKS 2/100/0,01UF/5%	
..217	..217				
C220	CC 2,2NF+-10%5X6R2000 CAPACITOR	CC 087.7060	VALVO	2222 63051 222	
C221	CC 2,2NF+-10%5X6R2000 CAPACITOR	CC 087.7060	VALVO	2222 63051 222	
C222	CC 100PF+-2%6X9NPD CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C225	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C235	CC 100PF+-2%6X9NPD CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C240	CC 100PF+-2%6X9NPD CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C245	CC 100PF+-2%6X9NPD CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C250	CC 100PF+-2%6X9NPD CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C255	CK 68NF+-5%63V5RM MKT CAPACITOR	CK 099.2923	WIMA	MKS2/63/0,068UF/5%	
C260	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C261	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 007.3940	VALVO.	2222 122 34229	
C262	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C265	CK 1,0NF +-1% 100V RM5 KP POLYPROPYLENE CAPACITOR	CK 007.7598	ROE	KP1830-210/011-R	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C270 ..275	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C280 ..287	CC 100PF+-2%63V6,5X9 NPO CAPACITOR	CC 092.7442	STETTNER	EGPZ2,5 100PFNPO	
C290	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C291	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C292	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C293	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C294	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C295	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C296	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C297	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C298	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C300	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C301	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C302	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C303	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C304	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C305	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C306 ..309	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C320	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C321	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C322	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C323	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C324	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C325	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C330	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C335	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C350	CE 100UF+-20%25V RDBX9,5 ELECTROLYTIC CAPACITOR	803.0580	MATSUSHITA	ECE-A1ESS-101	
C351	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C352	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C353	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C355	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C356	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C357	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C360	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C365	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C370	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C371	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C372	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C375	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	

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C380	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C390	CC 68PF+-2%6X7NPO CAPACITOR	CC 087.6529	VALVO	2222 678 10689	
D100	BC N80C186-10 16B.CPU CPU	BC 007.7930	INTEL	N80C186-10	
D107	BL PC74HCT00P 4X2I.NAND QUAD 2-INPUT NAND GATE	BL 571.3394	VALVO	PC74HCT00P	
D108	BL PC74HCT32P 4X2IN.ORG QUUAD 2-INPUT OR GATE	BL 571.3420	VALVO	PC74HCT32P	
D120	BL PC74HCT573P 8XD-LATCH OCTAL D-TYPE LATCH	BL 620.3146	VALVO	PC74HCT573P	
D125	BL MM74HC75N 4B.BIST.LA 4BIT BISTABLE LATCH	BL 099.9511	MOTOROLA	MC74HC75N	
D130	BL PC74HCT573P 8XD-LATCH OCTAL D-TYPE LATCH	BL 620.3146	VALVO	PC74HCT573P	
D135	BC SOFTW.N.BESTUECKUNGSPL SOFTW. SEE COMPONENTSPLAN 819.0049 BP	669.2808.90			
D140	BC SOFTW.N.BESTUECKUNGSPL SOFTW. SEE COMPONENTSPLAN 819.0049 BP	669.2808.90			
D142	BL PC74HCT32P 4X2IN.ORG QUUAD 2-INPUT OR GATE	BL 571.3420	VALVO	PC74HCT32P	
D145	BC D2817A-3 2KX8 EEPROM EEPROM	394.0248	SEEQ	DQ2817A-30	
D150	BC D2817A-3 2KX8 EEPROM EEPROM	394.0248	SEEQ	DQ2817A-30	
D170	BC HM6264LP15 8KX8 SRAM SRAM	BC 344.7410	HITACHI	HM6264LP15	
D175	BC HM6264LP15 8KX8 SRAM SRAM	BC 344.7410	HITACHI	HM6264LP15	
D225	BG CLA3726 GATEARRAY GATE-ARRAY	801.8348	PLESSEY	CLA3726	
D235	BL PC74HCT86P 4X2IN EXOR QUAD 2-INPUT EXOR GATE	BL 266.7228	VALVO	PC74HCT86P	
D240	BL PC74HCT32P 4X2IN.ORG QUUAD 2-INPUT OR GATE	BL 571.3420	VALVO	PC74HCT32P	
D245	BL PC74HCT74P 2XD-FF DUAL D-FLIP-FLOP	BL 571.3436	VALVO	PC74HCT74P	
D250	BL PC74HCT08P 4X2IN AND QUAD 2-INPUT AND GATE	BL 571.3413	VALVO	PC74HCT08P	
D255	BL PC74HCT123P 2MULTIVIB DUAL MONOST.MULTIVIBRATOR	BL 352.7367	VALVO	PC74HCT123P	
D260	BL PC74HCT138P LINE DEC 1-OF-8 DECODER/DEMUX	BL 571.3459	VALVO	PC74HCT138P	
D265	BL PC74HCT244P 8XBUFF.3S OCTAL BUFFER	BL 352.7473	VALVO	PC74HCT244P	
D270	BL PC74HCT273P 8XD-FF CL OCTAL D-FLIPFLOP	BL 815.8080	VALVO	PC74HCT273P	
D275	BL MM74HC259N 8B.A.LATCH 8 BIT ADDRESSABLE LATCH	BL 394.9097	NSC	MM74HC259N	
D280	BL PC74HCT08P 4X2IN AND QUAD 2-INPUT AND GATE	BL 571.3413	VALVO	PC74HCT08P	
D285	BL PC74HCT04P 6XINVERT. HEX-INVERTER	BL 379.6726	VALVO	PC74HCT04P	
D300	BL MM74HC4051N 8CH.AN.MUX 8CH.ANALOG MUX/DEMUX	BL 099.9670	NSC	MM74HC4051N	
D310	BL MM74HC259N 8B.A.LATCH 8 BIT ADDRESSABLE LATCH	BL 394.9097	NSC	MM74HC259N	
D325	BL PC74HCT32P 4X2IN.ORG QUUAD 2-INPUT OR GATE	BL 571.3420	VALVO	PC74HCT32P	
D330	BL PC74HCT244P 8XBUFF.3S OCTAL BUFFER	BL 352.7473	VALVO	PC74HCT244P	
D335	BL PC74HCT244P 8XBUFF.3S OCTAL BUFFER	BL 352.7473	VALVO	PC74HCT244P	
D360	BL PC74HCT273P 8XD-FF CL OCTAL D-FLIPFLOP	BL 815.8080	VALVO	PC74HCT273P	
D365	BL PC74HCT273P 8XD-FF CL OCTAL D-FLIPFLOP	BL 815.8080	VALVO	PC74HCT273P	
D370	BC UPD7210C GPIB IF CONTR GPIB INTERFACE CONTROLLER	BC 620.3130	NEC	UPD7210C	
D375	BJ SN75160AN 8XBUS TRANSC BUS TRANSCEIVER	BJ 345.6517	TEXAS INST	SN75160AN	
D380	BJ SN75161AN 8XBUS TRANSC BUS TRANSCEIVER	BJ 345.6523	TEXAS INST	SN75161AN	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
G160	EB 3,4V LITHIUM-BATTERIE LI BATTERY	565.1687	SAFT	LS 3 CNA	
L260	LD 25UH 3A 0,0460HM CHOKE	LD 026.4849	SIEMENS	BB2111-B-C24	
L292	LD 150UH BEI 0,17A 6,20HM CHOKE	LD 026.4055	JAHRE	72.10-1500K	
L295	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L298	LD 150UH BEI 0,17A 6,20HM CHOKE	LD 026.4055	JAHRE	72.10-1500K	
N101	BO TL7705ACP VOLT.DETECT VOLTAGE SUPERVISOR	347.1170	TEXAS	TL7705ACP	
N304	BO LF156J BIFET OPAMP OPERATIONAL AMPLIFIER	BO 645.7251	MOTOROLA	LF156J	
N308	BJ TL601CP 1X ANALOGSCH ANALOG SWITCH	BJ 213.4530	TEXAS	TL601CP {MJG}	
N320	BJ AD574AKD 12B.AD-CONV A/D-CONVERTER	006.9774	ANALOG DEV	AD574AKD	
N350	BO LF412CN 2XFET OPAMP OPERATIONAL AMPLIFIER	356.0521	NSC	LF412CN	
N355	BJ AM6012F 12B.DA-CONV D/A-CONVERTER	805.1425	VALVO	AM6012F	
N370	EO 4,000000MHZ-QU.OSZ. 5V CLOCK OSZILLATOR	377.4232	SEIKO	SG-31 T	
R100	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/475OHM-F-D	
R101	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMAO207/22,10HM-F-D	
R102	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMAO207/22,10HM-F-D	
R103	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R104	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R105	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R106	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R107	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R108	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R110	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R111	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R112	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R113	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMAO207/4,75K-F-D	
R114	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R115	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R116	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R117	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMAO207/100/HM-F-D	
R118	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R125	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R129	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R130	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R145	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMAO207/3,32K-F-D	
R160	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R161	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	
R162	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMAO207/150OHM-F-D	
R180	RN 9X 10KOHM+-SIL10 H5 RESISTOR NETWORK	RN 343.4523	BOURNS	4310R-101-103	

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	11	1089	EE RECHNER OHNE SOFTWARE PROC.WITHOUT SOFTWARE	819.2164.01 SA	4+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R181	RN 9X 10KOHM+-SIL10 H5 RESISTOR NETWORK	RN 343.4523	BOURNS	4310R-101-103	
R190	RN 9X 10KOHM+-SIL10 H5 RESISTOR NETWORK	RN 343.4523	BOURNS	4310R-101-103	
R191	RN 9X 10KOHM+-SIL10 H5 RESISTOR NETWORK	RN 343.4523	BOURNS	4310R-101-103	
R195	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R196	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R200	RN 9X3,3KOHM+-2% RESISTOR NETWORK	RN 340.2765	BOURNS	4310R-101-332	
R210 . . 217	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R220	RN 9X47 KOHM+-2% RESISTOR NETWORK	RN 341.9286	BOURNS	4310R-101-473	
R232	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R233	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R235	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R236	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R237	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R240	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R241	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R245	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R246	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R247	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R248	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R250	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R251	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R252	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R255	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R256	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R257	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R260	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R265	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R270 . . 275	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R276	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R279	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R280 . . 290	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R295	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R299	RL 0,35W42,7KOHM+-0,1%T25 RESISTOR	RL 084.4277	DRALORIC	SMA0207	
R300	RL 0,35W 866 KOHM+-1%TK50	RL 083.2835	DRALORIC	SMA/207/866K-F-C	
R301	RL 0,35W100KOHM+-0,1%TK25 RESISTOR	RL 084.4983	DRALORIC	SMA0207/100K-B-E	
R302	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R303	RL 0,35W 2,05KOHM+-1%TK50 RESISTOR	RL 083.0832	DRALORIC	SMA0207/2,05K-F-D	
R304	RL 0,35W 1MOHM+-1%TK50 RESISTOR	RL 082.7862	DRALORIC	SMA0207/1M-F-D	
R305	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R306	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R308	RL 0,35W13,5KOHM+-0,1%T25 RESISTOR	RL 084.3312			
R309	RL 0,35W1,50KOHM+-0,1%T25 RESISTOR	RL 083.9481	DRALORIC	SMA0207/1,5K-B-E	
R310	RL 0,35W 68,1KOHM+-1%TK50 RESISTOR	RL 082.2602	DRALORIC	SMA 0207/68,1K-F-C	
R311	RL 0,35W 27,4KOHM+-1%TK50 RESISTOR	RL 082.2583	DRALORIC	SMA 0207/27,4K-F-C	
R320	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R321	RS 0,5W100 OHM+-10%10X10X CERMET POTENTIOMETER	RS 247.7932	BOURNS	3386X-1-101	
R322	RL 0,35W 49,9 OHM+-1%TK50 RESISTOR	RL 082.9520	RESISTA	MK2	
R323	RS 0,5W200 OHM+-10%10X10X CERMET POTENTIOMETER	RS 247.7949	BOURNS	3386X-1-201	
R335	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R336	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R337	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R339	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R350	RL 0,35W 5,62KOHM+-1%TK50 RESISTOR	RL 082.2190	DRALORIC	SMA0207/5,62K-F-C	
R351	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R355	RL 0,35W10,0KOHM+-0,1%T25 RESISTOR	RL 084.3064	DRALORIC	SMA0207/10K-B-E	
R356	RL 0,35W10,0KOHM+-0,1%T25 RESISTOR	RL 084.3064	DRALORIC	SMA0207/10K-B-E	
R357	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R358	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R359	RL 0,35W2,49KOHM+-0,1%T25 RESISTOR	RL 083.9900	DRALORIC	SMA0207	
R360	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R363	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R365	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R371	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R372	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R379	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R390	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
V103	AK BCY79IX P 45V 200MA TRANSISTOR	AK 010.3777	VALVO	BCY79IX	
V105	AE BZX79/C3V3 0,5W ZDI ZENER DIODE	AE 012.2390	ITT	ZPD3,3	
V160	AK BCY79IX P 45V 200MA TRANSISTOR	AK 010.3777	VALVO	BCY79IX	
V161	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	VALVO	BCY59IX	
V162	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V163	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V260	AE ICT5 5V SUPPR SUPPRESSOR DIODE	AE 012.5502	SEMICON	1N5907	
V300	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V301	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V302	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V303	AE BZX79/C4V7 0,5W ZDI ZENER DIODE	AE 012.2432	AEG	BZX55/C4V7 GEG.	

ROHDE & SCHWARZ

Äl Datum
Date

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Schalttailliste für
Parts list for

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Sachnummer
Stock Nr.

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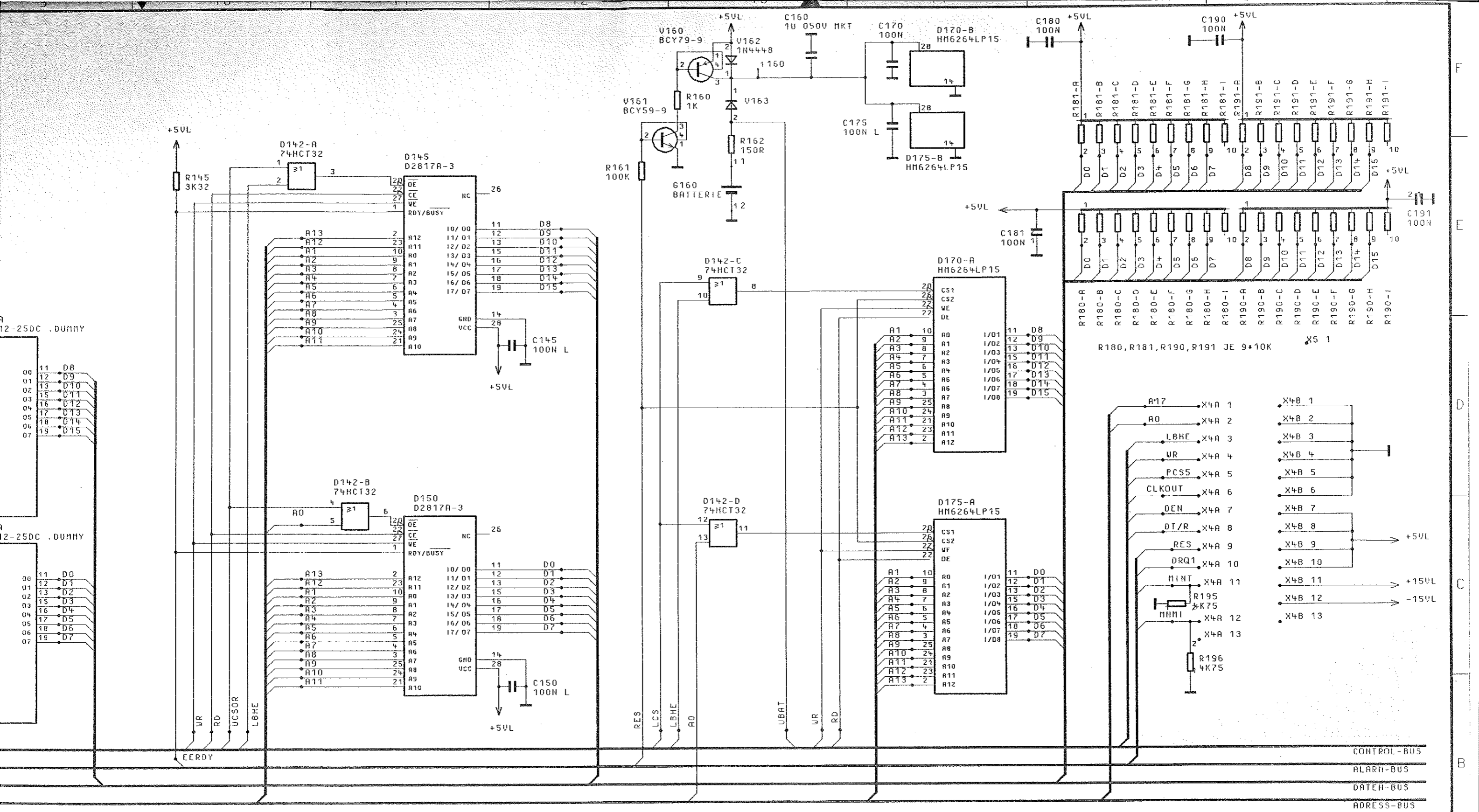
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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthaltene in contained in
V305	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V310	AK BCY591X N 45V 200MA TRANSISTOR	AK 010.5163	VALVO	BCY591X	
V390	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
X5	FP STECKERLEISTE 32POL. MULTIPOINT CONNECTOR	FP 514.4550	PANDUIT	100-232-033/999	
X6	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X235	10-POLIG/PINS FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X300	2-POLIG/PINS FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR	FP 243.3578	BINDER	742-5-11-0187-00-36	
X335	2-POLIG/PINS FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X370	3-POLIG/PINS FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X31A	5-POLIG/PINS FP STECKERL.ABGEW.36-POL. ANGLE PIN CONNECTOR	FP 087.9105	BINDER	742-5-11-0191-00-36	
X31B	20-POLIG/PINS FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR	FP 243.3578	BINDER	742-5-11-0187-00-36	
X4A	20-POLIG/PINS FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X4B	12-POLIG/PINS FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X43A	12-POLIG/PINS FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR	FP 243.3578	BINDER	742-5-11-0187-00-36	
X43B	17-POLIG/PINS FP STECKERL.ABGEW.36-POL. ANGLE PIN CONNECTOR	FP 087.9105	BINDER	742-5-11-0191-00-36	

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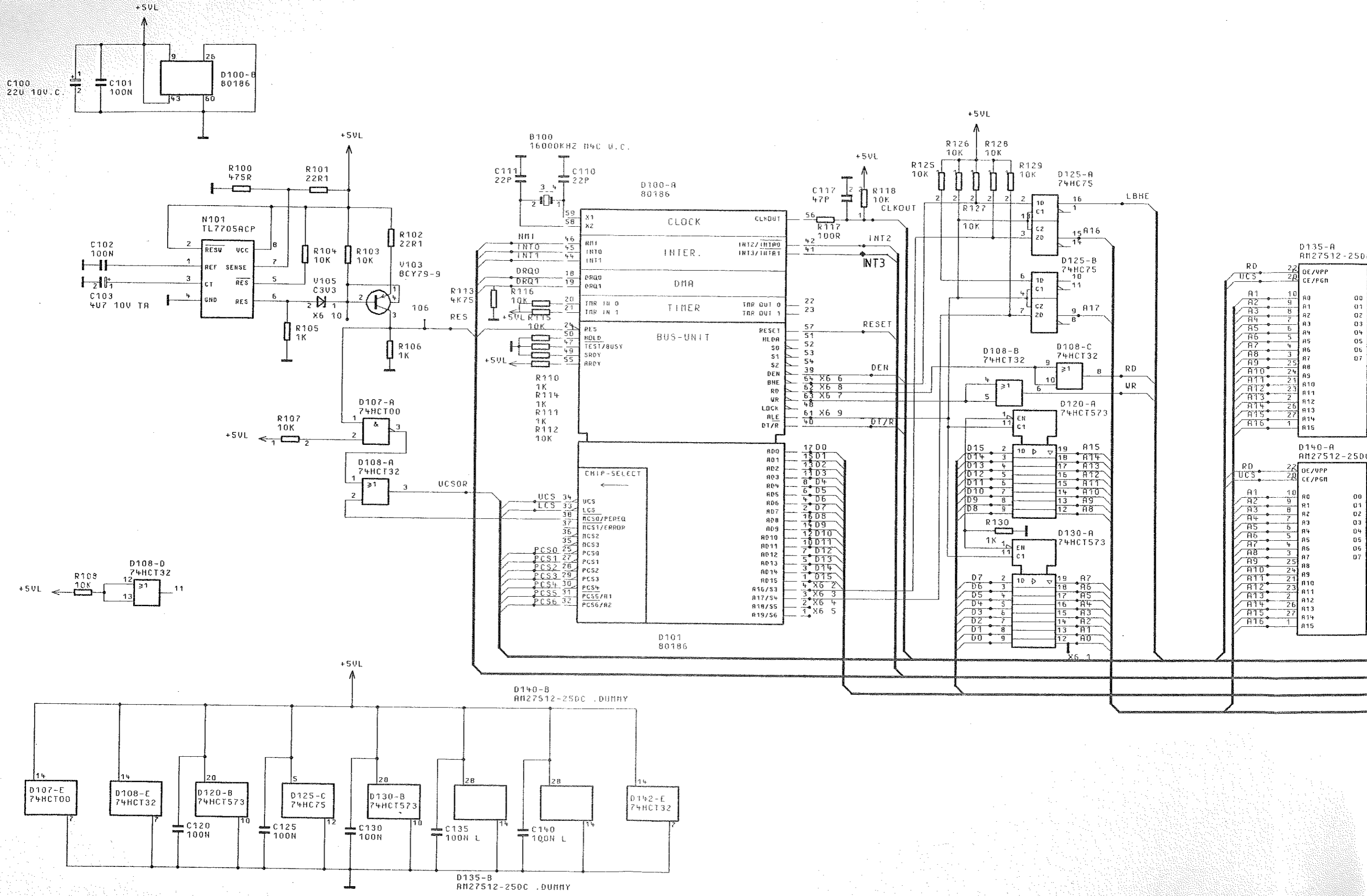


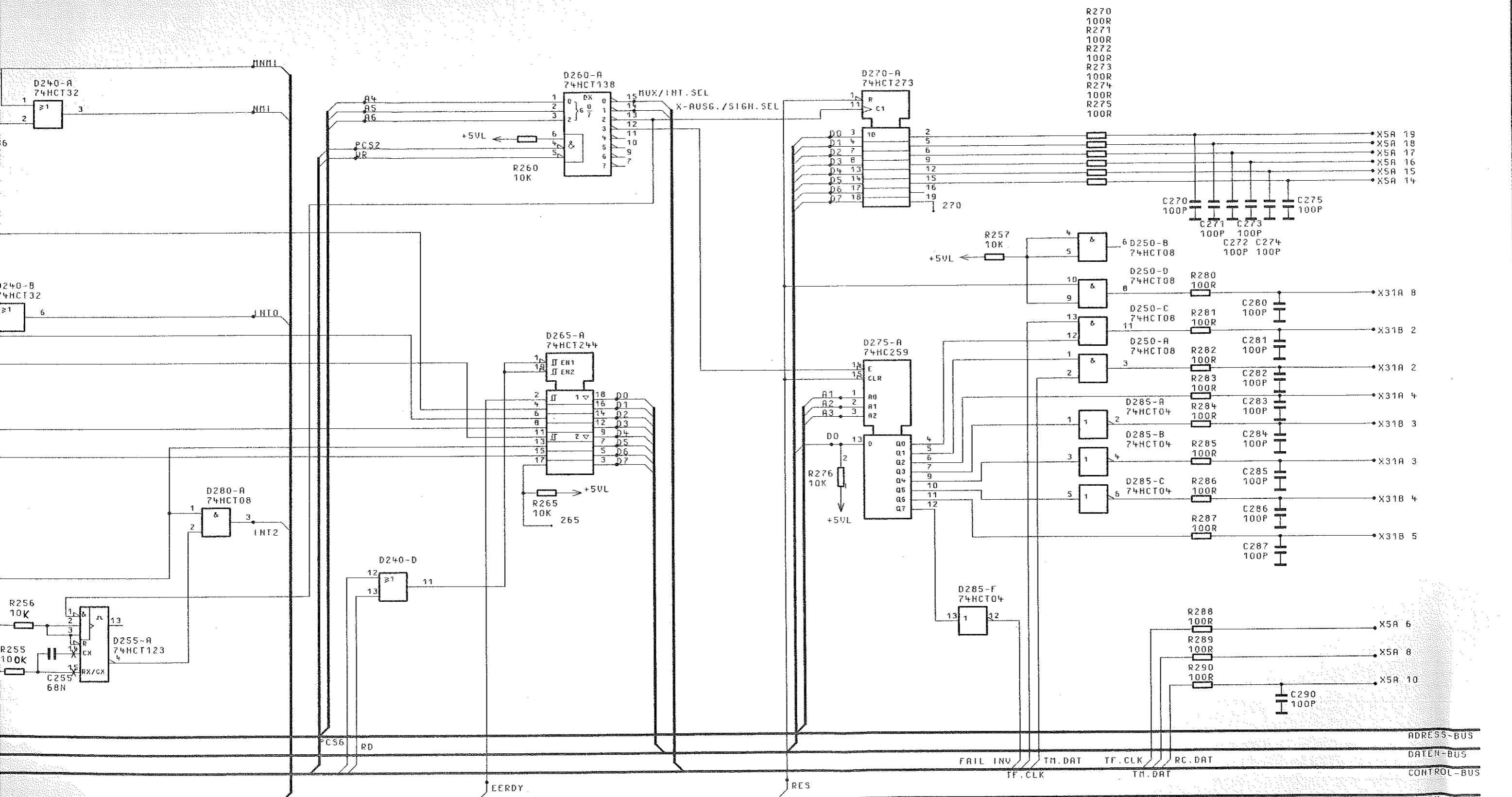
STROMLAUF GILT FUER VAR.02
 CIRCUIT DIAGRAM IS VALID FOR MOD.02

ACHTUNG: EGB!
 ELEKTROSTATISCH GEFÄHRDETE
 BAUELEMENTE ERFORDERN EINE
 BESONDERE HANDHABUNG.

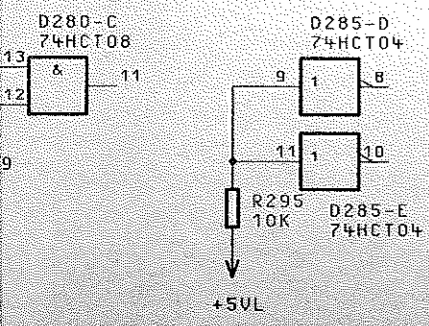
ATTENTION: ESD!
 ELECTROSTATIC SENSITIVE
 DEVICES REQUIRE A SPECIAL
 HANDLING.

A	39845	11,88	JN	1KGA	TAG	NAME	BENENNUNG
				BEARB.		BT	RECHNER MICROPROCESSOR
				GEPR.		JN	
				NORM			
				PLOTT	7. 9.88	*	
RECHN. IND.	RENDERUNGS-MITTEILUNG	DATUM	NAMEN				ZEICHN.-NR.
				ZU GERÄT	SMGU		819.2164.015
				REG. I. V.	819.0010	ERSTE Z.	





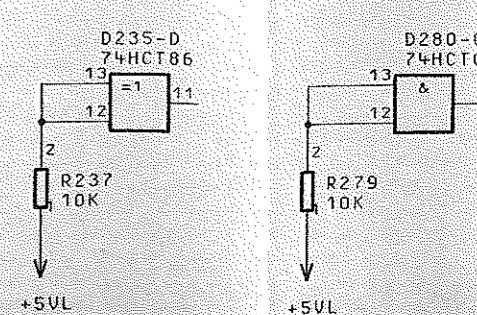
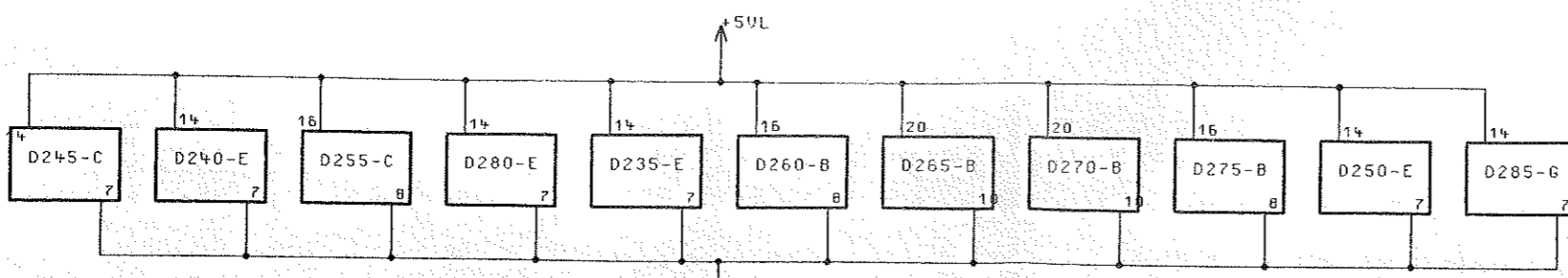
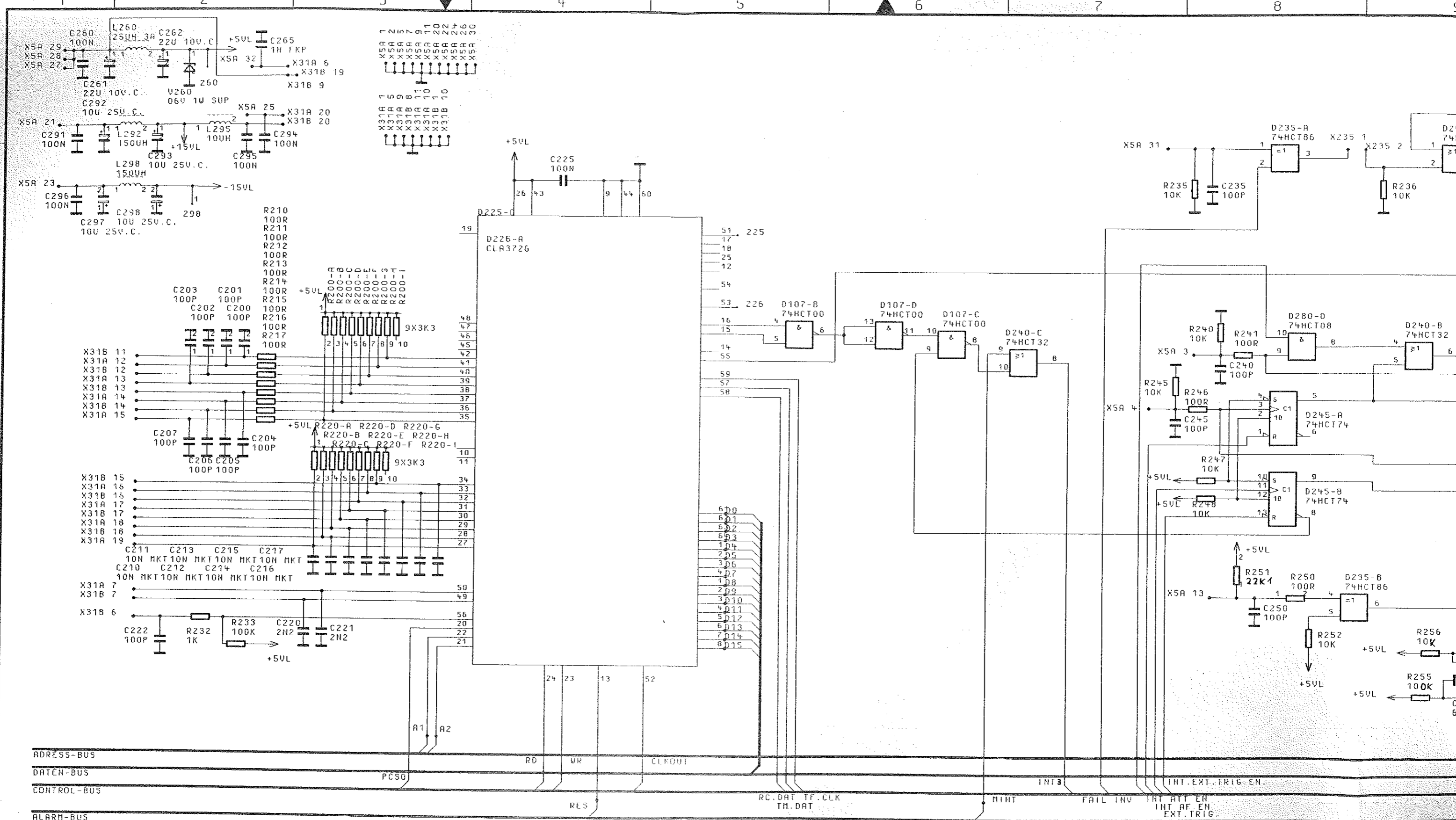
STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

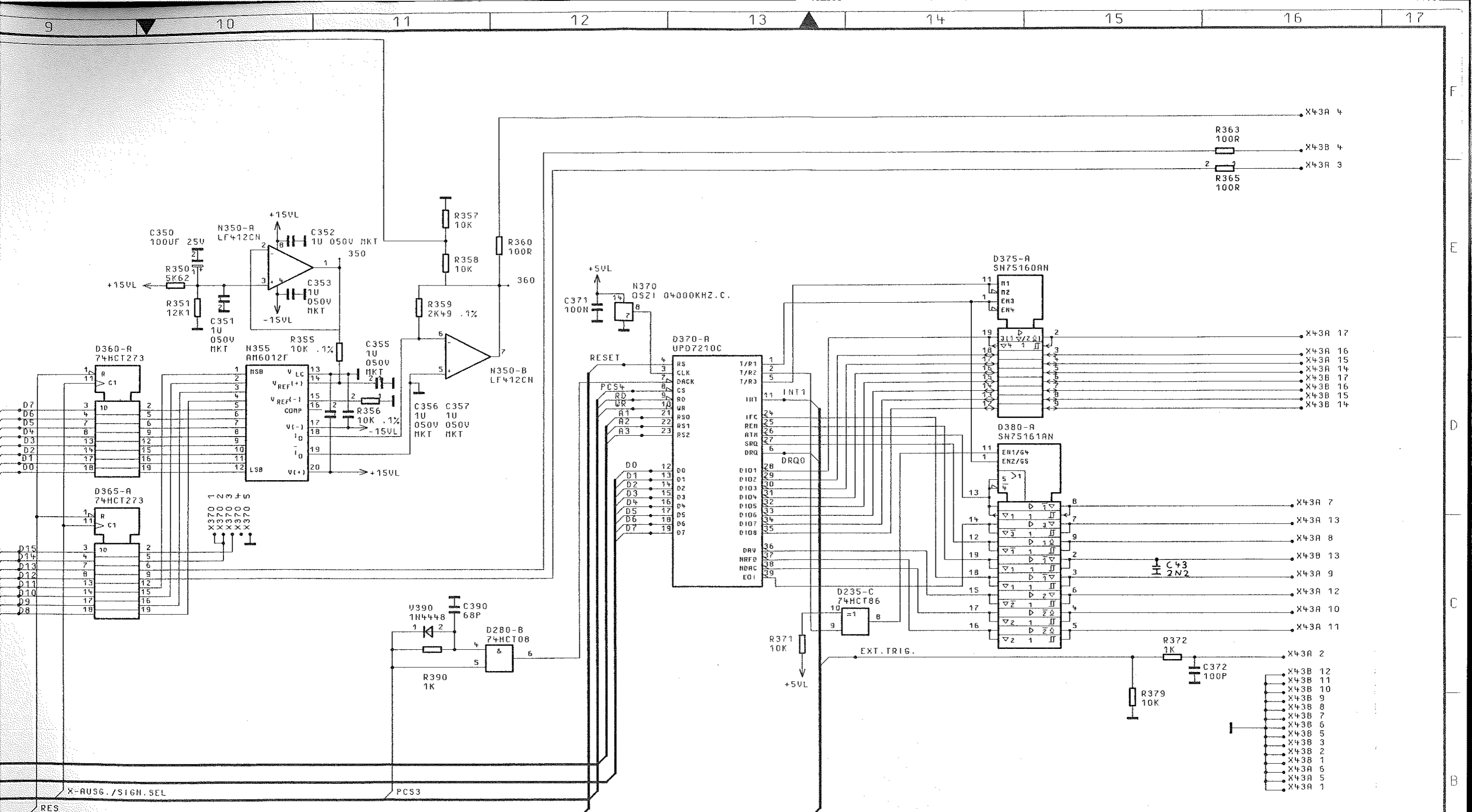


ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

A	39845	11.88	JN	1KGA	TRG	NAME	BENENNUNG	
B	39845	2.89	JN	BEARB.		BT	RECHNER MICROPROCESSOR	
				GEPR.		JN		
				NORM				
				PLOTT	6. 9.88	*		
ROHDE & SCHWARZ							ZEICHN.-NR.	BLATT-NR.
ZU GERÄT SMGU							819.2164.015	2
REND. IND.	ÄNDERUNGS-NITTEILUNG	DATUM	NAME	REG. I.V.	819.0010	ERSTE Z.	V. 3 BL.	




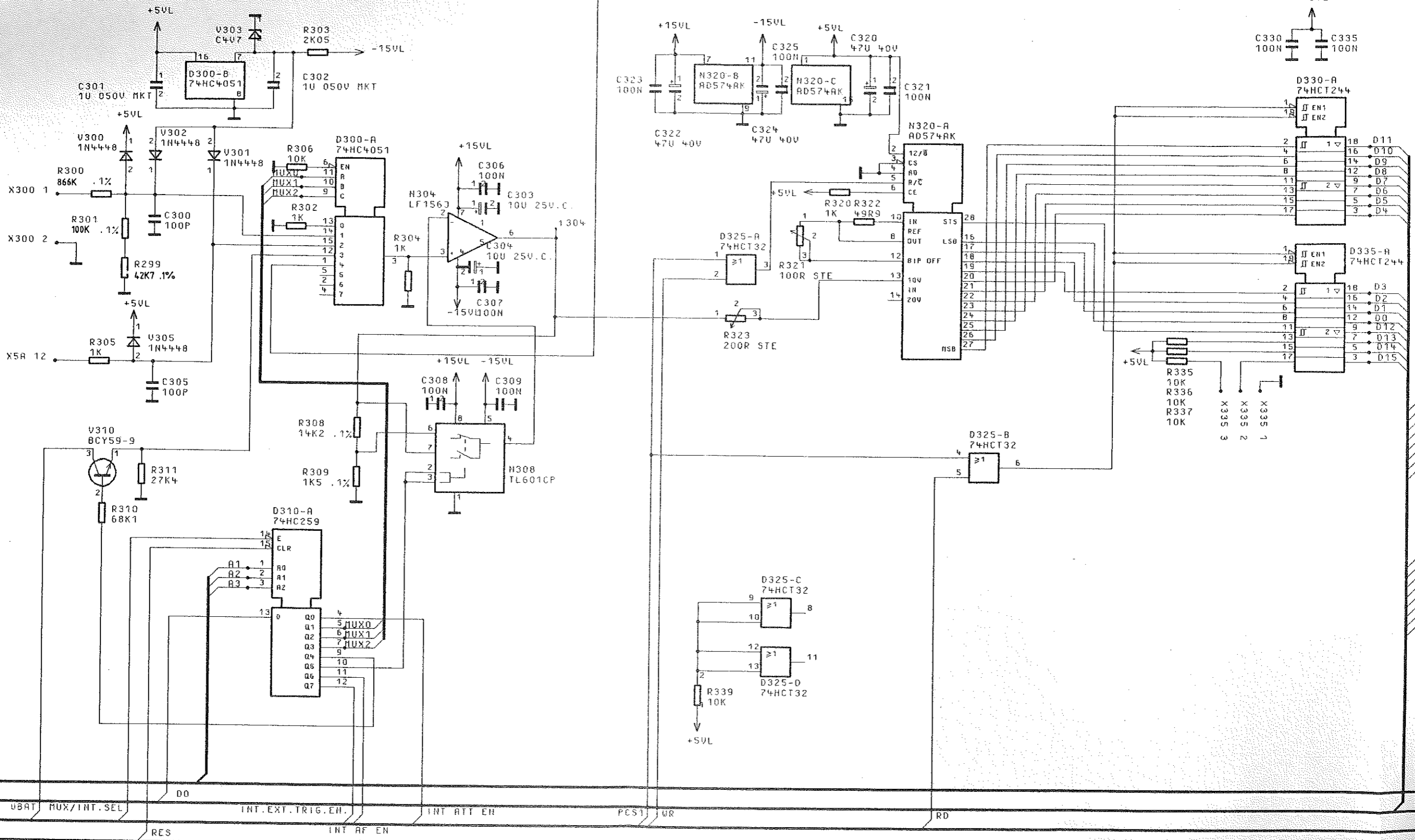


STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

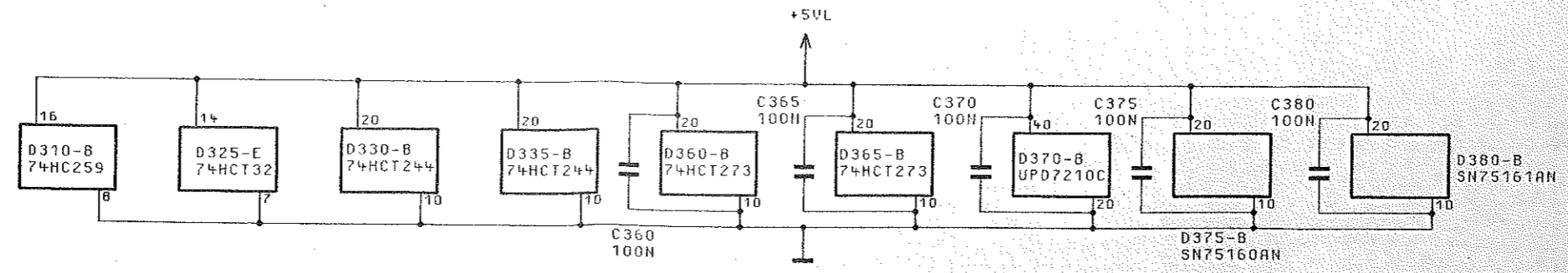
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

C	39845	2.89	JN	1KGA	TAG	NAME	BENENNUNG	
D	41825	07.89	JN	BEARB.		BT	RECHNER MICROPROCESSOR	
				GEPR.		JN		
				NORN				
				PLOTT	6. 9.88	*		
 ROHDE & SCHWARZ							ZEICHN.-NR.	819.2164.015
REND. IND.	RENDERUNGS-NITTEILUNG	ORTUN	NAME	ZU GERÄT	SMGU	REG.-I.V.	819.0010	ERSTE Z.
							BLATT-NR.	3
							v. 3 BL.	

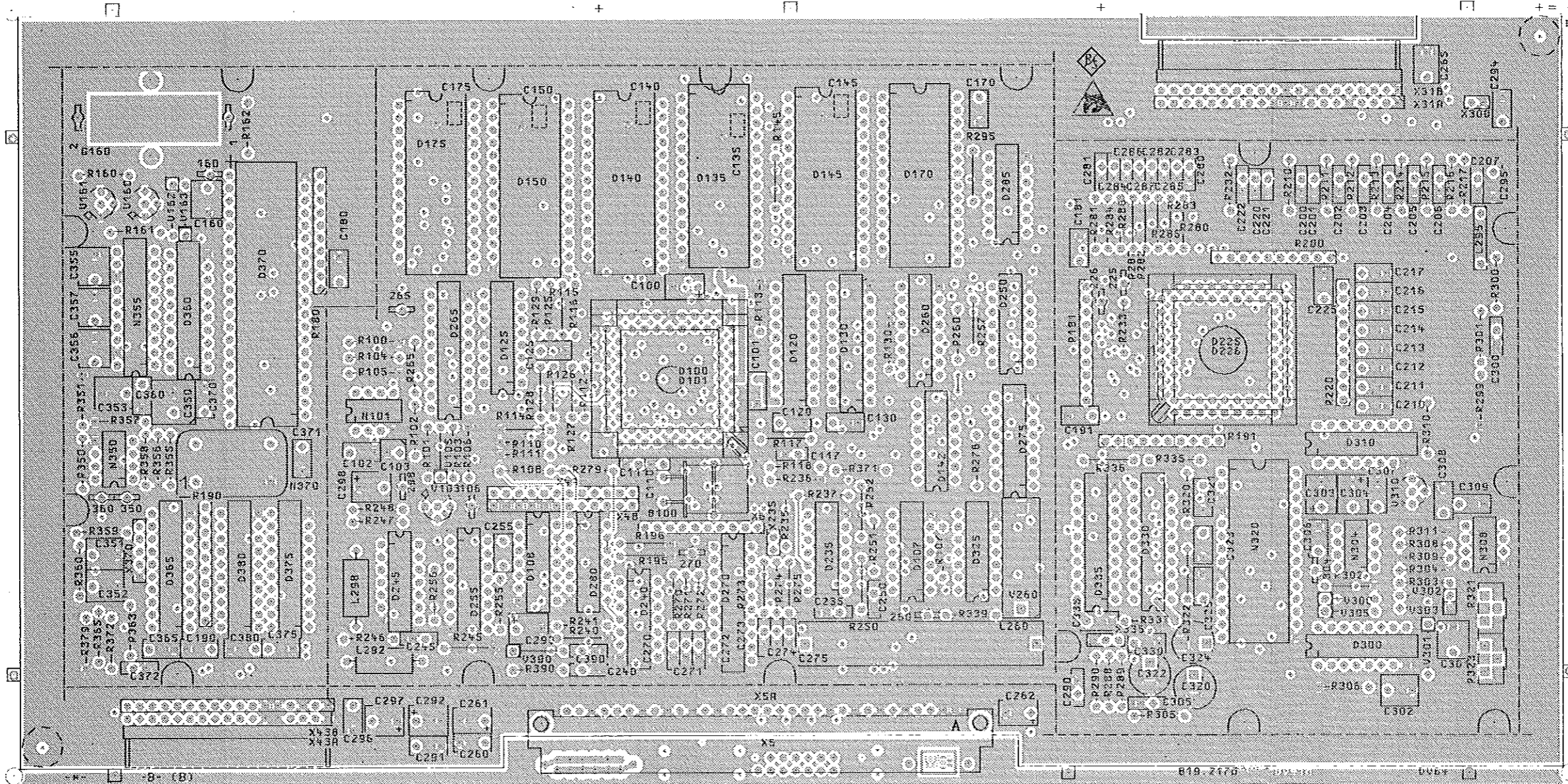


ADDRESS-BUS DATA-BUS CONTROL-BUS ALARM-BUS

UBAT MUX/INT. SEL INT. EXT. TRIG. EH. INT ATT EN PCS1 UR RD RES X-A



Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



DV 41

VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

Maße ohne Toleranzangabe		Maßstab 1 : 1			
		Halbzeug, Werkstoff			
1 KGA	Tag	Name	Benennung RECHNER COMPUTER		
Bearb.	06.88	BT			
Gepr.					
Norm			Zeichn.-Nr. 819.2164.01 EE		
				Blatt-Nr. 3	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	reg. i. V. 819.0010 V	erste Z.
			zu Gerät SMGU		

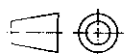
(hierzu HVC 250)



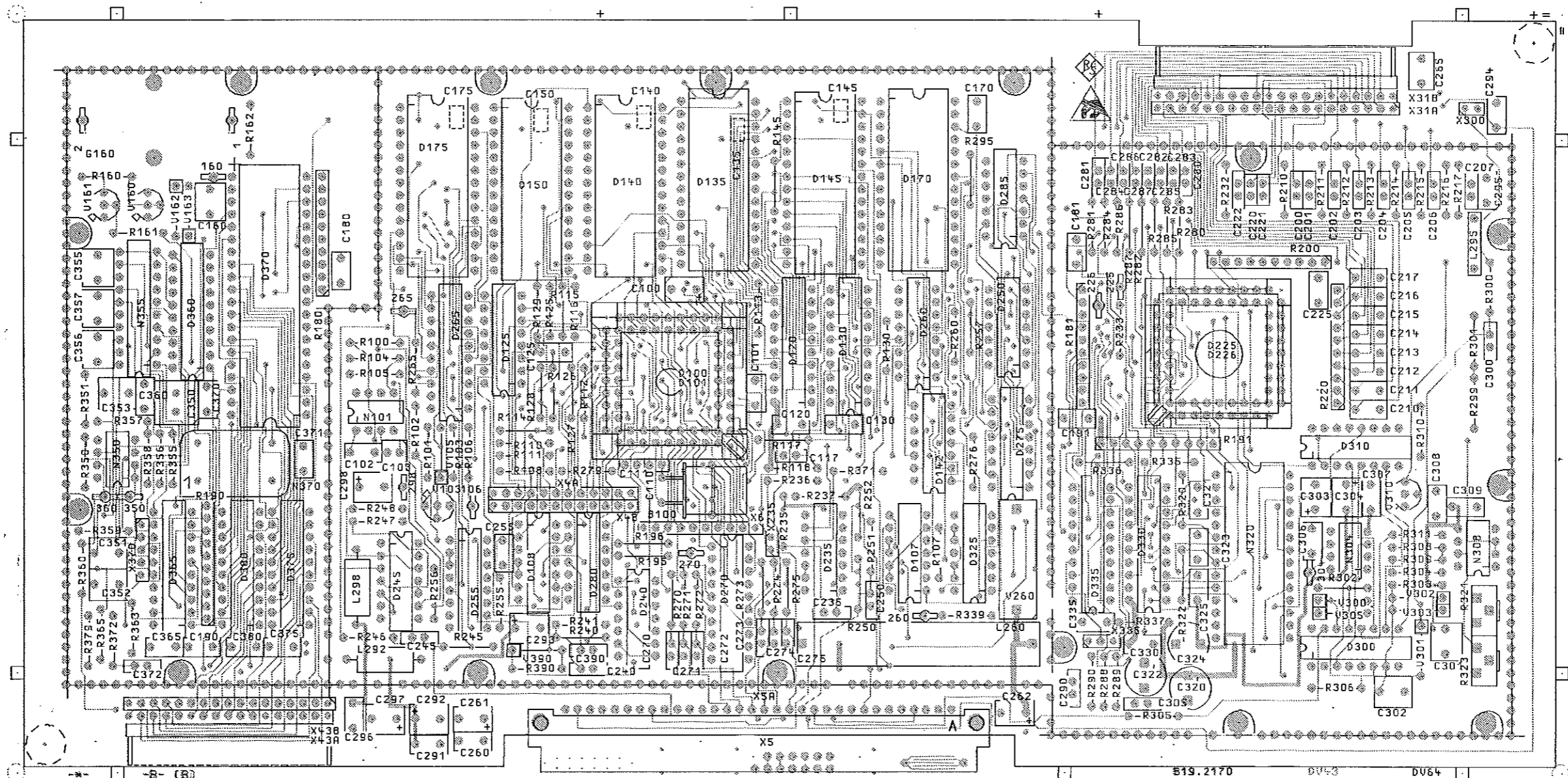
ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
Electrostatic sensitive devices require a special handling

Für diese Unterlage behalten wir uns alle Rechte vor.

ISO-Projektion Methode E



Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



DV 43

VARIANTENERKLÄRUNG / VERSION
VAR 02 - GRUNDAUSFÜHRUNG / BASIC MODEL

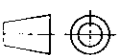
Maße ohne Toleranzangabe		Maßstab 1 : 1	
		Halbzeug, Werkstoff	
1KG A	Tag	Name	Benennung
Bearb.	06.88	BT	RECHNER COMPUTER
Gepr.			
Norm			
Z		Blatt-Nr. 4	
v. Bl.		Blatt-Nr. 4	
Zeichn.-Nr. 819.2164.01 EE		reg. i. V. 819.0010 V erste Z.	
zu Gerät SMGU			

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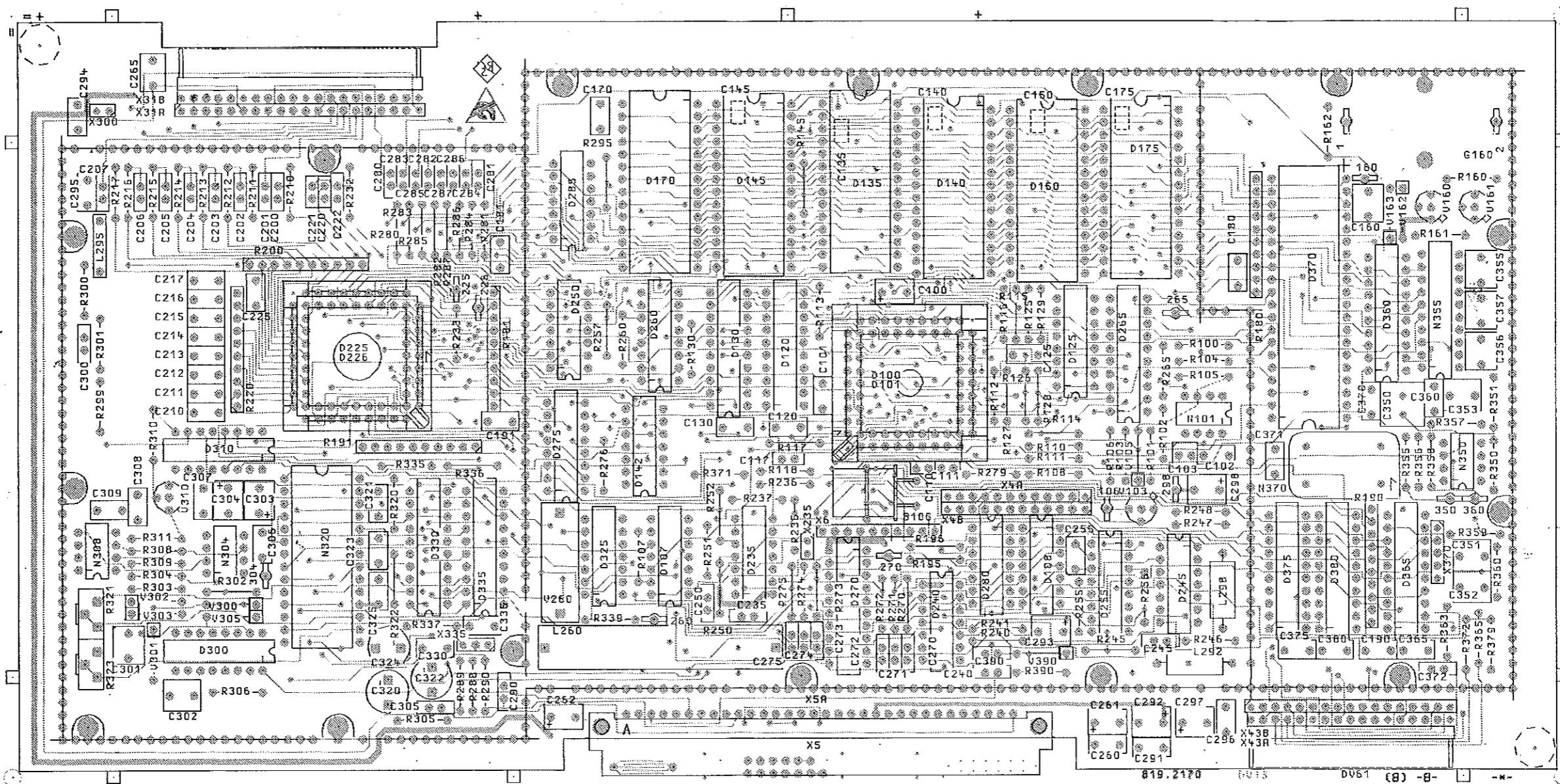


ACHTUNG: EGB!
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SC-Projektion Methode E



Ansicht und Leitungsführung Lötseite
View of tracks on solder side



DV13

VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

Maße ohne Toleranzangabe				Maßstab 1 : 1	
				Halbzeug, Werkstoff	
1KGA Tag Name		Benennung		Z	
Bearb. 06.88 BT		RECHNER			
Gepr.		COMPUTER			
Norm		Zeichn.-Nr.		Blatt-Nr.	
		819.2164.01 EE		5	
		zu Gerät SMGU		v. BL.	
Änd. Zust.		reg. i. V. 819.0010 V		erste Z.	
Änderungs-Mitteilung					
Tag					
Name					

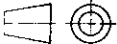
hierzu MVC 2501



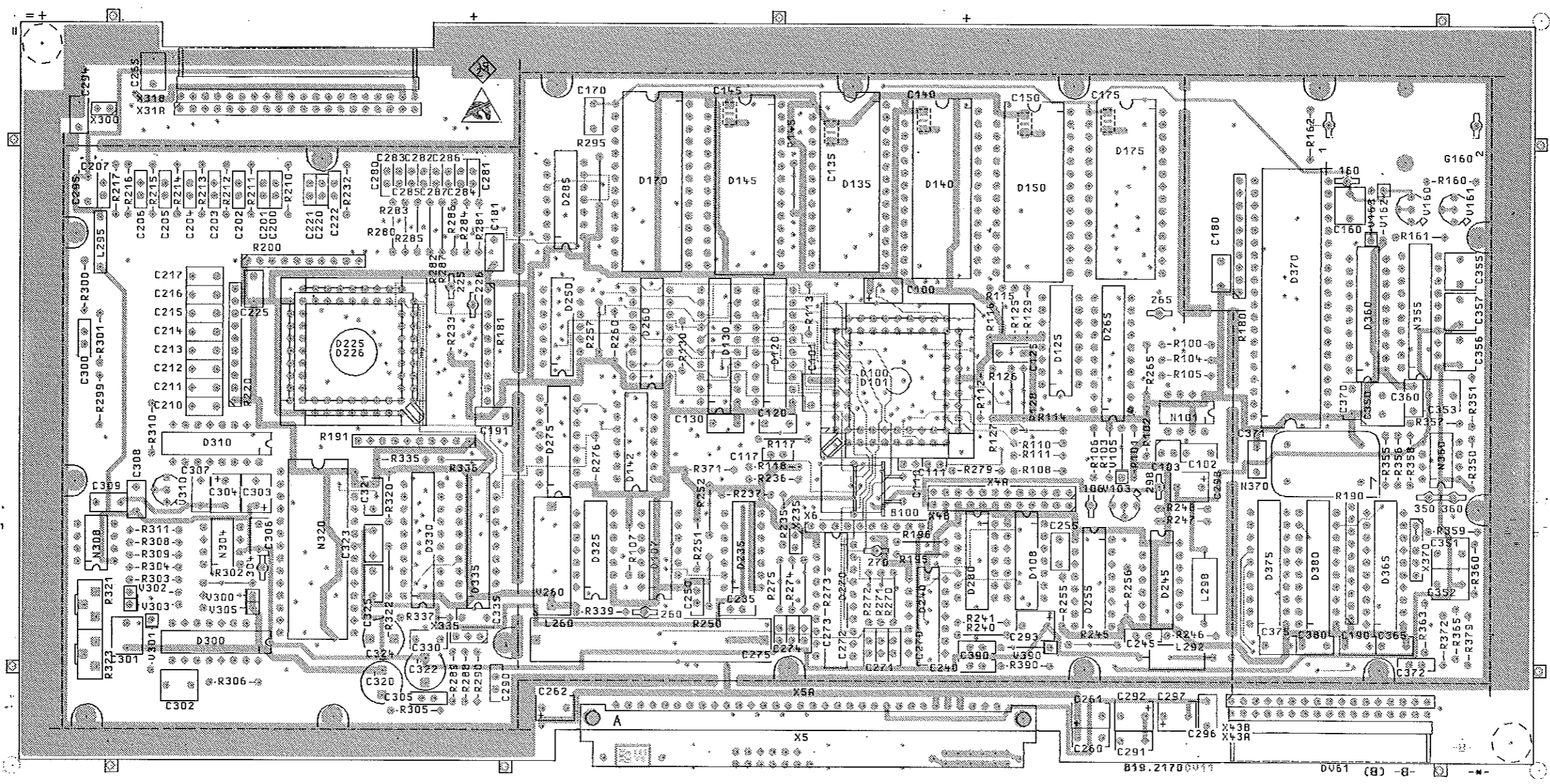
ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
Electrostatic sensitive devices require a special handling

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SC-Projektion Methode E



Ansicht und Leitungsführung Lötseite
View of tracks on solder side



DV11

VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

		Maße ohne Toleranzangabe		Maßstab 1 : 1	
				Halbzeug, Werkstoff	
		1KGA	Tag	Name	Benennung
		Bearb.	06.88	BT	RECHNER
		Gepr.			COMPUTER
		Norm			Z
		ROHDE & SCHWARZ		Zechn.-Nr.	819.2164.01 EE
				Blatt-Nr.	6
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	reg. i. V.	819.0010 V erste Z.
		zu Gerät SMGU			

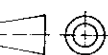
(Intern) HVC 2501



ACHTUNG EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
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ISO-Projektion Methode E



BESTUECKUNGSPLAN / COMPONENTS PLAN

BENENNUNG SOFTWARE SOFTWARE DESIGNATION		BEN. DER ZUEGH. INFORMATIONSTRAEGER NAMES OF APPERTAINING DATA MEDIA	SACHNUMMER STOCK NO
		HS EPROM-KIT RECHNER	819.2764.02
EL. KENNZEICHEN DER BAUGRUPPE EL. DESIGNATION OF SUBASSEMBLY	EL. KENNZ. DES PROG. INFOTRAEGERS EL. DESIGNATION OF DATA MEDIA USED	BENENNUNG DESIGNATION	SACHNUMMER STOCK NO
A5		EE RECHNER OHNE SOFTWARE PROCESSOR WITHOUT SOFTWARE	819.2164.02
	D135	HS 27C512-20 PROG.(D135)	819.2770
	D140	HS 27C512-20 PROG.(D140)	819.2787

PRUEFANWEISUNG / TESTING INSTRUCTIONS : T

ANMERKUNG: BESTEHT EINE SOFTWARE AUS MEHREREN INFORMATIONSTRAEGERN, MUESSEN BEI AUSTAUSCH
IMMER ALLE INFORMATIONSTRAEGER DIESER SOFTWARE GEWECHSELT WERDEN !!
(ADRESSENAENDERUNG MOEGLICH !)

NOTE: IF SOFTWARE IS STORED ON SEVERAL DATA MEDIA, ALL MEDIA MUST BE EXCHANGED IN CASE OF
A REPLACEMENT OF SOFTWARE (ADDRESS-MODIFICATIONS POSSIBLE !)

R O H D E & S C H W A R Z				DRUCK	ABT	NAME	BENENNUNG / DESIGNATION :	
				11.04.89	1KGB	LS	BESTUECKUNGSPLAN	
				TYP	: SMGU		ZEICHN.-NR./DRAWING NO	BLATT
AEI	AEND.M.	DATUM	NAME	REG.I.V	819.0010.00	V	819.0049.00	BP v. 1-



ROHDE & SCHWARZ

SERVICE DOCUMENTS

AF-Generator

819.3260.02

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	Parts lists
	Components plans



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 f_{af} and is given by the following equation: $I = f_{af}(Hz)$.

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 V_p 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 k Ω 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 $1/F_{min}$, where F_{min} 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.

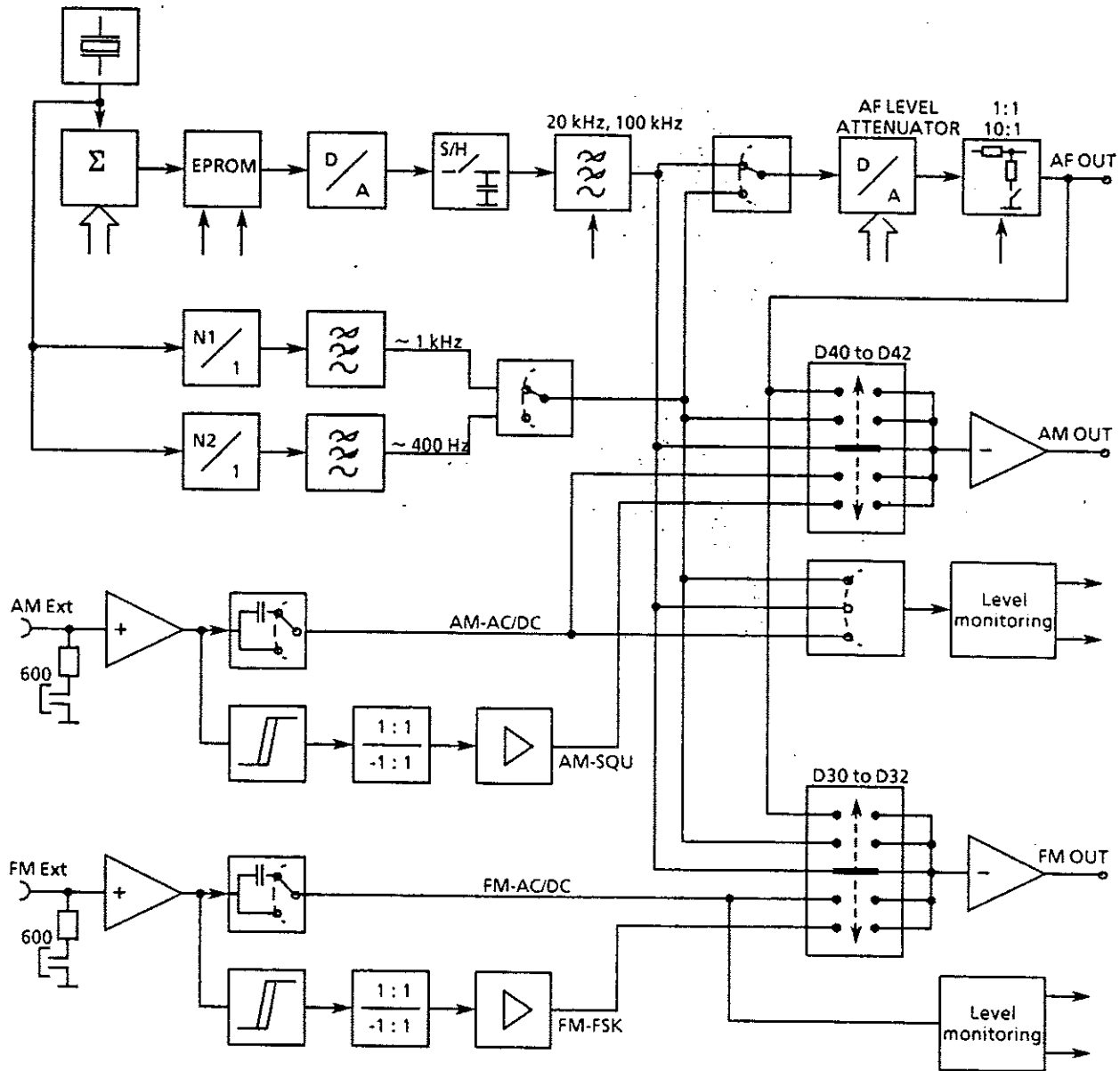


Fig. 5-1 Block diagram "AF generator"

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 \pm 5 mV using R11.
- Adjust DC voltage to 0 V \pm 1 mV using R19.

5.2.3 Level Adjustment of Fixed Frequencies

- Connect AC voltmeter to P113 via 1:1 probe.
- Setting: SHIFT AF 400 Hz.
- Adjust to 1 Vp \pm 2 mV using R59.
- Setting: SHIFT AF 1 kHz.
- Adjust to 1 Vp \pm 2 mV using R71.

5.2.4 Level Adjustment at AF Output

- Setting: SHIFT PRESET.
- Connect AC voltmeter to connector AF OUT.
- Adjust to 1.00 V \pm 1 mV using R99.

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 \pm 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: AF signal "  ", AF 2 kHz
- Connect oscilloscope to P32.
- Measure the overshoots of the output signal. Nominal value: \leq 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 \pm 5 % to AM EXT.

Output level

- Connect AC voltmeter to P32.
- Measure and check the level. Nominal value: 6 Vp \pm 2 %.

Checking the level monitoring

"EXT HIGH" should appear in the modulation display if the level of the external AF generator is increased by 3 %, "EXT LOW" should appear if the level is reduced by 3 % (referred to 1 Vp).

5.2.6 Measurements at FMODE 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} \pm 1 %, and at the following settings as well: SHIFT AF 1 kHz, SHIFT AF 400 Hz

5.2.6.3 Offset Adjustment

- Connect DC voltmeter to P60.
- Input: SHIFT PRESET, FM INT ON, AF 1 kHz
- Adjust the offset to 0 V \pm 1 mV using R260.

5.2.6.4 Testing the "FSK" Mode

- Input: AF signal "  ", AF 2 kHz
- Connect oscilloscope to P60.
- Measure output signal overshoots. Nominal value: $\leq 10\%$.

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

- Input: SHIFT PRESET, FM EXT AC, FM/ Φ M EXT
- Connect AF sinewave generator, $1 V_p \pm 5\%$ to connector FM/ Φ M EXT.

Output level

- Connect AC voltmeter to P60.
- Measure and check the level.
Nominal value: $1 V_{rms} \pm 2\%$

Offset adjustment

- Input: FM EXT DC
- Connect DC voltmeter to P60.
- Adjust the offset to $0 V \pm 1 mV$ at 1 kHz using R125.

Testing the level monitoring

"EXT HIGH" should appear in the modulation display if the level of the external AF generator is increased by 3 %, "EXT LOW" should appear if the level is reduced by 3 % (referred to $1 V_p$).

5.2.7 Testing the Diagnostics Interface

- Connect DC voltmeter to P41.
 - Input: SHIFT PRESET
 - Input: SHIFT SPECIAL 109
- Voltage at P41: 0.8 V to 1.3 V (oscilloscope)

STEP UP	1.65 V to 1.683 V (Ref.)
	2.425 V to 2.6 V (+ 5 V)
	3.6 V to 3.8 V (+ 15 V)
	-3.8 V to -3.6 V (-15 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)
- | | |
|------|-----------|
| P3 1 | 1.048 MHz |
| P10B | 1.024 kHz |
- Input: SHIFT AF 400 Hz
- | | |
|------|----------|
| P10A | 409.6 Hz |
|------|----------|

5.3.2 Testing the Power Supply and the Oscillator using Diagnostics as in 5.2.7

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	+5 V +15 V -15 V		Power supply
X6 A2, 4, 6, 8, 10, 12, 14, 16, 23, 25, 27, 28, 31	GND		
X6 A5	0 to 2 V _p	A	AF.OUT
X6 A1	1 V _p , HC-TTL	E	AM.IN Ext. mod. input
X6 A3	0 to 6 V _p	A	AMOD Mod. output
X6 A9	1 V _p , 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

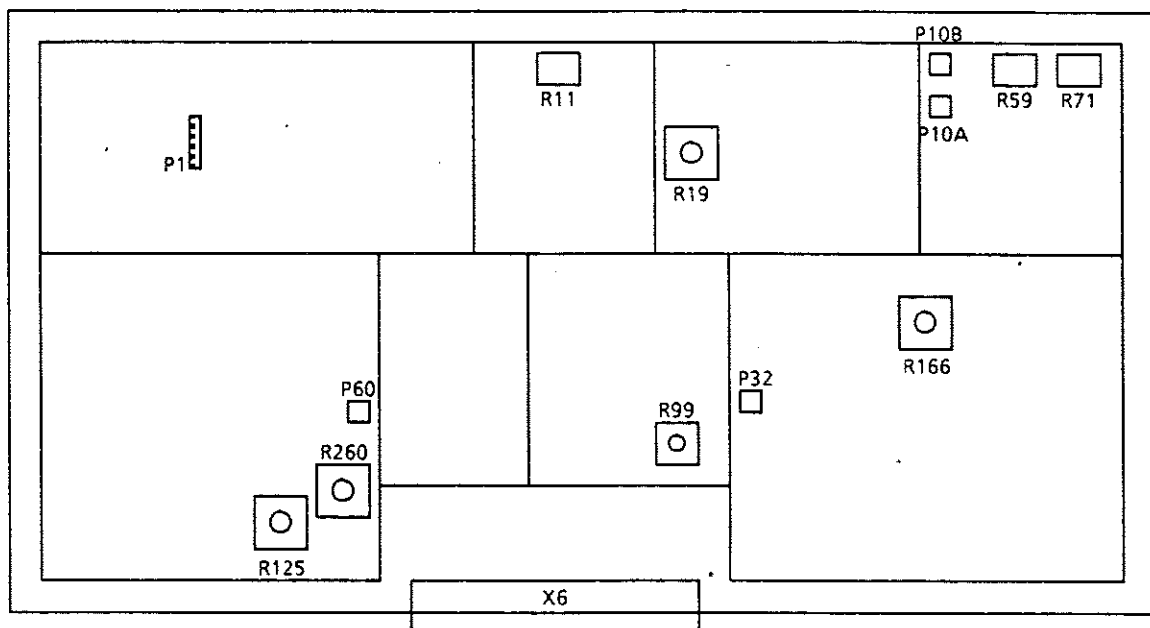


Fig. 5-2 Layout of test points and adjustment points





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Schaltteillisten

Stromläufe

Bestückungspläne

Part lists

Circuit diagrams

Components plans

Listes des pièces détachées

Schémas de Circuit

Plans des composants

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Kennz. Comp.No	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
B1	EQ 10,485800MHZ CL30HC43U QUARTZ CRYSTAL UNIT	091.8345	KRISTALLVE N.	R&S SACHNUMMER	
C1	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C2	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C3	CC 100PF+-2%6X9NPD CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C4	CC 100PF+-2%6X9NPD CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C5	CC 56PF+-2%5X6NPD CAPACITOR	CC 087.6512	VALVO	2222 678 10569	
C6	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C7	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C9	CE 22UF+-20%10V SAL ELECTR. CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C10	CE 100UF-10+50% 16V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7165	ROEDERST	EK 00CB 310 D	
C12	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C13	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C14	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C15	CC 10PF+-0,25PF3X4NPD CAPACITOR	CC 087.6429	VALVO	2222 678 09109	
C16	CC 150PF+-2%5X6N750 CAPACITOR	CC 087.6929	VALVO	2222 678 58151	
C17	CC 8,2PF+-0,25PF3X4NPD CAPACITOR	CC 087.6412	VALVO	2222 678 09828	
C20	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C21	CC 6,8PF+-0,25PF3X4NPD CAPACITOR	CC 087.6406	VALVO	2222 678 09688	
C30	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C31	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C32	CK 4,7NF +-1% 63V RMS KP POLYPROPYLENE CAPACITOR	007.7630	ROE	KP1830-247/061-R	
C33	CK 4,7NF +-1% 63V RMS KP POLYPROPYLENE CAPACITOR	007.7630	ROE	KP1830-247/061-R	
C34	CK 18NF+-1%63V7,50AX13 KP CAPACITOR	CK 099.1933	SIEMENS	B33531-A5183-F	
C35	CK 18NF+-1%63V7,50AX13 KP CAPACITOR	CK 099.1933	SIEMENS	B33531-A5183-F	
C36	CK 330PF +-1% 100V RMS KP POLYPROPYLENE CAPACITOR	CK 007.7569	ROE	KP1830-133/011-R	
C37	CK 330PF +-1% 100V RMS KP POLYPROPYLENE CAPACITOR	CK 007.7569	ROE	KP1830-133/011-R	
C50	CK 470NF+-5%63V5RM MKT CAPACITOR	CK 099.2975	WIMA	MKS2/63/O,47UF/5%	
C51	CK 68NF+-1%63V12X12X12 PP CAPACITOR	CK 303.7067	SIEMENS	B33531-A5683-F	
C52	CK 470NF+-5%63V5RM MKT CAPACITOR	CK 099.2975	WIMA	MKS2/63/O,47UF/5%	
C53	CK 330NF+-5%63V5RM MKT CAPACITOR	CK 099.2969	WIMA	MKS2/63/O,33UF/5%	
C54	CK 820PF+-1%63V6,3QUX11KP CAPACITOR	CK 340.6748	SIEMENS	B33531-A5821-F	
C55	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C56	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C57	CK 68NF+-1%63V12X12X12 PP CAPACITOR	CK 303.7067	SIEMENS	B33531-A5683-F	
C58	CK 470NF+-5%63V5RM MKT CAPACITOR	CK 099.2975	WIMA	MKS2/63/O,47UF/5%	
C59	CK 330NF+-5%63V5RM MKT CAPACITOR	CK 099.2969	WIMA	MKS2/63/O,33UF/5%	
C60	CK 820PF+-1%63V6,3QUX11KP CAPACITOR	CK 340.6748	SIEMENS	B33531-A5821-F	
C61	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	

ROHDE & SCHWARZ

Äi Datum
Date

15 0789

Schaltteilliste für
Parts list for

EE NF-GENERATOR
AF-GENERATOR

Sachnummer
Stock Nr.

819.3260.01 SA

Blatt
Page

1+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C62	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C63	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C66	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C70	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C71	CK 18NF+-1%63V7,50AX13 KP CAPACITOR	CK 099.1933	SIEMENS	B33531-A5183-F	
C72	CK 150NF+-5%63V5RM MKT CAPACITOR	CK 099.2946	WIMA	MKS2/63/0, 15UF/5%	
C74	CK 200PF+-1%63V6,3QUX11KP CAPACITOR	CK 341.8515	SIEMENS	B33531-A5201-F	
C77	CK 18NF+-1%63V7,50AX13 KP CAPACITOR	CK 099.1933	SIEMENS	B33531-A5183-F	
C78	CK 150NF+-5%63V5RM MKT CAPACITOR	CK 099.2946	WIMA	MKS2/63/0, 15UF/5%	
C80	CK 200PF+-1%63V6,3QUX11KP CAPACITOR	CK 341.8515	SIEMENS	B33531-A5201-F	
C86	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C91	CC 22PF+-2%4X5NPO CAPACITOR	CC 087.6464	VALVO	2222 678 10229	
C92	CC 22PF+-2%4X5NPO CAPACITOR	CC 087.6464	VALVO	2222 678 10229	
C93	CC 22PF+-2%4X5NPO CAPACITOR	CC 087.6464	VALVO	2222 678 10229	
C94	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C95	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C100 .. 107	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C108	CC 6,8PF+-0,25PF3X4NPO CAPACITOR	CC 087.6406	VALVO	2222 678 09688	
C109	CE 47UF -10+100%16V11X13B ELECTROLYTIC CAPACITOR	CE 086.4374	ROEDERST	ELKD EKU 47/16	
C110	CC 2,2PF+-0,25PF3X4NPO CAPACITOR	CC 087.6341	VALVO	2222 678 09228	
C112	CC 330PF+-2%6X9N750 CERAMIC CAPACITOR	CC 087.6964	VALVO	2222 678 58331	
C113	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C117	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C118	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C130 .. 133	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C135	CE 10UF -10+50% 40V 9X13B ELECTROLYTIC CAPACITOR	CE 247.6588	ROEDERST	ELKDEKU10/40	
C136	CC 2,7PF+-0,25PF3X4NPO CERAMIC CAPACITOR	CC 087.6358	VALVO	2222 678 09278	
C137	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C138	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C140	CE 10UF -10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE 022.7650	ROEDERST	ELKDEK10/63	
C141	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C142	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C143	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C144	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C145	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C146	CC 3,3PF+-0,25PF3X4NPO CAPACITOR	CC 087.6364	VALVO	2222 678 09338	
C147	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C148	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C150 .. 153	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	

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	15	0789	EE NF-GENERATOR AF-GENERATOR	819.3260.01 SA	2+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C154	CC 4,7NF+-10%6X9R2000 CAPACITOR	CC 087.7102	VALVO	2222 63051 472	
C160	CE 100UF-10+50% 25V 13X13 ELECTROLYTIC CAPACITOR	CE 208.4007	ROEDERST	ELKOEK100/25	
C161	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C164	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C165	CE 22UF+-20%10V SAL ELECTR. CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C166	CE 100UF-10+50% 25V 13X13 ELECTROLYTIC CAPACITOR	CE 208.4007	ROEDERST	ELKOEK100/25	
C167	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C168	CE 22UF+-20%10V SAL ELECTR. CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C173	CE 100UF-10+50% 16V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7165	ROEDERST	EK 00CB 310 D	
C194	CC 4,7NF+-10%6X9R2000 CAPACITOR	CC 087.7102	VALVO	2222 63051 472	
C195	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C196	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C230	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C233	..233				
C235	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C300	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C301	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C302	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C305	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C306	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C308	CC 47PF+-2%5X6NPO CAPACITOR	CC 087.6506	VALVO	2222 678 10479	
C309	CC 47PF+-2%5X6NPO CAPACITOR	CC 087.6506	VALVO	2222 678 10479	
C310	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C319	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C382	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
D1	BL MM74HCOON 4X2IN.NAND QUAD 2-INPUT NAND GATE	BL 571.3194	MOTOROLA	MC74HCOON	
D5	BC SOFTW.N.BESTUECKUNGSPL SOFTW. SEE COMPONENTSPLAN SMGU: 819.0049 BP SMHU: 835.8040 BP	651.6701.90			
D6	BL MM74HC175N 4XD-FF CL. QUAD D-FLIP-FLOP	BL 099.9528	NSC	MM74HC175N	
D7	BL MM74HC175N 4XD-FF CL. QUAD D-FLIP-FLOP	BL 099.9528	NSC	MM74HC175N	
D8	BL MM74HC273N 8XD-FF/REG OCTAL D-FLIPFLOP	BL 099.9611	NSC	MM74HC273N	
D9	BJ DAC800PCBI12B DA-CONV D/A CONVERTER	801.8190	BURR BROWN	DAC800PCBI-I	
D10	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D12	BL MM74HC4040N 12ST.B.CTR 12 STAGE BINARY COUNTER	BL 394.8784	NSC	MM74HC4040N	
D13	BL MM74HC390N 2X4B.COUNT DUAL 4-BIT DECADE COUNTER	BL 099.9640	NSC	MM74HC390N	
D14	BJ DG211CJ 4X ANALOGSCH ANALOG SWITCH	801.8260	SILICONIX	DG211CJ	
D15	BL MM74HCOON 4X2IN.NAND QUAD 2-INPUT NAND GATE	BL 571.3194	MOTOROLA	MC74HCOON	
D16	BG CLA2116 GATEARRAY GATE ARRAY	801.8183	PLESSEY	CLA2116	
D17	BL PC74HCT08P 4X2IN AND QUAD 2-INPUT AND GATE	BL 571.3413	VALVO	PC74HCT08P	

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	15	0789	EE NF-GENERATOR AF-GENERATOR	819.3260.01 SA	3+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
D20	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D21	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D22	BJ AD7533CQ 10B.DA-CONV D/A-CONVERTER	BJ 300.8740	ANALOG DEV	AD7533CQ	
D23	BJ TL604CP 2X ANALOGSCH ANALOG SWITCH	BJ 300.6199	TEXAS INST	TL604CP	
D30	BJ DG211CJ 4X ANALOGSCH ANALOG SWITCH	801.8260	SILICONIX	DG211CJ	
D31	BJ DG211CJ 4X ANALOGSCH ANALOG SWITCH	801.8260	SILICONIX	DG211CJ	
D32	BJ DG211CJ 4X ANALOGSCH ANALOG SWITCH	801.8260	SILICONIX	DG211CJ	
D33	BL MM74HC132N 4X2IN.NAND QUAD 2INP.NAND SCHMITT TR	BL 099.9557	NSC	MM74HC132N	
D34	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D35	BL MM74HCOON 4X2IN.NAND QUAD 2-INPUT NAND GATE	BL 571.3194	MOTOROLA	MC74HCOON	
D36	BL PC74HC123 2XMULTIVIB DUAL MONOST.MULTIVIBRATOR	BL 099.9540	VALVO	PC74HC123P	
D40	BJ DG211CJ 4X ANALOGSCH ANALOG SWITCH	801.8260	SILICONIX	DG211CJ	
D41	BJ DG211CJ 4X ANALOGSCH ANALOG SWITCH	801.8260	SILICONIX	DG211CJ	
D42	BJ DG211CJ 4X ANALOGSCH ANALOG SWITCH	801.8260	SILICONIX	DG211CJ	
D43	BL MM74HCOON 4X2IN.NAND QUAD 2-INPUT NAND GATE	BL 571.3194	MOTOROLA	MC74HCOON	
D44	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D45	BL MM74HC132N 4X2IN.NAND QUAD 2INP.NAND SCHMITT TR	BL 099.9557	NSC	MM74HC132N	
D46	BJ TL604CP 2X ANALOGSCH ANALOG SWITCH	BJ 300.6199	TEXAS INST	TL604CP	
D47	BL PC74HC123 2XMULTIVIB DUAL MONOST.MULTIVIBRATOR	BL 099.9540	VALVO	PC74HC123P	
D50	BL MM74HC4051N 8CH.AN.MUX 8CH.ANALOG MUX/DEMUX	BL 099.9670	NSC	MM74HC4051N	
D51	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D52	BL MM74HC165N 8B.SH.REG. 8 BIT SHIFT REGISTER	BL 641.7128	MOTOROLA	MC74HC165N	
D53	BL MM74HC126N 4XBUFF. 3S QUAD BUFFER TRISTATE	BL 099.9792	NSC	MM74HC126N	
D54	BL PC74HCT86P 4X2IN EXOR QUAD 2-INPUT EXOR GATE	BL 266.7228	VALVO	PC74HCT86P	
D55	BL PC74HCT4075P 3X3IN ORG OR GATE	BL 811.7780	VALVO	PC74HCT4075P	
D60	BL PC74HC238P 3TO8 L.DEC DECODER/DEMULTIPLEXER	BL 620.0847	VALVO	PC74HC238P	
L1	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L17	LD 15,OUH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L18	LD 15,OUH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L160	LD 15,OUH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L161	LD 15,OUH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L162	LD 15,OUH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L300	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L301	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
N1	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	
N2	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	
N3	BO AD744AQ BIFET OPAMP OPERATIONAL AMPLIFIER	820.3590	ANALOG DEV	AD744AQ	
N4	BO MC1558JG 2X OPAMP OPERATIONAL AMPLIFIER	275.0816	NSC	LM1558J	

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	15	0789	EE NF-GENERATOR AF-GENERATOR	819.3260.01 SA	4+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
N10	BO TLO74IN 4XFET OPAMP OPERATIONAL AMPLIFIER	568.7528	TEXAS INST	TLO74IN	
N15	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	
N16	BO SE5534AFE LOW N.OPAMP OPERATIONAL AMPLIFIER	BO 301.3335	SIGNETICS	SE5534AFE	
N17	BO SE5534AFE LOW N.OPAMP OPERATIONAL AMPLIFIER	BO 301.3335	SIGNETICS	SE5534AFE	
N20	BO HA7-2525-5 HSR.OPAMP OPERATIONAL AMPLIFIER	352.7544	HARRIS	HA7-2525-5	
N21	BO HA7-2525-5 HSR.OPAMP OPERATIONAL AMPLIFIER	352.7544	HARRIS	HA7-2525-5	
N22	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	
N23	BO LM119J 2X COMPAR COMPARATOR	007.5337	LINEAR TEC	LM119J	
N30	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	
N31	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	
N32	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	
N33	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	
N34	BO LM119J 2X COMPAR COMPARATOR	007.5337	LINEAR TEC	LM119J	
P1	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 4 PINS	FP 242.3600	BINDER	742-5-11-0178-00-36	
P11	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P28	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 6 PINS	FP 242.3600	BINDER	742-5-11-0178-00-36	
P34	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 5 PINS	FP 242.3600	BINDER	742-5-11-0178-00-36	
R1	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R2	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R3	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R4	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R6	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R7	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R8	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R9	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R11	RS 0,5W1KOHM+-10%10X10X5 CERMET POTENTIOMETER	RS 247.5917	BOURNS	3386X-1-102	
R12	RL 0,35W 392 OHM+-1%TK50 RESISTOR	RL 082.2183	DRALORIC	SMA0207/392K-F-C	
R13	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R14	RL 0,35W 301 OHM+-1%TK50 RESISTOR	RL 083.0210	DRALORIC	SMA0207/301OHM-F-D	
R15	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMA0207/332OHM-F-D	
R16	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R17	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R18	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R19	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 087.7577	BOURNS	3386F-1-203	
R20	RL 0,35W 681 OHM+-1%TK50 RESISTOR	RL 083.0490	DRALORIC	SMA0207/681OHM-F-D	
R21	RL 0,35W2,05KOHM+-0,1%T25 RESISTOR	RL 083.9746	DRALORIC	SMA/207/2,05K-B-E	

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	15	0789	EE NF-GENERATOR AF-GENERATOR	819.3260.01 SA	54

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R22	RL 0,35W1,87KOHM+-0,1%T25 RESISTOR	RL 083.9669	DRALORIC	SMA0207	
R23	RL 0,35W2,10KOHM+-0,1%T25 RESISTOR	RL 083.9769	DRALORIC	SMA0207	
R24	RL 0,35W 1MOHM+-1%TK50 RESISTOR	RL 082.7862	DRALORIC	SMA0207/1M-F-D	
R25	RL 0,35W432 OHM+-0,1%TK25 RESISTOR	RL 083.8440	DRALORIC	SMA0207	
R26	RL 0,35W402 OHM+-0,1%TK25 RESISTOR	RL 083.8385	DRALORIC	SMA/207/402OHM-B-E	
R27	RL 0,35W294 OHM+-0,1%TK25 RESISTOR	RL 083.8127	DRALORIC	SMA0207	
R28	RL 0,35W 1MOHM+-1%TK50 RESISTOR	RL 082.7862	DRALORIC	SMA0207/1M-F-D	
R29	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R30	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R31	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R32	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R39	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R50	RL 0,35W 243 OHM+-1%TK50 DEPOS.-CARBON RESISTOR	RL 083.0126	DRALORIC	SMA0207/243OHM-F-D	
R55	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R57	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R58	RL 0,35W 5,11KOHM+-1%TK50 RESISTOR	RL 082.2348	DRALORIC	SMA0207/5,11K-F-C	
R59	RS 0,5W2KOHM+-10%10X10X5 CERMET POTENTIOMETER	RS 247.7961	BOURNS	3386X-1-202	
R60	RL 0,35W 3,01KOHM+-1%TK50 RESISTOR	RL 083.0961	DRALORIC	SMA0207/3,01K-F-D	
R61	RL 0,35W 13,0KOHM+-1%TK50 RESISTOR	RL 083.1368	DRALORIC	SMA0207/13,0K-F-D	
R62	RL 0,35W 130 KOHM+-1%TK50 RESISTOR	RL 083.2093	DRALORIC	SMA0207/130K-F-C	
R63	RL 0,35W 1,43KOHM+-1%TK50 RESISTOR	RL 083.0710	DRALORIC	SMA/207/1,43K-F-D	
R64	RL 0,35W 15,0KOHM+-1%TK50 RESISTOR	RL 083.1400	DRALORIC	SMA0207/15K-F-D	
R65	RL 0,35W 130 KOHM+-1%TK50 RESISTOR	RL 083.2093	DRALORIC	SMA0207/130K-F-C	
R66	RL 0,35W 1,43KOHM+-1%TK50 RESISTOR	RL 083.0710	DRALORIC	SMA/207/1,43K-F-D	
R70	RL 0,35W 16,2KOHM+-1%TK50 RESISTOR	RL 083.1439	DRALORIC	SMA0207/16,2K-F-D	
R71	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER	RS 247.7526	BOURNS	3386X1-103	
R72	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R73	RL 0,35W 16,9KOHM+-1%TK50 RESISTOR	RL 083.1451	DRALORIC	SMA/207/16,9K-F-C	
R74	RL 0,35W 23,7KOHM+-1%TK50 RESISTOR	RL 083.1568	DRALORIC	SMA/207/23,7K-F-C	
R75	RL 0,35W25,5KOHM+-1%TK50 RESISTOR	RL 083.1580	DRALORIC	SMA0207/25,5K-F-C	
R76	RL 0,35W 23,7KOHM+-1%TK50 RESISTOR	RL 083.1568	DRALORIC	SMA/207/23,7K-F-C	
R77	RL 0,35W 23,7KOHM+-1%TK50 RESISTOR	RL 083.1568	DRALORIC	SMA/207/23,7K-F-C	
R78	RL 0,35W25,5KOHM+-1%TK50 RESISTOR	RL 083.1580	DRALORIC	SMA0207/25,5K-F-C	
R90	RL 0,35W10,9KOHM+-0,1%T25 RESISTOR	RL 084.3135	DRALORIC	SMA0207/10,9K-B-E	
R91	RL 0,35W1,21KOHM+-0,1%T25 RESISTOR	RL 083.9300	DRALORIC	SMA/207/1,21K-B-E	
R92	RL 0,35W4,75 OHM+-1%TK50 METALFILMRESISTOR	RL 099.8021	RESISTA	MK2 4,75 OHM 1% TK50	
R93	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R94	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R95	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	

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	15	0789	EE NF-GENERATOR AF-GENERATOR	819.3260.01 SA	6+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R96	RL 0,35W 5,11KOHM+-1%TK50 RESISTOR	RL 082.2348	DRALORIC	SMAO207/5,11K-F-C	
R97	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R98	RL 0,35W 4,32KOHM+-1%TK50 RESISTOR	RL 082.6572	DRALORIC	SMAO207/4,32K-F-D	
R99	RS 0,5W2KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7884	BOURNS	3386F-1-202	
R100	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	
R101	RL 0,35W 604 OHM+-1%TK50 RESISTOR	RL 082.2425	DRALORIC	SMA/207/604OHM-F-C	
R102	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R103	RL 0,35W 33,2KOHM+-1%TK50 RESISTOR	RL 083.1674	DRALORIC	SMAO207/33,2K-F-C	
R104	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 084.3729	DRALORIC	SMAO207	
R105	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 084.3729	DRALORIC	SMAO207	
R106	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 084.3729	DRALORIC	SMAO207	
R107	RL 0,35W 11,0KOHM+-1%TK50 RESISTOR	RL 083.1322	DRALORIC	SMAO207/11K-F-D	
R109	RL 0,35W31,2KOHM+-0,1%T25 RESISTOR	RL 084.4019	DRALORIC	SMAO207	
R111	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	
R112	RL 0,35W 8,25KOHM+-1%TK50 RESISTOR	RL 083.1239	DRALORIC	SMAO207/8,25K-F-D	
R113	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMAO207/2,74K-F-D	
R116	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R119	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 084.3729	DRALORIC	SMAO207	
R125	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 087.7577	BOURNS	3386F-1-203	
R126	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMAO207/100/HM-F-D	
R127	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMAO207/100/HM-F-D	
R128	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/475OHM-F-D	
R129	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/475OHM-F-D	
R130	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	
R132	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R136	RL 0,35W10,0KOHM+-0,1%T25 RESISTOR	RL 084.3064	DRALORIC	SMAO207/10K-B-E	
R137	RL 0,35W4,99KOHM+-0,1%T25 RESISTOR	RL 084.2480	DRALORIC	SMAO207/4,99K-B-E	
R138	RL 0,35W4,99KOHM+-0,1%T25 RESISTOR	RL 084.2480	DRALORIC	SMAO207/4,99K-B-E	
R139	RL 0,35W 1 KOHM+-0,1%TK25 RESISTOR	083.9146	DRALORIC	SMAO207/1K-B-E	
R140	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMAO207/12,1K-F-D	
R141	RL 0,35W10,0KOHM+-0,1%T25 RESISTOR	RL 084.3064	DRALORIC	SMAO207/10K-B-E	
R145	RL 0,35W39,7KOHM+-0,1%T25 RESISTOR	RL 084.4219	DRALORIC	SMAO207	
R146	RL 0,35W412 OHM+-0,1%TK25 RESISTOR	RL 083.8404	DRALORIC	SMAO207/412OHM-B-E	
R147	RL 0,35W9,76KOHM+-0,1%T25 RESISTOR	RL 084.3041	DRALORIC	SMAO207	
R148	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R149	RL 0,35W 274 KOHM+-1%TK50 RESISTOR	RL 083.2364	DRALORIC	SMA/207/274K-F-C	
R150	RL 0,35W 274 KOHM+-1%TK50 RESISTOR	RL 083.2364	DRALORIC	SMA/207/274K-F-C	
R151	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R160	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R161	RL 0,35W 604 OHM+-1%TK50 RESISTOR	RL 082.2425	DRALORIC	SMA/207/604OHM-F-C	
R162	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R163	RL 0,35W 33,2KOHM+-1%TK50 RESISTOR	RL 083.1674	DRALORIC	SMA0207/33,2K-F-C	
R164	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 084.3729	DRALORIC	SMA0207	
R165	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 084.3729	DRALORIC	SMA0207	
R166	RS 0,3W 1KOHM+-10% CERMET TRIMMING POTENTIOMETER	RS 006.6681	BOURNS	3296W-1- 1KOHM+-10%	
R167	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 084.3729	DRALORIC	SMA0207	
R170	RL 0,35W100KOHM+-0,1%TK25 RESISTOR	RL 084.4983	DRALORIC	SMA0207/100K-B-E	
R171	RL 0,35W32,4KOHM+-0,1%T25 RESISTOR	RL 084.4048	DRALORIC	SMA0207	
R174	RL 0,35W 11,0KOHM+-1%TK50 RESISTOR	RL 083.1322	DRALORIC	SMA0207/11K-F-D	
R179	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R180	RL 0,35W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMA0207/1,21K-F-D	
R181	RL 0,35W 15,0KOHM+-1%TK50 RESISTOR	RL 083.1400	DRALORIC	SMA0207/15K-F-D	
R182	RL 0,35W 11,0KOHM+-1%TK50 RESISTOR	RL 083.1322	DRALORIC	SMA0207/11K-F-D	
R185	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R187	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R188	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 084.3729	DRALORIC	SMA0207	
R192	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R193	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R194	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R208	RL 0,35W10,0KOHM+-0,1%T25 RESISTOR	RL 084.3064	DRALORIC	SMA0207/10K-B-E	
R209	RL 0,35W4,99KOHM+-0,1%T25 RESISTOR	RL 084.2480	DRALORIC	SMA0207/4,99K-B-E	
R210	RL 0,35W4,99KOHM+-0,1%T25 RESISTOR	RL 084.2480	DRALORIC	SMA0207/4,99K-B-E	
R211	RL 0,35W 1 KOHM+-0,1%TK25 RESISTOR	083.9146	DRALORIC	SMA0207/1K-B-E	
R212	RL 0,35W22,1KOHM+-0,1%T25 RESISTOR	RL 084.3729	DRALORIC	SMA0207	
R215	RL 0,35W39,7KOHM+-0,1%T25 RESISTOR	RL 084.4219	DRALORIC	SMA0207	
R216	RL 0,35W417 OHM+-0,1%TK25 RESISTOR	RL 083.8410	DRALORIC	SMA0207	
R217	RL 0,35W9,76KOHM+-0,1%T25 RESISTOR	RL 084.3041	DRALORIC	SMA0207	
R218	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R219	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R220	RL 0,35W 274 KOHM+-1%TK50 RESISTOR	RL 083.2364	DRALORIC	SMA/207/274K-F-C	
R221	RL 0,35W 274 KOHM+-1%TK50 RESISTOR	RL 083.2364	DRALORIC	SMA/207/274K-F-C	
R230	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R231	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R233	RL 0,35W 20,0KOHM+-1%TK50 RESISTOR	RL 083.1522	DRALORIC	SMA/207/20K-F-C	
R234	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R235	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R236	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R237	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R238	RL 0,35W 8,25KOHM+-1%TK50 RESISTOR	RL 083.1239	DRALORIC	SMAO207/8,25K-F-D	
R241	RL 0,35W 8,25KOHM+-1%TK50 RESISTOR	RL 083.1239	DRALORIC	SMAO207/8,25K-F-D	
R242	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMAO207/2,74K-F-D	
R243	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMAO207/2,74K-F-D	
R244	RL 0,35W 8,25KOHM+-1%TK50 RESISTOR	RL 083.1239	DRALORIC	SMAO207/8,25K-F-D	
R245	RL 0,35W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMAO207/1,21K-F-D	
R246	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R248	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R250	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R251	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R252	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R260	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 087.7577	BOURNS	3386F-1-203	
R261	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R270	RS 0,3W 200 OHM+-10% CERM. TRIMMING POTENTIOMETER	RS 006.6669	BOURNS	3296W-1- 200OHM+-10%	
R271	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMAO207/100/HM-F-D	
R272	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/475OHM-F-D	
R273	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/475OHM-F-D	
R274	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMAO207/100/HM-F-D	
R275	RL 0,35W 8,25KOHM+-1%TK50 RESISTOR	RL 083.1239	DRALORIC	SMAO207/8,25K-F-D	
R276	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMAO207/2,74K-F-D	
R307	RL 0,35W 301 OHM+-1%TK50 RESISTOR	RL 083.0210	DRALORIC	SMAO207/301OHM-F-D	
R308	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R309	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMAO207/221OHM-F-D	
R310	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMAO207/2,74K-F-D	
R311	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMAO207/47,5OHM-F-D	
R312	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMAO207/221OHM-F-D	
R313	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMAO207/2,74K-F-D	
R314	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMAO207/47,5OHM-F-D	
R315	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R316	RL 0,35W 301 OHM+-1%TK50 RESISTOR	RL 083.0210	DRALORIC	SMAO207/301OHM-F-D	
R318	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R319	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R338	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R343	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R344	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMAO207/3,32K-F-D	
R380	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R381	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R382	RL 0,35W 11,0KOHM+-1%TK50 RESISTOR	RL 083.1322	DRALORIC	SMAO207/11K-F-D	
R383	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMAO207/4,75K-F-D	

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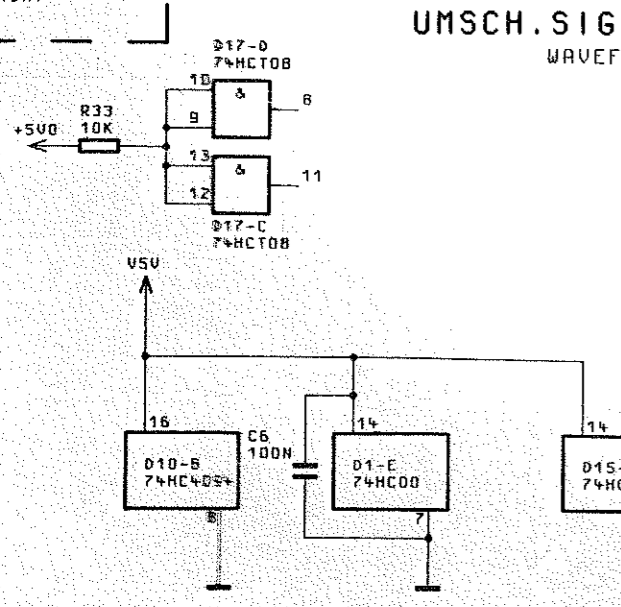
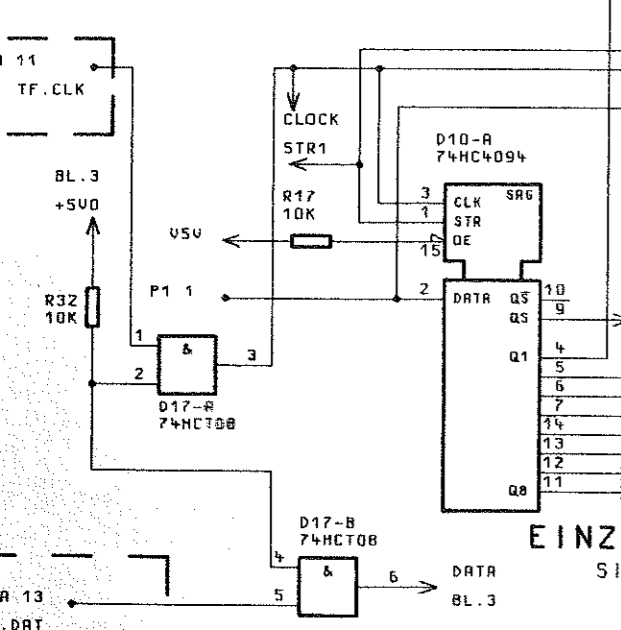
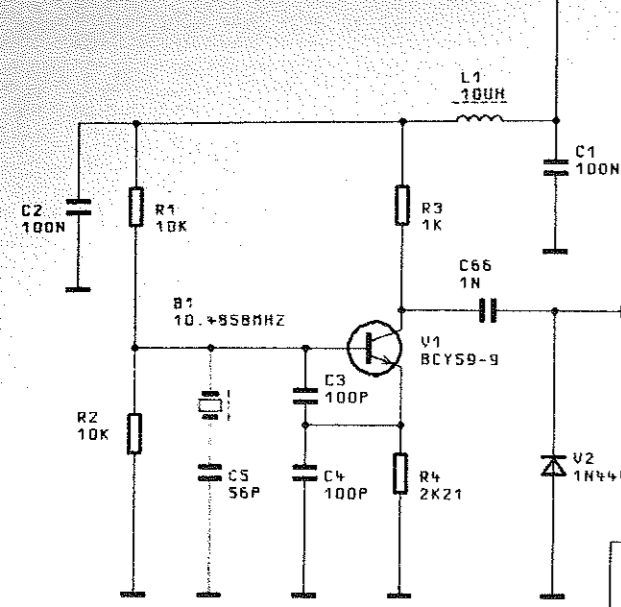
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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V1	AK BCY59IX N 45V 200MA TRANSISTOR	AK 010.5163	VALVO	BCY59IX	
V2	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V3	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V11	AM SD210DE N-E 30V MOSF MOS-FET	844.7637	SILICONIX	SD210DE	
V12	AM 2N4857A N-D 40V JFET FET	092.9422	TEXAS	2N4857A	
V13	AM 2N4857A N-D 40V JFET FET	092.9422	TEXAS	2N4857A	
V14	AM 2N4857A N-D 40V JFET FET	092.9422	TEXAS	2N4857A	
V15	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V16	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V25	AE BZX79/C8V2 0,5W ZDI ZENER DIODE	AE 012.2490	AEG	BZX55/C8V2 GEGURTET	
V26	AE BZX79/C8V2 0,5W ZDI ZENER DIODE	AE 012.2490	AEG	BZX55/C8V2 GEGURTET	
V30	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V31	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V40	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V41	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V42	AE 1N827 6,2V REF DI REFERENCE DIODE	AE 418.0029	CDI	1N827	
V43	AE BZX79/C8V2 0,5W ZDI ZENER DIODE	AE 012.2490	AEG	BZX55/C8V2 GEGURTET	
V50	AE BZX79/C4V7 0,5W ZDI ZENER DIODE	AE 012.2432	AEG	BZX55/C4V7 GEG.	
V97	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V98	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V260	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V261	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V301	AK 2N3906 P 40V 200MA TRANSISTOR	010.3225	MOTOROLA	2N3906	
V305	AK 2N3904 N 40V 200MA TRANSISTOR	010.4996	MOTOROLA	2N3904	
V306	AE BZX79/C6V8 0,5W ZDI ZENER DIODE	AE 012.2478	VALVO	BZX79/C6V8	
V307	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V308	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V309	AE BZX79/C12 0,5W ZDI ZENER DIODE	AE 012.2532	VALVO	BZX55/C12 BZX79...	
X2	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X3	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X6	FP STECKERLEISTE 32POL. MULTIPOINT CONNECTOR	FP 514.4550	PANDUIT	100-232-033/999	
Z1	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z2	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	

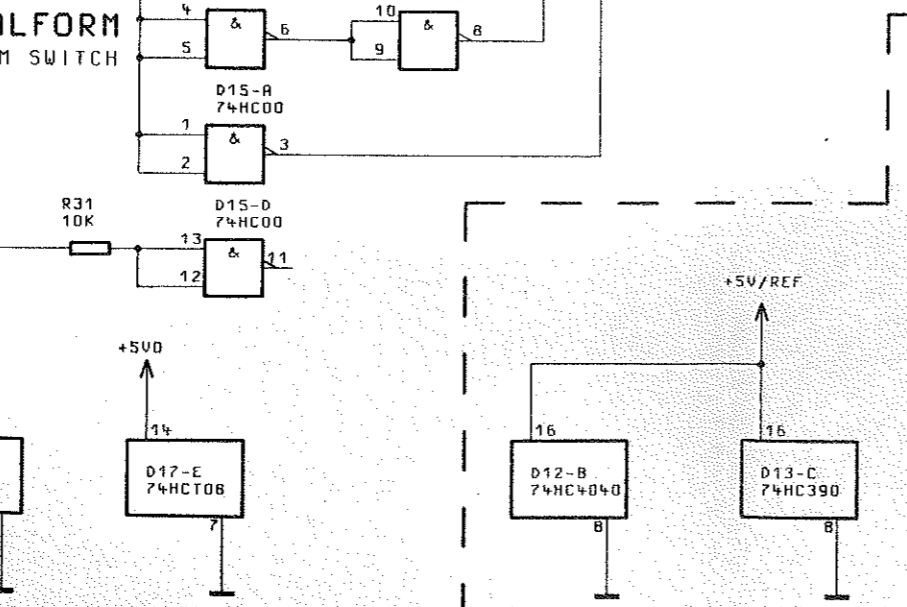
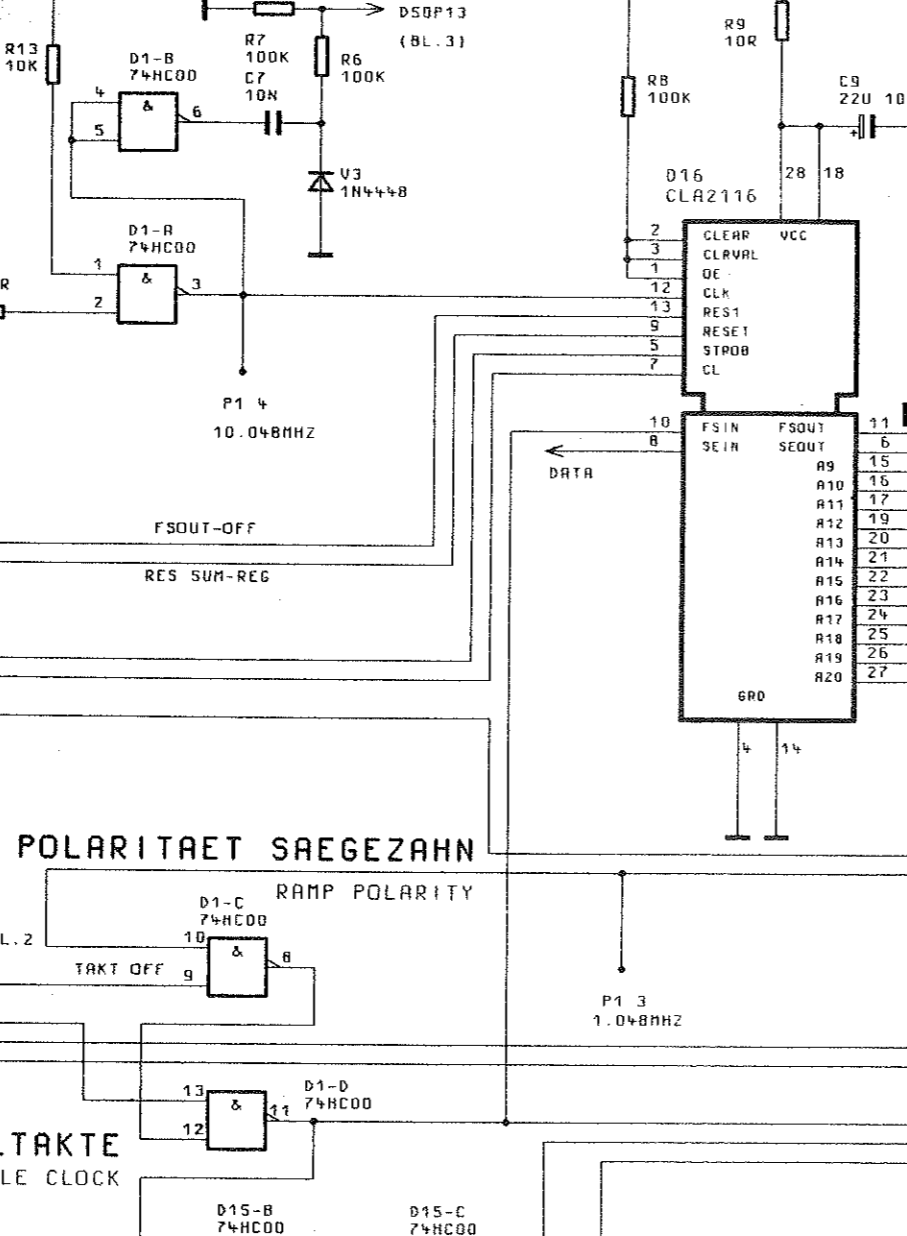
- ENDE -

ROHDE & SCHWARZ	Äl	Datum	Schaltteilliste für	Sachnummer	Blatt
		Date	Parts list for	Stock Nr.	Page.
	15	0789	EE-NF-GENERATOR AF-GENERATOR	819.3260.01 SA	10-

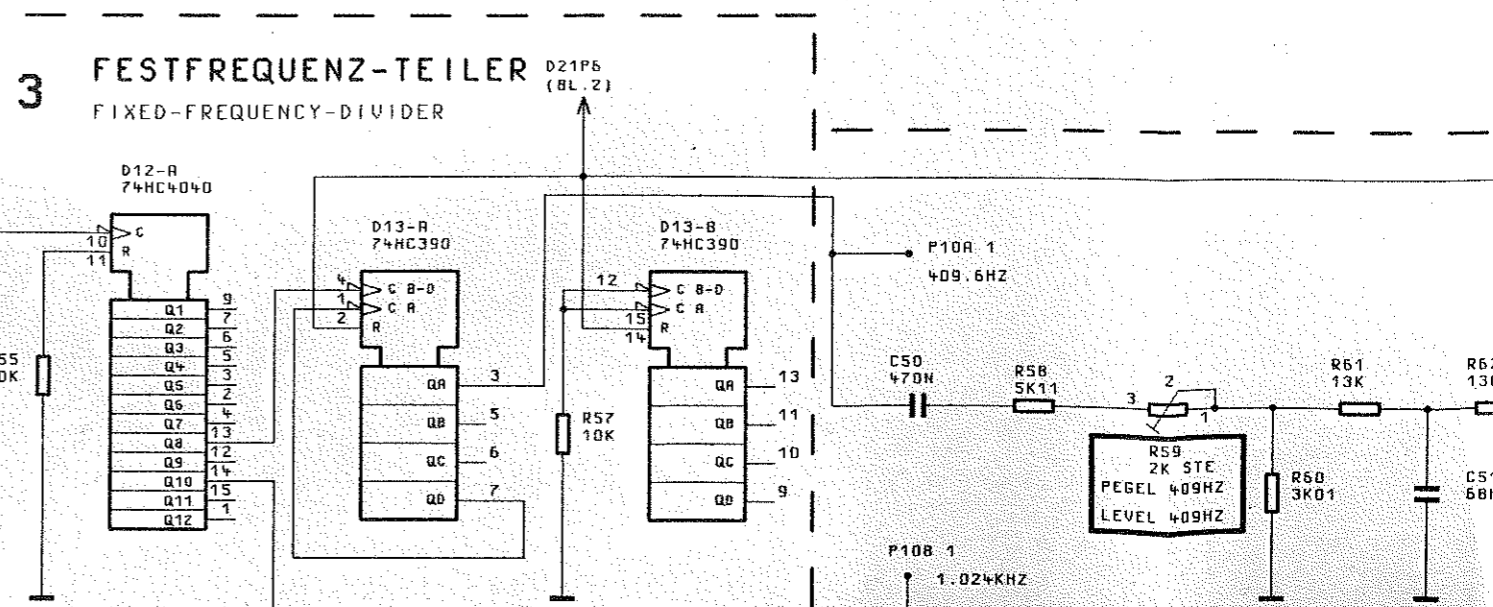
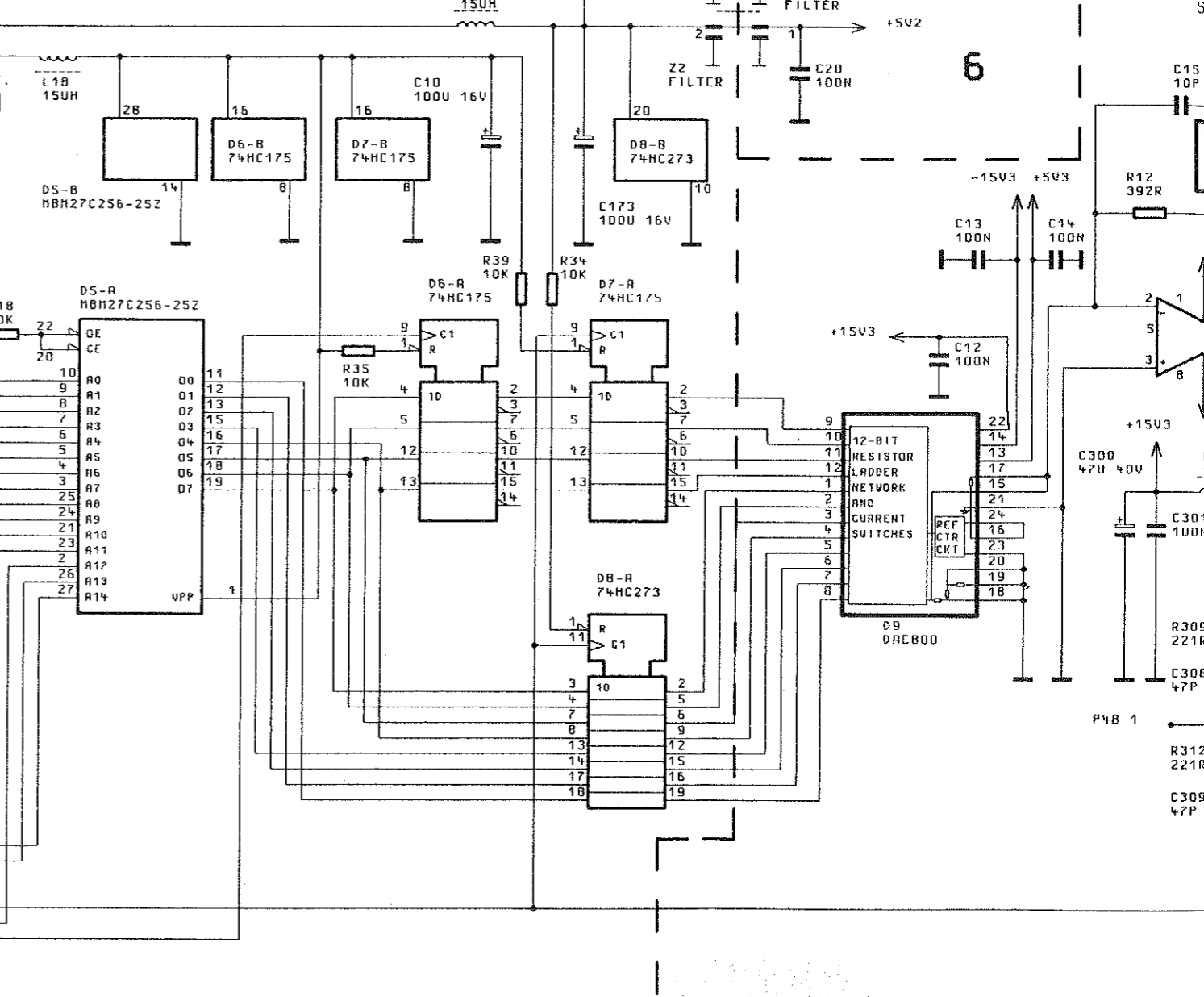
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CRYSTAL-OSCILLATOR

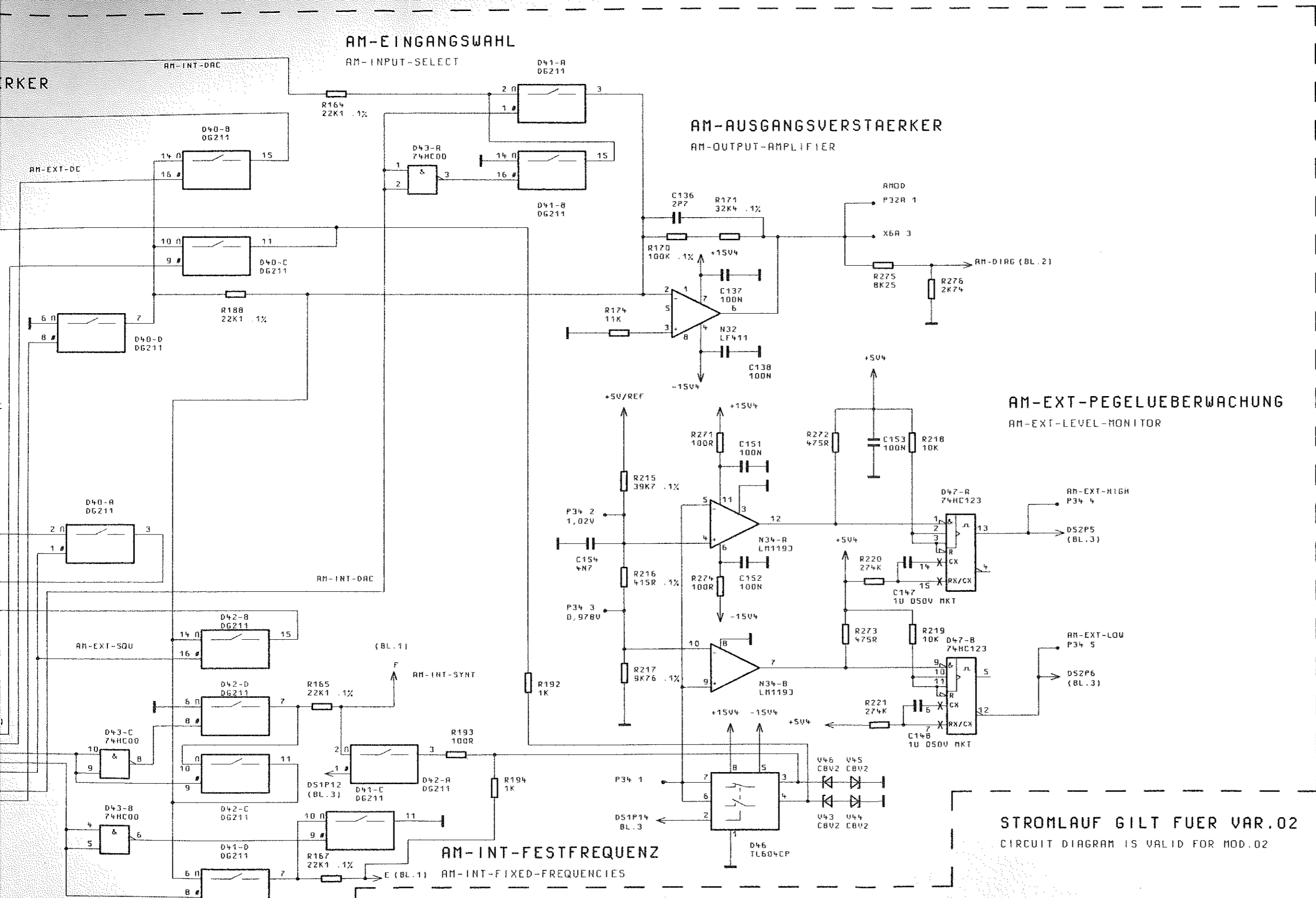


2 POLARITÄT SÄGEZAHN
RAMP POLARITY



3 AF-SYNTHESIZER 1HZ...100KHZ





STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

G	41825	6.89 JN	1KGB	TAG	NAME	BENENNUNG
			BEARB.		DR	AF-GENERATOR
			GEPR.		JN	AF-GENERATOR
			NORM			
			PLGT	6. 4.89	*	
REN. IND.	ÄNDERUNGS-NITTEILUNG	ORTUM	NAME			ZEICHN.-NR.
				ROHDE & SCHWARZ		819.3260.015
				ZU GERÄT	SMGU	REG. I.V.
						819.0010
						ERSTE Z.
						BLATT-NR.
						2
						V. 3 BL.

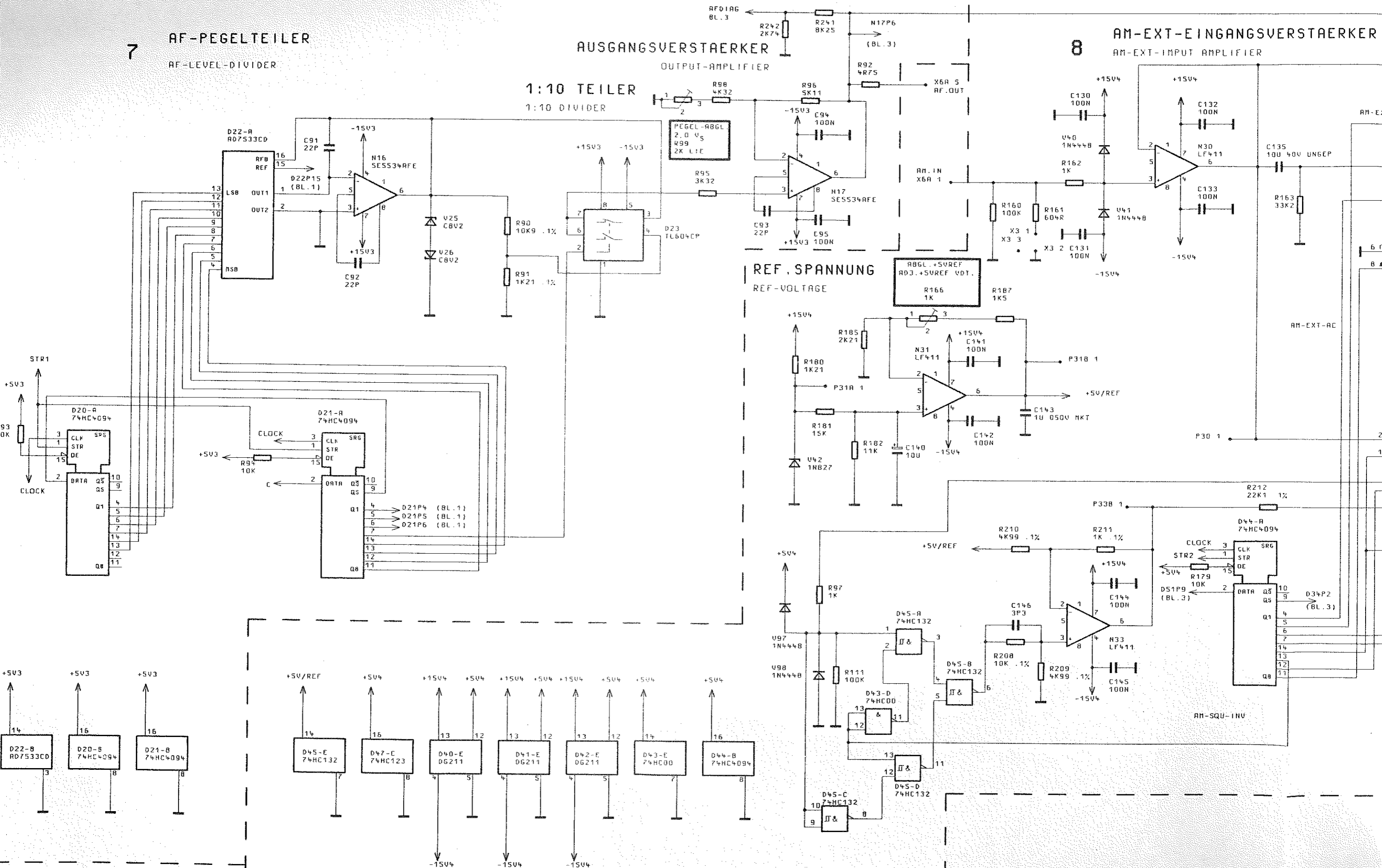
7 AF-PEGELTEILER AF-LEVEL-DIVIDER

AUSGANGSVERSTAERKER OUTPUT-AMPLIFIER

8 AM-EXT-EINGANGSVERSTAERKER AM-EXT-INPUT AMPLIFIER

1:10 TEILER 1:10 DIVIDER

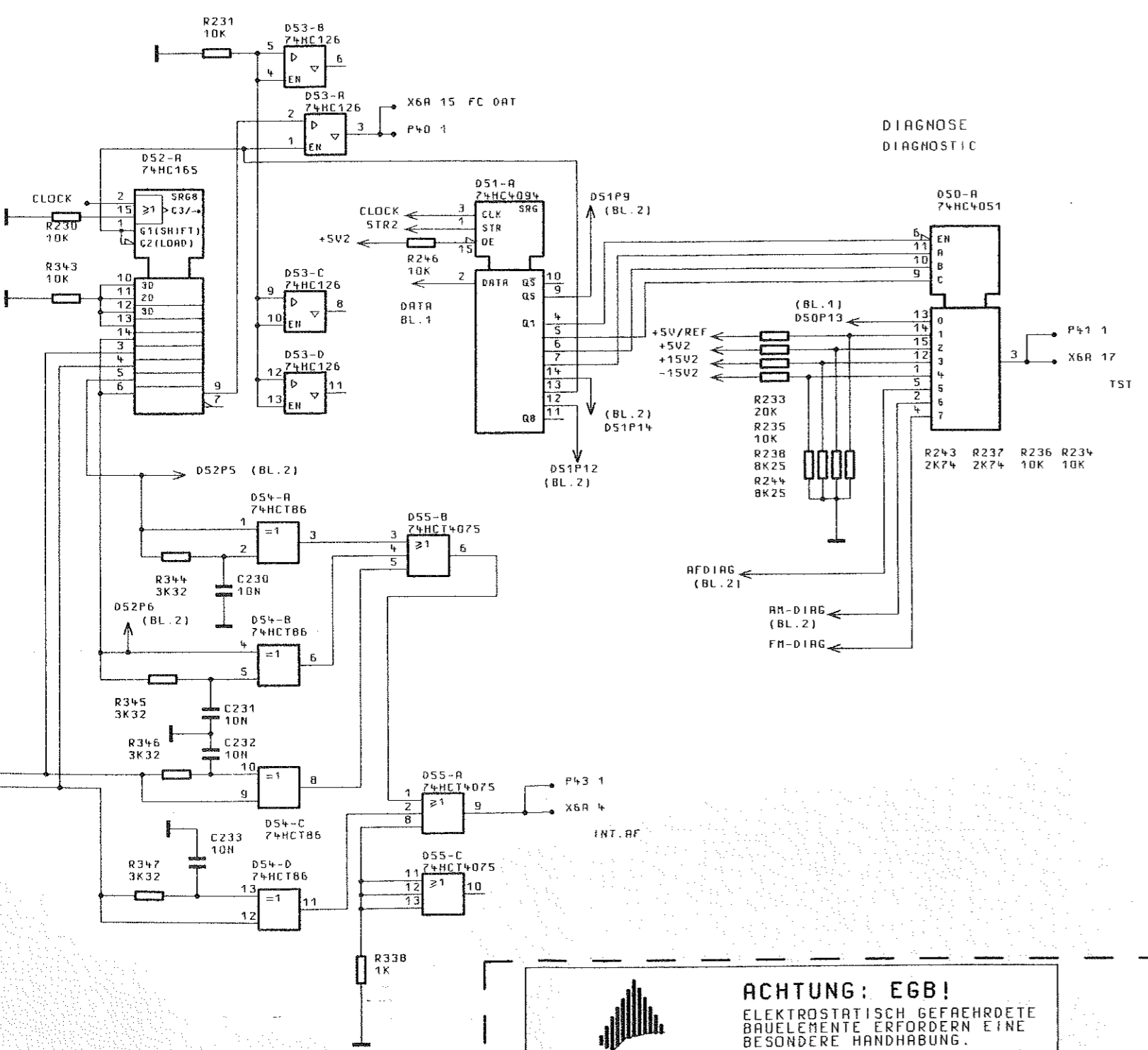
REF. SPANNUNG REF-VOLTAGE



6

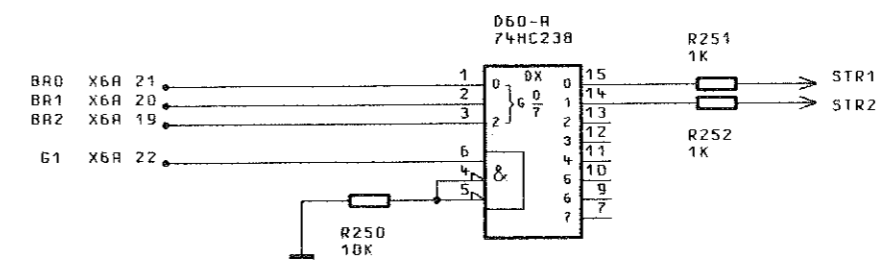
AUSGABE EXT. PEGELUEBERWACHUNG

OUTPUT EXT. LEVEL-MONITOR

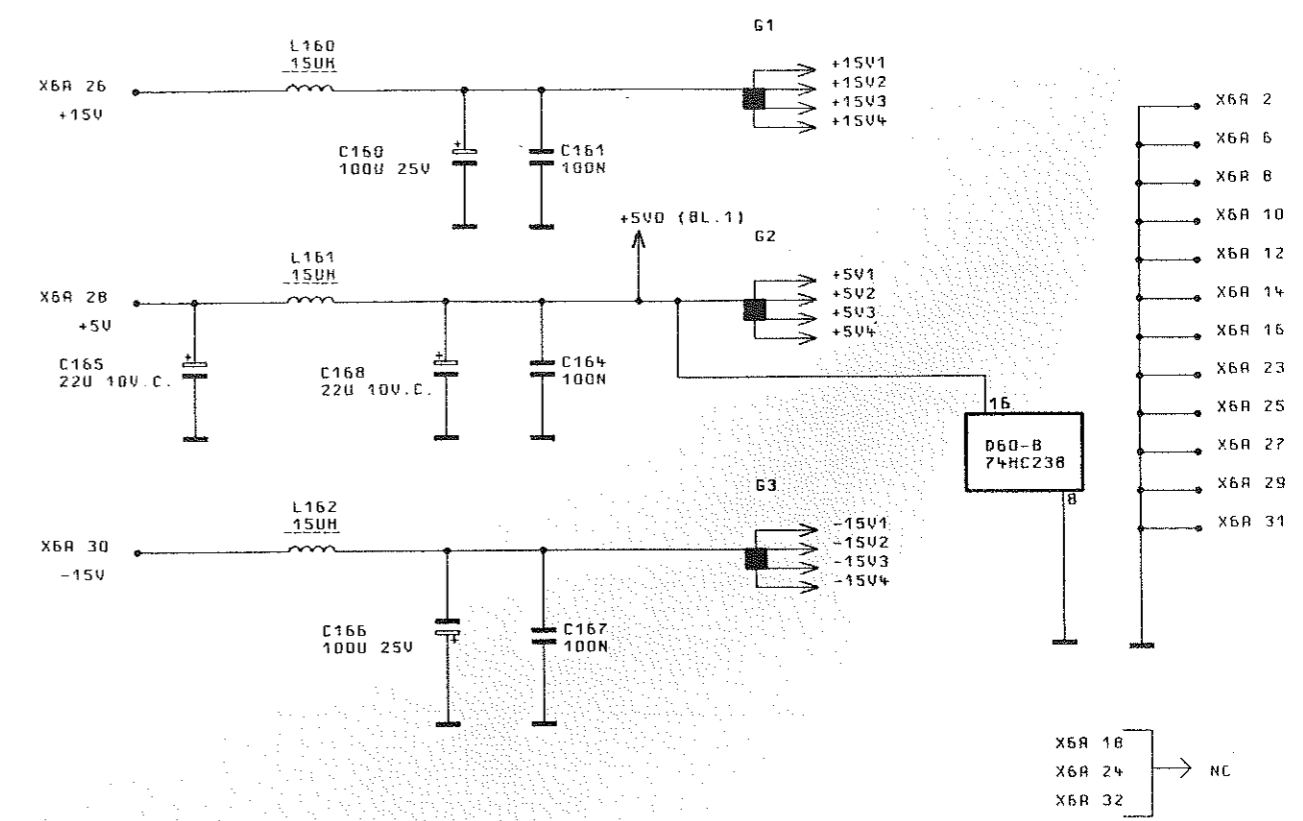


DIAGNOSE
DIAGNOSTIC

STROBE-DECODER



EINGANGSFILTER
INPUT-FILTER



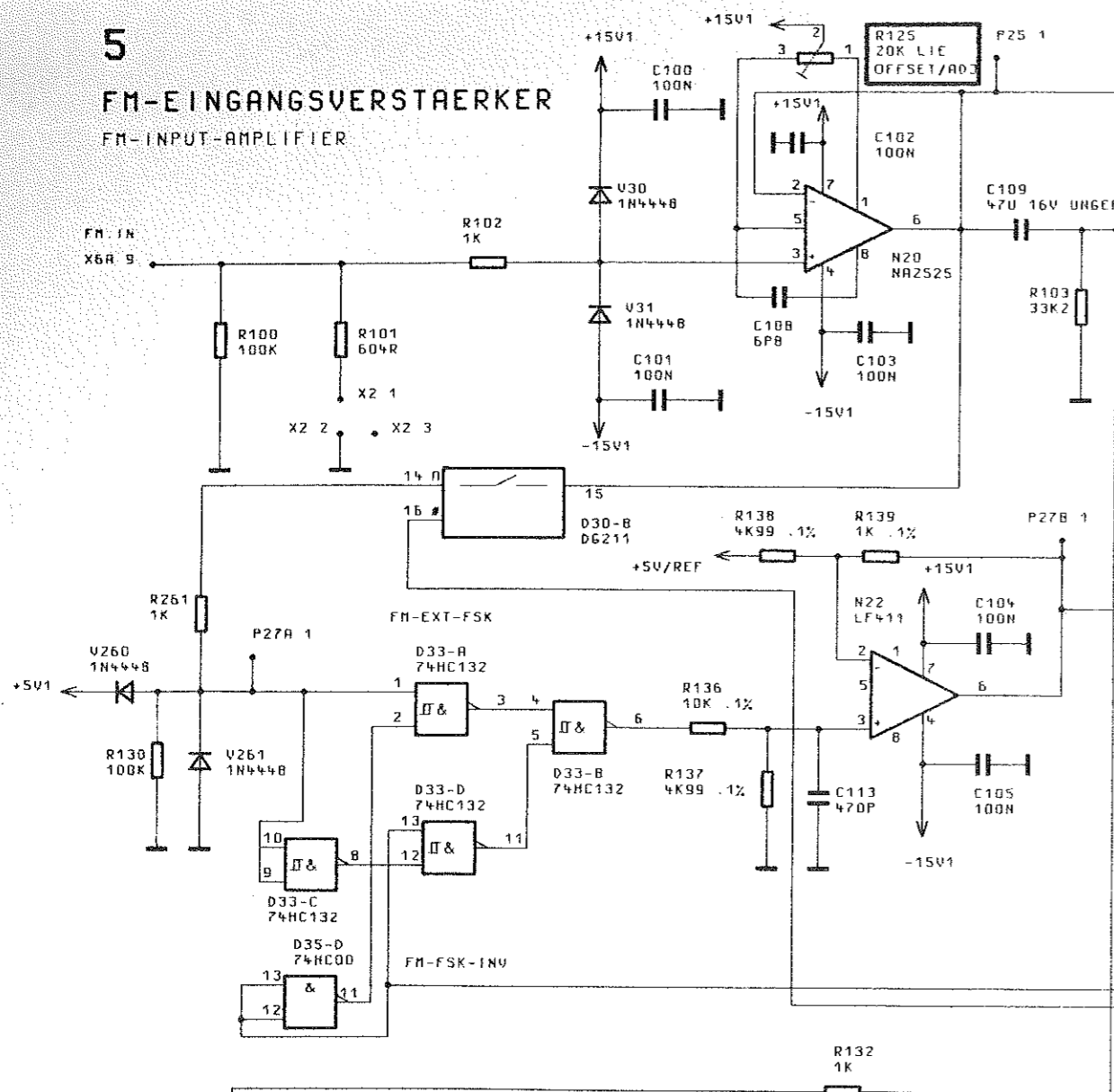
STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

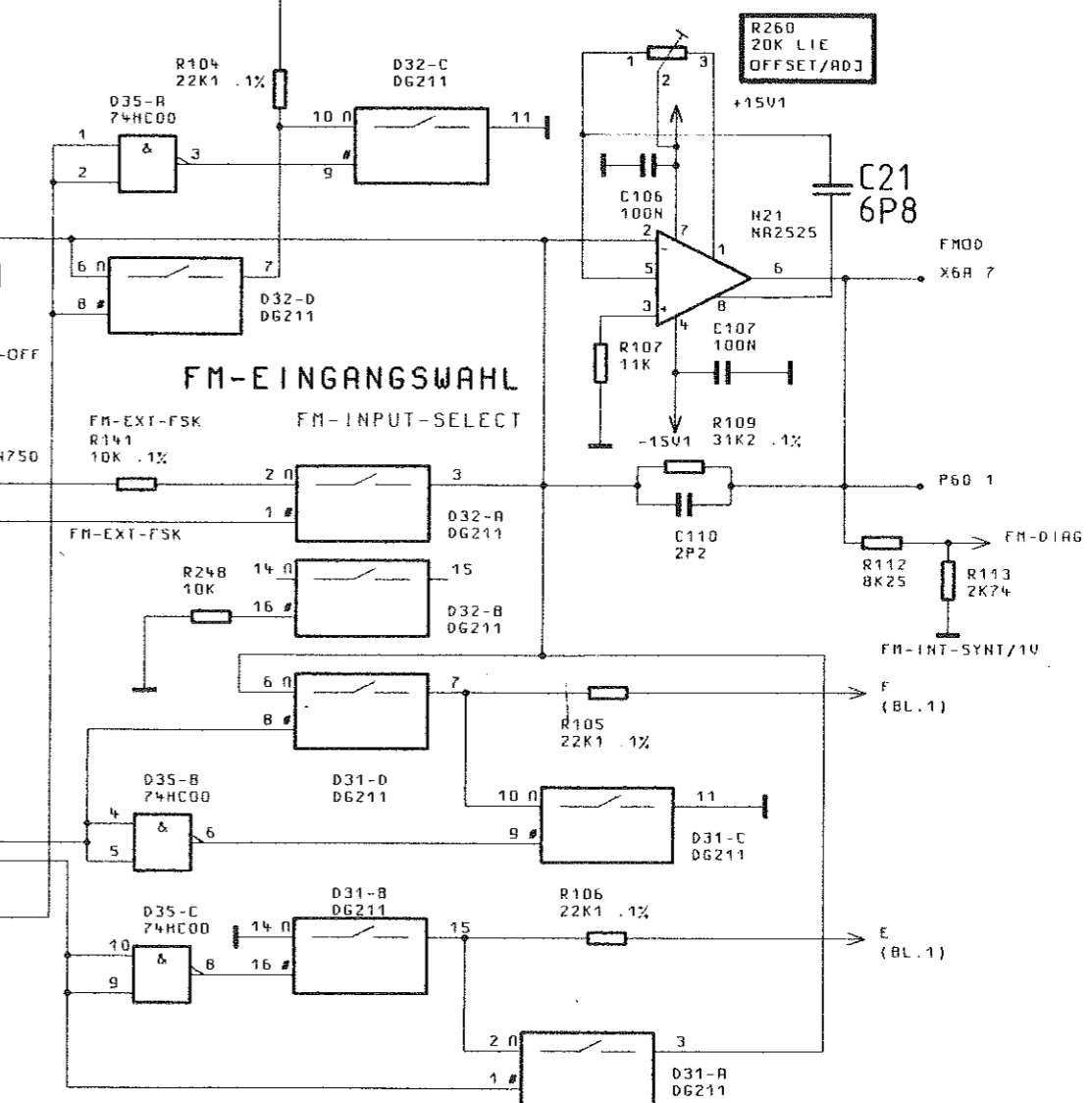
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

6	41825	6.89 JN	TKGB	TAG	NAME	BERENUNG
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			GEPR.		JN	
			NORM		*	
			PLOTT	6. 4. 89		
REN. IND.	ÄNDERUNGS- MITTEILUNG	DATUM	NAME			ZEICHN.-NR.
				ZU GERÄT	SMGU	819.3260.015
				REG. I. V.	819.0010	ERSTE Z.
						BLATT-NR. 3 V. 3 BL.

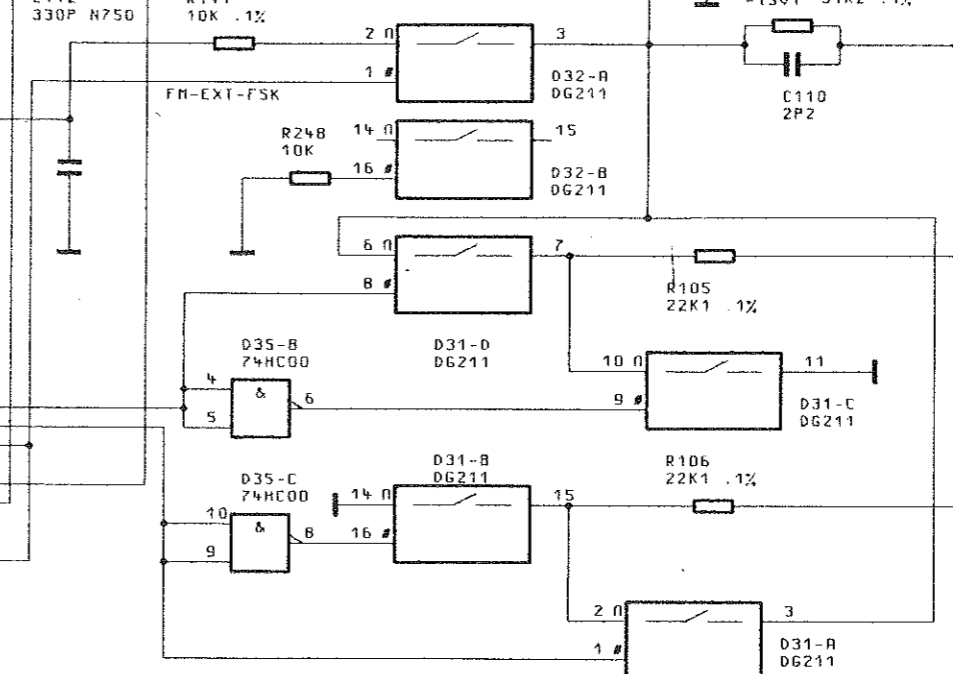
5 FM-EINGANGSVERSTÄRKER FM-INPUT-AMPLIFIER



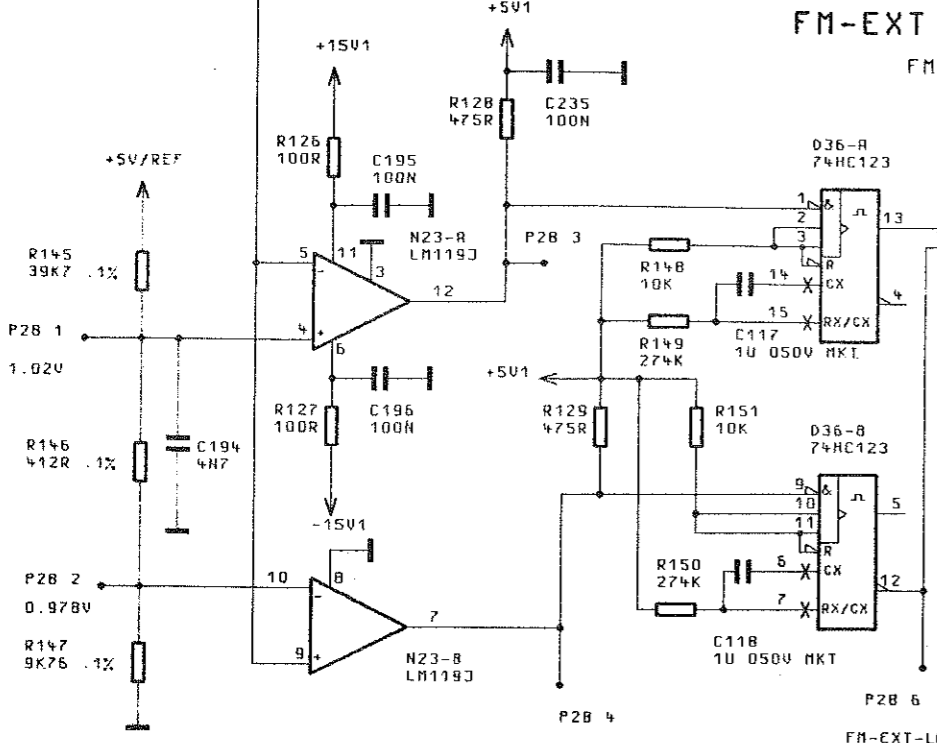
FM-AUSGANGSVERSTÄRKER FM-OUTPUT-AMPLIFIER



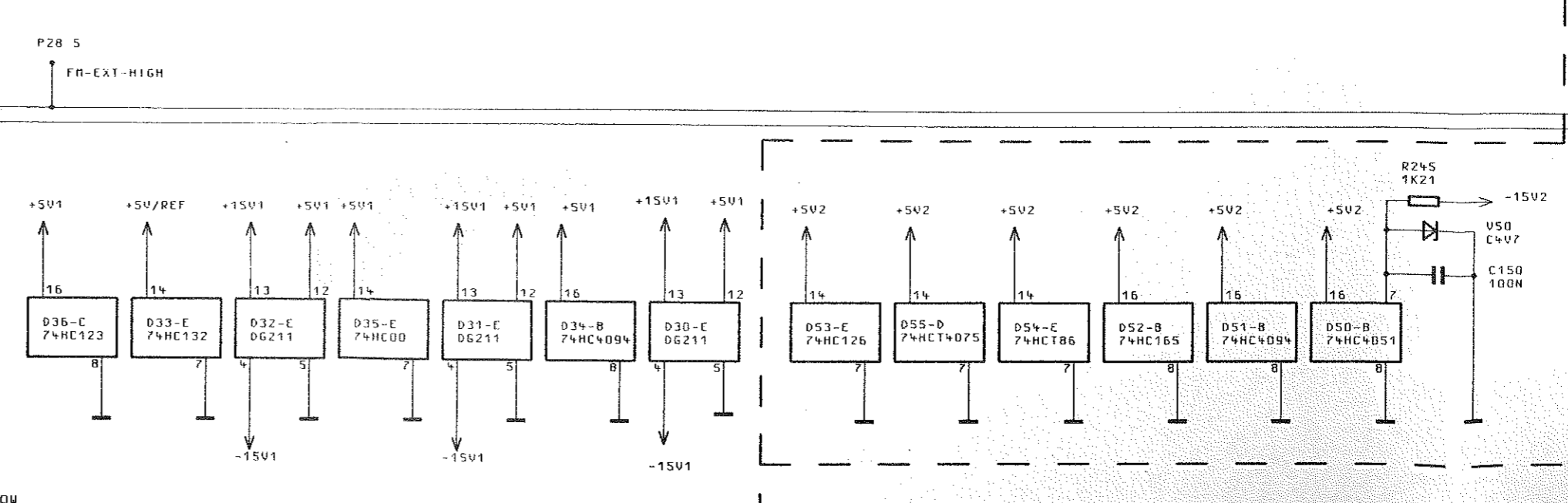
FM-EINGANGSWAHL FM-INPUT-SELECT



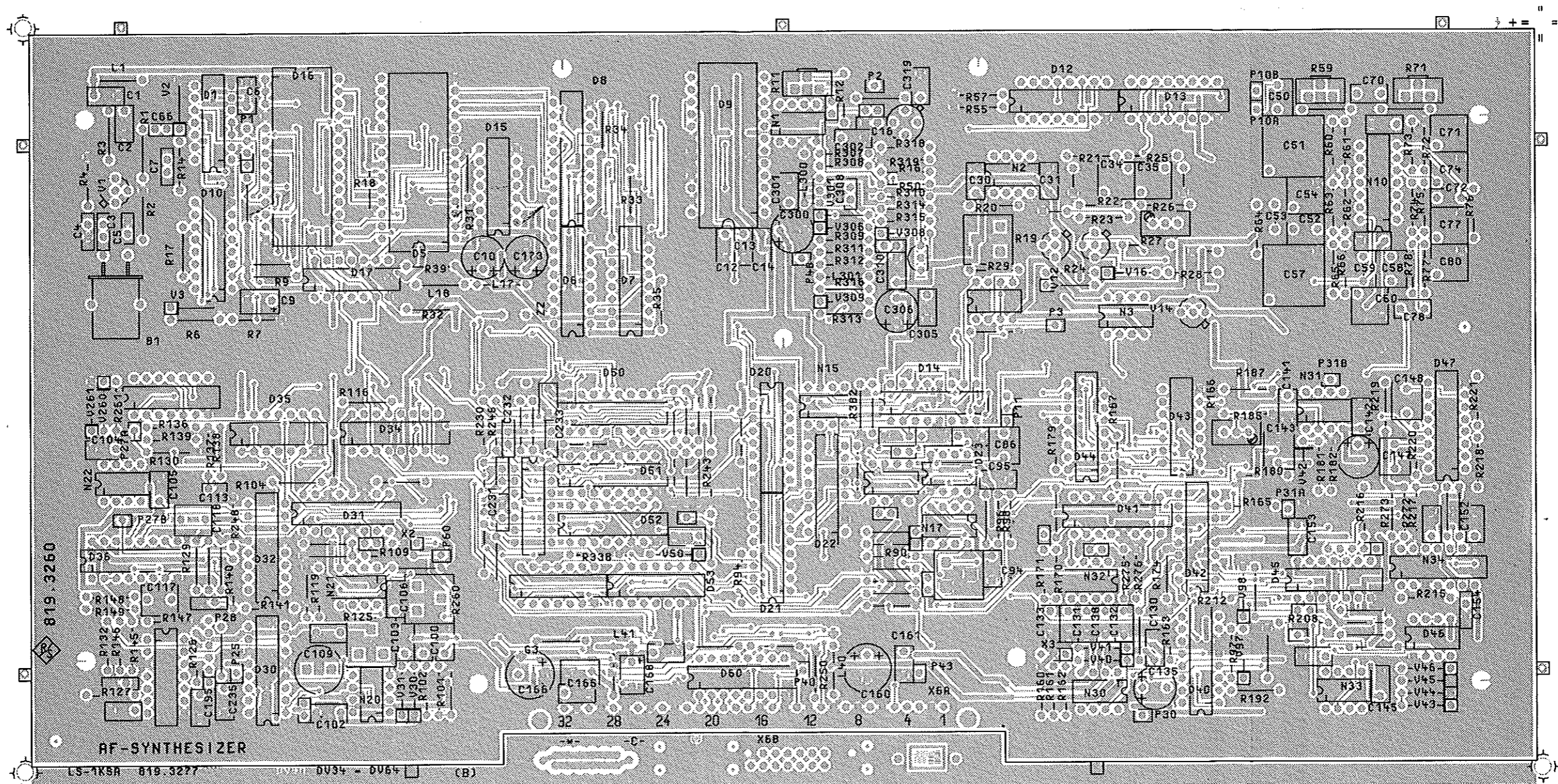
FM-EXT PEGEL UEBERWACHUNG FM-EXT-LEVEL-MONITOR



FM-INT-FESTFREQU/1V FM-INT-FIXED-FREQUENCIES



Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



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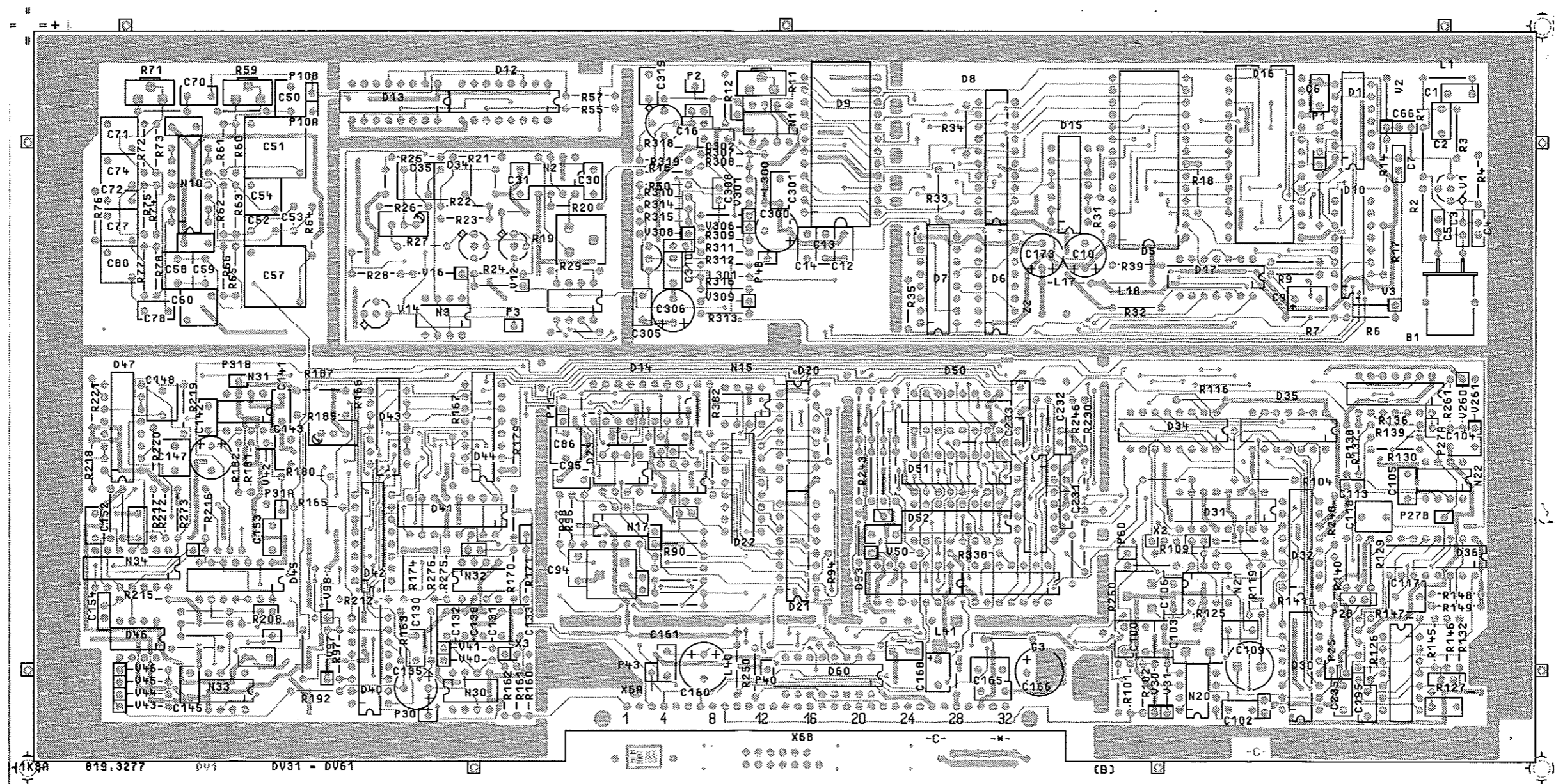


ACHTUNG EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
Electrostatic sensitive devices require a special handling

41825	6.89	JN	Maße ohne Toleranzangabe	Maßstab 1:1	
				Halbzeug, Werkstoff	
			1KGB	Tag	Name
			Bearb.	04.89	JN
			Gepr.		
			Norm		
				Benennung	Z
				AF - GENERATOR	
				Zeichn.-Nr.	Blatt-Nr.
				819.3260	2
				reg. i. V. 819.0010 V	v. Bl.
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	erste Z.	
			zu Gerät SMGU		

ISO-Projektion Methode E

Ansicht und Leitungsführung Lötseite
View of tracks on solder side



Für diese Unterlage behalten wir uns alle Rechte vor.

ISO-Projektion Methode E



ACHTUNG ESB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
Electrostatic sensitive devices require a special handling

1	41825	6.89	JN	Maße ohne Toleranzangabe	Maßstab 1:1	
					Halbzeug, Werkstoff	
				1KGB	Tag	Name
				Bearb.	04.89	JN
				Gepr.		
				Norm		
					Benennung	Z
					AF - GENERATOR	
					Zeichn.-Nr.	Blatt-Nr.
					819.3260	3
					reg. i. V. 819.0010 V	v. Bl.
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU	erste Z.	



ROHDE & SCHWARZ

SERVICE DOCUMENTS

FRN-Synthesis

819.3860.02

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Circuit diagrams
Component lists
Component layout diagrams

5 Service Manual "FRN Synthesis"

5.1 Function Description

(See circuit diagram 819.3860 5)

The FRN synthesis subassembly contains an oscillator generating frequencies from 48 to 58 MHz to produce the fine resolution in the frequency synthesis circuit of the SMGU following mixing-down with 40 MHz in a fractional-N PLL. The output frequency of the subassembly (3 to 3.625 MHz) is obtained after dividing by 16 to improve the spectral purity.

5.1.1 VCO 48 to 58 MHz with Down-mixing and 16:1 Divider

The VCO in a Clapp circuit with the FET V310 as the active element oscillates over the range 48 to 58 MHz. Its negative input resistance cancels the resistance in the oscillator circuit which is tuned using the diodes V58-71. The frequency range is adjusted using C70, 71. The output of the buffer stage with V90 contains a diagnostics detector which monitors the output level of the VCO. The signal is amplified to TTL levels by V120 following a further buffer stage (V100) and divided down in the following divider by a factor of 16 to the output frequency of the subassembly of 3 to 3.625 MHz. The output level is monitored by a diagnostics detector. The output signal of the buffer stage is amplified to 17 dBm by V111 and mixed down in U140 with 40 MHz to an IF of 8 to 18 MHz. The signal is amplified to TTL levels by V150, 155 following lowpass filtering. The signal is then applied to the divider of the fractional-N PLL.

5.1.2 40-MHz Amplifier and M Divider

The 40-MHz input signal at X72 with a level of 5 dBm is amplified in a buffer stage by V355 and monitored by a diagnostics detector. Following an amplifier with a common-gate FET circuit (V372), the signal is applied to a diode limiter in which variations in the input level and the amplifier stages are eliminated. The signal is available as an RF signal at mixer U140 following lowpass filtering. The 40-MHz signal is amplified to TTL levels by V380 via a second stage in the gate circuit (V360). After being fed to D387 a 8:1 fixed divider the signal is passed to the programmable M divider with a division factor that can be varied between 25 and 54. The output signal of 94 to 200 kHz following D390, 395 is the reference frequency for the fractional-N PLL. V112 and D380 ensure that a new M factor is loaded synchronously when the frequency is changed.

5.1.3 Fractional-N PLL

Operating Principle

Changing the division factor from N to $N + 1$ in a fractional-N divider now and again causes the VCO frequency to be a fractional multiple of the reference frequency, i.e. $FVCO = N,F \times FREF$. This procedure results in a PLL with a high frequency resolution.

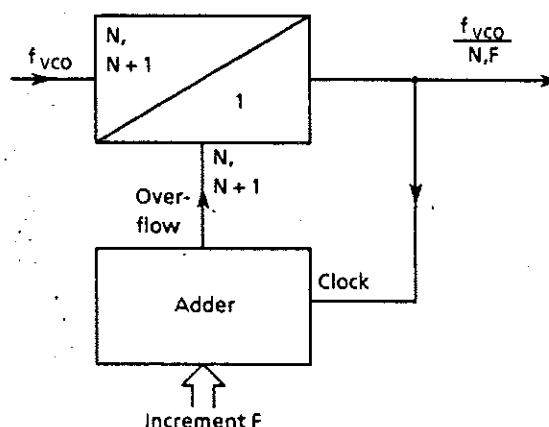


Fig. 5-1 Block diagram of N.F divider

An increment F is added on each output pulse from the divider. The division factor is switched to $N + 1$ for one reference frequency period if the adder overflows.

Example:

$$F = 0,1 \rightarrow \overline{N} = \frac{(9 \times N) + (N + 1)}{10} = N,1 = N,F$$

This switch-over of the division factor produces a phase discontinuity which leads via the PLL to spurious modulation of the oscillator. Spurious signal can be reduced by 60 to 80dB by a compensation circuit.

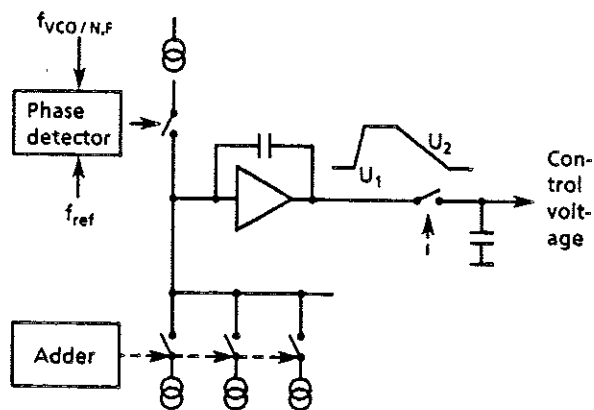


Fig. 5-2 Block diagram of N,F PLL

With its output signal, the phase detector switches a current source which charges the integration capacitor from V1 to V2. This voltage is sampled by the sample-and-hold circuit. The compensation current sources then discharge the integrator to V1. The on period of these current sources is controlled by the respective value in the adder, a current source being assigned to each digit. A bias current source also ensures that the phase shift in the PLL is constant.

Circuit description

The gate array D165 contains an interface for data transmission, the N.F divider with 8-digit adder and the control circuit for the compensation circuit sources of the first four digits after the decimal point.

D160 generates the clock for various parts of the circuit, the level is monitored by a diagnostics detector. The control signal for the sample-and-hold circuit is generated in D175. D180, 185, 186 synchronize the compensation and divider output pulses with the input clock. Crosstalk between the output signals of the gate array is thus reduced.

The output frequency of the N.F divider is compared with the reference frequency from the M divider in the phase detector comprising a J-K flipflop D220 and D221.

The current sources which determine the accuracy of the compensation consist of transistor current sources in a common array V235 followed by FET cascode stages. Diode selectors controlled by HCMOS levels are used to switch the currents for the phase detector, bias and compensation. The most important resistors for determining the current are fitted in an array (R235) in order to achieve as high a temperature stability as possible.

A sample-and-hold circuit controlled by the level converter V323 samples the output voltage of integrator N300 at the reference frequency. The control gain is switched over by D40 depending on the division factor. A preset voltage generated by the transistor current source V12 is added in N2 to the PI controller output voltage.

The output stages V20, 21 and V22, 23 are used to quick charge and discharge capacitors C15, 24 of the lag filter when the frequency is changed. The lag filter is also bypassed by the FET switch N20. The time constant of the PI controller is switched over by V303. The FET switch control triggered by the subassembly strobe is generated by the monostable D10 with the level converter V13. This ensures that the subassembly frequency settles rapidly.

The output voltages of the PI controller and the IF diagnostics detector are monitored by the alarm detector N410. Error message 42 is output if voltages are not within the limits.

5.2 Tests and Adjustments

5.2.1 Testing and Adjusting the 48 to 58-MHz Oscillator

The bottom screen cover should be screwed on when adjusting the VCO. Connect spectrum analyzer to jumper X1 using the adapter cable, connect power supply unit (0 to +20 V) to jumper X2, 2-3. Preliminary adjustment of VCO to following frequency range using C70, 71:

2.5 V --> $f = 48 \pm 0.2$ MHz
17.5 V --> $f = 58 \pm 0.2$ MHz.

Vary the tuning voltage from 1 to 19 V, the VCO should oscillate over the complete frequency range without drop-outs, spurious sidebands or marked increases in noise.

- * Level at X1: -14 to -11 dBm
- * Diagnostics voltage (SF 120): +0.4 to +0.7 V

5.2.2 Testing the Buffer Amplifier and 16:1 Divider

Connect spectrum analyzer to X3 using adapter cable, the power supply unit remains connected to X2.

- * Level at X3: -6 to -4 dBm.

Connect oscilloscope to X4 using 10:1 probe. HCMOS levels must be reached in the tuning range of the VCO (1 to 19 V).

Connect spectrum analyzer to X71, set jumper X4 to 1-2.

- * Level at X71: 3.000 to 3.625 MHz, +3 to +7 dm
- * Diagnostics voltage (SF 121): +0.2 to +0.5 V.

5.2.3 Checking the 40-MHz Signal

Connect signal generator set to 40 MHz, +5 dBm to X72.

- * Diagnostics voltage (SF 122): +0.8 to +1.2 V.

Measure signal at X5 using adapter cable, vary the input power at X72 from +2 to +8 dBm.

- * Level at X5: -17.5 to -14.5 dBm.

Measure the signal at P25 using an oscilloscope and 10:1 probe. HCMOS levels must be reached at an input power of +2 to +8 dBm. The signal generator set to 40 MHz, +5 dBm remains connected to X72.

5.2.4 Testing the M Divider

Connect frequency counter to P26 with 10:1 probe. Increment the M factor from 25 to 53, the output frequency at P26 is 5 MHz/M.

Setting on SMGU: $f_{RF} = 1002.5$ MHz ($M = 25$) to $f_{RF} = 2125.3$ MHz ($M = 53$) step size $\Delta f_{RF} = 40.1$ MHz, this corresponds to an increase in the M factor of 1.

5.2.5 Checking the IF signal 8 to 18 MHz

Connect power supply unit (0 to +20 V) to jumper X2, 2-3. Measure the signal at P6 using an oscilloscope and 10:1 probe. Vary the tuning voltage from 1 to 19 V, HCMOS levels must be achieved over the complete tuning range.

- * Diagnostics voltage (SF 123): +1.1 to +2.7 V.

5.2.6 Commissioning the PLL

5.2.6.1 Checking the Preset Voltage

Insert jumper X6 at 2-3. Measure the present voltage of the VCO at the following frequency settings using the diagnostics voltmeter (SF 118).

f_{SMGU} / MHz	Diagnostics voltage (SF 118) / V
1020,478000	12,8 ± 0,7
1019,648000	6,4 ± 0,35
1019,228000	3,2 ± 0,2
1019,434000	4,8 ± 0,3
1019,336000	4 ± 0,25
1019,277000	3,6 ± 0,25
1019,252000	3,4 ± 0,25
1019,238000	3,3 ± 0,25

5.2.6.2 PLL Function Test

Insert jumpers X6 and X2 at 1-2. Measure signal at P19 using oscilloscope and 10:1 probe. Setting on SMGU:

- * Signal at P19: see Fig. 5-3
- * Diagnostics voltage (SF 118): + 5 to + 6 V.

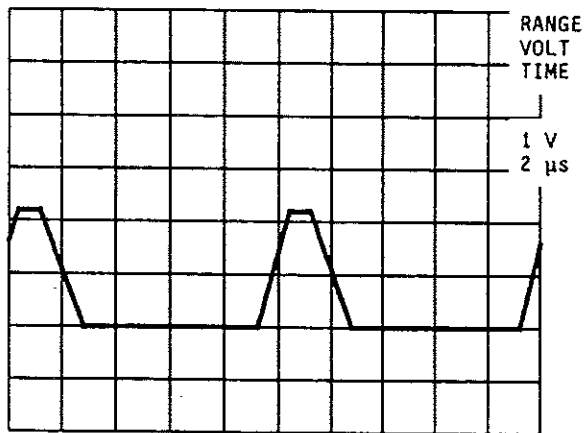


Fig. 5-3 Voltage at P19

5.2.6.3 Checking the Settling Time

Connect storage oscilloscope to P20 using probe (external triggering at P30,5).

Setting on SMGU:

RF sweep, $f_{START} = 1019.140625$,

$f_{STOP} = 1021.093750$, $f_{STEP} = 1.953125$ MHz.

Figs. 5-4 and 5-5 show the typical settling behaviour of the PI controller voltage at P20.

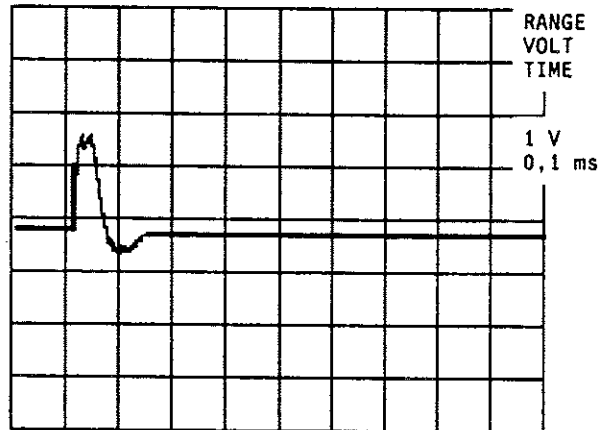


Fig. 5-4 PI controller voltage at P20,
 $f_{SMGU}: f_{START} \rightarrow f_{STOP}$

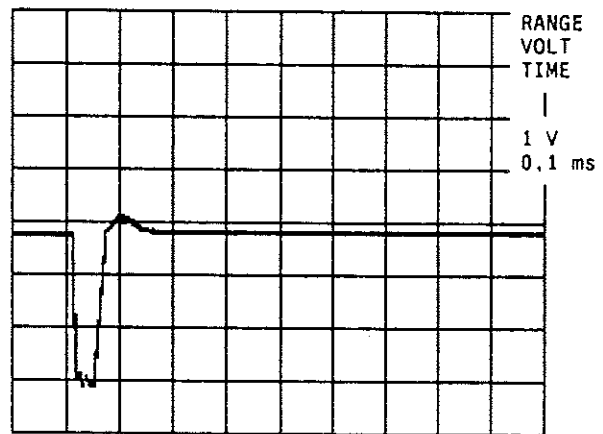


Fig. 5-5 PI controller voltage at P20,
 $f_{SMGU}: f_{START} \rightarrow f_{STOP}$

5.2.6.4 Checking Oscillator Linearity

The top and bottom screening covers must be screwed on. Adjust the output voltage of the PI controller on the diagnostics voltmeter (SF 117) to $\leq |0.3 \text{ V}|$ alternately at $f_{\text{SMGU}} = 2038.281$ and $f_{\text{SMGU}} = 2042.187$ using C70, 71.

The magnitude of the diagnostics voltage must be $\leq 2 \text{ V}$ at the following settings.

$f_{\text{SMGU}} / \text{MHz}$	Diagnostics voltage (SF 117) / V
2038,672000	≤ 2
2039,062000	≤ 2
2039,453000	≤ 2
2039,844000	≤ 2
2040,234000	≤ 2
2040,625000	≤ 2
2041,015	≤ 2
2041,406000	≤ 2
2041,796000	≤ 2

5.2.6.5 Setting and Checking Compensation

Insert jumper X4 at 2-3. Connect spectrum analyzer to X71 and cable W72 to X72 again. The top and bottom screen covers must remain screwed on for this adjustment, the spectrum analyzer and the SMGU must be synchronized at the same reference frequency.

Setting on SMGU: $f_{\text{RF}} = 2038.281641 \text{ MHz}$, SF 25 (control bandwidth of FRN loop too wide).

Setting on spectrum analyzer:
CF = 48 MHz, REF level = 5 dBm, RES BW = 30 Hz, video BW = 1 Hz, sweep time = 20 s, span = 0 Hz.

Adjust the level of the spurious signals to a minimum ($\leq -83 \text{ dBc}$) using R261.

Setting on SMGU: $f_{\text{RF}} = 2038.281289 \text{ MHz}$.

Setting on spectrum analyzer:
CF = 48.0011 MHz, otherwise as above.
Adjust the level of the spurious signals to a minimum ($\leq -83 \text{ dBc}$) using R263.

Check the spurious signals at $nx1 \text{ kHz}$ ($n = 1$ to 5) from the carrier with the following frequency settings on the SMGU ($\leq -78 \text{ dBc}$).

Spectrum analyzer setting:
CF = 48 MHz, REF level = 5 dBm, span = 10 kHz, RES BW = 30 Hz.

SMGU settings: SF 25

$f_{\text{SMGU}} / \text{MHz}$
2038.281641
2038.281289
2038.281254
2038.281250

Spectrum analyzer settings:
CF = 57 MHz, otherwise as above.

SMGU settings:
SF 49, $f_{\text{SMGU}} = 2041.797266 \text{ MHz}$.

Then remove top cover and insert jumper X4 at 1-2. Switch the control bandwidth of the FRN loop to narrow using SF 26.

5.2.7 Checking the Alarm

SMGU setting: $f_{\text{RF}} = 1000 \text{ MHz}$.

Disconnect the 40-MHz signal at X72, the display "Err 42" must light up. Connect the cable to X72 again. Connect a power supply unit (0 to $\pm 20 \text{ V}$) to X6, 2-3.

The display "Err 42" must light up at $< -8.8 \text{ V}$ and $> +8.8 \text{ V}$ and must disappear again at $> -8.2 \text{ V}$ and $< +8.2 \text{ V}$. Disconnect the power supply unit and connect the jumper X6 at 1-2 again, screw the top screen cover on again.

5.3 Troubleshooting

Faults in the FRN synthesis can be recognized at the RF output of the SMGU by means of a small frequency error ($\Delta f < 1.95$ MHz at $f_{RF} = 1$ GHz) and a poor spectrum close to the carrier. The PLL function is monitored by an alarm detector for the PI controller voltage and a detector for the input clock of the FRN divider. No synchronization errors occur in the following PLLs (summing loops 1 and 2) if there is a PLL fault because of the low frequency variation of the output signal (3.000 to 3.625 MHz). If "Err 42" (FRN synthesis) and "Err 46" (summing loops) occur nevertheless, either the 48 to 58 MHz oscillator, a series-connected buffer stage for the FRN synthesis or the 40-MHz signal for the fixed frequencies has failed.

5.3.1 Failure of the PLL (Err 42)

- Use the diagnostics function to check which voltage is out of tolerance:
SF 117, PI controller: -8 to +8 V,
SF 123, IF level: +1.1 to +2.7 V.
- If only the PI controller voltage is out of tolerance and if the output frequency at X71 displayed by SF 78 is correct, check the preset voltage and the adjustment of the oscillator using C70, 71 according to Section 5.2.6.1.
- If the PI controller voltage is out of tolerance and if the output frequency of the sub-assembly is incorrect, check the following parts of the circuit:
 1. The M divider with test points P25 (5 MHz) and P26 (5 MHz/M); the M factor is displayed using SF 83.
 2. The fractional-N divider with P8 ($f_{IF} = 8$ to 18 MHz, $f_{IF} = 16 \times f_{FRN} - 40$ MHz) P9 ($f_{IF}/N.F.$, $N.F. = 40$ to 194, $N.F. = M/5$ MHz ($f_{FRN} \times 16 - 40$ MHz), P11 ($f_{IF}/N.F.$). The output frequency f_{FRN} is displayed using SF 78, the M factor using SF 83.
 3. The operating points of the compensation current sources, the voltage stabilization, the integrator with test point P19, the sample-and-hold stage with P20, P21 and the function of the preset voltage according to Section 5.2.6.2.

- If the IF level is out of tolerance and there is an error message (the PI controller voltage may still be within tolerance), use the diagnostics function to check the oscillator level (SF 120) and the 40-MHz signal (SF 122). If these are still correct, check the 40-MHz buffer stage with V372, the oscillator buffer stage with V111, the mixer N140 and the IF amplifier with V150, V155.
It should be noted that no further settings (N, F and M dividers, preset voltage) can be carried out apart from the diagnostics function if there is no IF signal from the sub-assembly.

5.3.2 Occurrence of Spuria near the Carrier

If spuria with an amplitude of -70 to -15 dBc occur ≤ 2 kHz from the carrier, and if their frequency and amplitude change by a large amount when the output frequency of the SMGU is slightly adjusted ($f = 10$ to 100 Hz), check the adjustment according to Section 5.2.6.5. If this cannot be carried out, check the control signals for the compensation current sources at test points P12 (bias) and P13 to P16 (1st to 4th digits after the point), the voltage stabilization, the operating points of the current sources, the integrator and the sample-and-hold stage.

5.3.3 Signals at Test Points and DC Operating Points

Oscillator 48 to 58 MHz
V75 source: +0.5 to +2.5 V
V90 collector: +5 to +6 V
X1: 48 to 58 MHz, -14 to -11 dBm into 50 Ω

Buffer stages
V100 source: +0.7 to +2 V
V111 emitter: +4 to +4.5 V
X3: 48 to 58 MHz, -6 to 4 dBm into 50 Ω

16:1 Divider
V125 emitter: +4.8 to +5.2 V
P4: 48 to 58 MHz, HCMOS levels
P5: 3.000 to 3.625 MHz, HCMOS levels

IF amplifier 8 to 18 MHz

V150, 155 collector: +1 to +3 V DC

P6: 8 to 18 MHz, HCMOS levels

40-MHz isolating amplifier

V355 collector: +5.5 to +6.5 V

V360, 372 source: +0.7 to +2 V

X5: 40 MHz, -17.5 to -14.5 dBm into 50 Ω

M divider

V405 emitter: +4.7 to +5.1 V

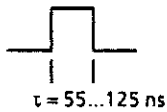
P25: 40 MHz, HCMOS levels

P26: 5 MHz/M, HCMOS levels

Fractional divider with synchronization

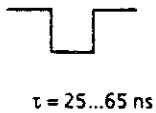
P7, P8: 8 to 18 MHz, HCMOS levels, duty factor ≈ 50 %

P9: narrow pulse, 94 to 200 kHz, HCMOS levels

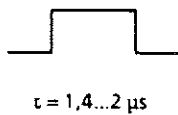


P10: as P9

P11: narrow pulse, 90 to 194 kHz, HCMOS levels

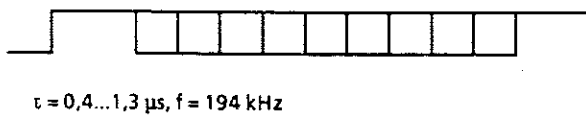


P12: pulse, HCMOS levels



P13: pulse train, HCMOS levels,

$f_{SMGU} = 1040$ MHz



P14: pulse train as with P13

$f_{SMGU} = 1040$ MHz

P14: pulse train as with P13

$f_{SMGU} = 1040$ MHz

P14: pulse train as with P13

$f_{SMGU} = 1040.000001$ MHz

Phase detector

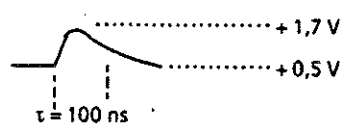
P17: pulse, HCMOS levels

$f_{SMGU} = 1040$ MHz



$τ = 0.5...0.6$ μs, $f = 200$ kHz

P18: narrow pulse, $f_{SMGU} = 1040$ MHz



Compensation current sources

V230 emitter: -14 V

V275 emitter: +14 V

V235.2: +6.75 V to +7.25 V

V236, 240, 245, 250 source: -7 to -10 V

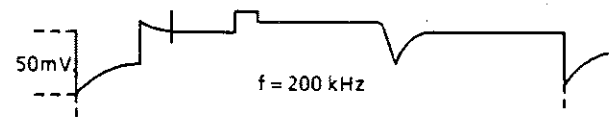
Voltage stabilization

V332 emitter: +4.7 to +4.95 V

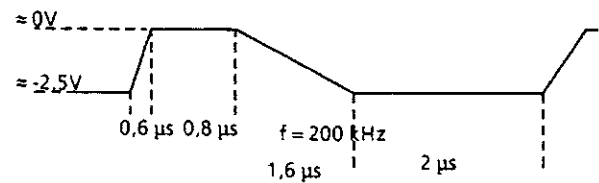
V331 emitter: +2.3 to +2.5 V

Integrator

N300.2: = 2.4 V DC

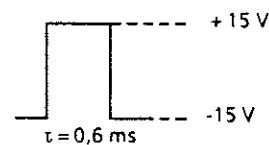


P19: $f_{SMGU} = 1040$ MHz



Sample-and-hold stage

P21: $f = 94$ to 200 kHz



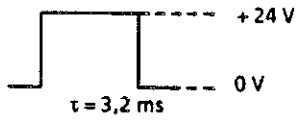
Loop filter with gain correction and preset voltage

P20: -8 to +8 V DC, typ. -2 to +2 V DC with adjusted VCO

V26 emitter: -14 V

V12 emitter: -6.7 to -7.7 V

N20.3: pulse



SMGU setting:

RF sweep, sweep time = 10 ms

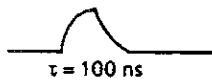
P22: + 2.5 to + 17.5 V DC

Diagnostics multiplexer and latch

SMGU setting:

RF sweep, sweep time = 10 ms

P30: very narrow pulse, HCMOS levels, period 10 ms, pulse width 100 ns



P31: as with P30

5.4 Interfaces

Signal		D	T	Range of values	Connection Point	Remarks
Name	Description					
+24 V	Power supply +24 V	I	P	23,4 ... 24,5 V 10 ... 30 mA	X7A24	Power supply
+15 V	Power supply +15 V	I	P	14,8 ... 15,3 V 240 ... 300 mA	X7A26	Power supply
+5 V	Power supply +5 V	I	P	4,9 ... 5,1 V 100 ... 150 mA	X7A28	Power supply
-15 V	Power supply -15 V	I	P	-15,2 ... -14,2 V 40 ... 70 mA	X7A30	Power supply
GND	Ground	B	P	HC-MOS	X7A10 X7A12 X7A14 X7A16 X7A23 X7A25 X7A27 X7A29 X7A31	
BA0	Subassembly address	I	D	HC-MOS	X7A21	Subassembly addressing
BA1	Subassembly address	I	D	HC-MOS	X7A20	Subassembly addressing
BA2	Subassembly address	I	D	HC-MOS	X7A19	Subassembly addressing
G1	Strobe 1	I	D	HC-MOS	X7A22	Subassembly addressing
TF.CLK	CLOCK	I	D	HC-MOS	X7A11	Data transmission
TR.DAT	Data	I	D	HC-MOS	X7A13	Data transmission
TST	Diagnostics	O	A	-5 ... +5 V	X7A17	Selftest
Ala	Alarm	O	L	Open collector	X7A18	Selftest
FRNREF	Reference	I	A	40 MHz 3 ... 7 dBm	X72	RF interface 50 Ω
FRN	FRN output	O	A	3,000 ... 3,625 MHz 3 ... 7 dBm	X71	RF interface 50 Ω

Direction
 I Input
 O Output
 B Bidirectional
 M Measurement

Type
 A Analog
 H Digital High
 L Digital Low
 P Power

5.5 Positions of Plug-in Jumpers

X2 at 2-3
 X4 at 1-2
 X6 at 1-2

5.6 Required Measuring Equipment

Spectrum analyzer (... 200 MHz)
 (e.g. FSA)

RF generator, high spectral purity, 40 MHz
 (e.g. SMG)

Oscilloscope > 100 MHz
 (e.g. BOL)

Digital storage oscilloscope
 (e.g. BOS)

RF adapter cable

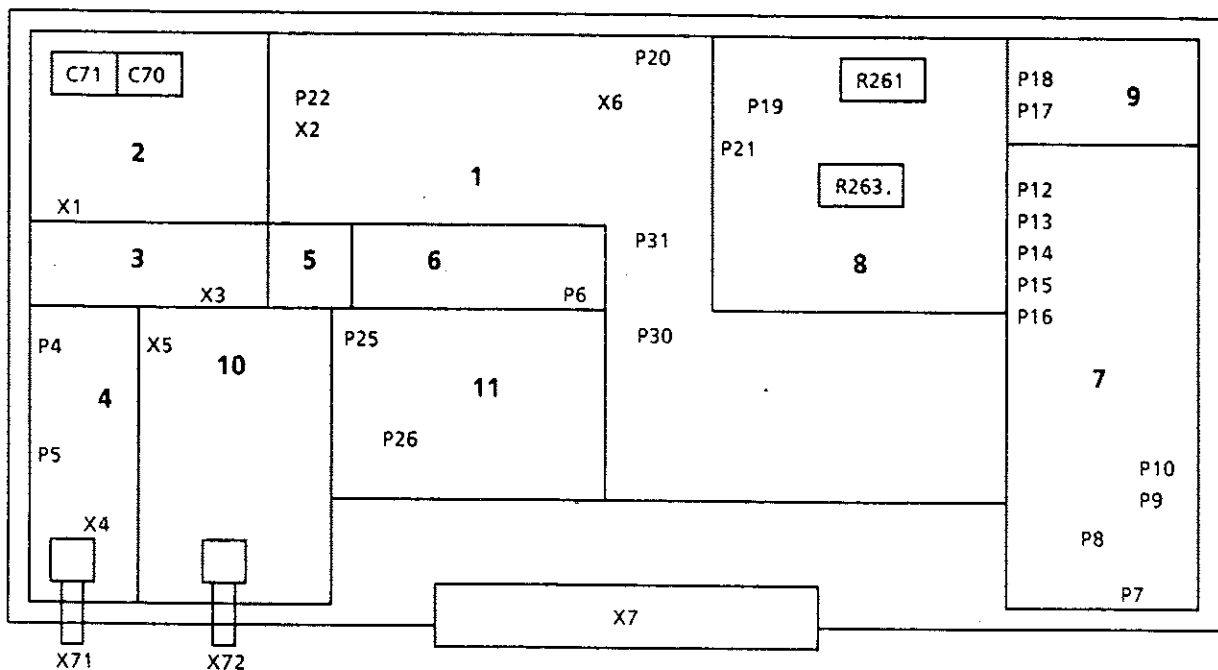
Test adapter

Frequency counter

Voltmeter
 (e.g. URE)

Controller
 (e.g. PUC)

Layout diagram



Schaltteillisten
Stromläufe
Bestückungspläne
Part lists
Circuit diagrams
Components plans
Listes des pièces détachées
Schémas de Circuit
Plans des composants

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	inhalten in contained in
C1	CK 1,5NF +-1% 100V RM5 KP POLYPROPYLENE CAPACITOR	CK 007.7600	ROE	KP1830-215/011-R	
C2	CK 68NF+-5%63V5RM MKT CAPACITOR	CK 099.2923	WIMA	MKS2/63/O,068UF/5%	
C3	CC 4,7NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8450	VITRAMON	VJ1206 Y 472 K FAT	
C4	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C5	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C6	CC 2,2PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8171	VITRAMON	VJ1206 A 2R2 C FAT	
C10	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/O,1UF/5%	
C11	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C12	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C13	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C15	CK 33NF+-1% 63V 10QARD. CAPACITOR	CK 294.6351	SIEMENS	B33531-A5333-F	
C19	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C22	CK 47NF+-5%63V5RM MKT CAPACITOR	CK 099.2917	WIMA	MKS2/63/O,047UF/5%	
C23	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C24	CK 1UF+-5%250V RM22,5 # CAPCITOR	711.6747	SIEMENS	B32650-L3105-J	
C26	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C30	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C35	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C36	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C37	CC 1PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8667	VITRAMON	VJ1206 A 1R0 C FAT	
C38	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C50	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C70	CT 13PF TAUCHTR.RD7X12 AIR-TYPE TRIMMER	CT 092.4266	TEKELEC	AT 5401	
C71	CT 13PF TAUCHTR.RD7X12 AIR-TYPE TRIMMER	CT 092.4266	TEKELEC	AT 5401	
C72	CC 33PF+- 5%100V NPO VIEL CERAMIC CAPACITOR	CC 060.0713	UNIONCARB	CO52C330J2G1CA	
C74	CC 22PF 2% N470/IA 3 ROHR CERAMIC CAPACITOR	022.3019	DRALORIC	N470/IA22/2RD3X10LC	
C75	CC 68PF+- 5%100V NPO VIEL CERAMIC CAPACITOR	CC 060.0759	UNIONCARB	CO52C680J2F1CA	
C76	CC 56PF+- 5%100V NPO VIEL CERAMIC CAPACITOR	CC 060.0742	UNIONCARB	CO52C560J2G1CA	
C77	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C78	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C80	CC 330PF+- 5%100V NPO VIE CERAMIC CAPACITOR	CC 060.0836	UNIONCARB	CO52C331J2G1CA	
C81	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C83	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C87	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C90	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C91	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C92	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C93	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C95	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	

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	23	0789	EE FR-N-SYNTHESE FRN-SYNTHESIS	819.3860.01 SA	1+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C96	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C100	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C101	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C102	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C103	CC 22PF+-2%6X9P100 CAPACITOR	CC 087.6335	VALVO	2222 678 04229	
C104	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C110	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C112	CC 18PF+-2%3X4N750 CAPACITOR	CC 087.6812	VALVO	2222 678 58189	
C113	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C114	CC 2,2NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8444	VITRAMON	VJ1206 Y 222 K FAT	
C120	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C126	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C127	CE 220UF-10+50%6V 8,7X13 ELEKTROLYTIC CAPACITOR	CE 022.7520	ROEDERST	EK 00 CB 322 B	
C128	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C130	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C134	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C135	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C136	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C137	CC 680PF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8421	VITRAMON	VJ1206Y681KFA	
C138	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C140	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C142	CC 220PF+-2%6X7N750 CAPACITOR	CC 087.6941	VALVO	2222 678 58221	
C143	CC 33PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8780	VITRAMON	VJ1206 A330F FAT	
C145	CC 270PF+-2%6X9N750 CAPACITOR	CC 087.6958	DRALORIC	EDPU6X9/270/2%N750	
C146	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C147	CC 270PF+-2%6X9N750 CAPACITOR	CC 087.6958	DRALORIC	EDPU6X9/270/2%N750	
C148	CC 15PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8750	VITRAMON	VJ1206 A 150 F FAT	
C149	CC 120PF+-2%6X9NPO CAPACITOR	CC 087.6558	VALVO	2222 678 10121	
C150	CC 56PF+-2%5X6NPO CAPACITOR	CC 087.6512	VALVO	2222 678 10569	
C152	CC 56PF+-2%5X6NPO CAPACITOR	CC 087.6512	VALVO	2222 678 10569	
C155	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C156	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C157	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C158	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C159	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C160	CE 47UF+-20%6,3V SAL ELECTR. CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C161	CE 47UF+-20%6,3V SAL ELECTR. CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C162	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C163	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C165	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C166	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C167	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C168	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C169	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C170	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C171	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C175	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C182	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C185	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C186	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C188	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C189	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C190	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C195	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C200	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C201	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C202	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C203	CC 390PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8880	VITRAMON	VJ1206 A 391 F FAT	
C212	CC 10PF+-0,25PF50VNPO1206 CERAMIC CHIP CAPACITOR	CC 099.8480	VITRAMON	VJ1206 A 100 C FAT	
C215	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C223	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C224	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C225	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C228	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C230	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C235	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C240	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C245	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C250	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C251	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C265	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C276	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C280	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C281	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C290	CK 68NF+-5%63V5RM MKT CAPACITOR	CK 099.2923	WIMA	MKS2/63/0,068UF/5%	
C292	CK 470PF +-1% 100V RMS KP POLYPROPYLENE CAPACITOR	CK 007.7575	ROE	KP1830-147/011-R	
C293	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C301	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C305	CC 2,2PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8171	VITRAMON	VJ1206 A 2R2 C FAT	

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C320	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C321	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C322	CC 3,3PF+-0,25PF3X4NPO CAPACITOR	CC 087.6364	VALVO	2222 678 09338	
C323	CC 47PF+-2%3X4N750 CAPACITOR	CC 087.6864	VALVO	2222 678 58479	
C326	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C327	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C330	CE 220UF-10+50%6V 8,7X13 ELEKTROLYTIC CAPACITOR	CE 022.7520	ROEDERST	EK 00 CB 322 B	
C331	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C332	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C333	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C334	CE 47UF+-20%6,3V SAL ELECTR. CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C350	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C351	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C360	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C362	CC 27PF+-2%3X4N750 CAPACITOR	CC 087.6835	VALVO	2222 678 58279	
C365	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C366	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C367	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C369	CC 1NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C370	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C371	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C372	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C373	CC 18PF+-2%3X4N750 CAPACITOR	CC 087.6812	VALVO	2222 678 58189	
C374	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C375	CC 82PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8821	VITRAMON	VJ1206 A 820 F FAT	
C376	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C377	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C378	CC 6,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8236	VITRAMON	VJ1206 A 6R8 C FAT	
C379	CC 15PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8750	VITRAMON	VJ1206 A 150 F FAT	
C380	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C381	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C385	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C387	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C388	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C389	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C390	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C391	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C392	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C393	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C394	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C395	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C396	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C397	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C402	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C405	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C407	CE 220UF-10+50%6V 8,7X13 ELEKTROLYTIC CAPACITOR	CE 022.7520	ROEDERST	EK 00 CB 322 B	
C420	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C421	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C422	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C425	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C426	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C430	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C431	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C435	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C436	CE 2,2UF+-20%40V SAL ELECTR.CAPACITOR	CE 007.3911	VALVO	2222 122 37228	
D10	BL MM74HC4538N 2XMULTIVIB DUAL MULTIVIBRATOR	BL 099.9740	NSC	MM74HC4538N	
D40	BL MM74HC4051N 8CH.AN.MUX 8CH.ANALOG MUX/DEMUX	BL 099.9670	NSC	MM74HC4051N	
D126	BL 74AC161SC 4B.BIN CNT 4BIT SYNC.PRES.BIN COUNT.	820.3519	NSC	74AC161SC	
D160	BL PC74HCOOT 4X2IN.NAND QUAD 2INPUT NAND GATE	BL 007.3463	VALVO	PC74HCOOT	
D165	BG L5A0429 GATEARRAY GATE-ARRAY	820.3290	LSI	L5A0429	
D175	BL 74AC161SC 4B.BIN CNT 4BIT SYNC.PRES.BIN COUNT.	820.3519	NSC	74AC161SC	
D180	BL PC74HCTOOT 4X2IN.NAND NAND GATE	BL 007.6156	VALVO	PC74HCTOOT	
D185	BL PC74HCT175T 4XD-FF RES QUAD D-TYPE FLIPFLOP	BL 007.6462	VALVO	PC74HCT175T	
D186	BL PC74HCT175T 4XD-FF RES QUAD D-TYPE FLIPFLOP	BL 007.6462	VALVO	PC74HCT175T	
D200	BL PC74HC238P 3TO8 L.DEC DECODER/DEMULTIPLEXER	BL 620.0847	VALVO	PC74HC238P	
D201	BL MM74HC4538N 2XMULTIVIB DUAL MULTIVIBRATOR	BL 099.9740	NSC	MM74HC4538N	
D205	BL MM74HC11N 3X3IN.ANDG TRIPLE 3-INPUT AND GATE	BL 099.9486	NSC	MM74HC11N	
D210	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D211	BL MM74HC4051N 8CH.AN.MUX 8CH.ANALOG MUX/DEMUX	BL 099.9670	NSC	MM74HC4051N	
D215	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D216	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D220	BL PC74HCT112T 2XJK-FF CL DUAL JK-FF	BL 007.6327	VALVO	PC74HCT112T	
D221	BL PC74HCTOOT 4X2IN.NAND NAND GATE	BL 007.6156	VALVO	PC74HCTOOT	
D380	BL 74AC74SC 2XD-FLIPFL DUAL D-TYPE FLIPF	820.3602	NSC	74AC74SC	
D385	BL PC74HCOOT 4X2IN.NAND QUAD 2INPUT NAND GATE	BL 007.3463	VALVO	PC74HCOOT	
D387	BL 74AC161SC 4B.BIN CNT 4BIT SYNC.PRES.BIN COUNT.	820.3519	NSC	74AC161SC	
D390	BL PC74HCT161T BIN.COUNT. BINARY COUNTER	BL 007.6427	VALVO	PC74HCT161T	

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D395	BL PC74HCT161T BIN.COUNT. BINARY COUNTER	BL 007.6427	VALVO	PC74HCT 16 1T	
L12	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L35	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L60	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L61	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L72	LD SPULE 287NH 8,5W FE-K COIL+CORE	613.6289	TOKO	E521HN080023	
L75	LD 4,70UH10%1,200HMO,239A CHOKE	LD 067.2940	DELEVAN	DROSSEL 1025-36	
L80	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L90	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L101	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L102	LD 0,39UH10%0,300HMO,710A CHOKE	LD 067.2811	DELEVAN	DROSSEL 1025-10	
L111	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L113	LD 0,39UH10%0,300HMO,710A CHOKE	LD 067.2811	DELEVAN	DROSSEL 1025-10	
L142	LD 0,39UH10%0,300HMO,710A CHOKE	LD 067.2811	DELEVAN	DROSSEL 1025-10	
L143	LD 0,56UH10%0,500HMO,550A CHOKE	LD 067.2834	DELEVAN	DROSSEL 1025-14	
L146	LD 0,56UH10%0,500HMO,550A CHOKE	LD 067.2834	DELEVAN	DROSSEL 1025-14	
L148	LD 0,56UH10%0,500HMO,550A CHOKE	LD 067.2834	DELEVAN	DROSSEL 1025-14	
L155	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L175	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L280	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L326	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L333	LD 1,20UH10%0,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L362	LD 0,47UH10%0,350HMO,660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12	
L365	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L372	LD 0,82UH10%0,850HMO,420A CHOKE	LD 067.2857	DELEVAN	DROSSEL 1025-18	
L375	LD 0,27UH10%0,160HMO,975A CHOKE	LD 067.2792	DELEVAN	DROSSEL 1025-06	
L376	LD 0,27UH10%0,160HMO,975A CHOKE	LD 067.2792	DELEVAN	DROSSEL 1025-06	
L377	LD 0,22UH10%0,140HM1,045A CHOKE	LD 067.2786	DELEVAN	DROSSEL 1025-04	
L405	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L420	LD 1,20UH10%0,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L422	LD 1,20UH10%0,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L425	LD 1,20UH10%0,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L426	LD 1,20UH10%0,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L430	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L431	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L435	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L436	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
N1	BO LF156J BIFET OPAMP OPERATIONAL AMPLIFIER	BO 645.7251	MOTOROLA	LF156J	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
N2	BO AD744AQ BIFET OPAMP OPERATIONAL AMPLIFIER	820.3590	ANALOG DEV	AD744AQ	
N20	BJ SD5000N 4X ANALOGSCH BJ SD5000N 4XANALOGSWITCH	BJ 342.2340	SILICONIX	SD5000N	
N300	BO SE5534AFE LOW N.OPAMP OPERATIONAL AMPLIFIER	BO 301.3335	SIGNETICS	SE5534AFE	
N330	BO NE5532AFE 2XL.N.OPAMP OPERATIONAL AMPLIFIER	BO 356.0450	VALVO	NE5532AFE	
N410	BO LM339N 4X COMPAR COMPARATOR	BO 342.2062	NSC	LM339N	
P4	VL WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
.22	WIRE-WRAP PIN				
P25	VL WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
	WIRE-WRAP PIN				
P26	VL WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
	WIRE-WRAP PIN				
P30	VL WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
	WIRE-WRAP PIN				
P31	VL WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
	WIRE-WRAP PIN				
R1	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMAO207/332OHM-F-D	
R2	RL 0,35W 392 OHM+-1%TK50 RESISTOR	RL 082.2183	DRALORIC	SMAO207/392K-F-C	
R3	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R6	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R7	RL 0,35W 210 KOHM+-1%TK50 RESISTOR	RL 083.2258	DRALORIC	SMAO207/210K-F-C	
R8	RL 0,35W 107 KOHM+-1%TK50 RESISTOR	RL 083.2035	DRALORIC	SMAO207/107K-F-C	
R9	RL 0,35W 53,6KOHM+-1%TK50 RESISTOR	RL 082.2590	DRALORIC	SMA 0207/53,6K-F-C	
R10	RG 221 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6004	DALE	CRCW1206-10 221K F-T	
R11	RG 3,92KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5808	DALE	CRCW1206-10 3K92 F-T	
R12	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R13	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	
R14	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R15	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMAO207/1,50K-F-D	
R16	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R17	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R18	RL 0,35W27,4KOHM+-0,1%T25 RESISTOR	RL 084.3906	DRALORIC	SMAO207	
R19	RL 0,35W13,7KOHM+-0,1%T25 RESISTOR	RL 084.3329	DRALORIC	SMAO207/13,7K-B-E	
R20	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R21	RL 0,35W6,81KOHM+-0,1%T25 RESISTOR	RL 084.2745	DRALORIC	SMAO207/6,81K-B-E	
R22	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R23	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R24	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R25	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R26	RL 0,35W 825 OHM+-1%TK50 RESISTOR	RL 082.2502	DRALORIC	SMA 0207/825OHM-F-C	
R27	RL 0,35W 392 KOHM+-1%TK50 RESISTOR	RL 083.2512	DRALORIC	SMAO207/392K-F-C	
R28	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R29	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R30	RL 0,35W 182 KOHM+-1%TK50 RESISTOR	RL 083.2193	DRALORIC	SMAO207/182K-F-C	

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R33	RL 0,35W3,40KOHM+-0,1%T25 RESISTOR	RL 084.2168	DRALORIC	SMA0207/3,40K-B-E	
R34	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R35	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R36	RL 0,35W6,98KOHM+-0,1%T25 RESISTOR	RL 084.2768	DRALORIC	SMA0207/6,98K-B-E	
R37	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R39	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R40	RG 3,92KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5808	DALE	CRCW1206-10 3K92 F-T	
R41	RG 1,3 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5708	DALE	CRCW1206-10 1K3 F-T	
R42	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R43	RG 2,43KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5750	DALE	CRCW1206-10 2K43 F-T	
R44	RG 3,57KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5795	DALE	CRCW1206-10 3K57 F-T	
R45	RG 5,62KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0735	DALE	CRCW1206-10 5K62 F-T	
R46	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R47	RG 27,4KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5895	DALE	CRCW1206-10 27K4 F-T	
R49	RL 0,35W 365 KOHM+-1%TK50 RESISTOR	RL 083.2487	DRALORIC	SMA0207/365K-F-C	
R50	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R51	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R52	RL 0,35W 422 KOHM+-1%TK50 RESISTOR	RL 083.2541	DRALORIC	SMA/207/422K-F-C	
R53	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R54	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R56	RG 15,0KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5843	DALE	CRCW1206-10 15K F-T	
R60	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T	
R61	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R75	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T	
R80	RL 0,35W 681 OHM+-1%TK50 RESISTOR	RL 083.0490	DRALORIC	SMA0207/681OHM-F-D	
R81	RG 1,5 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5714	DALE	CRCW1206-10 1K5 F-T	
R84	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R85	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/221OHM-F-D	
R86	RL 0,35W 5,62KOHM+-1%TK50 RESISTOR	RL 082.2190	DRALORIC	SMA0207/5,62K-F-C	
R87	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R88	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R89	RL 0,35W 392 OHM+-1%TK50 RESISTOR	RL 082.2183	DRALORIC	SMA0207/392K-F-C	
R90	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R95	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R100	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/150OHM-F-D	
R101	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R104	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R110	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R111	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	

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R112	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R113	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R114	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R115	RG 1,21KOHM+-1%TK100 1206 CHIP RESISTOR	006.9968	DALE	CRCW1206-10 1K21 F-T	
R116	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R117	RG 15,0 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5450	DALE	CRW1206-10 15R F-T	
R120	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R121	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/150OHM-F-D	
R122	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T	
R123	RG 2,74KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5766	DALE	CRCW1206-10 2K74 F-T	
R124	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R126	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
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R129	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R135	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R136	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R137	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R140	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R141	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R142	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R143	RG 56,2 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8826	DALE	CRCW1206-10 56R2 F-T	
R144	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R145	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R146	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R150	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R151	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R152	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/221OHM-F-D	
R153	RG 3,32OHM+-1%TK100 1206# CHIP-RESISTOR	007.8388	EBG	CT3216 3,32OHM 1% TK	
R155	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/150OHM-F-D	
R156	RG 2,74KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5766	DALE	CRCW1206-10 2K74 F-T	
R159	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R160	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R161	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R162	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R163	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMA0207/22,10OHM-F-D	
R164	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R165	RN 9X 1KOHM+-2%SIL10 H5 RESISTOR NETWORK	RN 343.4323	BOURNS	4310R-101-102	
R166	RN 9X 1KOHM+-2%SIL10 H5 RESISTOR NETWORK	RN 343.4323	BOURNS	4310R-101-102	
R167	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R168	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R169	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R173	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/4750HM-F-D	
R175	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R176	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R177	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R180	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R182	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMAO207/22,10HM-F-D	
R185	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R186	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R187	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMAO207/22,10HM-F-D	
R188	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMAO207/22,10HM-F-D	
R190	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R195	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R200	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R201	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R202	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R205	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R206	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R207	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R208	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R210	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMAO207/2210HM-F-D	
R211	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/4750HM-F-D	
R212	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R213	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R214	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/4750HM-F-D	
R215	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R216	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R217	RL 0,35W 5,62KOHM+-1%TK50 RESISTOR	RL 082.2190	DRALORIC	SMAO207/5,62K-F-C	
R218	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R219	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R220	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R221	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R222	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R223	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R224	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R225	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R228	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMAO207/22,10HM-F-D	
R229	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R230	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R231	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R235	RN 1X30K1/4X3K/1X2,74K/2X RESISTOR NETWORK	801.4842	EBG	R&S-ZCHNG.801.4842	
R236	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R237	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R240	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R241	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R245	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R246	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R250	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R251	RL 0,35W 75,0KOHM+-1%TK50 RESISTOR	RL 083.1916	DRALORIC	SMA/207/75K-F-C	
R252	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R253	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R254	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R260	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R261	RS 0,75W10KOHM+-10% CERMET DEPOS.-CARBON POTENTIOMET	RS 037.7396	BOURNS	3006P-1-10 KOHM+-10%	
R262	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R263	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7903	BOURNS	3386F-1-103	
R264	RL 0,35W 13,0KOHM+-1%TK50 RESISTOR	RL 083.1368	DRALORIC	SMA0207/13,0K-F-D	
R265	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R267	RL 0,35W 301 KOHM+-1%TK50 RESISTOR	RL 083.2406	DRALORIC	SMA0207/301K-F-C	
R268	RL 0,35W 301 OHM+-1%TK50 RESISTOR	RL 083.0210	DRALORIC	SMA0207/301OHM-F-D	
R269	RL 0,35W 301 KOHM+-1%TK50 RESISTOR	RL 083.2406	DRALORIC	SMA0207/301K-F-C	
R270	RL 0,35W 301 OHM+-1%TK50 RESISTOR	RL 083.0210	DRALORIC	SMA0207/301OHM-F-D	
R275	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R276	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R280	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R281	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R282	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R290	RL 0,35W 7,50KOHM+-1%TK50 RESISTOR	RL 083.1197	DRALORIC	SMA0207/7,5K-F-D	
R300	RG 1,21KOHM+-1%TK100 1206 CHIP RESISTOR	006.9968	DALE	CRCW1206-10 1K21 F-T	
R307	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R310	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R315	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R320	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R321	RL 0,35W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMA0207/1,21K-F-D	
R322	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R323	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R324	RL 0,35W 2,61KOHM+-1%TK50 RESISTOR	RL 083.0903	DRALORIC	SMA0207/2,61K-F-D	
R330	RL 0,35KOHM 1,24KOHM%TK50 RESISTOR	RL 083.0661	DRALORIC	SMA0207/1,24K-F-D	
R331	RL 0,35KOHM 1,24KOHM%TK50 RESISTOR	RL 083.0661	DRALORIC	SMA0207/1,24K-F-D	

ROHDE & SCHWARZ		AI	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
		23	0789	EE FR-N-SYNTHESE FRN-SYNTHESIS	819.3860.01 SA	11+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R332	RL 0,35W 5,11KOHM+-1%TK50 RESISTOR	RL 082.2348	DRALORIC	SMAO207/5,11K-F-C	
R333	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R334	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R350	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R351	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R353	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R354	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMAO207/221OHM-F-D	
R355	RL 0,35W 274 OHM+-1%TK50 RESISTOR	RL 083.0178	DRALORIC	SMAO207/274OHM-F-D	
R360	RG 182 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5595	DALE	CRCW1206-10 182R F-T	
R361	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMAO207/150OHM-F-D	
R362	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R363	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R364	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R370	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R371	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R372	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMAO207/150OHM-F-D	
R373	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R375	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R376	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R380	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R381	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMAO207/221OHM-F-D	
R386	RN 9X4,7KOHM+-2% SIL10 H5 NETWORK	RN 327.0804	BOURNS	4310R-101-472	
R387	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R388	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R399	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R405	RL 0,35W 121 OHM+-1%TK50 RESISTOR	RL 082.9859	DRALORIC	SMAO207/121OHM-F-D	
R406	RG 2,74KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5766	DALE	CRCW1206-10 2K74 F-T	
R407	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R408	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R409	RL 0,35W 365 KOHM+-1%TK50 RESISTOR	RL 083.2487	DRALORIC	SMAO207/365K-F-C	
R410	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R411	RL 0,35W 10,5KOHM+-1%TK50 RESISTOR	RL 083.1300	DRALORIC	SMAO207/10,5K-F-D	
R412	RL 0,35W 3,48KOHM+-1%TK50 RESISTOR	RL 083.1016	DRALORIC	SMAO207/3,48K-F-D	
R413	RL 0,35W 174 KOHM+-1%TK50 RESISTOR	RL 083.2170	DRALORIC	SMAO207/174K-F-C	
R414	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R415	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R416	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R417	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R430	RL 0,35W4,75MOHM+-1%TK50 METALFILMRESISTOR	RL 099.8250	RESISTA	MK2 4,75MOHM 1% TK50	

ROHDE & SCHWARZ	AI	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
		23 0789	EE FR-N-SYNTHESE FRN-SYNTHESIS	819.3860.01 SA	12+

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Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	inhalten in contained in
U140	BM TAK1WH MIXER 750MHZ MIXER	820.3483	MCL	TAK-1WH	
V10	AE BZX79/5V6 0.5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V12	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT, POL.CBE	
V13	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT, POL.CBE	
V14	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V20	AK BC337-40 N 45V 800MA TRANSISTOR	AK 815.7684	VALVO	BC337-40GEGURTET	
V21	AK BC327-40 P 45V 800MA TRANSISTOR	AK 815.7678	VALVO	BC327-40GEGURTET	
V22	AK BC327-40 P 45V 800MA TRANSISTOR	AK 815.7678	VALVO	BC327-40GEGURTET	
V23	AK BC337-40 N 45V 800MA TRANSISTOR	AK 815.7684	VALVO	BC337-40GEGURTET	
V24	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V25	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V26	AK 2N2907A P 60V 600MA TRANSISTOR	AK 010.3583	VALVO	2N2907A	
V28	AD BAS16 75V 0A25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V37					
V38	AE BZX79/C10 0,5W ZDI ZENER DIODE	AE 012.2510	VALVO	BZX55/(79)C10 GEG.	
V45					
V49	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	
V50	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	
V52	AE 1N827 6,2V REF DIODE REFERENCE DIODE	AE 418.0029	CDI	1N827	
V58	AE BB620 45/03PF CDI TUNING DIODE	848.5251	SIEMENS	BB620	
V71					
V75	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V90	AK BFR91A N 12V 35MA TRANSISTOR	644.0730	VALVO	BFR91A	
V95	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V100	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V111	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V120	AK BFY90 N 15V 25MA TRANSISTOR	AK 010.4550	VALVO	BFY90	
V125	AK BSX46-16 N 60V1000MA TRANSISTOR	AK 010.6847	VALVO	BSX46-16	
V135	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V150	AK BFY90 N 15V 25MA TRANSISTOR	AK 010.4550	VALVO	BFY90	
V155	AK BFY90 N 15V 25MA TRANSISTOR	AK 010.4550	VALVO	BFY90	
V164	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V212	AK 2N2369A N 15V 200MA TRANSISTOR	AK 010.4680	VALVO	2N2369A	
V215	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	
V230	AK 2N2907A P 60V 600MA TRANSISTOR	AK 010.3583	VALVO	2N2907A	
V235	AK MATO4FP 4XN TR.ARRAY TRANSISTOR ARRAY	820.3577	PMI	MATO4FP	
V236	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V240	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V245	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V250	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V260	AD BAS16 75V 0A25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V263					

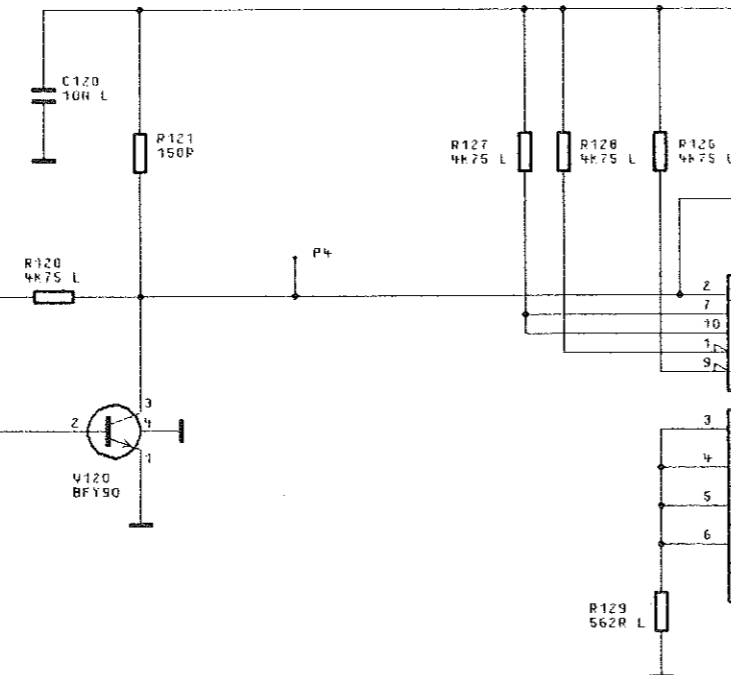
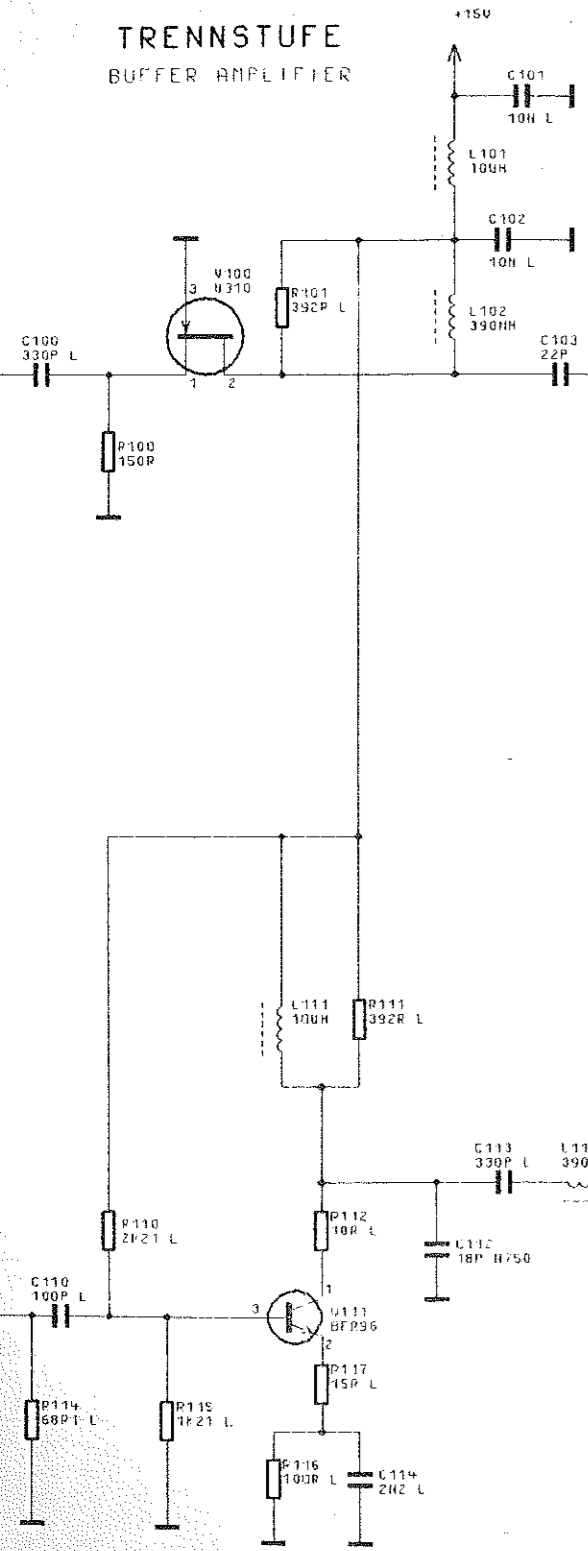
ROHDE & SCHWARZ	AI	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
		23 0789	EE FR-N-SYNTHESE FRN-SYNTHESIS	819.3860.01 SA	13+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V264 ..269	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V270 ..273	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V275	AK 2N2222A N 40V 800MA TRANSISTOR	AK 010.5405	VALVO	2N2222A	
V280	AK BF450 P 40V 25MA TRANSISTOR	AK 342.2240	SIEMENS	BF450	
V303	AM SD210DE N-E 30V MOSF MOS-FET	844.7637	SILICONIX	SD210DE	
V307	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V308	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V315	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V316	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V320	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V321	AE BZX79/B9V1 0,5W ZDI ZENER DIODE	AE 491.7507	VALVO	BZX79/B9V1	
V322	AM SD210DE N-E 30V MOSF MOS-FET	844.7637	SILICONIX	SD210DE	
V323	AK 2N2222A N 40V 800MA TRANSISTOR	AK 010.5405	VALVO	2N2222A	
V324	AE BZX79/C12 0,5W ZDI ZENER DIODE	AE 012.2532	VALVO	BZX55/C12 BZX79...	
V325	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V331	AK 2N2222A N 40V 800MA TRANSISTOR	AK 010.5405	VALVO	2N2222A	
V332	AK 2N2222A N 40V 800MA TRANSISTOR	AK 010.5405	VALVO	2N2222A	
V355	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V356	AE BZX79/5V6 0.5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V360	AM U310 N-D 25V JFET. FET	AM 454.6217	SILICONIX	U310	
V370	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V372	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V375 ..378	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V380	AK BFY90 N 15V 25MA TRANSISTOR	AK 010.4550	VALVO	BFY90	
V405	AK BSX46-16 N 60V1000MA TRANSISTOR	AK 010.6847	VALVO	BSX46-16	
W1	DX KABEL W1 CABLE	819.4496			819.4473
W2	DX KABEL W2 CABLE	819.4480			819.4473
X2	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X4	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X6	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X7	FP STECKERLEISTE 32POL. MULTIPOINT CONNECTOR	FP 514.4550	PANDUIT	100-232-033/999	
X71	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X72	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X1A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X1B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X3A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X3B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X5A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
		Äl Datum	Schaltteilliste für Parts list for		Blatt Page
ROHDE & SCHWARZ		29.0789	EE FR-N-SYNTHESE FRN-SYNTHESIS		819.3860.01 SA 14+

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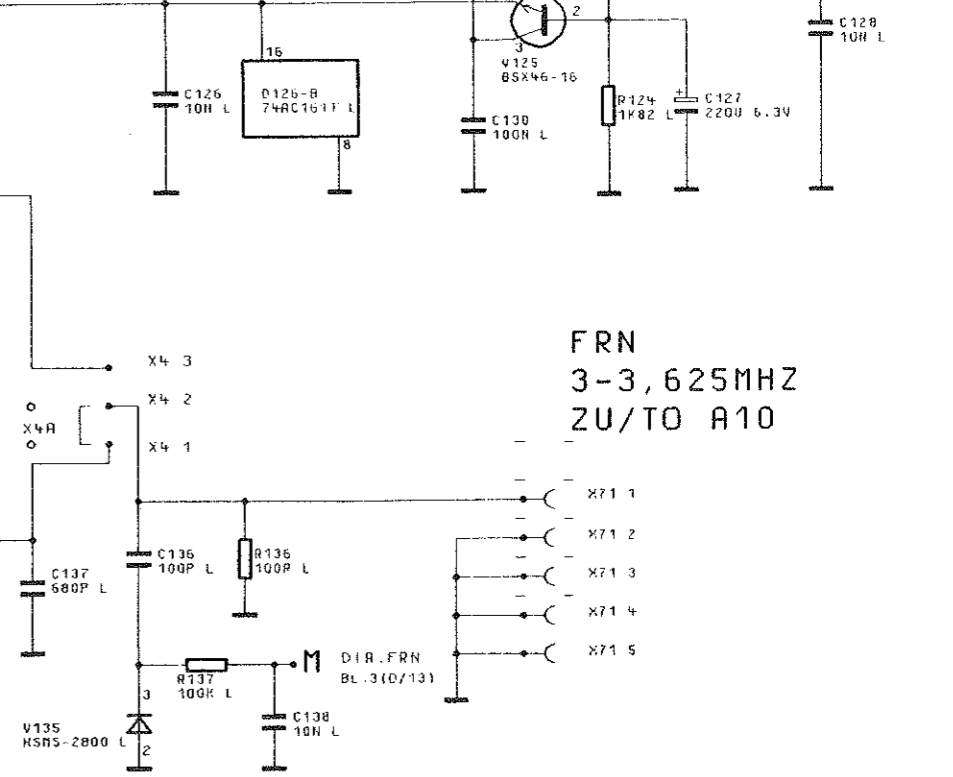
Kennz. Comp.No	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalt in contained in	
X5B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	- ENDE -	
Z1 ..6	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
ROHDE & SCHWARZ		Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
		23	0789	EE FR-N-SYNTHESE FRN-SYNTHESIS	819.3860.01 SA	15-

TRENNSTUFE
BUFFER AMPLIFIER

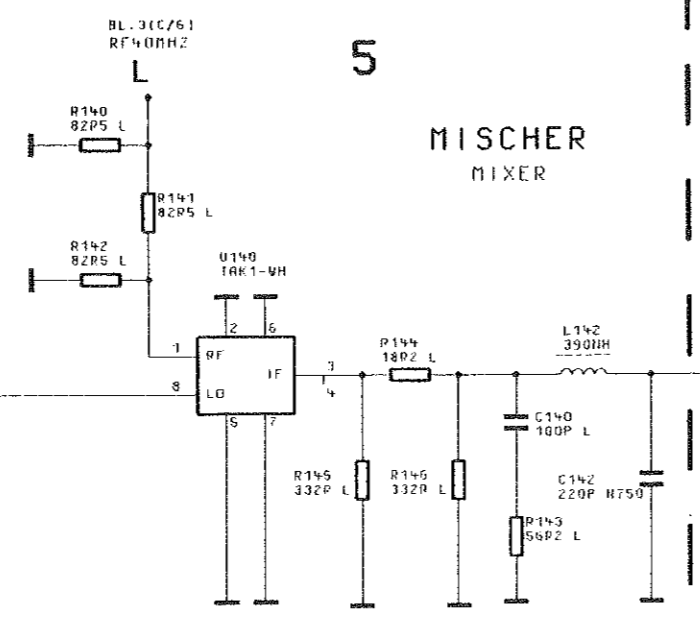


TEILER 1/16
DIVIDER 1/16

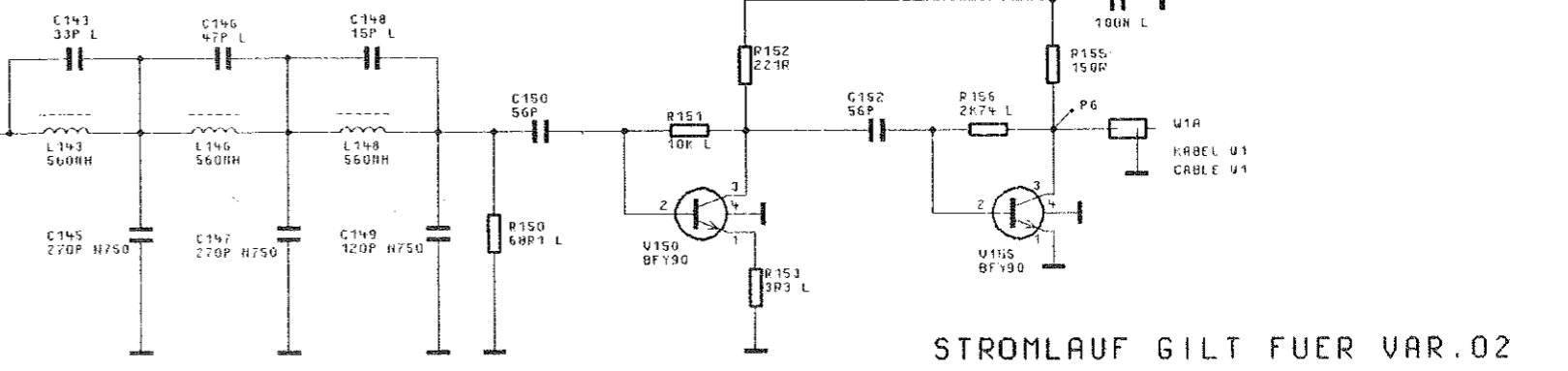
FRN
3-3,625MHZ
ZU/TO A10



MISCHER
MIXER



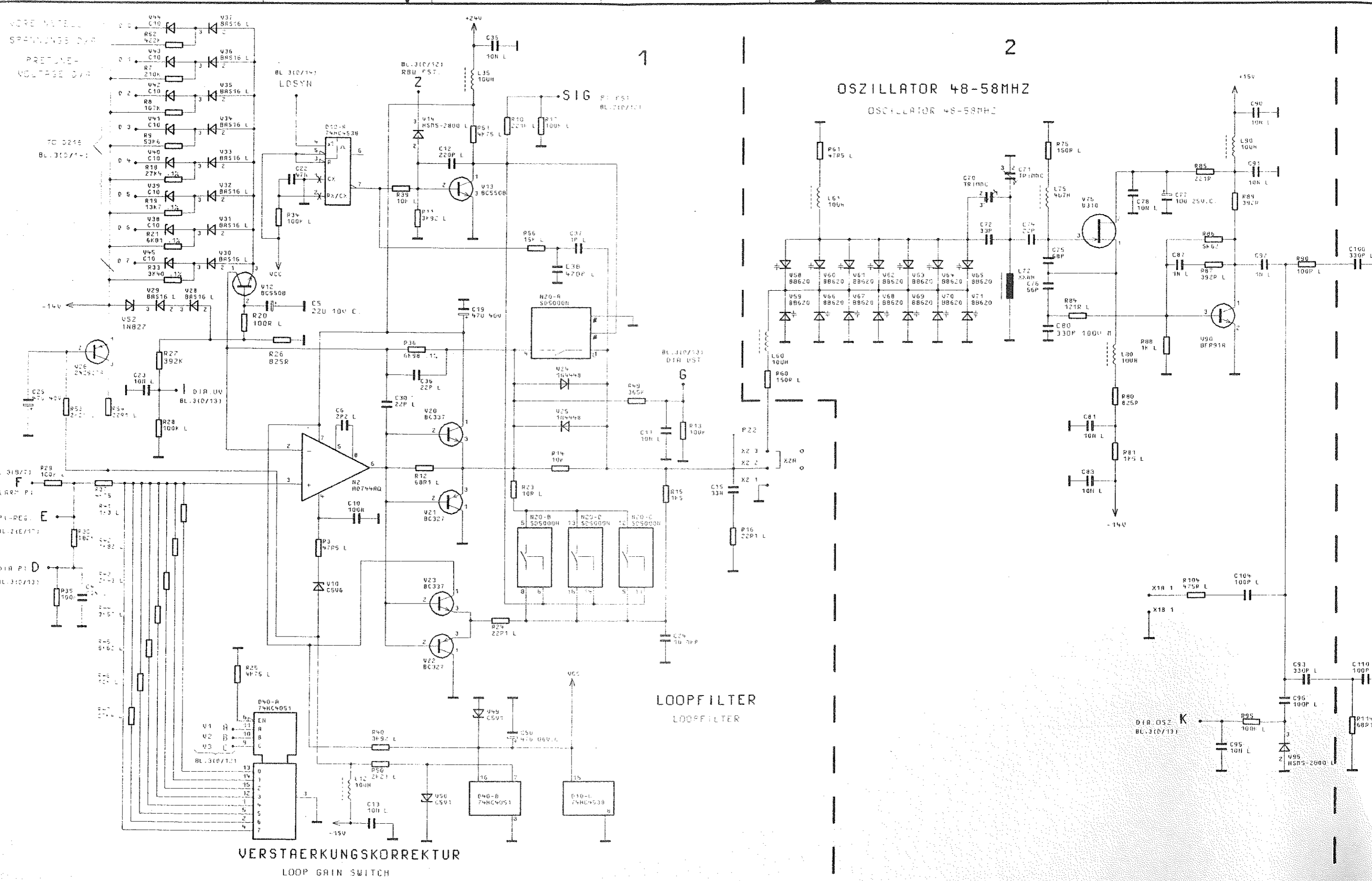
TIEFPASS/ZF-VERSTAERKER 8-18MHZ
LOWPASS/IF-AMPLIFIER 8-18MHZ



STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

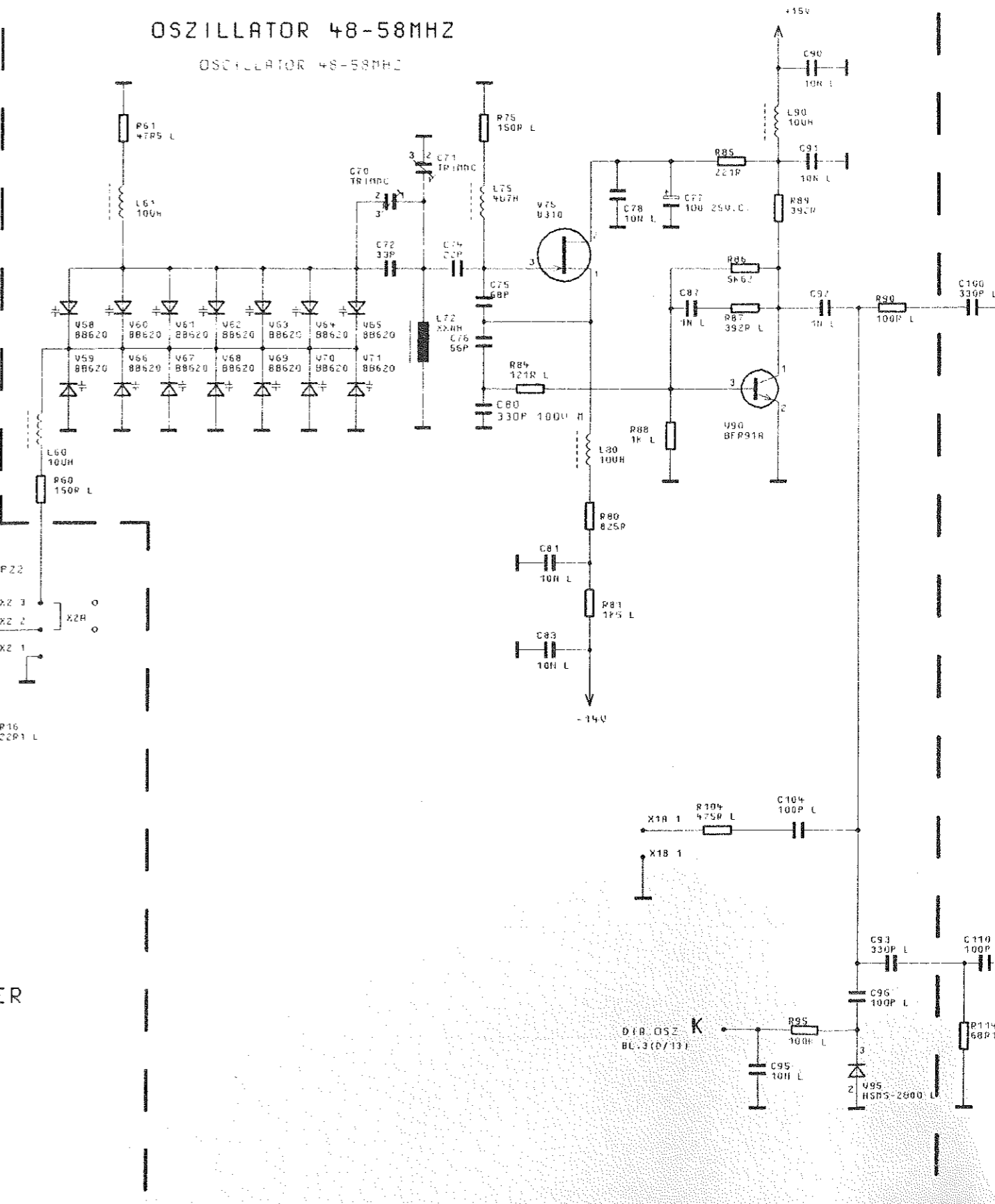
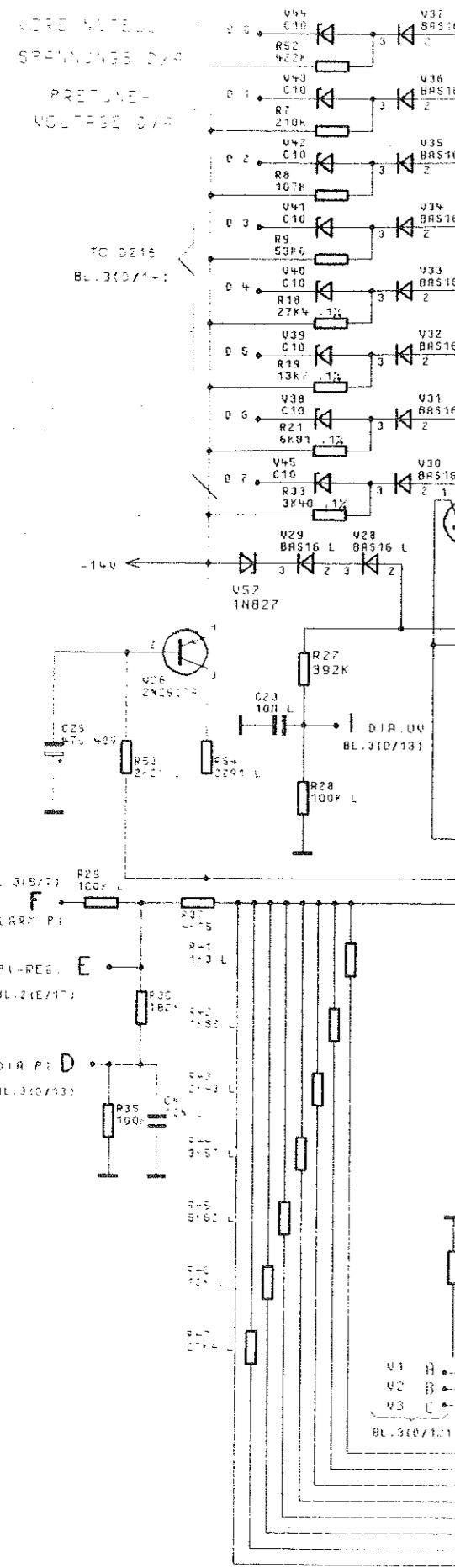
A	39845	15.11.88	HO	TKGB	TAG	NARE	BENENNUNG		
B	39845	28.11.88	HO	BEARB.		HO	FRN-SYNTHESE FRN-SYNTHESIS		
				GEPR.		HO			
				NORN					
				PLOTT	15.2.89	*			
REND. IND.	RENDERUNGS- MITTEILUNG	DATUM	NAME				ZEICHN.-NR.	819.3860.015	BLATT-NR. 1
							ZU GEHÖRT	SAGU	REG. I. V.

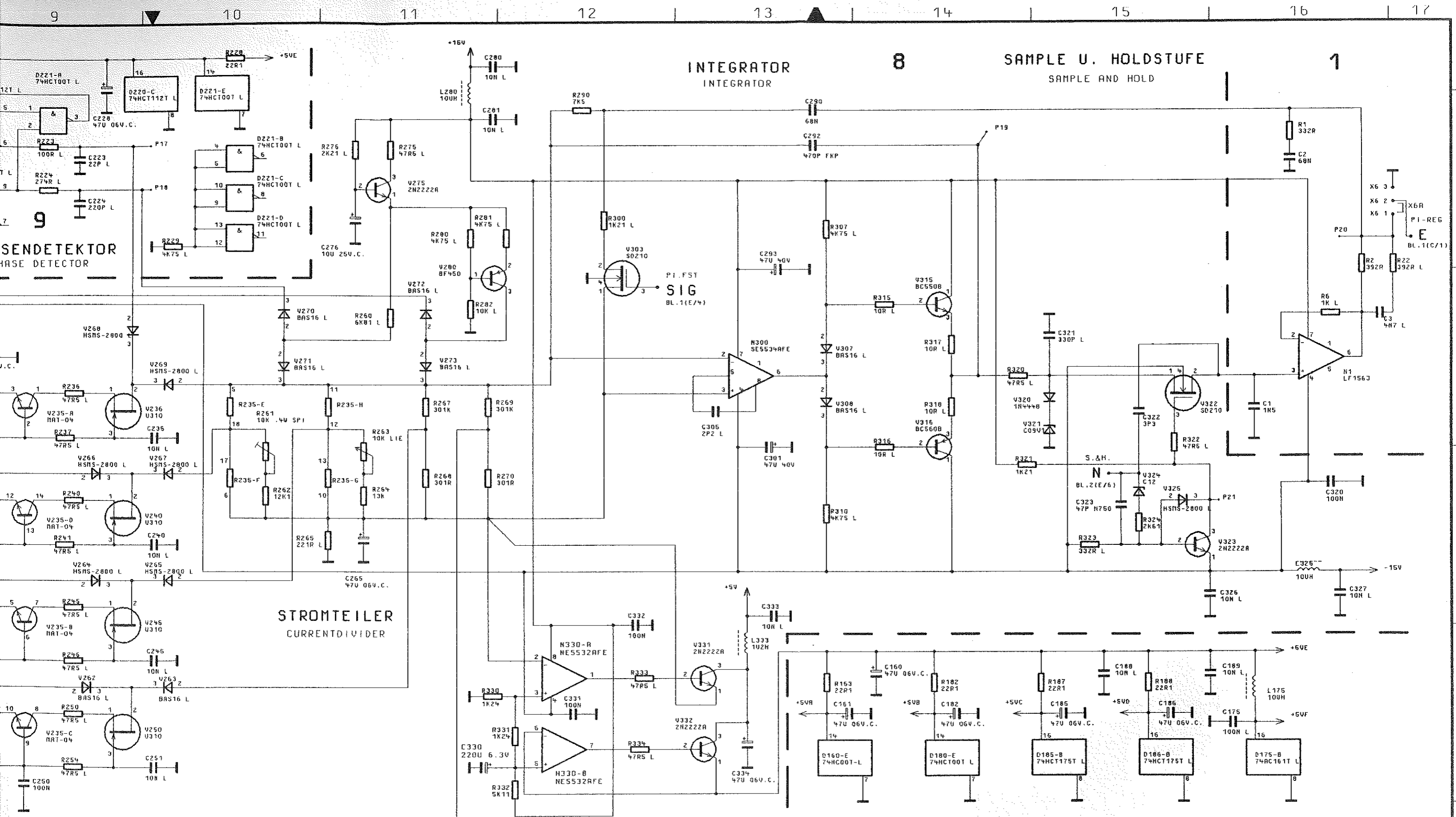


VERSTÄERKUNGSKORREKTUR
LOOP GAIN SWITCH

OSZILLATOR 48-58MHZ
OSCILLATOR 48-58MHZ

LOOPFILTER
LOOPFILTER

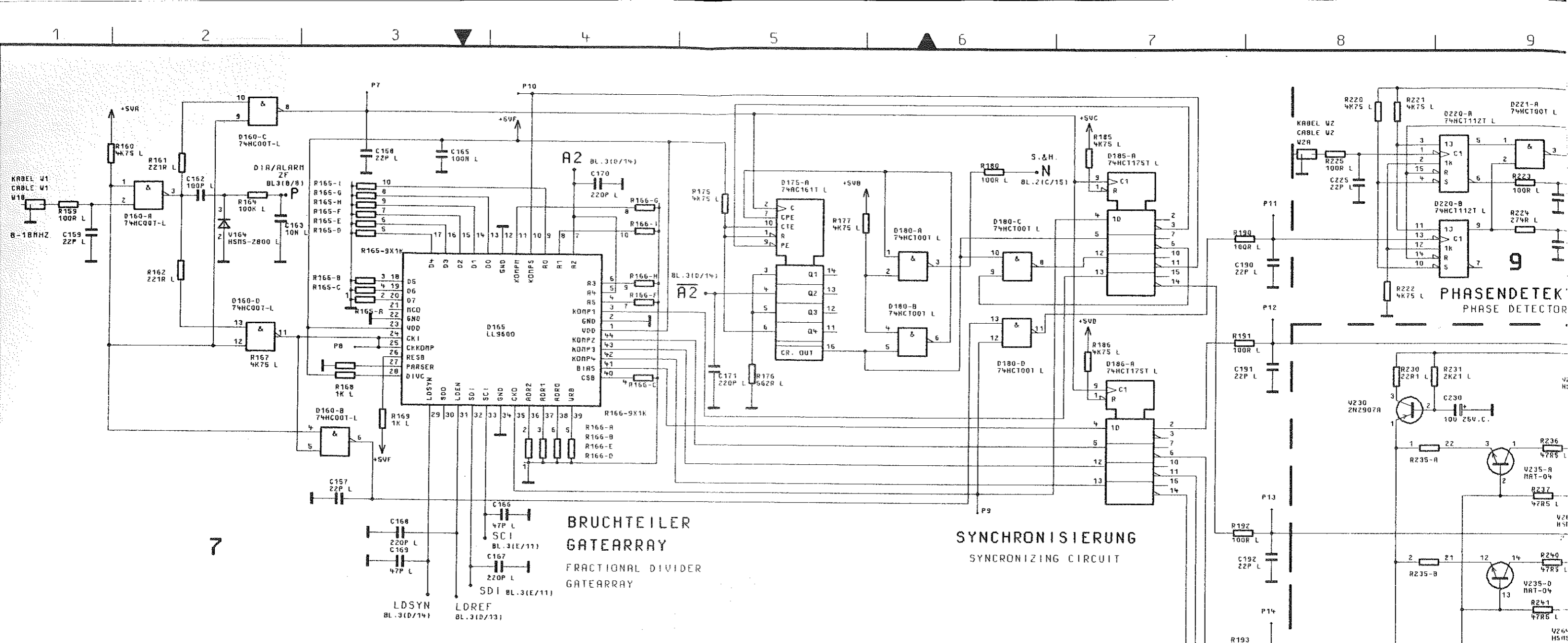




STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

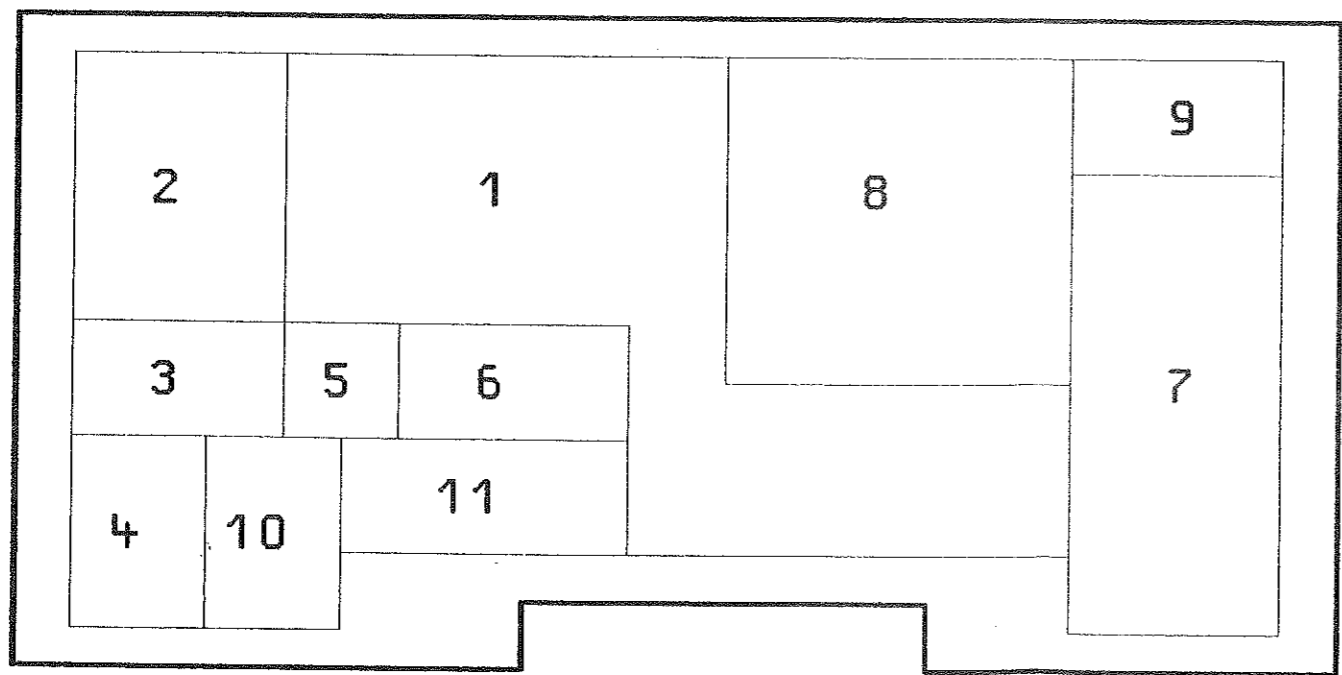
STROMLAUF GILT FUER VAR.01
CIRCUIT DIAGRAM IS VALID FOR MOD.01

A	39845	15.11.88	HO	1KGB	TRG	NAME	BENENNUNG	
B	39845	28.11.88	HO	BEARB.		HO	FRN-SYNTHESE FRN-SYNTHESIS	
				GEPR.		HO		
				NORM				
				PLATT	15. 2.89	*		
							ZEICHN.-NR.	BLATT-NR.
ROHDE & SCHWARZ							819.3860.015	2
REND. IND.	RENDERUNGS-NITTEILUNG	DATUM	NAME	ZU GERÄT	SMGU	REG.-I.V.	819.0010	ERSTE Z.



LAGEPLAN DER KAMMERN

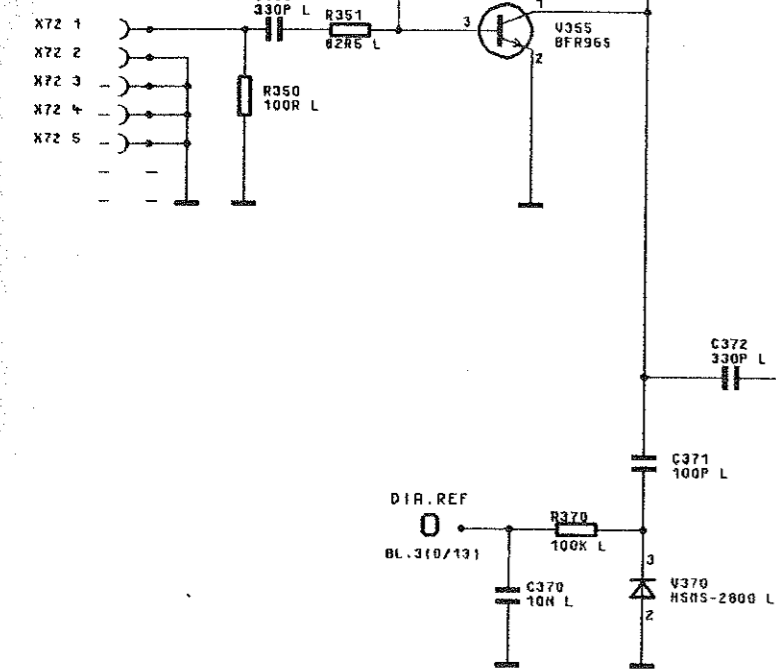
LOCATION OF THE SUBMODULES



40MHZ-TRENNVERSTAERKER 40MHZ-BUFFER AMPLIFIER

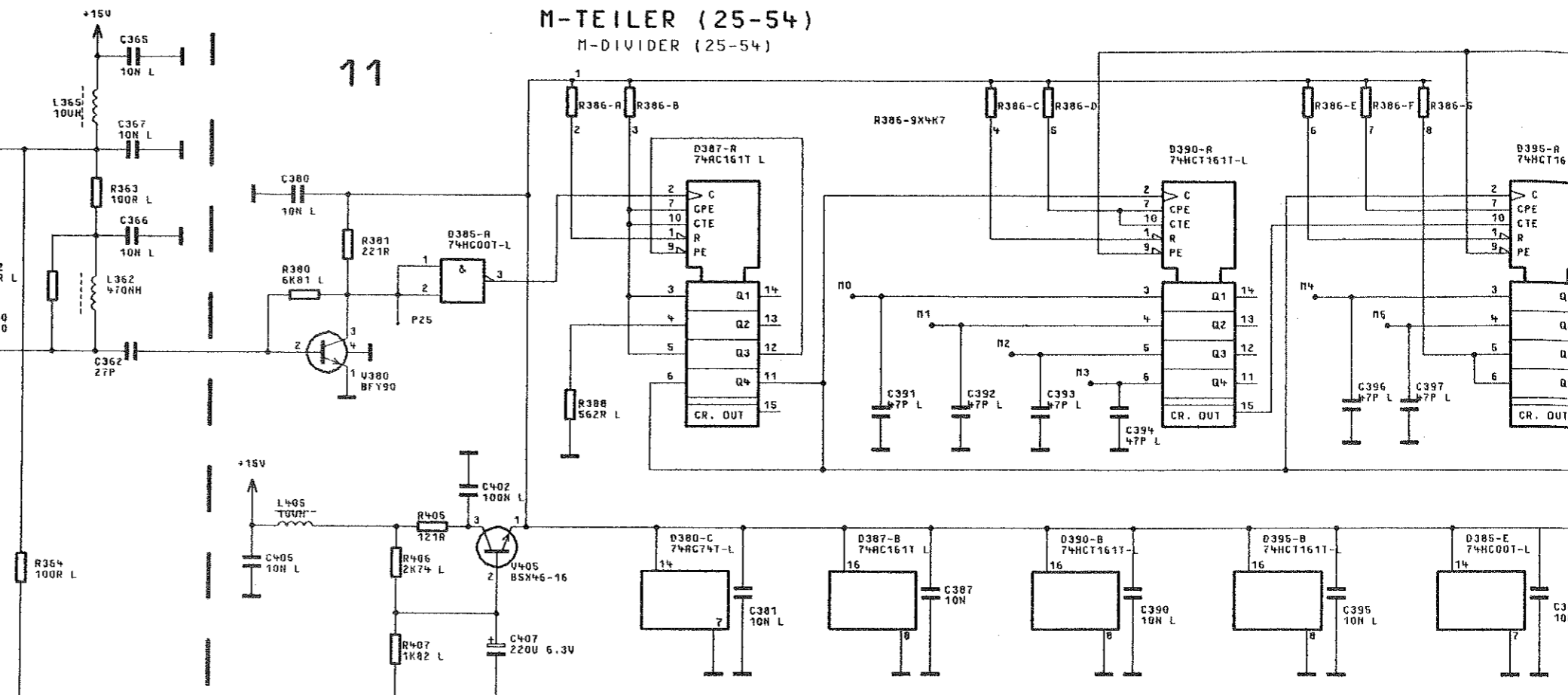
10

FRN REF
40MHZ
VON/FROM A9

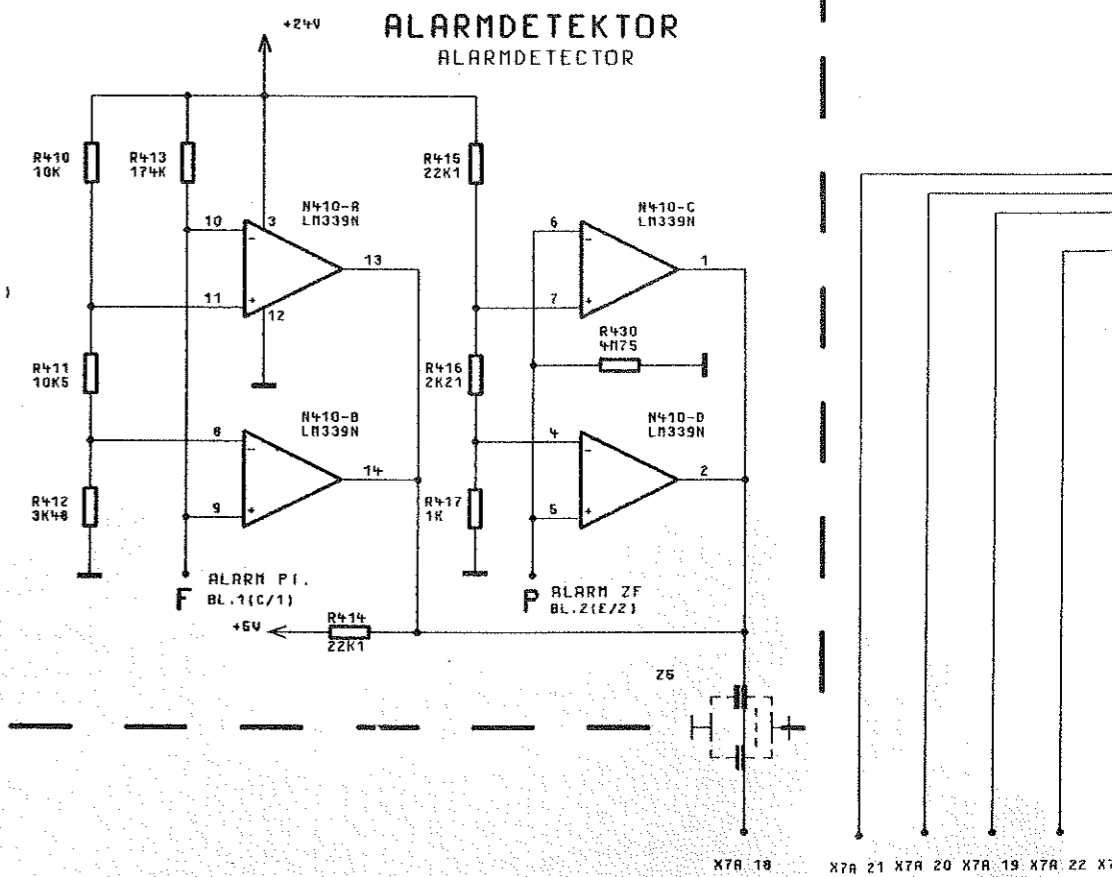


M-TEILER (25-54) M-DIVIDER (25-54)

11

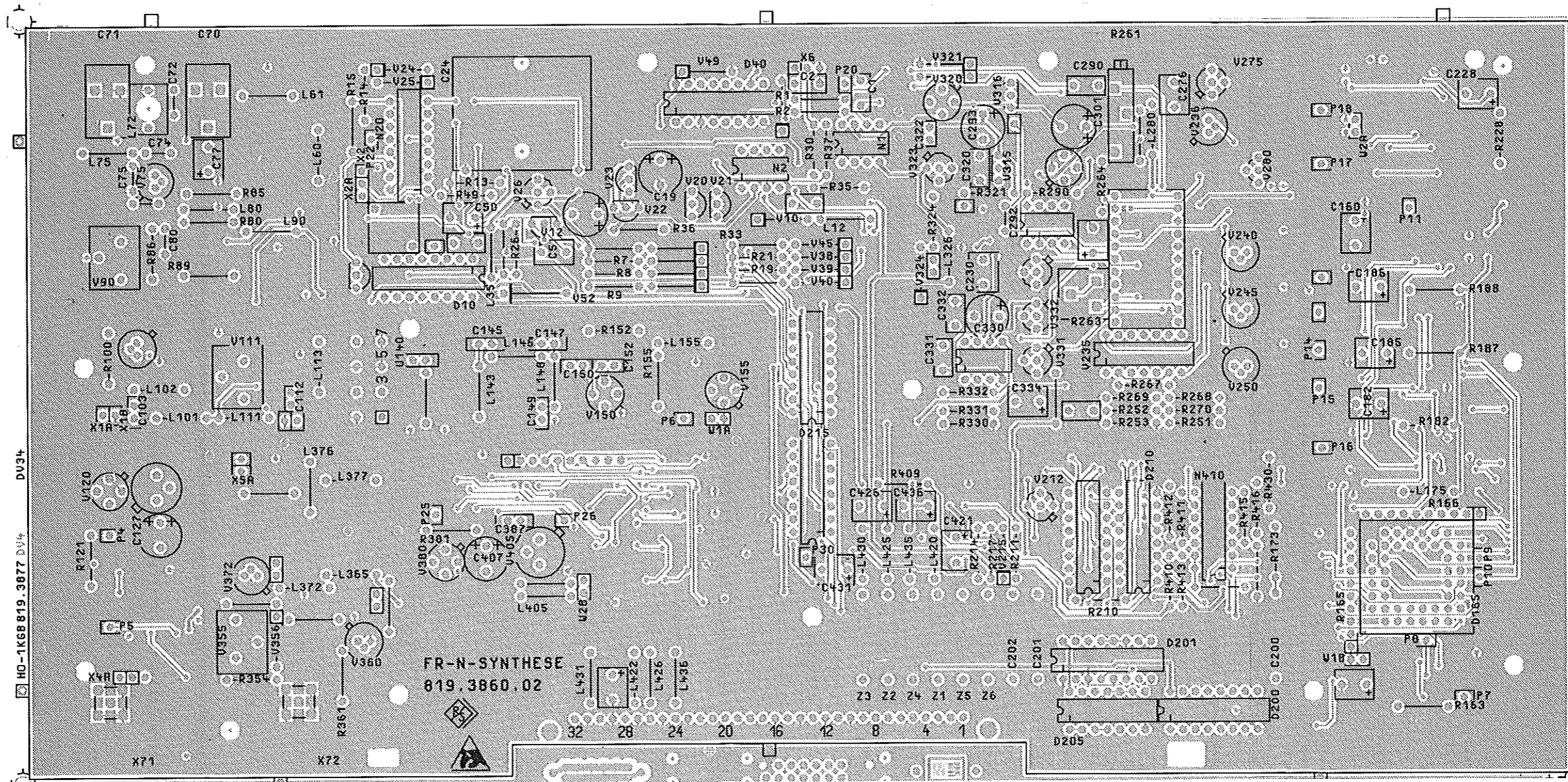


ALARMDETEKTOR ALARM DETECTOR



X7A 18 X7A 21 X7A 20 X7A 19 X7A 22 X7A

Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



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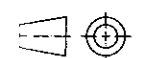
VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

D	39845	02.89	HO	Maße ohne Toleranzangabe	Maßstab 1 : 1		
					Halbzeug, Werkstoff		
				1KGB Tag Name	Benennung	Z	
				Bearb. 02.89 HO	FRN-SYNTHESE		
				Gepr.			
				Norm			
					Zeichn.-Nr.	Blatt-Nr.	
					819.3860.02	2	
						v. Bl.	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU	reg. i. V. 819.0010 V	erste Z.	

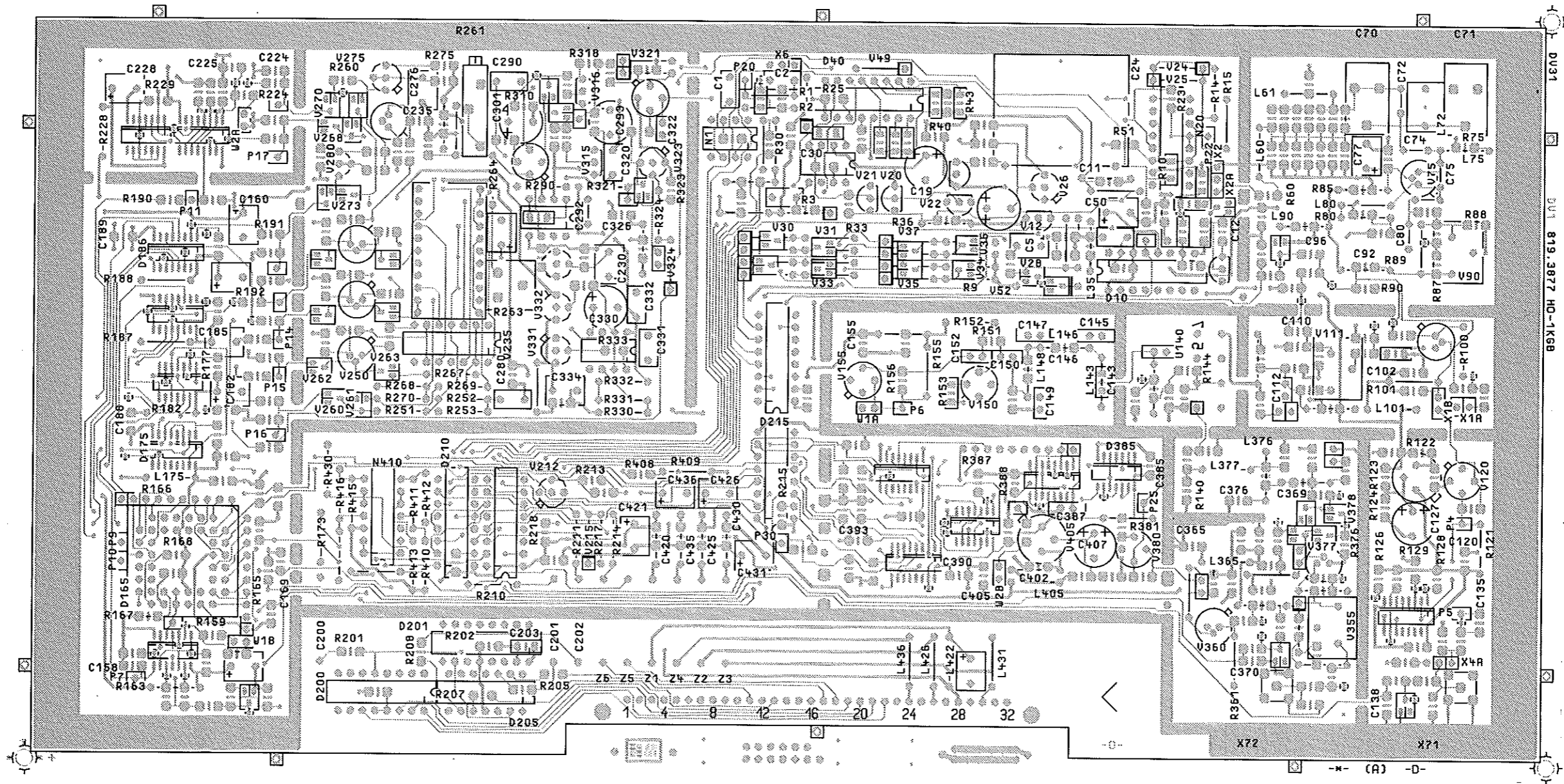


ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
Electrostatic sensitive devices require a special handling

ISO-Projektion
Methode E



Ansicht und Leitungsführung Lötseite
View of tracks on solder side



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VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

D	39845	02.89	HO	Maße ohne Toleranzangabe	Maßstab 1:1	
					Halbzeug, Werkstoff	
				1KGB Tag Name	Benennung	Z
				Bearb. 02.89 HO	FRN-SYNTHESE	
				Gepr.		
				Norm		
					Zeichn.-Nr.	Blatt-Nr.
Änd. Zust.	Änderungs-Mitteilung	Tag	Name		819.3860.02	3
				zu Gerät SMGU	reg. i. V. 819.0010 V	v. Bl.
					erste Z.	

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 methode E



ROHDE&SCHWARZ

SERVICE DOCUMENTS

Step Synthesis / FM

819.4944.02

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5 Service Manual "Step Synthesis / FM"

5.1 Function Description

(See circuit diagram 819.4969 S and Fig. 5-1)

The module "FM stage" contains three separate function units:

- ▶ 625-kHz step synthesizer with PLL
- ▶ FM oscillator with PLL
- ▶ AF precision attenuator

5.1.1 625-kHz Step Synthesizer with PLL

The oscillator tuned with a total of 12 varicap diodes covers the frequency range from 23.125 MHz to 29.375 MHz in steps of 625 kHz. The active element (V217) is inductively coupled to the loop. The signal is output via a buffer amplifier and lowpass filter. To enable level monitoring (diagnostics), the RF voltage is rectified and applied to the multiplexer. By means of a second amplifier/level converter (V222/V270) the oscillator signal is compared in the phase detector with the reference frequency, integrated (N200) and applied to the varicap diodes. The accelerator circuit V201, V202 ensures fast settling. The frequency is varied by changing the fractional division factor of the reference frequency. The tuning voltage is monitored in the window comparator N201 and a error signal is generated (LOOP OK).

5.1.2 FM Oscillator with PLL

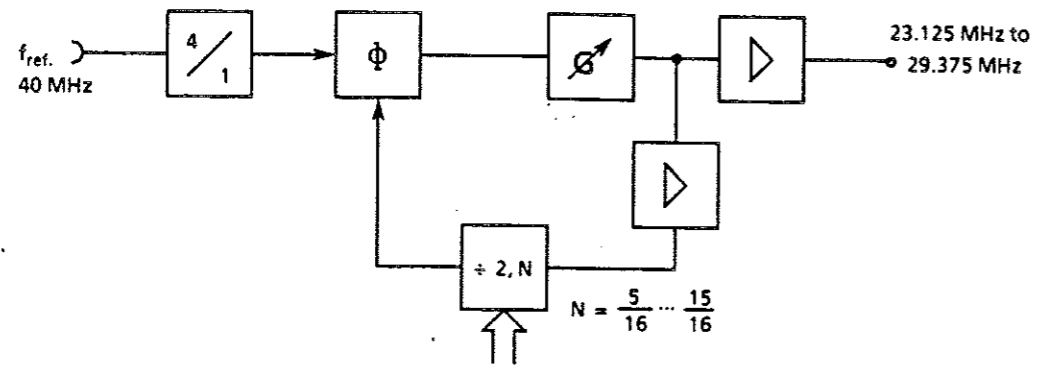
The 40-MHz Colpitts oscillator is fine tuned using V13. The frequency is modulated using V9 to V12. The signal is applied to the output connector via buffer amplifiers and to the phase detector via the level converter V100. The level of the FM signal is monitored by detector diode V15. The oscillator and 40-MHz reference signal are each divided by a factor of 3 (D50, D51) and applied to the digital phase detector. If the frequencies are different, one of the two outputs of the phase detector (P25 or P26) supplies a pulse sequence whose duty factor changes according to a sawtooth function. The repetition frequency is the difference between the frequencies. The sawtooth voltage is obtained from a lowpass and converted to a squarewave pulse sequence in a Schmitt trigger circuit N50. D55 is then used to obtain a pulse sequence "PULS" and information on the direction "DIR" (corresponding to the sign of the difference in frequency).

The pulse sequence triggers a timer D62 whose pulse width is derived from the down-divided reference frequency and which can be switched to different durations if the range is changed. This pulse is applied to an input of the adding integrator via switch D63 (controlled by "DIR") following conversion of the level. The integrator generates the voltage for the varicap diodes. The modulation signal with the opposite polarity is applied to the other input. The integration time can be changed to suit the modulation depth.

5.1.3 AF Precision Attenuator

For FM AC, the AF signal is applied to the FET switch D1, D12 via a highpass which is bypassed when FM DC is selected by means of the relay. Preemphasis is supplied by N6 for phase and frequency modulation, the signal is applied directly to amplifier N8 for FM. A 10-bit multiplying DAC D2 handles the fine resolution for the span setting. Selectable fixed dividers, connected in series, can be used for the coarse setting. The signal is applied via a buffer stage to the integrator of the PLL on the one hand, and to further fixed dividers via the adjustable amplifier N2 (span adjustment) on the other, and then to the deviation diodes in the FM oscillator.

625-kHz Step Synthesizer



FM Oscillator

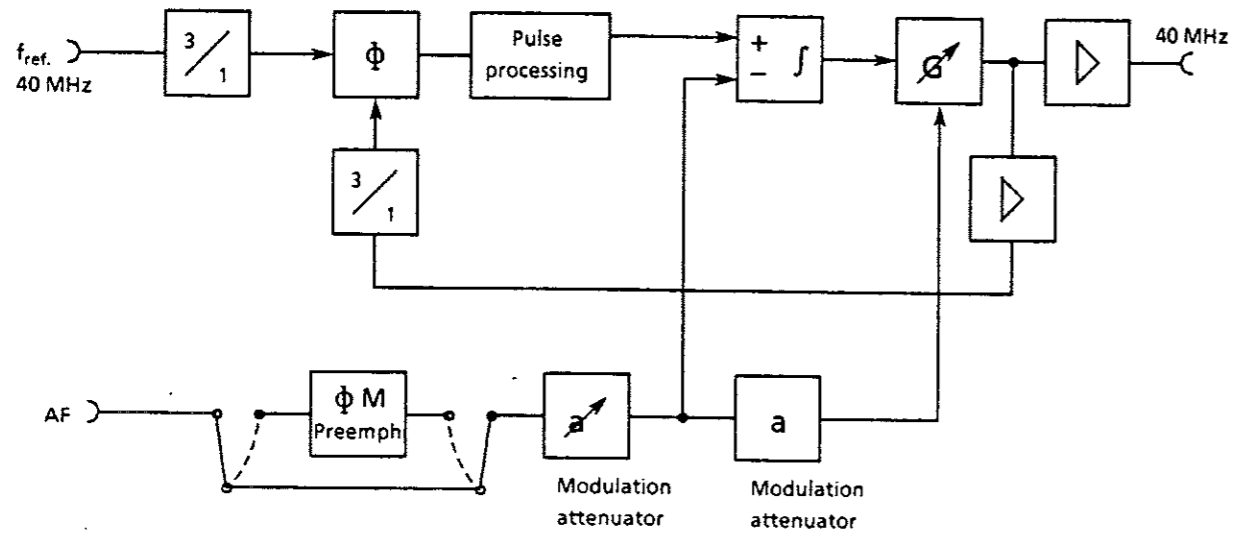


Fig. 5-1 Block diagram "FM stage"

5.2 Testing and Adjustment

5.2.1 625-kHz Step Synthesizer

5.2.1.1 Frequency Adjustment

- Connect RF spectrum analyzer to X81.
- Connect DC voltmeter to X11 1 (measurement of tuning voltage).
- Frequency input: 1000 MHz
Adjust the tuning voltage to 2.5 V (± 0.05 V) using C211.
- Frequency input: 1019 MHz
Adjust the tuning voltage to 19.5 V (± 0.1 V) using C212.

5.2.1.2 Level Adjustment

- Frequency entry: 1010 MHz
Adjust the output level at X81 to +10 dBm (± 0.2 dB) using R210.

5.2.2 FM Oscillator

5.2.2.1 Frequency and Control Voltage Adjustment

Setting: set the DC voltage at P13 1 to 8 V ± 0.2 V using R43.

Adjustment: adjust the DC voltage at P11 1 to 7 V ± 0.5 V using C42.

5.2.2.2 Level Adjustment

- Connect RF analyzer to X83 1.
Adjust level to 5 dBm ± 1 dB using L26.

5.2.2.3 Span Adjustment

- Connect modulation analyzer with distortion meter to X83.
- Setting: SHIFT PRESET, RF 322 MHz, FM INT ON
- Span setting: 256 kHz
Adjustment: adjust the span to 256 kHz using R30.

5.2.2.4 Distortion Adjustment

- Connect modulation analyzer with distortion meter to X83.
- Setting: SHIFT PRESET, RF 322 MHz, FM INT ON
- Span setting: 256 kHz
Adjustment: adjust the distortion to a minimum using C35.
Optimize further if necessary using R43.

5.2.2.5 Offset Adjustment

- Setting: SHIFT PRESET, RF 322 MHz, FM EXT DC ON, span 256 kHz
Without an AF voltage at input FM EXT, adjust the DC offset voltage at X7 1 to < 2 mV using R39.

5.2.2.6 Adjustment of FM Control

- Setting as in 5.2.2.4
- Connect DC voltage source V_{DC} to input FM EXT.
Measure the tuning voltage at P11 1 with $V_{DC} = 0$ V.
- $V_{DC} = 1.00$ V. Adjust to a minimum change in the tuning voltage at a set DC span.
Adjust span setting; the tolerance of tuning voltage at P11 1 applies.

Span setting	Adjust using	Tolerance at P11 1
256 kHz	R169	± 50 mV
32 kHz	R170	± 20 mV
4 kHz	R171	± 5 mV

5.3 Troubleshooting

5.3.1 625-kHz Step Synthesizer

Troubleshooting can be carried out according to the following table:

Test point	Level	Frequency	Meaning
X82	+ 5 dBm	40.0 MHz	Reference frequency
P112 1	TTL	10.0 MHz	Ref. freq. for phase detector
P110 1	TTL	23.125 MHz to 29.375 MHz	Oscillator frequency for phase detector
X11 1	DC: 4V to 17V	—	Tuning voltage
X81	+ 10 dBm	23.125 MHz to 29.375 MHz	Output

5.3.2 FM Oscillator

Test point	Level	Frequency	Meaning
X82	+ 5 dBm	40.0 MHz	Reference frequency
P23 1	TTL	40 MHz / 3	Ref. freq. for phase detector
P20 1	TTL	40.0 MHz	Oscillator frequency
P24 1	TTL	40 MHz / 3	Oscillator frequency for phase detector
P29	TTL	1)	Pulse for pulse blanking
P27	0 V 6 V	$f_{osc} < f_{ref}$ $f_{osc} > f_{ref}$	Directional control for control pulses
P28	TTL	Frequency difference $(f_{osc} - f_{ref}) / 3$	
P30 1 P31 1	0 V / + 6 V - 6 V / 0 V	Differenz-freq. $(f_{osc} - f_{ref}) / 3$	
P32 1 P33 1	+ 6 V - 6 V	DC DC	Power supply
P34	0 V / ± 6 V	$(f_{osc} - f_{ref}) / 3$	Control pulses to integrator
P16 P17	11.8 V -11.8 V	— —	Power supply of FM oscillator

- 1) Span: 256 kHz: 6.66 MHz
 32 kHz: 833.33 kHz
 4 kHz: 104.166 kHz

5.4 Interfaces

5.4.1 Analog Interfaces

Test point	Meaning	Level
X1 A1	FMOD Modulation freq.	0 Hz to 100 kHz. $1V_{rms}$
X1 A3	PHI OFFS Phase offset	DC
X1 A17	TEST Analog diagnostics line	-5 V to +5 V
X1 A24	Power supply	+24 V
X1 A26	Power supply	+15 V
X1 A28	Power supply	+5 V
X1 A30	Power supply	-15 V
X1 A32	Power supply	+12 V STBY
X2	FM output	40 MHz. 5 dBm \pm 1 dB
X3	Reference input	40 MHz. 5 dBm \pm 2 dB
X4	Step synthesizer output	23.125 MHz to 29.375 MHz, 10 dBm \pm 1 dB

5.4.2 Digital Interfaces

Test point	Meaning
X1 A11	TFR.CLK Clock for data transmission
X1 A13	TF.DAT Data line from controller
X1 A15	RC.DAT Data line from controller
X1 A18	LOK Open-collector alarm line
X1 A19,20,21	BA2 to BA0 Strobe addresses
X1 A22	G1 Group line of strobe address

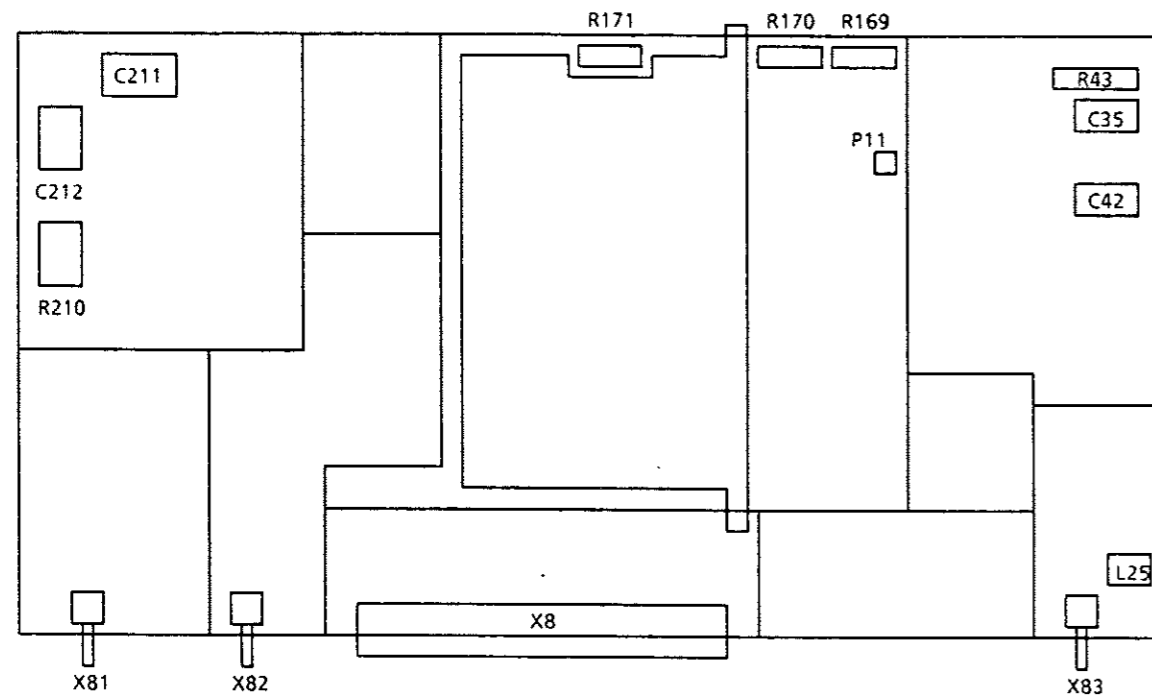


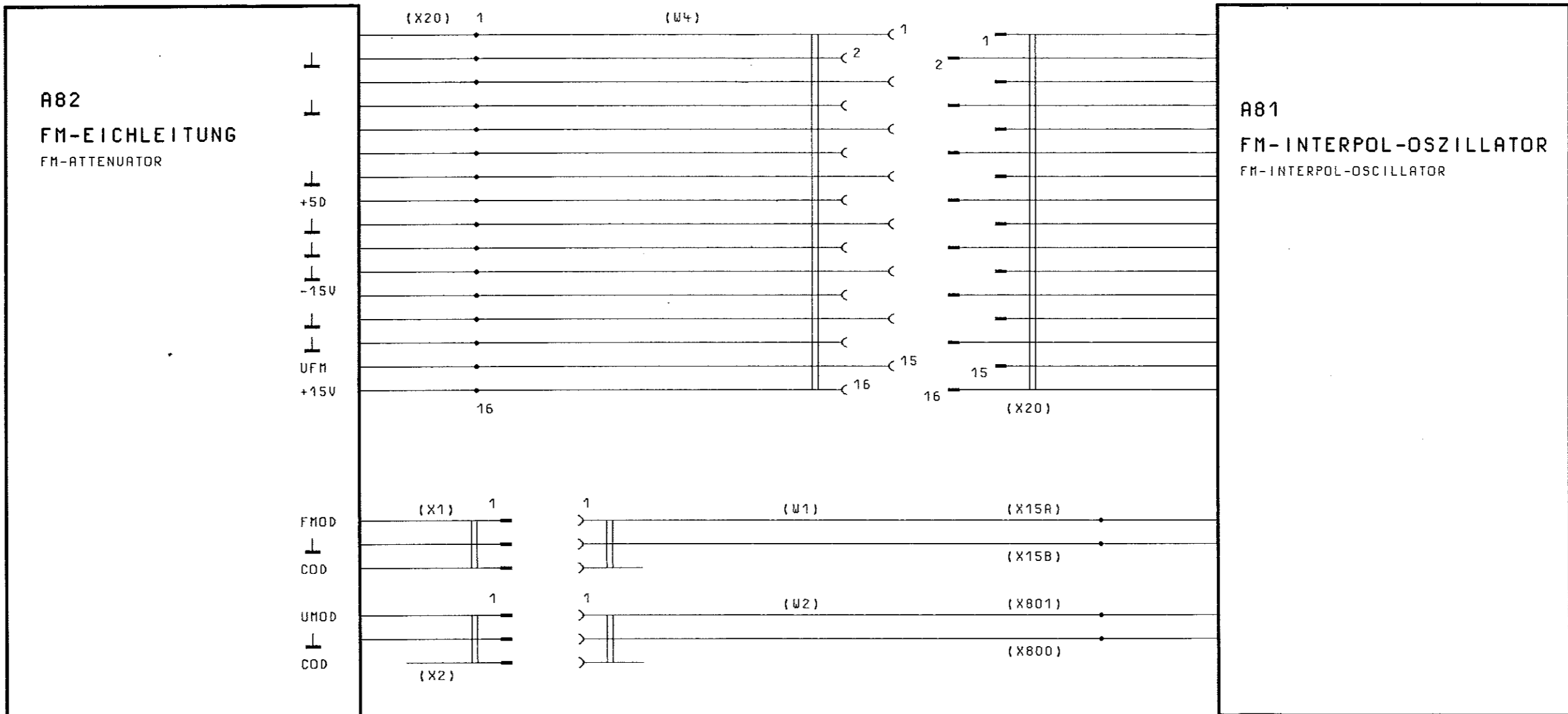
Fig. 5-2 Layout of test points and adjustment points

Schalteillisten
Stromläufe
Bestückungspläne
Part lists
Circuit diagrams
Components plans
Listes des pièces détachées
Schémas de Circuit
Plans des composants

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in											
A81	ED FM-INTERPOL-OSZILLATOR	819.4967.02														
A82	EM-INTERPOL-OSCILLATOR ED FM-EICHLLEITUNG FM-ATTENUATOR	819.4980.02			- ENDE -											
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="2" style="width: 15%;">ROHDE & SCHWARZ</td> <td style="width: 5%; text-align: center;">Äl</td> <td style="width: 10%;">Datum Date</td> <td style="width: 20%;">Schaltteilliste für Parts list for</td> <td style="width: 20%;">Sachnummer Stock Nr.</td> <td style="width: 10%;">Blatt Page</td> </tr> <tr> <td style="text-align: center;">01</td> <td style="text-align: center;">0489</td> <td>EE STEPSYNTHESE/FM STEPSYNTHESIS/FM</td> <td style="text-align: center;">819.4944.01 SA</td> <td style="text-align: center;">1-</td> </tr> </table>						ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page	01	0489	EE STEPSYNTHESE/FM STEPSYNTHESIS/FM	819.4944.01 SA	1-
ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page											
	01	0489	EE STEPSYNTHESE/FM STEPSYNTHESIS/FM	819.4944.01 SA	1-											

FUER DIESE UNTERLAGE
BEHALTEN MIR UNS ALLE RECHTE VOR



				1KGB	TAG	NAME	BENENNUNG	
				BEARB.		VL	STEPSYNTHESE/FM STEPSYNTHESESIS/FM	
				GEPR.		VL		
				NDRN				
				PLDIT	4. 4. 89	*		
				ROHDE&SCHWARZ			ZEICHN.-NR.	BLATT-NR.
							ZU GERÄT	SMGU
REND. IND.	RENDERUNGS- MITTEILUNG	DATUM	NAME	REG. I. V.	819.0010	ERSTE Z.	V. 1	BL.

ZEICHN.-NR.

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C1	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C2	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C6	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C12	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
..18					
C21	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C27	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C28	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C34	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C35	CT 13PF TAUCHTR.RD7X12 AIR-TYPE TRIMMER	CT 092.4266	TEKELEC	AT 5401	
C36	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C37	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C38	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C39	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C40	CE 100UF+-20%25V RDBX9,5 ELECTROLYTIC CAPACITOR	803.0580	MATSUSHITA	ECE-A1ESS-101	
C41	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C42	CT 9,2PF TAUCHTR.RD 7X12 AIR-TYPE TRIMMER	CT 025.7373	TEKELEC	LUFTTRAT5201MMUTTER	
C43	CK 20PF+-1PF160V4RDX12KS PLASTIC-FOIL CAPACITOR	CK 006.7159	SIEMENS	B31861-J1200-F	
C44	CK 27PF+-1PF160V5RDX12 KS CAPACITOR	CK 073.4387			
C45	CC 5,6PF+-0,25PF3X4NPO CAPACITOR	CC 087.6393	VALVO	2222 678 09568	
C46	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C47	CK 100PF+-5% 125V 4RDX12 CAPACITOR	CK 023.8250	SIEMENS	B31861-J1101-J000	
C48	CK 56PF+-5%160V RD5,5X12 PLASTIC-FOIL CAPACITOR	CK 023.0913			
C49	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C50	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C51	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C52	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C53	CC 2,7PF+-0,25PF3X4NPO CERAMIC CAPACITOR	CC 087.6358	VALVO	2222 678 09278	
C55	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C56	CC 10PF+-0,25PF50VNP01206 CERAMIC CHIP CAPACITOR	CC 099.8480	VITRAMON	VJ1206 A 100 C FAT	
C57	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C58	CC 33PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8780	VITRAMON	VJ1206 A330F FAT	
C59	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C60	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C61	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C62	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C63	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C64	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C65	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C66	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	

ROHDE & SCHWARZ	ÄI	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	14	1089	ED FM-INTERPOL-OSZILLATOR FM-INTERPOL-OSCILLATOR	819.4967.01 SA	1+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C67	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C68	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C69	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C70	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C71	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C72	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C80	CC 39PF+-2%4X5NPO CAPACITOR	CC 087.6493	VALVO	2222 678 10399	
C81	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C90	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C91	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C92	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C93	CC 39PF+-2%4X5NPO CAPACITOR	CC 087.6487	VALVO	2222 678 10339	
C94	CC 180PF+-2%6X7N750 CAPACITOR	CC 087.6935	VALVO	2222 678 58181	
C95	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C96	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C100	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C101	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C102	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C103	CC 180PF+-1%50V NPO 1206C CHIP CAPACITOR	CC 099.8844	VITRAMON	VJ1206 A 181 F FAT	
C104	CC 180PF+-1%50V NPO 1206C CHIP CAPACITOR	CC 099.8844	VITRAMON	VJ1206 A 181 F FAT	
C105	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C106	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C107	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C108	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C109	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C110	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C111	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C112	CK 10 UF+-20% 63V RD13X34 CAPACITOR	024.8724	SIEMENS	B32110-F9106-M	
C113	CE 4,7UF-10+50% 40V 9X13B ELECTROLYTIC CAPACITOR	CE 086.4397	ROEDERST	ELKO EKV 4/40	
C114	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C115	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C116	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C117	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C118	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C119	CE 100UF+-20%25V RD8X9,5 ELECTROLYTIC CAPACITOR	803.0580	MATSUSHITA	ECE-A1ESS-101	
C120	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C121	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C122	CE 100UF+-20%25V RD8X9,5 ELECTROLYTIC CAPACITOR	803.0580	MATSUSHITA	ECE-A1ESS-101	
C123	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C124	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C125	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C126	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C127	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C128	CE 100UF+-20%25V RD8X9,5 ELECTROLYTIC CAPACITOR	803.0580	MATSUSHITA	ECE-A1ESS-101	
C129	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
.. 135 C136	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C137	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C138	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C139	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C140	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C141	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C142	CC 180PF+-2%6X7N750 CAPACITOR	CC 087.6935	VALVO	2222 678 58181	
C143	CC 180PF+-2%6X7N750 CAPACITOR	CC 087.6935	VALVO	2222 678 58181	
C144	CE 220UF-10+50%6V 8,7X13 ELEKTROLYTIC CAPACITOR	CE 022.7520	ROEDERST	EK 00 CB 322 B	
C145	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C146	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C147	CC 120PF+-2%5X6N750 CAPACITOR	CC 087.6912	VALVO	2222 678 58121	
C148	CC 120PF+-2%5X6N750 CAPACITOR	CC 087.6912	VALVO	2222 678 58121	
C149	CC 82PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8821	VITRAMON	VJ1206 A 820 F FAT	
C150	CE 220UF+-20%25V RD8X14 ELECTROLYTIC CAPACITOR	803.1063	NIPPON	SXE 25 VB 220 8X14	
.. 153 C154	CC 47PF+-2%5X6NPO CAPACITOR	CC 087.6506	VALVO	2222 678 10479	
C155	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C199	CC 1,8NF+-10%4X5R2000 CAPACITOR	CC 087.7054	VALVO	2222 63051 182	
C200	CE 15 UF+-20%16V 7X 5X11 ELECTROLYTIC CAPACITOR	CE 087.9328	ROEDERSTEI	ETR 3 15/16	
C202	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C207	CK 2,2UF+-10%50V5RM MKT CAPACITOR	350.5944	WIMA	MKS 2/2.2UF/50V/10%	
C208	CK 2,2UF+-10%50V5RM MKT CAPACITOR	350.5944	WIMA	MKS 2/2.2UF/50V/10%	
C209	CC 180NF+-10%100V K1200VI CAPACITOR	060.1178	UNION CARB	CK06BX184K	
C210	CK 39PF+-1PF160V RD5X11,5 PLASTIC-FOIL CAPACITOR	CK 060.4954	SIEMENS	B31063-A5390-F000	
C211	CT 13PF TAUCHTR.RD7X12 AIR-TYPE TRIMMER	CT 092.4266	TEKELEC	AT 5401	
C212	CT 13PF TAUCHTR.RD7X12 AIR-TYPE TRIMMER	CT 092.4266	TEKELEC	AT 5401	
C213	CK 7PF+-1PF125V 4RDX12 KS CAPACITOR	CK 024.0075	SIEMENS	B31861-J1070-F000	
C216	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C219	CC 270PF+-10%63V3X5D2000 CAPACITOR	CC 099.5622	VALVO	2222 63051 271	
C220	CC 4,7NF+-10%6X9R2000 CAPACITOR	CC 087.7102	VALVO	2222 63051 472	
C221	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C222	CC 3,3PF+-0,25PF3X4NPO CAPACITOR	CC 087.6364	VALVO	2222 678 09338	
C223	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	

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Kennz. Comp.No.	Bezeichnung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C224	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C230	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C231	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C232	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C233	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C234	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C235	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C236	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C240	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C241	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C242	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C244	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C247	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C248	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C249	CC 27PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8409	VITRAMON	VJ1206 A270F FAT	
C250	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C251	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C252	CC 68PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8815	VITRAMON	VJ1206 A 680 F FAT	
C253	CC 82PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8821	VITRAMON	VJ1206 A 820 F FAT	
C254	CC 47NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5195	VITRAMON	VJ1206 Y 473 K FAT	
C255	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C256	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C270	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C271	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C273	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C278	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C279	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C280	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C281	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C282	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C301	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C303	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C304	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C305	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C306	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C307	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C309	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C310	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C311	CC 39PF+-2%4X5NPO CAPACITOR	CC 087.6493	VALVO	2222 678 10399	
C312	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C315	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C320	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C321	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C322	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C323	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
D9	BL PC74HC4094T 8ST.BUSREG BUS REGISTER	BL 804.0977	VALVO	PC74HC4094I	
D10	BL PC74HC238P 3T08 L.DEC DECODER/DEMULTIPLEXER	BL 620.0847	VALVO	PC74HC238P	
D11	BL PC74HCT11T 3X3IN ANDG AND GATE	BL 007.6191	VALVO	PC74HCT11T	
D50	BL 74F112PC 2XJK-FLIPF. DUAL JK-FLIPFLOP	BL 344.6565	FAIRCHILD	74F112PC	
D51	BL 74F112PC 2XJK-FLIPF. DUAL JK-FLIPFLOP	BL 344.6565	FAIRCHILD	74F112PC	
D52	BL 74F74PC 2XD-FLIPFLOP DUAL D-FLIPFLOP	BL 344.6694	FAIRCHILD	74F74PC	
D53	BL 74F74PC 2XD-FLIPFLOP DUAL D-FLIPFLOP	BL 344.6694	FAIRCHILD	74F74PC	
D54	BL 74FOOPC 4X2IN.NANDG QUAD-NAND-GATE	BL 344.6659	FAIRCHILD	74FOOPC	
D55	BL MM74HC132N 4X2IN.NAND QUAD 2INP.NAND SCHMITT TR	BL 099.9557	NSC	MM74HC132N	
D56	BL MM74HCOON 4X2IN.NAND QUAD 2-INPUT NAND GATE	BL 571.3194	MOTOROLA	MC74HCOON	
D57	BL MM74HC393N 2X4B.B.CTR DUAL 4-BIT BINARY COUNTER	BL 395.2950	NSC	MM74HC393N	
D58	BL MM74HC132N 4X2IN.NAND QUAD 2INP.NAND SCHMITT TR	BL 099.9557	NSC	MM74HC132N	
D59	BL MM74HC10N 3X3IN.NAND TRIPLE 3-INPUT NAND-GATE	BL 571.3294	MOTOROLA	MC74HC10N	
D60	BL MM74HC161N 8IN.COUNT. SYNC.BIN.COUNTER	BL 641.7111	MOTOROLA	MC74HC161N	
D61	BL MM74HC30N 8IN.NAND G 8-INPUT NAND GATE	BL 099.9505	NSC	MM74HC30N	
D62	BL MM74HC74N 2XD-FLIPFL DUAL D FLIP-FLOP	BL 571.3171	NSC	MM74HC74N	
D63	BJ TL191CN 4X ANALOGSCH ANALOG SWITCH	BJ 300.6182	TEXAS INST	TL191CN	
D64	BJ LF13331N 4X ANALOGSCH ANALOG SWITCH	BJ 356.0515	NSC	LF13331N	
D65	BJ LF13331N 4X ANALOGSCH ANALOG SWITCH	BJ 356.0515	NSC	LF13331N	
D70	BJ DG211CJ 4X ANALOGSCH ANALOG SWITCH	801.8260	SILICONIX	DG211CJ	
D200	BL 74F74PC 2XD-FLIPFLOP DUAL D-FLIPFLOP	BL 344.6694	FAIRCHILD	74F74PC	
D201	BL 74F74PC 2XD-FLIPFLOP DUAL D-FLIPFLOP	BL 344.6694	FAIRCHILD	74F74PC	
D202	BL 74F74PC 2XD-FLIPFLOP DUAL D-FLIPFLOP	BL 344.6694	FAIRCHILD	74F74PC	
D203	BL 74FOOPC 4X2IN.NANDG QUAD-NAND-GATE	BL 344.6659	FAIRCHILD	74FOOPC	
D204	BL PC74HC4094T 8ST.BUSREG BUS REGISTER	BL 804.0977	VALVO	PC74HC4094I	
D205	BL 74F283PC 4BIT-BIN.ADD 4BIT BINARY FULL ADDER	BL 373.6482	FAIRCHILD	74F283PC	
D206	BL 74F374PC 8B.D-FLIPF 3S 8BIT-D-REGISTER	BL 344.6642	FAIRCHILD	74F374PC	
D207	BL CD4051BE 8CH. MUX MULTIPLEXER	339.4174	RCA	CD4051BE	
L1	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1.	
L6	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L7	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L8	LD 5,60UH10%1,800HMO,195A CHOKE	LD 067.2957	DELEVAN	DROSSEL1025-38	
L10	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	

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L11	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L12 ..15	LD SPULE 287NH 8,5W FE-K COIL+CORE	613.6289	TOKO	E521HM080023	
L16	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60	
L17 ..22	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
L25	LD SPULE 500NH 11,5W FE-K CHOKE	300.8856	COMPONEX	E521HS-110023	
L26	LU UEBERTRAGER TRANSFORMER	451.1937			
L27	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L28	LD 100 UH10%8,000HMO,084A CHOKE	LD 067.3101	DELEVAN	DROSSEL1025-68	
L90	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L91	LD 0,56UH10%0,500HMO,550A CHOKE	LD 067.2834	DELEVAN	DROSSEL1025-14	
L92	LF ROHRK.RD3,5X1,2X3 GETR TUBLAR CORE	LF 026.9257			
L94	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
L95	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L100	LD 100 UH10%8,000HMO,084A CHOKE	LD 067.3101	DELEVAN	DROSSEL1025-68	
L101	LD 100 UH10%8,000HMO,084A CHOKE	LD 067.3101	DELEVAN	DROSSEL1025-68	
L102	LD 120 UH10%13,00HMO,066A CHOKE	LD 067.3118	DELEVAN	DROSSEL1025-70	
L103	LD 120 UH10%13,00HMO,066A CHOKE	LD 067.3118	DELEVAN	DROSSEL1025-70	
L105	LD 1000UH10%72,00HMO,028A CHOKE	LD 037.8005	DELEVAN	DROSSEL1025-92	
L106	LD 1000UH10%72,00HMO,028A CHOKE	LD 037.8005	DELEVAN	DROSSEL1025-92	
L107	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L108	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L109	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L110	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L111	LD 4,70UH10%1,200HMO,239A CHOKE	LD 067.2940	DELEVAN	DROSSEL1025-36	
L112	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L113	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L114	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	
L116	LD 4,70UH10%1,200HMO,239A CHOKE	LD 067.2940	DELEVAN	DROSSEL1025-36	
L117	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L118	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L119	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L120	LD 0,68UH10%0,600HMO,500A CHOKE	LD 067.2840	DELEVAN	DROSSEL1025-16	
L121	LD 100 UH10%8,000HMO,084A CHOKE	LD 067.3101	DELEVAN	DROSSEL1025-68	
L150 ..153	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
L200	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
L201	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
L202	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
L205	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L206	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	

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L207	LD SPULE COIL	819.5386			
L208	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60	
L209	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60	
L218	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60	
L219	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L220	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60	
L221	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L222	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60	
L223	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60	
L224	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60	
L226	LD 0,33UH10%0,220HMO,830A CHOKE	LD 067.2805	DELEVAN	DROSSEL1025--08	
L227	LD 0,22UH10%0,140HM1,045A CHOKE	LD 067.2786	DELEVAN	DROSSEL1025-04	
L228	LD 0,15UH10%0,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL1025-00	
L229	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
L230	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
L231	LD 100 UH10%8,000HMO,084A CHOKE	LD 067.3101	DELEVAN	DROSSEL1025-68	
L270	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
L271	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL1025-28	
L272	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL1025-28	
L274	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
L300	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
N4	BO NE5532AFE 2XL.N.OPAMP OPERATIONAL AMPLIFIER	BO 356.0450	VALVO	NE5532AFE	
N5	BO LM393N 2X COMPAR COMPARATOR	BO 803.0696	NSC	LM393N	
N51	BO OPO7CZ PREC. OPAMP OPERATIONAL AMPLIFIER	BO 303.6960	PMI	OPO7CZ	
N52	BO MC1558JG 2X OPAMP OPERATIONAL AMPLIFIER	275.0816	NSC	LM1558J	
N200	BO SE5534AFE LOW N.OPAMP OPERATIONAL AMPLIFIER	BO 301.3335	SIGNETICS	SE5534AFE	
N201	BO LM393N 2X COMPAR COMPARATOR	BO 803.0696	NSC	LM393N	
P1	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	
P2	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	
P11 .26	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P27	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	
P28	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	
P29 .37	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P100	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P101	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P109 .112	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
R1	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	

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	14	1989	ED FM-INTERPOL-OSZILLATOR FM-INTERPOL-OSCILLATOR	819.4967.01 SA	7+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R2	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R3	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R4	RG 42,2 OHM+-2%TK200 1206 CHIP RESISTOR	006.8790	DRALORIC	CGB3216 42,2OHM2% TK	
R5	RG 42,2 OHM+-2%TK200 1206 CHIP RESISTOR	006.8790	DRALORIC	CGB3216 42,2OHM2% TK	
R6	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R7	RG 42,2 OHM+-2%TK200 1206 CHIP RESISTOR	006.8790	DRALORIC	CGB3216 42,2OHM2% TK	
R8	RG 42,2 OHM+-2%TK200 1206 CHIP RESISTOR	006.8790	DRALORIC	CGB3216 42,2OHM2% TK	
R9	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R11	RG 383 OHM+-2%TK200 1206 CHIP RESISTOR	006.9022	DRALORIC	CGB3216 383OHM2% TK	
R12	RG 383 OHM+-2%TK200 1206 CHIP RESISTOR	006.9022	DRALORIC	CGB3216 383OHM2% TK	
R13	RG 383 OHM+-2%TK200 1206 CHIP RESISTOR	006.9022	DRALORIC	CGB3216 383OHM2% TK	
R14	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R30	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R31	RL 0,35W 182 OHM+-1%TK50 RESISTOR	RL 083.0010	DRALORIC	SMA0207/182OHM-F-D	
R32	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMA0207/47,5OHM-F-D	
R42	RG 2,15KOHM+-2%TK200 1206 CHIP RESISTOR	007.0635	DRALORIC	CGB 3216 2,15KOHM 2%	
R43	RS 0,75W10KOHM+-10% CERMET DEPOS.-CARBON POTENTIOMET	RS 037.7396	BOURNS	3006P-1-10 KOHM+-10%	
R44	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R50	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R51	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/221OHM-F-D	
R52	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/221OHM-F-D	
R53	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R54	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R55	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R56	RL 0,35W 3,92KOHM+-1%TK50 RESISTOR	RL 083.1039	RESISTA	MK2	
R58	RG 75,0 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8855	DALE	CRCW1206-10 75R F-T	
R59	RG 46,4 OHM+-2%TK200 1206 CHIP RESISTOR	006.8803	DRALORIC	CGB3216 46,4OHM2% TK	
R60	RG 4,64KOHM+-2%TK200 1206 CHIP RESISTOR	007.0712	DRALORIC	CGB 3216 4,64KOHM 2%	
R61	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R62	RG 46,4 OHM+-2%TK200 1206 CHIP RESISTOR	006.8803	DRALORIC	CGB3216 46,4OHM2% TK	
R63	RG 3,92KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5808	DALE	CRCW1206-10 3K92 F-T	
R64	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R67	RG 681 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6110	DALE	CRCW1206-10 681K F-T	
R68	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R69	RG 681 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6110	DALE	CRCW1206-10 681K F-T	
R70	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R72	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R73	RG 30,1KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5908	DALE	CRCW1206-10 30K1 F-M	
R74	RG 2,61KOHM+-2%TK200 1206 CHIP RESISTOR	007.0658	DRALORIC	CGB 3216 2,61KOHM 2%	

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	14	1089	ED-FM-INTERPOL-OSZILLATOR FM-INTERPOL-OSCILLATOR	819.4967.01 SA	8+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R75	RG 2,61KOHM+-2%TK200 1206 CHIP RESISTOR	007.0658	DRALORIC	CGB 3216 2,61KOHM 2%	
R76	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R78	RG 1,21KOHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9968	DALE	CRCW1206-10 1K21 F-T	
R79	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R80	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R81	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R82	RG 5,62KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0735	DALE	CRCW1206-10 5K62 F-T	
R83	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R84	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R85	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R90	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R91	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R92	RL 0,35W 3,48KOHM+-1%TK50 RESISTOR	RL 083.1016	DRALORIC	SMAO207/3,48K-F-D	
R93	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMAO207/12,1K-F-D	
R94	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMAO207/1,50K-F-D	
R95	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/475OHM-F-D	
R100	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R101	RG 2,15KOHM+-2%TK200 1206 CHIP RESISTOR	007.0635	DRALORIC	CGB 3216 2,15KOHM 2%	
R102	RG 215 OHM+-2%TK200 1206 CHIP RESISTOR	006.8961	DRALORIC	CGB3216 215OHM2% TK	
R103	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R106	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R108	RG 147 OHM+-2%TK200 1206 CHIP RESISTOR	006.8926	DRALORIC	CGB3216 147OHM2% TK	
R109	RG 147 OHM+-2%TK200 1206 CHIP RESISTOR	006.8926	DRALORIC	CGB3216 147OHM2% TK	
R110	RG 147 OHM+-2%TK200 1206 CHIP RESISTOR	006.8926	DRALORIC	CGB3216 147OHM2% TK	
R111	RG 215 OHM+-2%TK200 1206 CHIP RESISTOR	006.8961	DRALORIC	CGB3216 215OHM2% TK	
R112	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R117	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R119	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R120	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R121	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R122	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R123	RG 348 OHM+-2%TK200 1206 CHIP RESISTOR	006.9016	DRALORIC	CGB3216 348OHM2% TK	
R124	RG 348 OHM+-2%TK200 1206 CHIP RESISTOR	006.9016	DRALORIC	CGB3216 348OHM2% TK	
R125	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R126	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R130	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R131	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R132	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMAO207/4,75K-F-D	
R140	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R142	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R146	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R148	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	

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		14 1089	ED FM-INTERPOL-OSZILLATOR FM-INTERPOL-OSCILLATOR	B19.4967.01 SA	9+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R150 ..152	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R155	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R157	RG 2,15KOHM+-2%TK200 1206 CHIP RESISTOR	007.0635	DRALORIC	CGB 3216 2,15KOHM 2%	
R159 ..162	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R163	RL 0,35W 499 KOHM+-1%TK50 RESISTOR	RL 083.2612	RESISTA	MK2	
R164	RG 61,9KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1890	DALE	CRCW1206-10 69K9 F-T	
R165	RG 8,25KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0770	DALE	CRCW1206-10 8K25 F-T	
R166	RL 0,35W 392 KOHM+-1%TK50 RESISTOR	RL 083.2512	DRALORIC	SMA0207/392K-F-C	
R167	RL 0,35W 46,4KOHM+-1%TK50 RESISTOR	RL 083.1797	DRALORIC	SMA/207/46,4K-F-C	
R168	RG 3,83KOHM+-2%TK200 1206 CHIP RESISTOR	007.0693	DRALORIC	CGB 3216 3,83KOHM 2%	
R169	RS 0,5W2KOHM+-10%10X10X5 CERMET POTENTIOMETER	RS 247.7961	BOURNS	3386X-1-202	
R170	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7526	BOURNS	3386X1-103	
R171	RS 0,5W100KOHM+-10%10X10X CERMET POTENTIOMETER T	RS 087.7683	BOURNS	3386X-1-104	
R172	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R173	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/221OHM-F-D	
R174	RL 0,35W 68,1KOHM+-1%TK50 RESISTOR	RL 082.2602	DRALORIC	SMA 0207/68,1K-F-C	
R176	RG 1,21KOHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9968	DALE	CRCW1206-10 1K21 F-T	
R177	RL 0,35W12,1KOHM+-0,1%T25 RESISTOR	RL 084.3229	DRALORIC	SMA0207/12,1K-B-E	
R178	RL 0,35W12,1KOHM+-0,1%T25 RESISTOR	RL 084.3229	DRALORIC	SMA0207/12,1K-B-E	
R179	RG 464 OHM+-2%TK200 1206 CHIP RESISTOR	006.9045	DRALORIC	CGB3216 464OHM2% TK	
R180	RG 464 OHM+-2%TK200 1206 CHIP RESISTOR	006.9045	DRALORIC	CGB3216 464OHM2% TK	
R182	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R184	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R185	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R186	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R187	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R198	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R199	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R200	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R201	RG 1,78KOHM+-2%TK200 1206 CHIP RESISTOR	007.0006	DRALORIC	CGB 3216 1,78KOHM 2%	
R203 ..206	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/10OHM-F-D	
R207	RL 0,35W 110 OHM+-1%TK50 RESISTOR	RL 082.9813	DRALORIC	SMA0207/110OHM-F-D	
R208	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R209	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R210	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7526	BOURNS	3386X1-103	
R211	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R212	RL 0,35W 27,4KOHM+-1%TK50 RESISTOR	RL 082.2583	DRALORIC	SMA 0207/27,4K-F-C	
R213	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R214	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	

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		14	1089	ED FM-INTERPOL-OSZILLATOR FM-INTERPOL-OSZILLATOR	819.4967.01 SA	10+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R215	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/475OHM-F-D	
R216	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMAO207/100HM-F-D	
R220	RG 46,4KOHM+-2%TK200 1206 CHIP RESISTOR	007.1860	DRALORIC	CGB 3216 46,4KOHM 2%	
R221	RG 464 OHM+-2%TK200 1206 CHIP RESISTOR	006.9045	DRALORIC	CGB3216 464OHM2% TK	
R222	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R223	RL 0,35W 121 OHM+-1%TK50 RESISTOR	RL 082.9859	DRALORIC	SMAO207/121OHM-F-D	
R224	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R225	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R226	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R228	RG 464 OHM+-2%TK200 1206 CHIP RESISTOR	006.9045	DRALORIC	CGB3216 464OHM2% TK	
R229	RL 0,35W 13,0KOHM+-1%TK50 RESISTOR	RL 083.1368	DRALORIC	SMAO207/13,0K-F-D	
R230	RG 511 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9051	DALE	CRCW1206-10 511R F-T	
R231	RG 1,78KOHM+-2%TK200 1206 CHIP RESISTOR	007.0006	DRALORIC	CGB 3216 1,78KOHM 2%	
R232	RL 0,35W 511 OHM+-1%TK50 RESISTOR	RL 083.0426	DRALORIC	SMAO207/511OHM-F-D	
R235	RL 0,35W31,60 OHM+-1%TK50 RESISTOR	RL 082.9336	DRALORIC	SMAO207/31,6OHM-F-D	
R239	RG 681 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6110	DALE	CRCW1206-10 681K F-T	
R240	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R241	RG 681 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6110	DALE	CRCW1206-10 681K F-T	
R270	RG 383 OHM+-2%TK200 1206 CHIP RESISTOR	006.9022	DRALORIC	CGB3216 383OHM2% TK	
R271	RG 383 OHM+-2%TK200 1206 CHIP RESISTOR	006.9022	DRALORIC	CGB3216 383OHM2% TK	
R272	RG 383 OHM+-2%TK200 1206 CHIP RESISTOR	006.9022	DRALORIC	CGB3216 383OHM2% TK	
R273	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R274	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R277	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R279	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R280	RG 2,61KOHM+-2%TK200 1206 CHIP RESISTOR	007.0658	DRALORIC	CGB 3216 2,61KOHM 2%	
R281	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R282	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R283	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R285	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R287	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R288	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R291	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R292	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R293	RL 0,35W 68,1 OHM+-1%TK50 RESISTOR	RL 082.9636	DRALORIC	SMAO207/68,1OHM-F-D	
R294	RL 0,35W 68,1 OHM+-1%TK50 RESISTOR	RL 082.9636	DRALORIC	SMAO207/68,1OHM-F-D	
R295	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R296	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R300	RL 0,35W 681 OHM+-1%TK50 RESISTOR	RL 083.0490	DRALORIC	SMAO207/681OHM-F-D	
R301	RL 0,35W 681 OHM+-1%TK50 RESISTOR	RL 083.0490	DRALORIC	SMAO207/681OHM-F-D	

ROHDE & SCHWARZ	Äl	Datum	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	14	1089			

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R302	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R303	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R304	RG 2,0 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5737	DALE	CRCW1206-10 2K F-T	
R305	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R306	RG 17,8KOHM+-2%TK200 1206 CHIP RESISTOR	007.0887	DRALORIC	CGB 3216 17,8KOHM 2%	
R307	RG 3,83KOHM+-2%TK200 1206 CHIP RESISTOR	007.0693	DRALORIC	CGB 3216 3,83KOHM 2%	
R308	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R309	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R310	RL 0,35W 2,00KOHM+-1%TK50 RESISTOR	RL 083.0826	DRALORIC	SMA0207/2,00K-F-D	
R313	RL 0,35W 1,82KOHM+-1%TK50 RESISTOR	RL 082.2277	DRALORIC	SMA0207/1,82K-F-C	
R320	RG 2,0 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5737	DALE	CRCW1206-10 2K F-T	
R321	RG 200 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5995	DALE	CRCW1206-10 200K F-T	
R322	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R323	RL 0,35W 3,92KOHM+-1%TK50 RESISTOR	RL 083.1039	RESISTA	MK2	
R324	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R325	RL 0,35W 2,00KOHM+-1%TK50 RESISTOR	RL 083.0826	DRALORIC	SMA0207/2,00K-F-D	
V1	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V2	AK BFR96 N 15V 75MA TRANSISTOR	AK 093.2738	VALVO	BFR96	
V3	AK BC173C N 25V 100MA TRANSISTOR	010.4444	INTERMETAL	BC173C	
V4	AK BC253C P 25V 100MA TRANSISTOR	010.2829	INTERMETAL	BC253C	
V5	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V9	AE BB809 26/ 6PF CDI TUNING DIODE	AE 092.9616	VALVO	BB809	
V15	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V16	AE 1N823 6,2V REF DI REFERENCE DIODE	012.2278	CDI	1N823	
V90	AK 2N2369A N 15V 200MA TRANSISTOR	AK 010.4680	VALVO	2N2369A	
V100	AK 2N2369A N 15V 200MA TRANSISTOR	AK 010.4680	VALVO	2N2369A	
V101	AK BSX29 P 12V 200MA TRANSISTOR	010.3031	SGS	BSX29	
V102	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V104	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V105	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V106	AE BZX85/C12 1,3W ZDI ZENER DIODE	AE 092.8284	THOMSON	BZX85/C12	
V107	AE 1N827 6,2V REF DI REFERENCE DIODE	AE 418.0029	CDI	1N827	
V190	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V200	AK BCY79IX P 45V 200MA TRANSISTOR	AK 010.3777	VALVO	BCY79IX	
V201	AK 2N2905A P 60V 600MA TRANSISTOR	AK 010.3919	VALVO	2N2905A	
V202	AK 2N2219A N 40V 800MA TRANSISTOR	AK 083.6953	VALVO	2N2219A	
V203	AE BB620 45/03PF CDI TUNING DIODE	848.5251	SIEMENS	BB620	
V215	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	

ROHDE & SCHWARZ	Al	Datum	Schaltteilliste für	Sachnummer	Blatt
		Date	Parts list for	Stock Nr.	Page
	14	1089	ED FM-INTERPOL-OSZILLATOR FM-INTERPOL-OSCILLATOR	819.4967.01 SA	12+

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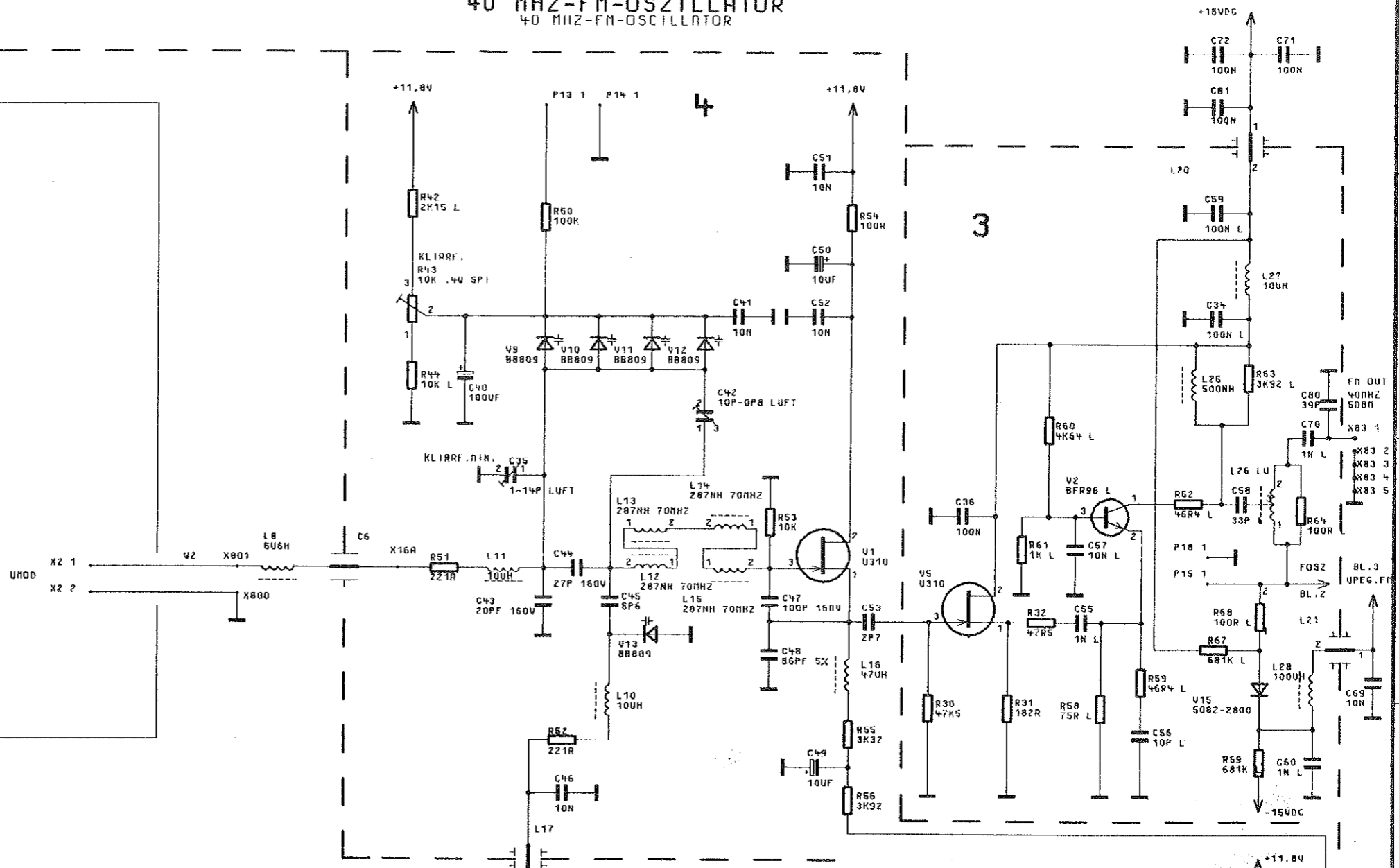
Für diese Unterlage behalten wir uns alle Rechte vor

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V216	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V217	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V218	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V221	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V222	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V223	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V224	AK 2N2369A N 15V 200MA TRANSISTOR	AK 010.4680	VALVO	2N2369A	
V225	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V226	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V270	AK 2N2369A N 15V 200MA TRANSISTOR	AK 010.4680	VALVO	2N2369A	
V304	AE BZX85/C12 1,3W ZDI ZENER DIODE	AE 092.8284	THOMSON	BZX85/C12	
V305	AD BAV99 2X70V OA1 UDI DIODE	911.0092	VALVO	BAV99	
V307	AD BAV99 2X70V OA1 UDI DIODE	911.0092	VALVO	BAV99	
V320	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V321	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	
W1	DX KABEL W1 CABLE	819.5405			
W2	DX KABEL W2 CABLE	819.5486			
W3	DX KABEL W3 CABLE	819.5470			
X11	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X20	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X81	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X82	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X83	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X800	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	
X801	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	
X15A	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	
X15B	VL LOETOESE 8,5 X 0,9 SOLDER LUG	455.9384	VOGT&CO	R&S-ZCHNG.455.9384	
X16A	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	
X8A	FP STECKERLEISTE 32POL. MULTIPOINT CONNECTOR	FP 514.4550	PANDUIT	100-232-033/999	

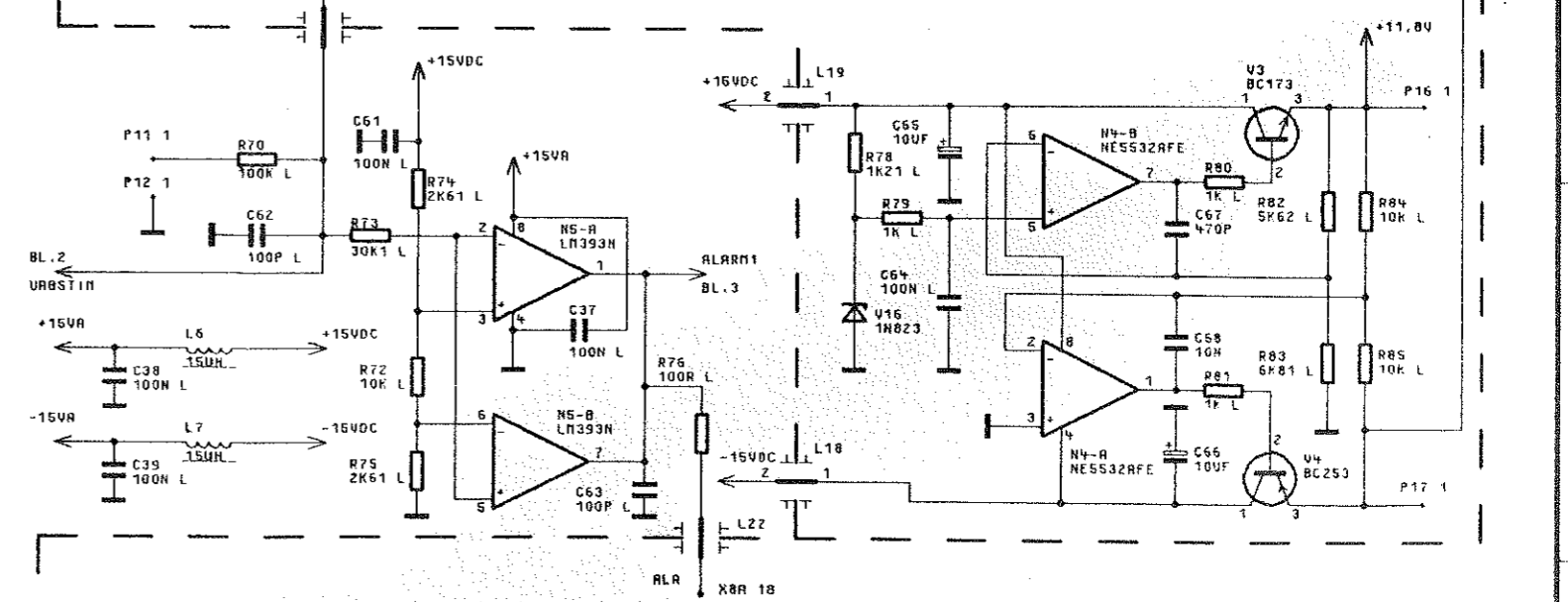
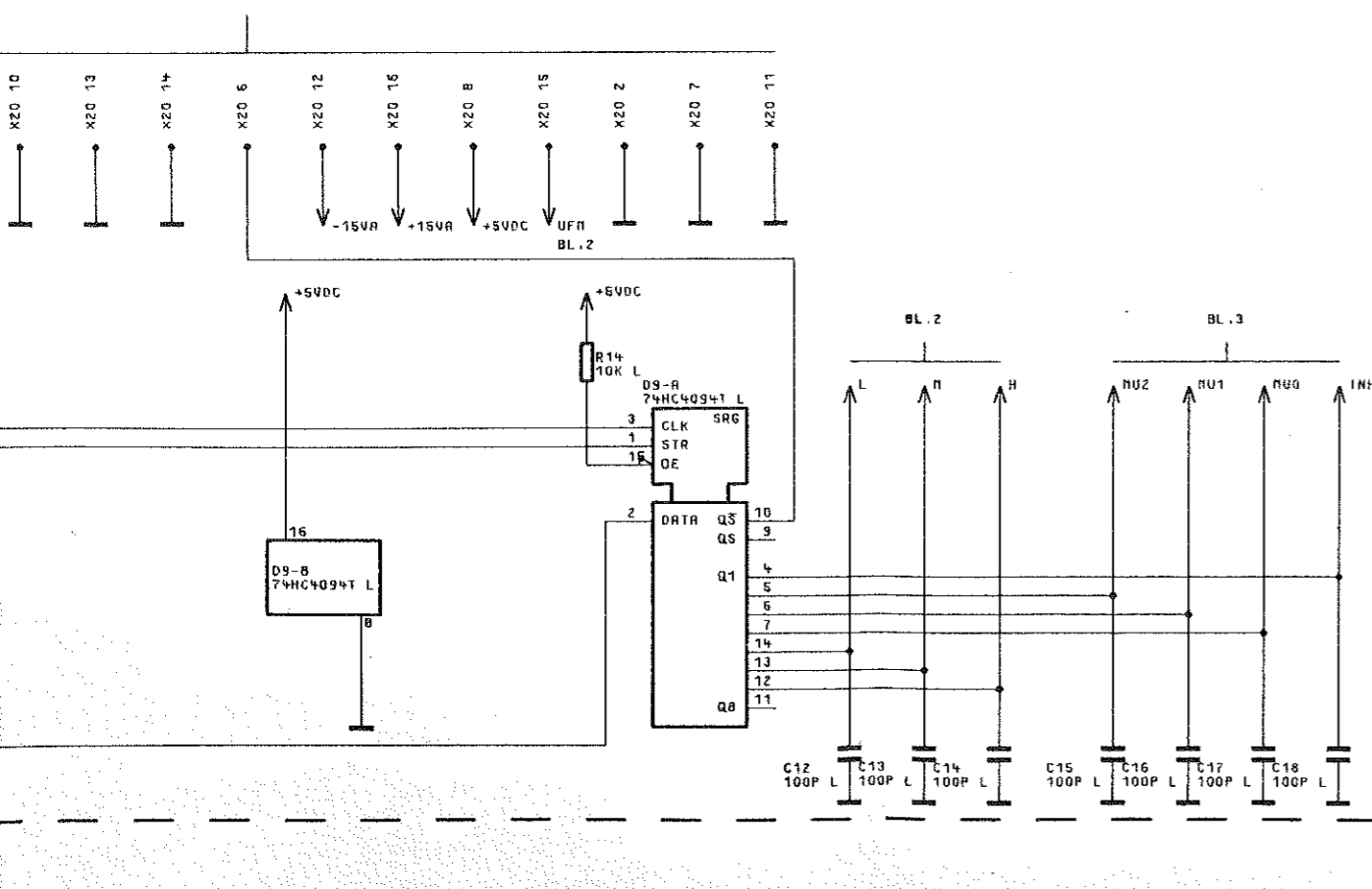
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ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
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40 MHZ-FM-OSZILLATOR
40 MHZ-FM-OSCILLATOR

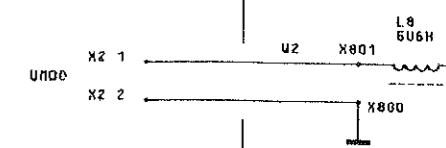
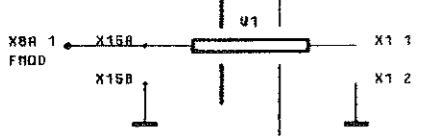


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FM-ATTENUATOR

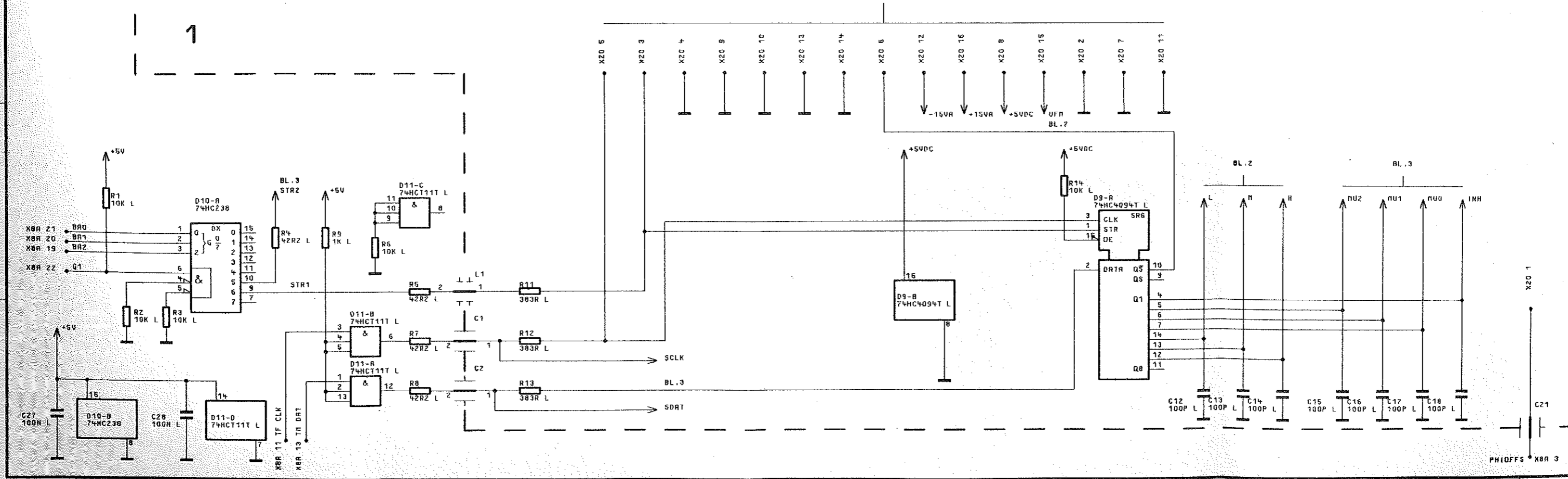


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				GEPR.		LS	FM-INTERPOL-OSCILLATOR
				NORM			
				PLOTT	30. 3.89	*	
							ZEICHN.-NR.
							819.4967.015
REND. IND.	RENDERUNGS-NITTEILUNG	DATUM	NAME	ZU GERÄT	SNGU	REG. I. V.	819.0010
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							U. 3 BL.

A82
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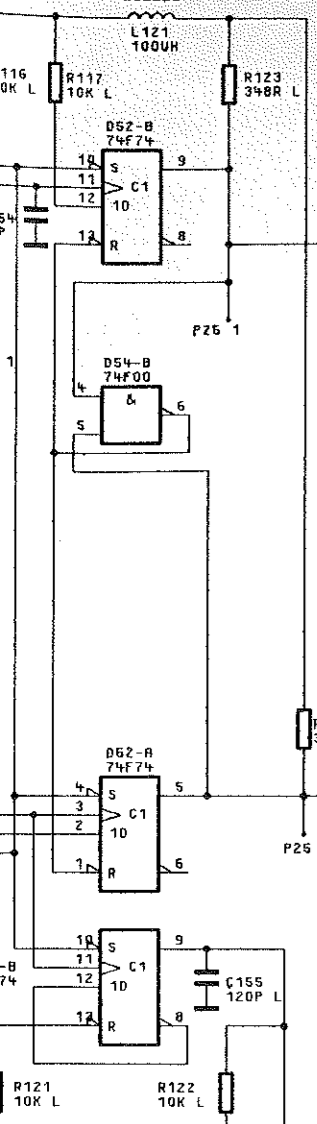


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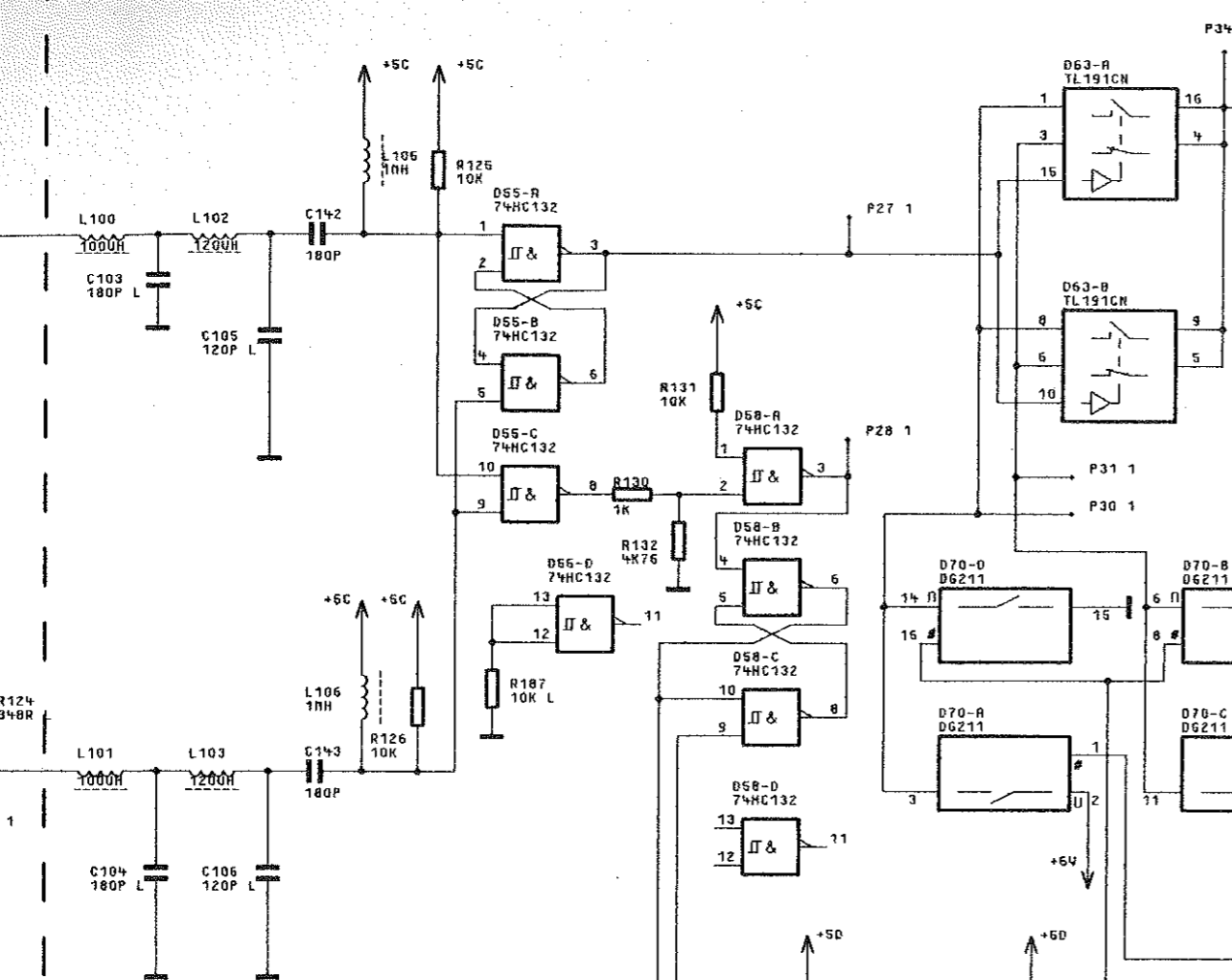


FÜR DIESE ZEICHNUNG BEHALTEN WIR UNS ALLE RECHTE VOR
 FÜR ANDERE VERWENDUNGEN. REVISIONEN KÖNNEN NUR DURCH RECHNUNG
 DES DATENSATZES ERFOLGEN.

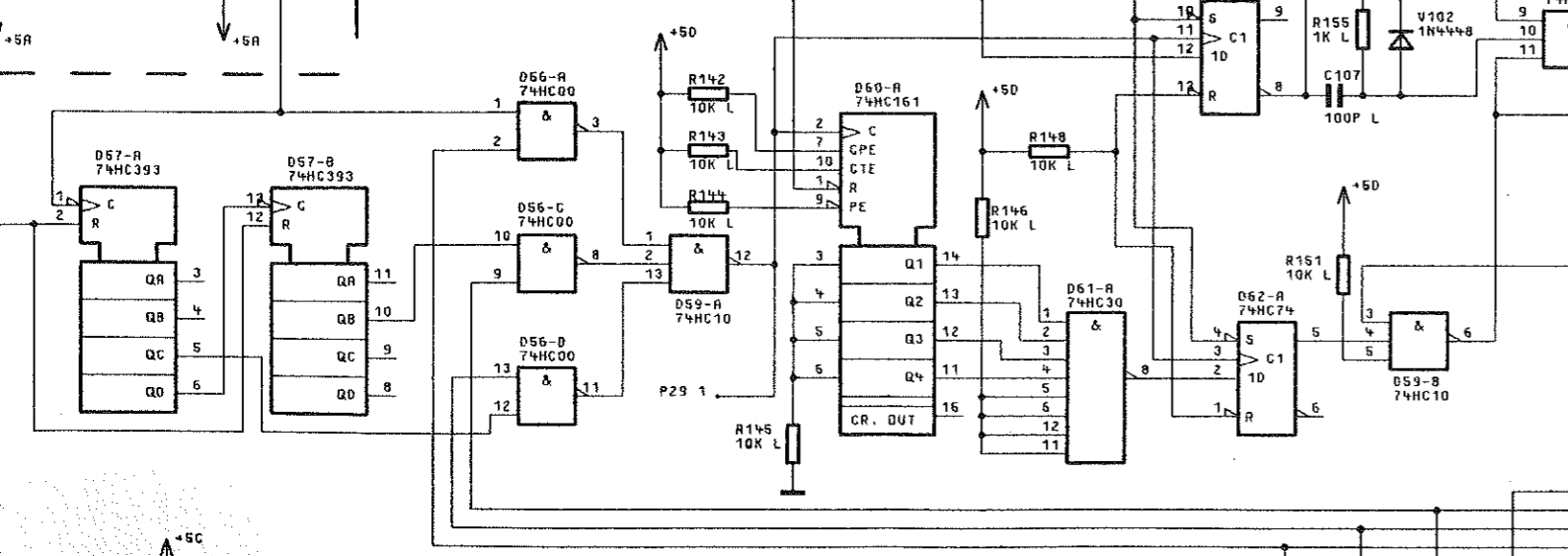
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PHASE DETECTOR



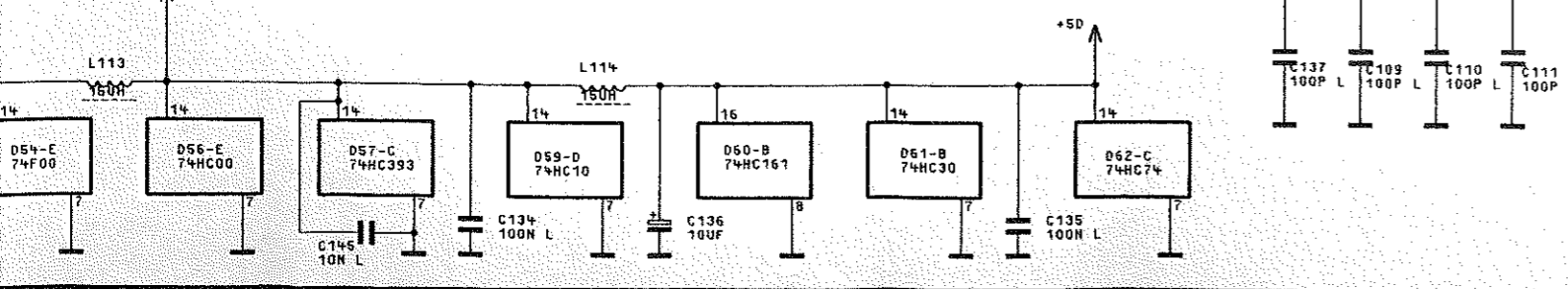
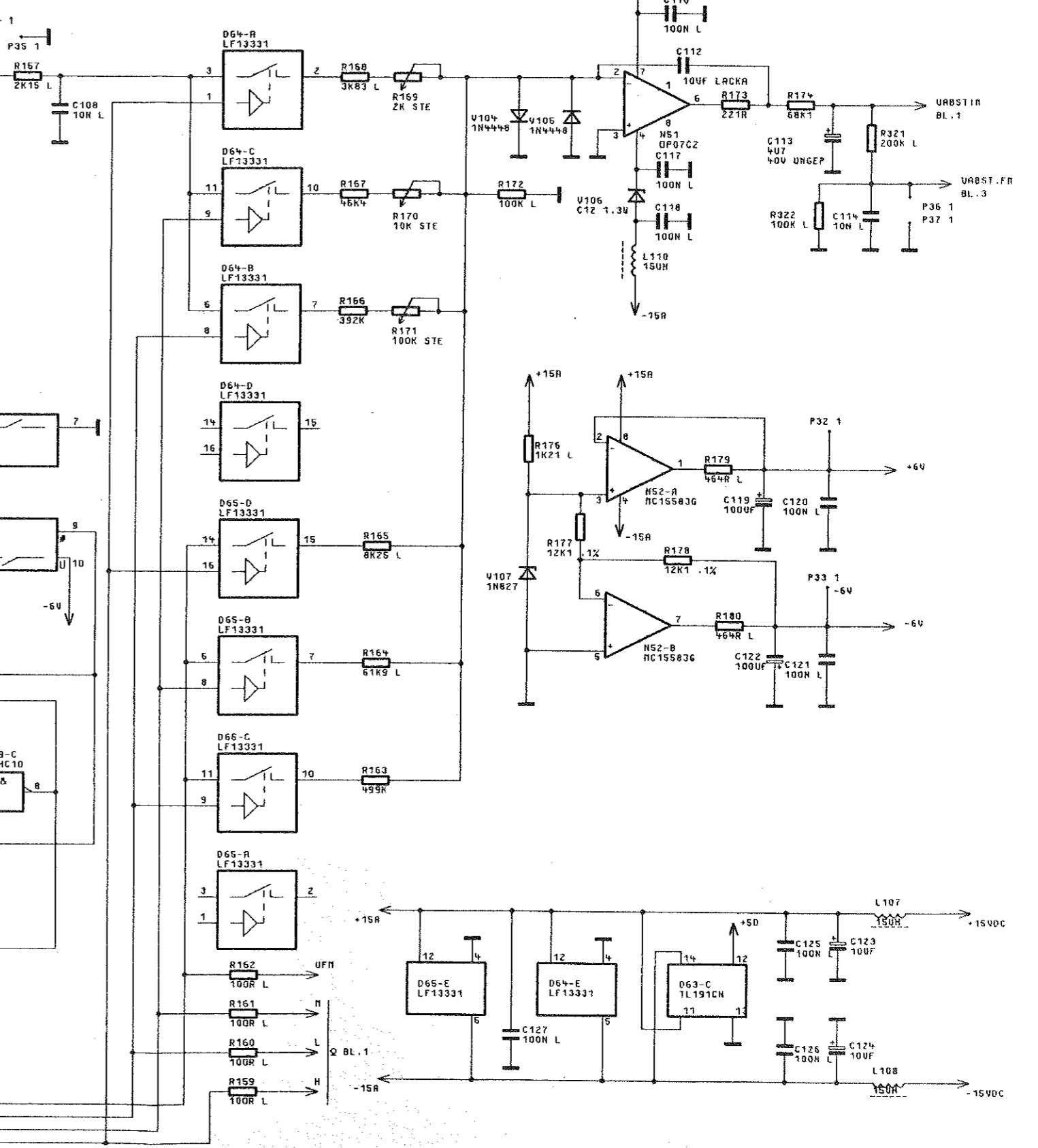
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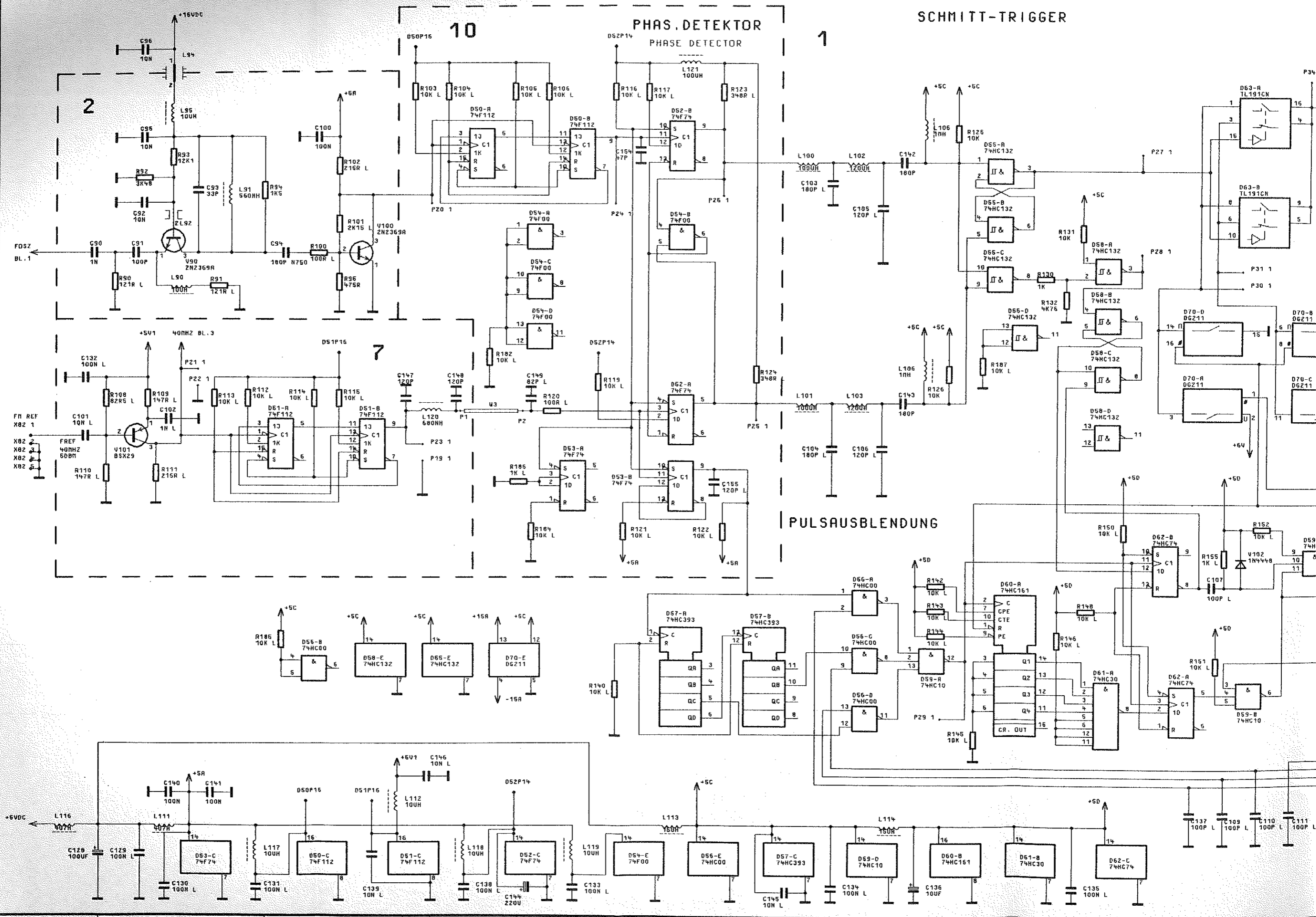


INTEGRATOR
INTEGRATOR



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				GEPR.		LS		
				NDRN				
				PLOTT	28. 3.89	*		
							ZEICHN.-NR.	BLATT-NR.
ROHDE & SCHWARZ ZU GEHÖRT SMGU							819.4967.015	2
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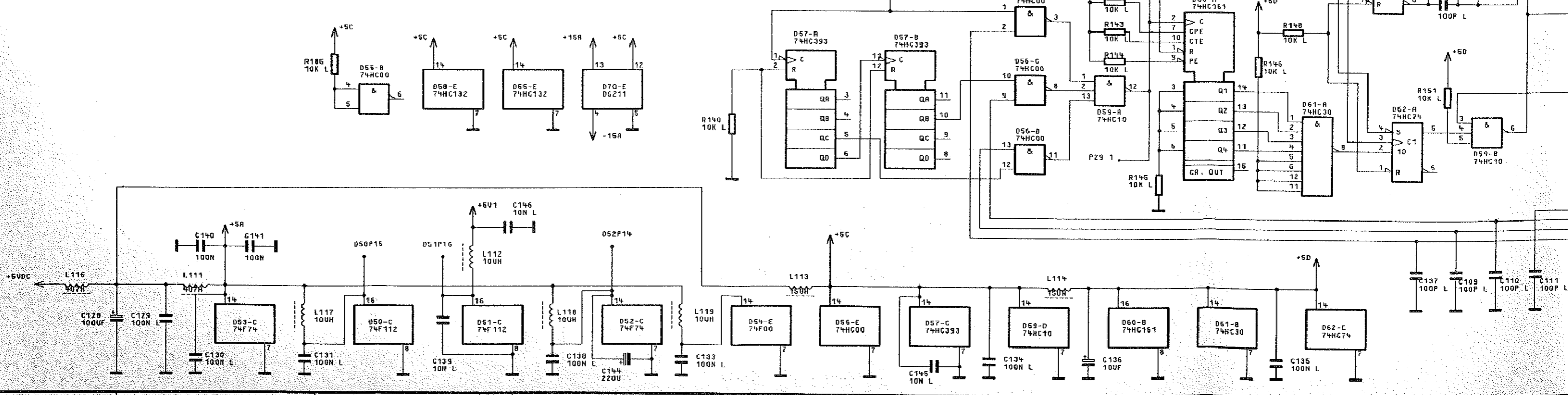
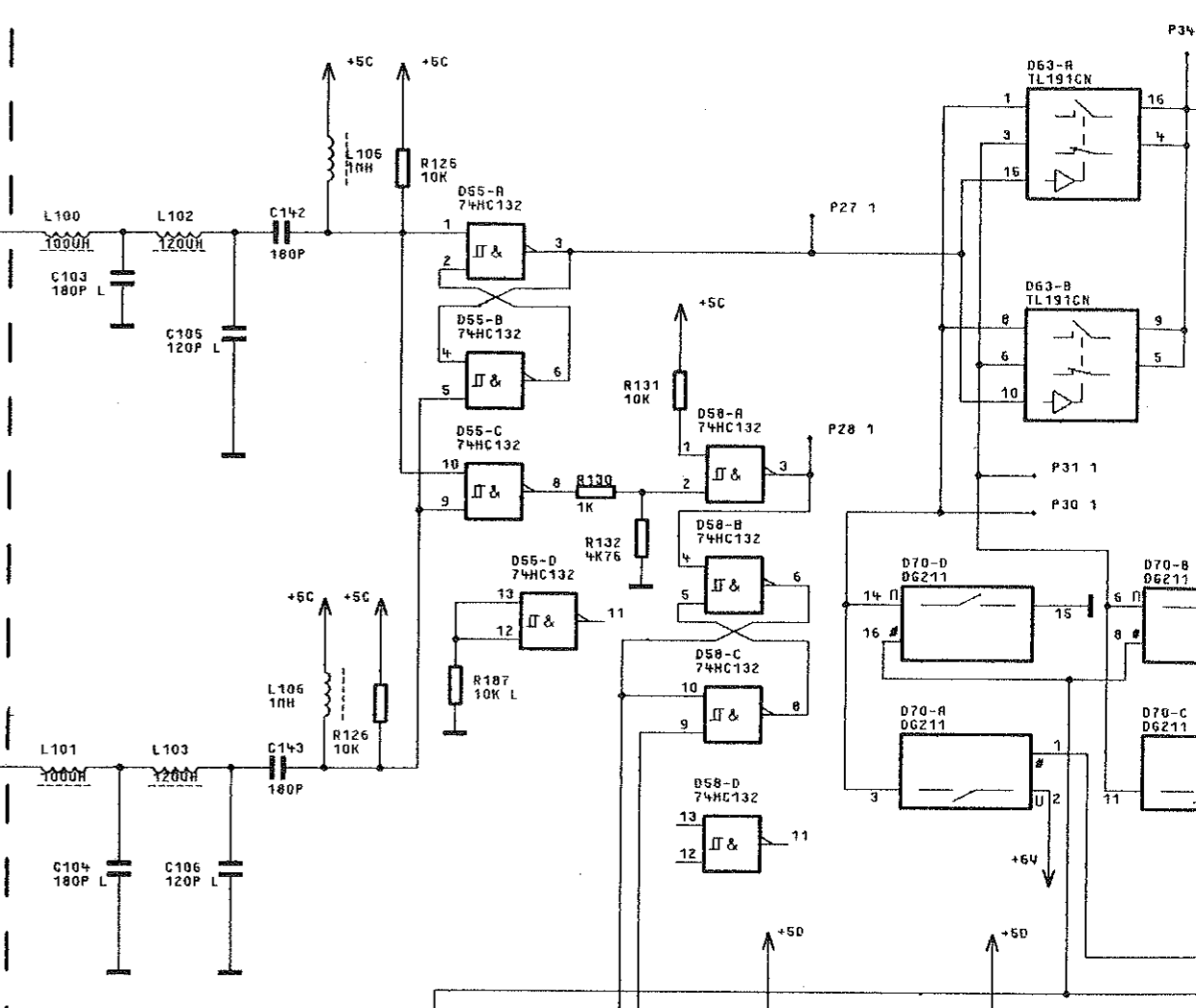
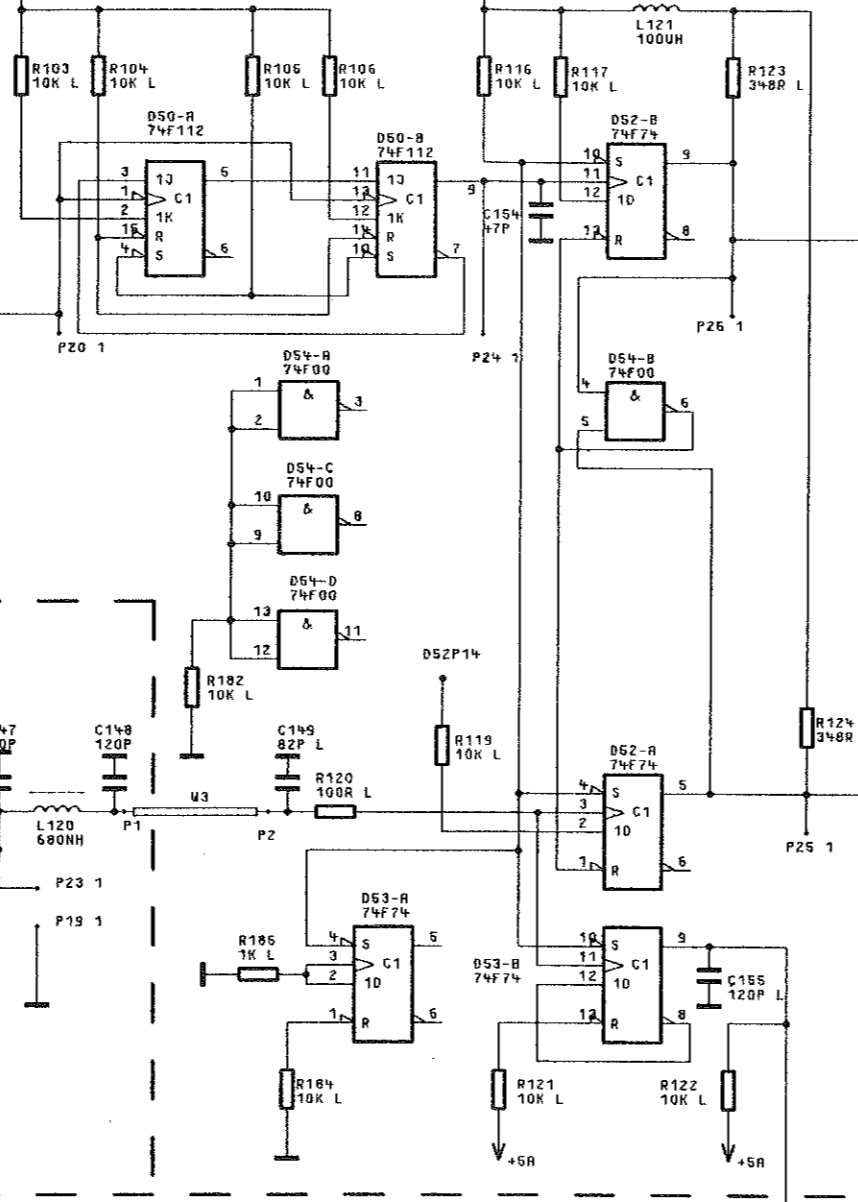
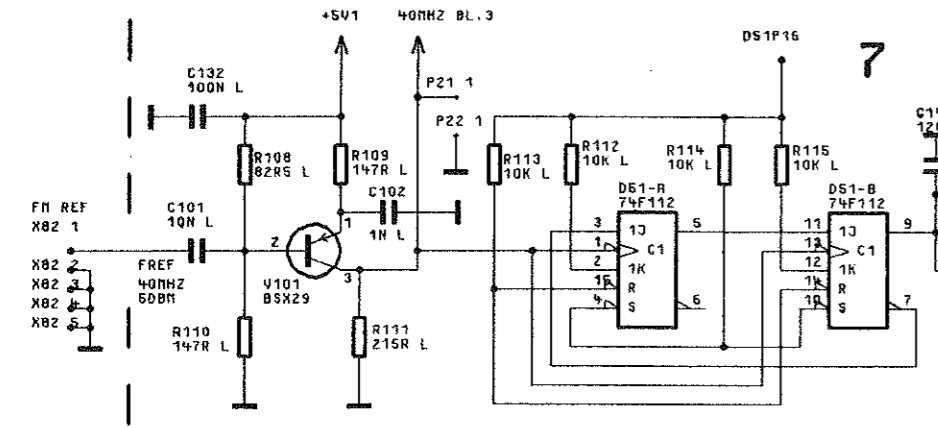
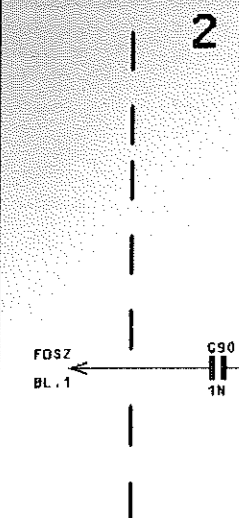
DIESE ZEICHNUNG IST EIN RECHNERAUSDRUCK, ÄNDERUNGEN KÖNNEN NUR DURCH RECHNEN DES DATENSATZES ERFOLGEN
FUER DIESE ZEICHNUNG BEHALTEN WIR UNS ALLE RECHTE VOR



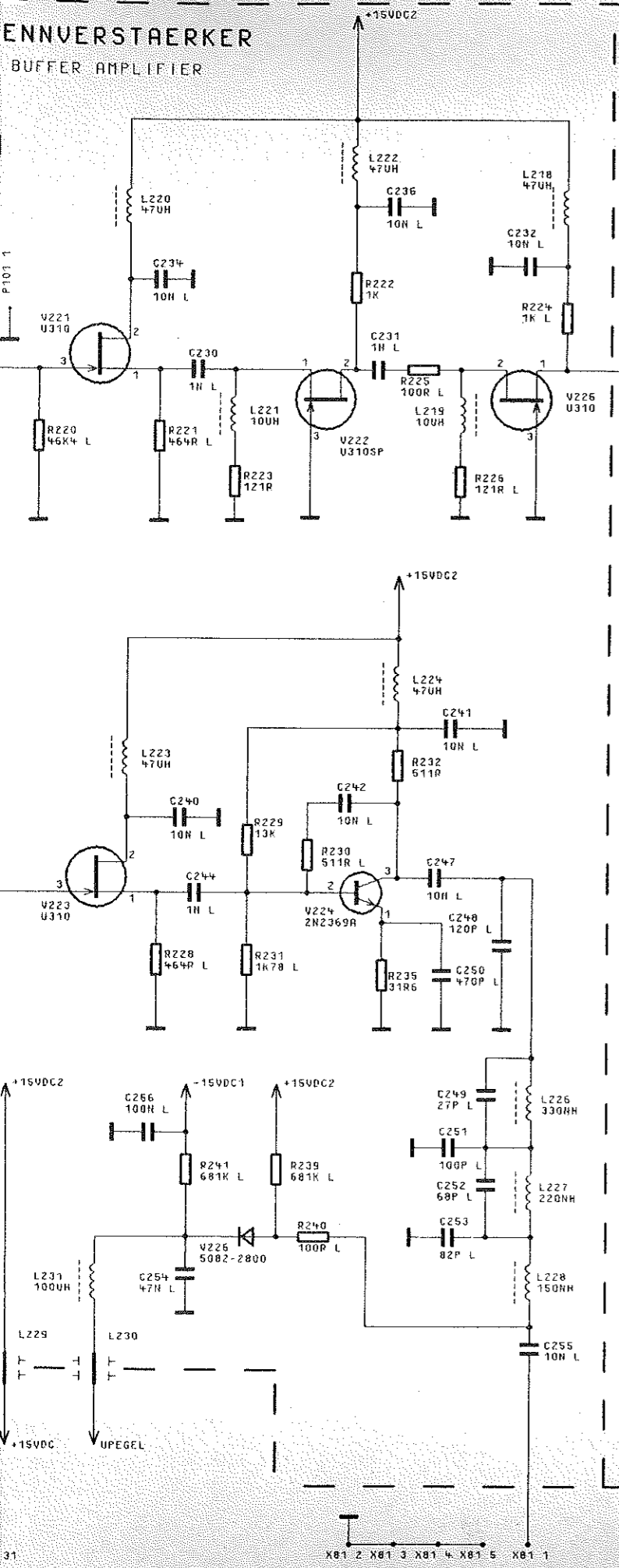
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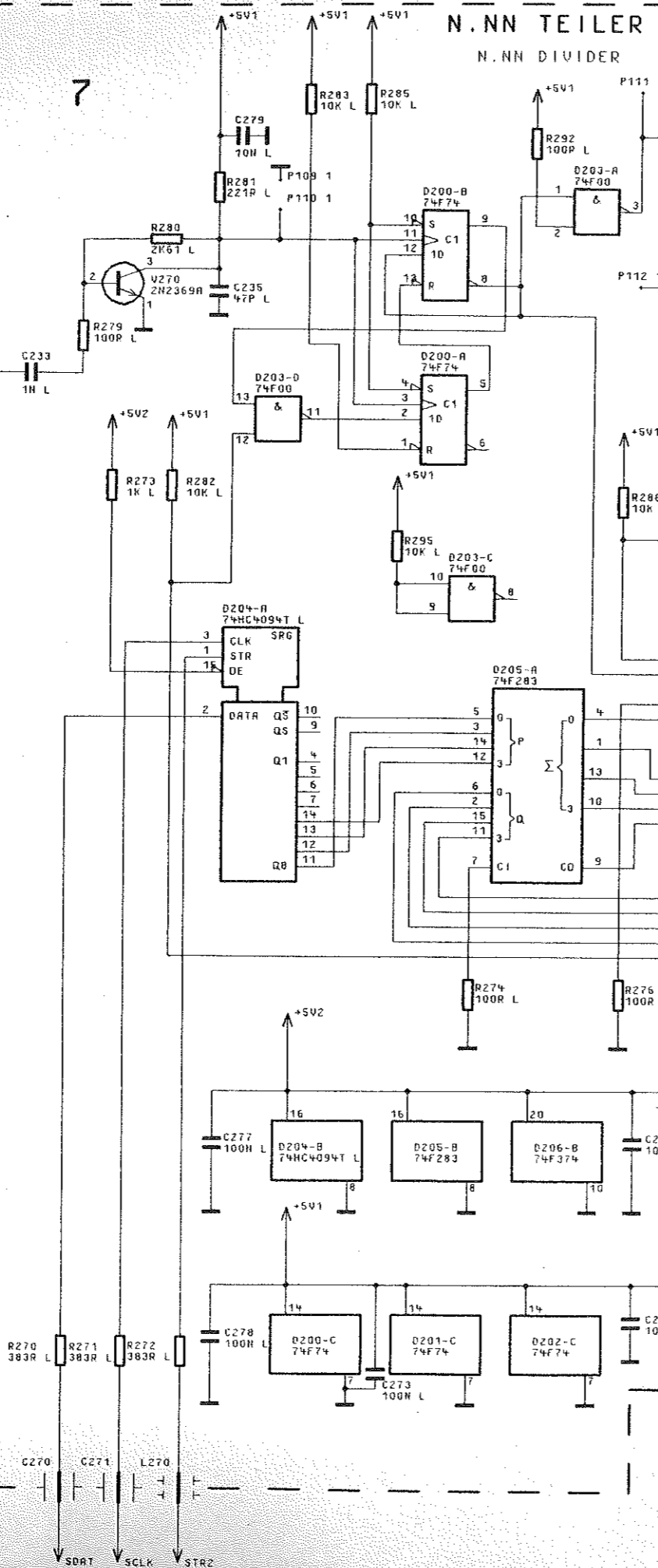
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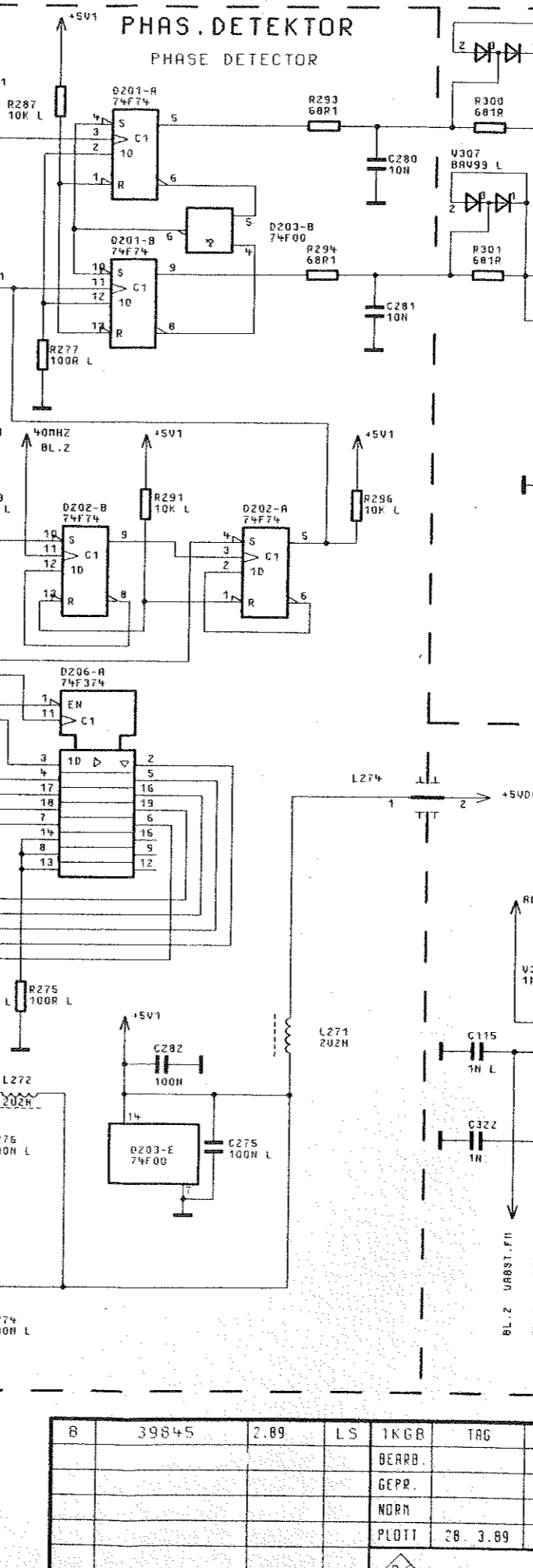
ENNVERSTÄRKER
BUFFER AMPLIFIER



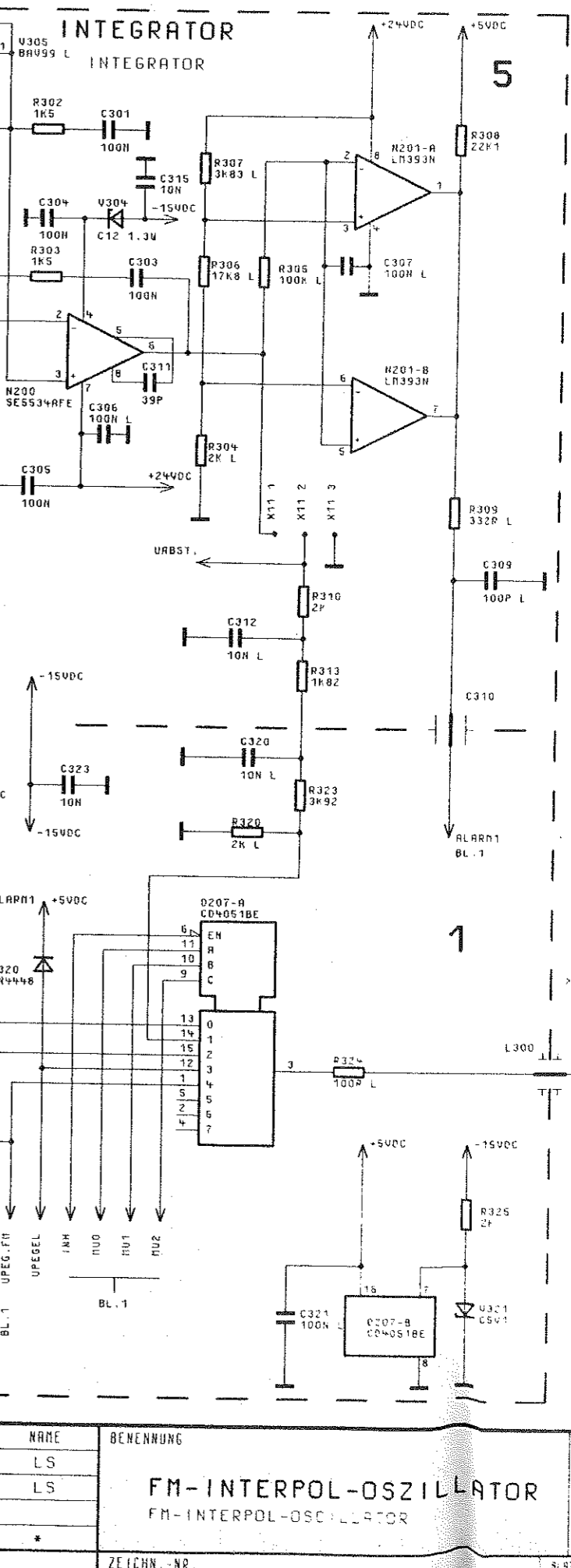
N.NN TEILER
N.NN DIVIDER



PHAS. DETEKTOR
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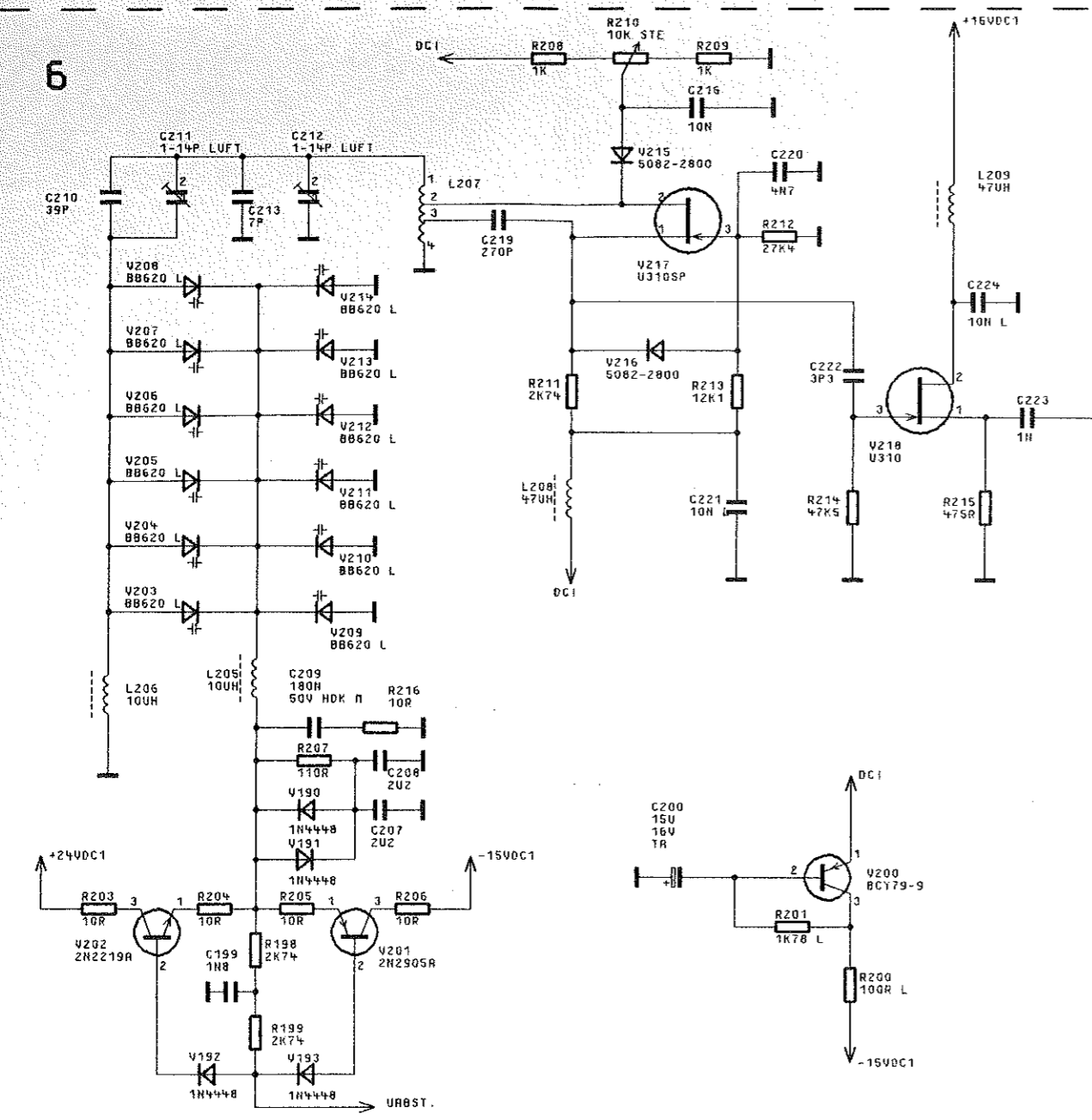
INTEGRATOR
INTEGRATOR



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REN	ÄNDERUNGS-	DATUM	NAME	ROHDE&SCHWARZ		ZEICHN.-NR.	
IND	MITTEILUNG			ZU GERÄT. SMGU.		819.4967.015	
						3	

DIESE ZEICHNUNG IST EIN RECHNERSDRUCK, AENDERUNGEN KOENNEN NUR DURCH RECHNENDES ERFOLGEN

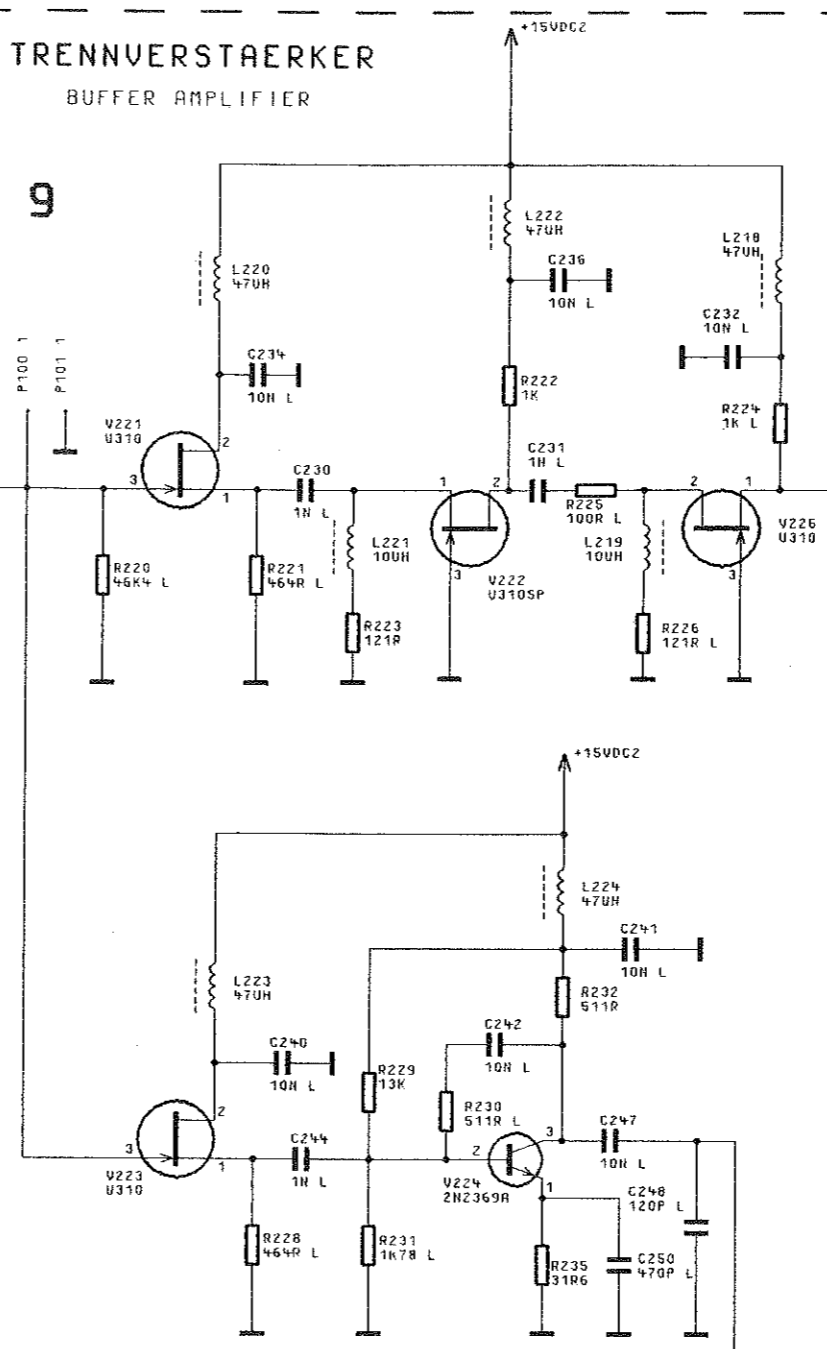
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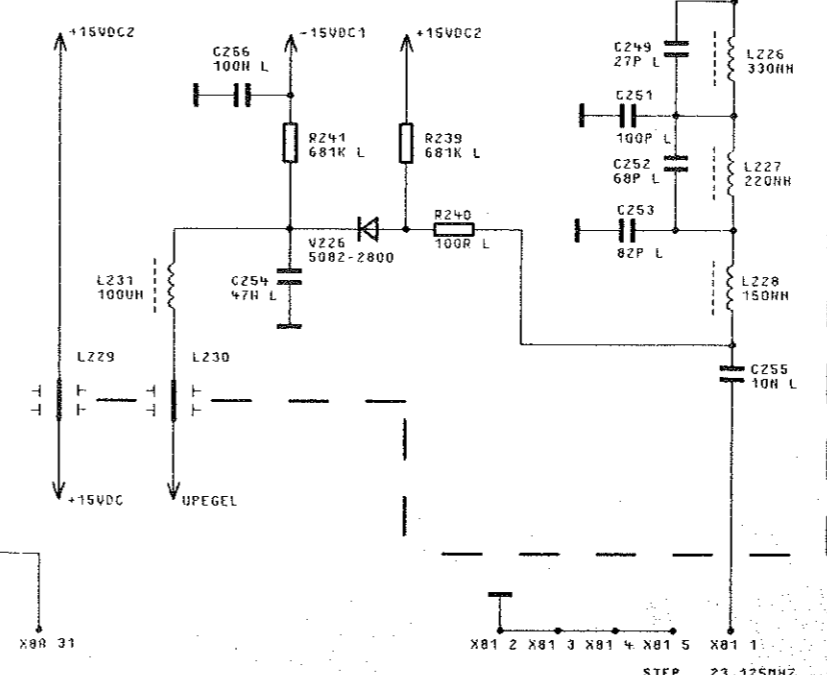
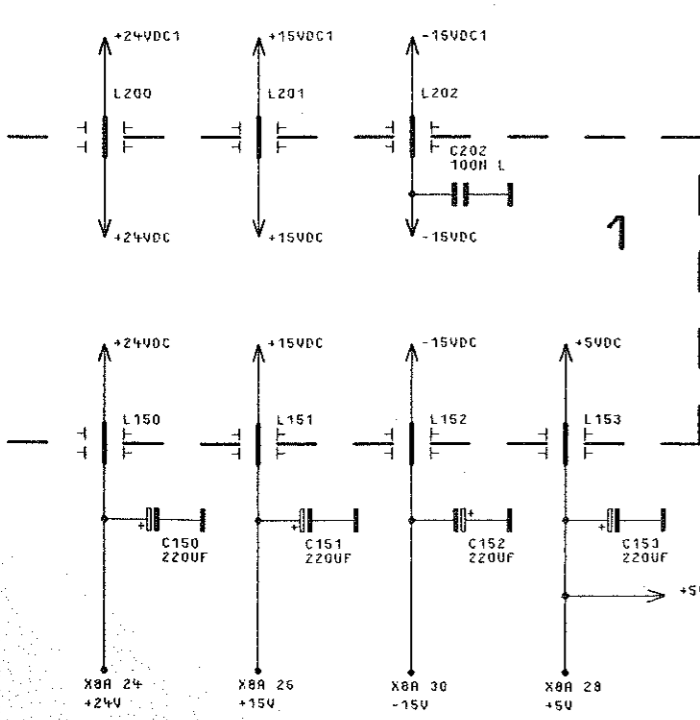
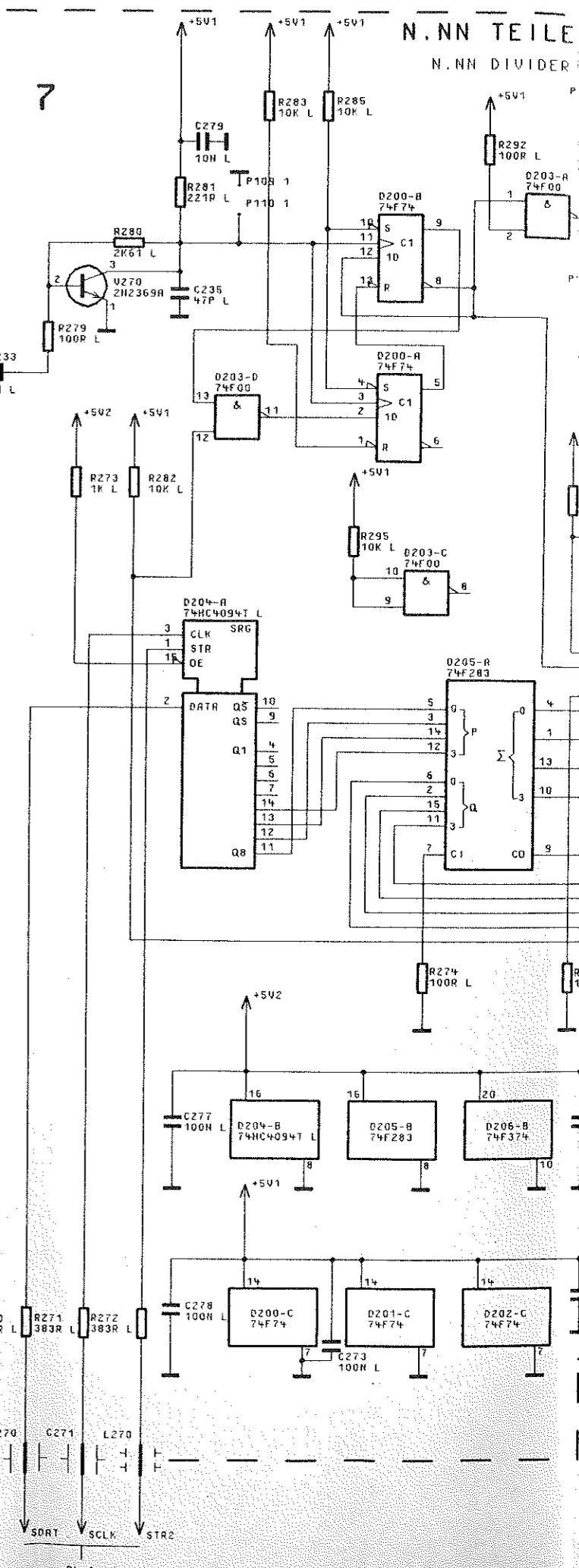
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BUFFER AMPLIFIER

9



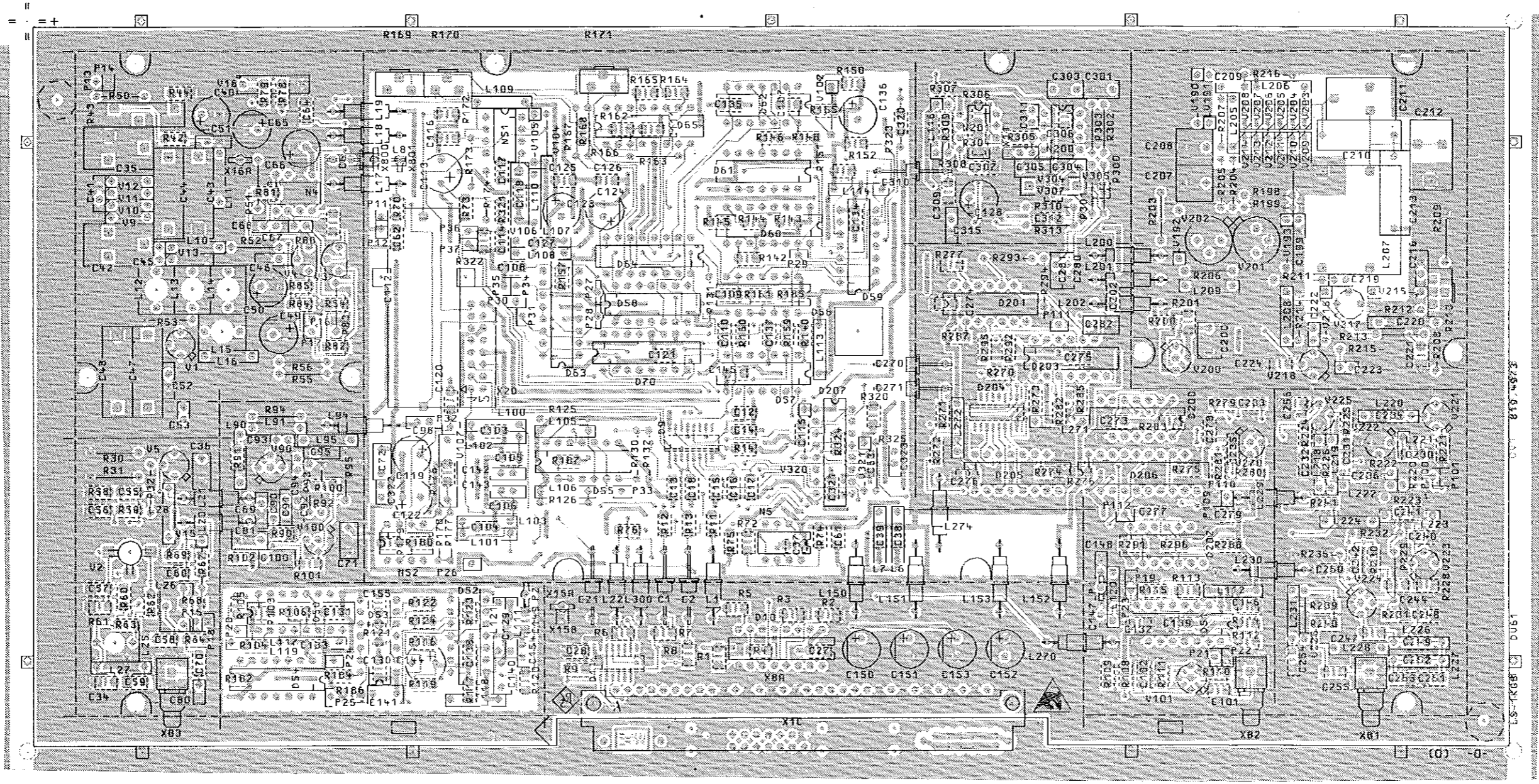
7



STEP 23.125MHZ
29.375MHZ
100DB

BL.1

Ansicht und Leitungsführung Lötseite
View of tracks on solder side

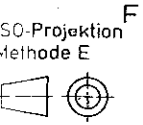


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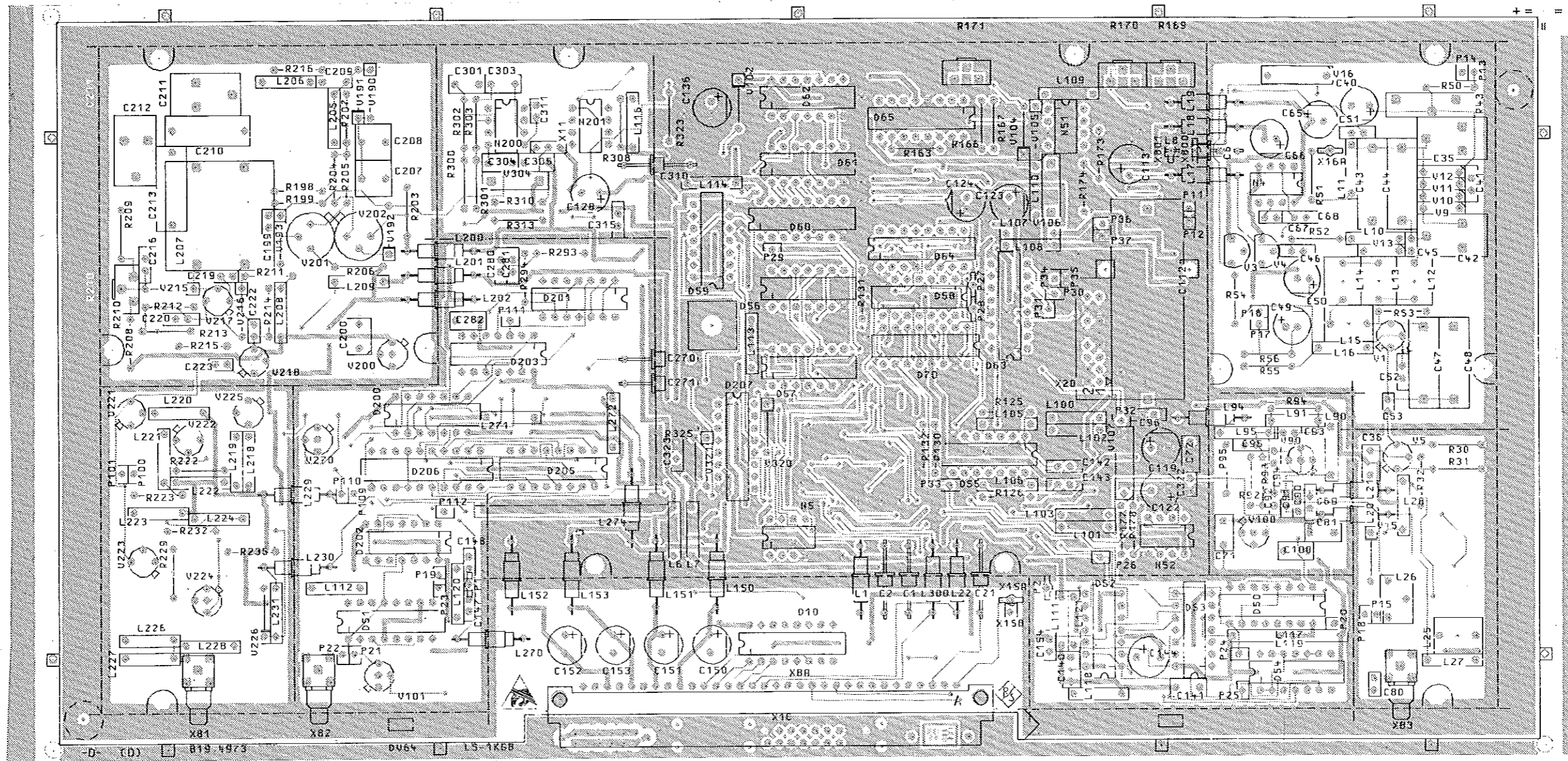
VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

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					Halbzeug, Werkstoff		
				1KGB Tag Name	Benennung		
				Bearb. 02.89 LS	Benennung		
				Gepr.	Benennung		
				Norm	Benennung		
					Zeichn.-Nr.		Blatt-Nr.
				ROHDE & SCHWARZ	819.4967.02		3
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU	reg. i. V. 819.0010 V	erste Z.	v. Bl.

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




Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



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VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

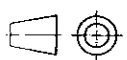
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				Gepr.		
				Norm		
				 ROHM & SCHWARZ	Zeichn.-Nr.	Blatt-Nr.
				zu Gerät SMGU	819.4967.02	2
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	reg. i. V.	819.0010 V	v. Bl.
				erste Z.		

(hierzu PVC 250)



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ISO-Projektion Methode E



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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C1	CK 10NF +-1% 63V RMS KP POLYPROPYLENE CAPACITOR	CK 007.7652	ROE	KP1830-310/061-R	
C3	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C4	CC 1UF+-10%50V7K120OVIEL CAPACITOR	084.5538	UNION CARB	CKO6BX105K	
C5	CC 1UF+-10%50V7K120OVIEL CAPACITOR	084.5538	UNION CARB	CKO6BX105K	
C7	CC 100PF+-2%6X7N150 CAPACITOR	CC 087.6712	VALVO	2222 678 34101	
C10	CK 10NF +-1% 63V RMS KP POLYPROPYLENE CAPACITOR	CK 007.7652	ROE	KP1830-310/061-R	
C11	CC 10PF+-0,25PF3X4NPO CAPACITOR	CC 087.6429	VALVO	2222 678 09109	
C15	CC 10PF+-0,25PF3X4NPO CAPACITOR	CC 087.6429	VALVO	2222 678 09109	
C17	CC 1PF+-0,25PF3X4P100 CAPACITOR	CC 087.6170	VALVO	2222 678 03108	
C18	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C20	CC 47PF+-2%5X6NPO CAPACITOR	CC 087.6506	VALVO	2222 678 10479	
C21	CK 470PF +-1% 100V RMS KP POLYPROPYLENE CAPACITOR	CK 007.7575	ROE	KP1830-147/011-R	
C22	CK 330PF +-1% 100V RMS KP POLYPROPYLENE CAPACITOR	CK 007.7569	ROE	KP1830-133/011-R	
C24	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C25	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C26	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C28	CK 10NF +-1% 63V RMS KP POLYPROPYLENE CAPACITOR	CK 007.7652	ROE	KP1830-310/061-R	
C29	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C30	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C31	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C32	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0, 1UF/5%	
C45	CC 150PF+-2%5X6N750 CAPACITOR	CC 087.6929	VALVO	2222 678 58151	
D1	BJ LF13331N 4X ANALOGSCH ANALOG SWITCH	BJ 356.0515	NSC	LF13331N	
D2	BJ AD7533CQ 10B.DA-CONV D/A-CONVERTER	BJ 300.8740	ANALOG DEV	AD7533CQ	
D3	BJ LF13331N 4X ANALOGSCH ANALOG SWITCH	BJ 356.0515	NSC	LF13331N	
D4	BJ LF13331N 4X ANALOGSCH ANALOG SWITCH	BJ 356.0515	NSC	LF13331N	
D6	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D7	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D8	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D10	BJ TL604CP 2X ANALOGSCH ANALOG SWITCH	BJ 300.6199	TEXAS INST	TL604CP	
D12	BJ LF13331N 4X ANALOGSCH ANALOG SWITCH	BJ 356.0515	NSC	LF13331N	
L3	LD 47,0UH10%4,500HMO, 110A CHOKE	LD 067.3060	DELEVAN	DROSSEL 1025-60	
L4	LD 15,0UH10%2,800HMO, 157A CHOKE	LD 067.3001	DELEVAN	DROSSEL 1025-48	
L5	LD 15,0UH10%2,800HMO, 157A CHOKE	LD 067.3001	DELEVAN	DROSSEL 1025-48	
N1	BO LT318AJ8 H.S.R.OPAMP OPERATIONAL AMPLIFIER	805.1454	LINEAR TEC	LT318AJ8	
N2	BO LT318AJ8 H.S.R.OPAMP OPERATIONAL AMPLIFIER	805.1454	LINEAR TEC	LT318AJ8	
N3	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	

ROHDE & SCHWARZ

AI Datum
Date

09 0789

Schaltteilliste für
Parts list for

ED FM-RICHLLEITUNG
FM-ATTENUATOR

Sachnummer
Stock Nr.

819.4980.01 SA

Blatt
Page

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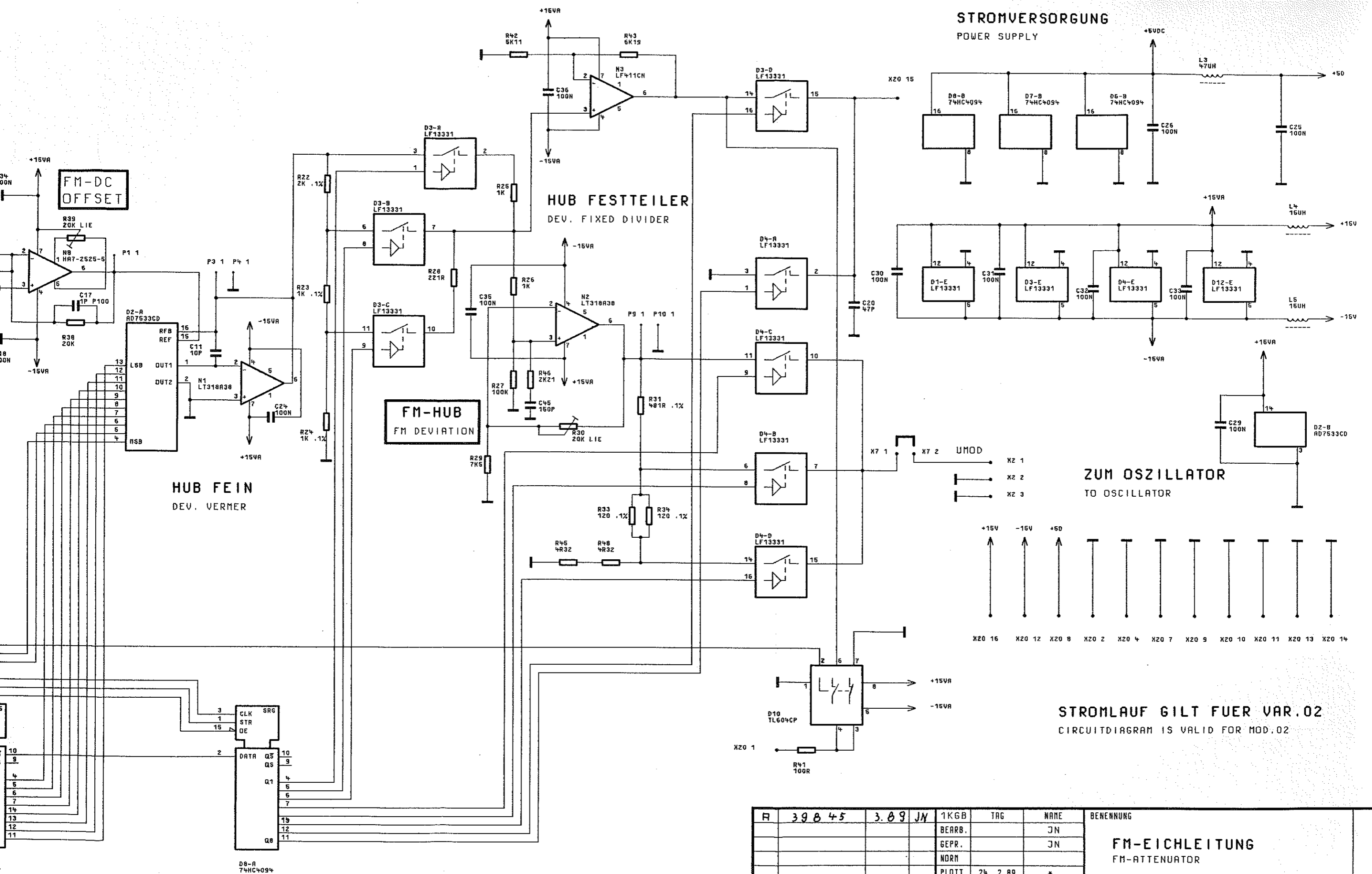
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N6	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	
N8	BO HA7-2525-5 HSR.OPAMP OPERATIONAL AMPLIFIER	352.7544	HARRIS	HA7-2525-5	
P1	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P3	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P4	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P9	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P10	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
R14	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R15	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R16	RL 0,35W 475 KOHM+-1%TK50 RESISTOR	RL 083.2593	DRALORIC	SMA0207/475K-F-C	
R17	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R18	RL 0,35W7,50KOHM+-0,1%T25 RESISTOR	RL 084.2822	DRALORIC	SMA/207/7,50K-B-E	
R19	RL 0,35W 475 KOHM+-1%TK50 RESISTOR	RL 083.2593	DRALORIC	SMA0207/475K-F-C	
R20	RL 0,35W 5,11KOHM+-1%TK50 RESISTOR	RL 082.2348	DRALORIC	SMA0207/5,11K-F-C	
R21	RL 0,35W 30,1KOHM+-1%TK50 RESISTOR	RL 083.1639	DRALORIC	SMA0207/30,1K-F-C	
R22	RL 0,35W2KOHM+-0,1%TK25 RESISTOR	RL 083.9723	DRALORIC	SMA0207/2,00K-B-E	
R23	RL 0,35W 1 KOHM+-0,1%TK25 RESISTOR	083.9146	DRALORIC	SMA0207/1K-B-E	
R24	RL 0,35W 1. KOHM+-0,1%TK25 RESISTOR	083.9146	DRALORIC	SMA0207/1K-B-E	
R25	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R26	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R27	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R28	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/221OHM-F-D	
R29	RL 0,35W 7,50KOHM+-1%TK50 RESISTOR	RL 083.1197	DRALORIC	SMA0207/7,5K-F-D	
R30	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 087.7577	BOURNS	3386F-1-203	
R31	RL 0,35W481 OHM+-0,1%TK25 RESISTOR	RL 083.8533	DRALORIC	SMA0207	
R33	RL 0,35W120 OHM+-0,1%TK25 RESISTOR	RL 083.7372	DRALORIC	SMA0207/120OHM-B-E	
R34	RL 0,35W120 OHM+-0,1%TK25 RESISTOR	RL 083.7372	DRALORIC	SMA0207/120OHM-B-E	
R37	RL 0,35W 20,0KOHM+-1%TK50 RESISTOR	RL 083.1522	DRALORIC	SMA/207/20K-F-C	
R38	RL 0,35W 20,0KOHM+-1%TK50 RESISTOR	RL 083.1522	DRALORIC	SMA/207/20K-F-C	
R39	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 087.7577	BOURNS	3386F-1-203	
R41	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R42	RL 0,35W 5,11KOHM+-1%TK50 RESISTOR	RL 082.2348	DRALORIC	SMA0207/5,11K-F-C	
R43	RL 0,35W 6,19KOHM+-1%TK50 RESISTOR	RL 082.2283	DRALORIC	SMA0207/6,19K-F-C	
R45	RL 0,35W4,32 OHM+-1%TK50 METALFILMRESISTOR	RL 099.8015	RESISTA	MK2 4,32 OHM 1% TK50	
R46	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R48	RL 0,35W4,32 OHM+-1%TK50 METALFILMRESISTOR	RL 099.8015	RESISTA	MK2 4,32 OHM 1% TK50	
R50	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R51	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	


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ROHDE & SCHWARZ	Äl	Datum Date	Schalttailliste für Parts list for	Sachnummer Stock Nr	Blatt Page
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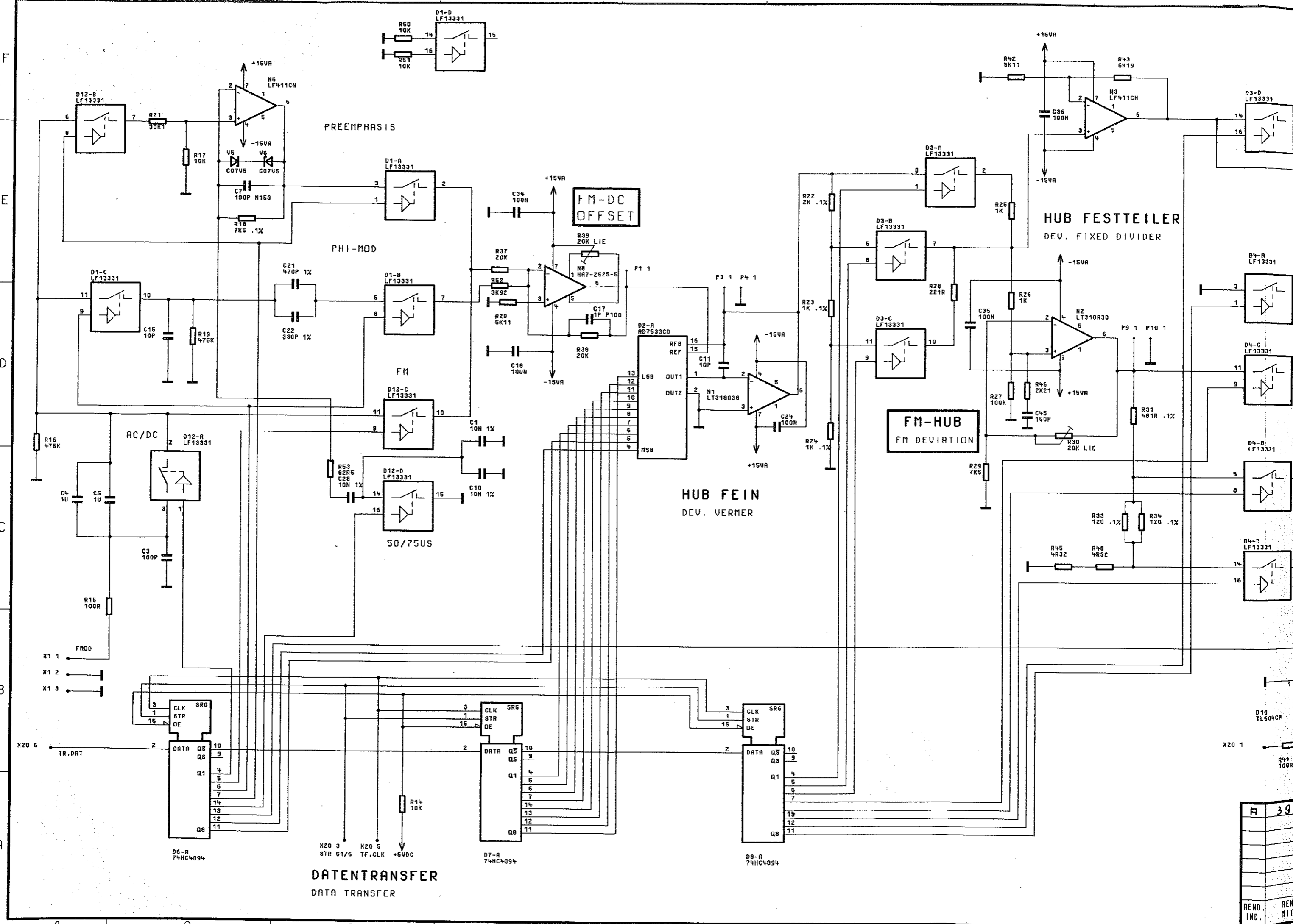
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R52	RL 0,35W 3,92KOHM+-1%TK50 RESISTOR	RL 083.1039	RESISTA	MK2	
R53	RL 0,35W 82,5 OHM+-1%TK50 RESISTOR	RL 082.9707	DRALORIC	SMA0207/82,5OHM-F-D	
V5	AE BZX79/C7V5 0,5W ZDI ZENER DIODE	AE 012.2484	VALVO	BZX79/C7V5	
V6	AE BZX79/C7V5 0,5W ZDI ZENER DIODE	AE 012.2484	VALVO	BZX79/C7V5	
W4	DX KABEL W4 CABLE	819.5392			
X1	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR 3-POLIG/PINS	FP 243.3578	BINDER	742-5-11-0187-00-36	
X2	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR 3-POLIG/PINS	FP 243.3578	BINDER	742-5-11-0187-00-36	
X7	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR 2-POLIG/PINS	FP 243.3578	BINDER	742-5-11-0187-00-36	
					- ENDE -
ROHDE & SCHWARZ		AI	Schalttaelliste für Parts list for		Sachnummer Stock Nr.
		Datum Date	ED FM-EICHLITUNG FM-ATTENUATOR		Blatt Page
		09 0789			819.4980.01 SA 3-



R	39845	3.09 JN	1KGB	TAG	NAME	BENENNUNG
			BEARB.		JN	FM-EICHLERUNG FM-ATTENUATOR
			GEPR.		JN	
			WDRN			
			PLOTT	24. 2.89	*	
REND. IND.	RENDERUNGS-MITTEILUNG	DATUM	NAME			ZEICHN.-NR.
				ROHDE & SCHWARZ		819.4980.015
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						V. 1 BL.

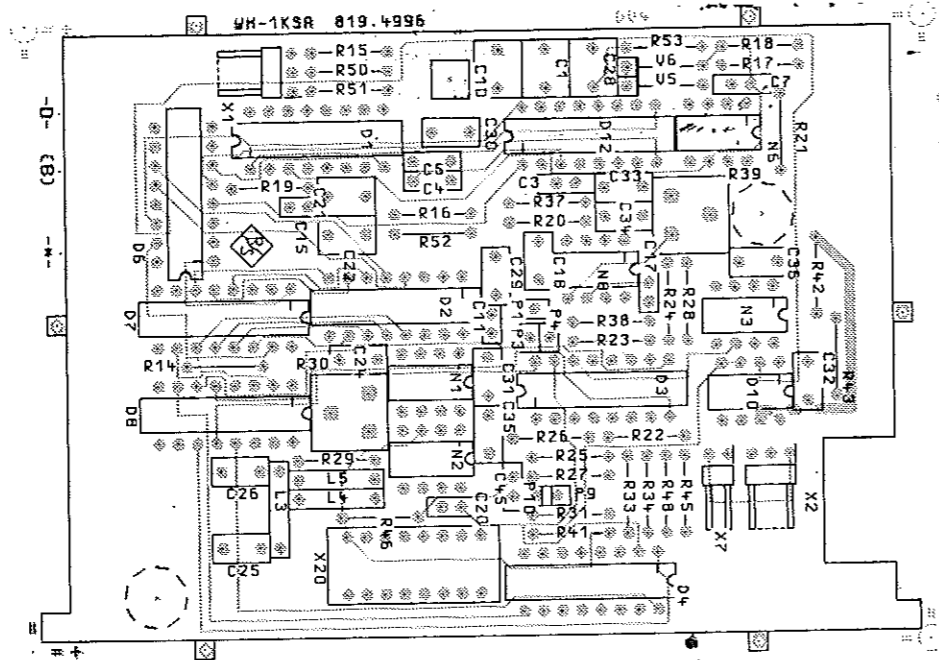
FUER DIESE UNTERLAGE
BEHALTEN WIR UNS ALLE RECHTE VOR



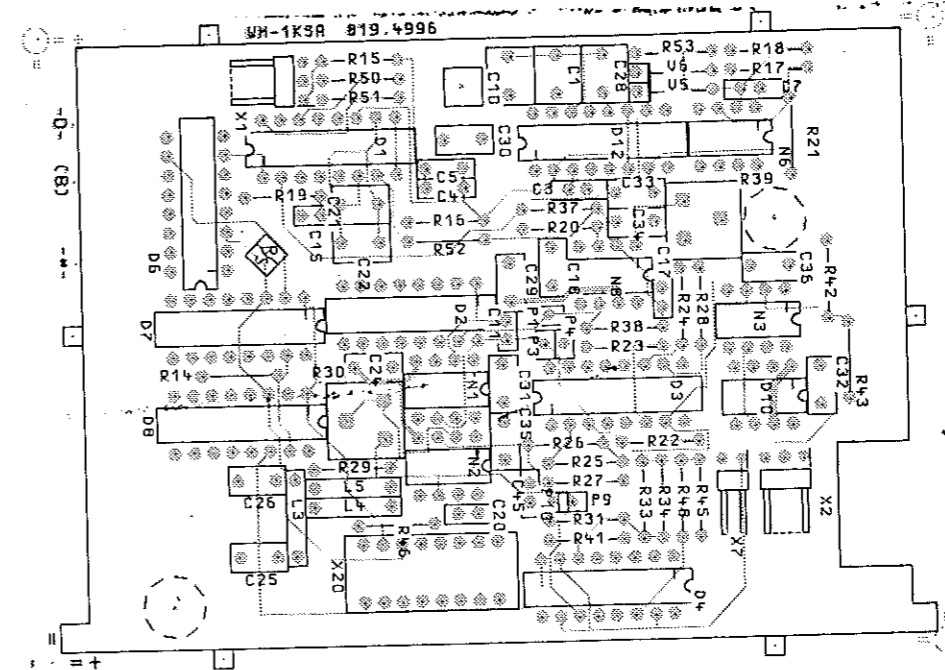
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REND. IND. RENDER MITTE

Ansicht und Leitungsführung Bauteilseite
View of tracks on component side

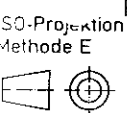


DV41



DV43

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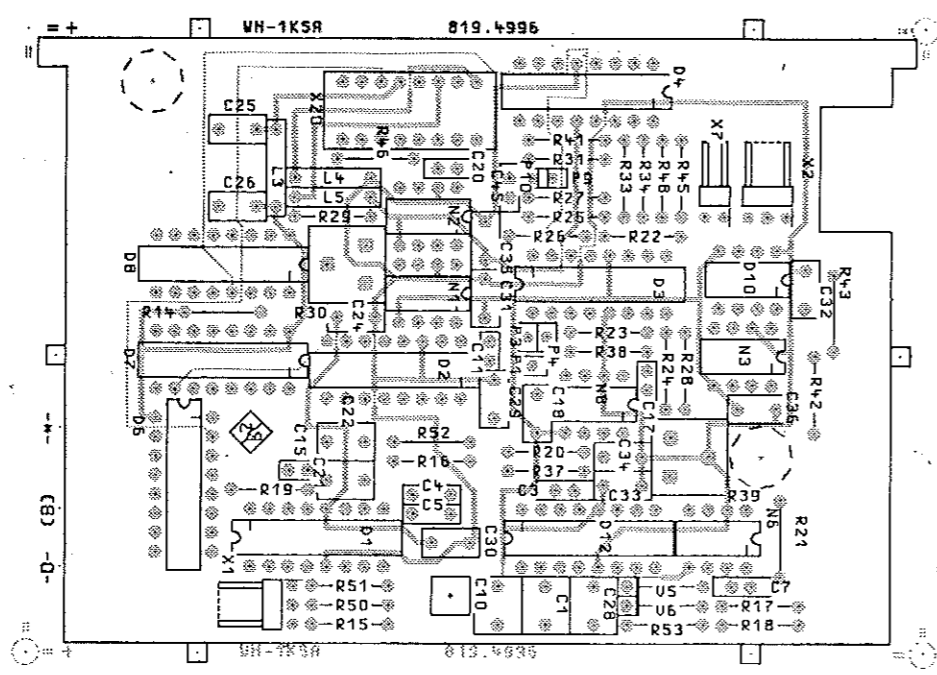


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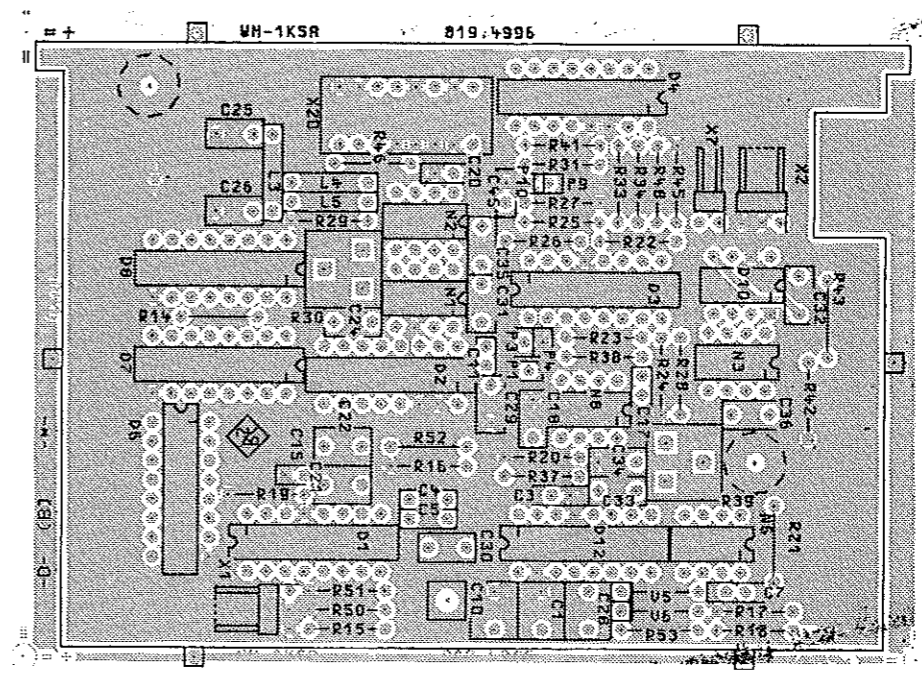
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				Gepr.		
				Norm		
					Benennung	
					FM - EICHLITUNG	
					Zeichn.-Nr.	Blatt-Nr.
					819.4980	2
					reg. i. V. 819.0010 V	v. Bl.
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU		erste Z.

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Ansicht und Leitungsführung Lötseite
View of tracks on solder side



DV13

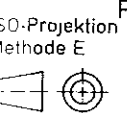


DV11



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				1KGB Tag Name	Benennung	Z	
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				Gepr.			
				Norm			
					Zeichn.-Nr.	Blatt-Nr.	
					819.4980	3	
						v. Bl.	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU	reg. i. V. 819.0010 V	erste Z.	



ISO-Projektion
Methode E

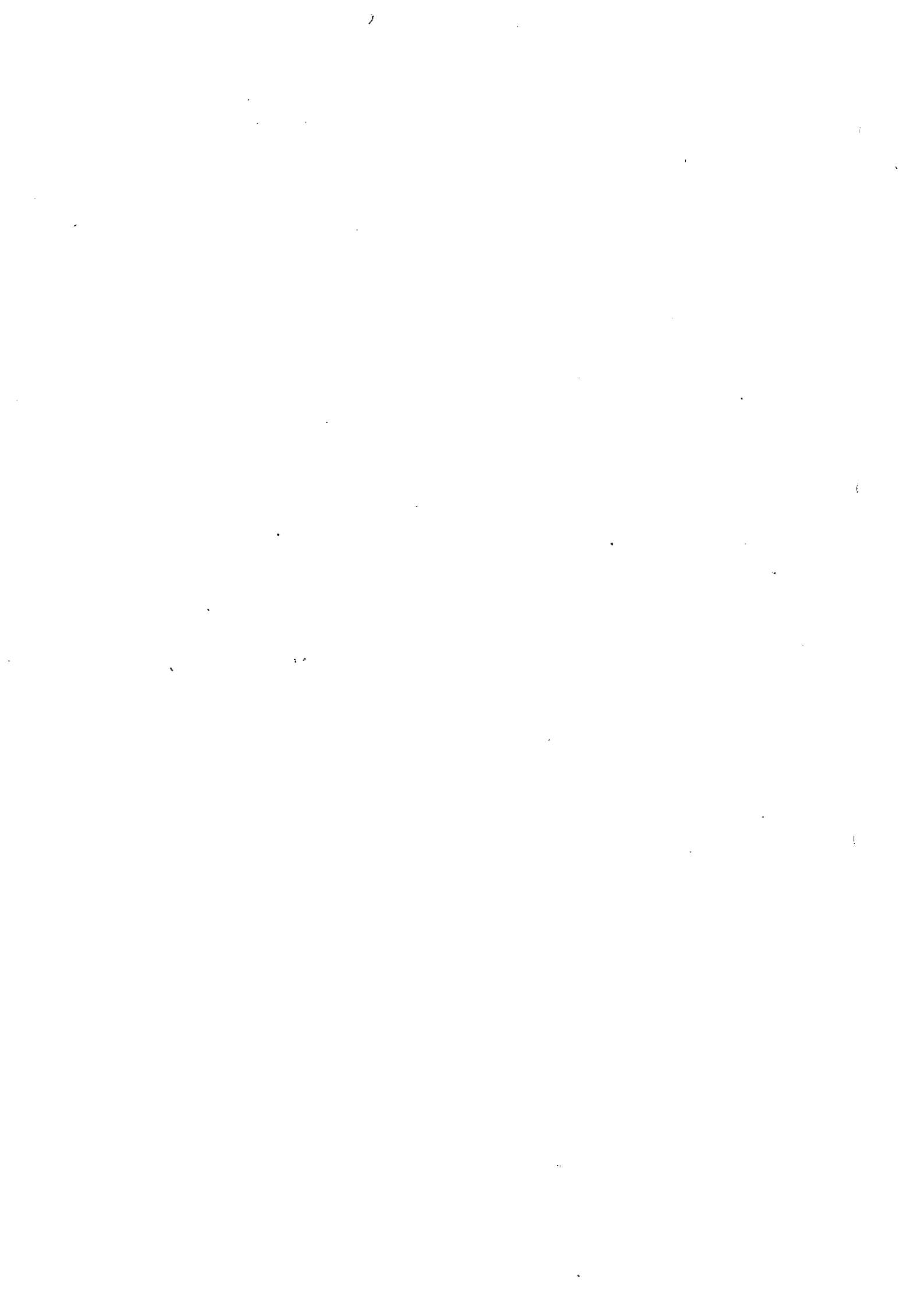


ROHDE & SCHWARZ

SERVICE DOCUMENTS

Fixed Frequencies

819.6060.02



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5 Service Manual "Fixed Frequencies"

5.1 Function Description

(See circuit diagrams 819.6060 S and 819.0010 S, sheet 1)

The "fixed frequencies" subassembly generates the reference frequency for all SMGU sub-assemblies. The subassembly consists of an oven-controlled, highly-stable 10-MHz crystal oscillator, which generates the reference frequency for the instrument. The 40 and 130-MHz crystal oscillators are each synchronized to this frequency by means of a PLL. The 130-MHz and the 520-MHz frequencies (4 x 130 MHz) are used in the output section as the LO for the mixing range. The 300-MHz signal for the summing loops is generated by doubling the 130-MHz signal mixing it with the 40-MHz crystal signal for CW or the 40-MHz FM oscillator for FM.

5.1.1 10-MHz OCXO

The module G10 contains a 10-MHz oven-controlled crystal oscillator. This gives a good temperature stability and good long-term characteristics.

The power supplies to the oven and the oscillator circuit are separate, the oven being permanently supplied by the +12 V standby voltage. This means that the oven does not have to heat up when the instrument is switched on (duration approx. 5 min.). The bridge voltage of the thermostat can be tapped at G10.4 for monitoring purposes and can be polled by the diagnostics function (test point SF 133) via the voltage follower N30-A. The processor also controls the "Oven cold" display using this voltage. The supply voltage for the crystal oscillator is generated by the voltage stabilizer V10. This is derived via V11 if an external reference is used.

There is a 10-MHz signal at terminal G10.1.

The frequency is adjusted using an externally-accessible trimmer.

5.1.2 40-MHz Crystal Oscillator with Buffer Stages and Control

5.1.2.1 40-MHz Crystal Oscillator

The 40-MHz crystal oscillator uses a common-base transistor circuit (V305). This gives the highest possible crystal and the lowest possible oscillator phase noise. The amplitude of the oscillations is stabilized by the biased Schottky diode V306. The four tuning diodes V300 to 303 in a push-pull circuit are used to tune the crystal frequency. The supply voltage to the crystal oscillator is also filtered via the emitter follower V310. A buffer stage in the common-base circuit (V315) decouples the oscillator from the following stages and increases the output power to 13 dBm.

5.1.2.2 40-MHz Amplifier

The output signal of the oscillator buffer stage is applied via a power divider (L320) to four amplifiers based on a FET in gate configuration. Diagnostics detectors (SF 138 to 140) are present on the three output stages (V330, 340, 350) for level monitoring. The fourth stage with V360 controls an ACMOS gate (D401) which generates the level for the following frequency divider.

5.1.2.3 40-MHz Amplifier PLL with Reference Switchover

A PLL locks the 40-MHz crystal oscillator onto the output frequency of the OCXO or - with the setting "Ref. ext." to the applied reference frequency. The 40-MHz signal is divided down to 5 MHz in divider D400 and compared in phase detector D50 with the frequency of the OCXO divided by two (D20, 21-A).

The output signal of D50 tracks the oscillator frequency via the differential amplifier N50-A with the following PI controller. The output voltage of the PI controller is monitored by the alarm detector N90-C/D (Err 40) and can also be interrogated by a diagnostics test point (SF 134).

The bandwidth of the PLL can be changed using plug-in jumper X55 and thus matched to the requirements in the "Ref. ext." mode:

- X55A-B 1 Level bandwidth 1 Hz, for suppression of hum sidebands and noise from the external reference outside the control bandwidth
- X55A-B 2 Level bandwidth 10 Hz, standard setting, optimum adaptation to internal OCXO
- X55A-B 3 Level bandwidth 100 Hz, e.g. use of a very low-noise external reference to improve the SMGU spectrum; inherent noise of PLL approx -130 dBc/Hz at FAF = 30 Hz, referred to 10 MHz.

After passing through a lowpass filter, the output signal of the OCXO in the "Ref. int." mode is available as a reference frequency at X91 and can be switched between 5 and 10 MHz using D20, 21-A (SF 13, 14). The input signal at X91 in the "Ref. ext." mode is amplified by V43 to HCMOS levels and applied to the phase detector D50 via the frequency divider D21-B with a selector for 5 or 10 MHz.

5.1.3 130-MHz Crystal Oscillator with PLL

5.1.3.1 130-MHz Crystal Oscillator

The circuit of the 130-MHz crystal oscillator corresponds to that of the 40-MHz oscillator (5.1.2.1) except that the tuning circuit only has one varicap diode and the co-compensation of the crystal is adjustable with L111.

A buffer stage with compensated feedback which amplifies the output power to 17 dBm feeds a power divider containing L130. The following stages are connected to the decoupled outputs of the divider.

5.1.3.2 130-MHz Oscillator PLL

The 130-MHz crystal oscillator is synchronized by a PLL to the 40-MHz crystal oscillator, and this in turn is locked to the 10-MHz OCXO or the external reference. Optimum phase noise for the 130-MHz signal is achieved by the cascaded control and corresponding adaptation of the bandwidths.

The signal from the 40-MHz crystal oscillator divided by four in D400, 401 is differentiated by the LC network L410, C410. The pulse stage V410 triggered by the positive edge generates a 3-ns needle pulse which the following sampling mixer uses to sample the 130-MHz signal.

The output signal tracks the 130-MHz oscillator via voltage follower N430-B and control amplifier N430-A. The output voltage of the PI controller is again monitored via an alarm comparator N40-A/B and can also be interrogated by the diagnostics function (SF 135).

A two-stage isolating amplifier (V440, 445) with common gate FETs circuit decouples the sampling mixer from the 130-MHz crystal oscillator.

5.1.4 130/520-MHz LO Signal

The 130/520-MHz signal, which is used in the output section as the LO signal for the two mixer ranges, is generated directly or by quadrupling the 130-MHz crystal oscillator.

In the direct case, the signal is applied via two diode switches (V195, 234) - with an intermediate attenuator for matching the level - to the output amplifier N240 which boosts the power to 5 dBm. The output power can be monitored using a diagnostics detector (SF 136).

The output frequency of 520 MHz is generated by a quadrupler consisting of a balancing transformer (L191, 192) with a full-wave rectifier (V200, 201). The filter L203 and the coupled bandpass filter L221, 222 suppress the resulting subharmonics ($1/2f$, $3/2f$), and the intermediate amplifier N204 compensates the loss in level in the multiplier.

The operational amplifiers N250-A/B control the diode switches of the 130 and 520-MHz branches.

5.1.5 Processing the 300-MHz Reference Signal

The 300-MHz signal is generated by mixing 260 MHz and 40 MHz, where the 260 MHz signal is obtained by doubling the frequency of the 130-MHz crystal oscillator. A two-stage IF amplifier with filter provides an output power of 5 dBm.

5.1.5.1 130/260-MHz Doubler with LO Amplifier

The frequency doubler also consists of a balance-to-unbalance transformer (L142, 143) with a full-wave rectifier. The following bandpass filter (L145, 146) suppresses the resulting subharmonics. The power amplifier with V146 controls the high-level mixer D150 with a Low power of 17 dBm.

5.1.5.2 300-MHz Amplifier with Filter

The IF amplifier has two stages with a bandpass filter between the stages and a bandpass at the output. These filters suppress the spurious signals generated during mixing.

The first stage has a common gate circuit FET (V160) which terminates the IF port of mixer D150 in 50 Ω .

input matching is adjusted by setting the drain current.

There is a coupled bandpass filter between the first and second stage which has a common-base transistor circuit (V170). This gives good decoupling between the two bandpass filters.

A diagnostics detector at the output (SF 137) is for monitoring the output power.

5.1.5.3 40-MHz Amplifier with FM/CW Selector

The FM/CW selector has two T-networks (V370-372, V375-377) for high crosstalk attenuation between the two filters.

The following amplifier is adjustable so that variations in gain in the 300-MHz IF amplifier can be eliminated.

A lowpass with a subsequent highpass/lowpass branching filter improves the harmonic ratio and terminates the RF port.

5.2 Checks and Adjustments

5.2.1 Checking the Alarm

Connect two power supply units (0 to 25 V) to X50 B-C and X43 B-C (C = ground). Set both voltages to +10 V, the display "Err 40, 41" must not light up. Then set the voltage at X50 to +0.5 V and +20.5 V, the display "Err 40" must light up in each case. Repeat the same test at X43 (Err 41).

5.2.2 Testing the 10-MHz OCO

Disconnect the SMGU from the AC power supply for at least 15 minutes (AC power switch on rear panel) so that the crystal oven cools down. Switch on the AC supply and measure the bridge voltage using the diagnostics function.

- * Diagnostics voltage (SF 133): +3.6 to +4.5 V

The display "OVEN COLD" should come on. This display should go off after a warm-up time of 2 to 5 minutes.

- * Diagnostics voltage (SF 133): +5.5 to +6.5 V

Connect oscilloscope to P1 using 10:1 probe, setting on instrument: REF.EXT.

- * Signal at P1: +5 V

Switch SMGU to "REF.INT".

- * Signal at P1: 10 MHz, HCMOS levels.

Connect spectrum analyzer to X91. Setting on SMGU: REF.INT., SF 13 (reference frequency 10 MHz).

- * Signal at X91: 10 MHz, +5 to +9 dBm, k2 k3 <20 dBc.

Setting on SMGU: SF 14 (reference frequency 5 MHz).

- * Signal at X91: 5 MHz, +5 to +9 dBm.

5.2.3 Testing and Trimming the 40-MHz Crystal Oscillator with PLL

5.2.3.1 Adjusting the Crystal Oscillator

Connect power supply unit (0 to 20 V) to jumper X50 B-C (C = ground), set voltage to 10 V. Connect voltmeter to P7 and spectrum analyzer to jumper X32 using the adapter cable from the service kit. Adjust L305 for minimum display on voltmeter.

- * Voltage at P7: +10.7 to +11.2 V.

Adjust L312 for max. level at X32.

Vary the voltage on the power supply unit from 1 to 20 V and observe the signal on the spectrum analyzer (span 0 to 100 MHz). The oscillation must be continuous over the tuning range and there must be no sidebands or noise peaks.

- * Signal at X32: 40 MHz, -11.5 to -8.5 dBm.

5.2.3.2 Testing the Output Amplifiers

Connect spectrum analyzer to X72, 82, 92 in succession. Adjust voltage on power supply unit to 10 V.

- * Signal at X72, 82, 92: 40 MHz, +3 to +7 dBm.

Then check the diagnostics detector.

- * Diagnostics voltage (SF 138, 139, 140): +0.3 to +1.2 V.

5.2.3.3 Testing the PLL

Disconnect power supply unit from X50, use jumper X50 to connect A-B and jumper X55 A-B to 2.

Instrument setting: REF.INT., SF 13 (reference frequency 10 MHz).

Checking the control voltage of the 40-MHz oscillator.

* Diagnostics voltage (SF 134): +7 to +13 V.

Connect signal generator set to 5 MHz, 0 dBm for REF. INT./EXT. The frequency accuracy of the generator must be better than 10⁻⁶.

Instrument setting: SF 14 (reference frequency 5 MHz).

* Diagnostics voltage (SF 134): +7 to +13 V.

Instrument setting: SF 13 (reference frequency 10 MHz).

Adjust signal generator frequency to 9.999850 MHz and then to 10.000150 MHz.

* Diagnostics voltage (SF 134): +2 to +18 V.

5.2.4 Testing and Adjustment of 130-MHz Crystal Oscillator

5.2.4.1 Adjusting the Crystal Oscillator

Connect power supply unit (0 to 20 V) to X43 B-C (C = ground). Adjust voltage to 10 V. Connect spectrum analyzer to X41 using adapter cable and connect voltmeter to P6. Adjust voltage on voltmeter to minimum using L117, then vary the tuning voltage from 1 to 20 V and adjust L111 so as to keep the voltage as constant as possible at P6.

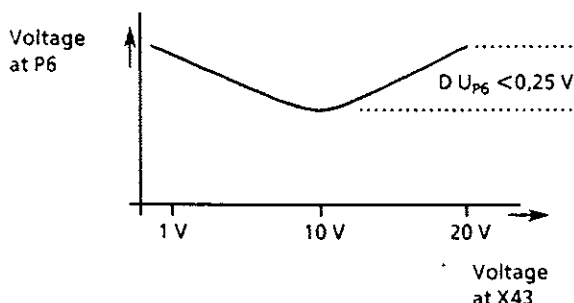


Fig. 5-1 Voltage at P6

* Voltage at P6: +9.9 to +10.7 V.

Adjust L125 for maximum signal at X41. Then vary the tuning voltage from 1 to 20 V and observe the signal on the spectrum analyzer (span 0 to 500 MHz). The oscillator must oscillate properly over the whole tuning range and there must be no noise peaks or sidebands.

* Signal at X41: 130 MHz, -8 to -5 dBm.

5.2.4.2 Testing of PLL

Connect oscilloscope to P10. Vary the power supply voltage from 1 to 20 V, a sinewave signal must be displayed on the oscilloscope.

* Signal at P10: 0 to 5 kHz, 1.0 to 1.5 Vpp.

Connect jumper X43 to A-B, connect signal generator with 10 MHz ($\Delta f < 10^{-6}$), 0 dBm to REF.INT./EXT. Setting on SMGU: REF.EXT., SF 13 (reference frequency 10 MHz).

Check the control voltage for the 130-MHz oscillator.

* Diagnostics voltage (SF 135): +7 to +13 V.

Set the signal generator frequency to 9.999850 MHz and then to 10.000150 MHz.

* Diagnostics voltage (SF 135): +2 to +18 V.

Disconnect signal generator from X91, switch over to REF.INT.

5.2.5 Checking and Adjusting the 130/520-MHz LO Signal

The lower screening cover must be screwed down. Connect spectrum analyzer to X93, setting: REF. INT., SF 21 $f_{RF} = 10 \text{ MHz}$ (normal mixer range).

* Signal at X93: 130 MHz, +3 to +7 dBm.

Testing diagnostics detector.

* Diagnostics voltage (SF 136): +0.3 to +0.7 V.

Setting: SF 22 (mixer range with large span). Adjust L203 for maximum level at 520 MHz. Then alternately set L221 and L222 for maximum.

* Signal at X93: 520 MHz, +3 to +7 dBm, spurious sidebands at 260 and 780 MHz $\leq -60 \text{ dBc}$.

Setting: SF 21, $f_{RF} = 1 \text{ GHz}$. No output signal must be displayed on the spectrum analyzer.

5.2.6 Checking and Adjusting the 300-MHz Reference Signal

5.2.6.1 Testing and Adjusting the 130/260-MHz Doubler and LO Amplifier

Connect spectrum analyzer to X15 using adapter cable. Adjust for maximum level at 260 MHz using L145, 146 alternately.

* Signal at X15: 260 MHz, -8 to -4 dBm.

5.2.6.2 Testing and Adjusting the 300-MHz Amplifier

The bottom screening cover must be screwed down when you adjust the bandpass filter. Connect network analyzer to X94, see Fig. 5-2 for settings. Adjust the bandpass filter L172, 180 by measuring the reflection coefficient at X94, see Fig. 5-2 for values. Then connect the network analyzer to X16 B-C (channel A) and X94 (channel B) using the adapter cable, see Fig. 5-3 for settings. Adjust the input reflection coefficient S11 at X16 B-C to -16 to -20 dB at 100 MHz using R160, see Fig. 5-3 for measured values.

The bandpass filter L162, 163 is adjusted by measuring the forward transmission coefficient S21 from X16 B-C to X94. See Fig. 5-4 for measured values. The settings of L172, 180 should not be changed in the process.

Disconnect network analyzer and insert jumper X16 to A-B. Connect spectrum analyzer to X94. Setting on instrument: REF. INT., FM OFF.

Adjust the level at X94 to +5 to +6 dBm using R390. Check the diagnostics detector.

* Diagnostics voltage (SF 137): +0.3 to 0.7 V.

The top and bottom screening covers must be screwed down for the following measurements. Check the spurious signals at the following frequencies:

f / MHz	P / dBm
220	≤ -74
260	≤ -74
310	≤ -104
320	≤ -100
340	≤ -104

5.2.6.3 Checking of FM/CW Selection

Spectrum analyzer remains connected to X94. Connect signal generator with 41 MHz, 5 dBm to X83.

Setting on instrument: REF. INT., FM OFF.

Level at X94 at 301 MHz ≤ -85 dBm.

Setting on instrument: REF. INT., FM. EXT. AC.

Level at X94 at 301 MHz: +4 to +6 dBm,

Level at X94 at 300 MHz: ≤ -85 dBm.

5.3 Troubleshooting

With only one of the error messages "Err 40, 41", the cause of the fault is in the PLL of the 40 or 130-MHz crystal oscillator in the 10-MHz reference frequency. If the error messages "Err 42" (FRN synthesis) and "Err 43" (step synthesis/FM) both occur, the 40-MHz crystal oscillator or the buffer stage has failed. In a similar manner, the fault is in the 130-MHz crystal oscillator or the buffer stage if the error messages "Err 46" (summing loop) and "Err 48" (output stage with mixer range switched over) occur simultaneously.

5.3.1 Failure of PLLs (Err 40, 41)

- With REF.EXT on, check the frequency (5/10 MHz \pm 5 ppm) and level (0.1 to 2 V) of the external reference frequency.
- Use the diagnostics function to check which PLL has failed
(40 MHz: Err 40, SF 134;
130 MHz: Err 41, SF 135).
- If both PLLs have failed, the cause is in the reference frequency (P1, P3 with internal reference, P5, P3 with external reference) or in the 40-MHz divider 1:4/8 (test points P8, P2, P9).
- If only the PLL of the 40-MHz crystal oscillator has failed, check the 40-MHz divider 1:4/8 D400, 401 at test point P8, the phase detector D50 at test points P2, P3 and the PI controller N50 at the plug-in jumpers X50, X55 and test point P4.
- If the PLL of the 130-MHz crystal oscillator has failed, check the test point P9, the IF voltage at P10 (apply external tuning voltage to X43 B-C), the PI controller N430 at jumper X43 and test point P11 and the 130-MHz isolating amplifier at X41 and X40.

5.3.2 Failure of the 40-MHz Signals at X72, 82, 92 (Err 40, 41)

- Use the diagnostics function (SF 138 to 140) to check which output signal has failed.
- If there are no signals at all and if the PLL has failed, the cause is in the 40-MHz crystal oscillator with V305, 310, 315 (test points P7 and X32).

5.3.3 Failure of 130/520-MHz Signal at X93 and 300-MHz Signal at X94 (Err 40, 41, 46, 48)

- Use the diagnostics function to check which output signal has failed (SF 136, 137).
- If both output signals are missing, the cause is in the 130-MHz crystal oscillator with V111, 125 (test points P6 and X14).
- If the 130/520-MHz signal is missing, check the drive signal for the 130/520-MHz selector containing N250 and the amplifiers N204, 240 (N204 only when the 520-MHz signal fails).
- If the 300-MHz signal is missing, check whether it is missing when FM and CW are selected. If it is only missing in one of these modes, check the 40-MHz FM signal at X83, the FM/CW selector and drive (N250). If it is missing in both modes, check the n 260-MHz amplifier (V146, test points X14, X15), the 40-MHz amplifier (V380, test point X3) and the 300-MHz amplifier (V160, 170).

5.3.4 Signals at Test Points and DC Operating Points

10-MHz OCXO

- G10.3: + 11.5 to 12.5 V with REF.INT. and 0 to + 0.5 with REF.EXT.
N30.1: + 5.5 to + 6.5 V with oven heated-up, + 4 V with cold oven.
P1: 10-MHz HCMOS levels with REF.INT., + 5 V with REF.EXT.

40-MHz crystal oscillator

- V305 emitter: + 3.8 V
V310 emitter: + 13.8 V
V315 emitter: + 1.6 V
P7: + 10.7 to + 11.2 V with oscillator working, + 11.5 V with oscillator not working

40-MHz amplifier

- X32: 40 MHz, -9 to -11 dBm into 50 Ω
V330, 340, 350, 360 source: + 1.0 to + 2.5 V

40-MHz PLL and reference selector

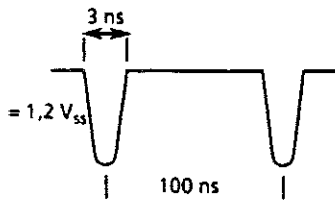
D401.8: 40 MHz, 3 to 4 V_{pp}
P8: 40 MHz, HCMOS levels
P9: 10 MHz, HCMOS levels
P2, 3: 5 MHz, HCMOS levels
N50.1: = 0 V
P5: + 1 to + 3 V DC without input signal at X91, 5/10 MHz, HCMOS levels with input signal
N90.4: + 1 V
N90.7: + 20 V

130-MHz crystal oscillator

V111 emitter: + 3.5 V
V125 emitter: + 2.4 V
P6: + 9.9 to + 10.7 V with oscillator working, + 10.9 V with oscillator not working
X40: 130 MHz, -9 to -6 dBm into 50 Ω

130-MHz PLL

X40: 130 MHz, -12 to -8 dBm into 50 Ω
X41:



Measurement using oscilloscope with 50 Ω- input impedance and bandwidth ≥ 250 MHz

P10: = 0 V with synchronous PLL, 0.5 to 0.7 V_{pp} with asynchronous PLL
P9: 10 MHz, HCMOS levels

130/520-MHz LO Signal

N250.1: + + 13 V/-14 V with 130 MHz on/off
N250.7: + 13 V/-14 V with 520 MHz on/off
N204.3: + 5.5 V DC
N240.3: + 5.5 V DC

200-MHz LO amplifier

V146 collector: + 6,5 V
X15: 260 MHz, -8 to -5 dBm into 50 Ω

300-MHz amplifier

V160 source: 0 to + 1,5 V
X161 emitter: + 3.4 V

FM/CW selector with 40-MHz amplifier

N250.8: -14/ + 13 V with FM/CW
N250.14: + 13 V/-14 V with FM/CW
V380 collector: + 9.7 V
X38: 40 MHz, -18 to -15 dBm into 50 Ω

5.4 Interfaces

Signal		D	T	Range	Connection Point	Remarks
Name	Designation					
+ 24 V	Power supply + 24 V	I	P	23,4 ... 24,5 V 10 ... 30 mA	X9A24	Power supply
+ 15 V	Power supply + 15 V	I	P	14,8 ... 15,3 V 350 ... 450 mA	X9A26	
+ 5 V	Power supply + 5 V	I	P	4,9 ... 5,1 V 40 ... 70 mA	X9A28	
-15 V	Power supply -15 V	I	P	-15,2 ... -14,8 V 30 ... 50 mA	X9A30	
+ 12 STB	Power supply + 12 V Standby	I	P	+11 ... +13 V 20 ... 150 mA	X9A32	
GND	Ground	B	P		X9A10 X9A12 X9A14 X9A16 X9A23 X9A25 X9A27 X9A29 X9A31	
BA0 BA1 BA2 G0	Subassembly address Subassembly address Subassembly address Strobe 0	I I I I	D D D D	HC-MOS HC-MOS HC-MOS HC-MOS	X9A21 X9A20 X9A19 X9A22	Subassembly addressing
TF.CLK TR.DAT	CLOCK Data	I I	D D	HC-MOS	X9A11 X9A13	Data transmission
TST ALA	Diagnostics Alarm	O O	O L	-5 ... +5 V Open collector	X9A17 X9A18	Selftest
REF	5/10-MHz reference	B	O	Output level +5 ... +9 dBm	X91	RF interface 50 Ω
INOUT	Input/Output	O	O	Input level -6 ... +19 dBm		RF interface 50 Ω
FMREF	40-MHz reference for step synthesis/FM	O	O	Output level +3 ... +7 dBm	X82	RF interface 50 Ω
FRMREF	40-MHz reference for FRN synthesis	O	O	Output level +3 ... +7 dBm	X72	RF interface 50 Ω
BBREF	40-MHz reference for option WBM	O	O	Output level +3 ... +7 dBm	X92	RF interface 50 Ω
MIXLO	LO signal 130 / 520 MHz for OPM	O	O	Output level +3 ... +7 dBm	X93	RF interface 50 Ω
REF300	300-MHz reference for SUM	O	O	Output level +3 ... +7 dBm	X94	RF interface 50 Ω
FMOUT	40 MHz	I	O	Input level +4 ... +6 dBm	X83	RF interface 50 Ω

Direction
 I Input
 O Output
 B Bidirectional
 M Measurement

Type
 A Analog
 H Digital high
 L Digital low
 P Power

5.5 Positions of Plug-in Jumpers

X55 A-B to 2
 X50 to A-B
 X43 to A-B
 X16 to A-B

5.6 Required Equipment

Power supply unit
 + 4.9 to + 5.1 V, 0.2 A
 + 14.9 to + 15.1 V, 0.5 A
 + 23.8 to + 24.2 V, 50 mA
 -14.4 to -15.1 V, 0.1 A
 2 x 0 to 25 V, 10 mA
 (e.g. NGT35)

Spectrum analyzer (1 GHz)
 (e.g. FSA)

RF generator 10 MHz, 40 MHz
 (e.g. SMG)

Network analyzer (to 500 MHz)

Oscilloscope
 (e.g. BOL)

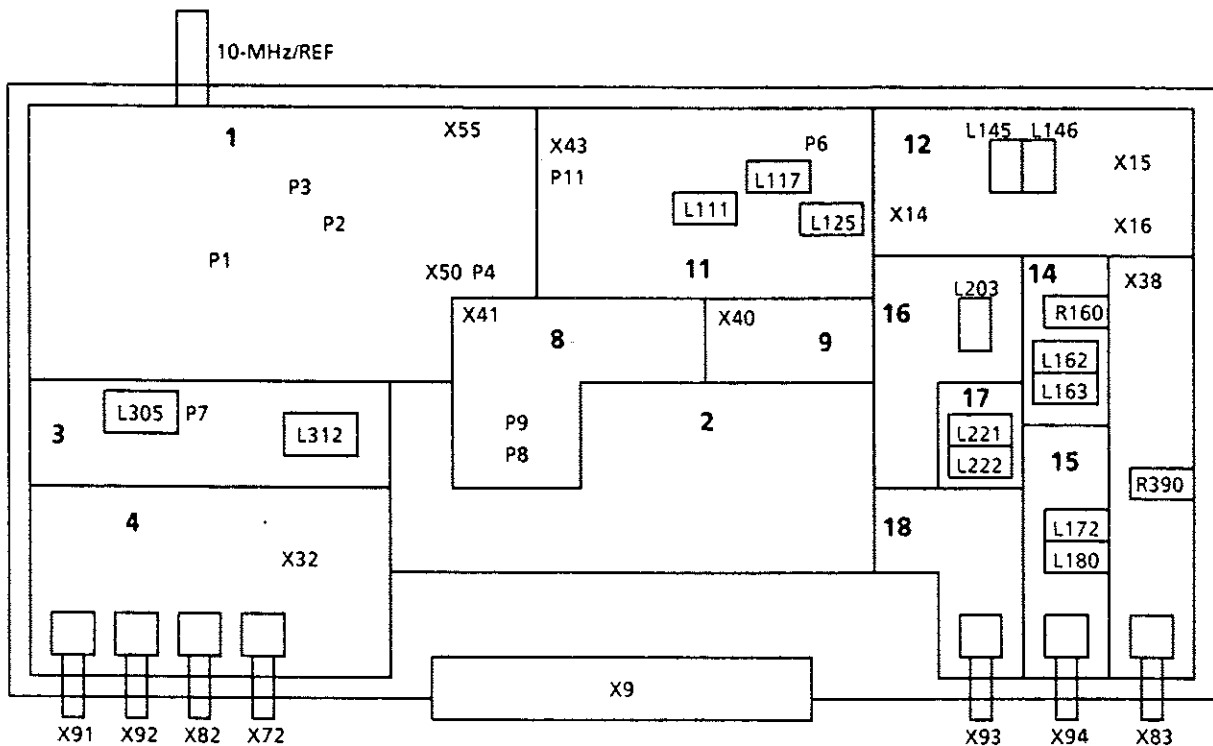
RF adapter cable

Test adapter

2 x voltmeter (1 x $Z_{in} = 1\text{ M}\Omega$; 1 x $Z_{in} \geq 10\text{ M}\Omega$)
 (e.g. URE)

Controller
 (e.g. PUC)

Layout diagram



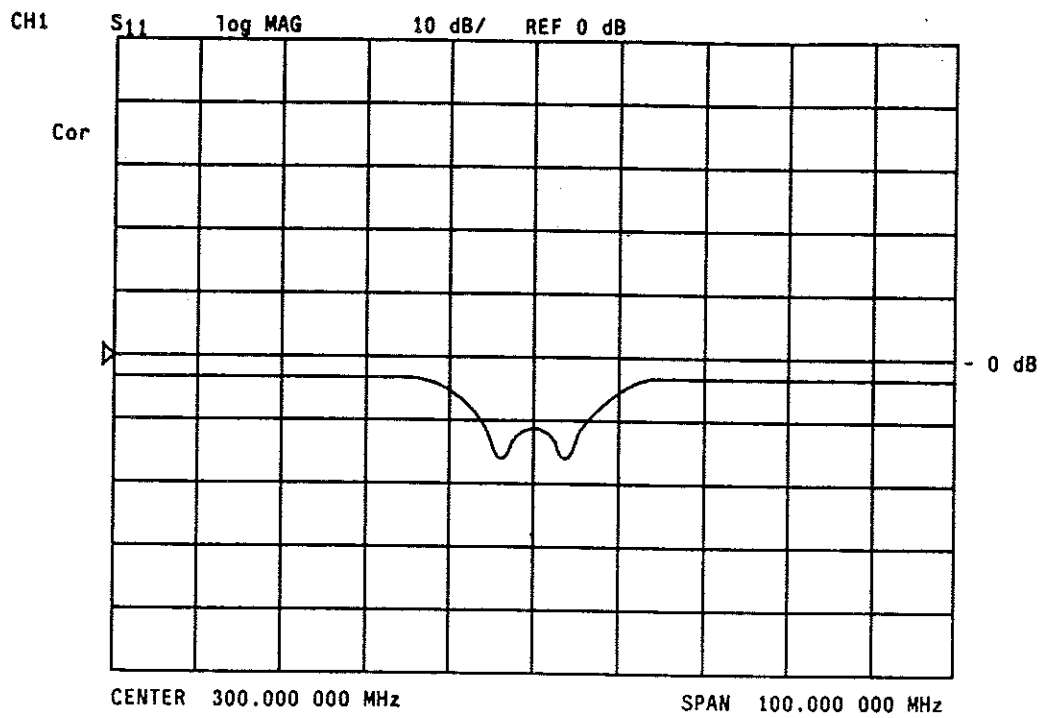


Fig. 5-2 S11 at X94, adjustment of L172, 180

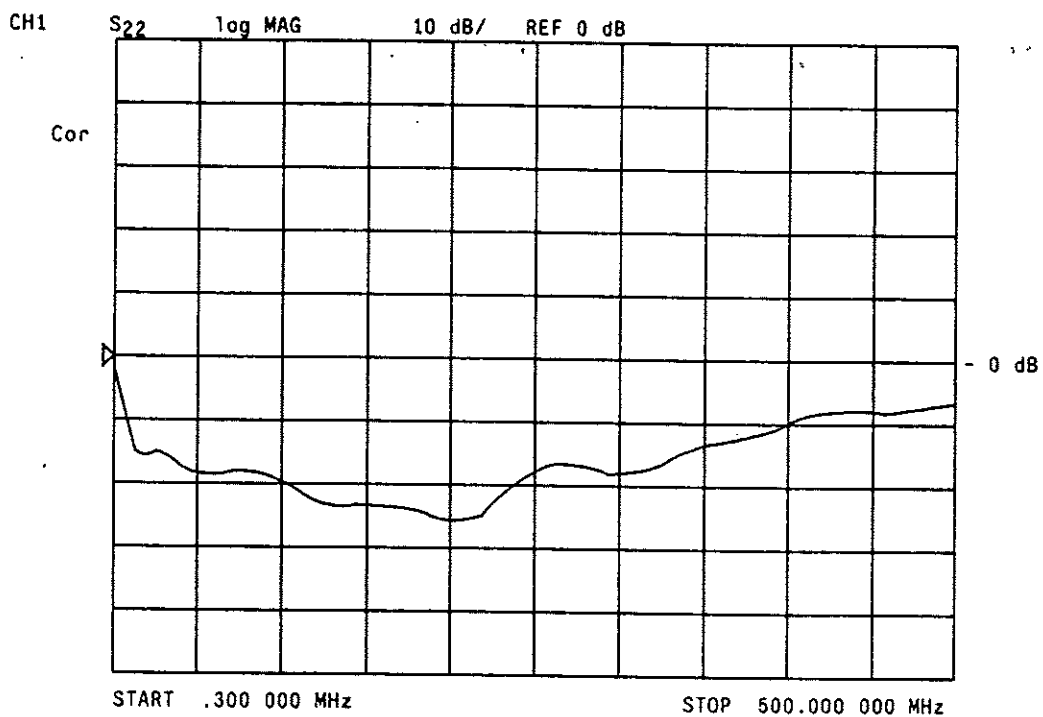


Fig. 5-3 S11 at jumper X16 B-C, adjustment of R160

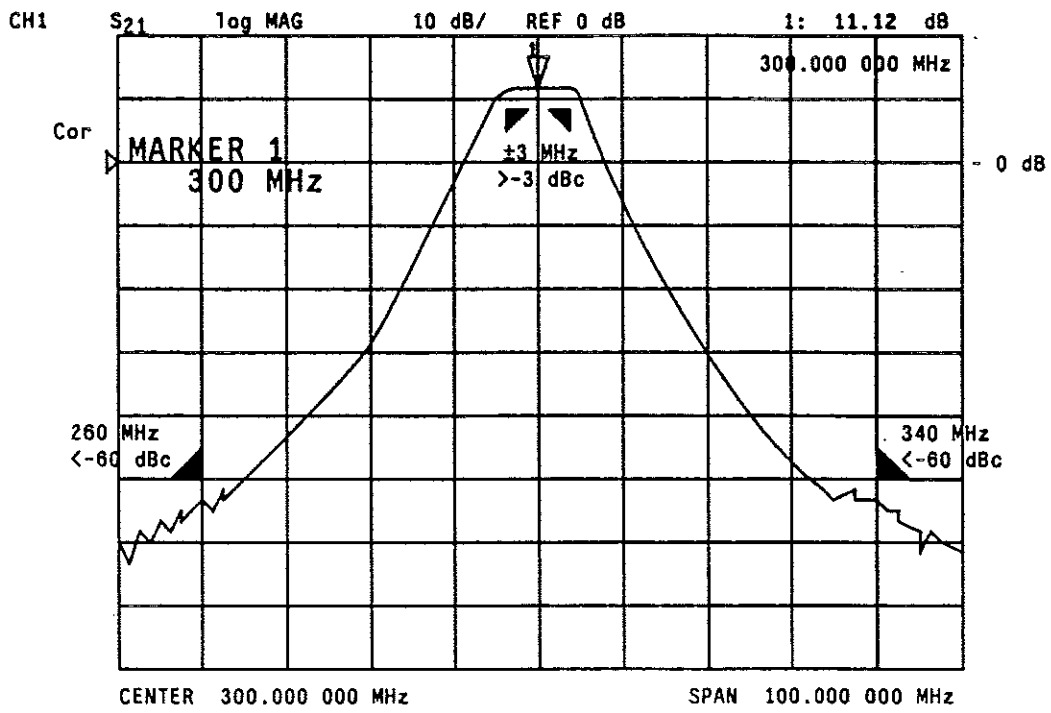


Fig. 5-4 S21 from X16 B-C to X94, adjustment of L162, 163
 Gain 9 to 13 dB
 Measured attenuation referred to gain at 300 MHz



ROHDE & SCHWARZ

**Schalteillisten
Stromläufe
Bestückungspläne
Part lists
Circuit diagrams
Components plans
Listes des pièces détachées
Schémas de Circuit
Plans des composants**

Für diese Unterlage behalten wir uns alle Rechte vor

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
	VARIANTENERKL. / VERSIONS VAR 02 = GRUNDAUSFUEHRUNG VAR 02 = BASIC VERSION				
C10	CE 1UF+-10%25V EIA3528 TANTALUM SMD-CAPACITOR	CE 007.7217	VALVO	2012195 67108 EIA	
C11	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C12	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C13	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C15	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C20	CC 330PF+-2%6X9N750 CERAMIC CAPACITOR	CC 087.6964	VALVO	2222 678 58331	
C21	CC 560PF+-10%3X4R2000 CAPACITOR	CC 087.7002	VALVO	2222 63051 561	
C22	CC 330PF+-2%6X9N750 CERAMIC CAPACITOR	CC 087.6964	VALVO	2222 678 58331	
C23	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C25	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C26	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C30	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C31	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C32	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C33	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C35	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C40	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C42	CC 220PF+-2%6X7N750 CAPACITOR	CC 087.6941	VALVO	2222 678 58221	
C43	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C45	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C46	CE 4,7UF+-10%10V EIA3528 TANTALUM SMD-CAPACITOR	CE 007.7275	VALVO	2012 195 64478 EIA	
C48	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C49	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C50	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C51	CK 68NF+-5%63V5RM MKT CAPACITOR	CK 099.2923	WIMA	MKS2/63/0,068UF/5%	
C52	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C53	CK 220NF+-5%63V5RM MKT CAPACITOR	CK 099.2952	WIMA	MKS2/63/0,22UF/5%	
C54	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C55	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C56	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C60	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C69	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C70	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C71	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C75	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C80	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C81	CE 47UF+-20%6,3V SAL ELECTR.CAPACITOR	CE 007.3957	VALVO	2222 128 33479	

ROHDE & SCHWARZ	AI	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	25	0989	EE-FESTFREQUENZEN REFERENCE FREQUENCIES	819.6060.01 SA	1+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C82	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C83	CE 10UF+-20%25V SAL ELECTR. CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C84	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C85	CE 10UF+-20%25V SAL ELECTR. CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C86	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C87	CE 2,2UF+-20%40V SAL ELECTR. CAPACITOR	CE 007.3911	VALVO	2222 122 37228	
C88	CE 47UF+-20%6,3V SAL ELECTR. CAPACITOR	CE 007.3957	VALVO	2222 128 33479	
C105	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C110	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C111	CK 10NF+-5%63V5RM MKT CAPACITOR	CK 099.2869	WIMA	FKS 2/100/0,01UF/5%	
C112	CC 12PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8744	VITRAMON	VJ1206 A 120 F FAT	
C115	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C117	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C118	CC 180PF+-5% 300V PELL# CAPACITOR	CC 556.8701	ATC	ATC100B181J-P300X	
C119	CC 150PF+-5% 300V PELL# CAPACITOR	CC 556.8718	ATC	ATC100B151J-P300	
C120	CC 18PF+-2% 500V PELL# CAPACITOR	CC 552.1660	ATC	ATC100B180GP500X	
C121	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C122	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C123	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C124	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C125	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C126	CC 150PF+-1%50VNPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8509	VITRAMON	VJ1206 A 151 F FAT	
C128	CC 12PF+-2%3X4NPO CAPACITOR	CC 087.6435	VALVO	2222 678 10129	
C129	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C140	CC 10PF+-0,25PF3X4NPO CAPACITOR	CC 087.6429	VALVO	2222 678 09109	
C141	CC 15PF+-2%3X4NPO CAPACITOR	CC 087.6441	VALVO	2222 678 10159	
C142	CC 15PF+-2%3X4NPO CAPACITOR	CC 087.6441	VALVO	2222 678 10159	
C143	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C144	CC 10PF+-0,25PF3X4NPO CAPACITOR	CC 087.6429	VALVO	2222 678 09109	
C145	CC 6,8PF+-0,25PF3X4NPO CAPACITOR	CC 087.6406	VALVO	2222 678 09688	
C146	CC 2,2PF+-0,25PF3X4NPO CAPACITOR	CC 087.6341	VALVO	2222 678 09228	
C147	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C148	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C149	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C150	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C153	CC 3,3PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8194	VITRAMON	VJ1206 A 3R3 C FAT	
C161	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C162	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C163	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C164	CC 3,9PF/0,25PF63V3X5N150 CAPACITOR	CC 099.5545	VALVO	2222 678 33398	
C165	CC 8,2PF+-0,25PF3X4N150 CAPACITOR	CC 087.6587	VALVO	2222 678 33828	
C170	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C171	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C172	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C173	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C174	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C175	CC 10PF+-0,25PF3X4N150 CAPACITOR	CC 087.6593	VALVO	2222 678 33109	
C176	CC 3,3PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8194	VITRAMON	VJ1206 A 3R3 C FAT	
C180	CC 12PF+-2%3X4N150 CAPACITOR	CC 087.6606	VALVO	2222 678 34129	
C181	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C182	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C183	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C184	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C185	CC 1PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8667	VITRAMON	VJ1206 A 1R0 C FAT	
C186	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C190	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C191	CC 18PF+-2%3X4NPO CAPACITOR	CC 087.6458	VALVO	2222 678 10189	
C192	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C194	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C195	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C200	CC 15PF+-2%3X4NPO CAPACITOR	CC 087.6441	VALVO	2222 678 10159	
C201	CC 15PF+-2%3X4NPO CAPACITOR	CC 087.6441	VALVO	2222 678 10159	
C202	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C203	CC 2,7PF+-0,25PF3X4NPO CERAMIC CAPACITOR	CC 087.6358	VALVO	2222 678 09278	
C204	CC 1PF+-0,25PF3X4P100 CAPACITOR	CC 087.6170	VALVO	2222 678 03108	
C206	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C207	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C212	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C220	CC 3,9PF+-0,25PF3X4NPO CAPACITOR	CC 087.6370	VALVO	2222 678 09398	
C222	CC 1PF+-0,25PF3X4P100 CAPACITOR	CC 087.6170	VALVO	2222 678 03108	
C231	CC 2,7PF+-0,25PF3X4NPO CERAMIC CAPACITOR	CC 087.6358	VALVO	2222 678 09278	
C232	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C233	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C239	CC 1,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8165	VITRAMON	VJ1206 A 1R8 C FAT	
C240	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C241	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C242	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C243	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C244	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C245	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C246	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C300	CK 47NF+-5%63V5RM MKT CAPACITOR	CK 099.2917	WIMA	MKS2/63/0.047UF/5%	
C301	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C302	CC 27PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8409	VITRAMON	VJ1206 A270F FAT	
C303	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C304	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C305	CC 620PF+-5% 100V PELL# CAPACITOR	556.8724	ATC	ATC100B621J-P100	
C307	CC 470PF+-5% 200V PELL# CERAMIC CAPACITOR	CC 469.5905	ATC	100B471J-P200	
C309	CC 56PF+-5% 500V PELL# CAPACITOR	CC 556.8660	ATC	ATC100B560J-P500X	
C310	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C311	CE 47UF-10+50% 40V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7142	ROEDERST	EK 00 CB 247 G	
C312	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C313	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C314	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C315	CC 27PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8409	VITRAMON	VJ1206 A270F FAT	
C316	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C319	CC 33PF+-2%4X5NPO CAPACITOR	CC 087.6487	VALVO	2222 678 10339	
C320	CC 150PF+-2%5X6N750 CAPACITOR	CC 087.6929	VALVO	2222 678 58151	
C322	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C330	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C331	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C333	CC 18PF+-2%3X4NPO CAPACITOR	CC 087.6458	VALVO	2222 678 10189	
C334	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C336	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C340	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C341	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C342	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C343	CC 18PF+-2%3X4NPO CAPACITOR	CC 087.6458	VALVO	2222 678 10189	
C344	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C345	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C346	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C350	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C351	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C352	CC 18PF+-2%3X4NPO CAPACITOR	CC 087.6458	VALVO	2222 678 10189	
C353	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C356	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C360	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C361	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C362	CC 12PF+-2%3X4NPO CAPACITOR	CC 087.6435	VALVO	2222 678 10129	
C370	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C371	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C372	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C374	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C375	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C376	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C379	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C380	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C381	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C382	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C383	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C384	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C385	CC 68PF+-2%6X7NPO CAPACITOR	CC 087.6529	VALVO	2222 678 10689	
C386	CC 120PF+-2%6X9NPO CAPACITOR	CC 087.6558	VALVO	2222 678 10121	
C387	CC 82PF+-2%6X7NPO CAPACITOR	CC 087.6535	VALVO	2222 678 10829	
C388	CC 8,2PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8242	VITRAMON	VJ1206 A BR2 C FAT	
C389	CC 33PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8780	VITRAMON	VJ1206 A330F FAT	
C390	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C391	CE 220UF-10+50%6V 8,7X13 ELEKTROLYTIC CAPACITOR	CE 022.7520	ROEDERST	EK 00 CB 322 B	
C392	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C393	CC 3,3PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8194	VITRAMON	VJ1206 A 3R3 C FAT	
C400	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C401	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C410	CC 10PF+-0,25PF3X4NPO CAPACITOR	CC 087.6429	VALVO	2222 678 09109	
C411	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C412	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C413	CE 100UF-10+50% 16V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7165	ROEDERST	EK 00CB 310 D	
C414	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C415	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C420	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C430	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C431	CK 47NF+-5%63V5RM MKT CAPACITOR	CK 099.2917	WIMA	MKS2/63/0,047UF/5%	
C432	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C433	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%	
C435	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C436	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C440	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	

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C441	CC 4,7PF+-0,25PF3X4NPD CAPACITOR	CC 087.6387	VALVO	2222 678 09478	
C442	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C443	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C444	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C445	CC 8,2PF+-0,25PF3X4N150 CAPACITOR	CC 087.6587	VALVO	2222 678 33828	
C446	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
D20	BL 74ACOOSC 4X2IN NAND QUAD NAND GATTER	820.3477	NSC	74ACOOSC	
D21	BL PC74HCT74T 2XD-FLIPFL DUAL D-TYPE FLIP FLOP	BL 007.6262	VALVO	PC74HCT74T	
D40	BL PC74HCOOT 4X2IN.NAND QUAD 2INPUT NAND GATE	BL 007.3463	VALVO	PC74HCOOT	
D41	BL PC74HCOOT 4X2IN.NAND QUAD 2INPUT NAND GATE	BL 007.3463	VALVO	PC74HCOOT	
D50	BL PC74HCT112T 2XJK-FF CL DUAL JK-FF	BL 007.6327	VALVO	PC74HCT112T	
D70	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D71	BL MM74HC4051N 8CH.AN.MUX 8CH.ANALOG MUX/DEMUX	BL 099.9670	NSC	MM74HC4051N	
D72	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D100	BL PC74HC238P 3TOB L.DEC DECODER/DEMULTIPLEXER	BL 620.0847	VALVO	PC74HC238P	
D101	BL MM74HC11N 3X3IN.ANDG TRIPLE 3-INPUT AND GATE	BL 099.9486	NSC	MM74HC11N	
D150	BM SRA1WH MIXER 0.7GHZ MIXER	BM 252.5363	MCL	SRA1WH	
D400	BL 74AC161SC 4B.BIN CNT 4BIT SYNC.PRES.BIN COUNT.	820.3519	NSC	74AC161SC	
D401	BL 74ACO2SC 4X2IN NORG QUAD NOR GATE	820.3490	NSC	74ACO2SC	
G10	EO 10MHZ-QU.OSZ.OCXO 12V 10MHZ CRYSTAL OSCILLATOR	835.0091	QK	R&S-ZCHNG.835.0091	
G110	EQ 130MHZ 5. SERIE LFO8 QUARTZ CRYSTAL UNIT	820.3525	TELEQUARZ	N.R&S-ZCHNG.820.3525	
G300	EQ 40MHZ 3. SERIE LFO8 QUARTZ CRYSTAL UNIT	820.3531	TELEQUARZ	N.R&S-ZCHNG.820.3531	
K35	SR 5V 1XU DIL M.DIODE+SCH RELAY	SR 282.5003	ELECTROL	RA 30441051-02	
L10	LD 3,30UH10%,850HMO,285A CHOKE	LD 067.2928	DELEVAN	DROSSEL1025-32	
L20	LD 1,20UH10%,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL1025-22	
L21	LD 1,20UH10%,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL1025-22	
L32	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L80	LD 2,20UH10%,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL1025-28	
L81	LD 2,20UH10%,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL1025-28	
L82	LD 1,20UH10%,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL1025-22	
L83	LD 5,6UH BEI 1,15A0,330HM CHOKE	LD 026.4090	JAHRE	72.10-5R60K	
L84	LD 2,20UH10%,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL1025-28	
L110	LD 0,15UH10%,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL1025-00	
L111	LD SPUL'E 260NH 7,5W FE-K CHOKE	300.8840	COMPONEX	E521HS-070023	
L113	LF ROHRK.RD3,6XRD1,2XL3,3 TUBULAR CORE	LF 026.9286			
L117	LD SPULE 85NH 3,5W FE-K COI-CORE	801.4865	TOKO	E521HN-030023	
L123	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	

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	Date	Date	Parts list for	Stock Nr.	Page
	25	0989	EE FESTFREQUENZEN REFERENCEREQUENCIES	819.6060.01 SA	64

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
L124	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	819.7066
L125	LD SPULE 85NH 3,5W FE-K COI-CORE	801.4865	TOKO	E521HN-030023	
L126	LD 1,20UH10%, 180HMO, 620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L130	LU UEBERTRAGER TRANSFORMER	451.1937			
L140	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L141	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L142	LU UEBERTRAGER 1 TRANSFORMER	819.7072			
L144	LD 0,18UH10%, 120HM1, 120A CHOKE	LD 067.2770	DELEVAN	DROSSEL 1025-02	
L145	LD SPULE 36NH 2,5W ALU-K COIL	820.3548	TOKO	E521-AN-020013	
L146	LD SPULE 36NH 2,5W ALU-K COIL	820.3548	TOKO	E521-AN-020013	
L148	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L150	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L160	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L161	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L162	LD SPULE 36NH 2,5W ALU-K COIL	820.3548	TOKO	E521-AN-020013	
L163	LD SPULE 36NH 2,5W ALU-K COIL	820.3548	TOKO	E521-AN-020013	
L165	LD 0,22UH10%, 140HM1, 045A CHOKE	LD 067.2786	DELEVAN	DROSSEL 1025-04	
L170	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L171	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L172	LD SPULE 24NH 1,5W ALU-K MOLDED COIL+ALU-CORE	840.2753	TOKO	E521 AN-010013	
L180	LD SPULE 24NH 1,5W ALU-K MOLDED COIL+ALU-CORE	840.2753	TOKO	E521 AN-010013	
L181	LD 0,15UH10%, 100HM1, 230A CHOKE	LD 067.2763	DELEVAN	DROSSEL 1025-00	
L190	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L191	LU UEBERTRAGER 2 TRANSFORMER	819.7089			
L194	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L200	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L201	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L202	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L203	LD SPULE 24NH 1,5W ALU-K MOLDED COIL+ALU-CORE	840.2753	TOKO	E521 AN-010013	
L206	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L220	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L221	LD SPULE 24NH 1,5W ALU-K MOLDED COIL+ALU-CORE	840.2753	TOKO	E521 AN-010013	
L222	LD SPULE 24NH 1,5W ALU-K MOLDED COIL+ALU-CORE	840.2753	TOKO	E521 AN-010013	
L230	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L233	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L240	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L241	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L300	LD 1,20UH10%, 180HMO, 620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L301	LD 8,20UH10%, 2,700HMO, 160A CHOKE	LD 067.2970	DELEVAN	DROSSEL 1025-42	

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	25	0989	EE FESTFREQUENZEN REFERENCE FREQUENCIES	819.6060.01 SA	7+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
L305	LD SPULE 287NH 8,5W FE-K COIL+CORE	613.6289	TOKO	E521HN080023	
L306	LF ROHRK.RD3,6XRD1,2XL3,3 TUBULAR CORE	LF 026.9286			
L310	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L311	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L312	LD SPULE 500NH 11,5W FE-K CHOKE	300.8856	COMPONEX	E521HS-110023	
L320	LU UEBERTRAGER TRANSFORMER	451.1937			
L330	LD 0,82UH10%,850HMO,420A CHOKE	LD 067.2857	DELEVAN	DROSSEL 1025-18	
L340	LD 0,82UH10%,850HMO,420A CHOKE	LD 067.2857	DELEVAN	DROSSEL 1025-18	
L341	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L350	LD 0,82UH10%,850HMO,420A CHOKE	LD 067.2857	DELEVAN	DROSSEL1025-18	
L360	LD 1,20UH10%,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL1025-22	
L380	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL1025-44	
L381	LD 0,27UH10%,160HMO,975A CHOKE	LD 067.2792	DELEVAN	DROSSEL 1025-06	
L382	LD 0,33UH10%,220HMO,830A CHOKE	LD 067.2805	DELEVAN	DROSSEL 1025--08	
L383	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L390	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L410	LD 0,047 UH 10% CHOKE	249.5995	INDUSTRIA	BAUREIHE1025,0,047	
L411	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L412	LU UEBERTRAGER 3 TRANSFORMER	819.7095			819.7066
L440	LD 0,15UH10%,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL 1025-00	
L441	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L443	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L445	LD 0,15UH10%,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL 1025-00	
N30	BO TLO72ACD 2XFET OPAMP OPERATIONAL AMPLIFIER	803.1057	TEXAS	TLO72ACD	
N50	BO TLO72ACP 2XFET OPAMP OPERATIONAL AMPLIFIER	340.6054	TEXAS INST	TLO72ACP	
N90	BO LM339N 4X COMPAR COMPARATOR	BO 342.2062	NSC	LM339N	
N204	BM MSA0304 BB.AMPL BROADBAND AMPLIFIER	840.6094	AVANTEK	MSA0304	
N240	BM MSA0304 BB.AMPL BROADBAND AMPLIFIER	840.6094	AVANTEK	MSA0304	
N250	BO LM124J 4XL.P.OPAMP OPERATIONAL AMPLIFIER	300.6353	NSC	LM124J	
N430	BO TLO72ACP 2XFET OPAMP OPERATIONAL AMPLIFIER	340.6054	TEXAS INST	TLO72ACP	
P1 ..11	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
R10	RG 11 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0806	DALE	CRCW1206-10 11K F-T	
R11	RG 39,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5543	DALE	CRCW1206-10 39R2 F-T	
R12	RG 1,21KOHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9968	DALE	CRCW1206-10 1K21 F-T	
R13	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R14	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R15	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	

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	25	0989	EE FESTFREQUENZEN REFERENCE FREQUENCIES	819.6060.01 SA	8+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthaltene in contained in
R16	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R17	RG 22,1KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5872	DALE	CRCW1206-10 22K1 F-T	
R18	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R20	RG 15,0KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5843	DALE	CRCW1206-10 15K F-T	
R22	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R23	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R25	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R30	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R31	RG 182KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5989	DALE	CRCW1206-10 182K F-T	
R32	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R35	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R40	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R41	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R45	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R46	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/150OHM-F-D	
R47	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R48	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R49	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R50	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R51	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R52	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R53	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R54	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R55	RL 0,35W 221 KOHM+-1%TK50 RESISTOR	RL 083.2270	DRALORIC	SMA0207/221K-F-C	
R56	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R57	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R58	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R59	RG 12,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0841	DALE	CRCW1206-10 12K1 F-T	
R60	RL 0,35W 365 KOHM+-1%TK50 RESISTOR	RL 083.2487	DRALORIC	SMA0207/365K-F-C	
R61	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R62	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R63	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R64	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R65	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R66	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R67	RL 0,35W 2,21MOHM+-1%TK50 METALFILMRESISTOR	RL 099.8173	RESISTA	MK2 2,21MOHM 1% TK50	
R68	RG 12,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0841	DALE	CRCW1206-10 12K1 F-T	
R69	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R70	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	

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	25	0989	EE FESTFREQUENZEN REFERENCE FREQUENCIES	819.6060.01 SA	9+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R71	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R72	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R73	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R74	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R75	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R76	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R77	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R90	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R91	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R92	RL 0,35W 18,2KOHM+-1%TK50 RESISTOR	RL 083.1480	DRALORIC	SMA/207/18,2K-F-C	
R93	RL 0,35W 3,92KOHM+-1%TK50 RESISTOR	RL 083.1039	RESISTA	MK2	
R100	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R104	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R105	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R106	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R109	RL 0,35W 39,2 OHM+-1%TK50 RESISTOR	RL 082.9420	DRALORIC	SMA0207/39,2OHM-F-D	
R110	RL 0,35W 39,2 OHM+-1%TK50 RESISTOR	RL 082.9420	DRALORIC	SMA0207/39,2OHM-F-D	
R111	RL 0,35W 39,2 OHM+-1%TK50 RESISTOR	RL 082.9420	DRALORIC	SMA0207/39,2OHM-F-D	
R112	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R113	RL 0,35W 392 OHM+-1%TK50 RESISTOR	RL 082.2183	DRALORIC	SMA0207/392K-F-C	
R114	RG 56,2 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8826	DALE	CRCW1206-10 56R2 F-T	
R115	RL 0,35W 4,64KOHM+-1%TK50 RESISTOR	RL 082.1687	DRALORIC	SMA0207/4,64K-F-C	
R116	RL 0,35W 2,37KOHM+-1%TK50 RESISTOR	RL 083.0878	DRALORIC	SMA0207/2,37K-F-D	
R117	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R118	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R119	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R120	RL 0,35W 432 OHM+-1%TK50 DEPOS.-CARBON RESISTOR	RL 083.0355	DRALORIC	SMA0207/432OHM-F-D	
R121	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R122	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R123	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R124	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R125	RG 15,0 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5450	DALE	CRW1206-10 15R F-T	
R126	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R127	RG 3,32KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5789	DALE	CRCW1206-10 3K32 F-T	
R128	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R129	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R130	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R140	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R141	RL 0,35W 82,5 OHM+-1%TK50 RESISTOR	RL 082.9707	DRALORIC	SMA0207/82,5OHM-F-D	

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R145	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R146	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R147	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/150OHM-F-D	
R148	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R150	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R152	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R155	RG 182 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5595	DALE	CRCW1206-10 182R F-T	
R156	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R157	RG 182 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5595	DALE	CRCW1206-10 182R F-T	
R160	RS 0,5W100 OHM+-20%KURVE1 DEPOS.-CARBON POTENTIOMET	RS 069.8081	BOURNS	3329H-1-101	
R161	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R162	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R163	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T	
R164	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R170	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R171	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R172	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R173	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R174	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R180	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R181	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R183	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R184	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R185	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R186	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R190	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T	
R191	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R192	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R193	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R194	RL 0,35W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMA0207/1,21K-F-D	
R195	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R196	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R197	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R200	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R207	RL 0,35W 274 OHM+-1%TK50 RESISTOR	RL 083.0178	DRALORIC	SMA0207/274OHM-F-D	
R210	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R211	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R230	RL 0,35W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMA0207/1,21K-F-D	
R231	RL 0,35W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMA0207/1,21K-F-D	

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R235	RL 0,35W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMAO207/1,21K-F-D	
R240	RL 0,35W 274 OHM+-1%TK50 RESISTOR	RL 083.0178	DRALORIC	SMAO207/274OHM-F-D	
R241	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R242	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	
R244	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R245	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R250	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMAO207/12,1K-F-D	
R251	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R300	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R301	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R302	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	
R303	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R304	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R305	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R306	RL 0,35W 4,64KOHM+-1%TK50 RESISTOR	RL 082.1687	DRALORIC	SMAO207/4,64K-F-C	
R307	RG 2,43KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5750	DALE	CRCW1206-10 2K43 F-T	
R308	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R310	RL 0,35W 432 OHM+-1%TK50 DEPOS.-CARBON RESISTOR	RL 083.0355	DRALORIC	SMAO207/432OHM-F-D	
R311	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R312	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R313	RG 75,0 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8855	DALE	CRCW1206-10 75R F-T	
R314	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R315	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R316	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R317	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMAO207/4,75K-F-D	
R318	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R319	RG 1,5 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5714	DALE	CRCW1206-10 1K5 F-T	
R320	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R321	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R322	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R323	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R330	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R331	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMAO207/221OHM-F-D	
R332	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R333	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	
R340	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R341	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMAO207/221OHM-F-D	
R342	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R343	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R344 .347	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R350	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R351	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R352	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R353	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R360	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R361	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R370	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R371	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R372	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R373	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R374	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R375	RG 15,0 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5450	DALE	CRW1206-10 15R F-T	
R376	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R377	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R378	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R379	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R380	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R381	RG 15,0 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5450	DALE	CRW1206-10 15R F-T	
R382	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R383	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	
R384	RL 0,35W 274 OHM+-1%TK50 RESISTOR	RL 083.0178	DRALORIC	SMA0207/274OHM-F-D	
R385	RL 0,35W 274 OHM+-1%TK50 RESISTOR	RL 083.0178	DRALORIC	SMA0207/274OHM-F-D	
R386	RL 0,35W 18,20 OHM+-1%TK50 RESISTOR	RL 082.9107	DRALORIC	SMA0207/18,20HM-F-D	
R387	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R388	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R389	RG 56,2 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8826	DALE	CRCW1206-10 56R2 F-T	
R390	RS 0,5W 200 OHM+-20%KURV1 DEPOS.-CARBON POTENTIOMET	RS 069.8017	BOURNS	3329H-1-201	
R392	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R393	RG 3,32KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5789	DALE	CRCW1206-10 3K32 F-T	
R394	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/150OHM-F-D	
R395	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R396	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R400	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R402	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R403	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R410	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R412	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R413	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	

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R415	RG 1,21KOHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9968	DALE	CRCW1206-10 1K21 F-T	
R416	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R417	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R418	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R419	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R420	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R421	RG 1,21KOHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9968	DALE	CRCW1206-10 1K21 F-T	
R430	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R431	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R432	RL 0,35W 6,81KOHM+-1%TK50 RESISTOR	RL 082.2560	DRALORIC	SMA 0207/6,81K-F-C	
R434	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R435	RL 0,35W 365 KOHM+-1%TK50 RESISTOR	RL 083.2487	DRALORIC	SMA0207/365K-F-C	
R436	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R437	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R440	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R441	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R442	RG 182 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5595	DALE	CRCW1206-10 182R F-T	
R443	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
V5	AK BCX69-16 P 20V 1 A TRANSISTOR	AK 007.5420	SIEMENS	BCX69-16	
V6	AD BAS32 75V OA20 UDI DIODE	AD 006.7288	VALVO	BAS32	
V10	AK BCX68-16 N 20V 1 A TRANSISTOR	AK 801.8383	SIEMENS	BCX68-16	
V11	AK BCX70H N 45V 200MA TRANSISTOR	AK 007.3105	VALVO	BCX70H	
V12	AK BCX68-16 N 20V 1 A TRANSISTOR	AK 801.8383	SIEMENS	BCX68-16	
V35	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V40	AD BAV99 2X70V OA1 UDI DIODE	911.0092	VALVO	BAV99	
V43	AK 2N2369A N 15V 200MA TRANSISTOR	AK 010.4680	VALVO	2N2369A	
V52	AE BZX79/C10 0,5W ZDI ZENER DIODE	AE 012.2510	VALVO	BZX55/(79)C10 GEG.	
V71	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	
V110	AE BB909B 25/ 3PF CDI TUNING DIODE	AE 092.9600	VALVO	BB909B	
V111	AK BFT66 N 15V 30MA TRANSISTOR	AK 252.5728	SIEMENS	BFT66	
V121	AE 5082-2810 SCHOTTKY DIODE	AE 012.9389	HEWLETT-P.	5082-2810	
V125	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V140	AE HSMS2820T31 SCHOTTKY DIODE	820.3502	HEWLETT-P.	HSMS2820T31	
V141	AE HSMS2820T31 SCHOTTKY DIODE	820.3502	HEWLETT-P.	HSMS2820T31	
V145	AE BZX79/5V6 0.5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V146	AK BFQ34T N 18V 150MA TRANSISTOR	801.8283	VALVO	BFQ34T	
V160	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V161	AK BFR91 N 15V 35MA TRANSISTOR	AK 210.6049	VALVO	BFR91	

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	25	0989	EE FESTFREQUENZEN REFERENCE FREQUENCIES	819.6060.01 SA	14+

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Kennz. Comp.No	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V180	AE HSMS2810 SCHOTTKY DIODE	520.7340	HEWLETT-PA	HSMS2810	
V190	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V195	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V200	AE HSMS2820T31 SCHOTTKY DIODE	820.3502	HEWLETT-P.	HSMS2820T31	
V201	AE HSMS2820T31 SCHOTTKY DIODE	820.3502	HEWLETT-P.	HSMS2820T31	
V230	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V232	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V234	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V235	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V240	AE HSMS2810 SCHOTTKY DIODE	520.7340	HEWLETT-PA	HSMS2810	
V300	AE BBY40 30/05PF CDI TUNNING DIODE	AE 007.2109	VALVO	BBY 40	
V301	AE BB909B 25/ 3PF CDI TUNING DIODE	AE 092.9600	VALVO	BB909B	
V302	AE BBY40 30/05PF CDI TUNNING DIODE	AE 007.2109	VALVO	BBY 40	
V303	AE BB909B 25/ 3PF CDI TUNING DIODE	AE 092.9600	VALVO	BB909B	
V305	AK BFT66 N 15V 30MA TRANSISTOR	AK 252.5728	SIEMENS	BFT66	
V306	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V310	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V315	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V330	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V335	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V340	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V345	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V350	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V355	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V360	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V370	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V371	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V372	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V375	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V376	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V377	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V380	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V381	AE BZX79/C8V2 0,5W ZDI ZENER DIODE	AE 012.2490	AEG	BZX55/C8V2 GEGURTET	
V391	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V410	AK BFQ34T N 18V 150MA TRANSISTOR	801.8283	VALVO	BFQ34T	
V411	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V420	AE HSMS2810 SCHOTTKY DIODE	520.7340	HEWLETT-PA	HSMS2810	
..423					
V431	AE BZX79/C10 0,5W ZDI ZENER DIODE	AE 012.2510	VALVO	BZX55/(79)C10 GEG.	
V440	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	

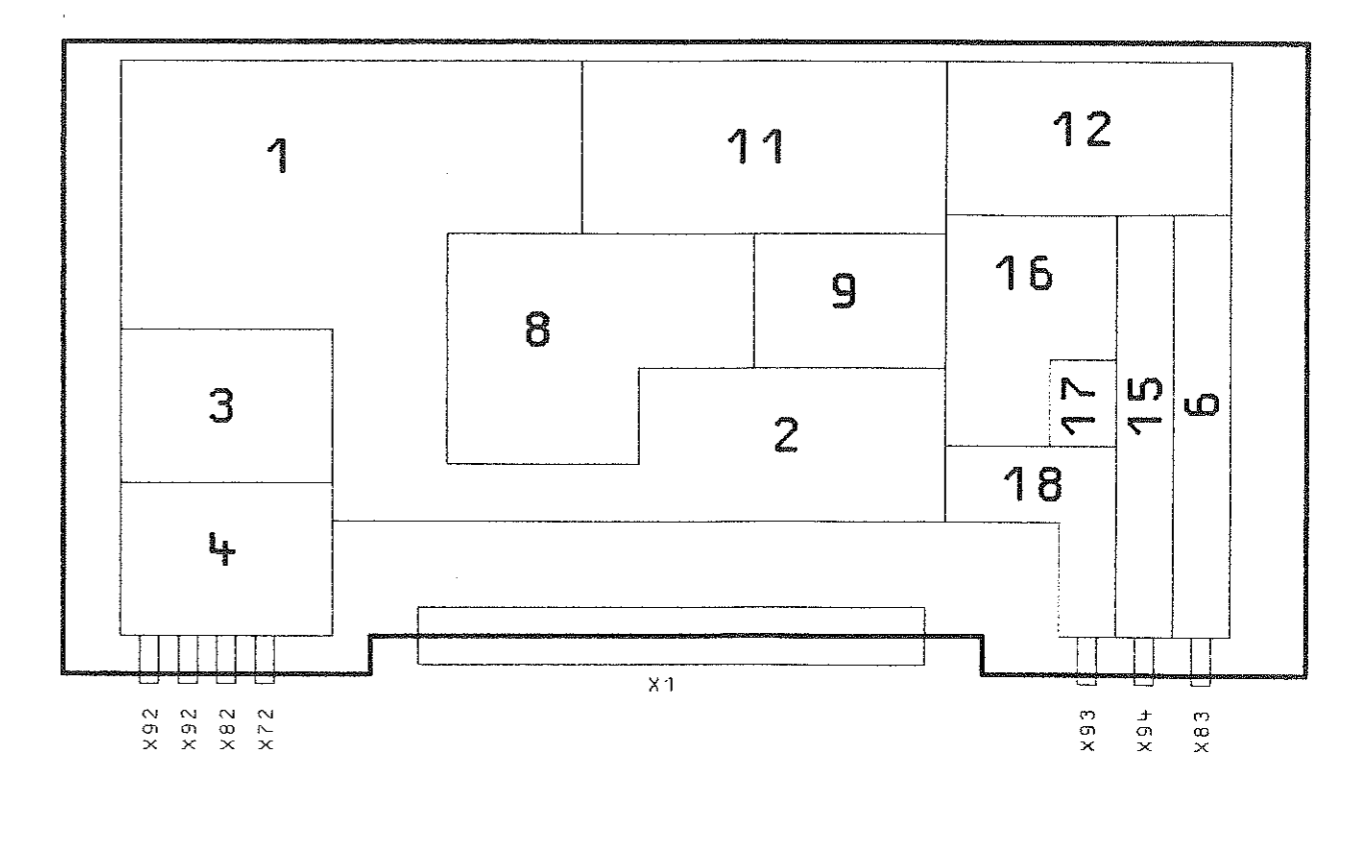
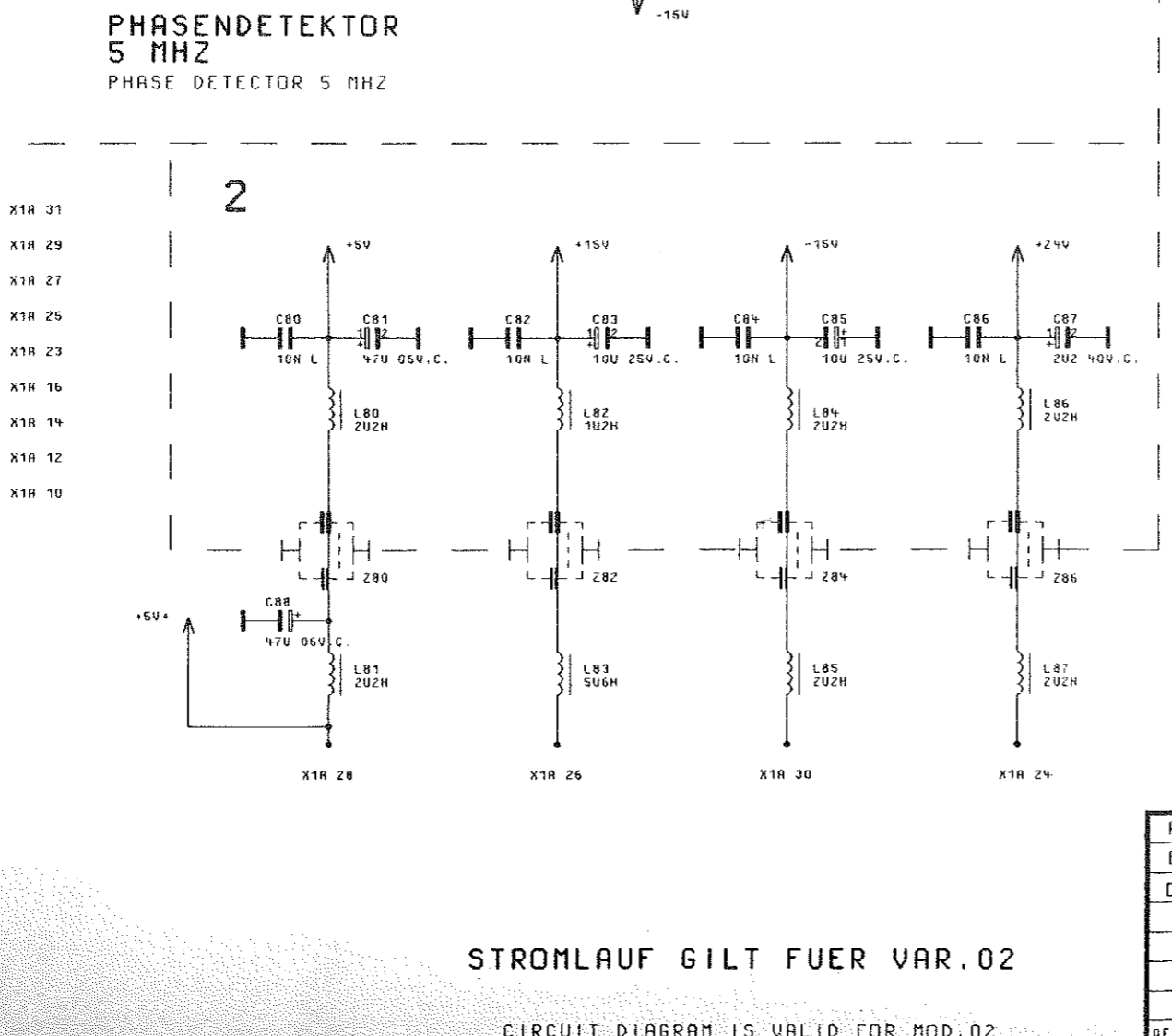
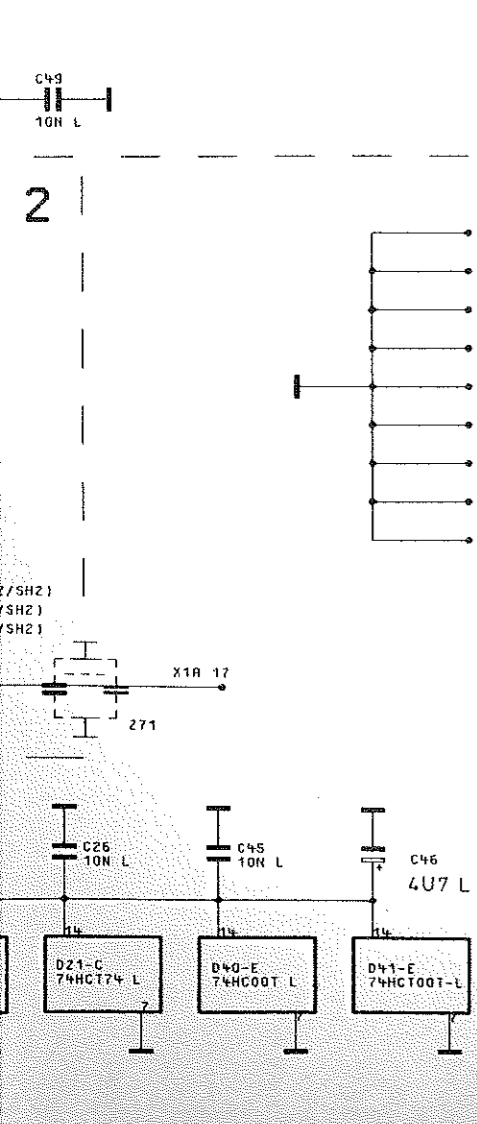
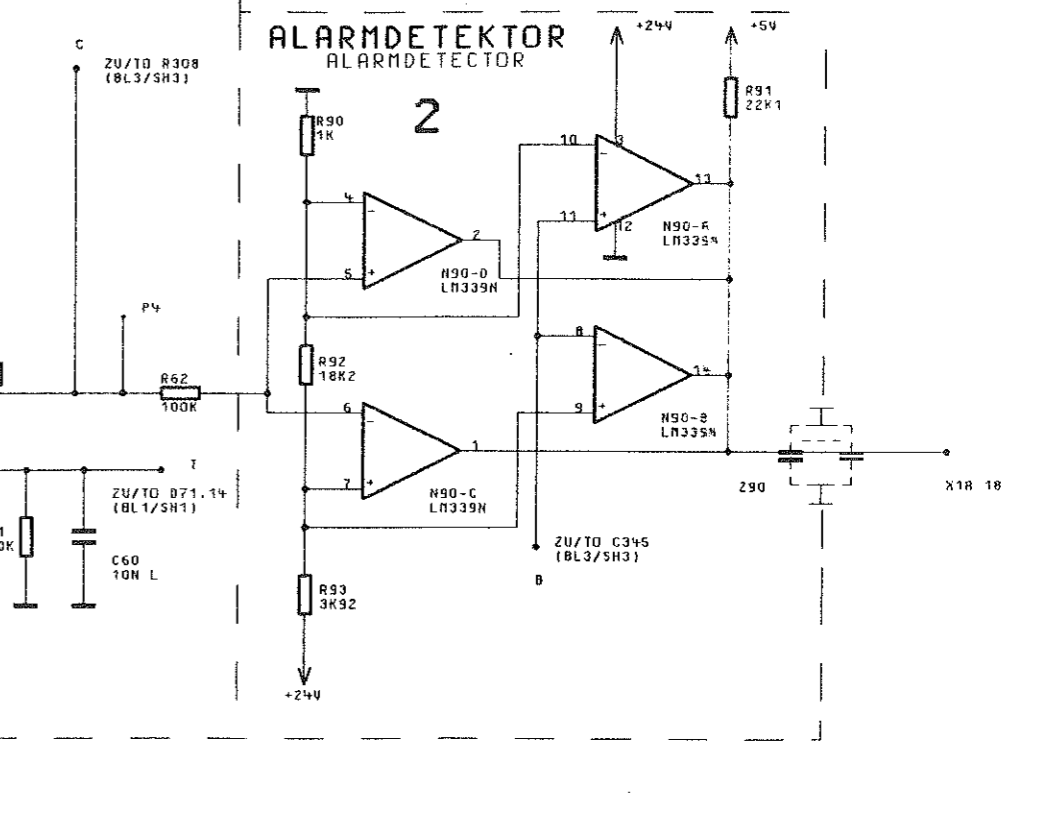
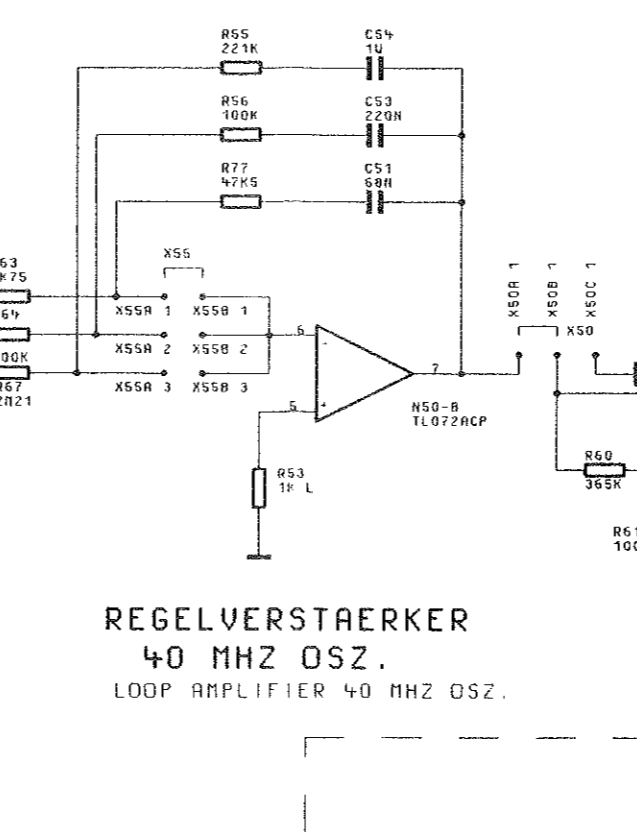
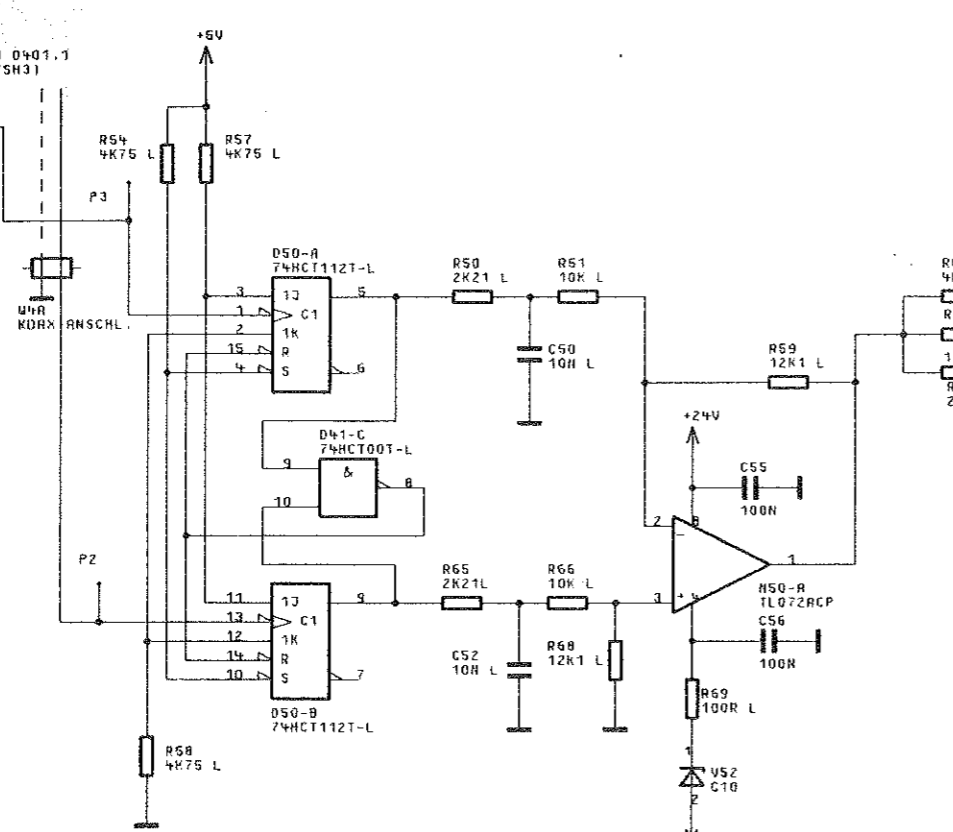
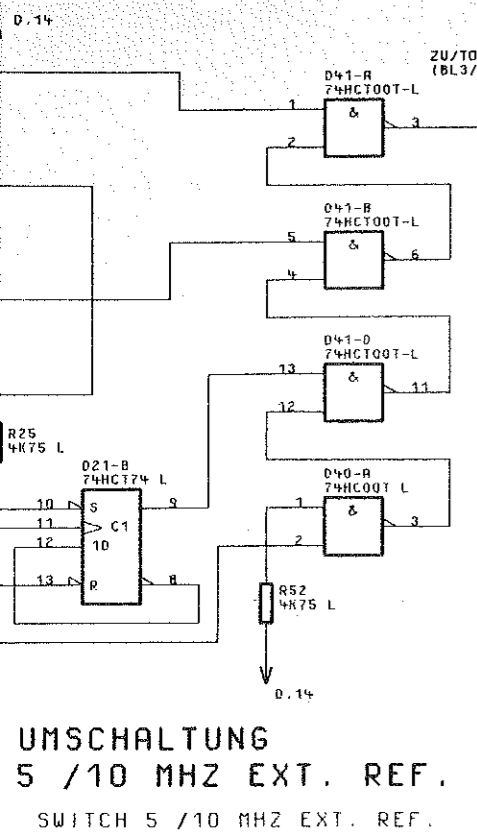
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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V445	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V450	AE HSMS2800 SCHÖTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V451	AE HSMS2800 SCHÖTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
X1	FP STECKERLEISTE 32POL. MULTIPOINT CONNECTOR	FP 514.4550	PANDUIT	100-232-033/999	
X16	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	
X50	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	
X55	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	
X72	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X82	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X83	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X91	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
.94 X430	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	
X14A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X14B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X15A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X15B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X16A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X16B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X16C	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X32A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X32B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X38A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X38B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X40A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X40B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X41A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X41B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X43A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X43B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X43C	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X50A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X50B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X50C	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
X55A	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X55B	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 3POLIG	FP 242.3600	BINDER	742-5-11-0178-00-36	
Z10	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z71	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	

ROHDE & SCHWARZ	Äl	Datum Date	Schalttafeliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	25	0989	EE FESTFREQUENZEN REFERENCE FREQUENCIES	819.6060.01 SA	16+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in	
Z80	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	- ENDE -	
Z82	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z84	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z86	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z90	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z150	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
ROHDE & SCHWARZ		Ä	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
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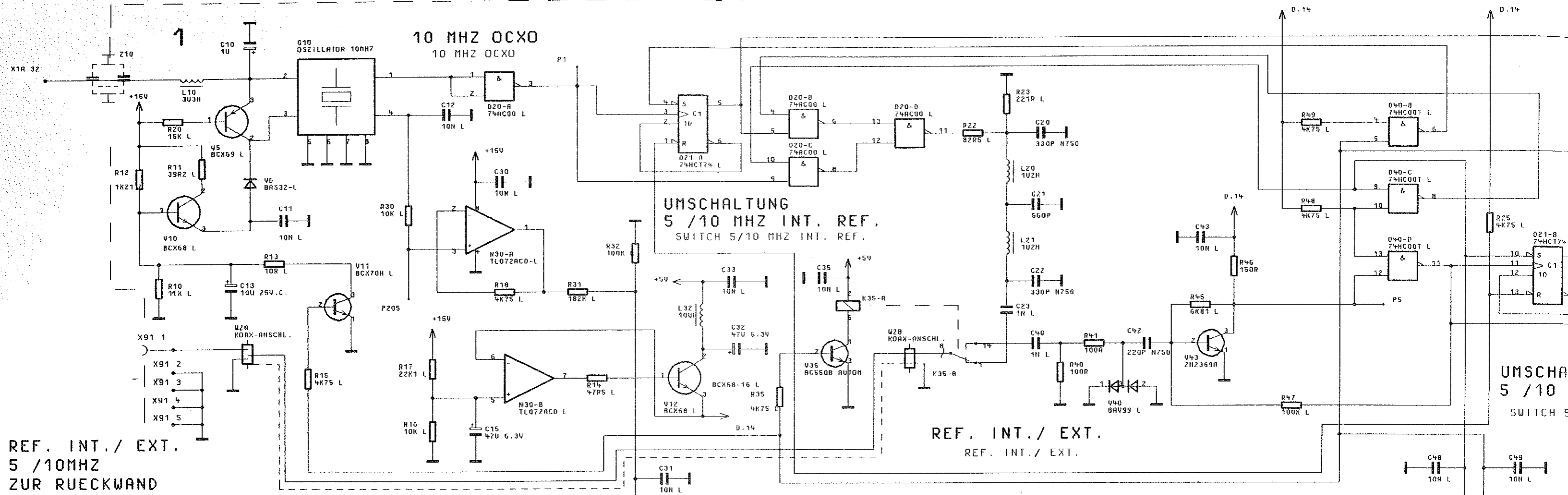


STROMLAUF GILT FUER VAR.02

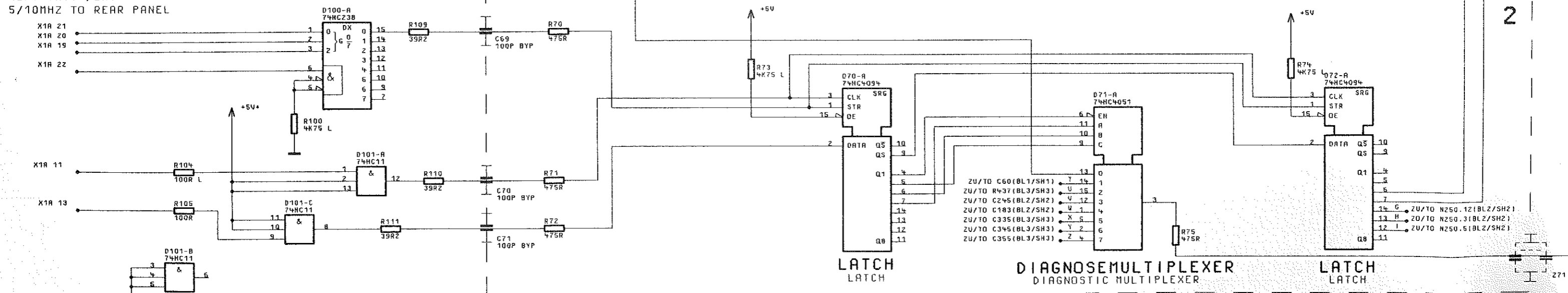
CIRCUIT DIAGRAM IS VALID FOR MOD.02

A	39845	12.88	HM	1KGB	TAG	NAME	BENENNUNG FESTFREQUENZEN REFERENCE-FREQUENCIES
B	39845	03.89	HM	BEARB.		HM	
D	45825	07.89	HM	GEPR.		HM	
				NORM			
				PLOTT	7. 7. 89	*	
REND. IND.	RENDERUNGS-MITTEILUNG	DATUM	NAME	 ROHDE & SCHWARZ			ZEICHN.-NR. 819.6060.015
				ZU GERÄT	SM6U	REG. I. V.	819.0010
						EPSTE Z.	

BLATT-NR.
1
V. 3 BL

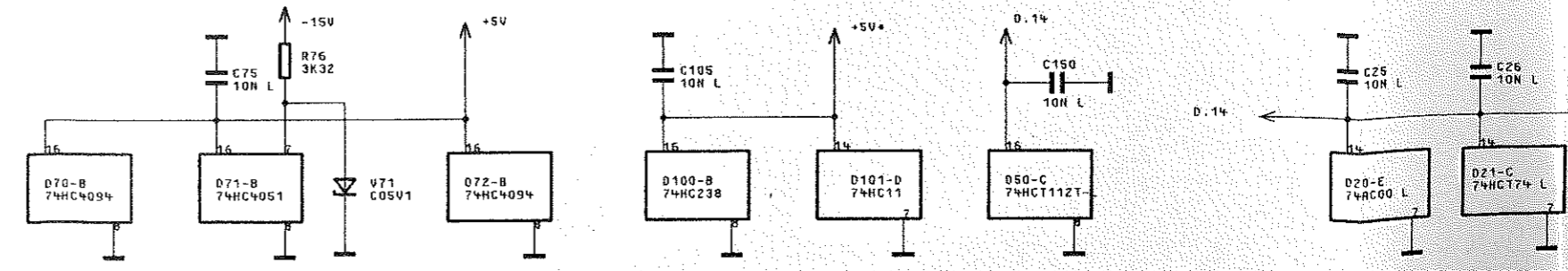


REF. INT./ EXT.
5 / 10 MHz
ZUR RUECKWAND
REF. INT. / EXT.
5 / 10 MHz TO REAR PANEL

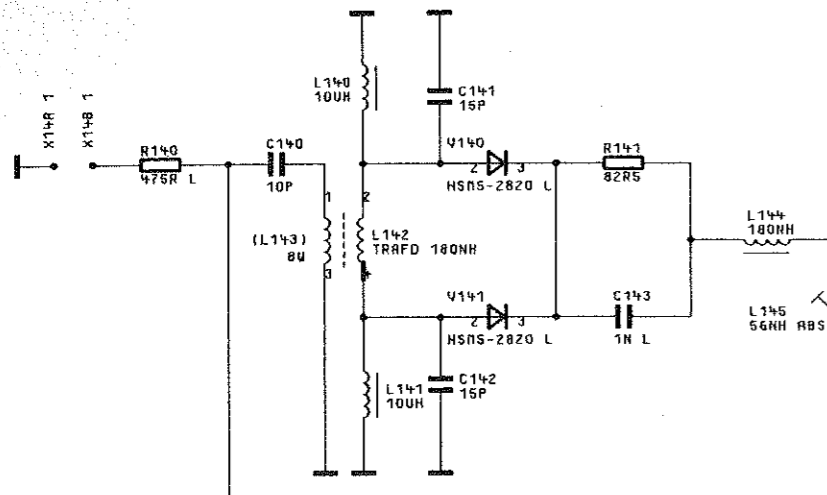


ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHREDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

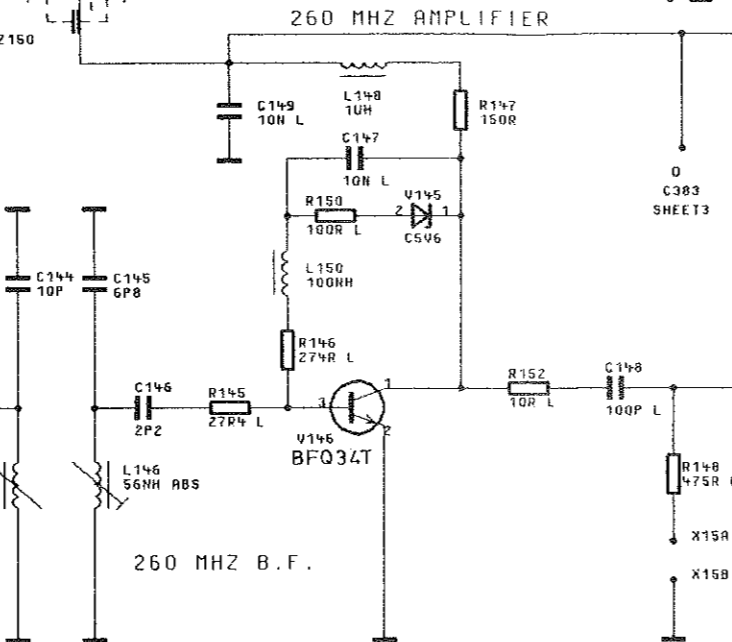
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.



VERDOPPLER 130/260 MHZ DOUBLER 130 / 260 MHZ

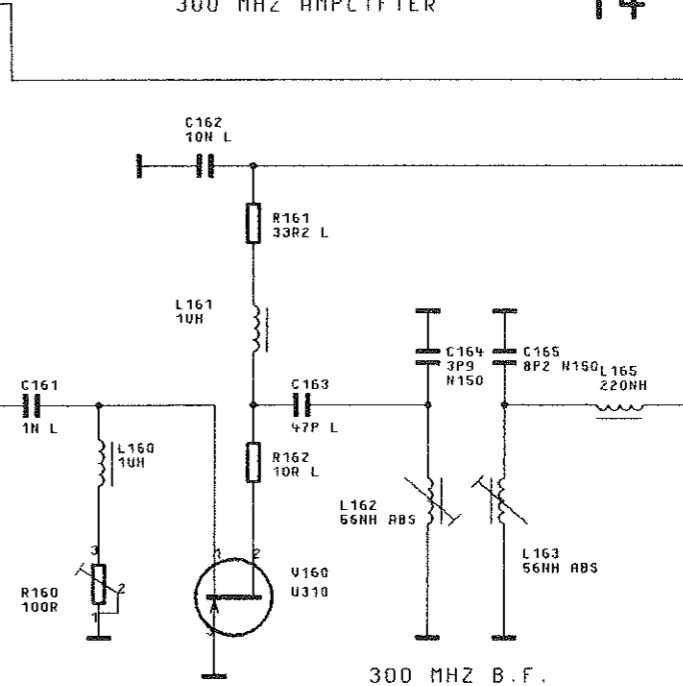


260 MHZ VERSTÄRKER 12 260 MHZ AMPLIFIER



260 MHZ B.F.

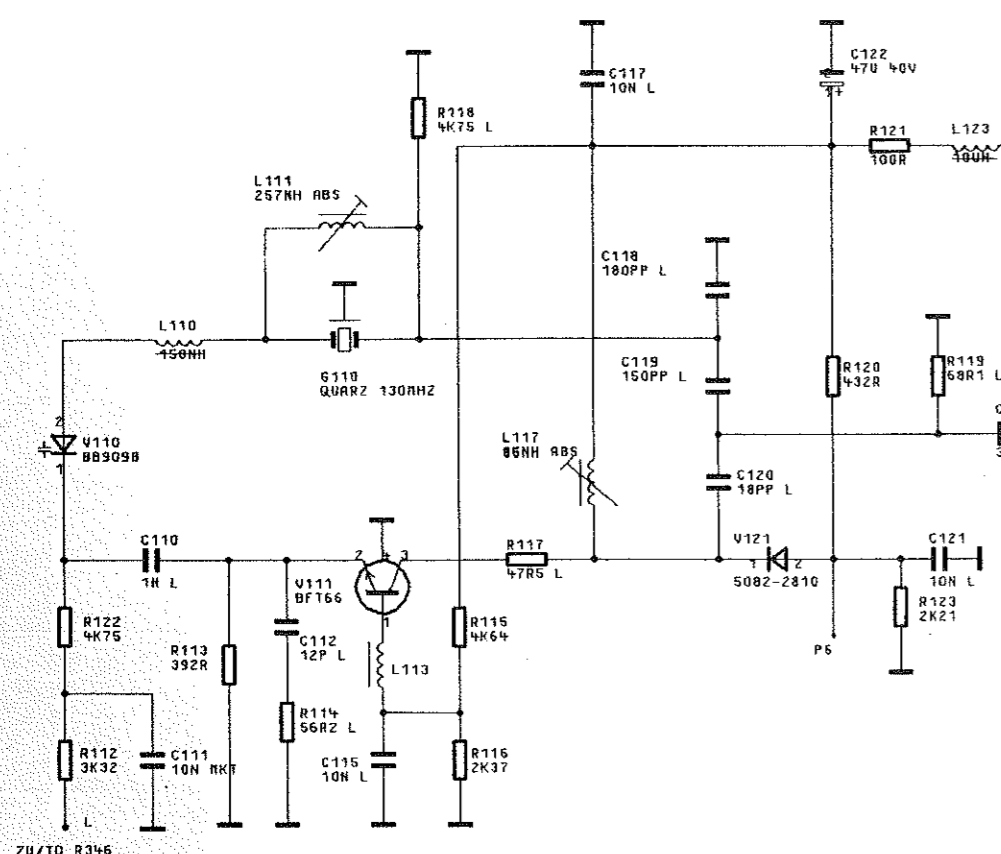
300MHZ VERSTÄRKER 300 MHZ AMPLIFIER



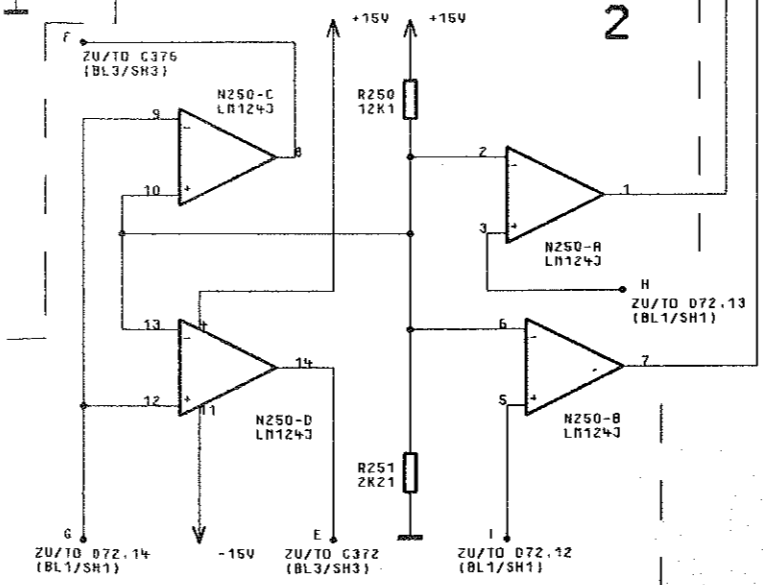
300 MHZ B.F.

PEGEL
300 MHZ

130 MHZ QUARZOSZILLATOR 130 MHZ CRYSTAL OSCILLATOR

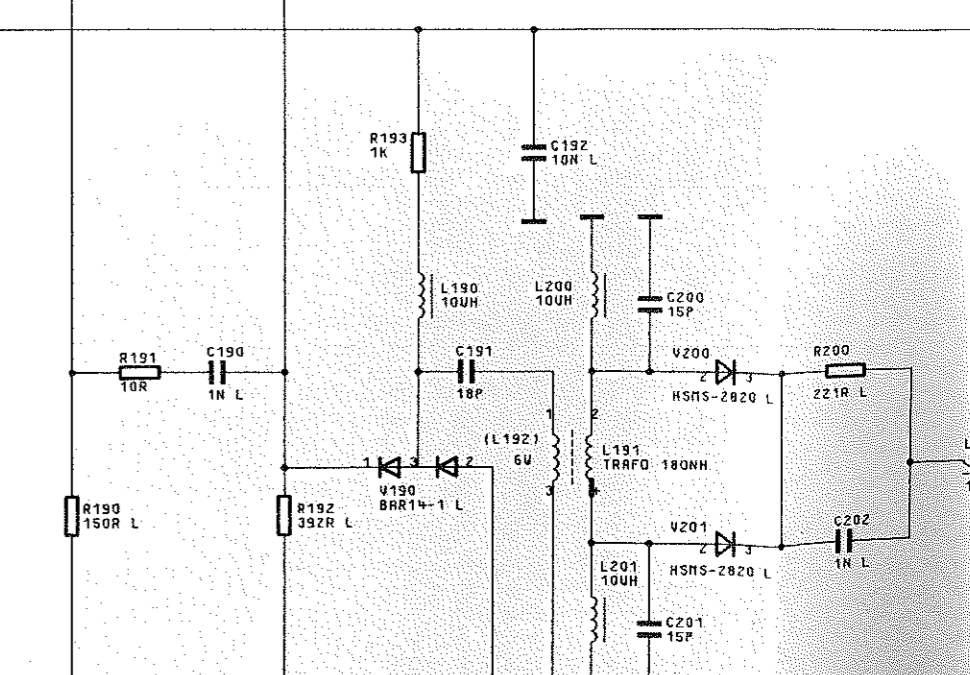


ANSTEUERUNG UMSCHALTER FM/CW SWITCH DRIVER FM / CW 130 / 520 MHZ

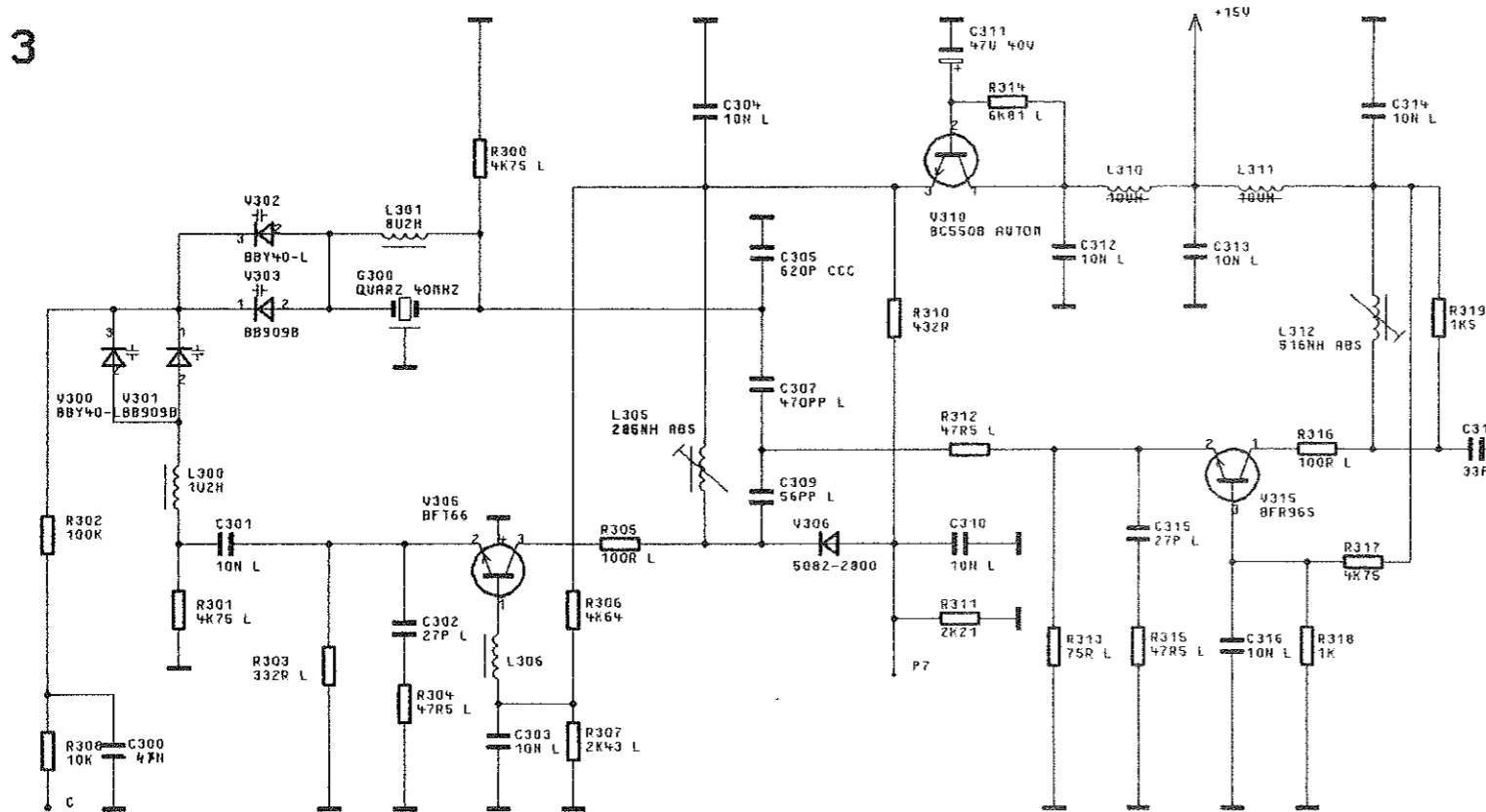


TRENNSTUFE
BUFFER AMPLIFIER

VERVIERFACHER 130/520 MHZ QUADRUPTER 130 / 520 MHZ



3



ZU/TO RG0 (BL1/SH1)

40 MHz- QUARZOSZILLATOR
40 MHz - CRYSTAL OSCILLATOR

TRENNSTUFE
BUFFER AMPLIFIER

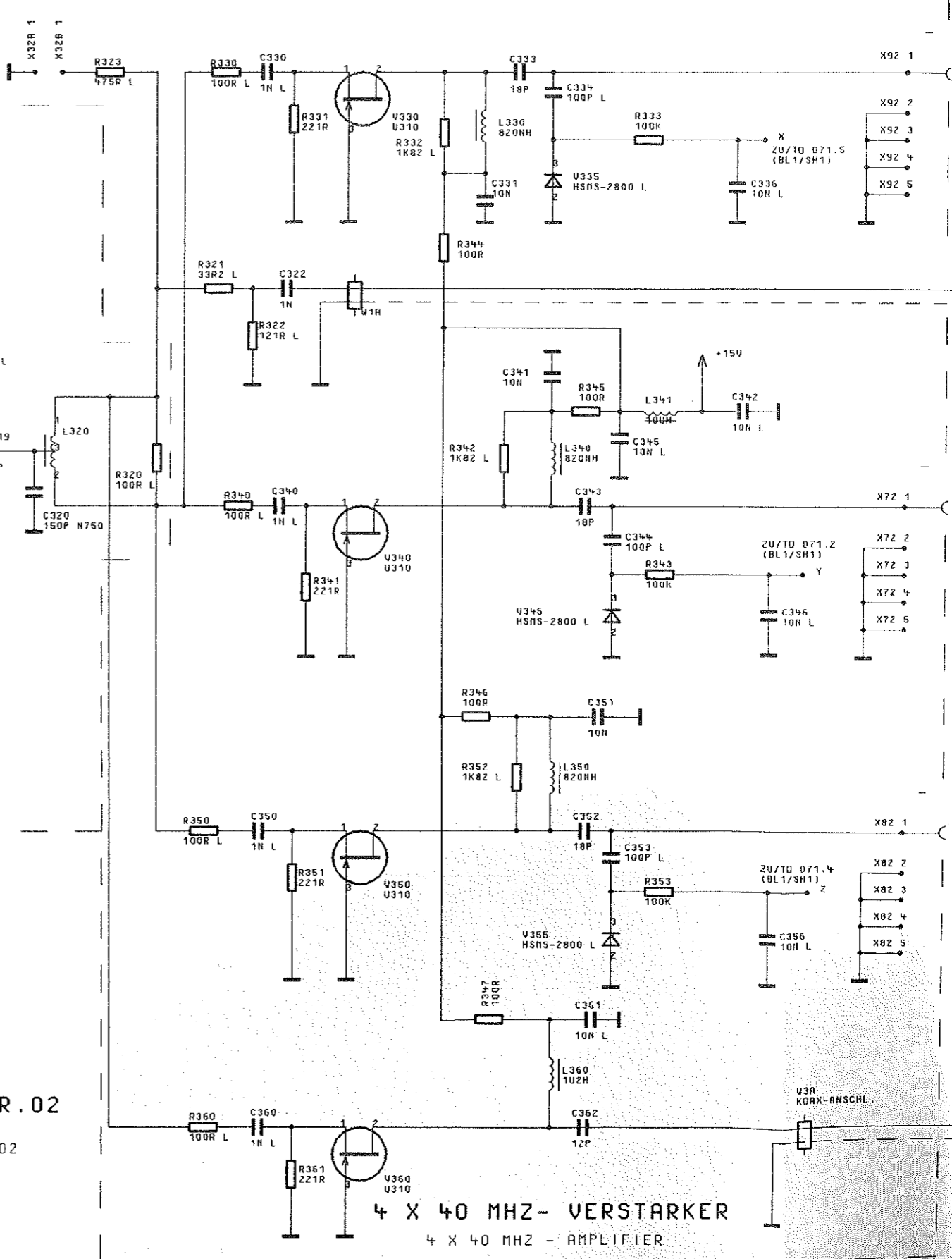


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ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

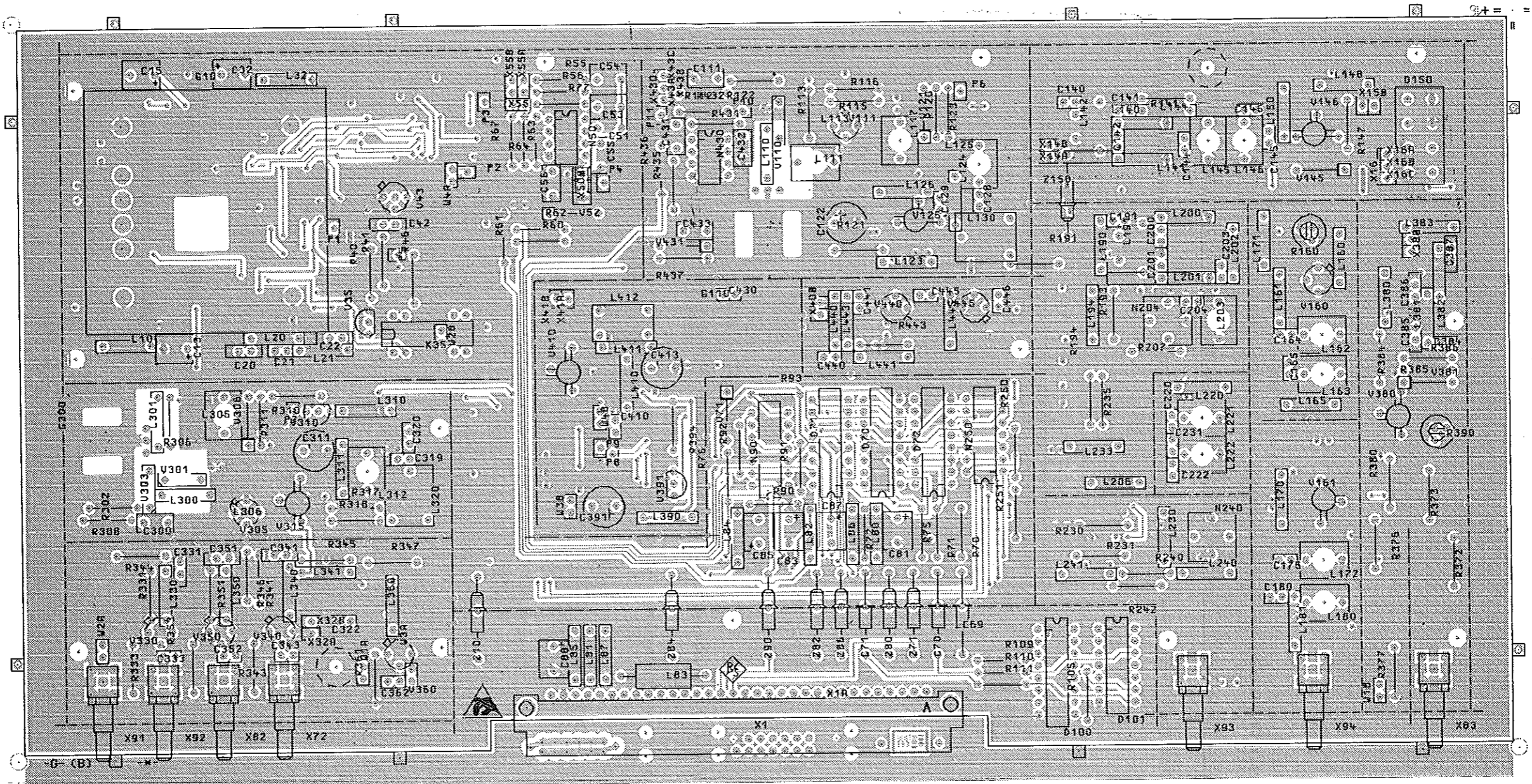
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

4



4 X 40 MHz- VERSTÄRKER
4 X 40 MHz - AMPLIFIER



Ansicht und Leitungsfuehrung Bauteilseite
View of tracks on component side

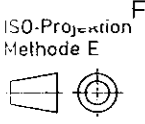
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VARIANTENERKLAERUNG/VERSION
VAR02-GRUNDAUSFUEHRUNG/BASIC MODEL

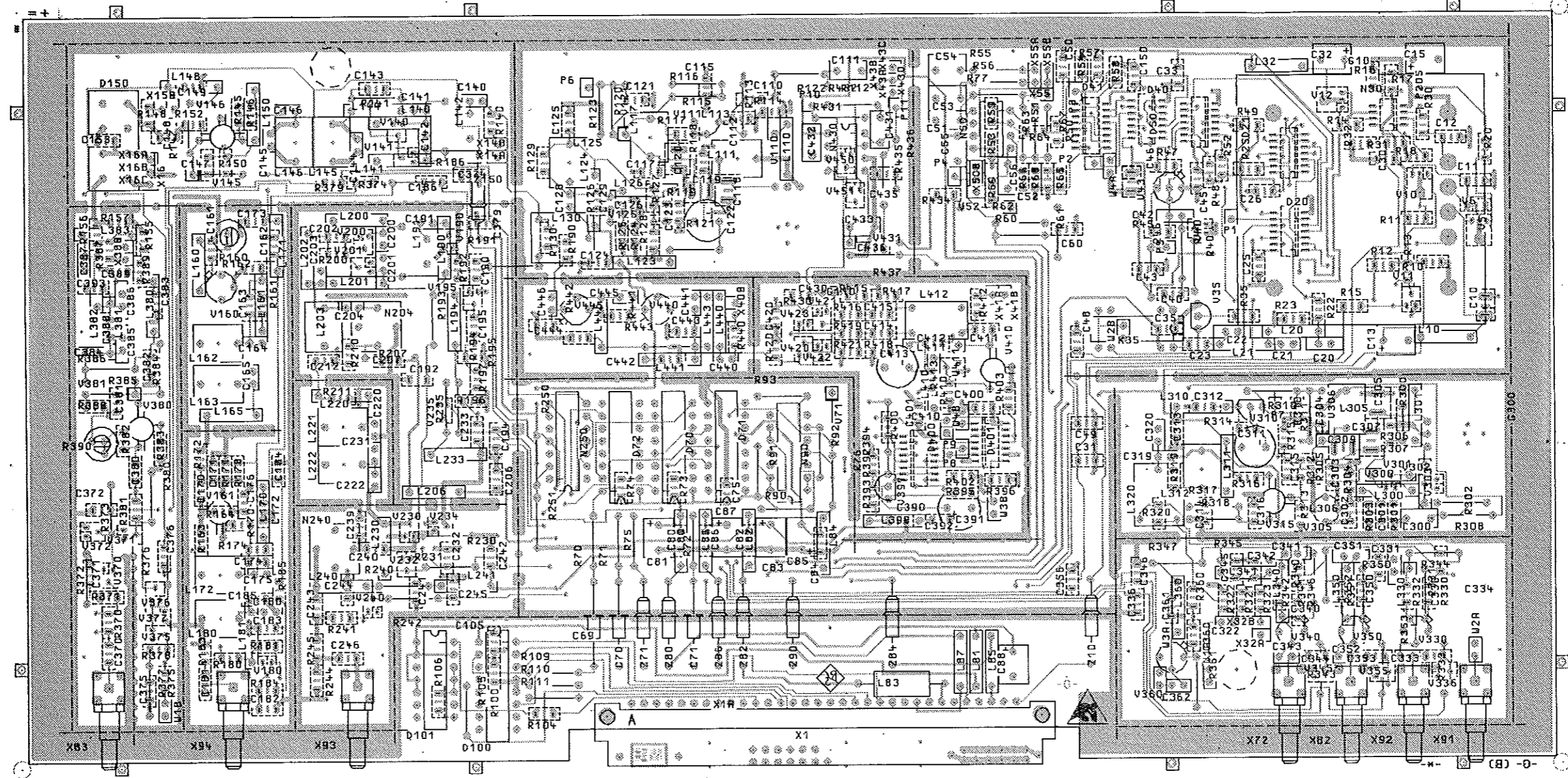
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				Gepr.	REFERENCE-FREQUENCIES	
				Norm		
				ROHDE & SCHWARZ	Zeichn.-Nr.	Blatt-Nr.
					819.6060.01	2
				zu Gerät SMGU	reg. i. V. 819.0010 V	v. 4 Bl.
Änd. Zust.	Änderungs-Mitteilung	Tag	Name		erste Z.	



ACHTUNG: EGB!
Elektrostatic gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
Electrostatic sensitive devices require a special handling



ISO-Projektion Methode E



Ansicht und Leitungsfuehrung Loetseite
View of tracks on solder side

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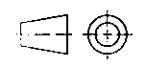
VARIANTENERKLAERUNG/VERSION
VAR02-GRUNDAUSFUEHRUNG/BASIC MODEL

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				IKGB Tag Name	Benennung FESTFREQUENZEN REFERENCE-FREQUENCIES	Z	
			Bearb. 07.89 HM				
			Gepr.				
			Norm				
					Zeichn.-Nr.	819.6060.01	EE
					zu Gerät SMGU	reg. i. V. 819.0010 V	erste Z.



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Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung
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ISO-Projektion
Methode E





ROHDE & SCHWARZ

SERVICE DOCUMENTS

Summing Loops

819.7166.02



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5 Service Manual "Summing Loops"

5.1 Function Description

(See circuit diagram 819.7166 5 and Fig. 5-1)

The summing loop module contains two PLLs, "summing loop 1" and "summing loop 2" and a frequency divider circuit, "pulse blanking divider".

In summing loop 1, the frequency of the external FRN signal at X71 (3 to 3.625 MHz; fine resolution) and the frequency of the external STEP signal at X81 (23.125 to 29.375 MHz; resolution 0.625 MHz) are added or subtracted such that the output is a frequency of 20 to 32.8 MHz with a fine resolution. If only an addition were used, the frequency range at the output would only be half as large.

The frequency of summing loop 1 is added in loop 2 to the external fixed frequency of 300 MHz, resulting in a signal overing 320 to 332.8 MHz. The reference frequency of 40 to 41.6 MHz required for the RF oscillator module is then obtained by dividing by 8 in the pulse blanking divider.

5.1.1 Summing loop 1 (see Fig. 5-1)

The addition or subtraction is performed with a PLL containing a double balance mixer which carries out frequency subtraction. A PLL, i.e. indirect frequency synthesis, has been selected to keep the unwanted mixer products as low as possible at the output of the summing loop.

Switch over between the addition and subtraction of the STEP frequency and the FRN frequency is achieved by inverting the digital phase detector D1, D2. The control signal required is designated as BAND and also switches over the oscillator between two bands (20 to 26.4 MHz/26.4 to 32.8 MHz).

BAND phase det. $f_{(OSC1)} =$
0 *inverted $f_{(STEP)} - f_{(FRN)} = 20 \text{ to } 26.4 \text{ MHz}$*
1 *not inv. $f_{(STEP)} + f_{(FRN)} = 26.4 \text{ to } 32.8 \text{ MHz}$*

The above frequencies are shown in Fig. 5-1.

The oscillator has three adjustment points: OSC1 TOP, OSC1 BOTTOM and OSC1 LEVEL.

The digital phase detector D1, D2 (two edge-triggered D flip-flops), which also operates as a frequency detector prior to synchronization of the control loop, delivers two pulse signals to the control amplifier N15. The width of these pulses corresponds to the phase offset.

The control amplifier converts the pulses into a DC voltage for controlling the oscillator, and provides the control loop with the required transfer function (PI network).

The amplifiers V85, V90, V95 and the attenuator R102 to R104 prevent feedback of the frequencies $f_{(STEP)}$, $f_{(IF)}$, $f_{(OSC1)} + f_{(STEP)}$ from the mixer to the output so that they do not appear as spurious signals at the output of the instrument.

As a result of the frequency detector property of the phase detector, the locking range is always large enough to enable the PLL to capture at switch on. It may be, however, that the frequency detector controls in the incorrect direction and the control amplifier is driven to full-range and remains there. If e.g. $f_{(OSC1)} = f_{(STEP)} - f_{(FRN)}$ is the target frequency, the frequency at the IF output of the mixer is equal to the FRN frequency $f_{(FRN)}$ even with $f_{(OSC1)} = f_{(STEP)} + f_{(FRN)}$ so that the frequency difference at the phase detector is equal to zero. This means, however, that the sign of the frequency control is changed and that the control for $f_{(OSC1)} > f_{(STEP)} + f_{(FRN)}$ go in the wrong direction.

The second case in which the frequency control fails is if the IF becomes so large that it falls within the stop band of the IF filter, meaning that there is no IF signal at the phase detector.

A capture circuit has therefore been installed which forces the tuning voltage into a range in which the frequency detector controls correctly. If the control loop synchronizes, the tuning voltage and the preset voltage agree sufficiently exactly that the diodes V423 and V424 block and isolate the preset value from the oscillator.

Since the preset voltages depend on the oscillator characteristic, which in turn is subject to manufacturing tolerances, aging and temperature drift, these factors can be taken into consideration by a calibration routine (SF 67). The controller in the instrument measures the characteristic by means of the Diagnostics function, generates a table of values and stores this table.

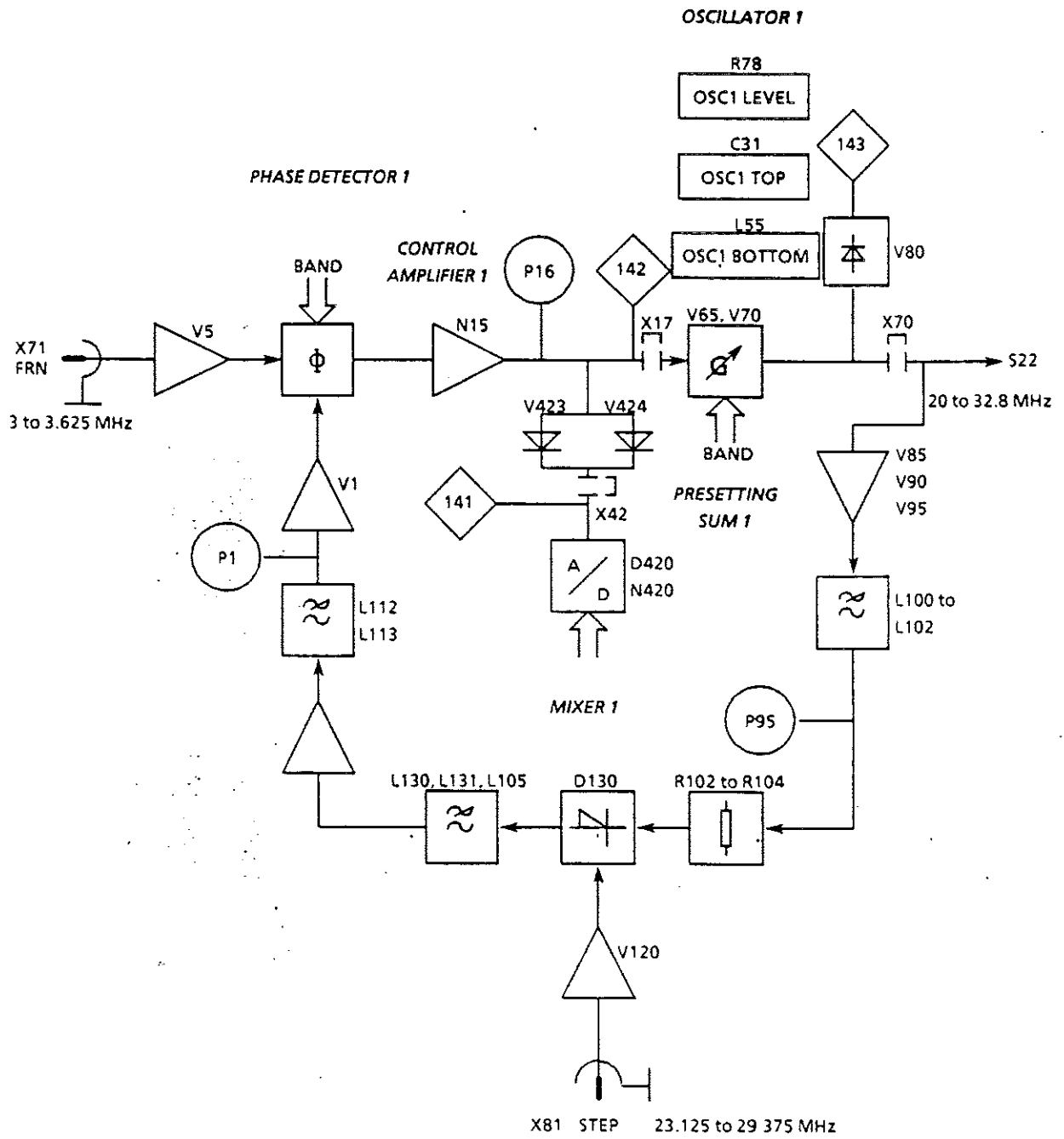


Fig. 5-1 Function diagram of "Summing loop 1"

5.1.2 Summing loop 2 (see Fig. 5-3)

The phase detector is a ring mixer which is over-driven (both input signals have the same level) so that amplitude variations cannot be transmitted and interfere with the control. The phase detector characteristic is triangular so that positive and negative output voltages are possible.

The oscillator does not have a range switchover and is designed for the frequency range from 320 to 332.8 MHz. The PLL can therefore only be synchronized at the total frequency of $f_{(OSC1)}$ and $f_{(FIXED)}$.

The oscillator has two adjustment points OSC2 BOTTOM and OSC2 TOP.

The lowpass filter L210 to L212 suppresses the reference signal from oscillator 1 and its harmonics. The cutoff frequency of approx. 10 MHz is a compromise between suppression of the reference signal and phase shift. The latter must not be too large as this would affect the stability of the loop.

The control amplifier consists of the operational amplifier N245 acting as a PI element and the transistor amplifier V240 which takes over the operational amplifier function in the proportional band above 500 kHz. This circuit improves the phase noise of the loop above 500 kHz since the transistor amplifier has a smaller noise figure.

Since the mixer D205 does not act as a frequency detector, the frequency of the oscillator must be pulled into the capture range of the loop by the capture circuit. The capture circuit and the control amplifier constitute a triangular-wave generator which applies the signal shown in Fig. 5-2 to the oscillator input.

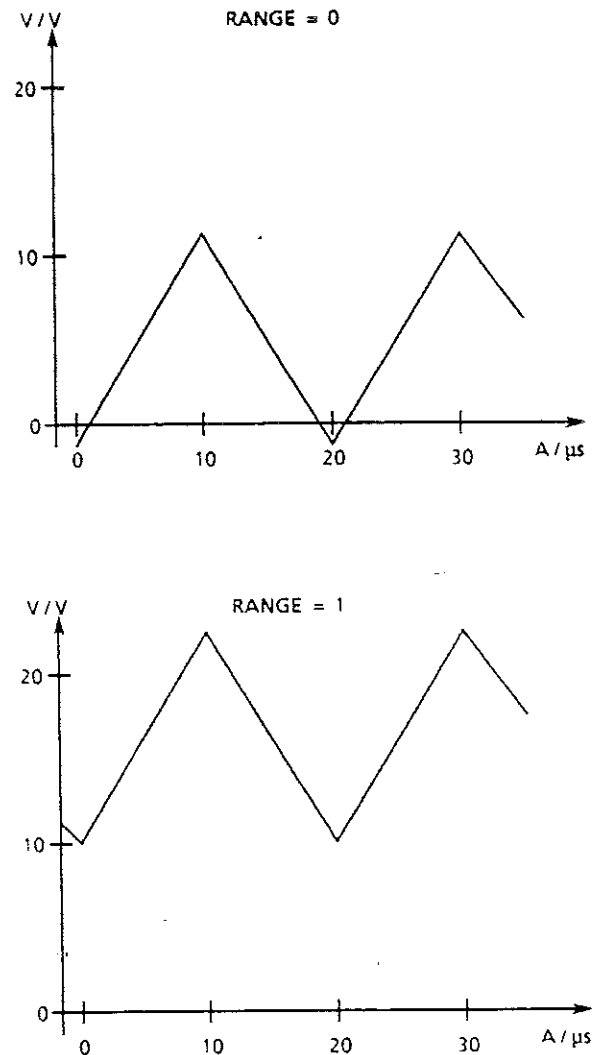


Fig. 5-2

The circuit operates in two ranges which are switched over by the RANGE signal by the controller depending on the frequency setting. The triangular-wave curve means that the oscillator is swept and reaches the lock-in range at some time so that the loop is synchronized. Synchronization of the loop is registered by the capture circuit which is then switched off. An unlocked loop detected either by the out-of-lock detector or by the window comparator of the capture circuit, and the triangular-wave signal is switched on again.

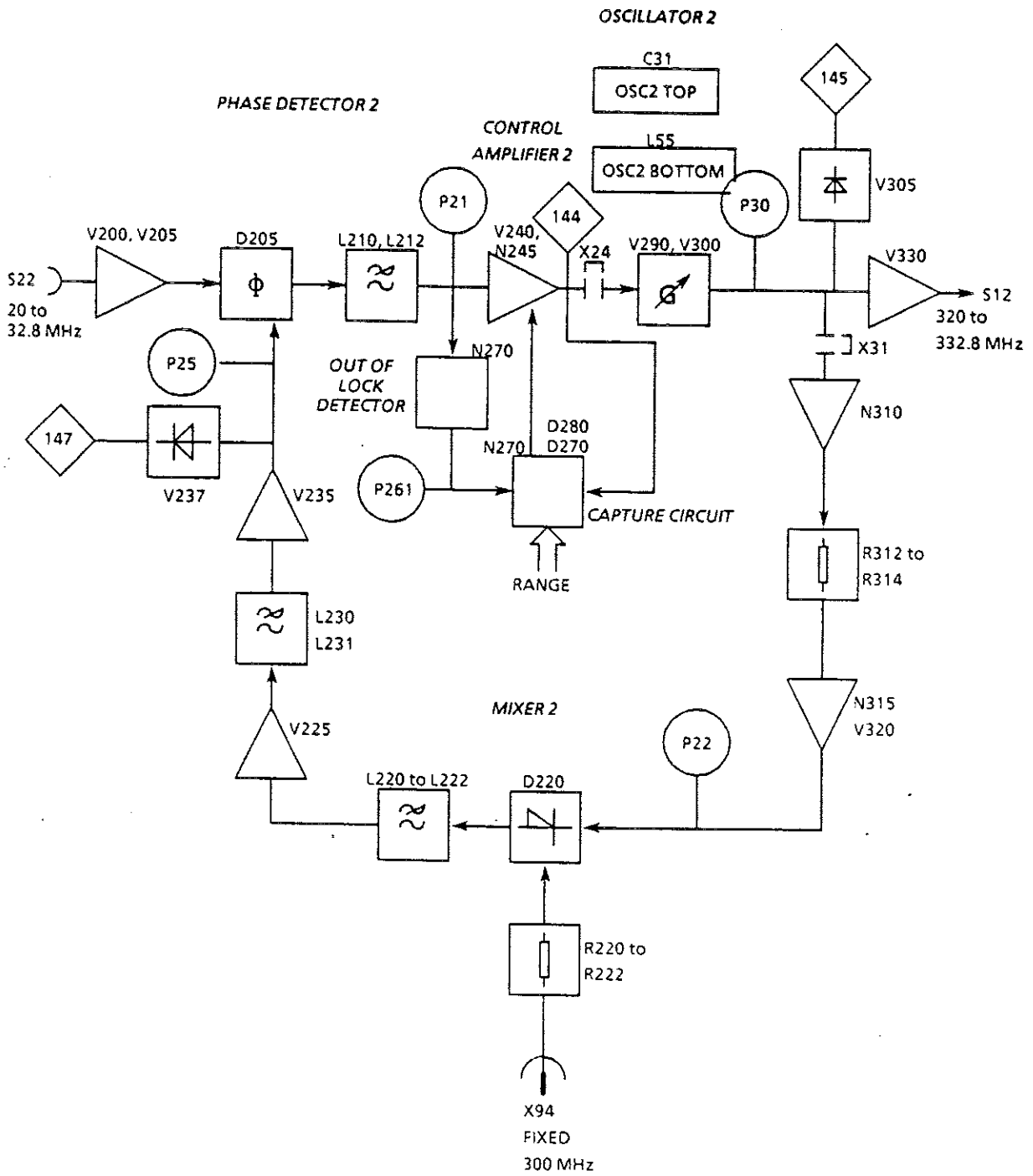


Fig. 5-3 Function diagram of "Summing loop 2"

5.1.3 Pulse blanking divider (see Fig. 5-4)

The output signal of the digital divider D450, D451 with the frequency $f_{OSC2}/8$ is applied via pulse shaper V455, V460 to the control input of the electronic switch V470 with which the input signal is switched on or off at the frequency f_{OSC2} . In this manner, one of the eight periods of the input signal is connected through to the output so that a pulse signal with the frequency $f_{OSC2}/8$ is present there.

Fig. 5-4 shows that the input signal is connected to the switch (adjustment point DELAY TIME) via a delay line which can be adjusted using varicap diodes. The tuning range corresponds to a phase shift of 180 degrees. Shifting by a total of 360 degrees is possible since the signal from the divider can be inverted using a plug-in jumper (adjustment point POLARITY).

The pulse width of the control signal can also be adjusted (adjustment point WIDTH).

The selective amplifier V440 is tuned to resonance using the adjustment point AMPLITUDE.

5.1.4 Control and Diagnostics Circuit

The module is controlled via a serial data bus. The data for the preset values, range switching and diagnostics multiplexer are read into two shift registers D410 and D411.

Eight different diagnostics points (DC values) can be applied to output X1.A17 via the multiplexer component D412.

The "Alarm line" at output X1.A18 is switched from 5 V to 0 V if the tuning voltage of oscillator 1 leaves the range of 1.6 V to 21.6 V (window comparator N20) or if the capture circuit of summing loop 2 is in operation.

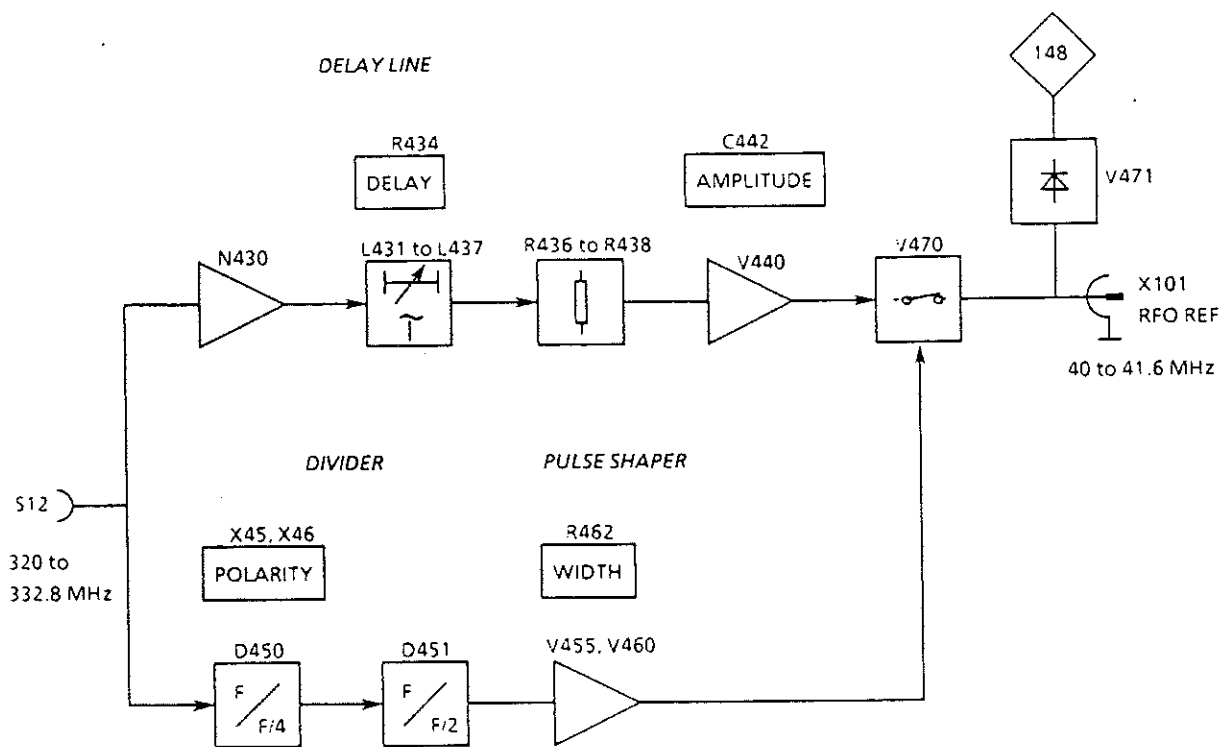


Fig. 5-4 Function diagram of "Pulse blanking divider"

5.2 Testing and Adjustment

- Unscrew top cover.
- Connect module to service adapter.
- Enter PRESET.

5.2.1 Adjustment of "Oscillator 1"

- Remove jumper X17.
- Apply DC voltage of 3 to 20 V to X17B.
- Connect a frequency counter or power meter to P95 (50 Ω).
- Adjust the frequency using coil L55 and trimmer C31 and the level using potentiometer R78 as shown in Table 5-1.

Table 5-1

Entry	Adjust	Marking	Voltage at X17B	Nominal frequency or level at X70	Remarks
RF 1010 MHz	L55	OSZ1 BOTTOM	3 V \pm 0.1 V	19.9 MHz \pm 0.1 MHz	Shift windings of ring core to adjust
RF 1025 MHz	C31	OSZ1 TOP	19.7 V \pm 0.1 V	32.9 MHz \pm 0.1 MHz	Alternately with adjustment OSC1 BOTTOM
RF 1010 MHz			19.7 V \pm 0.1 V	26.25 MHz \pm 28 MHz	If frequency is too large/small, correct adjustment OSC1 BOTTOM downwards/upwards
RF 1025 MHz			3 V \pm 0.1 V	26.5 MHz \pm 26.25 MHz	If frequency is too large/small, correct adjustment OSC1 TOP downwards/upwards (within tolerance range)
RF 1025 MHz	R78	OSZ1 LEVEL	10 V \pm 0.1 V	-15 dBm +0 dB -0.5 dB	

- Insert jumper X17 again.

5.2.2 Testing the Oscillator and RF Amplifier Levels of "Summing loop 1"

- Remove jumper X17.
- Apply DC voltage of 3 to 20 V (1-V steps) to X17.A.
- Remove jumper X70 and connect power meter to X70.A, C.
- The level must be -3 dBm \pm 2 dB after entering RF 1010 MHz and RF 1025 MHz on the instrument and 3 to 20 V at X17.A.
- Insert jumper X70 again.
- Connect a power meter to P95.
- The level must be -15 dBm + 1 dB -1.5 dB after entering RF 1010 MHz and RF 1025 MHz on the instrument and 3 to 20 V at X17.A.
- Insert jumper X17 again.

5.2.3 Testing the Closed "Summing loop 1"

- Connect two voltmeters to the plug-in jumpers X42 and X17 or use the diagnostics function 141 or 142 (SHIFT SPECIAL 141 ENTER).
- Connect a frequency counter to P95.
- Enter RF 1010 MHz on the instrument.
- Enter the frequencies listed in Table 5-2 on the instrument and check the frequencies and voltages. The sequence in Table 5-2 must always be followed as otherwise hysteresis will affect the subassembly setting.

Table 5-2

Entry on instrument	Nominal frequency at P95	Nominal voltage at X70
RF 1000.078125 MHz	20.025 MHz \pm 2 kHz	3.0 V \pm 1 V
RF 1010.46875 MHz	23.35 MHz \pm 2 kHz	10 V \pm 1 V
RF 1019.609375 MHz	26.275 MHz \pm 2 kHz	17 V \pm 1 V
RF 1038.984375 MHz	32.475 MHz \pm 2 kHz	18.5 V \pm 1 V
RF 1029.53125 MHz	29.45 MHz \pm 2 kHz	11 V \pm 1 V
RF 1019.453125 MHz	26.225 MHz \pm 2 kHz	4.3 V \pm 1 V

- The voltage difference between X42 and X17 must be \leq 2 V.
If this is not the case call a calibration routine using SHIFT SPECIAL 67 ENTER and attempt to reduce the voltage difference to below 2 V.

5.2.4 Testing the IF Amplifier Level of the "Summing loop 1"

- Connect a level meter to test point P1 (test frequency = 3 to 3.265 MHz).
- Set the following sweep on the instrument:

START	1000.39	MHz
STOP	1002.35	MHz
STEP	10	kHz
TIME/STEP	25	ms
- The level at P1 must be -18 dBm \pm 3 dB.

5.2.5 Testing the Settling of "Summing loop 1"

- Connect the signal input of a storage oscilloscope to test point P16 and the trigger input to X1.A22. Set the trigger to a positive slope and a 2.5-V threshold voltage.
- Enter RF 1001 MHz on the instrument, then RF 1019 MHz and then RF 1001 MHz again. With the second and third settings, the voltage at P16 must reach the full-scale value \pm 10 % of the voltage jump within 250 μ s.

5.2.6 Adjustment of "Oscillator 2"

- Remove jumper X24 and apply a variable DC voltage of 3 V to 20 V to X24.B.
- Connect a frequency counter to test point P22.
- Adjust the oscillator using coil L287 and trimmer C285 according to Table 5-3. When reading the frequency, the oscillator chamber (chamber 7) must be covered by a metal plate.

Table 5-3

Adjust	C285	L287
Marking	OSZILLATOR 2 BOTTOM	OSZILLATOR 2 TOP
Voltage at X24B	3 V \pm 0.1 V	20 V \pm 0.1 V
Nominal frequency at P22	319.75 MHz \pm 0.25 MHz	333.05 MHz \pm 0.25 MHz
Remarks	Alternately with adjustment OSCILLATOR 2 TOP	To adjust, bend windings of air core

- Insert jumper X24 again.

5.2.7 Testing of Levels of "Summing loop 2"

- Remove jumper X24 and apply a variable DC voltage (5 V to 22.6 V) to X24.B.
- Enter RF 1019 MHz on the instrument.
- Connect a power meter to P30 or P22 and P25 and vary the voltage at X24.B. The levels must have the values as in Table 5-4.

Table 5-4

Test point	Nominal level	Frequency range
P30	-8 dBm \pm 2 dB	310 to 335 MHz
P22	-4 dBm \pm 2 dB	310 to 335 MHz
P25	-6.5 dBm \pm 2 dB	10 to 35 MHz

- Insert jumper X24 again.

5.2.8 Testing the Capture Circuit

- Connect an oscilloscope to plug-in jumper X24.
- Disconnect RF interface plug X94.
- Enter RF 1010 MHz on the instrument.
- A triangular signal with
with V (MIN) = -1 V \pm 2 V
and V (MAX) = 15 V \pm 2 V
must now be present at X24.
- Enter RF 1025 MHz on the instrument.
- A triangular signal with
with V (MIN) = 6 V \pm 2 V
and V (MAX) = 23 V \pm 2 V
must now be measured at X24.

5.2.9 Testing the Closed "Summing loop 2"

- Connect a voltmeter to plug-in jumper X24 or use the diagnostics function (SHIFT SPECIAL 144 ENTER).
- Connect a frequency counter to P30.
- Cover the oscillator chamber using a metal cover.
- Enter RF 1000.25 MHz on the instrument, then RF 1020 MHz and then RF 1040 MHz.
- The voltage at X24 should be 3 V \pm 2 V, 12 V \pm 2 V and 20 V \pm 2 V.

5.2.10 Adjustment and Testing of "Pulse blanking divider"

- Cover the pulse blanking divider chamber (chamber 9) using a metal cover.
- Enter RF 1020 MHz on the instrument.

Adjustment

- Connect an oscilloscope to the RF output X101. The 3-dB bandwidth should be at least 250 MHz. Use a low-reflection 50-Ω input. Connect attenuator to oscilloscope input if necessary.
- If the Tektronix oscilloscope 475A is used, the vertical deviation has to be calibrated at 250 MHz by means of a sinewave generator.
- DC coupling has to be switched on at the oscilloscope and the 0-V line must be fixed.
- Adjust WIDTH to the left maximum.
- Adjust V_1 (amplitude of main pulse, see Fig. 5-5) for maximum using AMPLITUDE.
- Adjust V_1 alternately for maximum using WIDTH and DELAY (tolerance = $3.5 \text{ V} \pm 1 \text{ V}$).
- Adjust V_3 (amplitude of second adjacent pulse, see Fig. 5-5) for $V_3/V_1 = 0.25 \pm 0.05$ using DELAY.
- If this adjustment is unsuccessful, change the position of jumper X45/X46 (POLARITY) and repeat.
- V_1 should be $3.5 \text{ V} \pm 1 \text{ V}$.
- Enter RF 1001 MHz and RF 1039 MHz on the instrument. The amplitude of the main and adjacent pulses should then change by less than 0.3 V.
- Enter RF 1020 MHz, FM EXT AC on the instrument.
- Connect RF output X101 to the instrument again.
- Connect a phase noise test setup to the instrument output and measure the phase noise at 1020.45 MHz (if necessary a spectrum analyzer - overloaded by 10 dB - may be used).
- The phase noise test setup should be below 130 dBc/Hz.

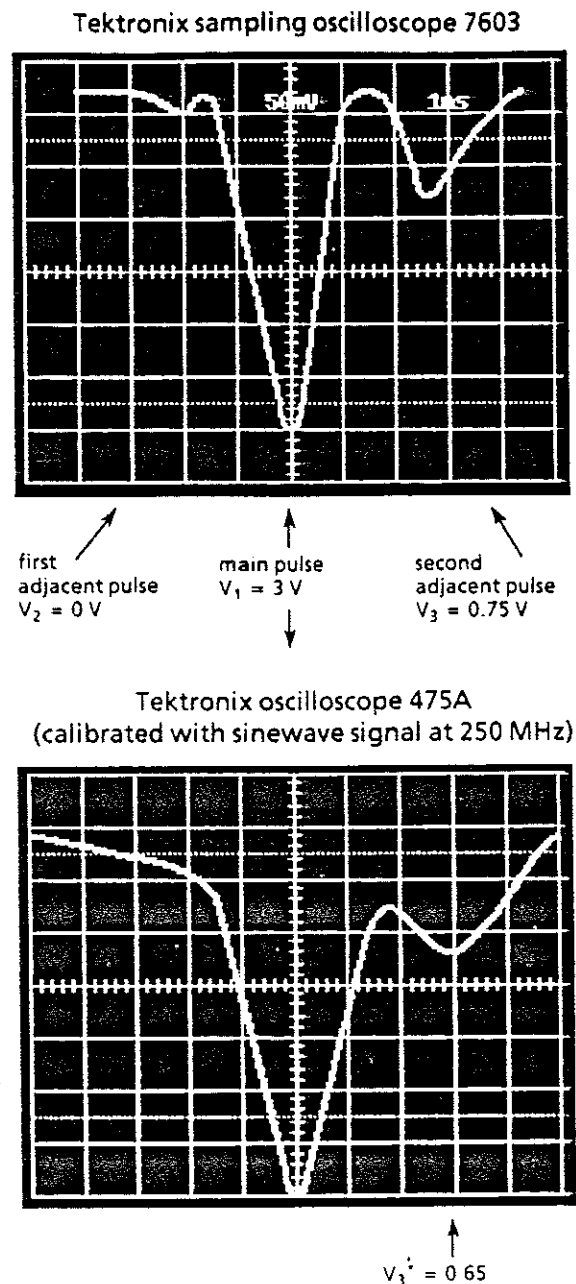


Fig. 5-5 Typical oscillograms of the output signal at X101 (RFO REF) after adjusting the pulse blanking divider

5.3 Troubleshooting

- Troubleshooting can be carried out using the DC voltage values and signal levels listed.
- Unscrew both covers, connect the module to the service adapter and enter PRESET RF 1000 MHz on the instrument.

Table 5-5 (DC voltage values)

Test point	Entry on instrument	DC voltage
P60	RF 1010 MHz	-14.2 V ± 1 V
P62	RF 1025 MHz	23.8 V ± 1 V
Source of V65		-6.0 V ± 0.5 V
Source of V70		6.7 V ± 0.5 V
Emitter of V85		-0.8 V ± 0.5 V
Emitter of V90		-0.7 V ± 0.5 V
Collector of V95		6.2 V ± 0.5 V
Collector of V120		7.1 V ± 0.5 V
Collector of V110		6.2 V ± 0.5 V
Collector of V200		7.3 V ± 0.5 V
Collector of V205		7.0 V ± 0.5 V
Collector of V240		6.3 V ± 0.5 V
Emitter of V290		-7.7 V ± 0.5 V
Emitter of V300		14.6 V ± 0.5 V
Collector of V330		13.8 V ± 0.5 V
Output of N310		4.4 V ± 0.5 V
Output of N315		4.3 V ± 0.5 V
Collector of V320		7.2 V ± 0.5 V
Collector of V225		6.3 V ± 0.5 V
Collector of V235		7.3 V ± 0.5 V
Output of N430		4.4 V ± 0.5 V
Kollector of V440		4.0 V ± 0.5 V
Emitter of V455		-1.9 V ± 0.5 V
Drain of V470		14.6 V ± 0.5 V
Collector of V270	RF 1010 MHz	0.0 V ± 0.5 V
Collector of V270	RF 1025 MHz	8.6 V ± 0.5 V
Collector of V275	RF 1010 MHz	13.0 V ± 0.5 V
Collector of V275	RF 1025 MHz	21.6 V ± 0.5 V
X42	RF 1039 MHz Set SF 67	Voltage at X17 ± 0.5 V

Table 5-6 (Control signals (CMOS))

Test point	Entry on instrument	Control signal
D410 / pin 14	RF 1010 MHz	1
D410 / pin 14	RF 1025 MHz	0
D410 / pin 13	RF 1010 MHz	0
D410 / pin 13	RF 1025 MHz	1
D412 / pin 6	SHIFT SPECIAL 141 ENTER	0
D412 / pin 6	SHIFT SPECIAL 0 ENTER	1

Table 5-7 (Signal level)

Test point	Frequency	Level	Remarks
P2	3 to 3.625 MHz	CMOS	
P3	3 to 3.625 MHz	CMOS	
P10	3 to 3.625 MHz	CMOS	
P11	3 ...to 3.625 MHz	CMOS	
X24	50 kHz ± 20 kHz	Triangular-wave signal with 16 V _{pp} ± 3 V	Plug-in jumper X29 removed

RF levels

The RF levels are measured using a plug-in jumper to which a 50-Ω cable is soldered.

Table 5-8

Test point	Entry on instrument RF	Frequency	Level
X70	1000 to 1040 MHz	20 to 32.8 MHz	-2 dBm ± 3 dB
P95	1000 to 1040 MHz	20 to 32.8 MHz	-15.5 dBm ± 3 dB
P1	1000 to 1003 MHz	3 to 3.625 MHz	-15.5 dBm ± 3 dB
P30	1000 to 1040 MHz	320 to 332.8 MHz	-10 dBm ± 2 dB
P22	1000 to 1040 MHz	320 to 332.8 MHz	-4 dBm ± 2 dB
P25	1000 to 1040 MHz	20 to 32.8 MHz	-6.5 dBm ± 2 dB

5.4 Interfaces

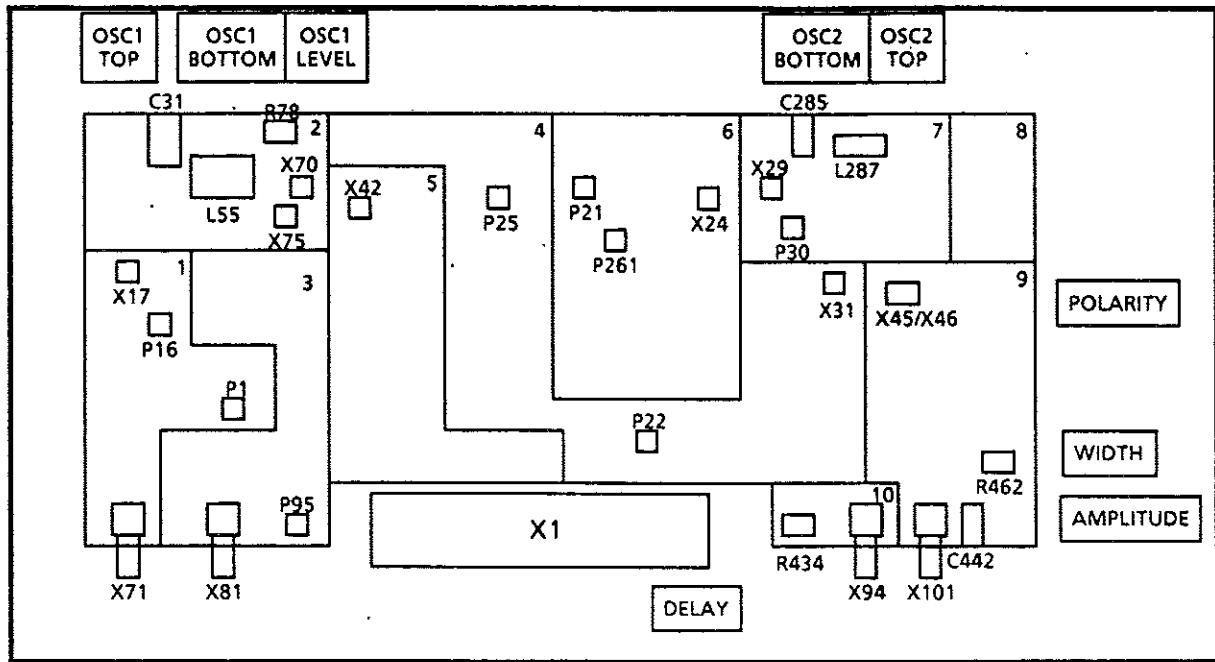


Fig. 5-6 Layout of test points and trimmers

Analog interfaces

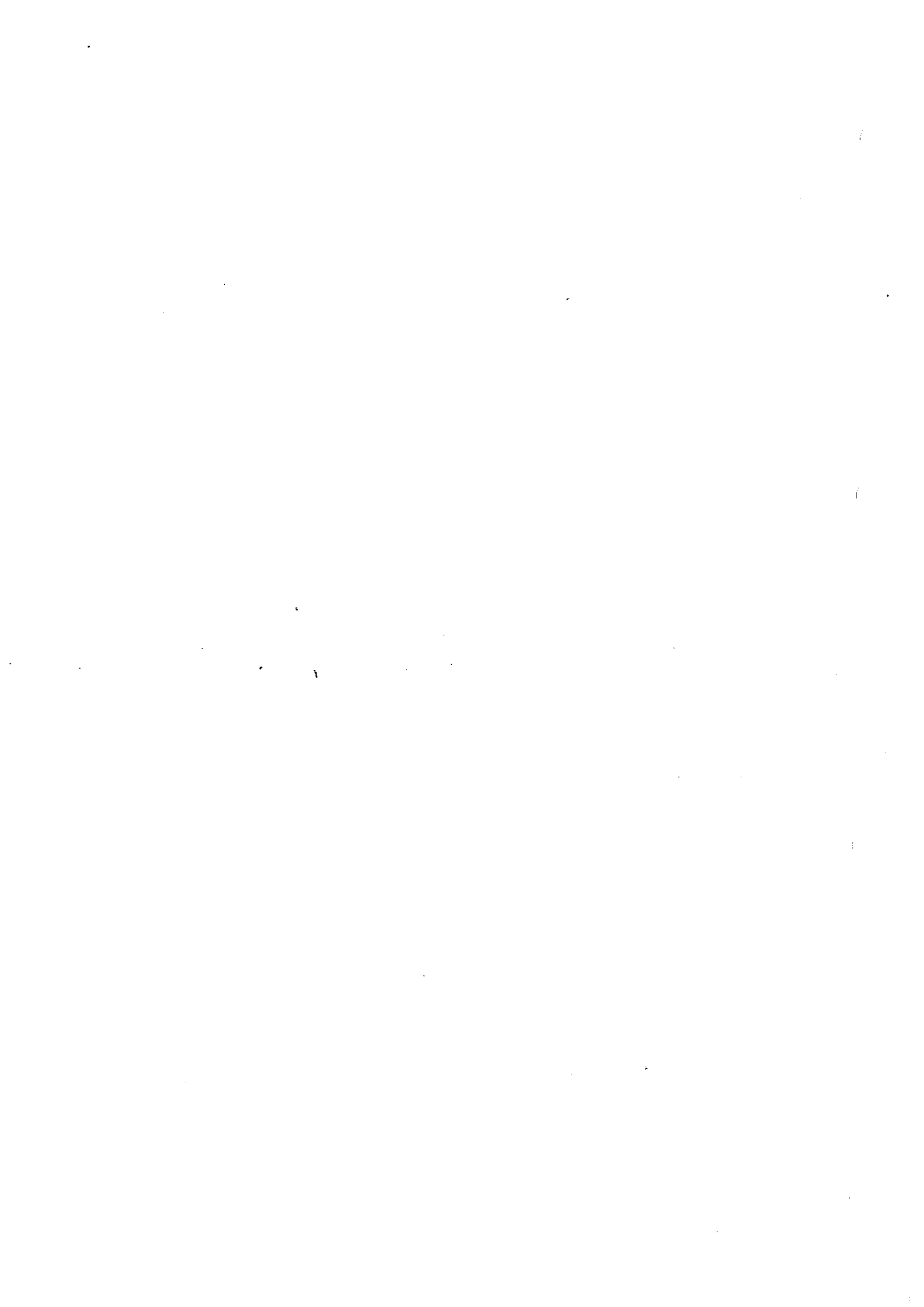
Designation	Function	Frequency	Level
X71	RF input	3 to 3.625 MHz	5 dBm \pm 1 dB
X81	RF input	23.125 to 29.375 MHz	10 dBm \pm 1 dB
X94	RF input	300 MHz	5 dBm \pm 2 dB
X101	RF output	40 to 41.6 MHz	3.5 V _r \pm 1 V
X1.A17	Diagnostics output		-5 to +5 V
X1.A18	Alarm line		CMOS

Digital interfaces

Designation	Function
X1.A21	LSB of address
X1.A20	
X1.A19	MSB of address
X1.A22	
X1.A11	Strobe
X1.A13	Clock
	Data

Supply voltages

Designation	Voltage
X1.A24	+24 V +0.5 V to -0.7 V
X1.A26	+15 V \pm 0.3 V
X1.A28	+5 V \pm 0.2 V
X1.A30	-15 V +0.8 V to +0.3 V
X1.A10, A12, A14, A16, A23, A25, A27, A29, A31	Ground





ROHDE & SCHWARZ

Schaltteillisten

Stromläufe

Bestückungspläne

Part lists

Circuit diagrams

Components plans

Listes des pièces détachées

Schémas de Circuit

Plans des composants



Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C1	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C5	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C6	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C7	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C8	CK 220NF+-5%63V5RM MKT CAPACITOR	CK 099.2952	WIMA	MKS2/63/0,22UF/5%	
C9	CK 220NF+-5%63V5RM MKT CAPACITOR	CK 099.2952	WIMA	MKS2/63/0,22UF/5%	
C10	CC 1,8NF+-10%4X5R2000 CAPACITOR	CC 087.7054	VALVO	2222 63051 182	
C11	CC 1,8NF+-10%4X5R2000 CAPACITOR	CC 087.7054	VALVO	2222 63051 182	
C12	CK 15NF+-5%63V5RM MKT CAPACITOR	CK 099.2875	WIMA	MKS2/63/0,015UF/5%	
C13	CK 15NF+-5%63V5RM MKT CAPACITOR	CK 099.2875	WIMA	MKS2/63/0,015UF/5%	
C14	CK 220NF+-5%63V5RM MKT CAPACITOR	CK 099.2952	WIMA	MKS2/63/0,22UF/5%	
C15	CK 220NF+-5%63V5RM MKT CAPACITOR	CK 099.2952	WIMA	MKS2/63/0,22UF/5%	
C16	CK 470NF+-5%63V5RM MKT CAPACITOR	CK 099.2975	WIMA	MKS2/63/0,47UF/5%	
C17	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C18	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C30	CC 33PF+- 5% 63V N750 VIE CERAMIC CAPACITOR	060.0265	ERIE	RPE110-U2J-330-J	
C31	CT 9,2PF TAUCHTR.RD 7X12 AIR-TYPE TRIMMER	CT 025.7373	TEKELEC	LUFTRATS201MMUTTER	
C40	CC 3,9PF+-0,25PF3X4NPO CAPACITOR	CC 087.6370	VALVO	2222 678 09398	
C55	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C56	CC 33PF+- 5% 63V N750 VIE CERAMIC CAPACITOR	060.0265	ERIE	RPE110-U2J-330-J	
C59	CC 1,2NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7400	VITRAMON	VJ1206 A 122 F FAT	
C60	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C61	CC 27NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8473	VITRAMON	VJ1206 Y 273 K FAT	
C65	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C66	CC 100NF+-10%50V5K 1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C67	CC 56PF+-2%5X6NPO CAPACITOR	CC 087.6512	VALVO	2222 678 10569	
C70	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C71	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C75	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C76	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C80	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C81	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C85	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C87	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
..90 C95	CC 100NF+-10%50V5K 1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C96	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
..99 C100	CC 82PF+-2%6X7NPO CAPACITOR	CC 087.6535	VALVO	2222 678 10829	
C101	CC 180PF+-2%6X7N750 CAPACITOR	CC 087.6935	VALVO	2222 678 58181	
C102	CC 4,7PF+-0,25PF3X4NPO CAPACITOR	CC 087.6387	VALVO	2222 678 09478	

Für diese Unterlage behalten wir
uns alle Rechte vor

ROHDE & SCHWARZ	A)	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	26	0989	EE SUMMIERSCHLEIFEN SUMMING LOOPS	819.7166.01 SA	1+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C103	CC 180PF+-2%6X7N750 CAPACITOR	CC 087.6935	VALVO	2222 678 58181	
C104	CC 82PF+-2%6X7NPO CAPACITOR	CC 087.6535	VALVO	2222 678 10829	
C105	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C106	CC 180PF+-2%6X7N750 CAPACITOR	CC 087.6935	VALVO	2222 678 58181	
C107	CC 47NF+-10%50V5K1200VIEL CAPACITOR	CC 082.7810	UNION CARB	CK05BX473K	
C110	CC 100NF+-10%50V5K1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C111	CC 680PF+-10%4X5R2000 CAPACITOR	CC 087.7019	VALVO	2222 63051 681	
C112	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C113	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C114	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C115	CC 680PF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7375	VITRAMON	VJ1206 A 681 F FAT	
C120	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C121	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C126	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C127	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C130	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C131	CC 390PF+-10%3X4R2000 CAPACITOR	CC 087.6987	VALVO	2222 63051 391	
C132	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C200	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C201	CK 220NF+-5%63V5RM MKT CAPACITOR	CK 099.2952	WIMA	MKS2/63/0,22UF/5%	
C202	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C203	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C204	CK 220NF+-5%63V5RM MKT CAPACITOR	CK 099.2952	WIMA	MKS2/63/0,22UF/5%	
C205	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C206	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C210	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C211	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C212	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C213	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C214	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C215	CC 47PF+-1%50V ODG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C220	CC 27PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8409	VITRAMON	VJ1206 A270F FAT	
C221	CC 150PF+-2%5X6N750 CAPACITOR	CC 087.6929	VALVO	2222 678 58151	
C222	CC 150PF+-2%5X6N750 CAPACITOR	CC 087.6929	VALVO	2222 678 58151	
C223	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C224	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C225	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C230	CC 47PF+-2%5X6NPO CAPACITOR	CC 087.6506	VALVO	2222 678 10479	
C231	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C232	CC 47PF+-2%5X6NPO CAPACITOR	CC 087.8506	VALVO	2222 678 10479	
C233	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C235	CC 100NF+-10%50V5K 1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C236	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C237	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C238	CC 1PF+-0,25PF3X4P100 CAPACITOR	CC 087.6170	VALVO	2222 678 03108	
C239	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C240	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C241	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C242	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C243	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C244	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C245	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C246	CC 100NF+-10%50V5K 1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C247	CC 100NF+-10%50V5K 1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C248	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C249	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C251	CC 82PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8821	VITRAMON	VJ1206 A 820 F FAT	
C252	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C255	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C256	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C257	CC 100NF+-10%50V5K 1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C258	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C270	CC 390PF+-10%3X4R2000 CAPACITOR	CC 087.6987	VALVO	2222 63051 391	
C271	CC 390PF+-10%3X4R2000 CAPACITOR	CC 087.6987	VALVO	2222 63051 391	
C272	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C283	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C284	CC 3,9PF/0,25PF63V3X5N750 CAPACITOR	CC 099.5568	VALVO	2222 678 57398	
C285	CT 3PF LUFTTR.3,6X13F.G.S PISTON TRIMMER	CT 037.7121	TEKELEC	LUFTTRAT5801MMUTTER	
C286	CC 1,8PF+-0,25PF63V3X5NPO CAPACITOR	CC 099.5539	VALVO	2222 678 09188	
C287	CC 33PF+-2%3X4N750 CAPACITOR	CC 087.6841	VALVO	2222 678 58339	
C288	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C289	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C290	CC 18PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8767	VITRAMON	VJ1206 A 180 F FAT	
C291	CC 15PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8750	VITRAMON	VJ1206 A 150 F FAT	
C292	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C293	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C300	CC 22NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8467	VITRAMON	VJ1206 Y 233 K FAT	
C301	CC 33PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8780	VITRAMON	VJ1206 A330F FAT	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C302	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C303	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C305	CC 1PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8667	VITRAMON	VJ1206 A 1R0 C FAT	
C308	CC 120PF+-2%6X9NPO CAPACITOR	CC 087.6558	VALVO	2222 678 10121	
C310	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C311	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C312	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C313	CC 1,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8165	VITRAMON	VJ1206 A 1R8 C FAT	
C315	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C316	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C317	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C318	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C320	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C321	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C322	CC 2,2NF+-10%5X6R2000 CAPACITOR	CC 087.7060	VALVO	2222 63051 222	
C323	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C324	CC 470PF+-10%3X4R2000 CAPACITOR	CC 087.6993	VALVO	2222 63051 471	
C330	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C331	CC 6,2PFO,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8709	VITRAMON	VJ1206 A 6R2 C FAT	
C335	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C336	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C337	CC 1,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8165	VITRAMON	VJ1206 A 1R8 C FAT	
C401	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C402	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C410	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C411	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C412	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
.414 C419	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C420	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C421	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C422	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C423	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C425	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C426	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C427	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C428	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C430	CC 150PF+-1%50VNPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8509	VITRAMON	VJ1206 A 151 F FAT	
C431	CC 680PF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7375	VITRAMON	VJ1206 A 681 F FAT	
C432	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	

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Kennz. Comp.No	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C433	CE 2,2UF+-20%40V SAL ELECTR.CAPACITOR	CE 007.3911	VALVO	2222 122 37228	
C434	CC 680PF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7375	VITRAMON	VJ1206 A 681 F FAT	
C435	CC 3,9PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8207	VITRAMON	VJ1206 A 3R9 C FAT	
C436	CC 150PF+-1%50VNPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8509	VITRAMON	VJ1206 A 151 F FAT	
C437	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C440	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C441	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C442	CT 9,2PF TAUCHTR.RD 7X12 AIR-TYPE TRIMMER	CT 025.7373	TEKELEC	LUFTRAT5201MMUTTER	
C443	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C444	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C450	CC 150PF+-1%50VNPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8509	VITRAMON	VJ1206 A 151 F FAT	
C451	CC 150PF+-1%50VNPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8509	VITRAMON	VJ1206 A 151 F FAT	
C452	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C453	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C454	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C455	CC 33PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8780	VITRAMON	VJ1206 A330F FAT	
C456	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C460	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C461	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C462	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C470	CC 18PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8767	VITRAMON	VJ1206 A 180 F FAT	
C472	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C473	CC 1PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8667	VITRAMON	VJ1206 A 1R0 C FAT	
C474	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C475	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C476	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C477	CE 2,2UF+-20%40V SAL ELECTR.CAPACITOR	CE 007.3911	VALVO	2222 122 37228	
C478	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C479	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C481	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C483	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C484	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C490	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C492	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
D1	BL PC74HC74T 2XD-FF DUAL D-TYPE FLIPFLOP	BL 007.3505	VALVO	PC74HC74T	
D2	BL PC74HC10T 3X3IN NAND TRIPLE 3 INPUT NAND GATE	BL 804.1115	VALVO	PC74HC10T	
D130	TAK 1H-A SELECT	819.7337			
D205	TAK 1H-B SELECT	819.7343			
D220	SFK 1H-C SELECT	819.7350			
D270	BL MM74HCOON 4X2IN.NAND QUAD 2-INPUT NAND GATE	BL 571.3194	MOTOROLA	MC74HCOON	

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Kennz. Comp.No	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
D280	BJ TL607CP 2X ANALOGSCH ANALOG SWITCH	BJ 339.6160	TEXAS INST	TL607CP	
D400	BL PC74HC08T 4X2IN.ANDG QUAD 2INPUT AND GATE	BL 007.3486	VALVO	PC74HC08T	
D401	BL PC744C238T 3TO8 L.DEC DECODER/DEMULTIPLEXER	820.3277	VALVO	PC74HC238T	
D410	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D411	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D412	BL MM74HC4051N 8CH.AN.MUX 8CH.ANALOG MUX/DEMUX	BL 099.9670	NSC	MM74HC4051N	
D420	BJ AD7523JN 8B.DA-CONV D/A CONVERTER	801.8219	MICRO POW.	MP7523JN	
D450	BL CA3199E 4:1 DIVID DIVIDER	372.1106	RCA	CA3199E	
D451	BL MC10H131P 2XD FLIPFL DUAL-D-MS-FLIPFLOP	345.8190	MOTOROLA	MC10H131P	
L1	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL 1025-60	
L17	LD 39,0UH10%3,600HMO,125A CHOKE	LD 067.3053	DELEVAN	DROSSEL 1025-58	
L20	LD 4,70UH10%1,200HMO,239A CHOKE	LD 067.2940	DELEVAN	DROSSEL 1025-36	
L30	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L31	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L40	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L50	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L51	LD 50UH 0,4A 3,00HM CHOKE	LD 026.4649	VALVO	4312 020 16360	
L55	LD SPULE 0,94 UH COIL	819.7214			819.7208
L95	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L100	LD 0,39UH10%0,300HMO,710A CHOKE	LD 067.2811	DELEVAN	DROSSEL 1025-10	
L101	LD 0,39UH10%0,300HMO,710A CHOKE	LD 067.2811	DELEVAN	DROSSEL 1025-10	
L102	LD 0,39UH10%0,300HMO,710A CHOKE	LD 067.2811	DELEVAN	DROSSEL 1025-10	
L105	LD 1,50UH10%0,220HMO,560A CHOKE	LD 067.2886	DELEVAN	DROSSEL 1025-24	
L106	LD 100 UH10%8,000HMO,084A CHOKE	LD 067.3101	DELEVAN	DROSSEL 1025-68	
L110	LD 1,20UH10%0,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L112	LD 2,70UH10%0,550HMO,355A CHOKE	LD 067.2911	DELEVAN	DROSSEL 1025-30	
L113	LD 2,70UH10%0,550HMO,355A CHOKE	LD 067.2911	DELEVAN	DROSSEL 1025-30	
L114	LD 1,20UH10%0,180HMO,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L120	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL 1025-48	
L121	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L130	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L131	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L210	LD 0,56UH10%0,500HMO,550A CHOKE	LD 067.2834	DELEVAN	DROSSEL 1025-14	
L211	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L212	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L220	LD 0,18UH10%0,120HM1,120A CHOKE	LD 067.2770	DELEVAN	DROSSEL 1025-02	
L221	LD 0,33UH10%0,220HMO,830A CHOKE	LD 067.2805	DELEVAN	DROSSEL 1025--08	
L222	LD 0,15UH10%0,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL 1025-00	

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Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in	
L223	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	819.7208	
L230	LD 0,27UH10%, 160HMO, 975A CHOKE	LD 067.2792	DELEVAN	DROSSEL 1025-06		
L231	LD 0,27UH10%, 160HMO, 975A CHOKE	LD 067.2792	DELEVAN	DROSSEL 1025-06		
L251	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94		
L255	LD 56,0UH10%, 700HMO, 100A CHOKE	LD 067.3076	DELEVAN	DROSSEL 1025-62		
L265	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1		
L285	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12		
L286	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12		
L287	LD LUFTSPULE 80 NH COIL	819.7220				
L288	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44		
L290	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20		
L300	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20		
L310	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12		
L311	LD 100 UH10%, 8,000HMO, 084A CHOKE	LD 067.3101	DELEVAN	DROSSEL 1025-68		
L315	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12		
L316	LD 100 UH10%, 8,000HMO, 084A CHOKE	LD 067.3101	DELEVAN	DROSSEL 1025-68		
L317	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12		
L320	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12		
L330	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94		
L331	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94		
L401	LD 100 UH10%, 8,000HMO, 084A CHOKE	LD 067.3101	DELEVAN	DROSSEL 1025-68		
L402	LD 10UH BEI 0,81A 0,660HM CHOKE	LD 026.4126	JAHRE	72.10-10ROK		
L403	LD 10UH BEI 0,81A 0,660HM CHOKE	LD 026.4126	JAHRE	72.10-10ROK		
L404	LD 10UH BEI 0,81A 0,660HM CHOKE	LD 026.4126	JAHRE	72.10-10ROK		
L410	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1		
L415	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1		
L416	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1		
L430	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12		
L431	LD LUFTSPULE 15NH COIL	819.7250				819.7208
L432	LD LUFTSPULE 29NH COIL	819.7266				819.7208
L433	LD LUFTSPULE 29NH COIL	819.7266				819.7208
L434	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12		
L435	LD LUFTSPULE 29NH COIL	819.7266				819.7208
L436	LD LUFTSPULE 29NH COIL	819.7266				819.7208
L437	LD LUFTSPULE 15NH COIL	819.7250				819.7208
L440	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12		
L441	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12		
L442	LD LUFTSPULE 15NH COIL	819.7250				819.7208
L443	LD 47,0UH10%, 500HMO, 110A CHOKE	LD 067.3060	DELEVAN	DROSSEL 1025-60		

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
L450	LD 5MHZ/20DB 10A CHOKE	LD 453.4404	OXLEY	DBZ4/P/22000	819.7208
L451	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	
L452	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	
L453	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	
L454	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	
L455	LD LUFTSPULE 29NH COIL	819.7266			
L456	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	
L460	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L470	LD 0,47UH10%, 350HMO, 660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12	
L471	LD 4,70UH10%1, 200HMO, 239A CHOKE	LD 067.2940	DELEVAN	DROSSEL 1025-36	
L472	LD 4,70UH10%1, 200HMO, 239A CHOKE	LD 067.2940	DELEVAN	DROSSEL 1025-36	
L481	LD 2,20UH10%, 400HMO, 415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
N15	BO SE5534AFE LOW N.OPAMP OPERATIONAL AMPLIFIER	BO 301.3335	SIGNETICS	SE5534AFE	
N20	BO LM393N 2X COMPAR COMPARATOR	BO 803.0696	NSC	LM393N	
N245	BO SE5534AFE LOW N.OPAMP OPERATIONAL AMPLIFIER	BO 301.3335	SIGNETICS	SE5534AFE	
N270	BO LM393N 4X COMPAR COMPARATOR	BO 342.2062	NSC	LM393N	
N310	BM MSA0304 BB.AMPL BROADBAND AMPLIFIER	840.6094	AVANTEK	MSA0304	
N315	BM MSA0304 BB.AMPL BROADBAND AMPLIFIER	840.6094	AVANTEK	MSA0304	
N420	BO SE5534AFE LOW N.OPAMP OPERATIONAL AMPLIFIER	BO 301.3335	SIGNETICS	SE5534AFE	
N430	BM MSA0304 BB.AMPL BROADBAND AMPLIFIER	840.6094	AVANTEK	MSA0304	
P2	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P3	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P10	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P11	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P15	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P16	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P21	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P26	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P27	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P28	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P60	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P75	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P261	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P1A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P1B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P22A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P22B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P25A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
P25B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P30A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P30B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P95A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P95B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
R1	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R2	RL 0,35W 68,1 OHM+-1%TK50 RESISTOR	RL 082.9636	DRALORIC	SMA0207/68,10HM-F-D	
R3	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R4	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R5	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R6	RL 0,35W 68,1 OHM+-1%TK50 RESISTOR	RL 082.9636	DRALORIC	SMA0207/68,10HM-F-D	
R7	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R8	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R9	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R11	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R14					
R15	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R16	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R17	RL 0,35W 33,2KOHM+-1%TK50 RESISTOR	RL 083.1674	DRALORIC	SMA0207/33,2K-F-C	
R18	RL 0,35W 316 OHM+-1%TK50 RESISTOR	RL 083.0232	DRALORIC	SMA0207/316OHM-F-D	
R19	RL 0,35W 121 OHM+-1%TK50 RESISTOR	RL 082.9859	DRALORIC	SMA0207/121OHM-F-D	
R20	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R21	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R22	RG 1,5 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5714	DALE	CRCW1206-10 1K5 F-T	
R23	RL 0,35W 18,2KOHM+-1%TK50 RESISTOR	RL 083.1480	DRALORIC	SMA/207/18,2K-F-C	
R24	RL 0,35W 1,37KOHM+-1%TK50 RESISTOR	RL 083.0690	DRALORIC	SMA0207/1,37K-F-D	
R25	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R55	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R56	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R59	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R60	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R61	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R62	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R63	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R64	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R65	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMA0207/47,5OHM-F-D	
R66	RL 0,35W 27,4KOHM+-1%TK50 RESISTOR	RL 082.2583	DRALORIC	SMA 0207/27,4K-F-C	
R67	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R68	RL 0,35W 1,82KOHM+-1%TK50 RESISTOR	RL 082.2277	DRALORIC	SMA0207/1,82K-F-C	

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R70	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R71	RL 0,35W 18,2KOHM+-1%TK50 RESISTOR	RL 083.1480	DRALORIC	SMA/207/18,2K-F-C	
R72	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R73	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R74	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R75	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R76	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R77	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R78	RS 0,5W200 OHM+-10%10X10X CERMET POTENTIOMETER	RS 247.7949	BOURNS	3386X-1-201	
R80	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R81	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R82	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R85	RL 0,35W 121 OHM+-1%TK50 RESISTOR	RL 082.9859	DRALORIC	SMA0207/1210HM-F-D	
R86	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMA0207/22,10HM-F-D	
R87	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMA0207/3320HM-F-D	
R88	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMA0207/22,10HM-F-D	
R89	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R90	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R91	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56,20HM-F-D	
R92	RL 0,35W 182 OHM+-1%TK50 RESISTOR	RL 083.0010	DRALORIC	SMA0207/1820HM-F-D	
R95	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R96	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R97	RL 0,35W 562 OHM+-1%TK50 RESISTOR	RL 083.0461	DRALORIC	SMA0207/5620HM-F-D	
R98	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMA0207/3320HM-F-D	
R99	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMA0207/3320HM-F-D	
R100	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMA0207/47,50HM-F-D	
R101	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMA0207/47,50HM-F-D	
R102	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R103	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R104	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R105	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R106	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/1500HM-F-D	
R107	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R108	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R110	RL 0,35W 392 OHM+-1%TK50 RESISTOR	RL 082.2183	DRALORIC	SMA0207/392K-F-C	
R111	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R112	RL 0,35W 51,1 OHM+-1%TK50 RESISTOR	RL 082.9536	DRALORIC	SMA0207/51,10HM-F-D	
R120	RL 0,35W271 OHM+-0,1%TK25 RESISTOR	RL 083.8056	DRALORIC	SMA/207/2710HM-B-E	
R121	RL 0,35W18,20 OHM+-1%TK50 RESISTOR	RL 082.9107	DRALORIC	SMA0207/18,20HM-F-D	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R122	RL 0,35W271 OHM+-0,1%TK25 RESISTOR	RL 083.8056	DRALORIC	SMA/207/2710HM-B-E	
R123	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R124	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R125	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R126	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R127	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R130	RL 0,35W 51,1 OHM+-1%TK50 RESISTOR	RL 082.9536	DRALORIC	SMA0207/51,10HM-F-D	
R200	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56,20HM-F-D	
R201	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R202	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R203	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMA0207/3320HM-F-D	
R204	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/4750HM-F-D	
R205	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R206	RL 0,35W 681 OHM+-1%TK50 RESISTOR	RL 083.0490	DRALORIC	SMA0207/6810HM-F-D	
R207	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/4750HM-F-D	
R208	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R209	RL 0,35W12,10 OHM+-1%TK50 RESISTOR	RL 082.8930	DRALORIC	SMA0207/12,10HM-F-D	
R210	RL 0,35W 51,1 OHM+-1%TK50 RESISTOR	RL 082.9536	DRALORIC	SMA0207/51,10HM-F-D	
R211	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R219	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R220	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R221	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R222	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R223	RG 51,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8810	DALE	CRCW1206 51,10HM F T	
R224	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/1500HM-F-D	
R225	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R226	RL 0,35W12,10 OHM+-1%TK50 RESISTOR	RL 082.8930	DRALORIC	SMA0207/12,10HM-F-D	
R227	RL 0,35W12,10 OHM+-1%TK50 RESISTOR	RL 082.8930	DRALORIC	SMA0207/12,10HM-F-D	
R228	RL 0,35W 392 OHM+-1%TK50 RESISTOR	RL 082.2183	DRALORIC	SMA0207/392K-F-C	
R230	RL 0,35W 51,1 OHM+-1%TK50 RESISTOR	RL 082.9536	DRALORIC	SMA0207/51,10HM-F-D	
R231	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/1500HM-F-D	
R235	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/4750HM-F-D	
R236	RL 0,35W 681 OHM+-1%TK50 RESISTOR	RL 083.0490	DRALORIC	SMA0207/6810HM-F-D	
R237	RL 0,35W12,10 OHM+-1%TK50 RESISTOR	RL 082.8930	DRALORIC	SMA0207/12,10HM-F-D	
R238	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R239	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R240	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56,20HM-F-D	
R241	RL 0,35W 511 OHM+-1%TK50 RESISTOR	RL 083.0426	DRALORIC	SMA0207/5110HM-F-D	
R242	RL 0,35W 121 OHM+-1%TK50 RESISTOR	RL 082.9859	DRALORIC	SMA0207/1210HM-F-D	

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	26	0989	EE SUMMIERSCHLEIFEN SUMMING LOOPS	819.7166.01 SA	11+

Kennz. Comp.No.	Benennung Designation	Sechnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R243	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/2210HM-F-D	
R244	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56,20HM-F-D	
R245	RL 0,35W 681 OHM+-1%TK50 RESISTOR	RL 083.0490	DRALORIC	SMA0207/6810HM-F-D	
R246	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R247	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R248	RL 0,35W 2,00KOHM+-1%TK50 RESISTOR	RL 083.0826	DRALORIC	SMA0207/2,00K-F-D	
R249	RL 0,35W 825 OHM+-1%TK50 RESISTOR	RL 082.2502	DRALORIC	SMA 0207/8250HM-F-C	
R250	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/4750HM-F-D	
R251	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R255	RL 0,35W 562 OHM+-1%TK50 RESISTOR	RL 083.0461	DRALORIC	SMA0207/5620HM-F-D	
R256	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R257	RL 0,35W 2,21KOHM+-1%TK50 RESISTOR	RL 082.2477	DRALORIC	SMA 0207/2,21K-F-C	
R258	RL 0,35W 221 KOHM+-1%TK50 RESISTOR	RL 083.2270	DRALORIC	SMA0207/221K-F-C	
R259	RL 0,35W 681 KOHM+-1%TK50 RESISTOR	RL 083.2735	DRALORIC	SMA0207/381K-F-C	
R260	RL 0,35W 681 KOHM+-1%TK50 RESISTOR	RL 083.2735	DRALORIC	SMA0207/381K-F-C	
R261	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R262	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R265	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R266	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R267	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R270	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R271	RL 0,35W 7,87KOHM+-1%TK50 RESISTOR	RL 083.1216	DRALORIC	SMA0207/7,87K-F-D	
R272	RL 0,35W 1,54KOHM+-1%TK50 RESISTOR	RL 083.0749	DRALORIC	SMA0207/1,54K-F-D	
R273	RL 0,35W 13,0KOHM+-1%TK50 RESISTOR	RL 083.1368	DRALORIC	SMA0207/13,0K-F-D	
R274	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22,1K-F-C	
R275	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R276	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R277	RL 0,35W 33,2KOHM+-1%TK50 RESISTOR	RL 083.1674	DRALORIC	SMA0207/33,2K-F-C	
R278	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R279	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R280	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R281	RL 0,35W 5,62KOHM+-1%TK50 RESISTOR	RL 082.2190	DRALORIC	SMA0207/5,62K-F-C	
R282	RL 0,35W 5,62KOHM+-1%TK50 RESISTOR	RL 082.2190	DRALORIC	SMA0207/5,62K-F-C	
R283	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R285	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R286	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R287	RL 0,35W 182 OHM+-1%TK50 RESISTOR	RL 083.0010	DRALORIC	SMA0207/1820HM-F-D	
R290	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R291	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	

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	26	0989	EE SUMMIERSCHLEIFEN SUMMING LOOPS	819.7166.01 SA	12+

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Kennz. Comp. No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R292	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/150OHM-F-D	
R300	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R301	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R302	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R303	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R304	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R305	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R307	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R308	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R310	RL 0,35W 182 OHM+-1%TK50 RESISTOR	RL 083.0010	DRALORIC	SMA0207/182OHM-F-D	
R311	RL 0,35W 182 OHM+-1%TK50 RESISTOR	RL 083.0010	DRALORIC	SMA0207/182OHM-F-D	
R312	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R313	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R314	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R315	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/150OHM-F-D	
R316	RL 0,35W 182 OHM+-1%TK50 RESISTOR	RL 083.0010	DRALORIC	SMA0207/182OHM-F-D	
R320	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/221OHM-F-D	
R321	RL 0,35W470 OHM+-0,1%TK25 RESISTOR	RL 083.8510	DRALORIC	SMA/207/4703HM-B-E	
R322	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R323	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R324	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/221OHM-F-D	
R325	RL 0,35W 221 OHM+-1%TK50 RESISTOR	RL 083.0084	DRALORIC	SMA0207/221OHM-F-D	
R330	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R331	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R332	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R333	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R334	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R335	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R336	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R337	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R400	RG 39,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5543	DALE	CRCW1206-10 39R2 F-T	
R401	RG 39,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5543	DALE	CRCW1206-10 39R2 F-T	
R402	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R410	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R411	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R412	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R420	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R421	RL 0,35W 9,09KOHM+-1%TK50 RESISTOR	RL 082.2177	DRALORIC	SMA0207/9,09K-F-C	
R422	RL 0,35W 5,23KOHM+-1%TK50 RESISTOR	RL 083.1122	DRALORIC	SMA0207/5,23K-F-D	

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	26	0989	EE SUMMIERSCHLEIFEN SUMMING LOOPS	819.7165.01 SA	13+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R423	RL 0,35W 47,5KOHM+-1%TK50 RESISTOR	RL 083.1800	DRALORIC	SMA/207/47,5K-F-C	
R424	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R430	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R431	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R432	RL 0,35W 274 OHM+-1%TK50 RESISTOR	RL 083.0178	DRALORIC	SMA0207/274OHM-F-D	
R433	RG 3,32KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5789	DALE	CRCW1206-10 3K32 F-T	
R434	RS 0,5W50KOHM+-10%10X10X5 CERMET POTENTIOMETER	RS 087.7677	BOURNS	3386-1-503	
R435	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R436	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R437	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R438	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R439	RG 39,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5543	DALE	CRCW1206-10 39R2 F-T	
R441	RG 1,21KOHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9968	DALE	CRCW1206-10 1K21 F-T	
R442	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R443	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R444	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R450	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R451	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R452	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R455	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R456	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R457	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R458	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R460	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R461	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R462	RS 0,5W500 OHM+-10%10X10X CERMET POTENTIOMETER	RS 247.7955	BOURNS	3386X-1-501	
R463	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R464	RL 1W 182 OHM+-15TK100 METAL FILM RESISTOR	RL 006.3799	RESISTA	MK5 182 OHM 1%TK100	
R465	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R470	RG 47,5KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5950	DALE	CRCW1206-10 47K5 F-T	
R476	RG 3,92KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5808	DALE	CRCW1206-10 3K92 F-T	
R477	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R480	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R481	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R482	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R483	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R484	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R485	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R487	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	

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	26	0989	EE SUMMIERSCHLEIFEN SUMMING LOOPS	819.7166.01 SA	14+

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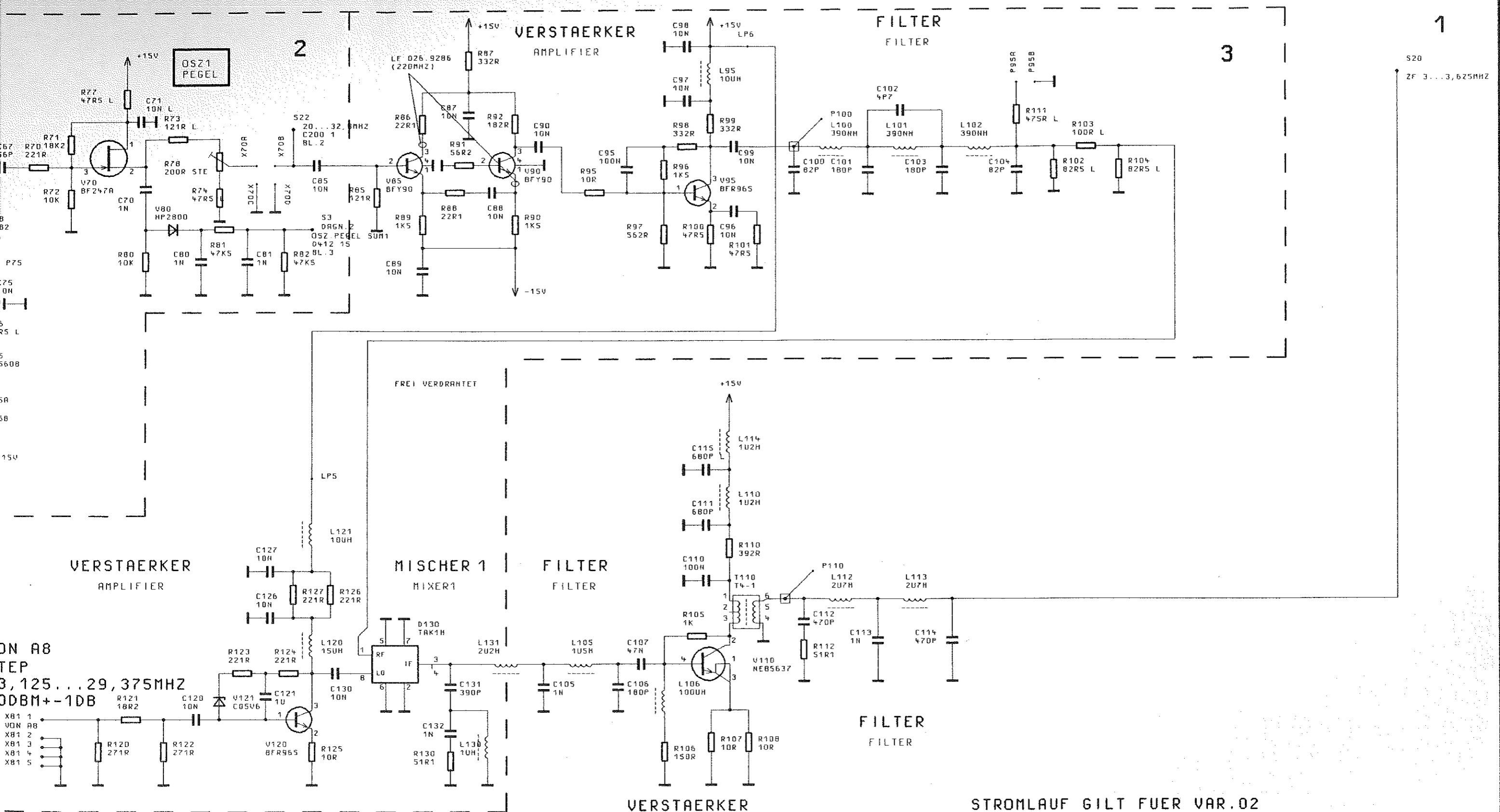
Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R488	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R489	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
T110	LU BREITB.UEBERTRAG.8X7X5 WIDE-BAND TRANSFORMER	276.3619	MINICIRCUIT	T 4-1	
T205	LU BREITB.UEBERTRAG.8X7X5 WIDE-BAND TRANSFORMER	276.3619	MINICIRCUIT	T 4-1	
T225	LU BREITB.UEBERTRAG.8X7X5 WIDE-BAND TRANSFORMER	276.3619	MINICIRCUIT	T 4-1	
T235	LU BREITB.UEBERTRAG.8X7X5 WIDE-BAND TRANSFORMER	276.3619	MINICIRCUIT	T 4-1	
V1	AK BFY90 N 15V 25MA TRANSISTOR	AK 010.4550	VALVO	BFY90	
V5	AK BFY90 N 15V 25MA TRANSISTOR	AK 010.4550	VALVO	BFY90	
V15	AE BZX79/C3V3 0,5W ZDI ZENER DIODE	AE 012.2390	ITT	ZPD3,3	
V30	AE BB809 26/ 6PF CDI TUNING DIODE	AE 092.9616	VALVO	BB809	
V49	AE BA483 BER.SCH.DI.UHF DIODE	AE 568.2290	VALVO	BA483	
V55	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V60	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V61	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V65	AM U310 N-D 25V JFET FET	AM 454.6217	SILICONIX	U310	
V70	AM BF247A N-D 25V JFET FET	AM 247.6536	VALVO	BF247A	
V75	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V80	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V85	AK BFY90 N 15V 25MA TRANSISTOR	AK 010.4550	VALVO	BFY90	
V90	AK BFY90 N 15V 25MA TRANSISTOR	AK 010.4550	VALVO	BFY90	
V95	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V110	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V120	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V121	AE BZX79/5V6 0.5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V200	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V201	AE BZX79/5V6 0.5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V205	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V206	AE BZX79/5V6 0.5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V225	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V235	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V236	AE BZX79/5V6 0.5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V237	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V240	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V241	AE BZX79/5V6 0.5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V246	AE BZX79/C3V3 0,5W ZDI ZENER DIODE	AE 012.2390	ITT	ZPD3,3	
V255	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V256	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V270	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	

ROHDE & SCHWARZ	Äl	Datum	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
		Date			
	26	0989	EE SUMMIERSCHLEIFEN SUMMING LOOPS	819.7166.01 SA	15+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V275	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V276	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V277	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V278	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V285	AE BB809 26/ 6PF CDI TUNING DIODE	AE 092.9616	VALVO	BB809	
V286	AE BB809 26/ 6PF CDI TUNING DIODE	AE 092.9616	VALVO	BB809	
V290	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V300	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V305	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V320	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V321	AE BZX79/5V6 0.5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V330	AK BFR91A N 12V 35MA TRANSISTOR	644.0730	VALVO	BFR91A	
V423	AE BZV86/2V6 STABISTOR ZENER DIODE	AE 086.8292	VALVO	BZX75/C2V8	
V424	AE BZV86/2V6 STABISTOR ZENER DIODE	AE 086.8292	VALVO	BZX75/C2V8	
V430 .434	AE BB621 11/ 2PF CDI TUNING DIODE	840.6188	ITT	BB621	
V440	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V455	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V460	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V470	AM BF982 N-D DG.MOSF DUALGATE MOSFET	303.6054	VALVO	BF982	
V471	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V480	AE BZX79/5V6 0.5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V494	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
W1	DX KABEL W1 CABLE	819.7366			
X1	FP STECKERLEISTE 32POL. MULTIPOINT CONNECTOR	FP 514.4550	PANDUIT	100-232-033/999	
X71	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X81	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X101	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
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X17B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X24A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X24B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
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X29B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X31A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X31B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X31C	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X31D	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X42A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	

ROHDE & SCHWARZ	Äl	Datum	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	26	0989	EE SUMMIERSCHLEIFEN SUMMING LOOPS	819.7166.01 SA	16+

Kennz. Camp No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	anheiten in contained in	
X42B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
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X45B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
X46A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
X46B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
X47A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
X47B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
X70A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
X70B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
X70C	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
X70D	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
X75A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
X75B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
					- ENDE -	
ROHDE & SCHWARZ		Äl	Datum	Schaltteilliste für	Sachnummer	Blatt
			Date	Parts list for	Stock Nr.	Page
		26	0989	EE SUMMIERSCHLEIFEN SUMMING LOOPS	819.7166.01 SA	17-



S20
ZF 3...3,625MHZ

STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

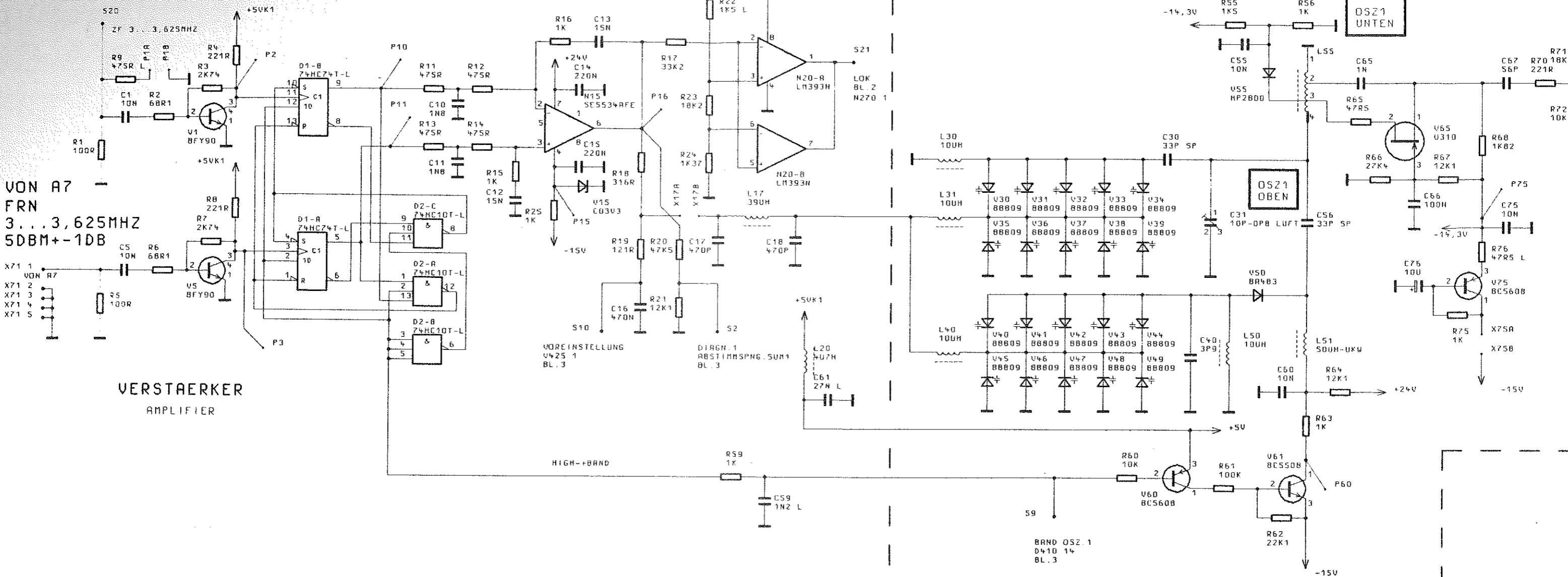
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G	39845	03.89	SP	BEARB.		SP	SUMMIERSCHLEIFEN	
H	41825	04.89	SP	GEPR.		SP		
				NORM				
					PLOTT	24.4.89	*	
							ZEICHN.-NR.	BLATT-NR.
ROHDE & SCHWARZ							819.7166.01S	1
REND. IND.	RENDERUNGS-NITTEILUNG	DATUM	NAME	ZU GERÄT	SMGU	REG. I. V.	819.0010	ERSTE Z.

VERSTAERKER
AMPLIFIER

PHASEDETEKTOR 1
PHASE DETECTOR 1

REGELVERSTAERKER 1
LOOP AMPLIFIER

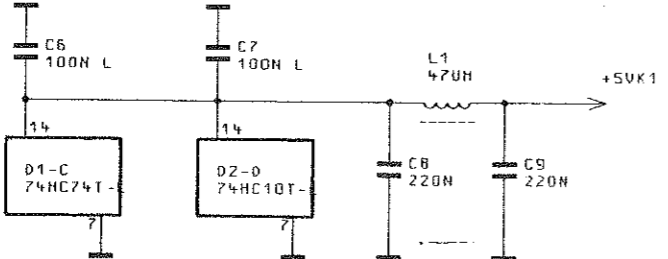
OSZILLATOR 1 20...32,8MHZ
OSCILLATOR 1



VON A7
FRN
3...3,625MHZ
5DBM+-1DB

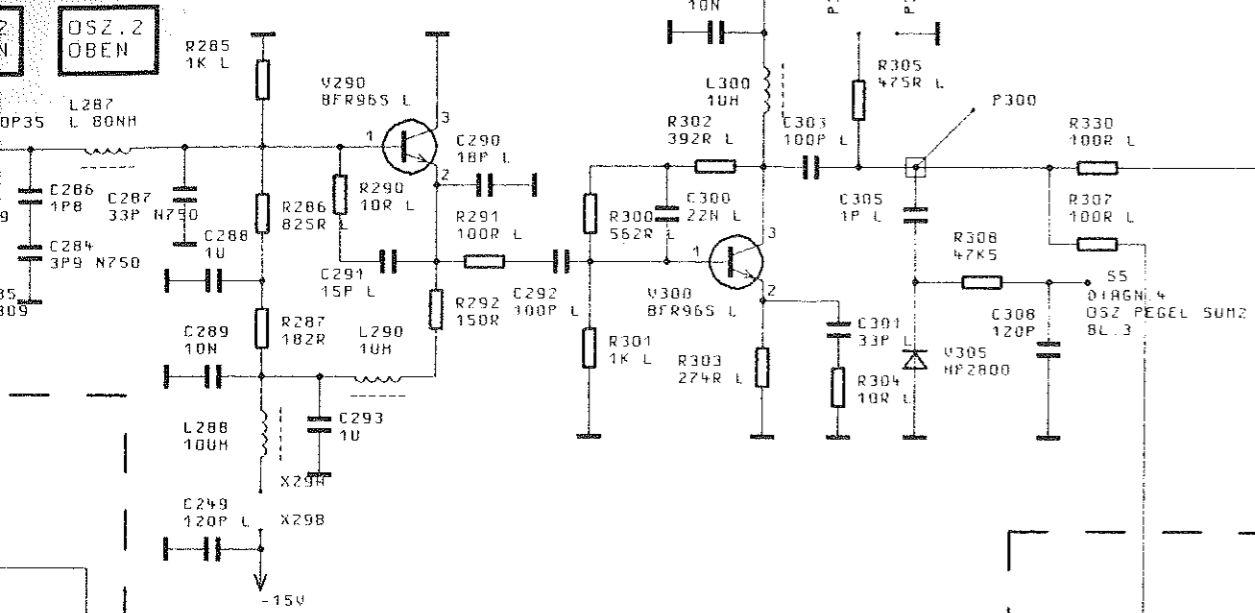
VERSTAERKER
AMPLIFIER

VON A8
STEP
23,125...
10DBM+-1

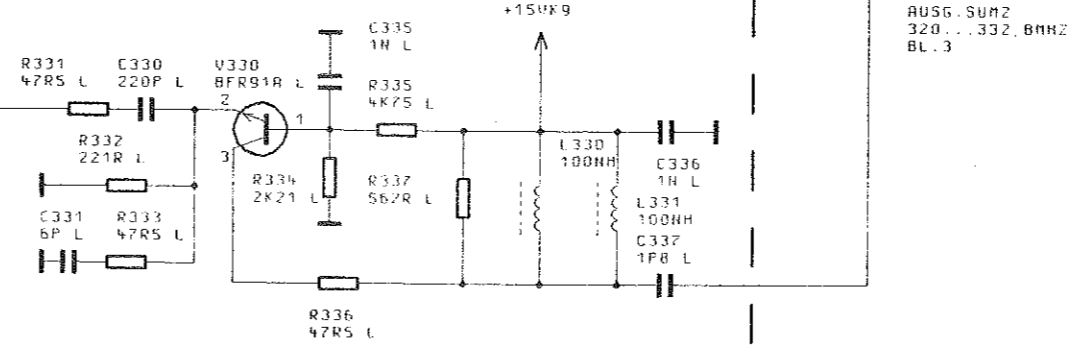


X81 1
VON A8
X81 2
X81 3
X81 4
X81 5

OSCILLATOR 2
320...332,8MHZ

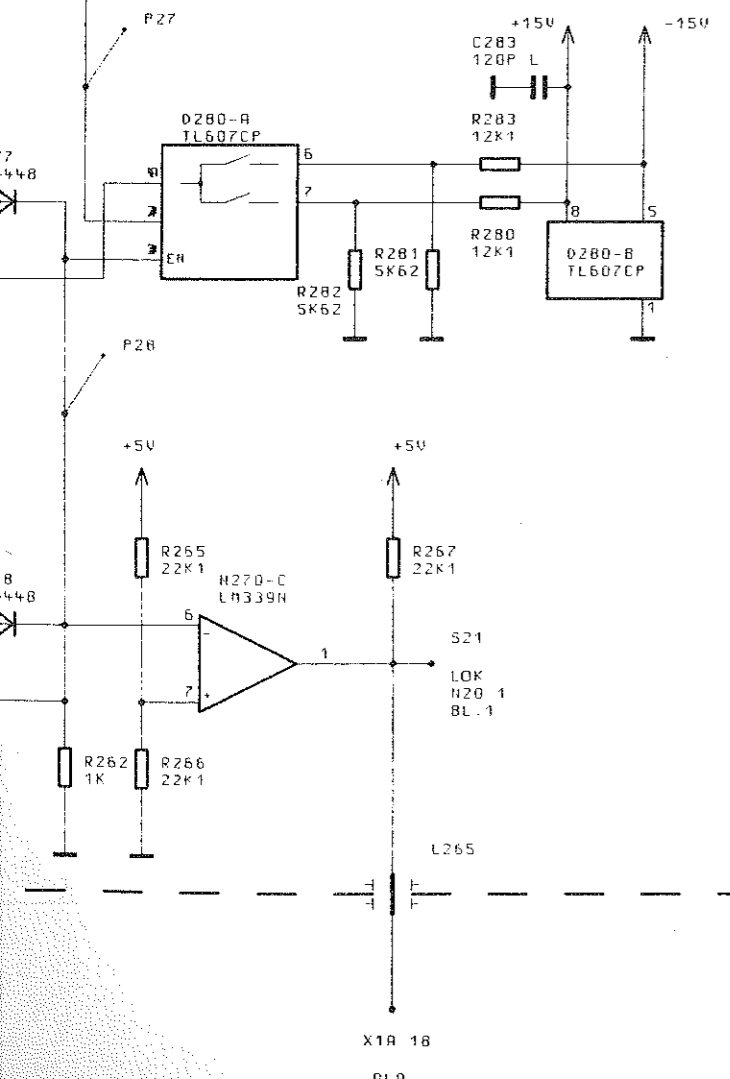
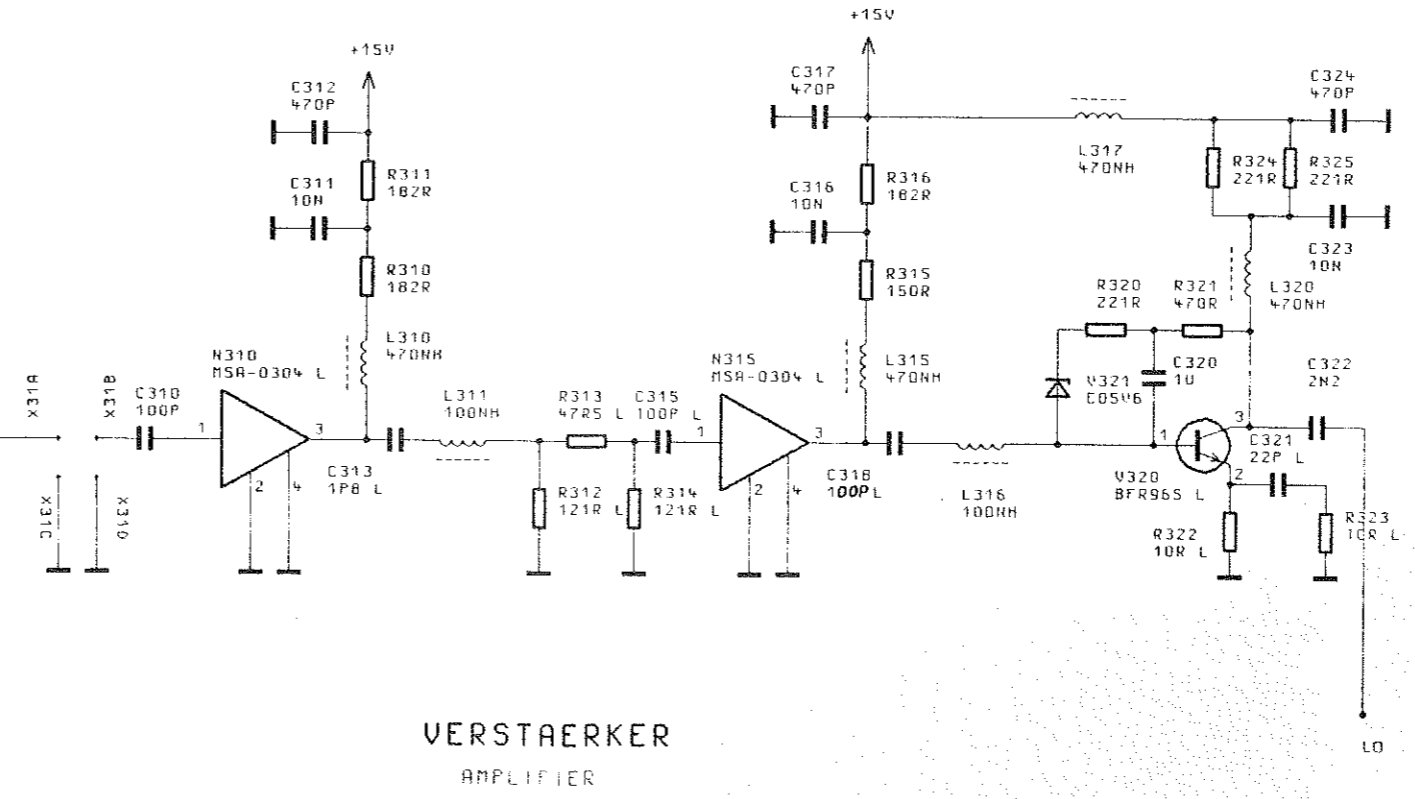


8
VERSTAERKER
AMPLIFIER



4

VERSTAERKER
AMPLIFIER



STROMLAUF GILT FUER VAR.02

CIRCUIT DIAGRAM IS VALID FOR MOD.02

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

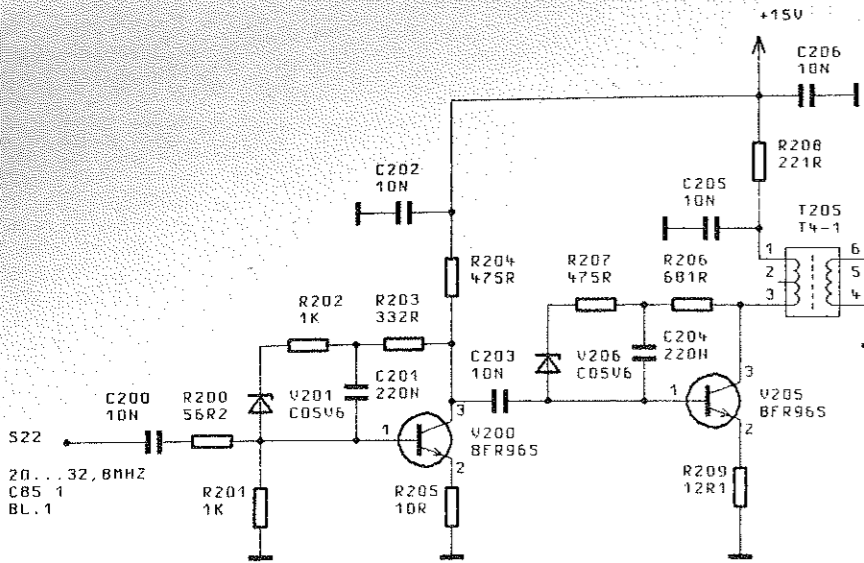
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

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G	39845	03.89	SP	BEARB.		SP		
H	41825	04.89	SP	GEPR.		SP		
I	41825	8.89	HO	NORM				
						PLOT1	24. 4.89	*
							ZEICHN.-NR 819.7166.015	
REND. IND.	ÄNDERUNGS- MITTEILUNG	DATUM	NAME	ZU GEPR.	SIGU	PEB L.V.	S19.0010	

4

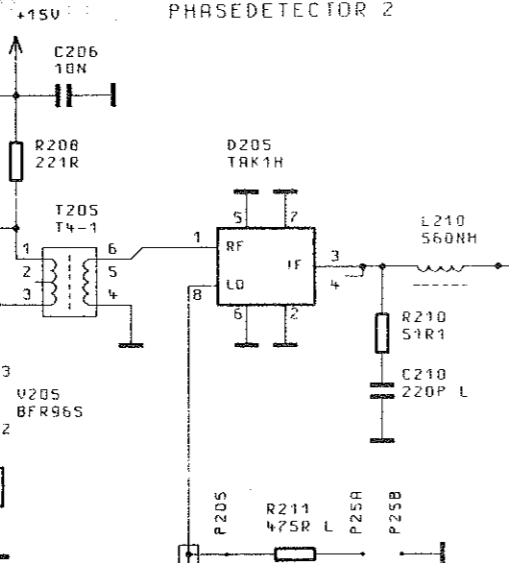
VERSTÄRKER

AMPLIFIER



PHASENDETEKTOR 2

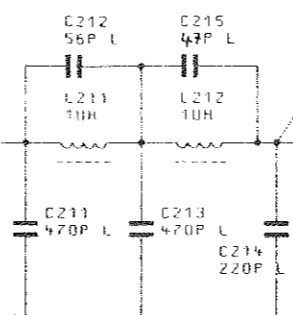
PHASEDETECTOR 2



6

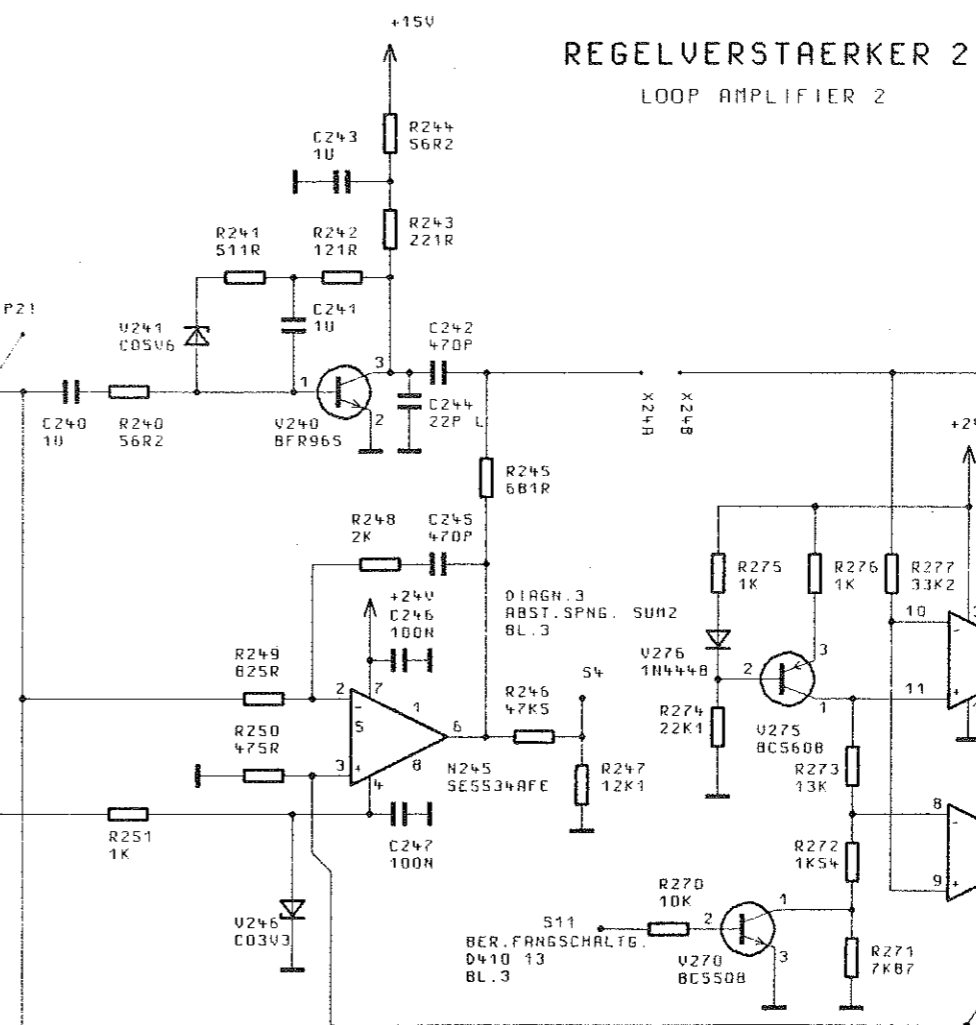
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FILTER



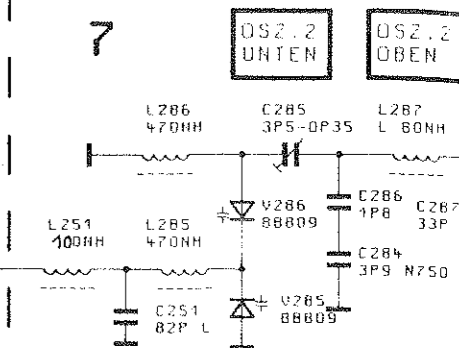
REGELVERSTÄRKER 2

LOOP AMPLIFIER 2



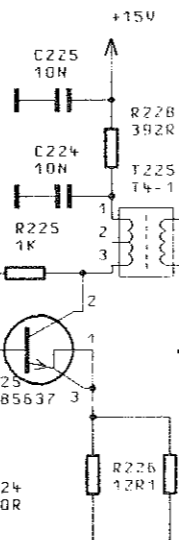
OSZILLATOR 2

OSCILLATOR



VERSTÄRKER

AMPLIFIER

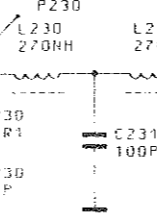


VERSTÄRKER

AMPLIFIER

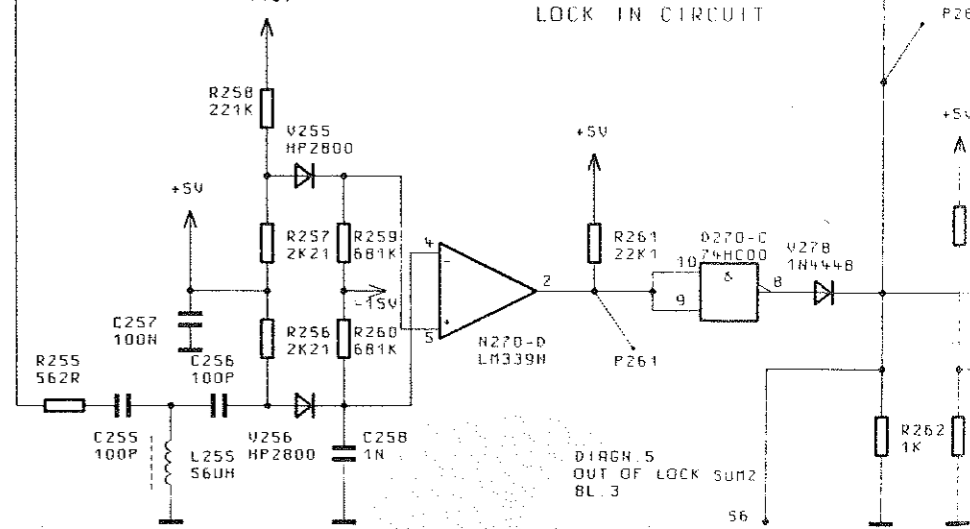
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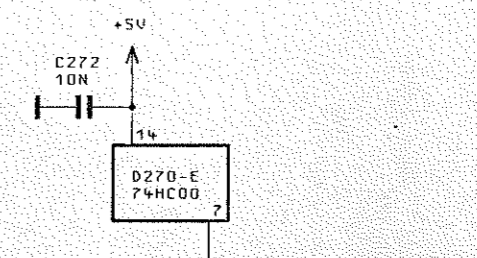


FANGSCHALTUNG

LOCK IN CIRCUIT

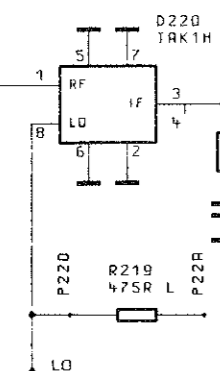


OUT OF LOCK DETECTOR



MISCHER 2

MIXER

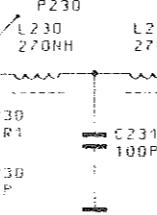


VERSTÄRKER

AMPLIFIER

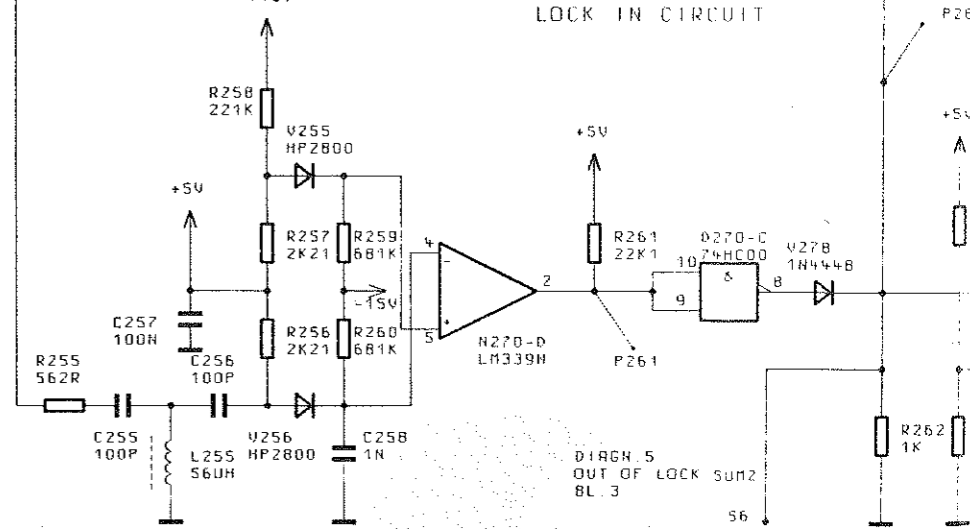
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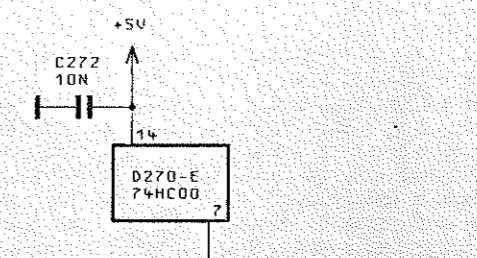


FANGSCHALTUNG

LOCK IN CIRCUIT



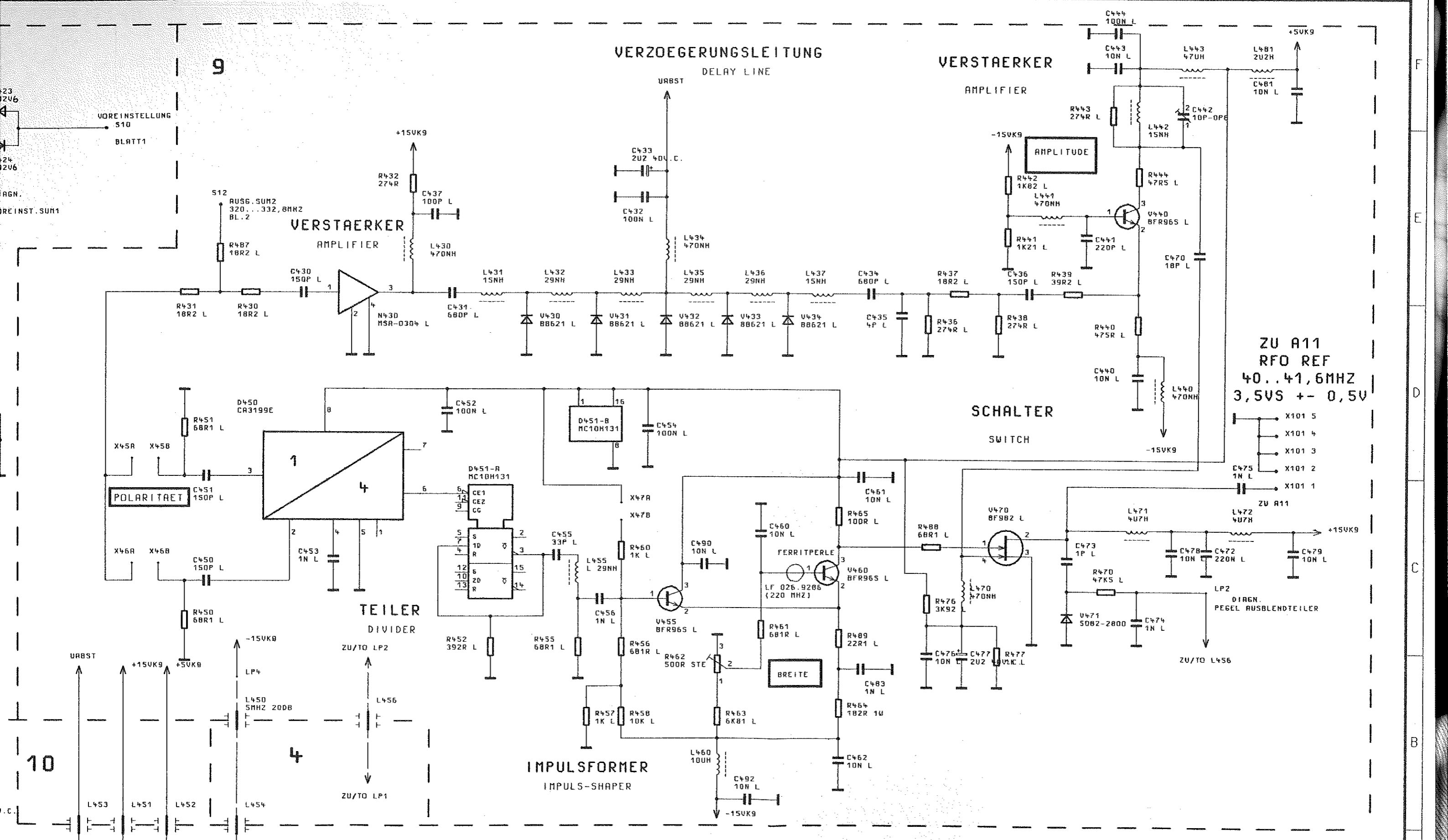
OUT OF LOCK DETECTOR



STROM

CIRCUIT

10



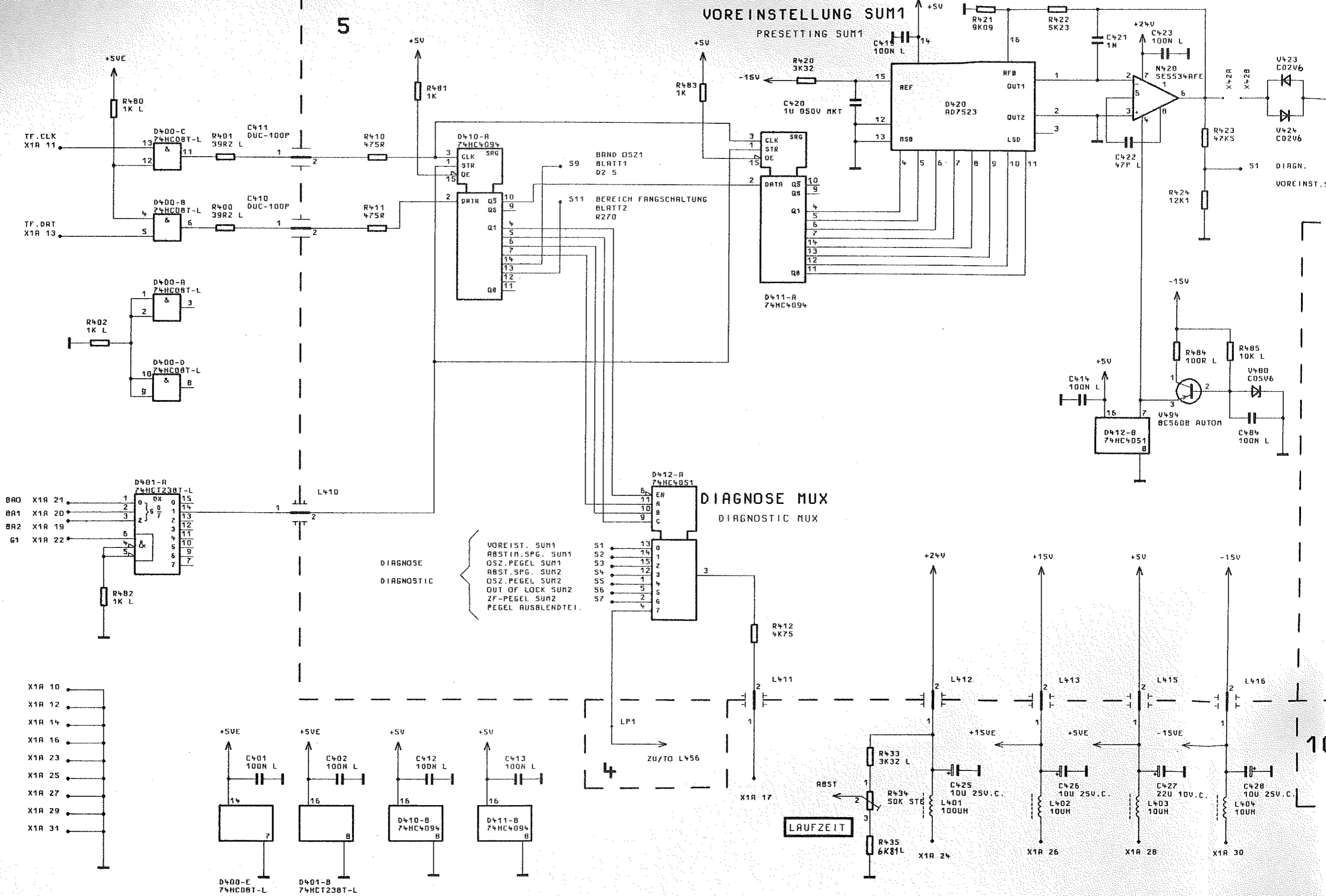
ZU A11
 RFO REF
 40..41,6MHZ
 3,5US +/- 0,5V

FUER VAR.02
 VALID FOR MOD.02

ACHTUNG: EGB!
 ELEKTROSTATISCH GEFAHRDETE
 BAUELEMENTE ERFORDERN EINE
 BESONDERE HANDHABUNG.

ATTENTION: ESD!
 ELECTROSTATIC SENSITIVE
 DEVICES REQUIRE A SPECIAL
 HANDLING.

F	39845	03.89	DR	1KGB	TAG	NARE	BENENNUNG	
G	39845	03.89	SP	BEARB.		SP	SUMMIERSCHLEIFEN	
H	39845	04.89	SP	GEPR.		SP		
I	41825	8.89	HO	NORN				
				PLOTT	24. 4.89	*		
							ZEICHN.-NR.	3
REND. IND. RENDUNGS- MITTEILUNG DATUM NAME							ZU GERAT SMGU	819.7166.015 REG. I.V. 819.0010 ERSTE Z.
							V. 3 BL.	



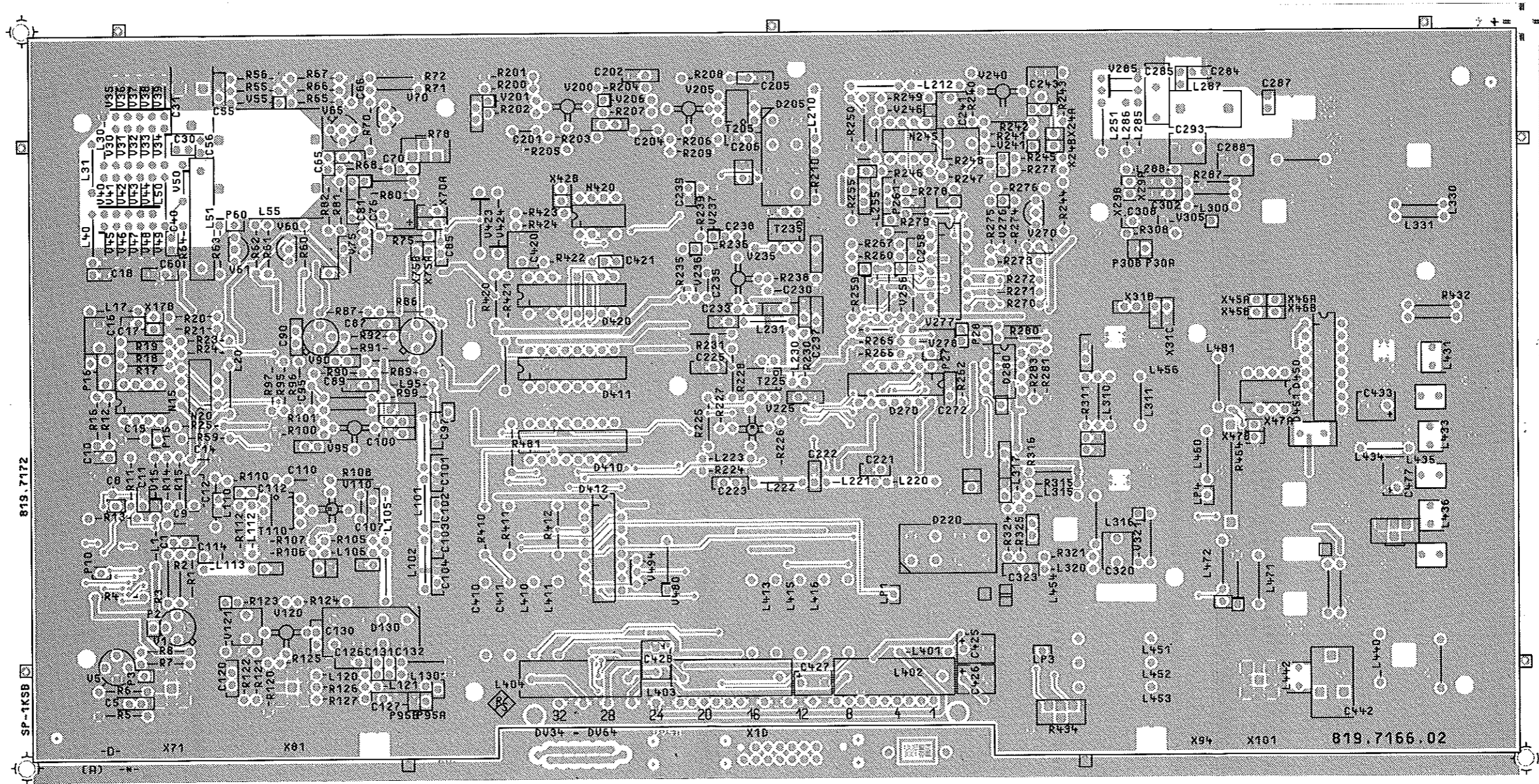
VOREINSTELLUNG SUM1
PRESETTING SUM1

DIAGNOSE MUX
DIAGNOSTIC MUX

- VOREINST. SUM1
- ABSTIN.SPG. SUM1
- OSZ.PEGEL SUM1
- ABST.SPG. SUM2
- OSZ.PEGEL SUM2
- OUT OF LOCK SUM2
- ZF-PEGEL SUM2
- PEGEL AUSBLENDTEI.

STROMLAUF GILT FUER
CIRCUIT DIAGRAM IS VALID FOR

Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



Für diese Unterlage behalten wir uns alle Rechte vor.

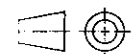
VARIANTENERKLÄRUNG / VERSION
VAR 02 - GRUNDAUSFÜHRUNG / BASIC MODEL

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					Halbzeug, Werkstoff		
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				Bearb. 04.89 SP	SUMMIERSCHLEIFEN		
				Gepr.			
				Norm			
					Zeichn.-Nr.	Blatt-Nr.	
					819.7166.02	2	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU	reg. i. V. 819.0010 V	v. Bl.	
					erste Z.		

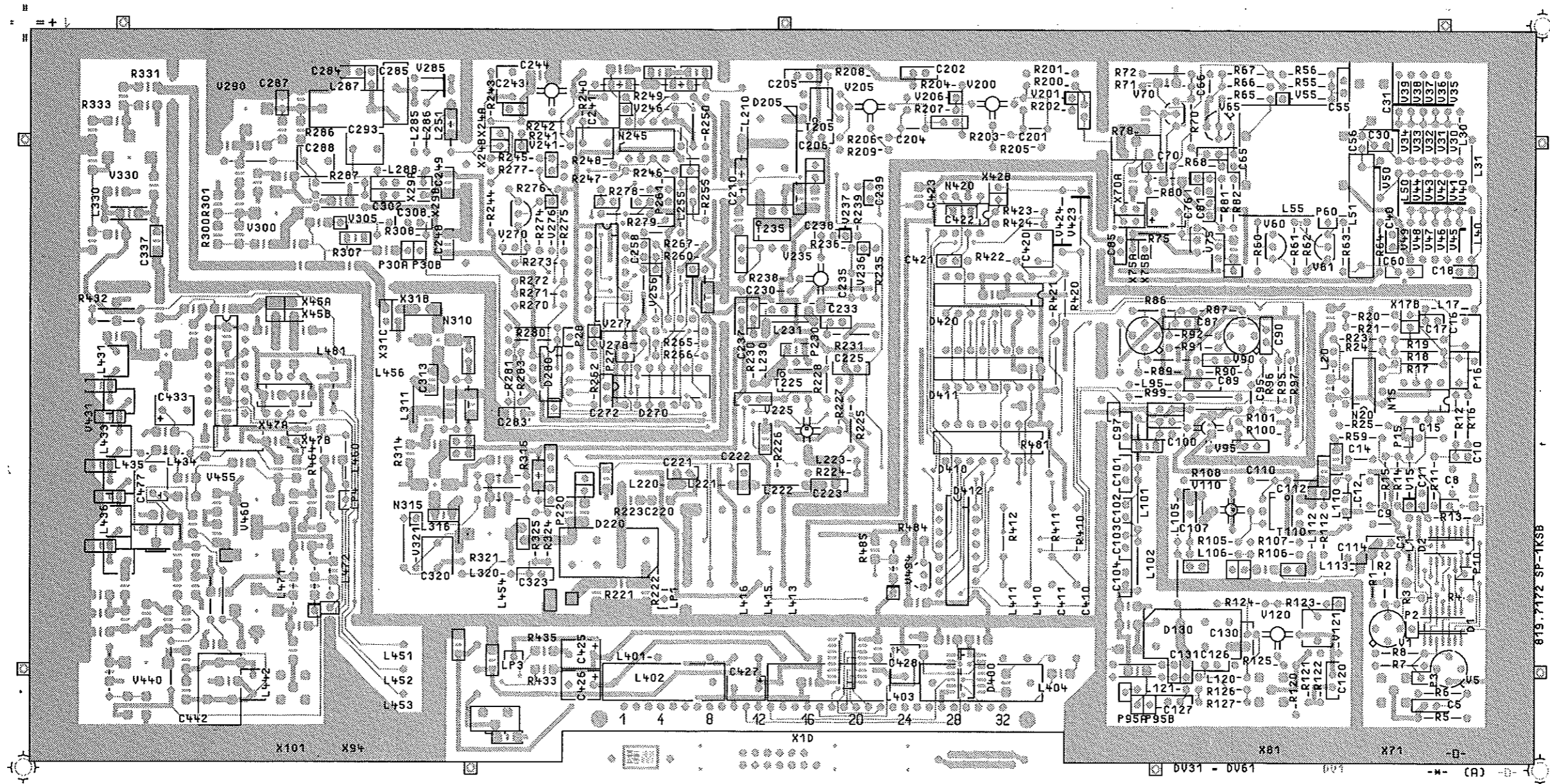


ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
Electrostatic sensitive devices require a special handling

ISO-Projektion Methode E



Ansicht und Leitungsführung Lötseite
View of tracks on solder side



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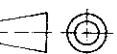
VARIANTENERKLÄRUNG/VERSION
VAR 02 - GRUNDAUSFÜHRUNG/BASIC MODEL

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						Halbzeug, Werkstoff		
				1KGB	Tag	Name	Benennung	
				Bearb.	04.89	SP	SUMMIERSCHLEIFEN	
				Gepr.				Z
				Norm				
				zu Gerät SMGU		Zeichn.-Nr.	819.7166.02	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	ROHDE & SCHWARZ		reg. i. V.	819.0010 V	Blatt-Nr. 3
						erste Z.		v. Bl.



ACHTUNG: EGB!
Elektrostatisch gefährdet-
Bauelemente erfordern eine
besondere Handhabung
ATTENTION ESD!
Electrostatic sensitive
devices require a special
handling

ISO-Projektion
Methode E





ROHDE & SCHWARZ

SERVICE DOCUMENTS

RF-Oscillators

819.8262.02

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Circuit diagrams

Component lists

Component layout diagrams

5 Service Manual "RF Oscillators"

5.1 Function Description

(See circuit diagram 819.0010 FS)

The RF oscillator subassembly contains the three oscillators for the frequency band from 1000 to 2160 MHz from which the output signal is derived. The subassembly also contains the associated presetting and synchronization circuits.

A pulse train with a frequency of 40 to 41.6 MHz and a peak voltage of approx. -3 V is applied by subassembly A10 (summing loops) to input X101. The oscillators must be synchronized to the 25th to 53rd harmonics of this pulse train.

A 200-ps pulse is generated using a step recovery diode. The pulse train is fed into a harmonic mixer (sampler) acting as a phase detector for the PLL of the RF oscillators. Since synchronization would be possible at any input signal harmonic, a presetting circuit forces the oscillator to synchronize at the correct harmonic. This is achieved using a programmable divider - whose division ratio corresponds to the order of the desired harmonic - and using two frequency ramp circuits. The fast circuit ignores possible locking points of the PLL, the slow circuit does not.

If the oscillator is to be synchronized to a new harmonic, the fast frequency ramp is activated until just before the new harmonic is reached. The slow frequency ramp then takes over until the PLL has locked-in. This is determined by a circuit which constantly monitors the output voltage of the phase detector and which switches off the presetting circuit following a short protection time.

5.1.1 Oscillators

(Circuit diagram 819.8262, sheet 1)

The three oscillators (negative impedance type, V5, V25, V55) are turned on by the signals ENA.0S1 to ENA.0S3 and are each stabilized at the operating point by a current injection circuit. The oscillator which is on is connected by means of a diode (V8, V28, V58) to the RF driver V72 which distributes the signal to the PLL driver (N125 ff), the RF divider (D71) and the output (N73, X111).

5.1.2 PLL

(Circuit diagram 819.8262, sheet 2)

The RF signal from the oscillators (RF.PLL) is applied to the sampler via the four-stage PLL driver. The RF level ahead of the sampler is measured by the detector V128 (V129 for temperature compensation) and kept constant by means of the control amplifier N128 and the PIN diodes V125.

The pulses from the summing loops (A10) are limited and amplified by the pulse driver V102. V103 generates a bias current which can be adjusted using R106 (SRD BIAS). The step recovery diode V104 can thus be triggered and supplies the sampler with 200-ps pulses via the balancing transformer T102.

The output voltage of the sampler is applied to the integrator via the voltage follower V160. A dual transistor is used for stability. The sampler and amplifier offsets are compared at the second transistor (V160-B) by means of R164 (OFFSET). The asynchronous detector is fed via V161 (IF) and the input capacitance of V160-A is compensated (C163).

The currents (PRE.INT) from the presetting circuit are fed to the integrating capacitor C168 giving a voltage ramp which results in a frequency change.

The pull-in slopes of the oscillators are adjusted using the trimming potentiometers R202 to R204 (FMAX: OS1 OS2 OS3) in the control voltage switch. The emitter follower V183 is followed by a bandwidth selector (V184, V185) for the PLL. The small bandwidth gives better spectral purity, the large bandwidth enables large FM deviations with high modulation frequencies. The capacitor C174 is charged rapidly by means of V450 when changing the harmonic.

5.1.3 Monitoring and Presetting Circuit

(Circuit diagram 819.8262, sheet 3)

The output voltage of the sampler (IF) is applied to the asynchronous detector (D180 to D182) via a lowpass/highpass combination. D180 A-B is a Schmitt trigger circuit, D181 and D182 give a "time threshold" so that only signals with frequencies above 1 MHz trigger the asynchronous detector. This prevents an FM signal from resulting in incorrect triggering. D181-B delivers the signal ENA.DIV for turning on the presetting circuit and delaying turning off the presetting circuit so that the PLL does not unlock again during the switching process. The processor switches the presetting circuit on via D180 C-D if the harmonic is changed. This ensures that a new setting is triggered even when frequency jumps of exactly one locking point occur.

In order to force synchronization to the correct harmonic, an appropriate division factor is set on a programmable divider (M divider, D202 to D204). The output of this divider is compared with the frequency from the 40-MHz divider (D205, D206) - the pulse frequency from input X101 divided by 32 - by means of the difference frequency detector D208 A-B. The output voltage from this detector is evaluated by a window comparator (N201) and leads to application of a large current in the appropriate direction (fast ramp) to the integrator until the difference in frequency is so small that the voltage is within the window again.

There is a digital/analog directional detector (D207, D209-C, N200) in parallel with the analog difference frequency detector.

The output voltage of the directional detector changes the logic level if the frequencies are the same and controls the direction of the slow ramp which brings the frequency into the capture range of the PLL.

The PLL then locks, the signal of the detection circuit drops and the ramp currents and dividers are switched off again after the delay provided by D181-B.

5.1.4 Data Transmission, Power Supply

(Circuit diagram 819.8262, sheet 4)

The data (TF.DAT) and clock (TF.CLK) lines of the serial data bus are buffered by D350 and supply the latches D212 and D213. The data is transferred on the positive slope of the strobe which is decoded in decoder D351 from the subassembly address (BA0 to BA2) and the group line (G0).

Eight test points on the subassembly can be connected to the diagnostics line TST (X11A17) by means of D214 (diagnostics multiplexer). The alarm detector N350 and the asynchronous detector (V190, sheet 3) can set the alarm line ALA (X11A18), and the status LED on the front panel then flashes to signal the faulty function. Fault 47 is displayed during the status poll if the processor finds that the subassembly is faulty by means of its diagnostics routine.

The attenuator control (N202) generates the control voltages for the attenuators and diode switches on sheet 1. V350 powers all integrated RF amplifiers on the subassembly.

5.2 Testing and Adjustment

All results without tolerances must be considered as approximate values. Unless otherwise stated, voltages are DC voltages.

The Service Kit SMGU-Z1 contains an adapter for making connections to the subassembly. The adapter is plugged into the chassis instead of the subassembly and the RF connections made again to the female connectors on the base. The subassembly can then be plugged onto the adapter.

The kit also contains a probe which can be connected to a plug on the top right-hand edge of subassembly A5 (processor) and which enables special function 101, DC voltage measurements in the range -40 to +40 V. The result is output in the level display and can be polled via the IEC bus.

5.2.1 Oscillators, RF Driver, RF Divider (sheet 1)

5.2.1.1 Testing and Adjustment of the Oscillators

The first oscillator is switched on at the frequency setting RF 1200 MHz, the second oscillator at RF 1600 MHz and the third at RF 2 GHz. The other two oscillators are switched off in each case.

Using the 1st oscillator as an example, the data for the oscillator when switched on and off are listed below. These values should be found for the other two oscillators.

Signal at	Measured value "On"	Measured value "Off"
ENA.OS1 D215-A/14	>2,5 V (High)	<0,8 V (Low)
UB.OS1 P1	-14,5 V	0,8 V
Emitter V6	-12 V	
Emitter V5	-5 V	
Emitter V7	-5,7 V	
Output N1	4,5 V	4,5 V

Oscillator adjustments

Pull out jumper X161 and connect a DC voltage source (0 to 25 V) to X160/2. Connect a spectrum analyzer with synthesizer tuning and frequency counting function to output X111.

First set the lower cutoff frequency with a DC voltage of 1.8 V, and then the upper cutoff frequency with a DC voltage of 21.5 V for each oscillator.

Adjustment table

	f(1,8 V)	at	f(21,5 V)	at
Oscillator 1	1000 MHz	C1	1400 MHz	R202
Oscillator 2	1400 MHz	C21	1800 MHz	R203
Oscillator 3	1800 MHz	C51	2170 MHz	R204

The screening cover on the component side must be screwed on during the adjustment.

Potentiometers R9, R30 and R60 must be left in their centre positions.

Check each oscillator over the whole tuning range for sidebands and increased noise using the spectrum analyzer (spans same as tuning range). These effects may be caused by faulty oscillator capacitors and the output stage.

5.2.1.2 RF Driver

Independent of the setting:

Emitter V72 560 mV
Collector V72 7 V

5.2.1.3 RF Divider

The divider is switched on at a frequency setting of RF 800 MHz and off at RF 1200 MHz.

Signal at	Measured value "On"	Measured value "Off"
SWI.DIV P209	13 V	-13 V
SWI.RAN P210	13 V	-13 V
D71/1	4,8 V	0 V
N71...73/3	4,5 V	4,5 V

5.2.1.4 Testing the RF Path up to the Output

A qualitative test is possible on the spectrum analyzer using an RF probe. It is essential to ensure that the ground connection is short and of low impedance (copper band).

The gain of the integrated amplifier MSA 0404 should be approx. 6 dB, that of MSA 0304 approx. 8 dB.

The level at the collector of the RF driver should be 7 to 10 dBm.

The level at output X111 should be between 3 and 9 dBm.

5.2.2 PLL (sheet 2)

5.2.2.1 PLL Driver

N125 to 127/3	4.5 V
Collector V127	7 V
Emitter V127	560 mV

Special diagnostics function 150 must indicate a constant voltage at all frequency settings. (range 0 to 110 mV).

Output N128/6 must remain in the range from 0.8 to 12 V at all frequency settings.

5.2.2.2 Pulse Driver, Adjustment of R106

There must be no current at V102 if an input signal is not applied (voltage at emitter < 150 mV).

The voltage at collector V103/1 should vary from approx. 1 to 11 V when potentiometer R106 is rotated through its complete range.

The low-voltage end of R121 should be 1.15 V and -1.15 V at R114.

Adjustment of SRD bias using R106

A correctly set input signal (see subassembly A10, summing loops) must be present at input X101 with a frequency setting of RF 1020 MHz. The test voltage of the diagnostics detector V105 can be displayed using special function 155.

R106 should be set such that this voltage is a maximum; the maximum must be above 3 V.

5.2.2.3 Sampler

Pull out jumper X161 at a frequency setting of RF 1200 MHz and connect a variable DC voltage source to X160/2. Observe the voltage at the emitter of V161 on an oscilloscope and slowly vary the DC voltage from 0 to 22 V.

The IF voltage should reach a maximum of 450 to 650 mVpp approx. every 2 V. The trace should be sinusoidal. Large changes in the slope must not take place, especially at zero crossings.

Repeat the measurement with frequency settings of RF 1600 MHz and RF 2 GHz.

5.2.2.4 Voltage Follower, Adjustment of R164

The source voltages of V160/1 and /7 should be between 1 and 3 V without a signal at X101.

Offset checks and adjustments using R164

Requirement: correct signal at input X101, the SRD bias (see above) should already have been adjusted using R106.

Preparation: pull out jumpers X122, X161 and X166, connect X165/2 to ground so that the presetting circuit does not respond.

The voltage at V187 can now be measured using special function 153 and recorded as the reference. Then measure the voltage at V169 using special function 154 and adjust to the same value using R164 (offset) if there are deviations > 30 mV. Insert the jumpers again.

5.2.2.5 Integrator

Correct functioning of the integrator can be tested when you adjust the offset using R164 (see above). Connect an oscilloscope or voltmeter to X160/1 and observe how the output voltage jumps between -4 and +23 V when R164 is adjusted.

Voltage at C167: -5 V

The voltages at the emitter of the current sources V168 and V170 must be approx. 1 V above the voltage at C167.

The voltage drop across R180 and R181 should be approx. 100 mV.

5.2.2.6 Control Voltage Switch

One of the three lines UB.OS1 to UB.OS3 is connected to -15 V depending on which oscillator is selected (see 5.1.1), and the associated transistor V178 to V180 goes off so that the gate-source voltage of the corresponding field-effect transistor V175 to V177 is zero, and the transistor is then on. The gate voltage goes to -15 V for the other field-effect transistors so that they go off (test points P161 to P163).

5.2.2.7 Bandwidth Selector

V184 must conduct (gate at 0 V) and V185 must be off (gate at -13 V) in CW mode (FM OFF). The reverse is true in FM mode. V450 is normally off (gate at -13 V) and only conducts for the duration of the fast frequency ramp (max. 200 μ s) when the frequency is switched over.

5.2.2.8 Measuring the Transfer Function

The transfer function need only be measured if there are problems with the settling time or if the status LED starts flashing with large FM spans although all other parts of the circuit are operating correctly.

To measure the transfer function, a 10-k Ω resistor must be connected in parallel with the integrating capacitor C168 so that a DC operating point can be set.

Then disconnect the cable from X101, remove jumper X166, connect X165/2 to ground; X161 remains inserted.

Set operating point by adjusting R164 until approx. 1 to 3 VDC are present at P160.

The supply at V160/2 is 100 mVrms free of DC voltage components. The measurement is made at the cathode of V186 using a high-impedance probe with an input capacitance <40 pF.

The voltage measured at 1 kHz must be between 700 and 1100 mVrms and is the reference value for the transfer function.

Table of nominal values for the transfer function

Frequ./Hz	100	1k	1,8k	3,2k	5,6k	10k	18k	32k	56k
dB / FM EXT	0	-3,5	-8	-12	-18	-22	-24	-25	-25
dB / FM OFF	0	-3,5	-8	-12	-18	-25	-30	-35	-40
Frequ./Hz	100k	180k	320k	560k	1M	1,8M	3,2M	5,6M	10M
dB / FM EXT	-27	-30	-34	-37	-37	-37	-36	-35	-34
dB / FM OFF	-44	-46	-47	-48	-50	-52	-54	-55	-55

Remove the resistor when the measurements are complete and reset the offset correctly (see above).

5.2.3 Asynchronous Detector, Presetting Circuit (sheet 3)

5.2.3.1 Selection of Presetting Circuit

All dividers are switched off during synchronization, the ENA.DIV signal is low and P200 is at 0 Volt. The complete presetting circuit is continuous set in operation by repositioning jumper X166 to position 2-3 ("Divider on").

The PLL can now be disconnected by pulling jumper X161 (sheet 2) and the VCO can be tuned with a DC voltage applied to X160/2 (sheet 2). The set frequency is monitored using a frequency counter or spectrum analyzer at output X111.

The tuning range of the oscillators is shifted when the subassembly is open, and therefore at least the resonator chambers must be closed to test all settings.

P200: jumper X166 2-3 (divider on) 4.8 V
X165/2 to ground (divider off) 0 V

All following measurements are carried out in the position "Divider on".

5.2.3.2 RF Predivider, M Divider

With a frequency setting of RF 1015 MHz, also set this frequency at output X111 using the DC voltage at X160/2.

Using the spectrum analyzer and RF probe, test the divider stages up to D202/1 where the frequency must be 31.719 MHz. The frequency at P202 must be 1.26875 MHz. If the RF setting is now increased in steps of 40.6 MHz up to 2151.8 MHz and the corresponding frequency set each time at the output using the DC voltage, the frequency of 1.26875 MHz must always be present at P202.

5.2.3.3 40-MHz Divider

The signal at input X101 must be correct and the adjustment of the SRD bias using R106 (5.2.2.2) must have been carried out.

<0.8 V and >2.5 V must be achieved for the low and high levels respectively at the divider input D205/3 (40 MHz, use a suitable oscilloscope with appropriate probe). The frequency at P203 must be 1.26875 MHz with the frequency set to RF 1015 MHz.

5.2.3.4 Frequency Detector and Direction Detector

Testing and adjustment of frequency detector (F-DET.NULL) using R295.

The output frequency of the 40-MHz divider is applied to both inputs of the frequency detector by moving jumper X201 to position 2-3.

Approximately equal DC voltages of approx. 2.5 V must then be present at test points P206 and P207. Display the output voltage of the frequency detector using special function 152. Then set the voltage to 0 ± 20 mV using R295.

There should be a voltage of $+0.32 \pm 0.01$ V at pin 2 on comparator N201 and a voltage of -0.32 ± 0.01 V at pin 12.

Reinsert jumper X201 at position 1-2. With the frequency set to RF 1218 MHz, set the output frequency to the same value again using the applied DC voltage

Both comparator outputs N201/4 and /9 must be high (>2.5 V), the switches D211C and D block and there should be approx. 1.5 V at P208.

If the oscillator frequency is now offset in both directions using the DC voltage, the voltage at the direction detector P204 must vary between +4.7 and -0.7 V and must change at P205 from +15 to -13 V. The output N201/4 must jump to low at approx. +13 MHz, and output 9 at -13 MHz. The associated switch D211-D or C must be active in each case so that +15 V are present at P208 in the first case and -13 V in the second case.

5.2.3.5 Asynchronous Detector

The asynchronous detector is tested using the same setup.

The same frequency (RF 1218 MHz) is set again at the output using the applied DC voltage, and then detuned.

When detuned by more than 500 kHz, square-waves with an amplitude of 5 V_{peak} must be measured at the Schmitt trigger D180 using the oscilloscope at P164. The signal SYN at P165 must only jump to low at frequency differences above 1 MHz, which would cause the output signal of D181-B (at X165/1) to go high. If the frequency is detuned further until a difference of 39.6 MHz the capture range of the adjacent locking point is reached, the signal at X165/1 must decrease while this is being done especially in the range around 20.3 MHz.

5.2.4 Data Transmission, Power Supply (sheet 4)

5.2.4.1 Data Transmission

The LSB of the lowest byte is the first to be transmitted. D212 therefore contains byte 2 and D213 contains byte 1 of the data record. The LSB of each byte is applied to Q8 (pin 11) of the corresponding latch, the MSB to Q1 (pin 4). See Section 5.4 for the settings and data.

5.2.4.2 Oscillator Decoder

The oscillator decoder selects one of the three oscillators.

RF setting	ENA.OS1	ENA.OS2	ENA.OS3
1200 MHz	1	0	0
1600 MHz	0	1	0
2000 MHz	0	0	1

"1" corresponds to 5 V, "0" corresponds to 0 V

5.2.4.3 Divider Controller

The RF divider is switched on at frequencies above 1 GHz only during the settling period, it is always on below this value.

To check the sweep mode, select RF SPAN and set SPAN 10 MHz, STEP 10 MHz, TIME/STEP 10 ms. The signal at P210 must be -13 V at a centre frequency RF/CF of 1400 MHz, and the voltage at P209 must jump from -13 to +13 V for approx. 0.4 ms each time the frequency changes. Both signals must remain constant at +13 V if an RF/CF of 700 MHz is now set.

5.2.4.4 Alarm Detector

The threshold voltages are 0.18 ± 0.005 V at N350/3 and 4.85 ± 0.1 V at N350/6.

To check the comparator, disconnect the cable from input X101, remove jumper X161 and apply a DC voltage to X160/2. The output N350/1/7 must go low (<0.8 V) at voltages below approx. 0.5 and above approx. 22 V.

5.2.4.5 Power Supply

Collector	V350	11.5 V
Base	V350	8.2 V
Emitter	V350	7.5 V

5.2.5 Checking the Closed PLL

All plug-in jumpers must be set to their normal positions (see 5.5); select the sweep mode CF SPAN by entering the following: SPAN 5 MHz, STEP 5 MHz, TIME/STEP 10 ms. Start the sweep with AUTO at RF 1 GHz. The resonator chambers must be closed.

Fig. 5.2-1 shows a typical frequency jump when an oscillator changeover occurs and the largest jump in the tuning voltage. The following events are indicated:

- 1 Strobe connected to subassembly, trigger point
- 2 Switch-on of ramp currents and accelerator V450
Switching-over to small control bandwidth
- 3 Switch-off of fast ramp and accelerator
Switching-over to large control bandwidth
- 4 PLL locks
- 5 Switch-off of presetting circuit, switching-over to small control bandwidth when FM OFF.

Typical times:

1-2	25 μ s
2-3	0 to 150 μ s (proportional to number of locking points covered)
3-4	0 to 200 μ s
4-5	100 μ s

A storage oscilloscope is ideal for recording the waveforms in Fig. 5.3-1 so that the timing of a single transient can be determined. The oscilloscope is triggered externally by the subassembly strobe which can be tapped at the feed-through filter Z352 (sheet 4). The RF setting should be increased in steps of 40 MHz up to 2120 MHz in order to check all possible locking points. The settling time must not be longer than 500 μ s (typically 350 μ s), the fast change in the control voltage at X160/1-2 must not take more than 200 μ s.

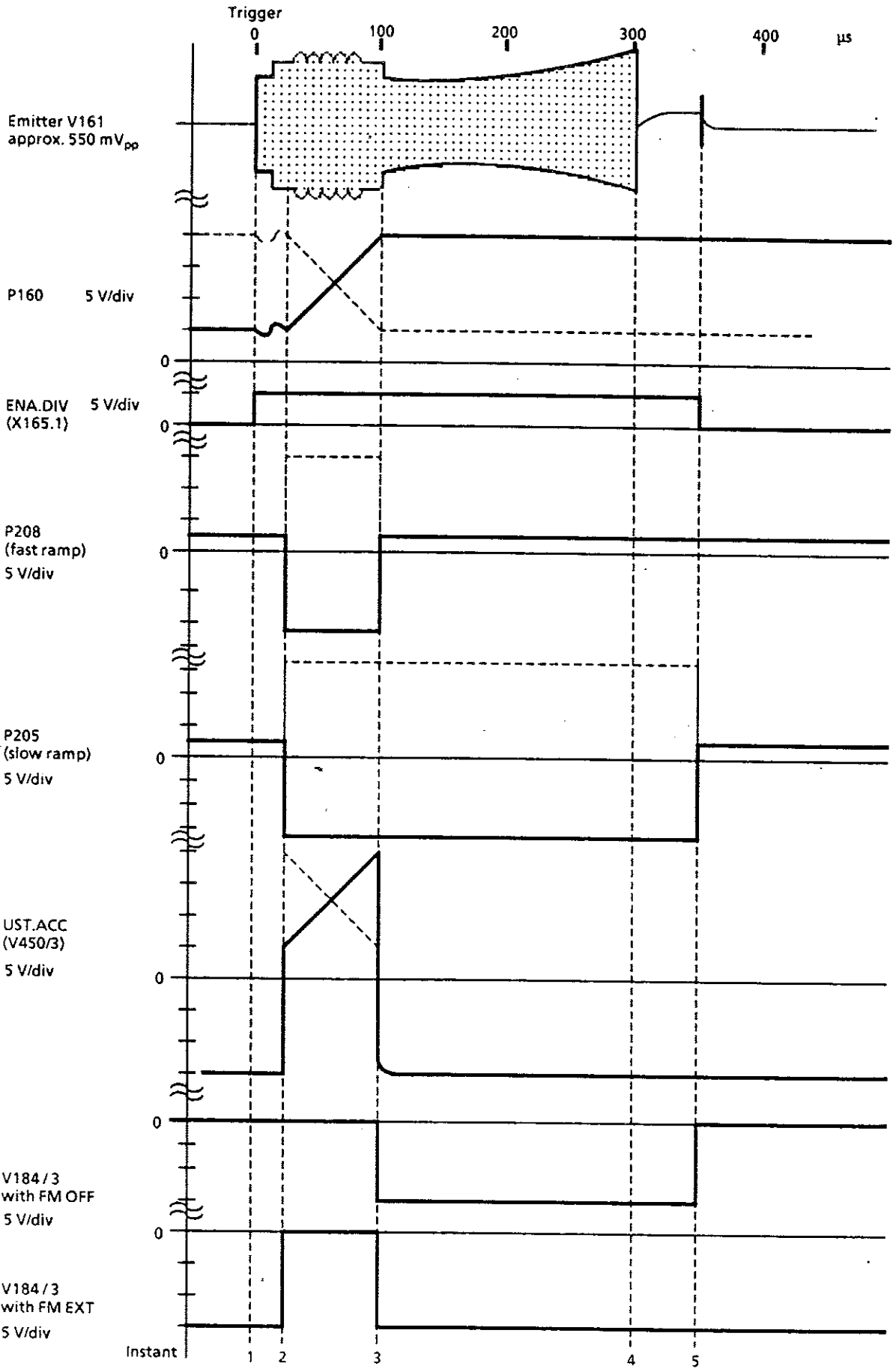


Fig. 5-2 Settling time traces

5.3 General Information, Troubleshooting

5.3.1 Switching Hysteresis

Harmonics and oscillator switchover has a hysteresis of 0.5 MHz. The 25th harmonic is used e.g. from 1000 to 1040.5 MHz, the 26th from 1040 to 1080.5 MHz. The RF divider is turned on at 1000 MHz and off at 1000.25 MHz.

5.3.2 Special Service Functions

All synthesized frequencies used in the device can be output on the RF/CF display using the service functions 78 to 85. The RF display appears when any other key is pressed.

Special function	Display
82	Frequency at input X101
83	Division factor for M divider (harmonic)
84	RF division factor
85	Oscillator frequency

The RF divider (sheet 1) is switched on at all RF division factors ≥ 2 , it is switched off with a division factor 1.

5.3.3 Troubleshooting

To locate a fault, first examine the frequency settings at which faulty signals occur. Use a spectrum analyzer connected to output connector X111.

- Frequency settings 1001 to 2159 MHz:

The frequency does not change:

Check data transmission (5.2.4).

There are only 3 different frequencies:

Check sampler, integrator and presetting circuit (5.2.3), divider controller (5.2.4.3) and RF divider (5.2.1.3).

No signal in one or two thirds of the range:

Check oscillator decoder (5.2.4) and oscillators (5.2.1).

Sidebands and flashing status LED at ends of oscillator range:

Readjust oscillators (5.2.1.1).

Sidebands and flashing status LED in smaller ranges, frequency approx. 40 MHz out:

Check data transmission (5.2.4, D213) and M divider (5.2.3.2).

Synchronization errors, large settling time, spurious sidebands and flashing status LED with large FM deviations and high modulation frequency:

Check sampler, integrator, control voltage switch and bandwidth switch, measure transfer function (5.2.2).

Frequency correct, level too low:

Check RF path (5.2.1.4).

- No signal at frequency settings below 1 GHz, ok otherwise:

Check N72 and diode switch V79 from RF divider to output.

5.4 Interfaces

5.4.1 Digital Interface

Strobe G0, subassembly address 2 (010)

Byte	Bit	Function	1	0
Byte 2	D 7	ENA.DIA, switch on diagnostics	Wide M new	Narrow M old
	D 6	MSB, diagnostics, test point address		
	:			
	D 4	LSB, diagnostics, test point address		
	D 3	RBW.FST, control bandwidth of PLL		
	D 2	NEW.M, change in M factor		
	D 1	MSB, oscillator selection		
	D 0	LSB, oscillator selection		
Byte 1	D 7	DIV. RF, switch on RF divider	On	Off
	D 6	MSB, M division factor N		
	:			
	:			
	D 3	LSB, M division factor N		
	D 2	MSB, M division factor A		
	:			
	D 0	LSB, M division factor A		

The M factor is expressed in terms of two factors (N and A) and sent to the M divider. The following relationships apply:

$$N = \text{INT}(M / 5) \quad A = M - N * 5 + 1 \quad \text{N and A are transmitted in binary form.}$$

Setting table

Frequency / MHz	M	N	A	Osc.		Byte 2	Byte 1	Hex. code
				D1	D0			
1015	25	5	1	0	1	10001101	00101001	8D29H
1055,6	26	5	2	0	1	10001101	00101010	8D2AH
1096,2	27	5	3	0	1	10001101	00101011	8D2BH
1136,8	28	5	4	0	1	10001101	00101100	8D2CH
1177,4	29	5	5	0	1	10001101	00101101	8D2DH
1218	30	6	1	0	1	10001101	00110001	8D31H
1258,6	31	6	2	0	1	10001101	00110011	8D32H
1299,2	32	6	3	0	1	10001101	00110011	8D33H
1339,8	33	6	4	0	1	10001101	00110100	8D34H
1380,4	34	6	5	0	1	10001101	00110101	8D35H
1421	35	7	1	1	0	10001110	00111001	8E39H
1461,6	36	7	2	1	0	10001110	00111010	8E3AH
1502,2	37	7	3	1	0	10001110	00111011	8E3BH
1542,8	38	7	4	1	0	10001110	00111100	8E3CH
1583,4	39	7	5	1	0	10001110	00111101	8E3DH
1624	40	8	1	1	0	10001110	01000001	8E41H
1664,6	41	8	2	1	0	10001110	01000010	8E42H
1705,2	42	8	3	1	0	10001110	01000011	8E43H
1745,8	43	8	4	1	0	10001110	01000100	8E44H
1786,4	44	8	5	1	0	10001110	01000101	8E45H
1827	45	9	1	1	1	10001111	01001001	8F49H
1867,6	46	9	2	1	1	10001111	01001010	8F4AH
1908,2	47	9	3	1	1	10001111	01001011	8F4BH
1948,8	48	9	4	1	1	10001111	01001100	8F4CH
1989,4	49	9	5	1	1	10001111	01001101	8F4DH
2030	50	10	1	1	1	10001111	01010001	8F51H
2070,6	51	10	2	1	1	10001111	01010010	8F52H
2111,2	52	10	3	1	1	10001111	01010011	8F53H
2151,8	53	10	4	1	1	10001111	01010100	8F54H

5.4.2 Diagnostics

Spec. func.	Diag. Addr.	Test point	Measured value	Addr.
149	0	VCO control voltage	1 ... 22 V	5
150	1	Level ahead of sampler	0 ... 110 mV	1
151	2	Power supply to RF amplifier	7 ... 7,5 V	5
152	3	Frequencydetector	-50 ... +50 mV	1
153	4	Offset of reference	1 ... 3 V	4
154	5	Offset of adjustment	1 ... 3 V	4
155	6	Pulse amplitude	3 ... 10 V	1
156	7	Output level	30 ... 200 mV	1

Only voltages below 5 V may be applied to the diagnostics multiplexer. Certain test voltages must therefore be passed through a divider. The division factor is taken into account by the processor. The measured value ahead of the divider is output on the display as shown in the table for the corresponding special function, but a voltage reduced by the division factor is measured on the line TST (X11A17).

5.4.3 Analog Interface

Input/output X11A1-32, 32-contact board connector

Power supply

X11A24 Power supply +24 V
 X11A26 Power supply +15 V
 X11A28 Power supply +5 V
 X11A30 Power supply -15 V

Data transmission (HCMOS logic)

X11A22 Group line G0
 X11A21 Subassembly address BA0
 X11A20 Subassembly address BA1
 X11A19 Subassembly address BA2

X11A11 TF.CLK Clock line for data transmission

X11A13 TR.DAT Data line for data transmission

Monitoring

X11A17 TST Diagnostics line
 X11A18 ALA Low-active alarm line, open collector

X11A1-9 Not connected

All other contacts are connected to ground

Input X101, SMB system

Signal: pulse train with an amplitude of -3 to -5 V_{peak}, pulse width 2 ns, repetition frequency 40 to 41.6 MHz, impedance 50 Ω (see subassembly A10, summing loops).

Output X111, SMB system

Signal: sinewave plus harmonics, amplitude 3 to 9 dBm, frequency 500 to 2160 MHz, impedance 50 Ω.

5.5 Positions of Plug-in Jumpers

Caution:

Before securing, ensure that all jumpers are in their normal positions:

X122 at X121/1 - 2
 X161 at X160/1 - 2
 X201 at X200/1 - 2
 X166 at X165/1 - 2

5.6 Required Measuring Equipment

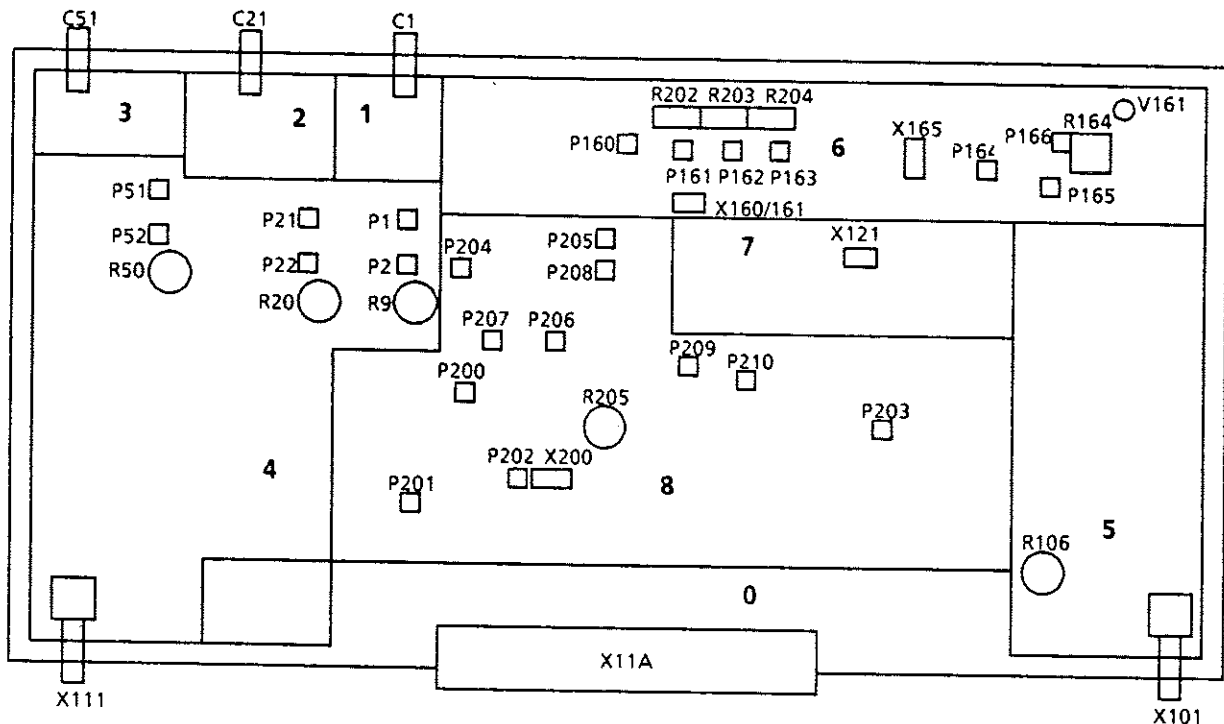
Spectrum analyzer with synthesizer tuning and frequency counting facility to 2.2 GHz

Storage oscilloscope, resolution 50 μ s/div

Oscilloscope, frequency range > 300 MHz

DC voltage source 0 to 25 V

Layout diagram





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Schalteillisten

Stromläufe

Bestückungspläne

Part lists

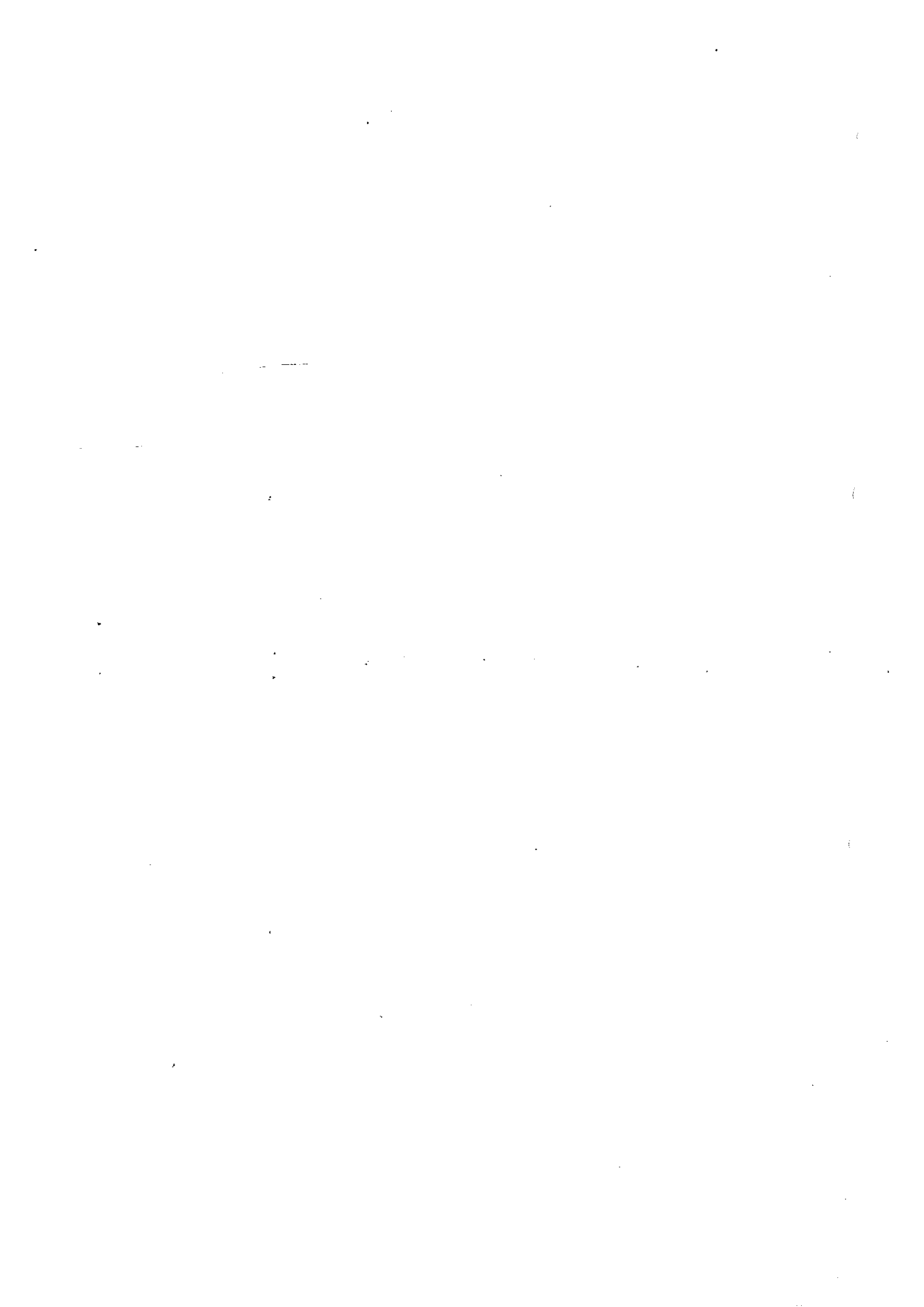
Circuit diagrams

Components plans

Listes des pièces détachées

Schémas de Circuit

Plans des composants



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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
A111	ED SAMPLERPLATTE SAMPLER BOARD ZUG.STROML. 819.8262 S CIRC.DIAGR. 819.8262 S	819.8827.02			
C1	CT 9PF TAUCHTR.7RDX13 AIR-TYPE TRIMMER	CT 249.5095	TEKELEC	LUFTTR.AT5202	
C2	CC 15PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8750	VITRAMON	VJ1206 A 150 F FAT	
C3	CC 2,1PF+-0,25PF50V2NPO CAPACITOR	CC 093.5550	VITRAMON	VJ0805A2R1CFA	
C4	CC 220PF-20+50%400VR2000 CERAMIC CAPACITOR	099.4903	STETTNER	TEFK7 400V 220PF-20	
C5	CC 7,8PF+-0,25PF 50V NPO CERAMIC CHIP CAPACITOR	CC 099.8296	VITRAMON	VJ0805A7R8CFA	
C6	CC 100PF+-10X50V2NPOCHIP CAPACITOR	CC 082.2948	VITRAMON	VJ0805A101KFA	
C7	CC 3,6PF+-0,25PF50V2NPO CAPACITOR	CC 093.5614	VITRAMON	VJ0805A3R6CFA	
C9	CC 47PF+-1X50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C10	CC 47PF+-1X50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C11	CC 56PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C12	CC 1NF+80-20XR4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7L0E1000/2080XR40	
C13	CC 56PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C14	CC 2,7PF-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8188	VITRAMON	VJ1206 A 2R7 C FAT	
C15	CC 2,7PF-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8188	VITRAMON	VJ1206 A 2R7 C FAT	
C16	CC 3,3PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 099.8273	VITRAMON	VJ0805A3R3CFA	
C17	CC 33PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8780	VITRAMON	VJ1206 A330F FAT	
C18	CC 56PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C21	CT 9PF TAUCHTR.7RDX13 AIR-TYPE TRIMMER	CT 249.5095	TEKELEC	LUFTTR.AT5202	
C22	CC 10PF+-0,25PF50VNPO1206 CERAMIC CHIP CAPACITOR	CC 099.8480	VITRAMON	VJ1206 A 100 C FAT	
C23	CC 1,0PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6770	VITRAMON	VJ0805A1ROCFA	
C24	CC 220PF-20+50%400VR2000 CERAMIC CAPACITOR	099.4903	STETTNER	TEFK7 400V 220PF-20	
C25	CC 5,2PF+-0,25PF50V2NPO CAPACITOR	CC 093.5650	VITRAMON	VJ0805A5R2CFA	
C26	CC 33PF+-10X100V2NPO CHIP CAPACITOR	CC 082.7340	VITRAMON	VJ0805A330KFA	
C27	CC 2,6PF+-0,25PF50V2NPO CAPACITOR	CC 093.5572	VITRAMON	VJ0805A2R6CFA	
C29	CC 47PF+-1X50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C30	CC 47PF+-1X50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C31	CC 56PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C32	CC 1NF+80-20XR4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7L0E1000/2080XR40	
C33	CC 56PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C34	CC 3,9PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8207	VITRAMON	VJ1206 A 3R9 C FAT	
C35	CC 3,9PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8207	VITRAMON	VJ1206 A 3R9 C FAT	
C37	CC 33PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8780	VITRAMON	VJ1206 A330F FAT	
C38	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C51	CT 0,35/3,5PF RD3,6XL14,3 AIR-TYPE TRIMMER	CT 037.9553	TEKELEC	AT5802MIT MUTTER 488	
C52	CC 6,2PFO,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8709	VITRAMON	VJ1206 A 6R2 C FAT	
C54	CC 220PF-20+50%400VR2000 CERAMIC CAPACITOR	099.4903	STETTNER	TEFK7 400V 220PF-20	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C55	CC 1,5PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6793	VITRAMON	VJ0805A1R5CFA	
C56	CC 33PF+-10X100V2NPO CHIP CAPACITOR	CC 082.7340	VITRAMON	VJ0805A330KFA	
C57	CC 1,8PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6806	VITRAMON	VJ0805A1R8CF100	
C59	CC 47PF+-1X50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C60	CC 47PF+-1X50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C61	CC 56PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C62	CC 1NF+80-20XR4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7LOE1000/2080XR40	
C63	CC 56PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C64	CC 2,7PF-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8188	VITRAMON	VJ1206 A 2R7 C FAT	
C65	CC 2,7PF-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8188	VITRAMON	VJ1206 A 2R7 C FAT	
C67	CC 18PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8767	VITRAMON	VJ1206 A 180 F FAT	
C69	CC 100PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C71	CC 1NF+-1X 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C72	CC 1NF+80-20XR4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7LOE1000/2080XR40	
C73	CC 22NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8467	VITRAMON	VJ1206 Y 233 K FAT	
C74	CC 56PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C75	CC 1,0PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6770	VITRAMON	VJ0805A1ROCFA	
C77	CC 100PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C78	CC 56PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C79	CC 1NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C80	CE 22UF+-20X10V SAL ELECTR. CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C81	CC 1NF+80-20XR4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7LOE1000/2080XR40	
C82	CC 100PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C83	CC 100PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C84	CC 1NF+80-20XR4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7LOE1000/2080XR40	
C86	CC 10PF+-0,25PF50VNPO1206 CERAMIC CHIP CAPACITOR	CC 099.8480	VITRAMON	VJ1206 A 100 C FAT	
C87	CC 100PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C88	CC 3,3PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8194	VITRAMON	VJ1206 A 3R3 C FAT	
C89	CC 1NF+80-20XR4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7LOE1000/2080XR40	
C90	CC 5,6PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8220	VITRAMON	VJ1206 A5R6 C FAT	
C91	CC 100PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C92	CC 1PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8667	VITRAMON	VJ1206 A 1R0 C FAT	
C95	CC 1,0PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6770	VITRAMON	VJ0805A1ROCFA	
C97	CC 1NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C98	CC 100PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C100	CC 5,2PF+-0,25PF50V2NPO CAPACITOR	CC 093.5650	VITRAMON	VJ0805A5R2CFA	
C101	CC 10NF+-10X50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C102	CC 100NF+-10X50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C103	CC 15PF+-1X50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8750	VITRAMON	VJ1206 A 150 F FAT	

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Kennz. Comp.No	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthaltene in contained in
C104	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C105	CC 1PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8667	VITRAMON	VJ1206 A 1R0 C FAT	
C106	CC 100PF+-10% N4700 TRAP CAPACITOR	086.7467	DRALORIC	TRE7L0E,100/10%N4700	
C107	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C108	CE 1,0UF+-20%35V 5X 4X 7 ELECTROLYTIC CAPACITOR	CE 022.8185	ROEDERSTEI	ETR 1 1/40 20%	
C109	CC 8,2PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8242	VITRAMON	VJ1206 A 8R2 C FAT	819.8827.01
C110	CC 8,2PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8242	VITRAMON	VJ1206 A 8R2 C FAT	819.8827.01
C111	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C112	CE 1,0UF+-20%35V 5X 4X 7 ELECTROLYTIC CAPACITOR	CE 022.8185	ROEDERSTEI	ETR 1 1/40 20%	
C113	CC 1,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8165	VITRAMON	VJ1206 A 1R8 C FAT	
C114	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C125	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C126	CC 1NF+80-20%R4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7L0E1000/2080%R40	
C127	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C128	CC 1,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8165	VITRAMON	VJ1206 A 1R8 C FAT	
C129	CC 1,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8165	VITRAMON	VJ1206 A 1R8 C FAT	
C130	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C131	CC 1NF+80-20%R4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7L0E1000/2080%R40	
C132	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C133	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C134	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C135	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C136	CC 1NF+80-20%R4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7L0E1000/2080%R40	
C137	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C138	CC 22NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8467	VITRAMON	VJ1206 Y 233 K FAT	
C139	CC 22NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8467	VITRAMON	VJ1206 Y 233 K FAT	
C140	CC 1NF+80-20%R4000 TRAP CERAMIC CAPACITOR	086.7515	DRALORIC	TRE7L0E1000/2080%R40	
C141	CC 15PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8750	VITRAMON	VJ1206 A 150 F FAT	
C142	CC 1,0PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6770	VITRAMON	VJ0805A1ROCFA	
C144	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C145	CC 1PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8667	VITRAMON	VJ1206 A 1R0 C FAT	
C146	CC 47PF+-10% N1500 TRAPEZ CAPACITOR	263.9694	STETTNER	TEFK7 47PF/10N1500/	
C147	CC 330PF+-2%6X9N750 CERAMIC CAPACITOR	CC 087.6964	VALVO	2222 678 58331	
C148	CC 1,0PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6770	VITRAMON	VJ0805A1ROCFA	
C156	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C157	CC 39PF+-2%4X5NPO CAPACITOR	CC 087.6493	VALVO	2222 678 10399	
C158	CC 120PF+-2%6X9NPO CAPACITOR	CC 087.6558	VALVO	2222 678 10121	
C160	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C161	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	

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			RF-OSCILLATORS		

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C162	CK 1UF+-10X50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C163	CC 100NF+-10X50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C164	CC 3,3NF+-10X50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8909	VITRAMON	VJ1206 Y 332 K FAT	
C165	CK 1UF+-10X50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C166	CK 1UF+-10X50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C167	CK 1UF+-10X50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%	
C168	CK 15NF+-5%63V5RM MKT CAPACITOR	CK 099.2875	WIMA	MKS2/63/0,015UF/5%	
C169	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C170	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C171	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C172	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C173	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C174	CK 33NF+-1% 63V 10QARD. CAPACITOR	CK 294.6351	SIEMENS	B33531-A5333-F	
C175	CK 5,6NF+-1%63V6,3QUX11KP CAPACITOR	CK 340.9047	SIEMENS	B33531-A5562-F	
C176	CC 2,7NF+-10X50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.3228	VITRAMON	VJ1206 Y 272 K FAT	
C177	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C178	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C179	CC 10PF+-0,25PF50VNPO1206 CERAMIC CHIP CAPACITOR	CC 099.8480	VITRAMON	VJ1206 A 100 C FAT	
C180	CC 10PF+-0,25PF50VNPO1206 CERAMIC CHIP CAPACITOR	CC 099.8480	VITRAMON	VJ1206 A 100 C FAT	
C181	CC 10NF+-10X50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C182	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C183	CC 68PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8815	VITRAMON	VJ1206 A 680 F FAT	
C184	CC 4,7NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8450	VITRAMON	VJ1206 Y 472 K FAT	
C186	CC 4,7NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8450	VITRAMON	VJ1206 Y 472 K FAT	
C188	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C195	CC 6,8PF+-0,25PF4X5P100 CAPACITOR	CC 087.6270	VALVO	2222 678 03688	
C196	CC 100PF+-2%6X9NPO CAPACITOR	CC 087.6541	VALVO	2222 678 10101	
C197	CC 56PF+-2%5X6NPO CAPACITOR	CC 087.6512	VALVO	2222 678 10569	
C200	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C201	CC 1NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C202	CC 1NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C203	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C204	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C205	CC 1NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C206	CC 1NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C207	CC 1NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C208	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C209	CC 10NF+-10X50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C210	CC 1NF+-10X50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthaltene in contained in
C211	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C212	CC 270PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8867	VITRAMON	VJ1206 A 271 F FAT	
C213	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C214	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C215	CC 180PF+-1%50V NPO 1206C CHIP CAPACITOR	CC 099.8844	VITRAMON	VJ1206 A 181 F FAT	
C216	CC 180PF+-1%50V NPO 1206C CHIP CAPACITOR	CC 099.8844	VITRAMON	VJ1206 A 181 F FAT	
C217	CC 2,2NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8444	VITRAMON	VJ1206 Y 222 K FAT	
C218	CC 2,2NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8444	VITRAMON	VJ1206 Y 222 K FAT	
C219	CC 680PF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8421	VITRAMON	VJ1206Y681KFA	
C220	CC 390PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8880	VITRAMON	VJ1206 A 391 F FAT	
C221	CC 82PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8821	VITRAMON	VJ1206 A 820 F FAT	
C222	CC 680PF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8421	VITRAMON	VJ1206Y681KFA	
C223	CC 390PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8880	VITRAMON	VJ1206 A 391 F FAT	
C224	CC 82PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8821	VITRAMON	VJ1206 A 820 F FAT	
C225	CC 100NF+-10%50V X7R 1206 GERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C240	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C270	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C285	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C325	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C348	LD FILT. 40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C349	LD FILT. 40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C350	CE 10UF+-20%25V SAL ELECTR. CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C351	CE 10UF+-20%25V SAL ELECTR. CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C352	CE 22UF+-20%10V SAL ELECTR. CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C353	CE 10UF+-20%25V SAL ELECTR. CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C354	CE 10UF+-20%25V SAL ELECTR. CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C355	CE 10UF+-20%25V SAL ELECTR. CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C356	CE 22UF+-20%10V SAL ELECTR. CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C357	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
..361					
C362	CE 22UF+-20%10V SAL ELECTR. CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
D71	BL UPB581C 2:1 DIVID DIVIDER	840.6113	NEC	UPB581C	
D180	BL MM74HCOON 4X2IN.NAND QUAD 2-INPUT NAND GATE	BL 571.3194	MOTOROLA	MC74HCOON	
D181	BL PC74HC123 2XMULTIVIB DUAL MONOST.MULTIVIBRATOR	BL 099.9540	VALVO	PC74HC123P	
D182	BL MM74HC74N 2XD-FLIPFL DUAL D FLIP-FLOP	BL 571.3171	NSC	MM74HC74N	
D200	BL UPB582C 4:1 DIVID PRESCALER	820.3390	NEC	UPB582C	
D201	BL CA3199E 4:1 DIVID DIVIDER	372.1106	RCA	CA3199E	
D202	BL SP8740BDG 6:1DIVID UHF DIVIDER	349.9879	PLESSEY	SP8740BDG	
D203	BL 74F191PC U/D-BIN.CNT UP/DOWN BIN.-COUNTER	BL 344.6871	FAIRCHILD	74F191PC	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
D204	BL 74F191PC U/D-BIN.CNT UP/DOWN BIN.-COUNTER	BL 344.6871	FAIRCHILD	74F191PC	
D205	BL 74F74PC 2XD-FLIPFLOP DUAL D-FLIPFLOP	BL 344.6694	FAIRCHILD	74F74PC	
D206	BL PC74HCT393P BIN COUNT BINARY COUNTER	BL 377.8909	VALVO	PC74HCT393P	
D207	BL PC74HCT74P 2XD-FF DUAL D-FLIP-FLOP	BL 571.3436	VALVO	PC74HCT74P	
D208	BL MM74HC4538N 2XMULTIVIB DUAL MULTIVIBRATOR	BL 099.9740	NSC	MM74HC4538N	
D209	BL MM74HCOON 4X2IN.NAND QUAD 2-INPUT NAND GATE	BL 571.3194	MOTOROLA	MC74HCOON	
D210	BL MM74HCOON 4X2IN.NAND QUAD 2-INPUT NAND GATE	BL 571.3194	MOTOROLA	MC74HCOON	
D211	BJ DG211CJ 4X ANALOGSCH ANALOG SWITCH	801.8260	SILICONIX	DG211CJ	
D212	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D213	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D214	BL MM74HC4051N 8CH.AN.MUX 8CH.ANALOG MUX/DEMUX	BL 099.9670	NSC	MM74HC4051N	
D215	BL PC74HC238P 3TO8 L.DEC DECODER/DEMULTIPLEXER	BL 620.0847	VALVO	PC74HC238P	
D350	BL MM74HC11N 3X3IN.ANDG TRIPLE 3-INPUT AND GATE	BL 099.9486	NSC	MM74HC11N	
D351	BL PC74HC238P 3TO8 L.DEC DECODER/DEMULTIPLEXER	BL 620.0847	VALVO	PC74HC238P	
L1	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L3	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L6	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L21	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L23	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L26	LD 2,20UH10% 0,400HM 0,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L30	LD 2,20UH10% 0,400HM 0,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L51	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L53	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L56	LD 1,00UH10% 1,000HM 0,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L70	LD 1,00UH10% 1,000HM 0,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L71	LD 1,00UH10% 1,000HM 0,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L73	LD 1,00UH10% 1,000HM 0,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L74	LD 4,70UH10% 1,200HM 0,239A CHOKE	LD 067.2940	DELEVAN	DROSSEL 1025-36	
L75	LD 0,47UH10% 0,350HM 0,660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12	
L76	LD 0,47UH10% 0,350HM 0,660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12	
L77	LD 1,00UH10% 1,000HM 0,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L78	LD 0,47UH10% 0,350HM 0,660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12	
L101	LD 22,0UH10% 3,300HM 0,114A CHOKE	LD 067.3024	DELEVAN	DROSSEL 1025-52	
L102	LD 1,20UH10% 0,180HM 0,620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L103	LD HVB SPULE 12NH COIL	820.3454			819.8879
L125	LD 2,20UH10% 0,400HM 0,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L126	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L127	LD 2,20UH10% 0,400HM 0,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L129	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L130	LD 2,20UH10% 0,400HM 0,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L131	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
L132	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L133	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L160	LD 22,0UH10%3,300HMO,114A CHOKE	LD 067.3024	DELEVAN	DROSSEL 1025-52	
L161	LD 22,0UH10%3,300HMO,114A CHOKE	LD 067.3024	DELEVAN	DROSSEL 1025-52	
L162	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL 1025-60	
L163	LD 0,39UH10%0,300HMO,710A CHOKE	LD 067.2811	DELEVAN	DROSSEL 1025-10	
L164	LD 0,47UH10%0,350HMO,660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12	
L165	LD 0,56UH10%0,500HMO,550A CHOKE	LD 067.2834	DELEVAN	DROSSEL 1025-14	
L166	LD 4,70UH10%1,200HMO,239A CHOKE	LD 067.2940	DELEVAN	DROSSEL 1025-36	
L167	LD 0,18UH10%0,120HM1,120A CHOKE	LD 067.2770	DELEVAN	DROSSEL 1025-02	
L168	LD 0,47UH10%0,350HMO,660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12	
L169	LD 6,80UH10%2,000HMO,185A CHOKE	LD 026.4178	DELEVAN	DROSSEL 1025-40	
L170	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL 1025-60	
L200	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L201	LD 0,22UH10%0,140HM1,045A CHOKE	LD 067.2786	DELEVAN	DROSSEL 1025-04	
L202	LD 2,2MIH 10%99MIA33,80HM CHOKE	073.1759	NYTRONIC	HF-DROSSEL SWD-2200	
L203	LD 100UH10%72,00HMO,028A CHOKE	LD 037.8005	DELEVAN	DROSSEL 1025-92	
L204	LD 150 UH10%15,00HMO,061A CHOKE	LD 067.3124	DELEVAN	DROSSEL 1025-72	
L205	LD 560 UH10%46,00HMO,035A CHOKE	LD 067.3199	DELEVAN	DROSSEL 1025-86	
L206	LD 2,2MIH 10%99MIA33,80HM CHOKE	073.1759	NYTRONIC	HF-DROSSEL SWD-2200	
L207	LD 100UH10%72,00HMO,028A CHOKE	LD 037.8005	DELEVAN	DROSSEL 1025-92	
L208	LD 150 UH10%15,00HMO,061A CHOKE	LD 067.3124	DELEVAN	DROSSEL 1025-72	
L209	LD 560 UH10%46,00HMO,035A CHOKE	LD 067.3199	DELEVAN	DROSSEL 1025-86	
L350	LD 22,0UH10%3,300HMO,114A CHOKE	LD 067.3024	DELEVAN	DROSSEL 1025-52	
L351	LD 4,7UH BEI 1,35A0,240HM CHOKE	LD 026.4084	JAHRE	72.10-4R70K	
L352	LD 4,7UH BEI 1,35A0,240HM CHOKE	LD 026.4084	JAHRE	72.10-4R70K	
L353	LD 10UH BEI 0,81A 0,660HM CHOKE	LD 026.4126	JAHRE	72.10-10R0K	
L354	LD 100 UH10%8,000HMO,084A CHOKE	LD 067.3101	DELEVAN	DROSSEL 1025-68	
L355	LD 100 UH10%8,000HMO,084A CHOKE	LD 067.3101	DELEVAN	DROSSEL 1025-68	
L356	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L357	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L358	LD 4,70UH10%1,200HMO,239A CHOKE	LD 067.2940	DELEVAN	DROSSEL 1025-36	
L359	LD 2,20UH10%0,400HMO,415A CHOKE	LD 067.2905	DELEVAN	DROSSEL 1025-28	
L360	LD 4,70UH10%1,200HMO,239A CHOKE	LD 067.2940	DELEVAN	DROSSEL 1025-36	
L361	LD 4,70UH10%1,200HMO,239A CHOKE	LD 067.2940	DELEVAN	DROSSEL 1025-36	
N1	BM MSA0404 BB.AMPL BROADBAND AMPLIFIER	822.0075	AVANTEK	MSA0404	
N21	BM MSA0404 BB.AMPL BROADBAND AMPLIFIER	822.0075	AVANTEK	MSA0404	
N51	BM MSA0404 BB.AMPL BROADBAND AMPLIFIER	822.0075	AVANTEK	MSA0404	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
N71	BM MSA0304 BB.AMPL BROADBAND AMPLIFIER	840.6094	AVANTEK	MSA0304	
N72	BM MSA0304 BB.AMPL BROADBAND AMPLIFIER	840.6094	AVANTEK	MSA0304	
N73	BM MSA0404 BB.AMPL BROADBAND AMPLIFIER	822.0075	AVANTEK	MSA0404	
N125	BM MSA0404 BB.AMPL BROADBAND AMPLIFIER	822.0075	AVANTEK	MSA0404	
N126	BM MSA0404 BB.AMPL BROADBAND AMPLIFIER	822.0075	AVANTEK	MSA0404	
N127	BM MSA0404 BB.AMPL BROADBAND AMPLIFIER	822.0075	AVANTEK	MSA0404	
N128	BO LF156J BIFET OPAMP OPERATIONAL AMPLIFIER	BO 645.7251	MOTOROLA	LF156J	
N200	BO LF156J BIFET OPAMP OPERATIONAL AMPLIFIER	BO 645.7251	MOTOROLA	LF156J	
N201	BO NE521N 2X COMPAR COMPARATOR	230.5602	SIGNETICS	NE521N	
N202	BO TLO72ACP 2XFET OPAMP OPERATIONAL AMPLIFIER	340.6054	TEXAS INST	TLO72ACP	
N220	BO LF412CN 2XFET OPAMP OPERATIONAL AMPLIFIER	356.0521	NSC	LF412CN	
N350	BO LM393N 2X COMPAR. COMPARATOR	BO 803.0696	NSC	LM393N	
P1	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P2	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P21	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P22	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P51	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P52	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P160 ..166	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
P200 ..210	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
R1	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R2	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R3	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R4	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R5	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R6	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R7	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R8	RG 2,74KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5766	DALE	CRCW1206-10 2K74 F-T	
R9	RS 0,5W 5KOHM+-20%KURVE 1 DEPOS.-CARBON POTENTIOMET	RS 069.8052	BOURNS	3329H-1-502	
R10	RG 12,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0841	DALE	CRCW1206-10 12K1 F-T	
R11	RG 3,92KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5808	DALE	CRCW1206-10 3K92 F-T	
R12	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R13	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R14	RG 182 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5595	DALE	CRCW1206-10 182R F-T	
R15	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R16	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R17	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R18	RG 2,7 OHM+-5%TK200 1206# CHIP RESISTOR	356.3637	VALVO	RC 01 2,7OHM 5%TK200	

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R19	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R20	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R21	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R22	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R23	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R24	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R25	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R26	RG 1,82KOHM+0%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R27	RG 15,0 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5450	DALE	CRW1206-10 15R F-T	
R28	RG 2,74KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5766	DALE	CRCW1206-10 2K74 F-T	
R29	RS 0,5W 5KOHM+-20%KURVE1 DEPOS.-CARBON POTENTIOMET	RS 069.8052	BOURNS	3329H-1-502	
R30	RG 12,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0841	DALE	CRCW1206-10 12K1 F-T	
R31	RG 3,92KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5808	DALE	CRCW1206-10 3K92 F-T	
R32	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R33	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R34	RG 182 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5595	DALE	CRCW1206-10 182R F-T	
R35	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R36	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R37	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R38	RG 2,7 OHM+-5%TK200 1206# CHIP RESISTOR	356.3637	VALVO	RC 01 2,7OHM 5%TK200	
R39	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R40	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R44	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R45	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R46	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R47	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56,2OHM-F-D	
R50	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R51	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R52	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R53	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R54	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R55	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R56	RG 1,82KOHM+0%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R57	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R58	RG 2,74KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5766	DALE	CRCW1206-10 2K74 F-T	
R59	RS 0,5W 5KOHM+-20%KURVE1 DEPOS.-CARBON POTENTIOMET	RS 069.8052	BOURNS	3329H-1-502	
R60	RG 12,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0841	DALE	CRCW1206-10 12K1 F-T	
R61	RG 3,92KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5808	DALE	CRCW1206-10 3K92 F-T	
R62	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	

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R63	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R64	RG 182 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5595	DALE	CRCW1206-10 182R F-T	
R65	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R66	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R67	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R68	RG 2,7 OHM+-5%TK200 1206# CHIP RESISTOR	356.3637	VALVO	RC 01 2,7OHM 5%TK200	
R69	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R70	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R71	RG 4,75OHM+-1%TK100 1206# CHIP-RESISTOR	RG 007.8420	EBG	CT3216 4,75OHM 1% TK	
R72	RL 0,21W 180 OHM2% UNGEW. RESISTOR	RL 092.5985	RESISTA	MK1 180OHM 2% UNGEW.	
R73	RL 0,21W 180 OHM2% UNGEW. RESISTOR	RL 092.5985	RESISTA	MK1 180OHM 2% UNGEW.	
R75	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R76	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R77	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R78	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R79	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R83	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R84	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R85	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R86	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R87	RG 15,0 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5450	DALE	CRW1206-10 15R F-T	
R88	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R89	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R90	RG 75,0 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8855	DALE	CRCW1206-10 75R F-T	
R91	RG 75,0 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8855	DALE	CRCW1206-10 75R F-T	
R92	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R93	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R94	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R95	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R96	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R97	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R98	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R99	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R100	RG 56,2 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8826	DALE	CRCW1206-10 56R2 F-T	
R101	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R102	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R103	RG 4,75OHM+-1%TK100 1206# CHIP-RESISTOR	RG 007.8420	EBG	CT3216 4,75OHM 1% TK	
R104	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R105	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R106	RS 0,5W 2KOHM+-20%KURVE 1 DEPOS.-CARBON POTENTIOMET	RS 069.8046	BOURNS	3329H-1-202	
R107	RG 8,25KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0770	DALE	CRCW1206-10 8K25 F-T	
R108	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R109	RG 47,5KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5950	DALE	CRCW1206-10 47K5 F-T	
R110	RG 182KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5989	DALE	CRCW1206-10 182K F-T	
R111	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R112	RG 12,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0841	DALE	CRCW1206-10 12K1 F-T	
R113	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R114	RL 0,21W 1,0KOHM2% UNGEW. RESISTOR	RL 092.6075	RESISTA	MK1 1K 2% UNGEW.	
R115	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	819.8827.01
R116	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	819.8827.01
R117	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R118	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R119	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	819.8827.01
R120	RG 12,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0841	DALE	CRCW1206-10 12K1 F-T	
R121	RL 0,21W 1,0KOHM2% UNGEW. RESISTOR	RL 092.6075	RESISTA	MK1 1K 2% UNGEW.	
R122	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R125	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R126	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R127	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	
R128	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R129	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R130	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R131	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R132	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R133	RG 432 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5689	DALE	CRCW1206-10 22R1 F-T	
R134	RG 432 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5689	DALE	CRCW1206-10 22R1 F-T	
R135	RG 47,5KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5950	DALE	CRCW1206-10 47K5 F-T	
R136	RG 12,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0841	DALE	CRCW1206-10 12K1 F-T	
R137	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R138	RG 15,0 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5450	DALE	CRW1206-10 15R F-T	
R139	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56,20HM-F-D	
R140	RL 0,21W 180 OHM2% UNGEW. RESISTOR	RL 092.5985	RESISTA	MK1 180OHM 2% UNGEW.	
R142	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R143	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R144	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R145	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R146	RG 332 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6033	DALE	CRCW1206-10 332K F-T	
R147	RG 681 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6110	DALE	CRCW1206-10 681K F-T	

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R148	RG 47,5KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5950	DALE	CRCW1206-10 47K5 F-T	
R149	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R150	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R151	RG 68,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1902	DALE	CRCW1206-10 68K1 F-T	
R152	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R153	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R154	RL 0,21W 180 OHM2% UNGEW. RESISTOR	RL 092.5985	RESISTA	MK1 180OHM 2% UNGEW.	
R155	RG 68,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1902	DALE	CRCW1206-10 68K1 F-T	
R156	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R157	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R158	RL 0,35W3,32MOHM+-1%TK50 METALFILMRESISTOR	RL 099.8215	RESISTA	MK2 3,32MOHM 1% TK50	
R159	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R160	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R161	RG 2,74KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5766	DALE	CRCW1206-10 2K74 F-T	
R162	RG 2,74KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5766	DALE	CRCW1206-10 2K74 F-T	
R163	RG 150 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5972	DALE	CRCW1206-10 150K F-T	
R164	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7903	BOURNS	3386F-1-103	
R165	RG 150 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5972	DALE	CRCW1206-10 150K F-T	
R166	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R167	RG 562 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9068	DALE	CRCW1206-10 562R F-T	
R168	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R169	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R170	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R171	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R172	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R173	RG 33,2KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5914	DALE	CRCW1206-10 33K2 F-T	
R174	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R175	RG 33,2KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5914	DALE	CRCW1206-10 33K2 F-T	
R177	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R180	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R181	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R184	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R185	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R186	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R187	RG 0-OHM WIDERSTAND-CHIP RESISTOR CHIP 0-OHM	RG 007.5108	DALE	CRCW1206-10 0R F-T	
R188	RG 0-OHM WIDERSTAND-CHIP RESISTOR CHIP 0-OHM	RG 007.5108	DALE	CRCW1206-10 0R F-T	
R189	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R190	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R191	RG 3,32KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5789	DALE	CRCW1206-10 3K32 F-T	

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R192	RG 3,32KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5789	DALE	CRCW1206-10 3K32 F-T	
R193	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T	
R194	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R195	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R196	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R200	RG 1,5 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5714	DALE	CRCW1206-10 1K5 F-T	
R201	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R202	RS 0,5W2KOHM+-10%10X10X5 CERMET POTENTIOMETER	RS 247.7961	BOURNS	3386X-1-202	
R203	RS 0,5W2KOHM+-10%10X10X5 CERMET POTENTIOMETER	RS 247.7961	BOURNS	3386X-1-202	
R204	RS 0,5W2KOHM+-10%10X10X5 CERMET POTENTIOMETER	RS 247.7961	BOURNS	3386X-1-202	
R205	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R206	RG 681 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6110	DALE	CRCW1206-10 681K F-T	
R207	RG 681 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6110	DALE	CRCW1206-10 681K F-T	
R208	RG 681 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.6110	DALE	CRCW1206-10 681K F-T	
R209	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R210	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R211	RD 0,8W2,7KOHM+-3%TK20 WIRE-WOUND RESISTOR	RD 463.1650	DRALORIC	T-1A-702,7KOHM	
R212	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	
R213	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R214	RG 27,4KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5895	DALE	CRCW1206-10 27K4 F-T	
R215	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R216	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R217	RG 33,2KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5914	DALE	CRCW1206-10 33K2 F-T	
R218	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R219	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R220	RG 56,2KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1883	DALE	CRCW1206-10 56K2 F-T	
R221	RG 56,2KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1883	DALE	CRCW1206-10 56K2 F-T	
R222	RG 56,2KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1883	DALE	CRCW1206-10 56K2 F-T	
R223	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R224	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R225	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R226	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R227	RG 22,1KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5872	DALE	CRCW1206-10 22K1 F-T	
R228	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R229	RG 47,5 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5566	DALE	CRCW1206-10 47R5 F-T	
R230	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R231	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R232	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R233	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	

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R234	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R235	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R236	RG 12,1KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0841	DALE	CRCW1206-10 12K1 F-T	
R237	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R241	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R242	RG 15,0KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5843	DALE	CRCW1206-10 15K F-T	
R243	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R244	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R245	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R247	RL 0,35W47,5KOHM+-0,1%T25 RESISTOR	RL 084.4360	DRALORIC	SMA/207/47,5K-B-E	
R248	RL 0,35W11,0KOHM+-0,1%T25 RESISTOR	RL 084.3141	DRALORIC	SMA0207/11K-B-E	
R250	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R251	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R252	RG 33,2KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5914	DALE	CRCW1206-10 33K2 F-T	
R253	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R257	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R260	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R261	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R262	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R263	RG 68,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8849	DALE	CRCW1206-10 68R1 F-T	
R264	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T	
R265	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R266	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R267	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R268	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R269	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R270	RL 0,35W 1,82KOHM+-1%TK50 RESISTOR	RL 082.2277	DRALORIC	SMA0207/1,82K-F-C	
R271	RG 3,32KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5789	DALE	CRCW1206-10 3K32 F-T	
R272	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T	
R273	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R274	RG 4,75OHM+-1%TK100 1206# CHIP-RESISTOR	RG 007.8420	EBG	CT3216 4,75OHM 1% TK	
R275	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R278	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R279	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R280	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R281	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R285	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R290	RL 0,35W1,82KOHM+-0,1%T25 RESISTOR	RL 083.9646	DRALORIC	SMA/207/1,82K-B-E	
R291	RL 0,35W1,82KOHM+-0,1%T25 RESISTOR	RL 083.9646	DRALORIC	SMA/207/1,82K-B-E	
R292	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	

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R293	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R294	RL 0,35W 1,58KOHM+-1%TK50 RESISTOR	RL 082.2525	DRALORIC	SMA 0207/1,58K-F-C	
R295	RS 0,5W 500 OHM+-20%KURV1 DEPOS.-CARBON POTENTIOMET	RS 069.8023	BOURNS	3329H-1-501	
R296	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R297	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R298	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R299	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R300 .303	RL 0,35W1,47KOHM+-0,1%T25 RESISTOR	RL 083.9469	DRALORIC	SMA0207	
R304	RG 27,4KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5895	DALE	CRCW1206-10 27K4 F-T	
R305	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R306	RG 8,25KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0770	DALE	CRCW1206-10 8K25 F-T	
R307	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R308	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R309	RG 8,25KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0770	DALE	CRCW1206-10 8K25 F-T	
R310	RG 56,2KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1883	DALE	CRCW1206-10 56K2 F-T	
R311	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R312	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R313	RG 6,81KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0758	DALE	CRCW1206-10 6K81 F-T	
R314	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R315	RG 182KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5989	DALE	CRCW1206-10 182K F-T	
R317	RG 22,1KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5872	DALE	CRCW1206-10 22K1 F-T	
R318	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R319	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRGW1206-10 4K75 F-T	
R320	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R321	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R322	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R326	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R327	RG 3,32KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5789	DALE	CRCW1206-10 3K32 F-T	
R350	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R351	RG 39,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5543	DALE	CRCW1206-10 39R2 F-T	
R352	RG 39,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5543	DALE	CRCW1206-10 39R2 F-T	
R353	RL 0,35W 19,6KOHM+-1%TK50 RESISTOR	RL 083.1516	DRALORIC	SMA/207/19,6K-F-C	
R354	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R355	RG 182 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5595	DALE	CRCW1206-10 182R F-T	
R356	RG 22,1KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5872	DALE	CRCW1206-10 22K1 F-T	
R357	RD 2.4W 10 OHM+-3% WIRE-WOUND RESISTOR	RD 087.5097	SAGE	1200S100HM+3%	
R358	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R359	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMA0207/3320HM-F-D	
R360	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R470	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	819.8879
T101	LU UEBERTRAGER TRANSFORMER	356.1057			
V1	AE BB405B 11/ 2PF CDI TUNING DIODE	AE 596.6839	VALVO	BB405B	
V2	AE BB405B 11/ 2PF CDI TUNING DIODE	AE 596.6839	VALVO	BB405B	
V3	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V4	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V5	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V6	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V7	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V8	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V21	AE BB405B 11/ 2PF CDI TUNING DIODE	AE 596.6839	VALVO	BB405B	
V22	AE BB405B 11/ 2PF CDI TUNING DIODE	AE 596.6839	VALVO	BB405B	
V23	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V24	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V25	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V26	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V27	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V28	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V51	AE BB405B 11/ 2PF CDI TUNING DIODE	AE 596.6839	VALVO	BB405B	
V52	AE BB405B 11/ 2PF CDI TUNING DIODE	AE 596.6839	VALVO	BB405B	
V53	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V54	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V55	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V56	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V57	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V58	AE MA4P274-287 200V PIN PIN DIODE	843.3238	MACOM	MA4P274-287	
V71	AE 1N4689 5V1 0.3W ZDI# ZENER DIODE	AE 303.9418	SEMITRONIC	1N4689 (HST. SES)	
V72	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V74	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V75	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V76	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V77	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V78	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V79	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V80	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V101	AE 5082-2810 SCHOTTKY DIODE	AE 012.9389	HEWLETT-P.	5082-2810	
V102	AK BFQ34T N 18V 150MA TRANSISTOR	801.8283	VALVO	BFQ34T	
V103	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	

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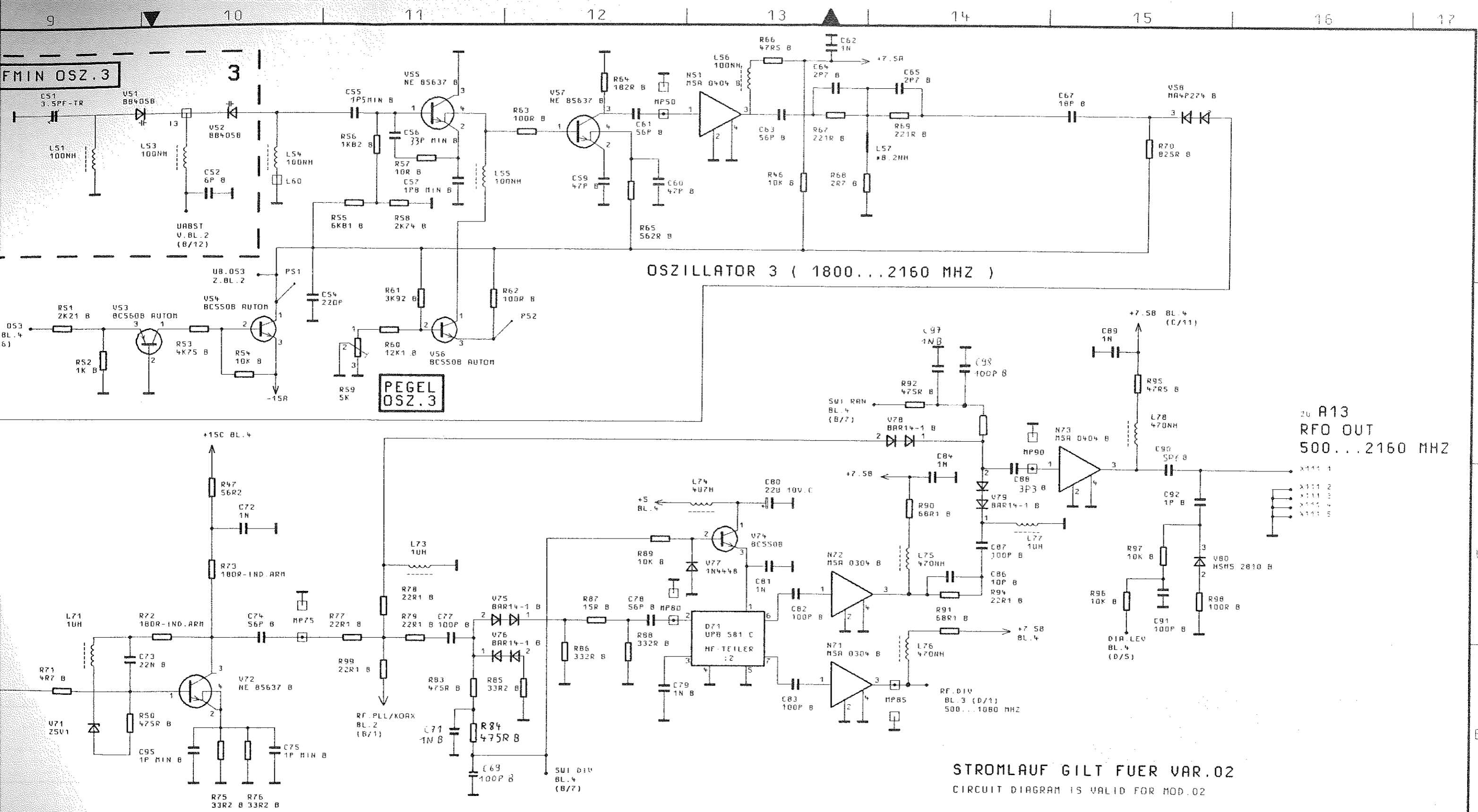
Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V104	AE 5082-0840 15V STEPRDI DIODE	AE 300.6830	HEWLETT-P.	5082-0840	
V105	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V106 .. 109	AE 5082-2810 SCHOTTKY DIODE	AE 012.9389	HEWLETT-P.	5082-2810	
V125	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V126	AE 1N4689 5V1 0.3W ZDI# ZENER DIODE	AE 303.9418	SEMITRONIC	1N4689 (HST. SES)	
V127	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V128	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V129	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V160	AM U431 N-D DUALJFET FET	AM 511.8677	SILICONIX	U431	
V161	AK 2N2369A N 15V 200MA TRANSISTOR	AK 010.4680	VALVO	2N2369A	
V162	AK 2N3906 P 40V 200MA TRANSISTOR	010.3225	MOTOROLA	2N3906	
V163	AK 2N3906 P 40V 200MA TRANSISTOR	010.3225	MOTOROLA	2N3906	
V165	AK 2N3906 P 40V 200MA TRANSISTOR	010.3225	MOTOROLA	2N3906	
V166 .. 170	AK 2N3904 N 40V 200MA TRANSISTOR	010.4996	MOTOROLA	2N3904	
V171	AK 2N3906 P 40V 200MA TRANSISTOR	010.3225	MOTOROLA	2N3906	
V172	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V173	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V174	AE BZX79/C10 0,5W ZDI ZENER DIODE	AE 012.2510	VALVO	BZX55/(79)C10 GEG.	
V175	AM J111A N-D 35V JFET FET	AM 007.2038	SILICONIX	J111A GEGURTET AMMOP	
V176	AM J111A N-D 35V JFET FET	AM 007.2038	SILICONIX	J111A GEGURTET AMMOP	
V177	AM J111A N-D 35V JFET FET	AM 007.2038	SILICONIX	J111A GEGURTET AMMOP	
V178	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT, POL. CBE	
V179	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT, POL. CBE	
V180	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT, POL. CBE	
V181	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT, POL. CBE	
V182	AK 2N2222A N 40V 800MA TRANSISTOR	AK 010.5405	VALVO	2N2222A	
V183	AK 2N2219A N 40V 800MA TRANSISTOR	AK 083.6953	VALVO	2N2219A	
V184	AM J108 N-D 25V JFET FET	AM 332.2660	SILICONIX	J108	
V185	AM J108 N-D 25V JFET FET	AM 332.2660	SILICONIX	J108	
V186	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	
V187	AK 2N2369A N 15V 200MA TRANSISTOR	AK 010.4680	VALVO	2N2369A	
V188	AK 2N2369A N 15V 200MA TRANSISTOR	AK 010.4680	VALVO	2N2369A	
V190	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT, POL. CBE	
V192	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V193	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V200	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT, POL. CBE	
V201	AK 2N4033 P 80V 1000MA TRANSISTOR	AK 083.6460	VALVO	2N4033	
V202	AK BFX48 P 30V 100MA TRANSISTOR	AK 010.3202	SGS	BFX48	
V203	AK BFX48 P 30V 100MA TRANSISTOR	AK 010.3202	SGS	BFX48	

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	21	0789	EE RF-OSZILLATOREN RF-OSCILLATORS	819.8262.01 SA	17+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V204	AE BZX79/C4V7 0,5W ZDI ZENER DIODE	AE 012.2432	AEG	BZX55/C4V7 GEG.	
V205	AE BZX55/C2V7 0,5W ZDI ZENER DIODE	AE 086.8228	AEG-TELEF.	BZX55/C2V7	
V206	AE BZX55/C2V7 0,5W ZDI ZENER DIODE	AE 086.8228	AEG-TELEF.	BZX55/C2V7	
V207	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V208	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V209	AD BAS16 75V 0A25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V213	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V214	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V350	AL BD139 N 80V 1A0 TRANSISTOR	AL 274.8994	VALVO	BD139	
V351	AE BZX79/C8V2 0,5W ZDI ZENER DIODE	AE 012.2490	AEG	BZX55/C8V2 GEGURTET	
V352	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	
V450	AM J111A N-D 35V JFET FET	AM 007.2038	SILICONIX	J111A GEGURTET AMMOP	
W1	DX HF-KABEL W1 RF-CABLE	819.8810			819.8885
W2	DX HF-KABEL W2 RF-CABLE	819.8856			819.8885
W3	DX HF-KABEL W3 RF-CABLE	819.8862			819.8885
X101	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X111	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X121	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X122	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	
X160	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X161	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	
X165	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X166	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	
X200	FP INDIREKT.STECKERL.36P. PIN CONNECTOR	FP 242.3600	BINDER	742-5-11-0178-00-36	
X201	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302	
X11A	FP STECKERLEISTE 32POL. MULTIPOINT CONNECTOR	FP 514.4550	PANDUIT	100-232-033/999	
Z352	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z353	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z355	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z357	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z361	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z362	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z363	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z365	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z366	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	

- ENDE -

ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	21	0789	EE RF-OSZILLATOREN RF-OSCILLATORS	819.8262.01 SA	18-



HF - TREIBER

STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

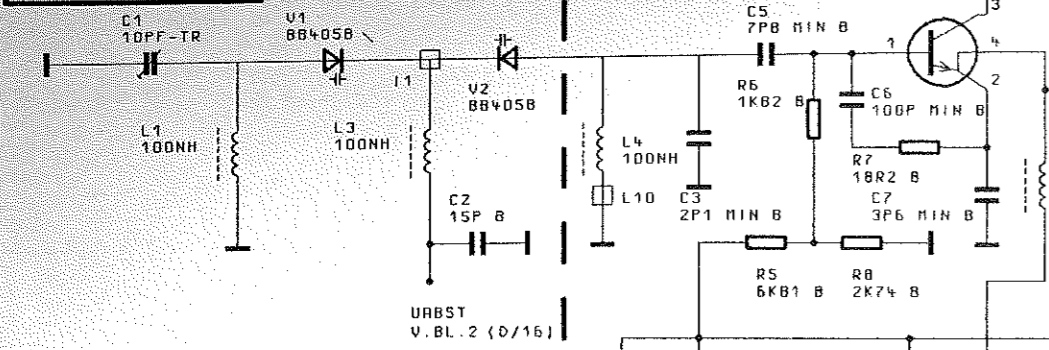
* GEDRUCKTE SPULE, DARGESTELLT AUF LEITERPLATTE

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDHABUNG.

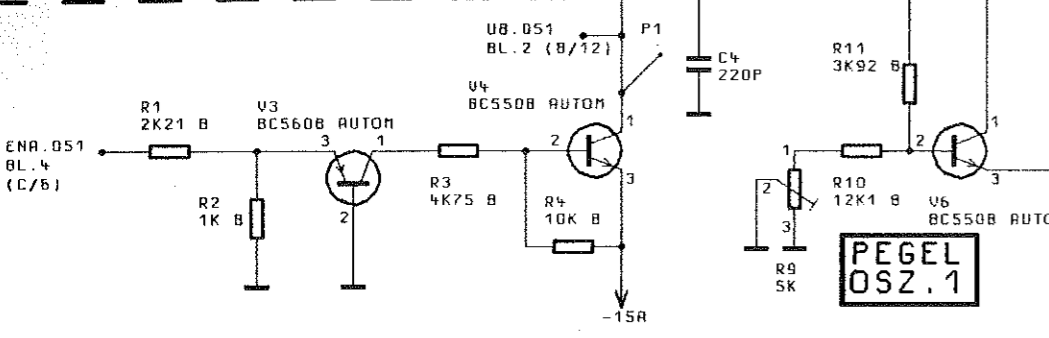
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING.

A	39845	10.88	HO	1KGB	TAG	NARE	BENENNUNG
B	39845	11.88	HO	0CAPB.		HO	
C	39845	2.89	HO	GEPR.		HO	
				NORM			RF-OSZILLATOREN RF-OSCILLATORS
				PLDTT	24.10.88	*	
RENO. IND.	RENDERUNGS-NITTEILUNG	DATUM	NARE			ZEICHN.-NR.	819.8262.015
				ZU GERÄT	SIGU	REG. I.V.	
						819.0010	ERSTE Z.

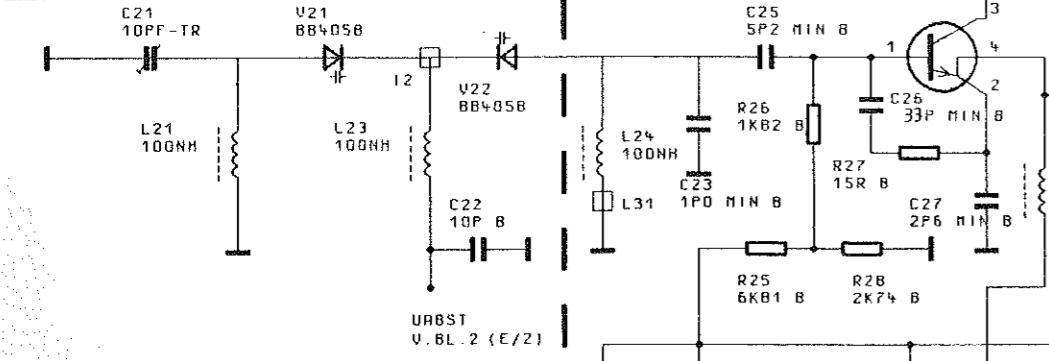
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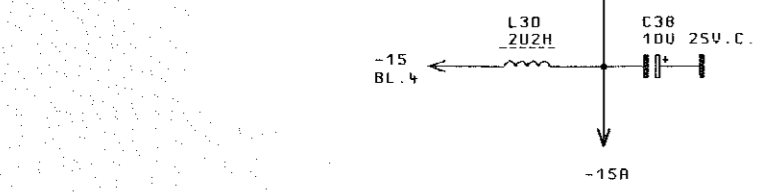
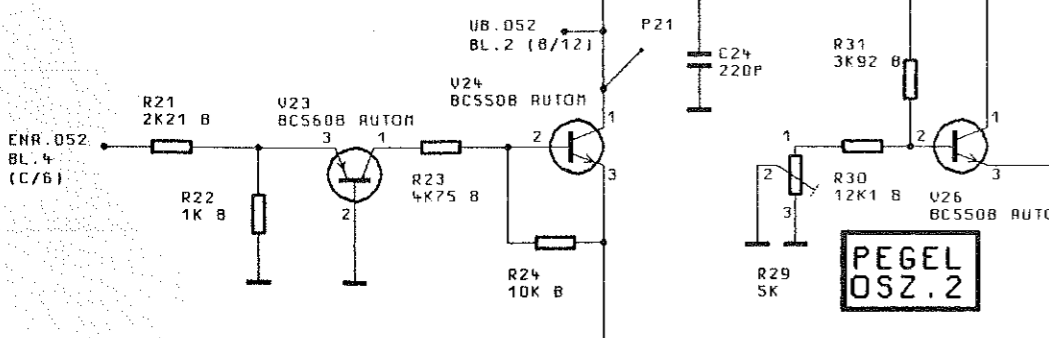
OSZILLATOR 1 (1000...1400 MHZ)



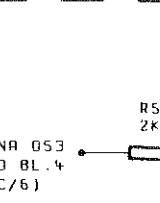
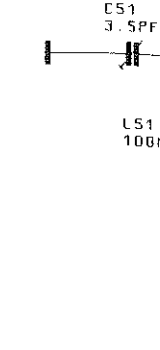
FMIN OSZ. 2



OSZILLATOR 2 (1400...1800 MHZ)



FMIN OSZ.



6

INTEGRATOR


TIEFPASS REGELSPANNUNGSSCHALTER

BANDBREITENUMSCHALTER

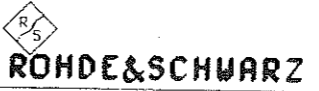
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V. BL. 3 (E/11)
FMAX: OS1 OS2 OS3

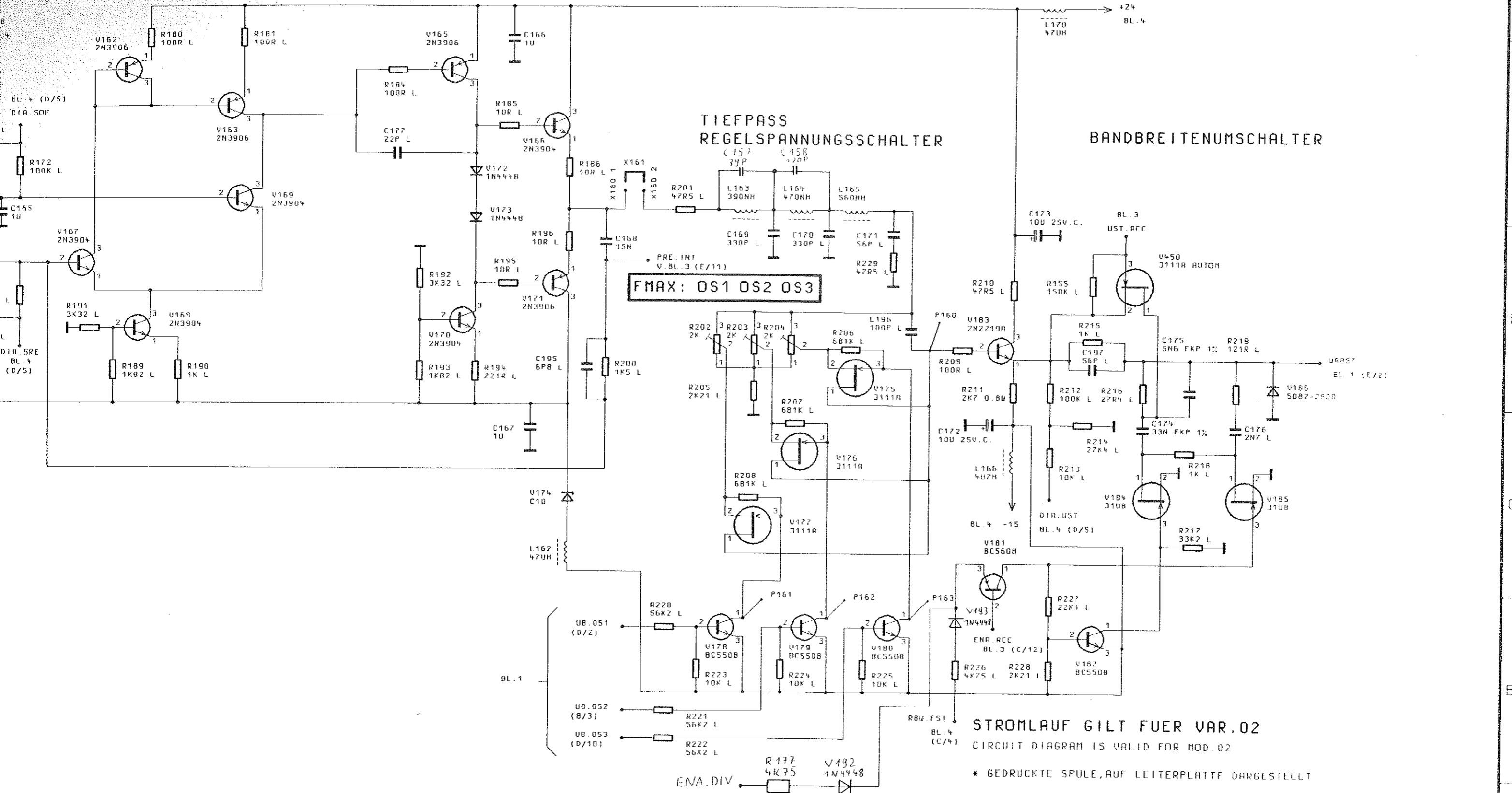
STROMLAUF GILT FUER VAR. 02
CIRCUIT DIAGRAM IS VALID FOR MOD. 02

* GEDRUCKTE SPULE, AUF LEITERPLATTE DARGESTELLT



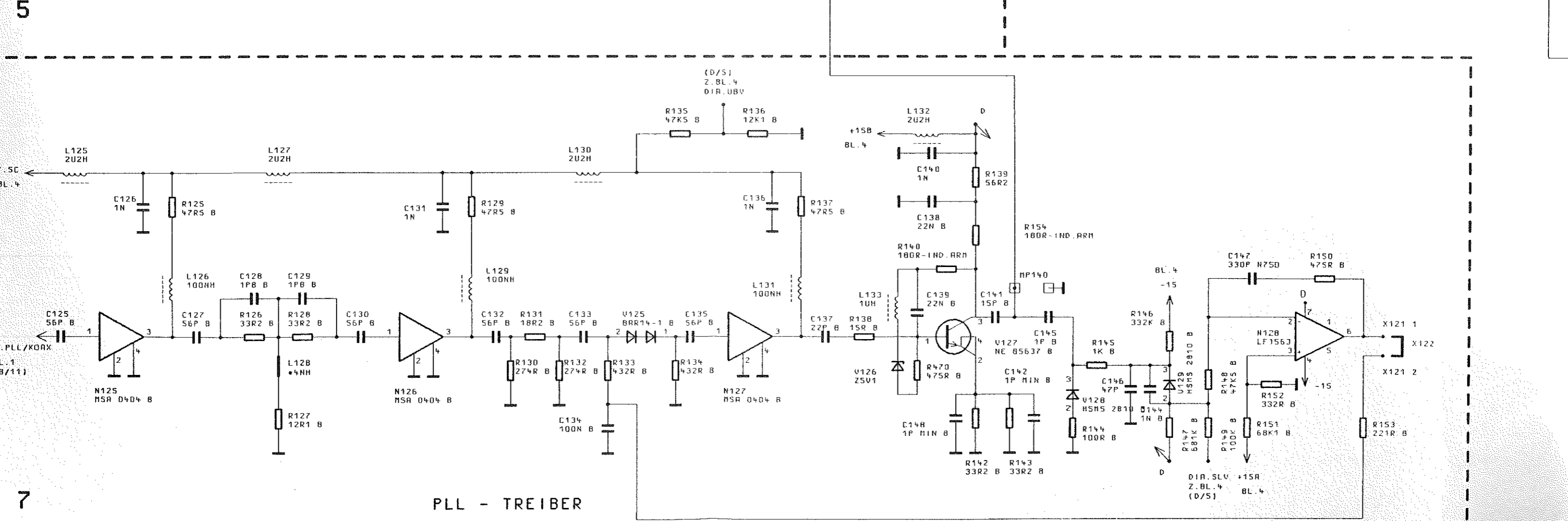
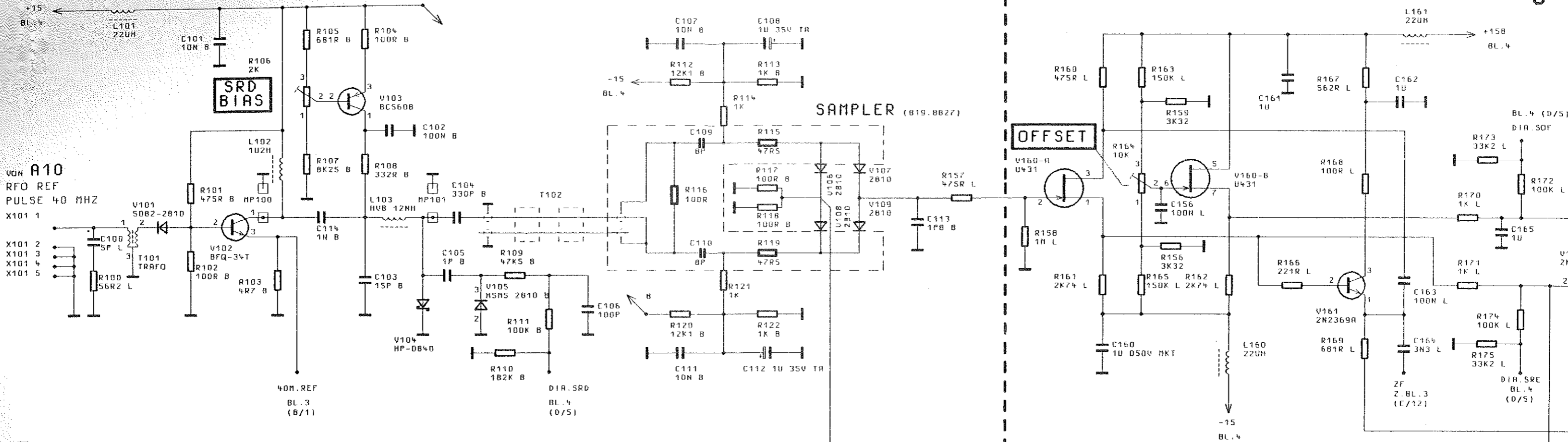
ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

A	39845	10.88	HO	TKGB	TAG	NAME	BENENNUNG RF-OSZILLATOREN RF-OSCILLATORS	
B	39845	11.88	HO	BEARB.		HO		
C	39845	2.89	HO	GEPR.		HO		
D	41825	7.89	HO	NORR				
				PLOTT		24.10.88		
 ROHDE & SCHWARZ							ZEICHN-NR.	819.8262.015
REN. IND.	RENDERUNGS-NITTEILUNG	DATUM	NAME	ZU BEHELT		SM6U	REG. I. V.	819.0010

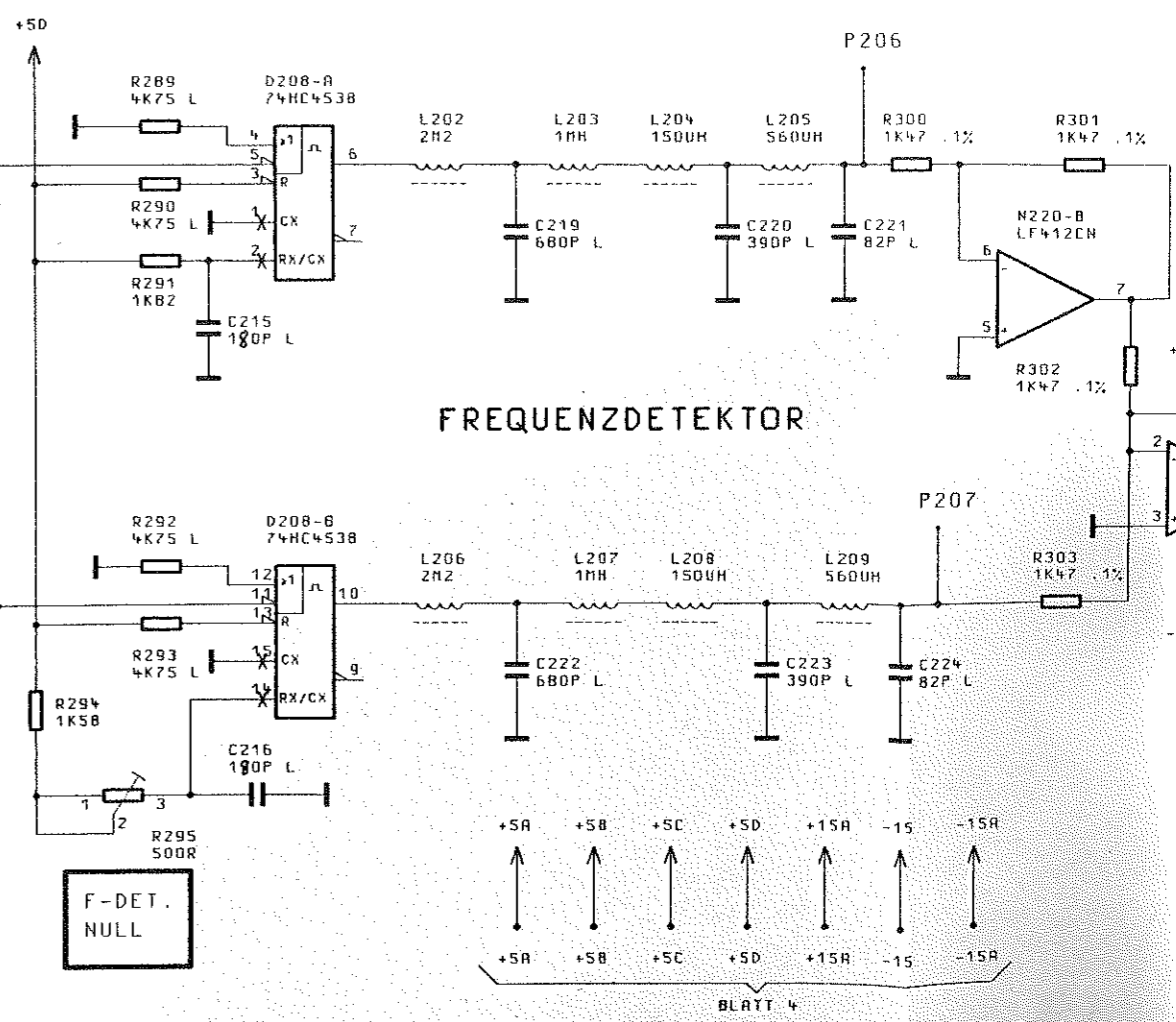
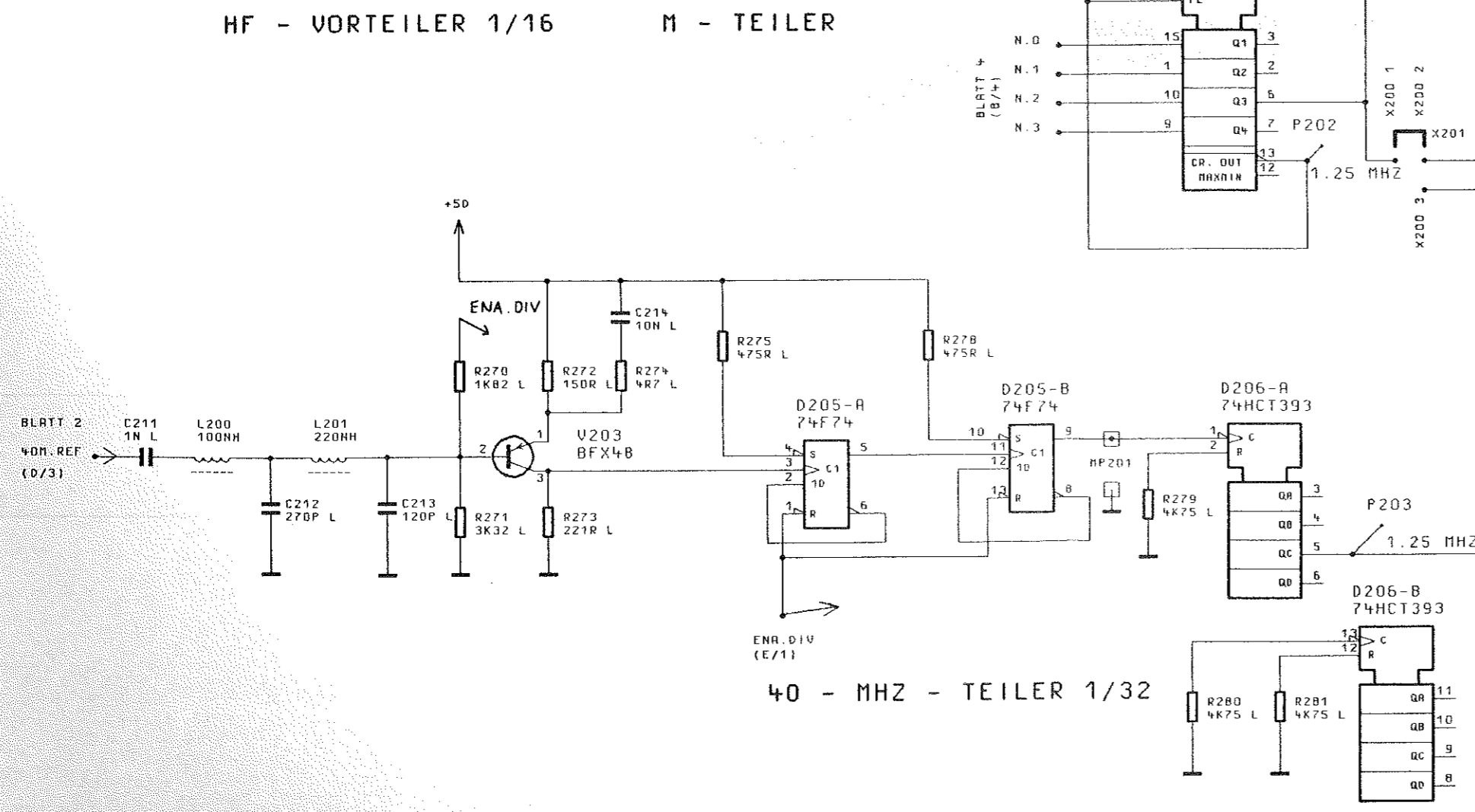
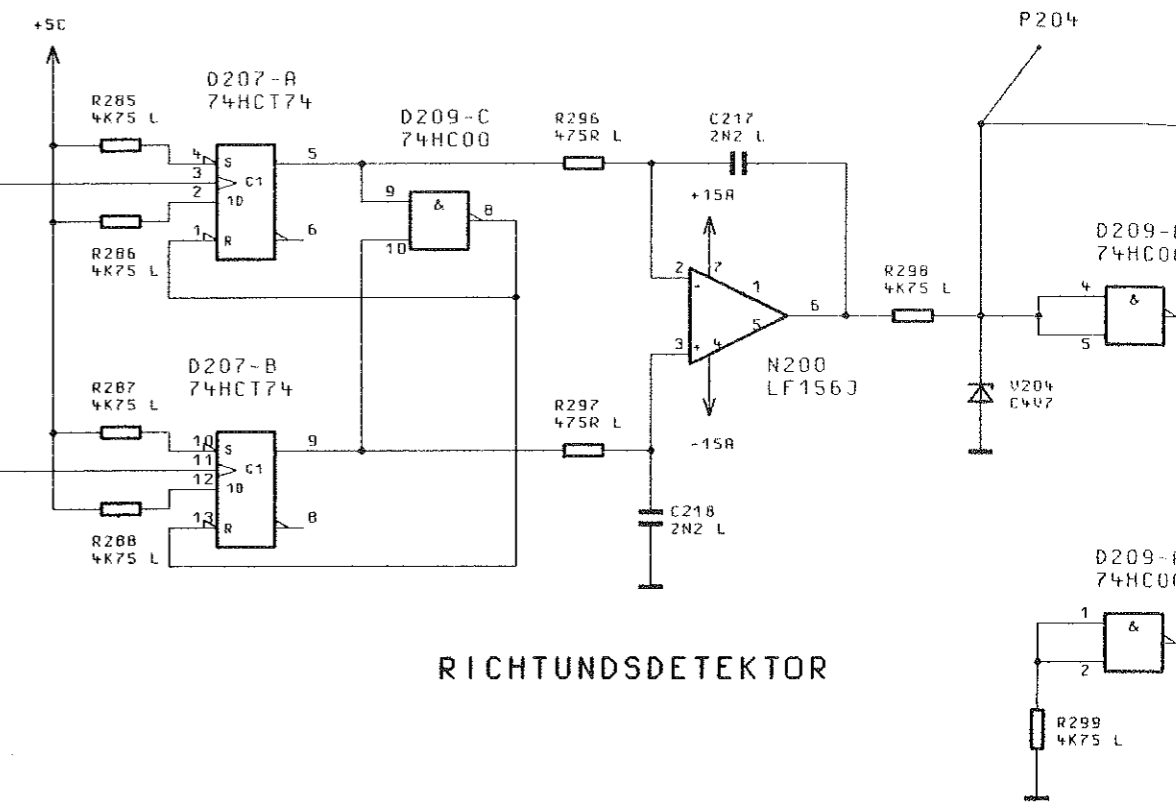
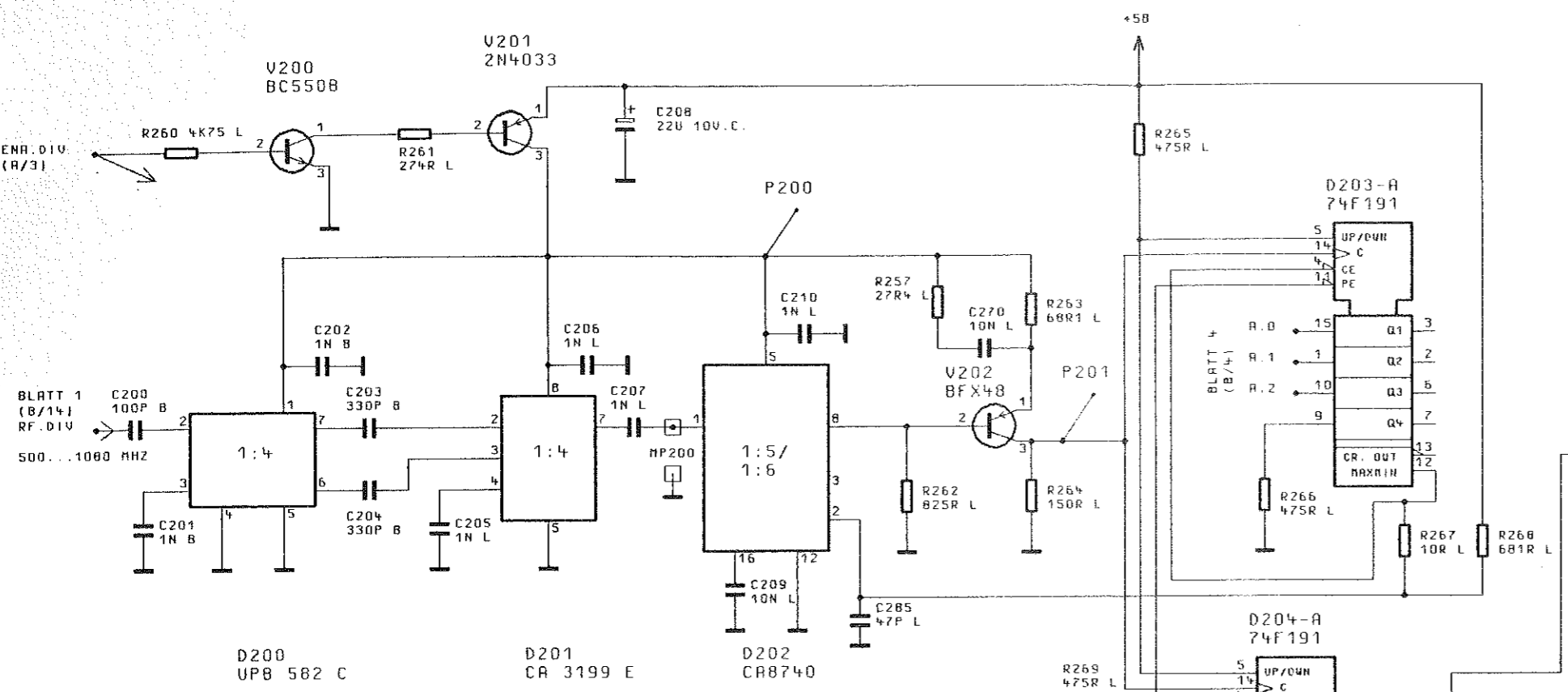


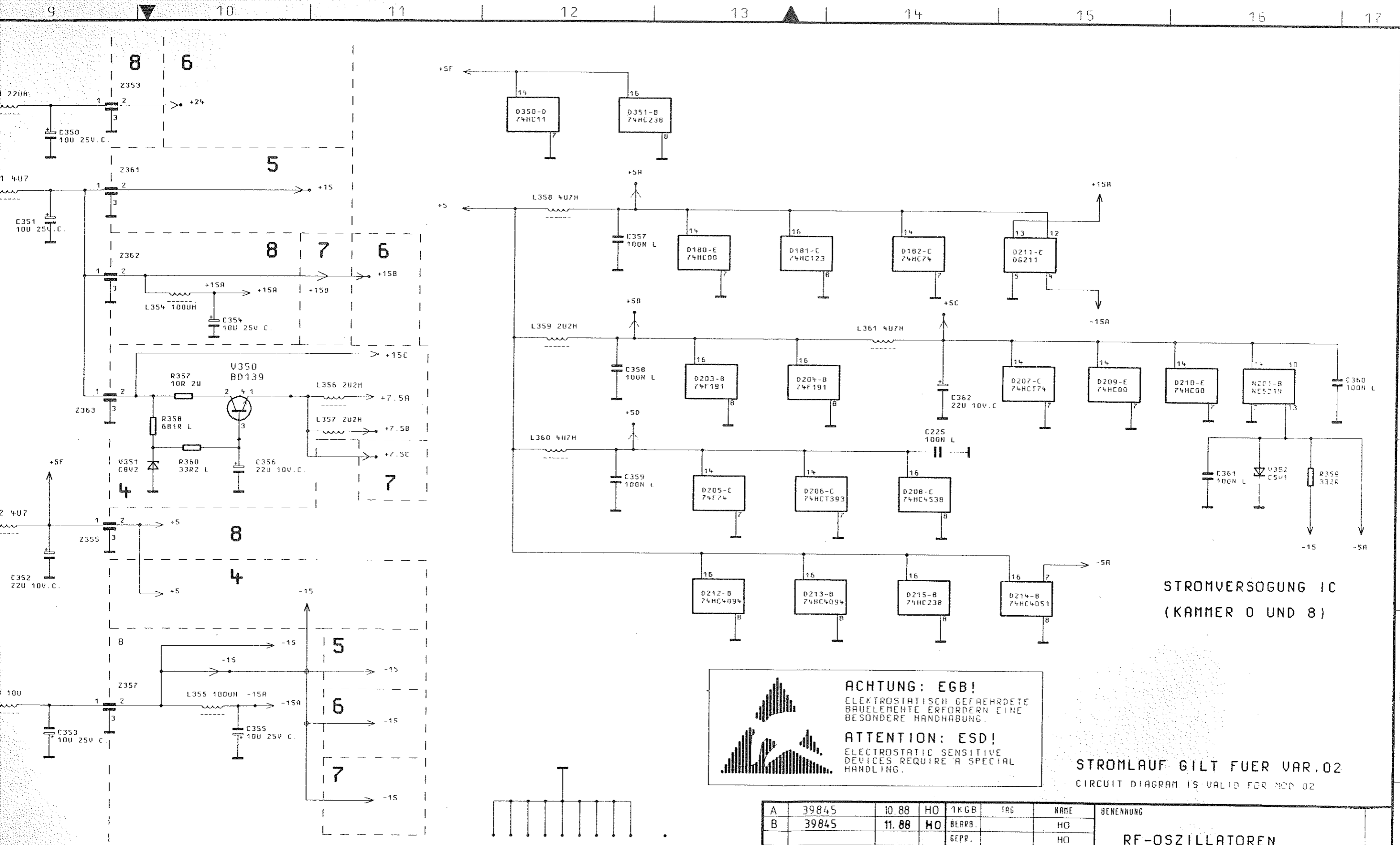
PULSTREIBER

SPANNUNGSFOLGER



PLL - TREIBER



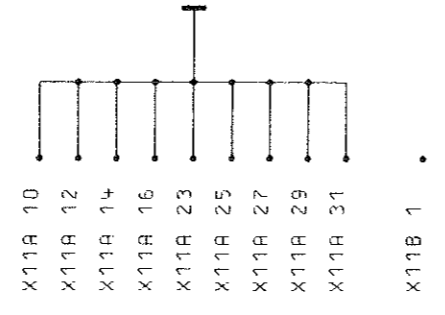


STROMVERSORGUNG

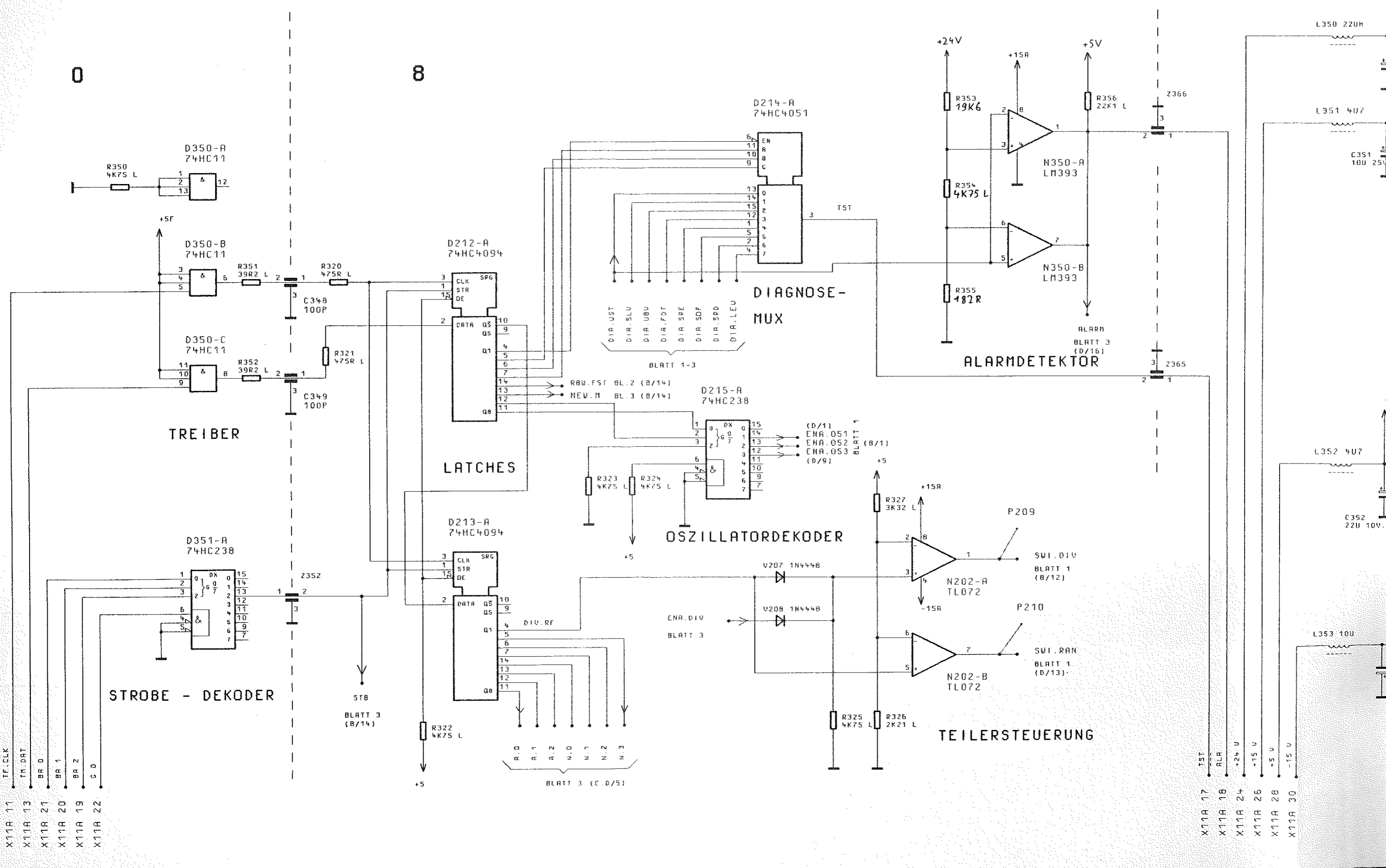
STROMVERSORGUNG IC (KAMMER 0 UND 8)

ACHTUNG: EGB!
 ELEKTROSTATISCH GEFÄHRDETE BAUELEMENTE ERFORDERN EINE BESONDERE HANDLUNG.
ATTENTION: ESD!
 ELECTROSTATIC SENSITIVE DEVICES REQUIRE A SPECIAL HANDLING.

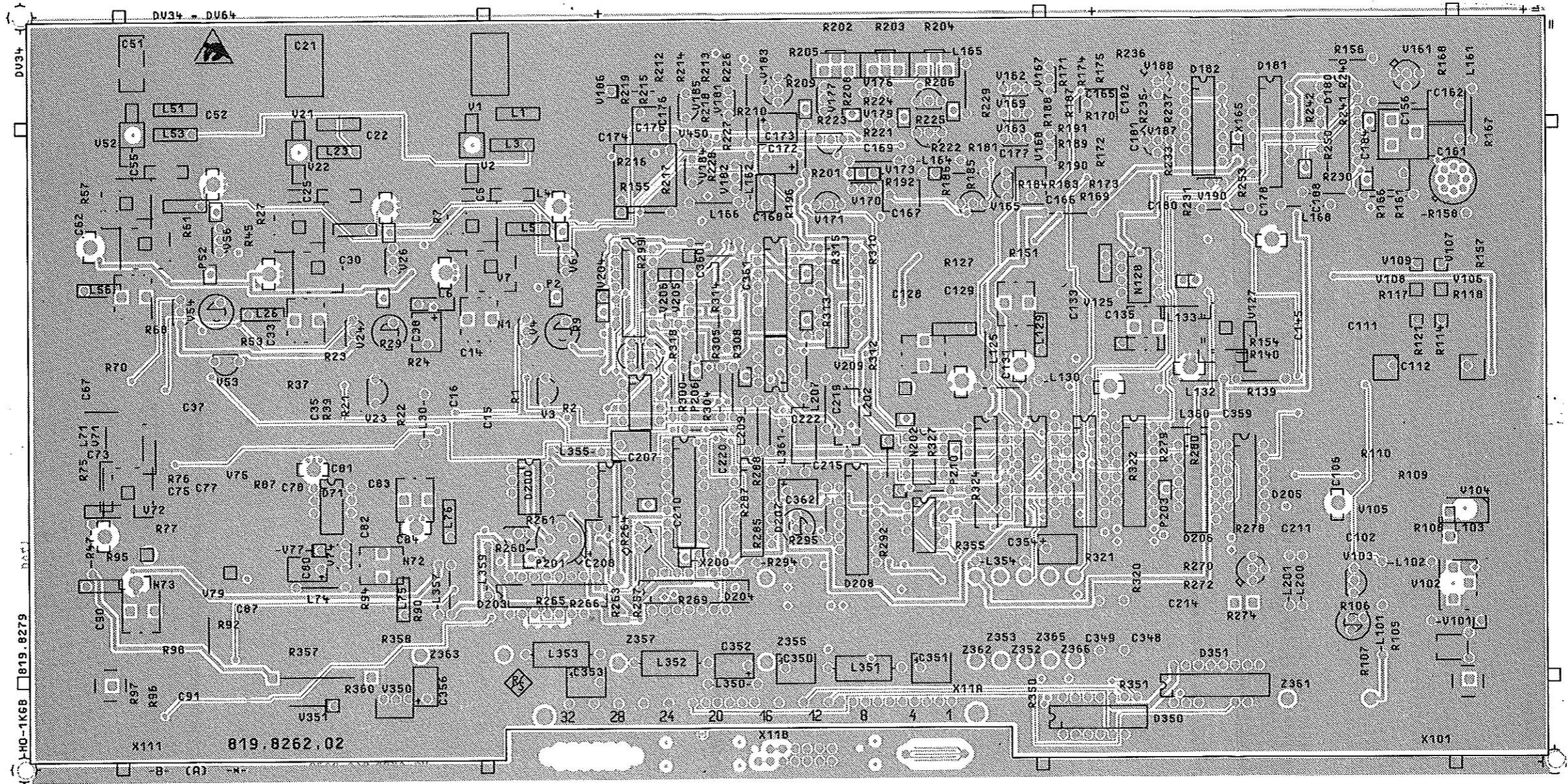
STROMLAUF GILT FUER VAR.02
 CIRCUIT DIAGRAM IS VALID FOR MOD 02



A	39845	10.88	HO	1KGB	TAG	NAME	BENENNUNG	
B	39845	11.88	HO	BEARB.		HO	RF-OSZILLATOREN RF-OSCILLATORS	
				GEPP.		HO		
				NORN				
				PLOTT	24.10.88	*		
							ZEICHN.-NR.	819.8262.01S
REND. IND.	ÄNDERUNGS-MITTEILUNG	DATUM	NAMEN	ZU GEHÖRT	SMGU	REG. I. V.	819.0010	
							EPSTE 2	4



Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



Für diese Unterlage behalten wir uns alle Rechte vor.

VARIANTENERKLÄRUNG / VERSION
VAR 02 - GRUNDAUSFÜHRUNG / BASIC MODEL

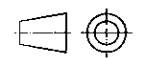
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		Halbzeug, Werkstoff	
1KGB	Tag	Name	Benennung RF - OSZILLATOR
Bearb.	09.88	HO	
Gepr.			
Norm			
			Zeichn.-Nr. 819.8262.02
Änd. Zust.	Änderungs-Mitteilung	Tag	Name
		zu Gerät SMGU	
		reg. i. V. 819.0010 V	
		erste Z.	
			Blatt-Nr. 2
			v. g. Bl.

(hierzu HVC 250)

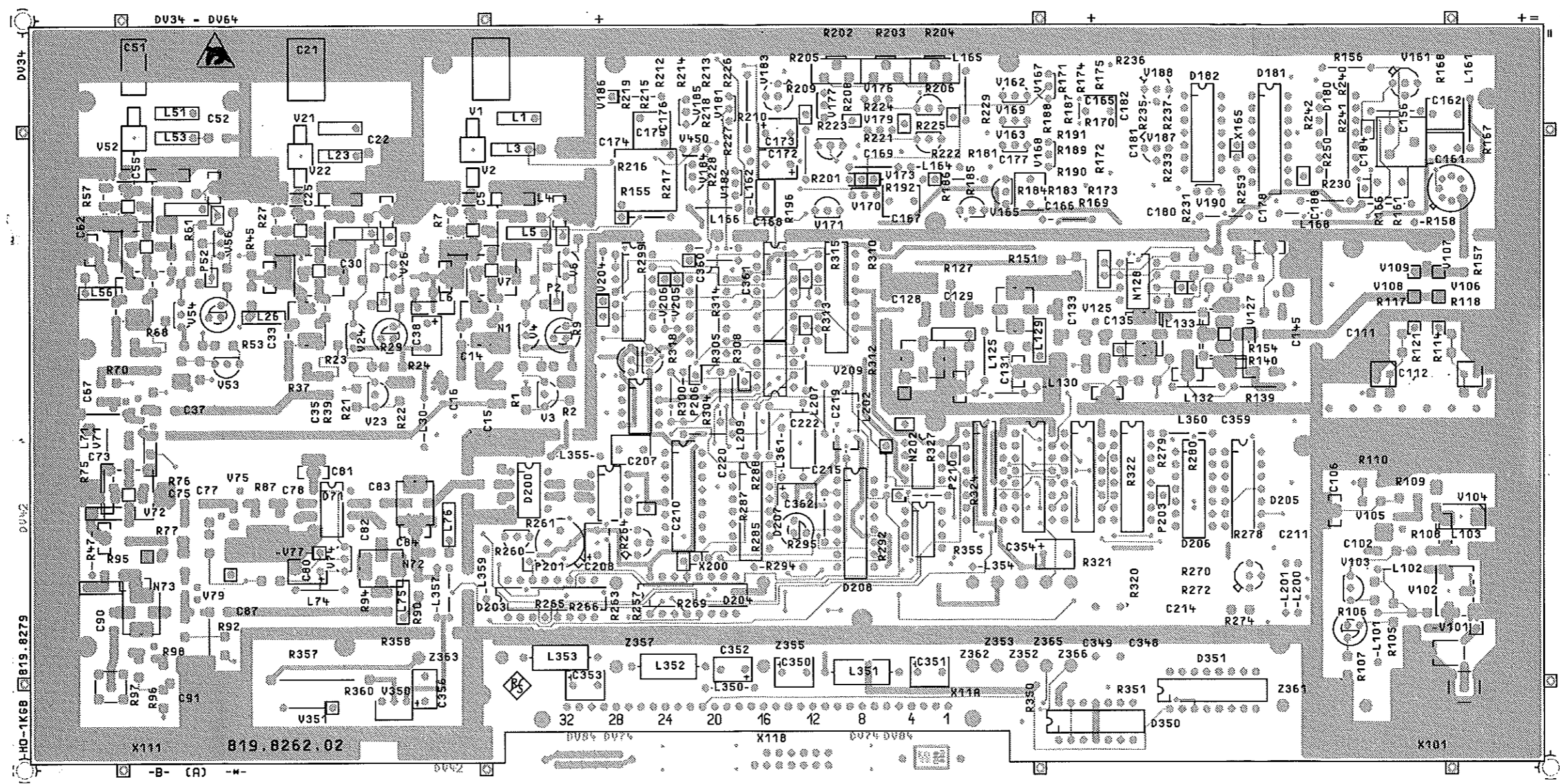


ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION ESD!
Electrostatic sensitive devices require a special handling

ISO-Projektion Methode E



Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



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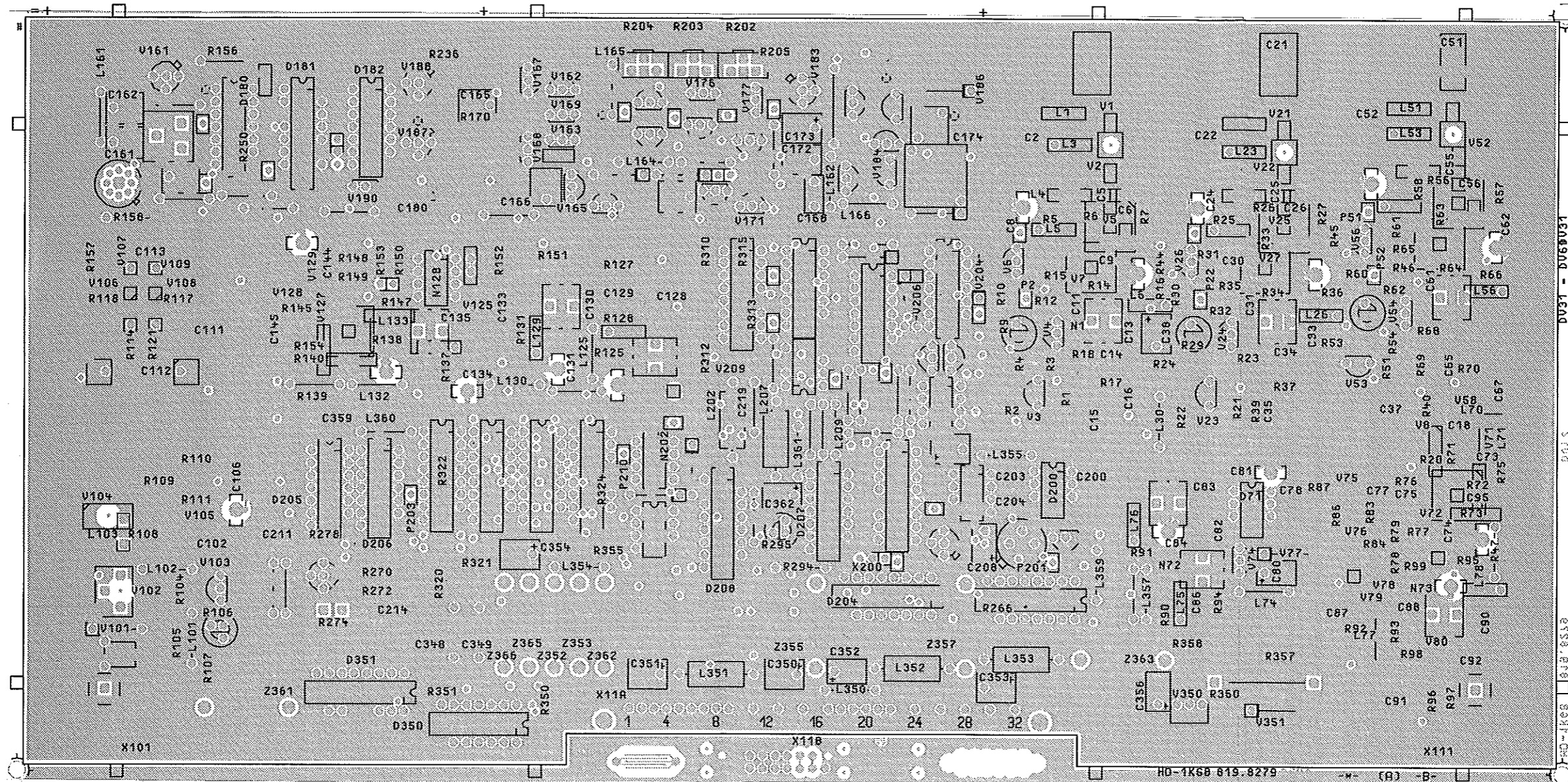
VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

Maße ohne Toleranzangabe				Maßstab 1 : 1	
				Halbzeug, Werkstoff	
1KGB	Tag	Name		Benennung	
Bearb.	09.88	HO		RF - OSZILLATOR	
Gepr.				Z	
Norm					
				Zeichn.-Nr.	
zu Gerät SMGU				819.8262.02	
reg. i. V.				819.0010 V	
erste Z.					
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	Blatt-Nr.	
				3	
				v. 9 BL	

ACHTUNG: EGB!
 Elektrostatic gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
 Electrostatic sensitive devices require a special handling

ISO-Projektion Methode E

Ansicht und Leitungsführung Lötseite
View of tracks on solder side



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VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

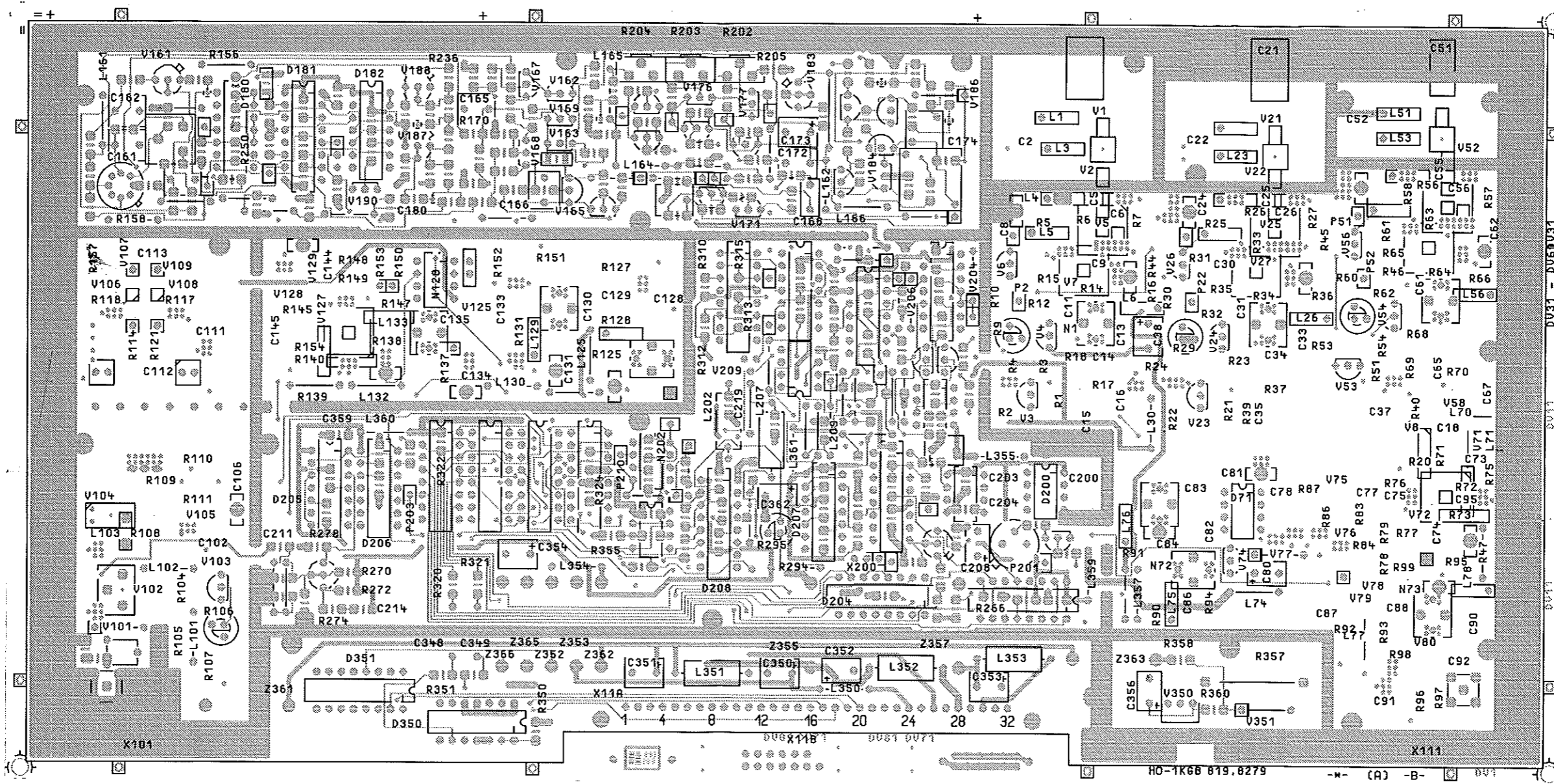
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1KGB Tag Name		Halbzeug, Werkstoff	
Bearb. 09.88	HO	Benennung	
Gepr.		RF - OSZILLATOR	
Norm		Z	
ROHDE & SCHWARZ		Zeichn.-Nr.	
zu Gerät SMGU		819.8262.02	
Änd. Zust.		reg. i. V. 819.0010 V	
Änderungs-Mitteilung		erste Z.	
Tag Name		Blatt-Nr.	
		4	
		v. 7 Bl.	



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

ISO-Projektion Methode E

Ansicht und Leitungsführung Lötseite
View of tracks on solder side



Für diese Unterlage behalten wir uns alle Rechte vor.

VARIANTENERKLÄRUNG / VERSION
VAR02 - GRUNDAUSFÜHRUNG / BASIC MODEL

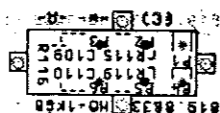
Maße ohne Toleranzangabe		Maßstab 1 : 1	
		Halbzeug, Werkstoff	
1KGB	Tag	Name	Benennung
Bearb.	09.88	HO	RF - OSZILLATOR
Gepr.			Z
Norm			
Änd. Zust.		Änderungs-Mitteilung	Tag
		Name	
		zu Gerät SMGU	
		Zeichn.-Nr.	Blatt-Nr.
		819.8262.02	5
		reg. i. V. 819.0010 V	v. 7 Bl.
		erste Z.	



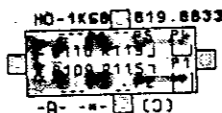
ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION ESD!
Electrostatic sensitive devices require a special handling

ISO-Projektion
Methode E


Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



Ansicht und Leitungsführung Lötseite
View of tracks on solder side



Für diese Endanwendung behalten wir uns alle Rechte vor

		Maßstab 1 : 1 Maßstab Werkstoff	
1KGB Tag Name Bearb 09.88 HO		Benennung SAMPLER	Z
Gepr			
Norm			
		Zeichn.-Nr. 819.8827	Blatt-Nr. 2 v 2 Bl.
And Zust	Anderungs-Mitteilung	Tag	Name
zu Gerät SMGU		reg. V 819.0010 V	erste Z

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ROHDE & SCHWARZ

SERVICE DOCUMENTS

Filter Bank

819.9369.02



Contents

	Page
5	Service Manual "Filter Bank" 5.1
5.1	Functions Description 5.1
5.2	Testing 5.3
5.2.1	Checking RF Transmission Level
5.2.2	Checking Spurious Harmonics
5.2.3	Checking the Return Loss at X121 and X123
5.3	Troubleshooting 5.9
5.4	Interfaces 5.11

Circuit diagrams
Parts lists
Components plans

5 Service Manual "Filter Bank"

5.1 Function Description

(See circuit diagram 819.9369 S and Fig. 5-1)

The filter bank is basically 16 lowpass filters to improve the harmonic ratio of the synthesized signal. The input signal at X121 has a frequency range of 15.625 MHz to 2160 MHz and is applied from output X121 of the output unit module. The input signal is applied in the so-called divider range (output frequency 15.625 to 2160 MHz) to the output amplifier module (output X123) and in the mixer range (output frequency 0.1 to 15.625 MHz) to the output unit module (output X122).

The various signal paths are switched over using PIN diodes. Only one filter is in operation at a time. Two filters are used for each octave for the divider range; thus 14 filters (filters 0 to 13) are required.

A pair of switches is assigned to each filter for the input and output (V43 and V56 for filter 0, V44 and V66 for filter 1 etc.)

Four pairs of group switches have been used (V40 and V68, V70 and V98 etc.) to ensure that the RF branch currently connected is not excessively loaded by RF lines branching to open switches (no-load branch lines). These group switches ensure that the switches connected to one branch point are close to one another so that only very short branch lines occur.

The signal to be applied to the mixer unit of the output stage is usually between 130 MHz and 145.625 MHz or between 520 MHz and 645 MHz with the special function "Mixing range 125 MHz" switched on. This means that it is necessary to switch over between two filters (14 and 15).

The module is driven via a serial data bus. The data for the switch control and the diagnostics multiplexer are read into the two shift registers D310 and D311.

The signals Q1 to Q4 from shift register D311 directly control the four pairs of group switches via driver modules N310.

The signals Q5 to Q8 from shift register D311 are applied to the binary decoder component D313 whose 16 outputs control the 16 pairs of switches for the filters via the driver modules N311 to N314.

Eight different diagnostics points (DC values) can be connected to output X1.A17 via the multiplexer D312.

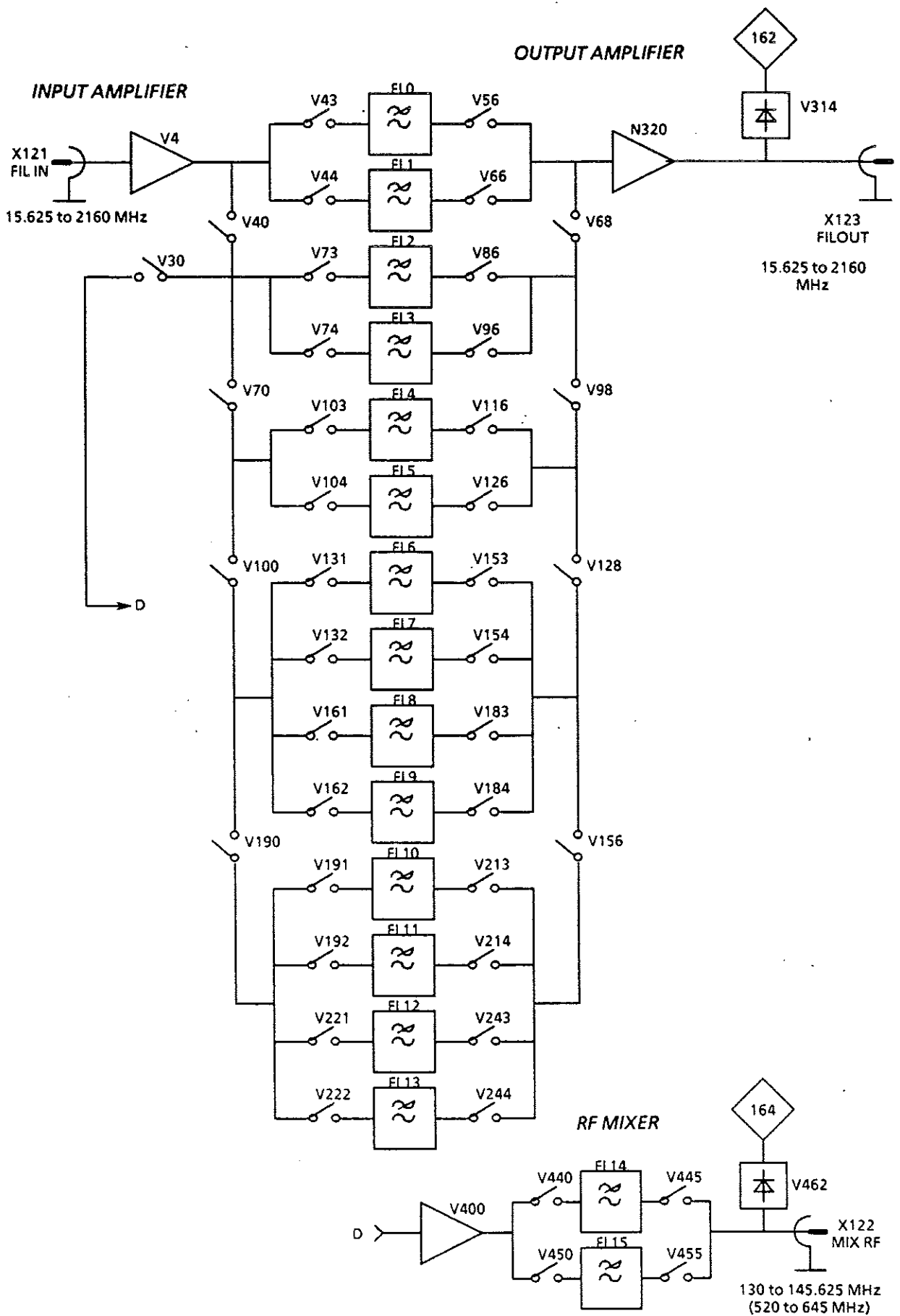


Fig. 5-1 Function diagram of module "Filter bank"

5.2 Testing

- Connect the subassembly to the service adapter.
- Pull out all RF connectors.
- Enter PRESET.

5.2.1 Checking RF Transmission Level

- Measure the transmission level between X121 and X122 (divider range) and between X121 and X123 (mixer range) at the frequencies listed in Table 5-1.

The input level at X121 should be 5 dBm ± 1 dB.

Measure three frequencies in the passband (cutoff frequencies and centre frequency) and three in the stop band (except filter 0) for each of the 16 filters.

To select each filter, set 16 different frequencies on the instrument according to the Table 5-1.

Distortion on the connecting lines and the measuring instrument should be eliminated by calibration.

Table 5-1

Entry on instrument	Remarks	Test frequency in MHz ± 1 kHz	Filter No.	Transmission level in dB	Test output	
					X123	X122
RF 2000 MHz	Lower limit	1400	0	$H_U = 3.5 \text{ dB} \pm 2 \text{ dB}$	X	
RF 2000 MHz	Centre	1780	0	$H_M = 2.0 \text{ dB} \pm 2 \text{ dB}$	X	
RF 2000 MHz	Upper limit	2160	0	$H_O = 2.8 \text{ dB} \pm 2 \text{ dB}$	X	
RF 2000 MHz	Additional frequency	1950	0	$H_Z = 2 \text{ dB} \pm 2 \text{ dB}$	X	
	Relative frequency response			$\text{MAX}(H_U, H_M, H_O, H_Z) - \text{MIN}(H_U, H_M, H_O, H_Z) \leq 2.5 \text{ dB}$	X	
RF 2000 MHz	2nd harmonic, lower limit	2800	0	$< -34 \text{ dB} + H_U$	X	
RF 1200 MHz	Lower limit	1000	1	$H_U = 3.6 \text{ dB} \pm 2 \text{ dB}$	X	
RF 1200 MHz	Centre	1200	1	$H_M = 2.7 \text{ dB} \pm 2 \text{ dB}$	X	
RF 1200 MHz	Upper limit	1400	1	$H_O = 2.5 \text{ dB} \pm 2 \text{ dB}$	X	
RF 1200 MHz	2nd harmonic, lower limit	2000	1	$< -46 \text{ dB} + H_U$	X	
RF 1200 MHz	2nd harmonic, centre	2400	1	$< -60 \text{ dB} + H_M$	X	
RF 1200 MHz	2nd harmonic, upper limit	2800	1	$< -50 \text{ dB} + H_O$	X	

Table 5-1

Entry on instrument	Remarks	Test frequency in MHz ± 1 kHz	Filter No.	Transmission level in dB	Test output	
					X123	X122
RF 800 MHz	Lower limit	700	2	$H_u = 3.6 \text{ dB} \pm 2 \text{ dB}$	X	
RF 800 MHz	Centre	850	2	$H_M = 3.1 \text{ dB} \pm 2 \text{ dB}$	X	
RF 800 MHz	Upper limit	1000	2	$H_o = 3.0 \text{ dB} \pm 2 \text{ dB}$	X	
RF 800 MHz	2nd harmonic, lower limit	1400	2	$< -33 \text{ dB} + H_u$	X	
RF 800 MHz	2nd harmonic, centre	1700	2	$< -46 \text{ dB} + H_M$	X	
RF 800 MHz	2nd harmonic, upper limit	2000	2	$< -47 \text{ dB} + H_o$	X	
RF 600 MHz	Lower limit	500	3	$H_u = 3.4 \text{ dB} \pm 2 \text{ dB}$	X	
RF 600 MHz	Centre	600	3	$H_M = 3.3 \text{ dB} \pm 2 \text{ dB}$	X	
RF 600 MHz	upper limit	700	3	$H_o = 2.5 \text{ dB} \pm 2 \text{ dB}$	X	
RF 600 MHz	2nd harmonic, lower limit	1000	3	$< -28 \text{ dB} + H_u$	X	
RF 600 MHz	2nd harmonic, centre	1200	3	$< -28 \text{ dB} + H_M$	X	
RF 600 MHz	2nd harmonic, upper limit	1400	3	$< -37 \text{ dB} + H_o$	X	
RF 400 MHz	Lower limit	350	4	$H_u = 2.2 \text{ dB} \pm 2 \text{ dB}$	X	
RF 400 MHz	Centre	425	4	$H_M = 2.1 \text{ dB} \pm 2 \text{ dB}$	X	
RF 400 MHz	Upper limit	500	4	$H_o = 2.0 \text{ dB} \pm 2 \text{ dB}$	X	
RF 400 MHz	2nd harmonic, lower limit	700	4	$< -27 \text{ dB} + H_u$	X	
RF 400 MHz	2nd harmonic, centre	850	4	$< -34 \text{ dB} + H_M$	X	
RF 400 MHz	2nd harmonic, upper limit	1000	4	$< -39 \text{ dB} + H_o$	X	
RF 300 MHz	Lower limit	250	5	$H_u = 3.3 \text{ dB} \pm 2 \text{ dB}$	X	
RF 300 MHz	Centre	300	5	$H_M = 2.6 \text{ dB} \pm 2 \text{ dB}$	X	
RF 300 MHz	Upper limit	350	5	$H_o = 2.2 \text{ dB} \pm 2 \text{ dB}$	X	
RF 300 MHz	2nd harmonic, lower limit	500	5	$< -25 \text{ dB} + H_u$	X	
RF 300 MHz	2nd harmonic, centre	600	5	$< -31 \text{ dB} + H_M$	X	
RF 300 MHz	2nd harmonic, upper limit	700	5	$< -32 \text{ dB} + H_o$	X	

Table 5-1

Entry on instrument	Remarks	Test frequency in MHz \pm 1 kHz	Filter No.	Transmission level in dB	Test output	
					X123	X122
RF 200 MHz	Lower limit	175	6	$H_u = 2.2 \text{ dB} \pm 2 \text{ dB}$	X	
RF 200 MHz	Centre	212.5	6	$H_M = 1.7 \text{ dB} \pm 2 \text{ dB}$	X	
RF 200 MHz	Upper limit	250	6	$H_o = 0.8 \text{ dB} \pm 2 \text{ dB}$	X	
RF 200 MHz	2nd harmonic, lower limit	350	6	$< -30 \text{ dB} + H_u$	X	
RF 200 MHz	2nd harmonic, centre	425	6	$< -40 \text{ dB} + H_M$	X	
RF 200 MHz	2nd harmonic, upper limit	500	6	$< -40 \text{ dB} + H_o$	X	
RF 150 MHz	Lower limit	125	7	$H_u = 2.3 \text{ dB} \pm 2 \text{ dB}$	X	
RF 150 MHz	Centre	150	7	$H_M = 2.1 \text{ dB} \pm 2 \text{ dB}$	X	
RF 150 MHz	Upper limit	175	7	$H_o = 1.7 \text{ dB} \pm 2 \text{ dB}$	X	
RF 150 MHz	2nd harmonic, lower limit	250	7	$< -29 \text{ dB} + H_u$	X	
RF 150 MHz	2nd harmonic, centre	300	7	$< -43 \text{ dB} + H_M$	X	
RF 150 MHz	2nd harmonic, upper limit	350	7	$< -42 \text{ dB} + H_o$	X	
RF 100 MHz	Lower limit	87.5	8	$H_u = 2.2 \text{ dB} \pm 2 \text{ dB}$	X	
RF 100 MHz	Centre	106.25	8	$H_M = 2.1 \text{ dB} \pm 2 \text{ dB}$	X	
RF 100 MHz	Upper limit	125	8	$H_o = 1.6 \text{ dB} \pm 2 \text{ dB}$	X	
RF 100 MHz	2nd harmonic, lower limit	175	8	$< -23 \text{ dB} + H_u$	X	
RF 100 MHz	2nd harmonic, centre	212.5	8	$< -44 \text{ dB} + H_M$	X	
RF 100 MHz	2nd harmonic, upper limit	250	8	$< -47 \text{ dB} + H_o$	X	
RF 80 MHz	Lower limit	62.5	9	$H_u = 2.7 \text{ dB} \pm 2 \text{ dB}$	X	
RF 80 MHz	Centre	75	9	$H_M = 2.5 \text{ dB} \pm 2 \text{ dB}$	X	
RF 80 MHz	Upper limit	87.5	9	$H_o = 2.1 \text{ dB} \pm 2 \text{ dB}$	X	
RF 80 MHz	2nd harmonic, lower limit	125	9	$< -24 \text{ dB} + H_u$	X	
RF 80 MHz	2nd harmonic, Centre	150	9	$< -41 \text{ dB} + H_M$	X	
RF 80 MHz	2nd harmonic, upper limit	175	9	$< -48 \text{ dB} + H_o$	X	

Table 5-1

Entry on instrument	Remarks	Test frequency in MHz ± 1 kHz	Filter No.	Transmission level in dB	Test output	
					X123	X122
RF 50 MHz	Lower limit	43.7	10	$H_U = 1.7 \text{ dB} \pm 2 \text{ dB}$	X	
RF 50 MHz	Centre	53.1	10	$H_M = 1.6 \text{ dB} \pm 2 \text{ dB}$	X	
RF 50 MHz	Upper limit	62.5	10	$H_O = 0.4 \text{ dB} \pm 2 \text{ dB}$	X	
RF 50 MHz	2nd harmonic, lower limit	87.4	10	$< -24 \text{ dB} + H_U$	X	
RF 50 MHz	2nd harmonic, centre	106.2	10	$< -41 \text{ dB} + H_M$	X	
RF 50 MHz	2nd harmonic, upper limit	125	10	$< -48 \text{ dB} + H_O$	X	
RF 40 MHz	Lower limit	31.25	11	$H_U = 1.8 \text{ dB} \pm 2 \text{ dB}$	X	
RF 40 MHz	Centre	37.475	11	$H_M = 1.6 \text{ dB} \pm 2 \text{ dB}$	X	
RF 40 MHz	Upper limit	43.7	11	$H_O = 0.9 \text{ dB} \pm 2 \text{ dB}$	X	
RF 40 MHz	2nd harmonic, lower limit	62.5	11	$< -24 \text{ dB} + H_U$	X	
RF 40 MHz	2nd harmonic, centre	74.95	11	$< -39 \text{ dB} + H_M$	X	
RF 40 MHz	2nd harmonic, upper limit	87.4	11	$< -47 \text{ dB} + H_O$	X	
RF 30 MHz	Lower limit	21.9	12	$H_U = 1.5 \text{ dB} \pm 2 \text{ dB}$	X	
RF 30 MHz	Centre	26.575	12	$H_M = 1.2 \text{ dB} \pm 2 \text{ dB}$	X	
RF 30 MHz	Upper limit	31.25	12	$H_O = -0.3 \text{ dB} \pm 2 \text{ dB}$	X	
RF 30 MHz	2nd harmonic, lower limit	43.8	12	$< -26 \text{ dB} + H_U$	X	
RF 30 MHz	2nd harmonic, centre	53.15	12	$< -43 \text{ dB} + H_M$	X	
RF 30 MHz	2nd harmonic, upper limit	62.5	12	$< -56 \text{ dB} + H_O$	X	
RF 20 MHz	Lower limit	15.6	13	$H_U = 1.1 \text{ dB} \pm 2 \text{ dB}$	X	
RF 20 MHz	Centre	18.75	13	$H_M = 1.3 \text{ dB} \pm 2 \text{ dB}$	X	
RF 20 MHz	Upper limit	21.9	13	$H_O = 0.6 \text{ dB} \pm 2 \text{ dB}$	X	
RF 20 MHz	2nd harmonic, lower limit	31.2	13	$< -25 \text{ dB} + H_U$	X	
RF 20 MHz	2nd harmonic, centre	37.5	13	$< -40 \text{ dB} + H_M$	X	
RF 20 MHz	2nd harmonic, upper limit	43.8	13	$< -52 \text{ dB} + H_O$	X	

Table 5-1

Entry on instrument	Remarks	Test frequency in MHz ± 1 kHz	Filter No.	Transmission level in dB	Test output	
					X123	X122
	Lower limit			$H_u = \text{dB} \pm \text{dB}$		
	Centre			$H_M = \text{dB} \pm \text{dB}$		
	Upper limit			$H_o = \text{dB} \pm \text{dB}$		
	2nd harmonic, lower limit			$< \text{dB} + H_u$		
	2nd harmonic, centre			$< \text{dB} + H_M$		
	2nd harmonic, upper limit			$< \text{dB} + H_o$		
RF 10 MHz	Lower limit	130	14	$H_u = 6.7 \text{ dB} \pm 2 \text{ dB}$		X
RF 10 MHz	Centre	137.8	14	$H_M = 6.6 \text{ dB} \pm 2 \text{ dB}$		X
RF 10 MHz	Upper limit	145.625	14	$H_o = 6.6 \text{ dB} \pm 2 \text{ dB}$		X
RF 10 MHz	2nd harmonic, lower limit	260	14	$< -41 \text{ dB} + H_u$		X
RF 10 MHz	2nd harmonic, centre	275.6	14	$< -47 \text{ dB} + H_M$		X
RF 10 MHz	2nd harmonic, upper limit	291.25	14	$< -53 \text{ dB} + H_o$		X
SHIFT SPECIAL 21 ENTER	Lower limit	520	15	$H_u = 7.5 \text{ dB} \pm 2 \text{ dB}$		X
SHIFT SPECIAL 21 ENTER	Centre	582.5	15	$H_M = 7.5 \text{ dB} \pm 2 \text{ dB}$		X
SHIFT SPECIAL 21 ENTER	Upper limit	645	15	$H_o = 6.8 \text{ dB} \pm 2 \text{ dB}$		X
SHIFT SPECIAL 21 ENTER	2nd harmonic, lower limit	1040	15	$< -35 \text{ dB} + H_u$		X
SHIFT SPECIAL 21 ENTER	2nd harmonic, centre	1165	15	$< -45 \text{ dB} + H_M$		X
SHIFT SPECIAL 21 ENTER	2nd harmonic, upper limit	1290	15	$< -54 \text{ dB} + H_o$		X
	Lower limit			$H_u = \text{dB} \pm \text{dB}$		
	Centre			$H_M = \text{dB} \pm \text{dB}$		
	Upper limit			$H_o = \text{dB} \pm \text{dB}$		
	2nd harmonic, lower limit			$< \text{dB} + H_u$		
	2nd harmonic, centre			$< \text{dB} + H_M$		
	2nd harmonic, upper limit			$< \text{dB} + H_o$		

5.2.2 Checking Spurious Harmonics

- Connect RF generator to input X121 (15 to 1400 MHz \pm 1 kHz).
- Connect spectrum analyzer (15 to 4200 MHz \pm 1 kHz) to output X123.
- Always adjust the level of the RF generator so that the wanted signal (fundamental) at output X123 has a level of 2.5 dBm \pm 1 dB.
- Distortion from the analyzer and cable must be eliminated by calibration.

5.2.3 Checking the Return Loss at X121 and X123

- Enter RF 2000 MHz on the instrument.
- Carry out a two-tone calibration on a network analyzer (full 2-port) and connect to X121 and X123.
- The following should be measured for $f = 15$ to 2160 MHz:
 $|S_{11}| \leq -7$ dB and
 $|S_{22}| \leq -7$ dB.

Re 5.2.2: Checking spurious harmonics

Entry on instrument	Frequency of wanted signal in MHz \pm 1 kHz	Level of wanted signal at X123 in MHz \pm 1 kHz	Frequency of 2nd harmonic in MHz \pm 1 kHz	Nominal S/N ratio of 3rd harmonic in MHz	Frequency of 3rd harmonic in MHz	Nominal S/N ratio of 3rd harmonic in dB
RF 2000 MHz	1400	0	2800	>40	4200	>40
RF 200 MHz	175	0	350	>40	525	>40
RF 20 MHz	15.6	0	31.2	>40	46.8	>40

5.3 Troubleshooting

- Troubleshooting can be carried out using the DC voltages and signal levels given.
- Unscrew both covers, connect subassembly to service adapter and enter PRESET RF 1000 MHz LEV/RF 0 dBm on the instrument.

Table 5-2 (DC voltage values)

Test point	DC voltage
Collector of V4	6.6 V \pm 0.5 V
Output of N320	8.4 V \pm 0.5 V
Collector of V400	9.2 V \pm 0.5 V

RF levels

- Connect a signal generator (15 to 2160 MHz, 5 dBm \pm 1 dB) to X121.
- The RF levels are measured using a 500- Ω probe.

Table 5-3

Test point	Entry on instrument	Frequency of signal generator	Level *)
Collector of V4	RF 2000 MHz	15 to 1300 MHz	8 dBm \pm 3 dB
Input of N320	RF 2000 MHz	15 to 1300 MHz	5 dBm \pm 5 dB
Output of N320	RF 2000 MHz	15 to 1300 MHz	7.5 dBm \pm 5 dB
C31 /R400	RF 10 MHz SHIFT SPECIAL 0	130 to 146 MHz	5.5 dBm \pm 2 dB
C31 / R400	RF 10 MHz SHIFT SPECIAL 21	520 to 645 MHz	2 dBm \pm 2 dB
Collector of V400	RF 10 MHz SHIFT SPECIAL 0	130 to 146 MHz	10.5 dBm \pm 2 dB
Collector of V400	RF 10 MHz SHIFT SPECIAL 21	520 to 645 MHz	11.0 dBm \pm 3 dB

*) Probe attenuation of 20 dB already added

Control voltages

Entry on instrument	Filter No.	Check DC voltage at test point/value in V ± 1 V																							
		N310/PIN				N311/PIN				N312/PIN				N313/PIN				N314/PIN				V332 PIN	V333 PIN	V338 PIN	
		1	7	14	8	1	7	14	8	1	7	14	8	1	7	14	8	1	7	14	8	3	3	1	
RF 2000 MHz	0	-14.2	-14.2	-14.2	-14.2	12.2	-12.4	-12.5	-12.4	-12.5	-12.4	-14.2	-14.1	-14.2	-14.2	-14.2	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 1200 MHz	1	-14.2	-14.2	-14.2	-14.2	-12.3	12.0	-12.5	-12.4	-12.5	-12.4	-14.2	-14.1	-14.2	-14.2	-14.2	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 800 MHz	2	-14.2	-14.2	-14.2	12.4	-12.3	-12.4	12.0	-12.4	-12.5	-12.4	-14.2	-14.1	-14.2	-14.2	-14.2	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 600 MHz	3	-14.2	-14.2	-14.2	12.4	-12.3	-12.4	-12.4	11.9	-12.5	-12.4	-14.2	-14.1	-14.2	-14.2	-14.2	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 400 MHz	4	-14.2	-14.2	12.4	12.4	-12.3	-12.4	-12.4	-12.4	12.4	-12.4	-14.2	-14.1	-14.2	-14.2	-14.2	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 300 MHz	5	-14.2	-14.2	12.4	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	12.4	-14.2	-14.1	-14.2	-14.2	-14.2	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 200 MHz	6	-14.2	12.3	12.4	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	-12.4	13.2	-14.1	-14.2	-14.2	-14.2	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 150 MHz	7	-14.2	12.3	12.4	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	-12.4	-14.1	13.2	-14.2	-14.2	-14.2	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 100 MHz	8	-14.2	12.3	12.4	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	-12.4	-14.1	-14.1	13.1	-14.2	-14.2	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 80 MHz	9	-14.2	12.3	12.4	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	-12.4	-14.1	-14.1	-14.1	13.1	-14.2	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 50 MHz	10	12.8	12.3	12.4	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	-12.4	-14.1	-14.1	-14.1	-14.1	13.1	-14.2	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8	
RF 40 MHz	11	12.8	12.3	12.4	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	-12.4	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	13.1	-14.2	-14.1	-13.1	-13.1	-12.4	-12.4	13.8
RF 30 MHz	12	12.8	12.3	12.4	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	-12.4	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	13.1	-14.1	-13.1	-13.1	-12.4	-12.4	13.8
RF 20 MHz	13	12.8	12.3	12.4	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	-12.4	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	13.1	-13.1	-13.1	-12.4	-12.4	13.8
RF 10 MHz	14	-14.2	-14.2	-14.2	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	-12.4	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	-14.2	13.4	-13.1	12.3	-12.4	0
RF 5 MHz SHIFT SPECIAL 21 ENTER	15	-14.2	-14.2	-14.2	12.4	-12.3	-12.4	-12.4	-12.4	-12.4	-12.4	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	-14.1	-14.2	-13.1	13.4	-12.4	12.3	0

5.4 Interfaces

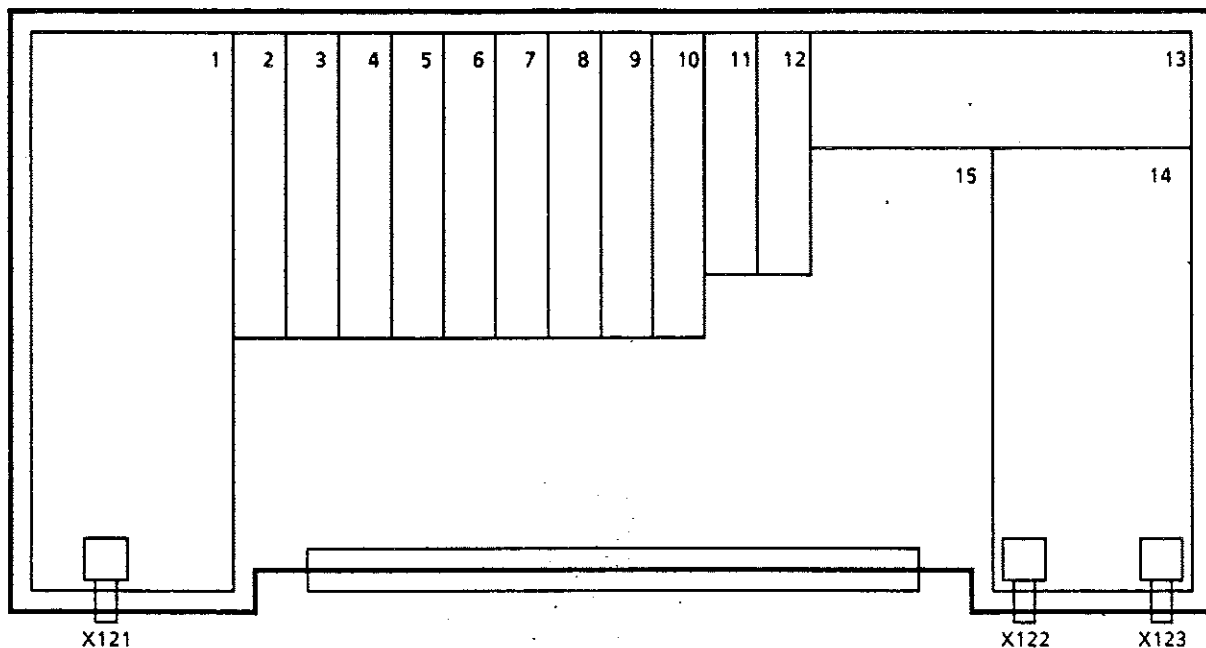


Fig. 5-3 Layout of test points and trimmers

Analog interfaces

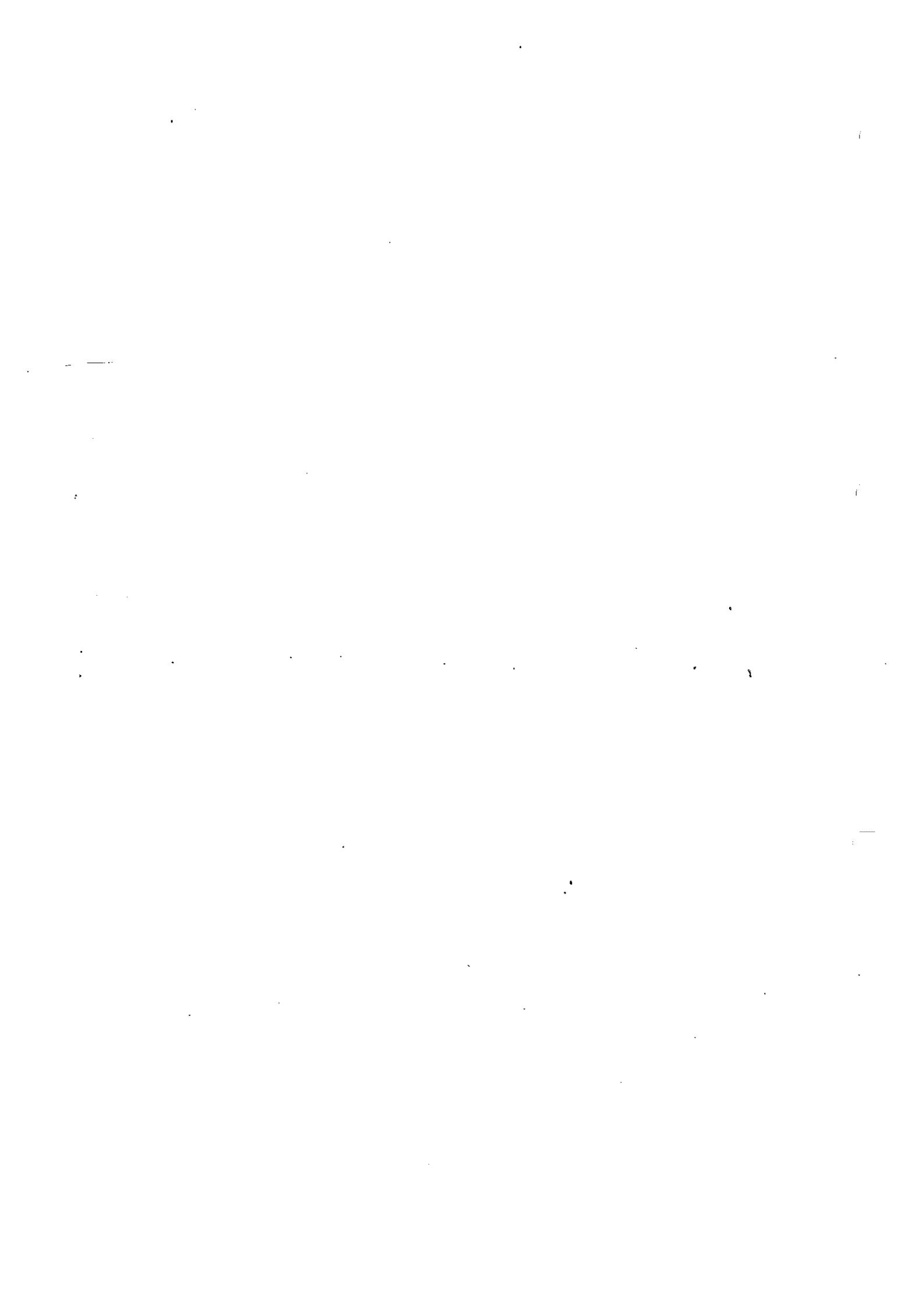
Designation	Function	Frequency	Level (for overrange mode)
X121	RF input	15.625 to 2160 MHz	≥ 8 dBm
X122	RF output	130 to 145.625 MHz 520 to 645 MHz	≥ 13 dBm
X123	RF output	15.625 to 2160 MHz	≥ 6.5 dBm

Digital interfaces

Designation	Function
X12.A21	LSB of address
X12.A20	
X12.A19	MSB of address
X12.A22	
X12.A11	Strobe
X12.A11	Clock
X12.A13	Data

Supply voltages

Designation	Voltage
X12.A26	+15 V \pm 0.3 V
X12.A28	+5 V \pm 0.2 V
X12.A30	-15 V +0.8 V to +0.3 V
X12.A10, A12, A14, A16, A23, A25, A27, A29, A31	Ground





ROHDE & SCHWARZ

Schaltteillisten
Stromläufe
Bestückungspläne
Part lists
Circuit diagrams
Components plans
Listes des pièces détachées
Schémas de Circuit
Plans des composants

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C1	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C5	CC 1,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8165	VITRAMON	VJ1206 A 1R8 C FAT	
C6	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C7	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C20	CC 1,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8165	VITRAMON	VJ1206 A 1R8 C FAT	
C21	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C31	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C41	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C46	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C48	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C60	CC 2,7PF+-0,25PF400V7P100 CAPACITOR	417.8761	DRALORIC	TEFK 7	
C61	CC 3,9PF+-0,5PF7P100TRAP. CAPACITOR	417.8584	STETTNER	TEFK7-3,9PF/0,5PFP10	
C62	CC 3,9PF+-0,5PF7P100TRAP. CAPACITOR	417.8584	STETTNER	TEFK7-3,9PF/0,5PFP10	
C63	CC 3,9PF+-0,5PF7P100TRAP. CAPACITOR	417.8584	STETTNER	TEFK7-3,9PF/0,5PFP10	
C67	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C68	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C69	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C71	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C76	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C78	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C80	CC 4,7PF+-0,5PF7NPO TRAP CAPACITOR	417.8603	STETTNER	TEFK7,4,7PF/0,5PF,NP	
C81	CC 6,8PF+-0,5PF NPO TRAP CAPACITOR	249.9261	STETTNER	TEFK7-6,8/0,5NPO	
C82	CC 6,8PF+-0,5PF NPO TRAP CAPACITOR	249.9261	STETTNER	TEFK7-6,8/0,5NPO	
C83	CC 4,7PF+-0,5PF7NPO TRAP CAPACITOR	417.8603	STETTNER	TEFK7,4,7PF/0,5PF,NP	
C90	CC 8,2PF+-0,25PF NPO TRAP CERAMIC CAPACITOR	099.4561	STETTNER	TEFK7 400V 8,2PF	
C91	CC 12PF+-2% NPO TRAPEZ CERAMIC CAPACITORS	099.4603	STETTNER	TEFK7 400V 12PF	
C92	CC 12PF+-2% NPO TRAPEZ CERAMIC CAPACITORS	099.4603	STETTNER	TEFK7 400V 12PF	
C93	CC 8,2PF+-0,25PF NPO TRAP CERAMIC CAPACITOR	099.4561	STETTNER	TEFK7 400V 8,2PF	
C97	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C98	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C101	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C106	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C108	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C110	CC 10PF+-2% NPO TRAPEZ CERAMIC CAPACITORS	099.4584	STETTNER	TEFK7 400V 10PF	
C111	CC 15PF+-2% NPO TRAPEZ CAPACITOR	099.5722	STETTNER	TEFK 7 400V-15PF	
C112	CC 15PF+-2% NPO TRAPEZ CAPACITOR	099.5722	STETTNER	TEFK 7 400V-15PF	
C113	CC 10PF+-2% NPO TRAPEZ CERAMIC CAPACITORS	099.4584	STETTNER	TEFK7 400V 10PF	
C120	CC 10PF+-0,25PF50VNPO1206 CERAMIC CHIP CAPACITOR	CC 099.8480	VITRAMON	VJ1206 A 100 C FAT	
C121	CC 18PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8767	VITRAMON	VJ1206 A 180 F FAT	

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	10	0489	EE FILTERSATZ FILTER-MODULE	819.9369.01 SA	1+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C122	CC 18PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8767	VITRAMON	VJ1206 A 180 F FAT	
C123	CC 10PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8480	VITRAMON	VJ1206 A 100 C FAT	
C127	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C128	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C130	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C135	CC 15PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8750	VITRAMON	VJ1206 A 150 F FAT	
C136	CC 27PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8409	VITRAMON	VJ1206 A270F FAT	
C137	CC 27PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8409	VITRAMON	VJ1206 A270F FAT	
C138	CC 15PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8750	VITRAMON	VJ1206 A 150 F FAT	
C140	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C145	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C146	CC 33PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8780	VITRAMON	VJ1206 A330F FAT	
C147	CC 33PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8780	VITRAMON	VJ1206 A330F FAT	
C148	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C158	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C159	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C160	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C165	CC 39PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8796	VITRAMON	VJ1206 A 390 F FAT	
C166	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C167	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C168	CC 39PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8796	VITRAMON	VJ1206 A 390 F FAT	
C170	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C175	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C176	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C177	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C178	CC 56PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8809	VITRAMON	VJ1206 A 560 F FAT	
C180	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C190	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C195	CC 82PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8821	VITRAMON	VJ1206 A 820 F FAT	
C196	CC 150PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8509	VITRAMON	VJ1206 A 151 F FAT	
C197	CC 150PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8509	VITRAMON	VJ1206 A 151 F FAT	
C198	CC 82PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8821	VITRAMON	VJ1206 A 820 F FAT	
C200	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C205	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C206	CC 180PF+-1%50V NPO 1206C CHIP CAPACITOR	CC 099.8844	VITRAMON	VJ1206 A 181 F FAT	
C207	CC 180PF+-1%50V NPO 1206C CHIP CAPACITOR	CC 099.8844	VITRAMON	VJ1206 A 181 F FAT	
C208	CC 120PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8838	VITRAMON	VJ 1206 A 121 F FAT	
C220	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C225	CC 180PF+-1%50V NPO 1206C CHIP CAPACITOR	CC 099.8844	VITRAMON	VJ1206 A 181 F FAT	

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	10	0489	EE FILTERSATZ FILTER-MODULE	819.9369.01 SA	2+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C226	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C227	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C228	CC 180PF+-1%50V NPO 1206C CHIP CAPACITOR	CC 099.8844	VITRAMON	VJ1206 A 181 F FAT	
C230	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C235	CC 270PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8867	VITRAMON	VJ1206 A 271 F FAT	
C236	CC 390PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8880	VITRAMON	VJ1206 A 391 F FAT	
C237	CC 390PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8880	VITRAMON	VJ1206 A 391 F FAT	
C238	CC 270PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8867	VITRAMON	VJ1206 A 271 F FAT	
C311	CC 1PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8667	VITRAMON	VJ1206 A 1R0 C FAT	
C312	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C315	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C333	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C350	CE 10UF+-20%25V SAL ELECTR. CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C351	CE 10UF+-20%25V SAL ELECTR. CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C352	CE 22UF+-20%10V SAL ELECTR. CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C353	CC 100NF+-10%50V5K1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C366					
C400	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C406	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C410	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C441	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C442	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C443	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C444	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C445	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C447	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C448	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C449	CC 1NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8438	VITRAMON	VJ1206Y102KFA	
C451	CC 3,9PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8207	VITRAMON	VJ1206 A 3R9 C FAT	
C452	CC 6,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8236	VITRAMON	VJ1206 A 6R8 C FAT	
C453	CC 8,2PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8242	VITRAMON	VJ1206 A 8R2 C FAT	
C454	CC 3,9PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8207	VITRAMON	VJ1206 A 3R9 C FAT	
C458	CC 1PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8667	VITRAMON	VJ1206 A 1R0 C FAT	
C513	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	
C700	CC 2,7PF+-0,25PF400V7P100 CAPACITOR	417.8761	DRALORIC	TEFK 7	
D300	BL MM74HC11N 3X3IN. ANDG TRIPLE 3-INPUT AND GATE	BL 099.9486	NSC	MM74HC11N	
D301	BL PC74HC238P 3TO8 L.DEC DECODER/DEMULTIPLEXER	BL 620.0847	VALVO	PC74HC238P	
D310	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D311	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	

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	10	0489	EE FILTERSATZ FILTER-MODULE	819.9369.01 SA	3+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
D312	BL MM74HC4051N 8CH.AN.MUX	BL 099.9670	NSC	MM74HC4051N	
D313	8CH.ANALOG MUX/DEMUX BL MM74HC4514N 1/16 DECOD 1-OF-16 DECODER/DEMUX	BL 099.9734	SGS	M74HC4514B1	
L5	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L45	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L47	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L75	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L77	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L105	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L107	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L120	LL SPULE 30N COIL 30N	801.6468			
L121	LL SPULE 30N COIL 30N	801.6468			
L122	LL SPULE 30N COIL 30N	801.6468			
L135	LL SPULE 45N COIL	819.9469			
L136	LL SPULE 45N COIL	819.9469			
L137	LL SPULE 45N COIL	819.9469			
L142	LD 0,12UH10%0,090HM1,300A CHOKE	LD 067.2757	DELEVAN	DROSSEL 1025-96	
L145	LD 0,15UH10%0,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL 1025-00	
L146	LD 0,15UH10%0,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL 1025-00	
L147	LD 0,12UH10%0,090HM1,300A CHOKE	LD 067.2757	DELEVAN	DROSSEL 1025-96	
L162	LD 0,15UH10%0,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL 1025-00	
L163	LD 0,22UH10%0,140HM1,045A CHOKE	LD 067.2786	DELEVAN	DROSSEL 1025-04	
L164	LD 0,15UH10%0,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL 1025-00	
L167	LD 100NH 10% 0,080HM -1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L175	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L176	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L177	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L195	LD 0,15UH10%0,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL 1025-00	
L196	LD 0,15UH10%0,100HM1,230A CHOKE	LD 067.2763	DELEVAN	DROSSEL 1025-00	
L197	LD 0,12UH10%0,090HM1,300A CHOKE	LD 067.2757	DELEVAN	DROSSEL 1025-96	
L205	LD 0,22UH10%0,140HM1,045A CHOKE	LD 067.2786	DELEVAN	DROSSEL 1025-04	
L206	LD 0,22UH10%0,140HM1,045A CHOKE	LD 067.2786	DELEVAN	DROSSEL 1025-04	
L207	LD 0,22UH10%0,140HM1,045A CHOKE	LD 067.2786	DELEVAN	DROSSEL 1025-04	
L225	LD 0,27UH10%0,160HMO,975A CHOKE	LD 067.2792	DELEVAN	DROSSEL 1025-06	
L226	LD 0,27UH10%0,160HMO,975A CHOKE	LD 067.2792	DELEVAN	DROSSEL 1025-06	
L227	LD 0,22UH10%0,140HM1,045A CHOKE	LD 067.2786	DELEVAN	DROSSEL 1025-04	
L235	LD 0,39UH10%0,300HMO,710A CHOKE	LD 067.2811	DELEVAN	DROSSEL 1025-10	
L236	LD 0,47UH10%0,350HMO,660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12	
L237	LD 0,39UH10%0,300HMO,710A CHOKE	LD 067.2811	DELEVAN	DROSSEL 1025-10	
L315	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L339	LD 15UH 10% 1R2 0,46A CHOKE	LD 026.4149	JAHRE	72.10-15R0 K	

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	10	0489	EE FILTERSATZ FILTER-MODULE	819.9369.01 SA	4+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
L341	LD 15UH 10% 1R2 0,46A CHOKE	LD 026.4149	JAHRE	72.10-15RD K	
L342	LD 22,0UH10%3,300HMO,114A CHOKE	LD 067.3024	DELEVAN	DROSSEL 1025-52	
L420	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L441	LD 0,12UH10%0,090HM1,300A CHOKE	LD 067.2757	DELEVAN	DROSSEL 1025-96	
.446 L447	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L448	LD 0,47UH10%0,350HMO,660A CHOKE	LD 067.2828	DELEVAN	DROSSEL 1025-12	
L453	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L460	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
N310	BD LM124J 4XL.P.OPAMP	300.6353	NSC	LM124J	
.314 N320	OPERATIONAL AMPLIFIER BM MSA0520 BB.AMPL BROADBAND AMPLIFIER	820.3431	AVANTEK	MSA0520	
R2	RG 15,0 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5450	DALE	CRW1206-10 15R F-T	
R3	RL 0,21W 180 OHM2% UNGEW. RESISTOR	RL 092.5985	RESISTA	MK1 180OHM 2% UNGEW.	
R4	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R5	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R6	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R8	RG 56,2 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8826	DALE	CRCW1206-10 56R2 F-T	
R9	RG 182 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5595	DALE	CRCW1206-10 182R F-T	
R31	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R41	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R43	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R45 .48 R66	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R68	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R71	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R73	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R75 .78 R96	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R98	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R101	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R103	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R105	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R106	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R107	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R108	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R126	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R128	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R133	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R135	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	

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**EE FILTERSATZ
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R145	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R156	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R158	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R165	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R175	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R190	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R191	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R195	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R205	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R215	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R225	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R235	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R301	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R303	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R309	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R310	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R311	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R312	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R313	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R314	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R315	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R316	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R320	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R321	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R322	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R323	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R324	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R325	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R326	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R327	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R328	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R329	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R332	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R333	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R334	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R336	RL 0,35W 1,82KOHM+-1%TK50 RESISTOR	RL 082.2277	DRALORIC	SMA0207/1,82K-F-C	
R337	RL 0,35W 1,82KOHM+-1%TK50 RESISTOR	RL 082.2277	DRALORIC	SMA0207/1,82K-F-C	
R338	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R339	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	

ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	10	0489	EE FILTERSATZ FILTER-MODULE	819.9369.01 SA	6+

Für diese Unterlage behalten wir uns alle Rechte vor

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R340	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R341	RL 0,35W 10,0 KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R343	RL 0,35W 3,32 KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R345	RL 0,35W 4,75 KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R346	RL 0,35W 3,32 KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	
R400	RG 15,0 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5450	DALE	CRW1206-10 15R F-T	
R402	RL 0,21W 180 OHM2% UNGEW. RESISTOR	RL 092.5985	RESISTA	MK1 180OHM 2% UNGEW.	
R405	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	
R411	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R412	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R420	RL 0,35W 75,0 OHM+-1%TK50 RESISTOR	RL 082.9665	DRALORIC	SMA0207/75OHM-F-D	
R421	RL 0,35W 82,5 OHM+-1%TK50 RESISTOR	RL 082.9707	DRALORIC	SMA0207/82,5OHM-F-D	
R422	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R423	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRW1206-10 18R2 F-T	
R425	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R439	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R447	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R460	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R461	RG 274 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5637	DALE	CRCW1206-10 274R F-T	
R463	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R600	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	
R715	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
V4	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V6	AE 1N4689 5V1 0,3W ZDI# ZENER DIODE	AE 303.9418	SEMITRONIC	1N4689 (HST. SES)	
V30	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V40	AE MA4P274-287 200V PIN PIN DIODE	843.3238	MACOM	MA4P274-287	
V43	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V44	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V46	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V48	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V56	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V66	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V68	AE MA4P274-287 200V PIN PIN DIODE	843.3238	MACOM	MA4P274-287	
V70	AE MA4P274-287 200V PIN PIN DIODE	843.3238	MACOM	MA4P274-287	
V73	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V74	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V76	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V78	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	

ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	10	0489	EE FILTERSATZ FILTER-MODULE	819.9369.01 SA	7+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V86	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V96	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V98	AE MA4P274-287 200V PIN PIN DIODE	843.3238	MACOM	MA4P274-287	
V100	AE MA4P274-287 200V PIN PIN DIODE	843.3238	MACOM	MA4P274-287	
V103	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V104	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V106	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V108	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V116	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V126	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V128	AE MA4P274-287 200V PIN PIN DIODE	843.3238	MACOM	MA4P274-287	
V131	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
..134					
V151	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
..154					
V156	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V161	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
..164					
V181	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
..184					
V190	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
..194					
V211	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
..214					
V221	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
..224					
V241	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
..244					
V314	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V330	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V331	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V332	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V333	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V334	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V336	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V337	AE BZX79/C4V7 0,5W ZDI ZENER DIODE	AE 012.2432	AEG	BZX55/C4V7 GEG.	
V338	AK 2N2907A P 60V 600MA TRANSISTOR	AK 010.3583	VALVO	2N2907A	
V339	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	
V340	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V400	AK BFQ34T N 18V 150MA TRANSISTOR	801.8283	VALVO	BFQ34T	
V440	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V443	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V445	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V447	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V448	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V449	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V450	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	

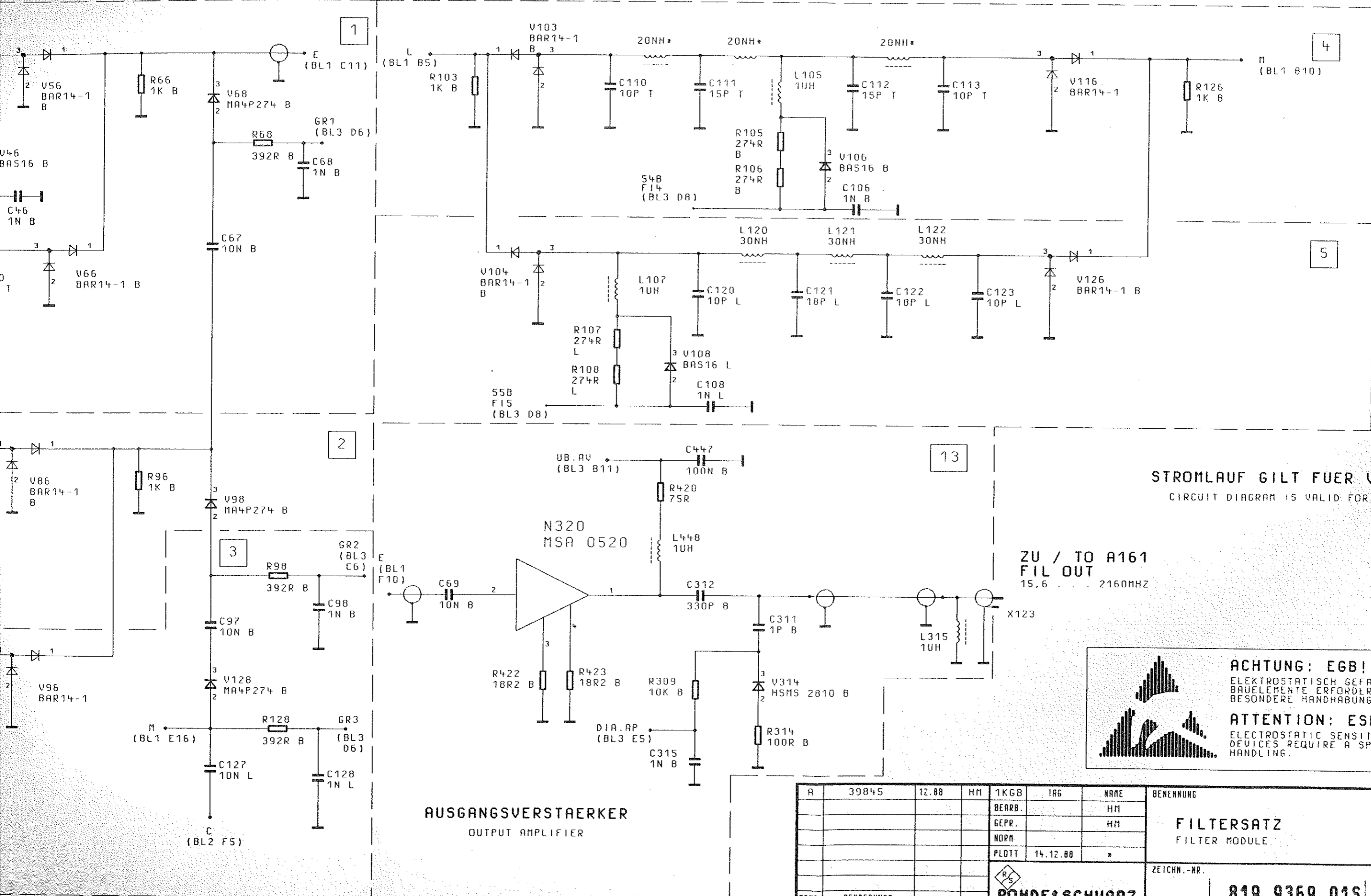
uns alle Rechte vor

ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	10	0489	EE FILTERSATZ FILTER-MODULE	819.9369.01 SA	8+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthaltene in contained in
V455	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V462	AE HSMS2800 DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V710	AE BZX79/C7V5 ZENER DIODE	AE 012.2484	VALVO	BZX79/C7V5	
W1	DX KABEL W1 CABLE	820.0278			820.0261
W2	DX KABEL W2 CABLE	820.0284			820.0261
W3	DX KABEL W3 CABLE	820.0290			820.0261
X12	FP STECKERLEISTE 32POL. MULTIPOINT CONNECTOR	FP 514.4550	PANDUIT	100-232-033/999	
X121	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG. 602.8804	
X122	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG. 602.8804	
X123	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG. 602.8804	
Z1	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	
Z4	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	
Z8	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	
Z10	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
Z11	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
Z12	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
Z14	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	
Z15	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	
Z30	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF. 1	

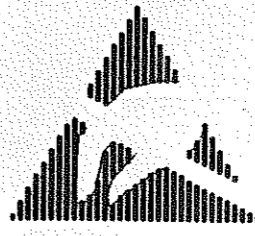
- ENDE -

ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	10	0489	EE FILTERSATZ FILTER-MODULE	819.9369.01 SA	9-



STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

ZU / TO A161
FIL OUT
15,6 2160MHZ



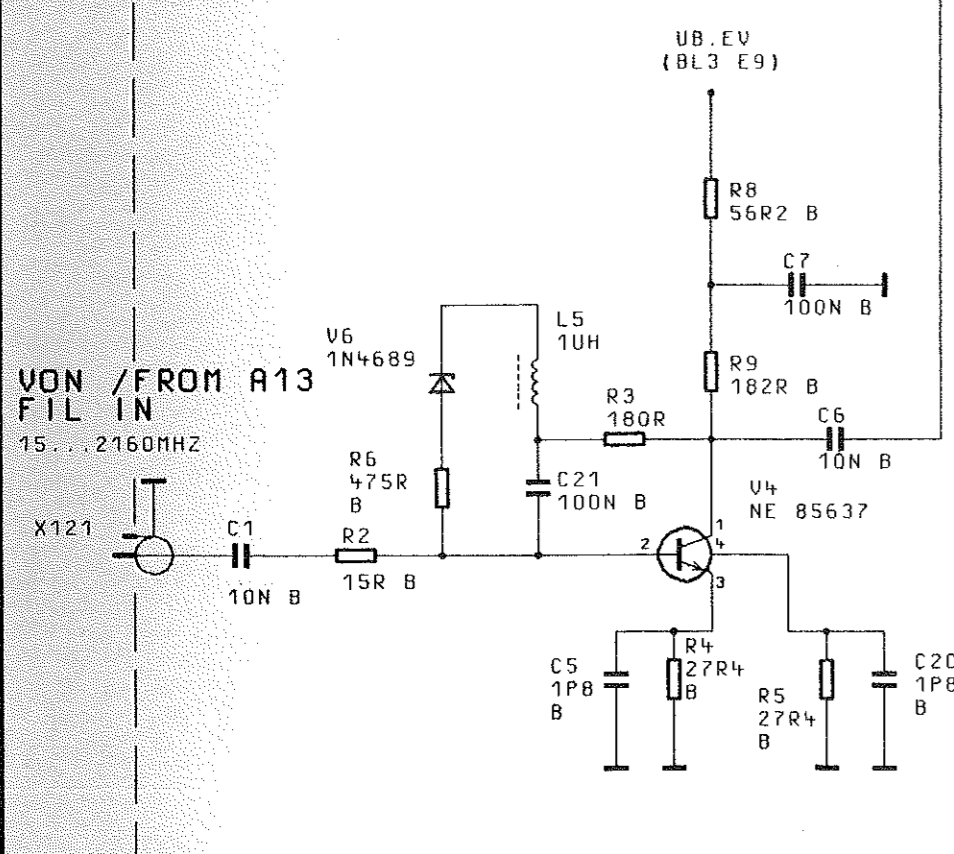
ACHTUNG: EGB!
ELEKTROSTATISCH GEFAEHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

AUSGANGSVERSTAECKER
OUTPUT AMPLIFIER

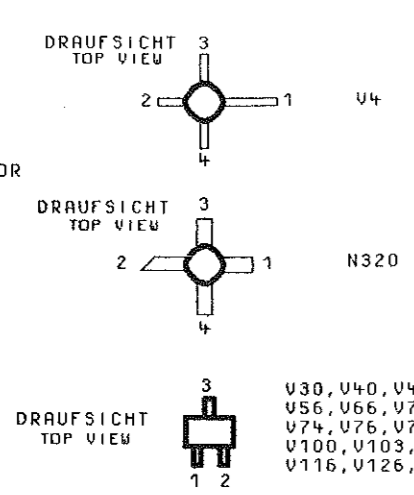
R	39845	12.88	HM	1KGB	TAG	NAME	BENENNUNG	
				BEARB.		HM	FILTERSATZ FILTER MODULE	
				GEPR.		HM		
				NORM				
				PLOTT	14.12.88	*		
ROHDE & SCHWARZ							ZEICHN.-NR.	819.9369.015
RENO. IND.	RENDERUNGS-MITTEILUNG	DATUM	NAME	ZU GERÄT	SMGU	RES. I.V.	819.0010	
							EPSTE 2.	BLATT-NR. 1 V. 3 BL.

EINGANGSVERSTÄRKER
INPUT AMPLIFIER

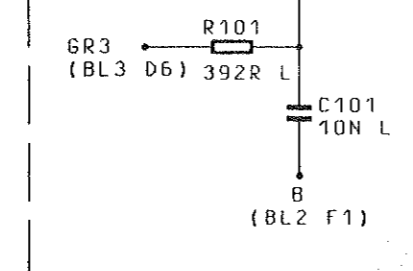
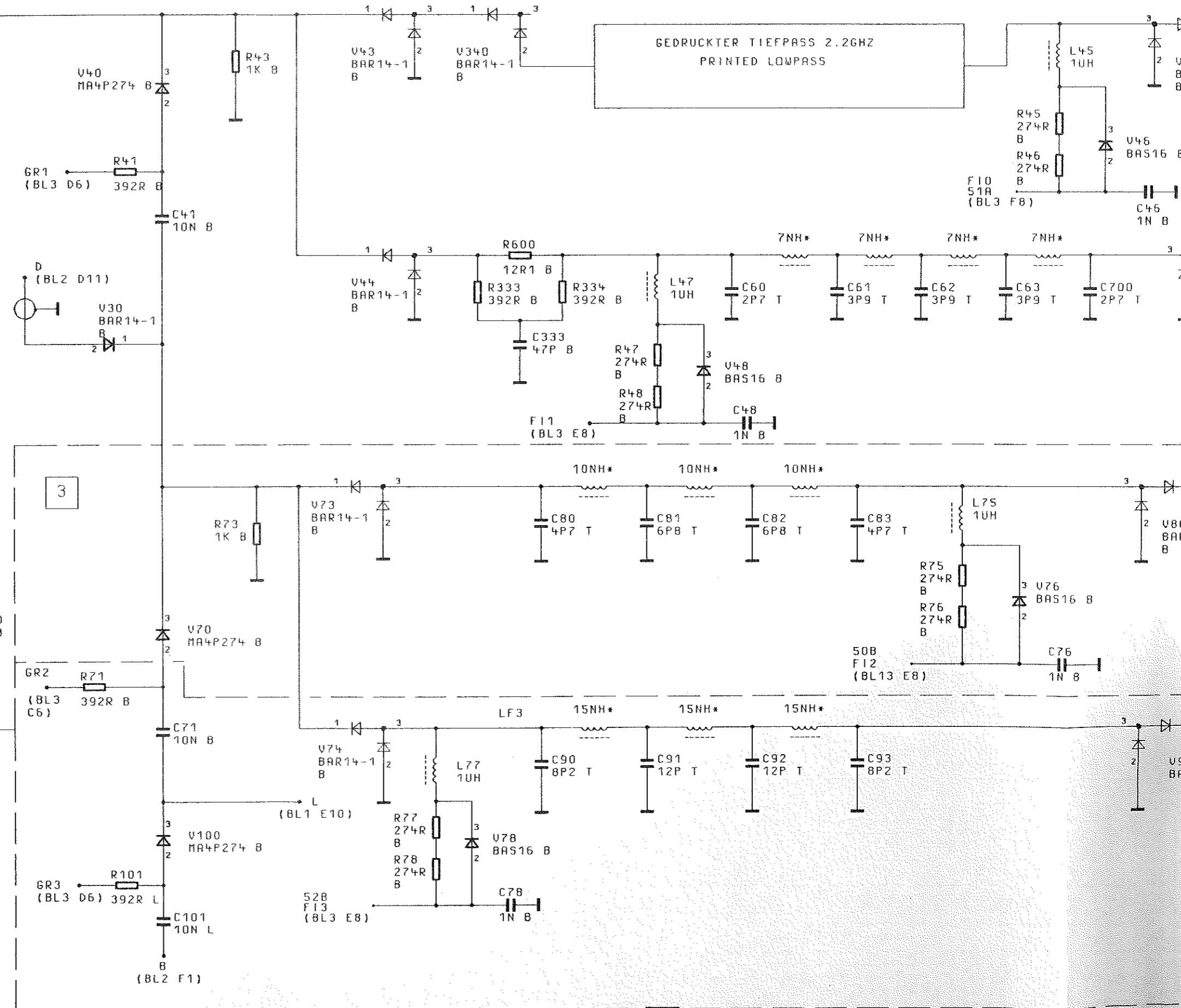


VON /FROM A13
FIL IN
15...2160MHZ

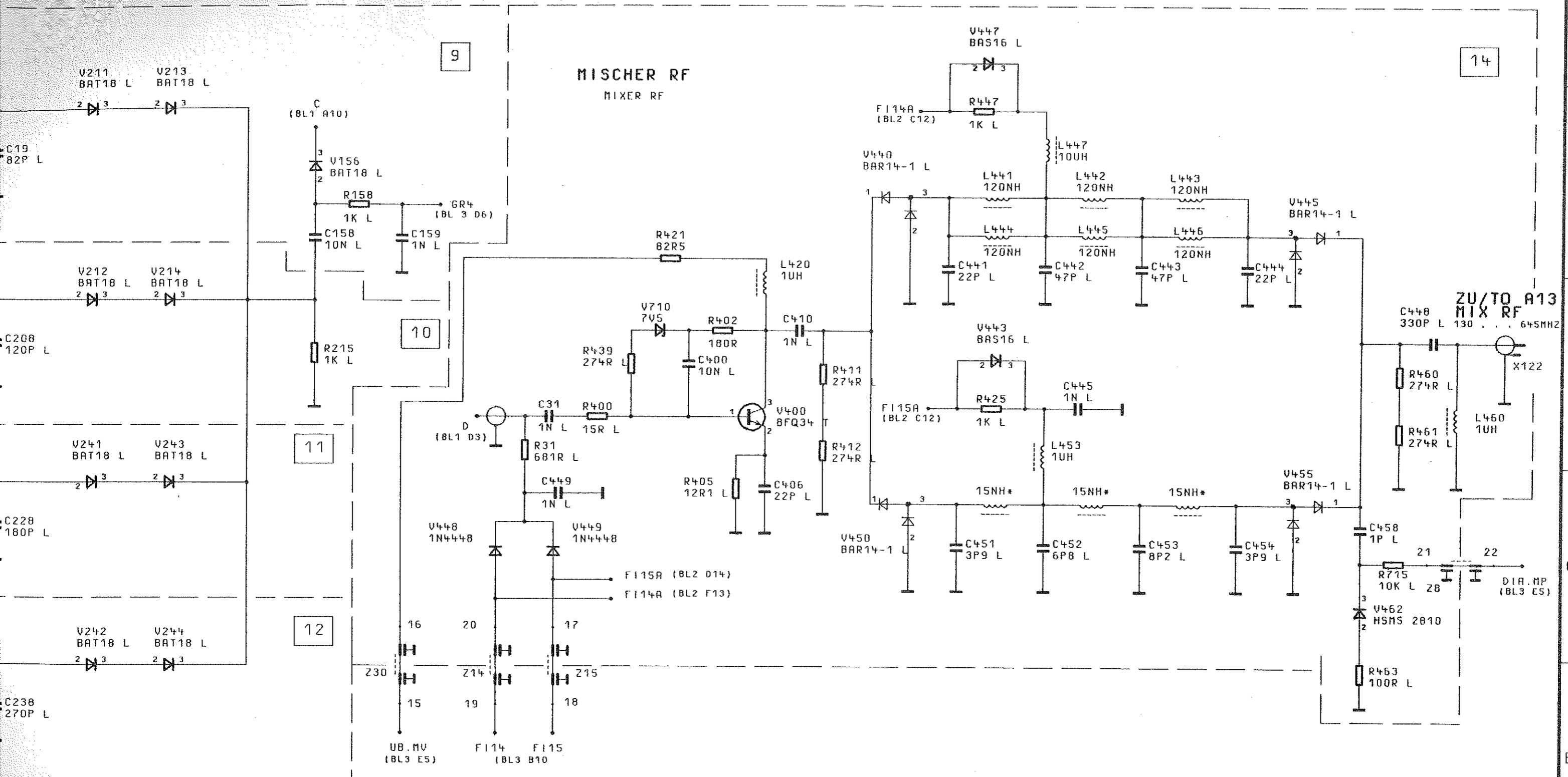
- * GEDRUCKTE SPULE
PRINTED INDUCTANCE
- * B : BAUTEILSEITE
COMPONENT POSITION
- * L : LOETSEITE
JOINT POSITION
- * T : TRAPEZKONDENSATOR
TRAPEZIOD CAPACITOR



V30, V40, V43, V44, V46, V48,
V56, V66, V70, V68, V73,
V74, V76, V78, V86, V96, V98,
V100, V103, V104, V106, V108,
V116, V126, V128, V314, V340



(BL2 F1)

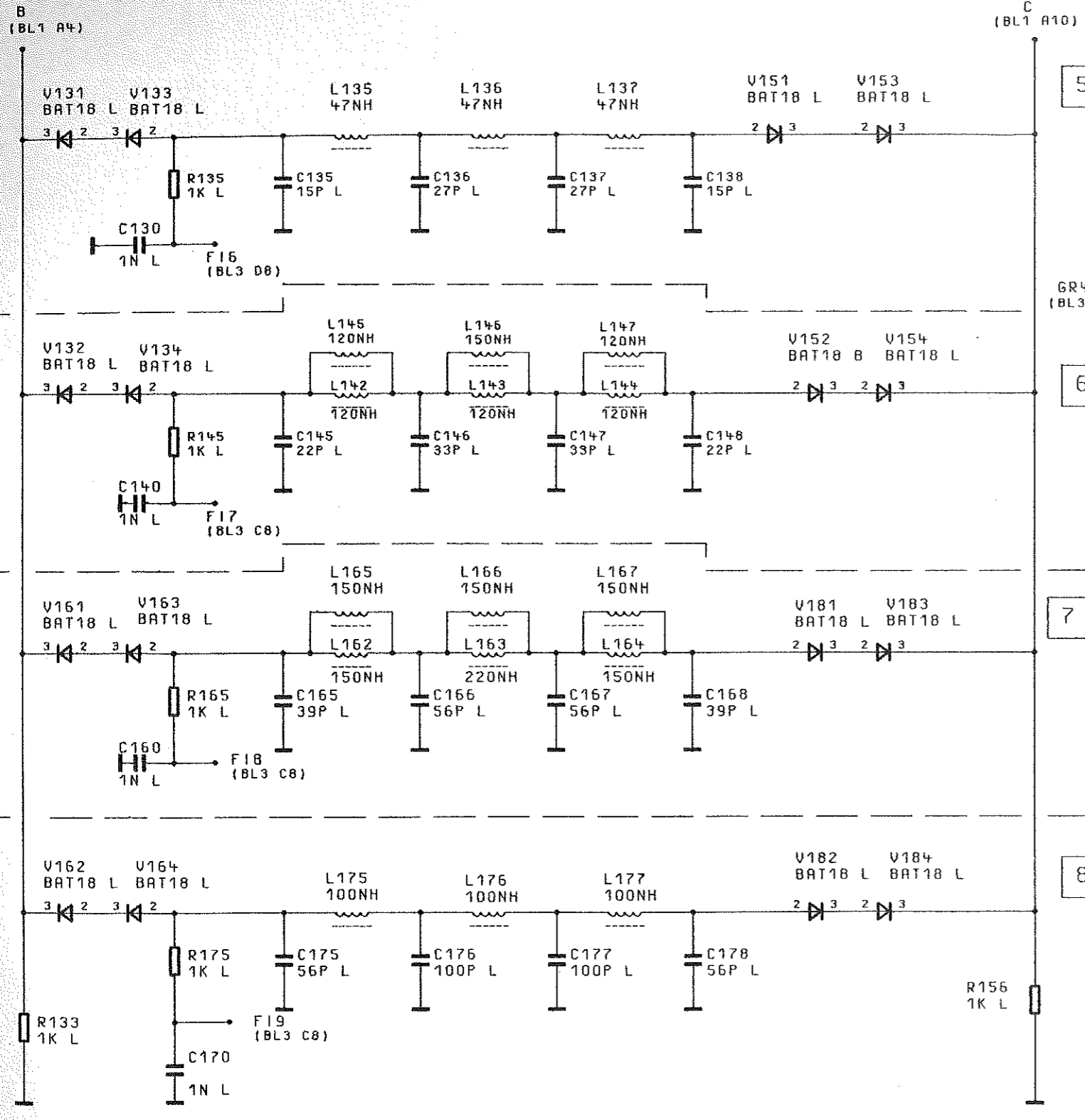


STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

A	39845	12.88	HM	1KGB	TAG	NAME	BENENNUNG
				BEARB.		HM	FILTERSATZ FILTER MODULE
				GEPR.		HM	
				NORM			
				PLOTT	14.12.88	*	
REND. IND.	RENDERUNGS-NITTEILUNG	DATUM	NAME	ROHDE & SCHWARZ		ZEICHN.-NR.	
						819.9369.015	
				ZU GERÄT	SMGU	REG. I. V.	819.0010
						ERSTE Z.	

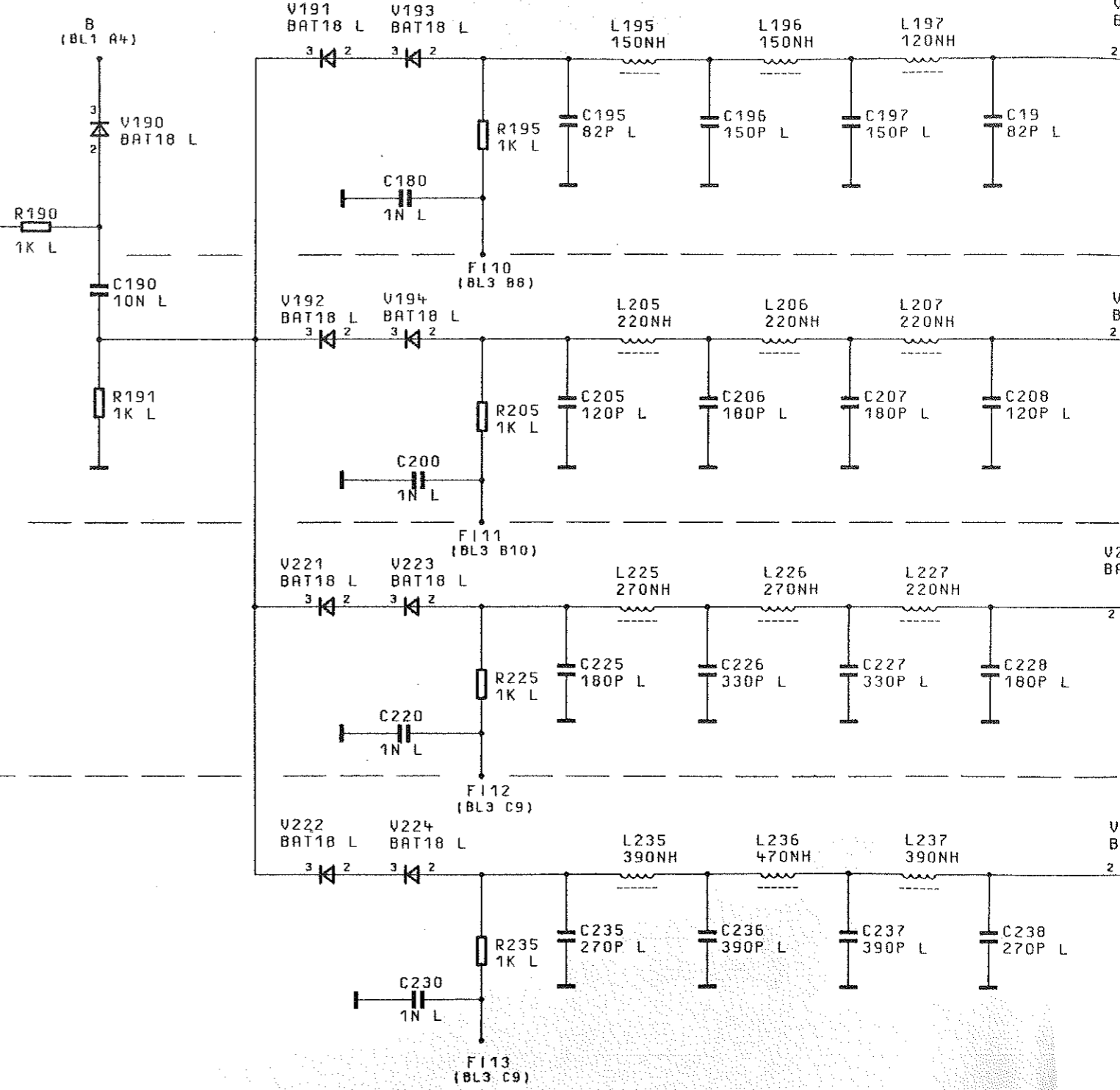


5

6

7

8

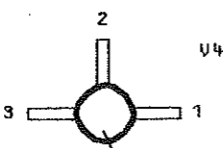


DRAUFSICHT
TOP VIEW

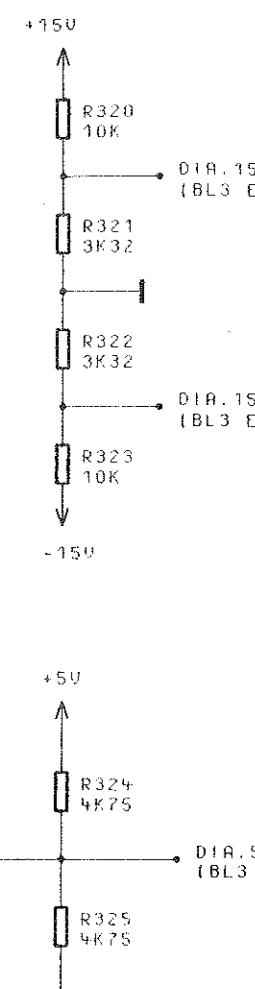
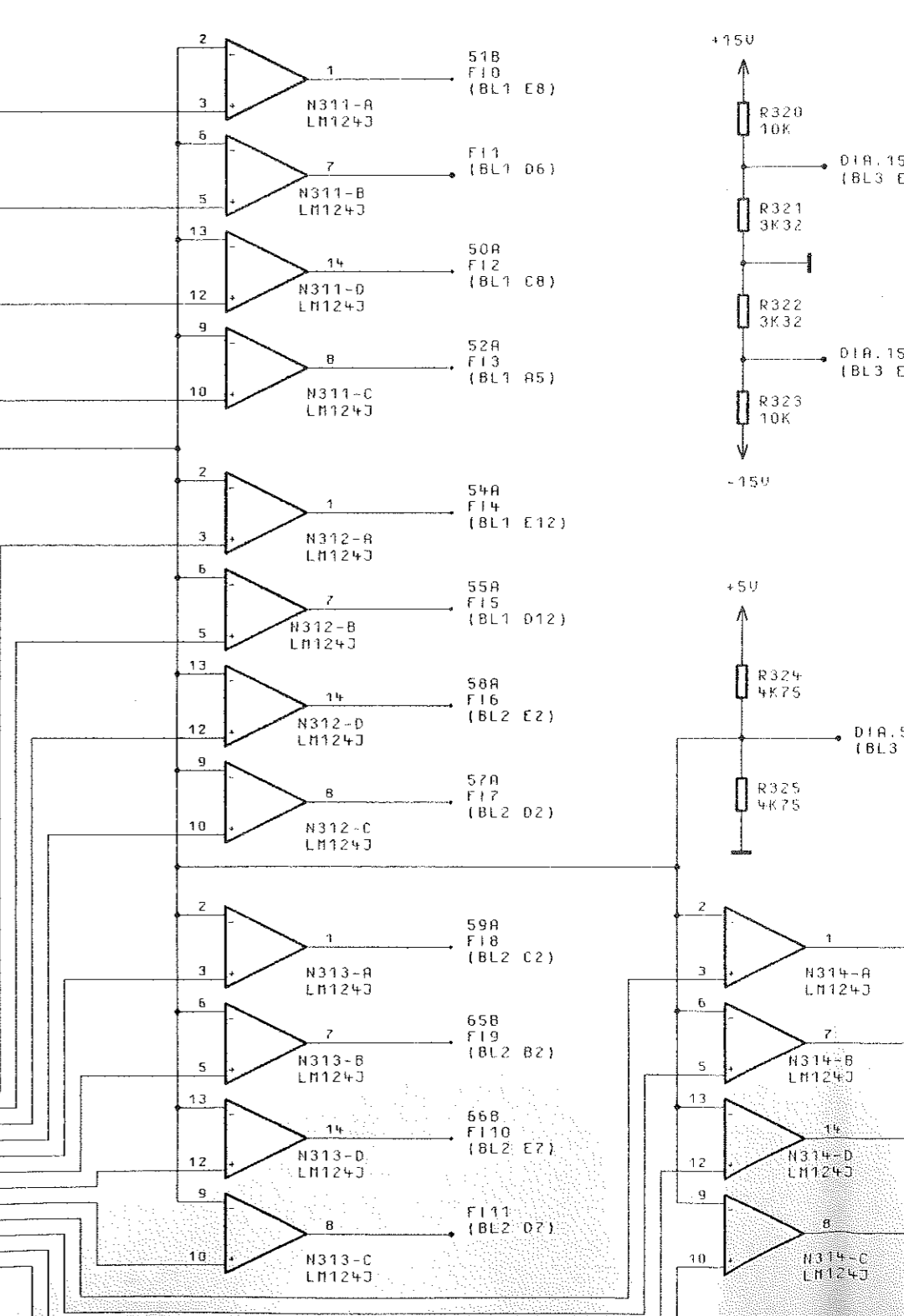
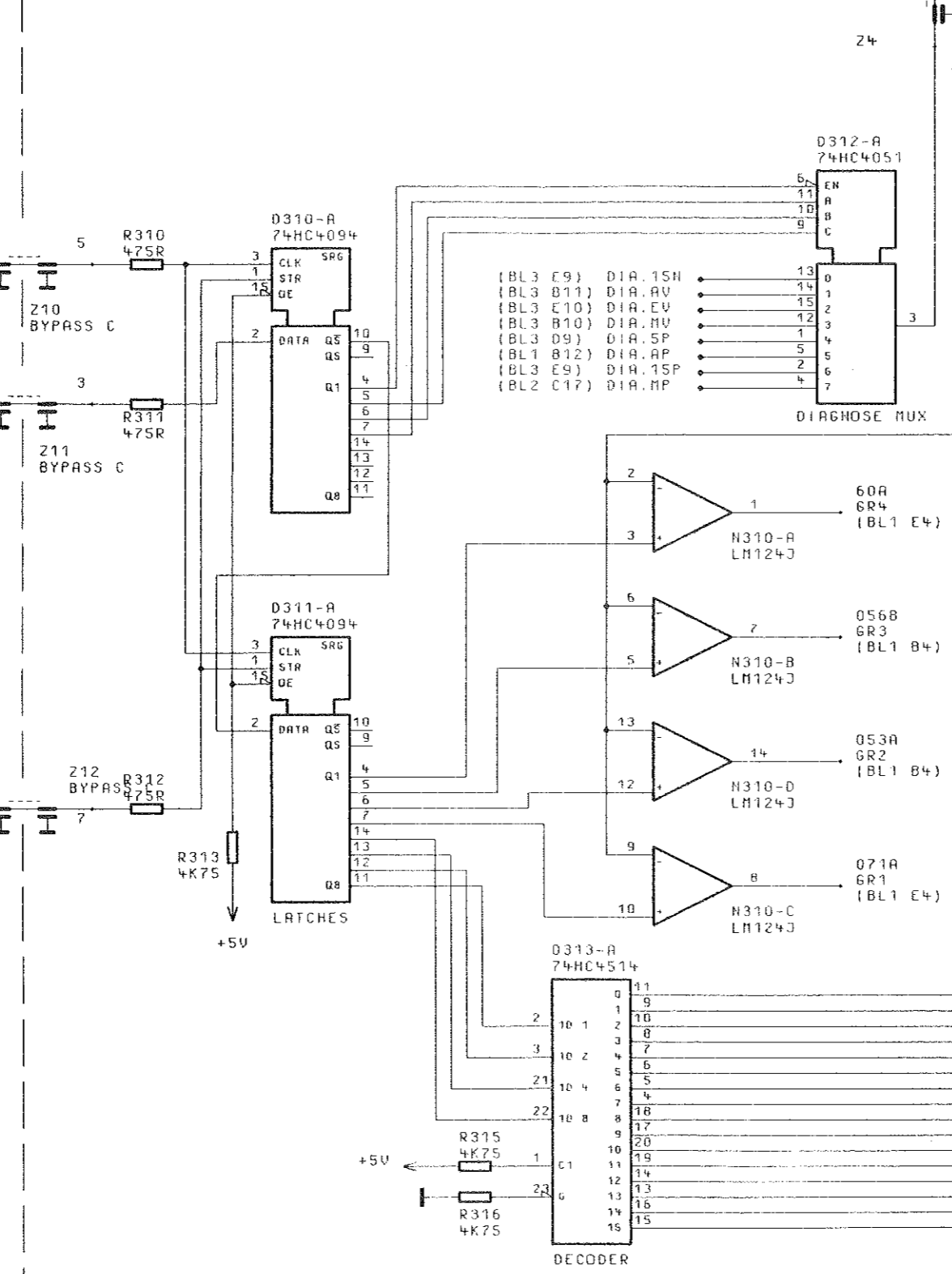
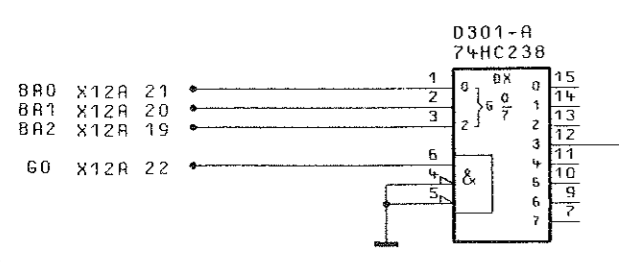
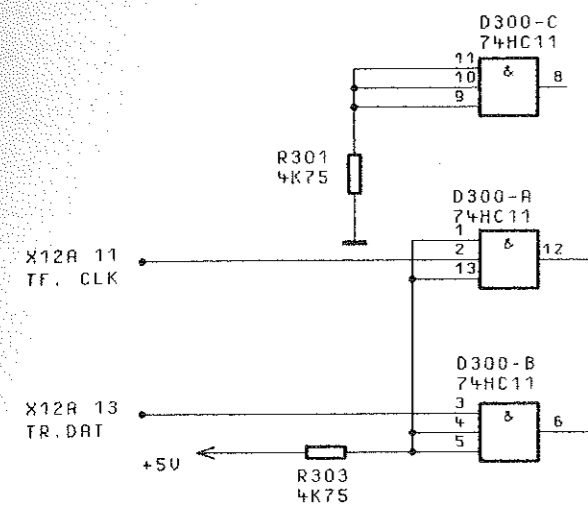


V131 - V134, V161 - V164,
V151 - V154, V181 - V184,
V191 - V194, V221 - V224,
V211 - V214, V241 - V244,
V156, V190, V440, V443, V445,
V447, V450, V455, V462

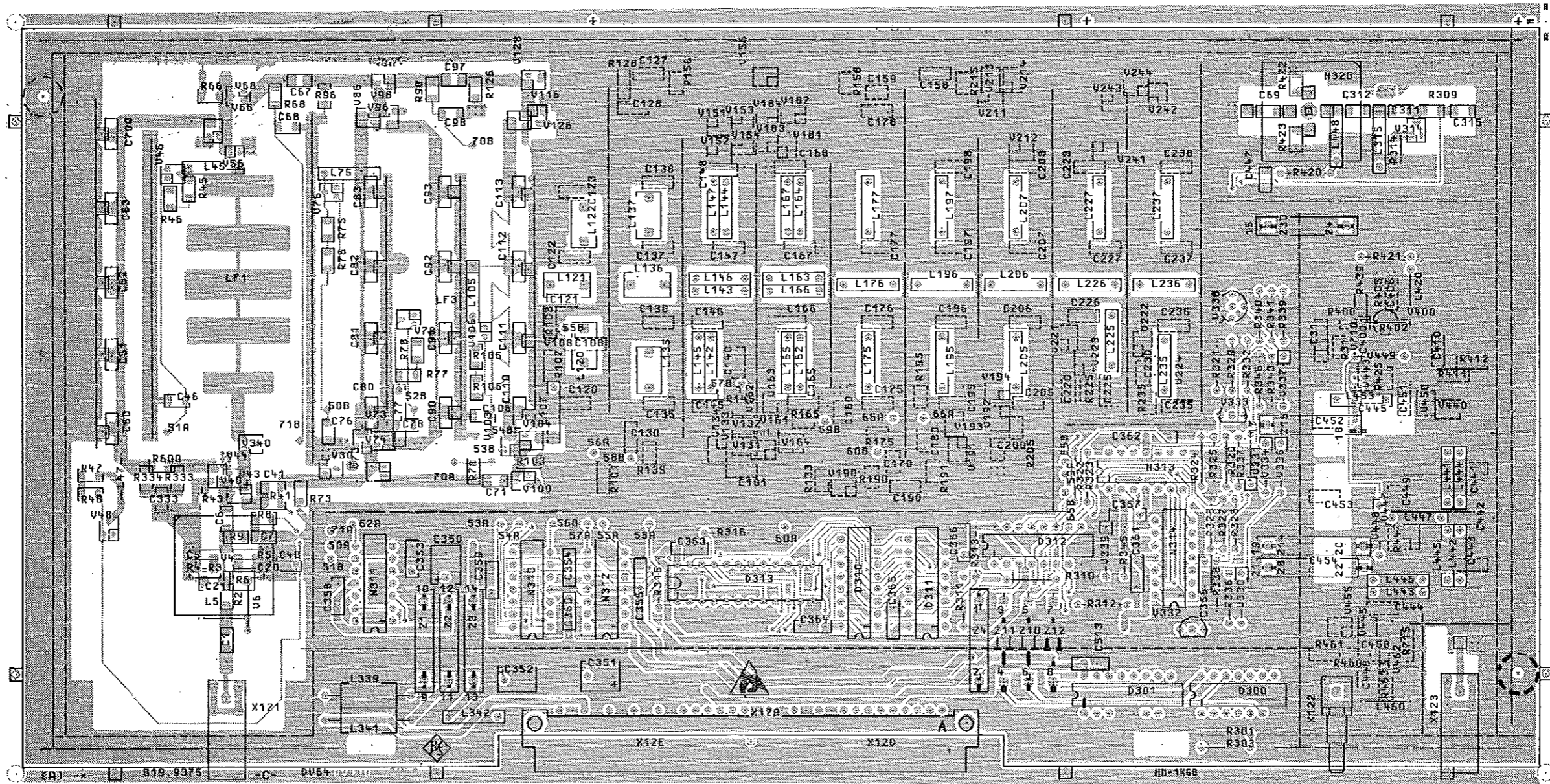
DRAUFSICHT
TOP VIEW



SCHRIFT OBEN
DRAWING TOP



Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



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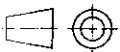
VARIANTENERKLÄRUNG / VERSION
VAR 02 - GRUNDAUSFÜHRUNG / BASIC MODEL

		08.88	HM	Maße ohne Toleranzangabe		Maßstab 1 : 1	
						Halbzeug, Werkstoff	
		1KGB	Tag	Name		Benennung	
		Bearb.	03.88	HM		FILTERSATZ FILTER MODULE	
		Gepr.					
		Norm					
						Zeichn.-Nr.	
						819.9369.01	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU		reg. i. V.	819.0010 V
						erste Z.	
						Blatt-Nr.	4
						v. Bl.	

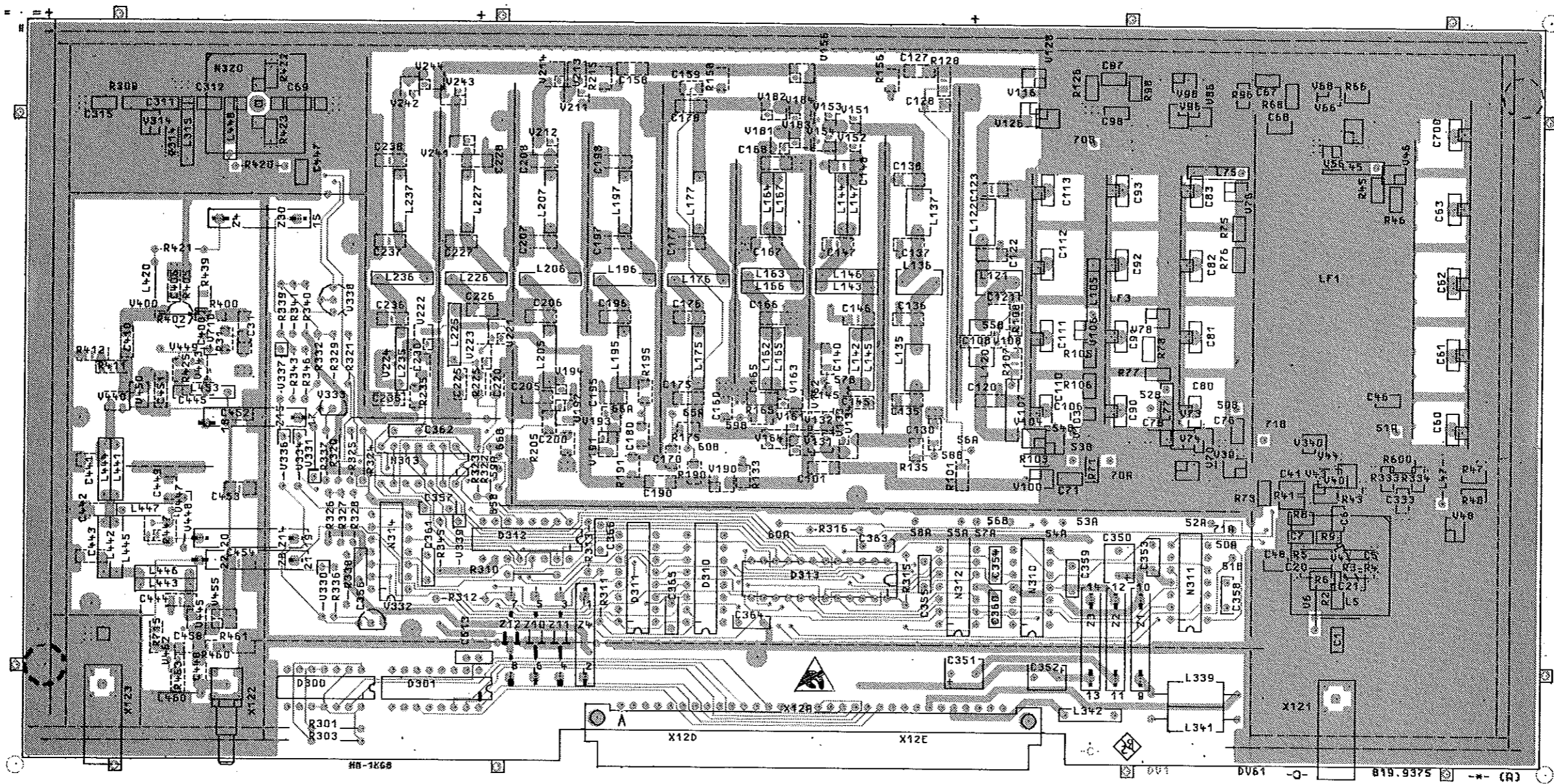


ACHTUNG EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
Electrostatic sensitive devices require a special handling

ISO-Projektion
Methode E



Ansicht und Leitungsführung Lötseite
View of tracks on solder side



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VARIANTENERKLÄRUNG / VERSION
VAR 02 - GRUNDAUSFÜHRUNG / BASIC MODEL

08.88		HM	Maße ohne Toleranzangabe		Maßstab 1 : 1	
					Halbzeug, Werkstoff	
			1KGB	Tag	Name	Benennung
			Bearb.	03.88	HM	FILTERSATZ FILTER MODULE
			Gepr.			
			Norm			
					Zeichn.-Nr.	
					819.9369.01	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU		Blatt-Nr. 5
				reg. i. V. 819.0010 V		erste Z.



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SO-Produktion Methode E



ROHDE & SCHWARZ

SERVICE DOCUMENTS

Output Section

820.0461.02

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5 Service Manual "Output Section"

5.1 Function Description

(See circuit diagram 820.0461 S and Fig. 5-1)

The frequencies between 500 MHz and 2160 MHz generated by the module "RF oscillators" are converted on the module "Output section" to the frequency range 0.1 to 2160 MHz by dividing and mixing.

In addition to frequency processing, the module controls the amplitude of the RF signal so that the amplitude can be electronically adjusted at the instrument output so making AM possible.

The module contains an electronic switch which can rapidly switch the RF signal on and off to implement pulse modulation.

5.1.1 Frequency Conditioning

The RF signal from the RF oscillators (500 to 2160 MHz) is applied via X111 to the module and to the binary divider circuit whose division factor can be set to a value between 2 and 32 by the controller (see Fig. 5-1). The digital counters D1, D20 and D30 are connected in a cascade depending on the division ratio required. For example, D1 and D20 are connected in a cascade if a division factor of 8 is required, D20 and D30 for a division factor of 16, and D1, D20 and D30 for a division factor of 32. None of the dividers is used when a factor of 1 is required; only the attenuator R31 to R33 is in operation and matches the attenuation to that of the switches and counters. The electronic switches for switching over the signal paths are implemented using PIN diodes.

The broadband amplifiers N40, N50 and V65 that follow compensate the attenuation of the divider circuit and reduce its amplitude in that N50 and V65 are underdriven. Via the PIN modulator and the pulse modulator - which are described in more detail below - the signal is applied to output X121 to which the input of the module "Filter bank" is connected. The filter bank rejects spurious harmonics.

The divider circuit covers the frequency range from 15.625 MHz to 2160 MHz; this is referred to as the divider range.

Frequencies below these values (0.1 to 15.625 MHz) are produced in the output section by mixing; this is referred to as the mixer range.

In the divider range, the signal passes via output X123 of the module "Filter bank" to the module "Output amplifier" or "Doubler". In the mixer mode, the signal passes via output X122 of the module "Filter bank" back to the output section at input X122 to which the RF input of the frequency mixer is connected via the amplifier V301, the attenuators R310 to R312 and R331 to R333 and the filter L303 to L306 (see Fig. 5-2). The LO signal has a frequency of 130 MHz and is applied from the module "Fixed frequencies" via input X93 and amplifiers V371 and V373.

The frequency of the RF signal is between 130.1 MHz and 145.625 MHz (division factor = 4) and is down-mixed to 0.1 MHz to 15.525 MHz by the mixer. The frequency sum, which also appears at the mixer output, is attenuated by the lowpass filter L323, L331, L333.

Once the level has been boosted by the amplifiers N430 and V363, and the harmonics rejected by the filter L344 to L346, the signal is applied via output X131 to the module "Output amplifier".

Slightly higher frequencies are applied to the inputs of the mixer if the special function "Mixing range 125 MHz" is on. The values are shown in brackets in Fig. 5-2. The division factor is then only 1 so that in FM mode the frequency span of the RF oscillators is not reduced by dividing. This then permits the large frequency span of 800 kHz at the instrument output in the mixer range. As a result of the other frequency range, a switch is made from filter L303 ... L306 to filter L317, L318 and from filter L346 ... L348 to filter L341 ... L345.

5.1.2 Amplitude Conditioning

To enable electronic adjustment of the amplitude, amplifier V65 is followed by a PIN modulator whose PIN diodes attenuate the RF signal as a function of the applied control voltage (see Fig. 5-1).

The amplitude is detected by the detector on the module "Output amplifier" at frequencies from 8 to 2160 MHz and by detector V302 in the output section for frequencies below 8 MHz. A switchover between the two detectors using switch D430-B, D425-C is necessary so that the operating frequency does not fall below 8 MHz which would increase the response time excessively.

The detector voltage is applied to the control amplifier which generates the difference from the setpoint and controls the PIN modulator following a PI transmission. The target value is obtained from the DAC D410 which is controlled by the controller. There is therefore a closed control loop with which the detector voltage is controlled and thus also the RF amplitude of a command variable adjustable by the controller.

The reference voltage of the level DAC comes from the differential amplifier N400-A which superimposes a constant DC voltage on the output signal of the so-called "Modulation depth divider". This is also a DAC (D400-A) whose reference voltage is the AM signal at X13.A1. In this manner, the module delivers an AM signal whose modulation depth is determined by the modulation depth divider and whose amplitude is determined by the level DAC.

If the instrument operates in the doubling range (output frequency range 2160 to 4320 MHz), a switchover from the PIN modulator of the output unit to the doubler module (switches D430-D and D435-B) is made. The control voltage of the PIN modulator in the output unit is then clamped to a fixed value via switch D435-C. The fixed value is determined by the controller and the DAC D450 (control voltage for PIN modulator).

Switch D425-B is used to clamp the control amplifier to the lower limit if an RF signal path is switched over somewhere in the instrument (switching between divider, mixer and doubler ranges, switching oscillators and filters). The PIN modulator is thus switched to maximum attenuation during the switching procedure and no large noise signals are applied to the instrument output.

5.1.3 Pulse Modulation

The pulse modulator comprises the three GaAs switches D260, D270 and D280 connected in a cascade as well as a drive circuit in which the signal from modulation input X41 is conditioned for the switches. Cascading the switches gives the higher pulse blanking and the lower rise and fall times of the pulse signal.

The pulse control must be switched off if the pulse modulator is switched on otherwise the former would try to compensate for the modulation. The control loop is therefore closed by the controller prior to activation of the pulse modulator, and the setting of the PIN modulator is measured by the diagnostics function. The PIN modulator is then clamped at the measured value via switch D435-C and the DAC D450 (control voltage for PIN modulator) so that the amplitude at the output remains constant at the set value despite opening of the control loop (as when calling the special function ALC OFF). The pulse modulation is subsequently switched on. The calibration described above is repeated if a frequency or amplitude is changed on the instrument.

In the doubler range, the PIN modulator on the doubler module is clamped to fixed value via the level DAC in the same manner.

5.1.4 Control and Diagnostics Circuit

The module is controlled via a serial data bus. The data for the RF setting and the modulation control are read into a total of 8 shift registers. Two different strobes at the output of the address decoder D248-A distinguish between the data for the RF setting and the modulation control.

Eight different diagnostics values (DC values) can be applied to output X13.A17 via multiplexer module D455-A.

The level control loop is monitored by comparator N80. This switches output X13.A18 from +5 V to 0 V if the level control has failed.

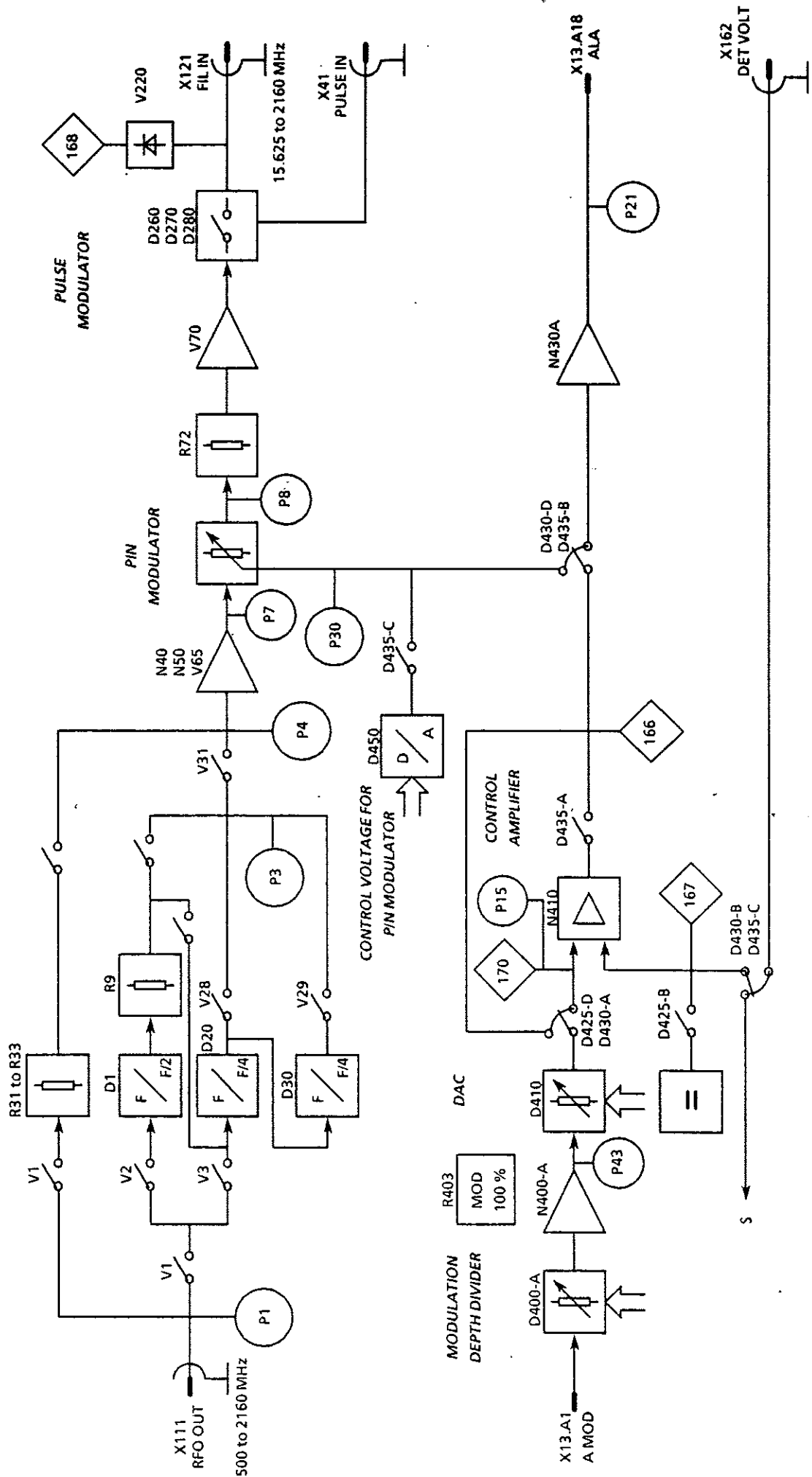


Fig. 5-1 Block diagram of the divider circuit and amplitude processing

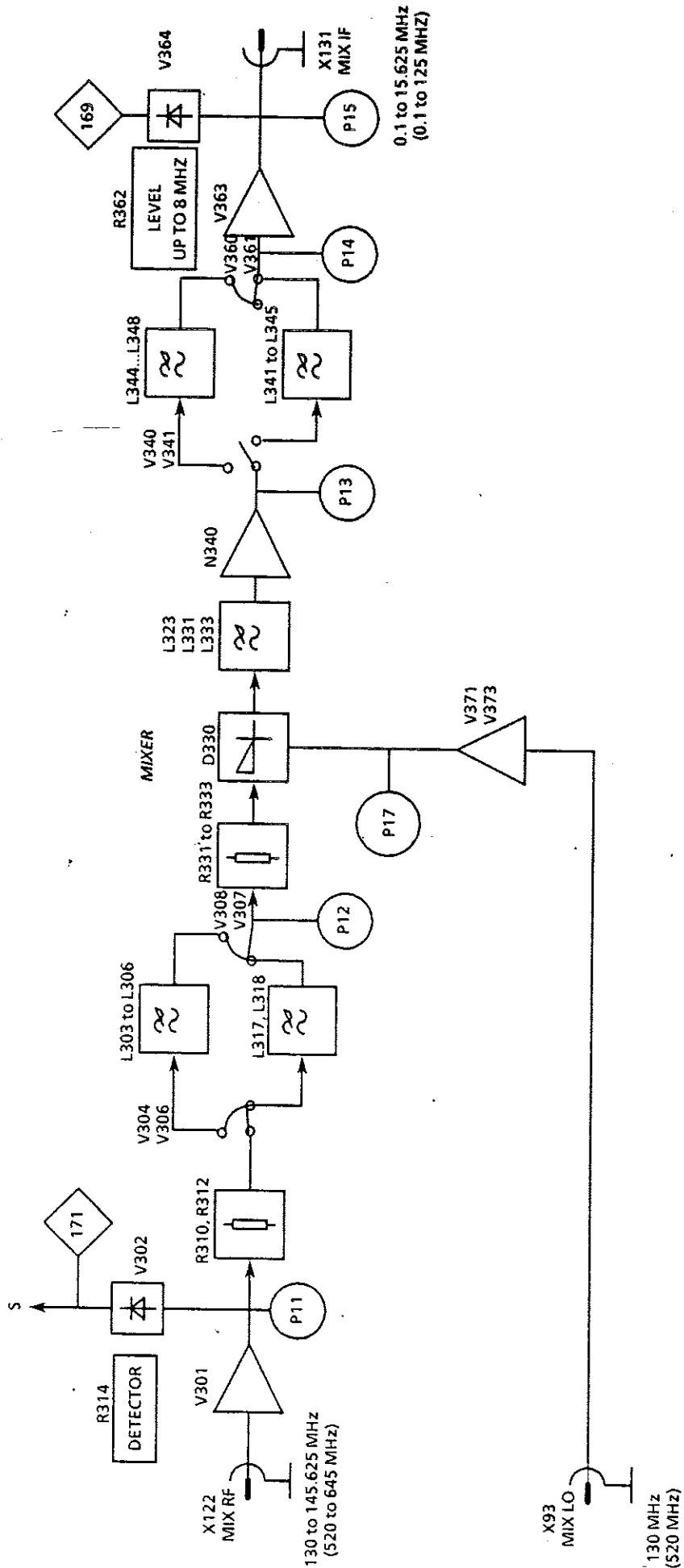


Fig. 5-2 Block diagram of the mixer circuit

5.2 Testing and Adjustment

5.2.1 Testing and Adjusting Signal Path X111 → X121

5.2.1.1 Adjustment of Modulation Depth

- Instrument settings:
AM 100 %, AF 1 kHz, sinewave AF signal
- Check AF voltage at X13.A1
($f = 1 \text{ kHz}$, $V_{\text{rms}} = 4.2426 \text{ V} \pm 1 \%$,
 $V_{\text{dc}} = 0 \pm 10 \text{ mV}$).
- Measure AF voltage at P43 using an oscilloscope and adjust potentiometer R403 for $V_{\text{min}} = 0 \pm 10 \text{ mV}$.

Note: The level at the RF output of the instrument is changed by this adjustment. The RF level must therefore be measured again when the modulation depth is reset, and a new software calibration carried out if necessary. See instrument adjustment for further information.

5.2.1.2 Testing the Modulation Depth Divider

- Instrument settings required:
- AM 100 %, AF 1 kHz, sinewave AF signal
- Measure the AC voltage at P13 using a suitable voltmeter (e.g. UDS5), record this value as the reference voltage, and select the ΔdB setting on the UDS5.
- Measure the AC voltage at P43 using the UDS5.
- Check the nominal attenuation settings of the attenuator for the following AM settings:

AM in %	Nominal value
100.0	-0.2 \pm 0.1 dB
50.0	-6.2 \pm 0.1 dB
25.0	-12.2 \pm 0.1 dB
12.5	-18.2 \pm 0.1 dB
6.3	-24.2 \pm 0.2 dB
3.1	-30.2 \pm 0.2 dB
1.6	-36.2 \pm 0.3 dB
0.8	-42.2 \pm 0.3 dB
0.4	-48.2 \pm 0.3 dB
0.2	-54.2 \pm 0.3 dB
0.1	-60.2 \pm 0.3 dB
0.0	< -80 dB

5.2.1.3 Testing the Modulation Depth Attenuator

- Instrument settings required:
AM OFF, RF level OFF, special function 1 (interruption-free level setting) on.
- Measure the DC voltage at P15 using a suitable voltmeter (e.g. UDS5), the magnitude of the DAC offset voltage must be < 10 mV.
- Store the voltage value at UDS5 as an offset.
- Activate special function 9 (level correction switched off).
- Set RF level 19 dBm.
The voltage at P15 must be $-5.7 \pm 0.2 \text{ V}$.
- Store the voltage value at UDS5 as the reference and select the ΔdB setting on the UDS5.
- Check the nominal attenuation of the DAC for the following RF level settings:

RF level	CONT	Nominal value
19.0 dBm	0.0 dB	0 (reference)
13.0 dBm	-6.0 dB	-6 \pm 0.05 dB
7.0 dBm	-12.0 dB	-12 \pm 0.10 dB
1.0 dBm	-18.0 dB	-18 \pm 0.15 dB

- Store the voltage value on the UDS5 as the reference.
- Check the nominal attenuation of the DAC for the following RF level settings:

RF-LEVEL	CONT	Sollwert
1.0 dBm	-18.0 dB	0.0 (reference)
0.9 dBm	-18.1 dB	-0.1 \pm 0.02 dB
0.8 dBm	-18.2 dB	-0.2 \pm 0.02 dB
0.7 dBm	-18.3 dB	-0.3 \pm 0.02 dB
0.6 dBm	-18.4 dB	-0.4 \pm 0.02 dB
0.5 dBm	-18.5 dB	-0.5 \pm 0.02 dB
0.4 dBm	-18.6 dB	-0.6 \pm 0.02 dB
0.3 dBm	-18.7 dB	-0.7 \pm 0.02 dB
0.2 dBm	-18.8 dB	-0.8 \pm 0.02 dB
0.1 dBm	-18.9 dB	-0.9 \pm 0.02 dB
0.0 dBm	-19.0 dB	-1.0 \pm 0.02 dB
OFF	----	< -60.00 dB

5.2.1.4 Checking the Control Voltage Setting for "Local Levelling"

- Instrument settings:
RF level 13 dBm, RF frequency > 2.161 GHz
- Disconnect cable W122 from X121, connect RF power meter to X121.
- The RF level at X121 must be between 3 and 10 dBm in the frequency range $2.161 \text{ GHz} \leq f_{RF}(\text{instrument}) \leq 4.32 \text{ GHz}$.

5.2.1.5 Testing the PIN Modulator

- Instrument settings required: $16 \text{ MHz} \leq \text{RF frequency} \leq 2.159 \text{ GHz}$, RF level 16 dBm
- Disconnect cable W121 from X121, connect spectrum analyzer to X121.
- Maximum level:
The RF level at X121, P_{max} , must be $> 7.5 \text{ dBm}$ in the frequency range $16 \text{ MHz} \leq f_{RF}(\text{instrument}) \leq 2.159 \text{ GHz}$.
- Minimum level:
Remove jumper XB1, connect XB1.1 to P15.
The RF level at X121, P_{min} , must be $< P_{max} - 45 \text{ dB}$ in the frequency range $16 \text{ MHz} \leq f_{RF}(\text{instrument}) \leq 2.159 \text{ GHz}$.
Insert jumper XB1 again.

5.2.1.6 Testing the Pulse Modulator

Note: The module cover must be screwed down when testing the pulse modulator dynamics.

- Connect analyzer or test receiver to RF connector of instrument.
- Instrument settings:
 $f_{RF} = 125 \text{ MHz}$, RF level 13 dBm, AM OFF
- Measure reference level P_{ref} at RF output of instrument, switch on pulse modulation and activate special function 31 (inverted pulse polarity).
- The output level must be $< (P_{ref} - 80 \text{ dB})$.
- Connect pulse generator with 1-MHz square-wave signal (TTL levels) to PULSE connector at rear of instrument, and connect suitable oscilloscope with 50- Ω input impedance to RF connector of instrument.
- The rise and fall times of the carrier envelope (10 % \rightarrow 90 %) must be $< 20 \text{ ns}$.
- Connect spectrum analyzer to RF connector of instrument.
- The level of the spectral lines at 1 MHz must be $< -30 \text{ dBc}$ referred to the level of the unmodulated carrier.

5.2.1.7 Testing the Frequency Divider

- Instrument settings:
FM OFF, AM OFF, pulse OFF,
 $16 \text{ MHz} \leq f_{RF}(\text{instrument}) \leq 2.159 \text{ GHz}$
- Connect spectrum analyzer to X121.
- It is alright if harmonics of the frequency set on the front panel are present in the output spectrum if they are $< -5 \text{ dBc}$, the nonharmonics must be $< -100 \text{ dBc}$.
The broadband S/N ratio at an offset from the carrier of $\geq 2 \text{ MHz}$ must be $< -142 \text{ dBc}$ (referred to 1-Hz bandwidth).

5.2.2 Testing and Adjusting of Signal Path X122 → X131

5.2.2.1 Adjustment of Detector Offset

- Instrument settings:
 $f_{RF} < 4.9$ MHz, activate special function 22 (mixing range 15.625 MHz), AM OFF, FM OFF, RF level 13 dBm.
- Connect power meter to RF connector of instrument, measure level P_{ref} .
- Activate special function 1 (interruption-free level setting) reduce level by 20 dB to -7 dBm.
- Set power meter reading to $P_{ref} - 20$ dB ± 0.1 dB using potentiometer R314.

5.2.2.2 Checking the Maximum IF Power

- Instrument settings:
 $f_{RF} = 10$ MHz, activate special function 22 (mixing range 15.625 MHz), AM OFF, FM OFF, RF level 13 dBm.
- Connect power meter to X131, the output power must be between 4 and 8 dBm.

5.2.2.3 Adjustment of IF Gain

Note: Recalibration of the software level correction is required following a readjustment of the IF gain (see instrument adjustment).

- Instrument settings:
 $f_{RF} = 6$ MHz, activate special function 22 (mixing range 15.625 MHz) and special function 9 (level correction switched off), AM OFF, FM OFF, RF level 13 dBm.
- Connect power meter to RF connector of instrument.
- Measure level P_{ref} .
- Set $f_{RF} = 4$ MHz, adjust indicator of power meter to $P_{ref} \pm 0.1$ dB using R362.

5.2.2.4 Testing the IF Frequency Response

- Instrument settings:
 100 kHz $\leq f_{RF} < 5$ MHz, activate special function 22 (mixing range 15.625 MHz) and special function 9 (level correction switched off), AM OFF, FM OFF, RF level 13 dBm.
- Connect power meter to RF connector of instrument, the frequency response flatness of the output power must be < 1 dB in the defined frequency range.

5.2.2.5 Checking the IF Harmonic Ratio

- Instrument settings:
 100 kHz $\leq f_{RF} \leq 15$ MHz
- Activate special function 22 (mixing range 15.625 MHz), AM OFF, FM OFF, RF level 13 dBm.
- Activate special function 5 (level control not functioning) and special function 7 (level control voltage from table).
- Connect spectrum analyzer to X131, the harmonics ratio must be < -35 dBc.

5.2.2.6 Checking Nonharmonics

- Instrument settings:
 $f_{RF} = 10$ MHz, activate special function 22 (mixing range 15.625 MHz), AM OFF, FM OFF, RF level 13 dBm.
- Set $f_{RF} = 14.777$ MHz.
- Connect spectrum analyzer to RF connector of instrument, measure nonharmonics at the following frequencies, the nonharmonics must be < -100 dBc:
130.000 MHz / 260.000 MHz / 390.000 MHz /
115.223 MHz / 100.446 MHz / 85.669 MHz /
70.892 MHz / 56.115 MHz / 41.338 MHz /
26.561 MHz
- Instrument settings:
 $f_{RF} = 124.123$ MHz, activate special function 21 (mixing range 125 MHz), AM OFF, FM OFF, RF level 13 dBm.
- Connect spectrum analyzer to RF connector of instrument, measure nonharmonics at following frequencies, the nonharmonics must be < -50 dBc:
520.000 MHz / 1040.000 MHz / 1560.000 MHz /
395.887 MHz / 271.754 MHz / 147.631 MHz /
23.508 MHz / 100.615 MHz / 224.738 MHz /
348.861 MHz

5.3 Troubleshooting

Instrument faults whose cause may be found in the module "Output unit" include:

Fault	Source
Instrument RF level too small	
a) At all frequencies	Pulse modulator, PIN modulator
b) At $f < 5$ MHz	IF detector
c) At $f < 15.625$ MHz	Mixing range
d) At $f < 2.16$ GHz	Analog switch, serial interface
e) At $f > 2.16$ GHz	AM2 line, incorrect input level for doubler, incorrect software correction values for local levelling
f) With electronic reduction	IF detector, level DAC
Incorrect RF	Frequency divider, mixing range
Poor broadband S/N ratio	Frequency divider, PIN modulator
Poor AM data	Integrator, PIN modulator current source
Noise sidebands close to carrier	AM control loop
No pulse modulation	Pulse modulator including control circuit
Nonharmonics too near signal	Mixing range
Harmonic ratio too small at $f < 15.625$ MHz	Mixing range, IF amplifier

5.3.1 Troubleshooting the PIN Modulator

- Check operating point of amplifier chain N40, N50, V65 and V70, check forward voltage at PIN diodes V61 to V64, check DC voltage at R430, measure control voltage at P30, check jumper XB1.

5.3.2 Troubleshooting the Pulse Modulator

- Check drive voltages at the feed-through capacitors C210 to C215:

RF signal	Voltage at C210. 212. 214	Voltage at C211. 213. 215
On	0 ± 0.1 V	-6.3 ± 0.3 V
Off	-6.3 ± 0.3 V	0 ± 0.1 V

- Direct current must not flow through the resistors R250 to R255.
- Set $f_{RF} = 20$ MHz and check RF signal before and after the switches D260, D270 and D280 using an oscilloscope.
- Check logic levels of control circuit.

Note: D210 is connected between 0 and -6.2 V, the signal level is converted by V201.

5.3.3 Troubleshooting the Frequency Divider

- Set $f_{RF} = 16$ MHz and check function of dividers D30, D20 and D1 using oscilloscope, measure forward voltages of switching diodes.
- The division ratio f_t is the ratio between the input frequency at X111 and the output frequency at X121.

Measure the control voltages at P23 to P29:

"1" represents values between 13 V and 15.5 V

"0" represents values between -15.5 V and -13 V

f_t	f_{RF} (instrument)	P23	P24	P25	P26	P27	P28	P29
1	1000 to 2160 MHz	1	0	1	1	1	1	1
1	500 to 1000 MHz	1	0	1	1	1	1	1
2	250 to 500 MHz	0	0	1	1	0	0	1
4	125 to 250 MHz	1	0	1	0	1	0	1
8	62.5 to 125 MHz	1	1	1	0	0	0	1
16	31.5 to 62.5 MHz	1	0	0	1	1	0	1
32	15.625 to 31.25 MHz	1	1	0	1	0	0	1

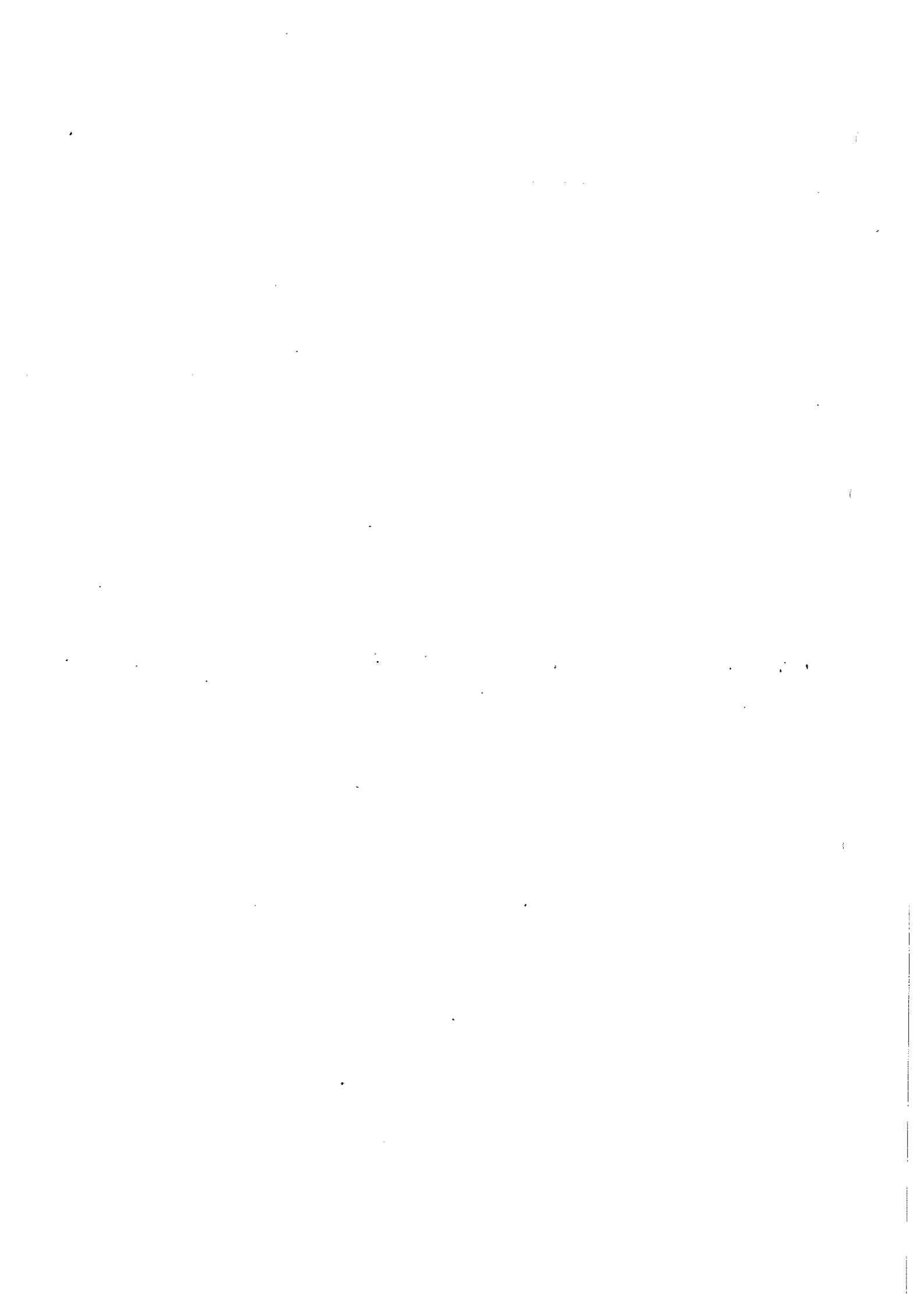
5.3.4 Troubleshooting the IF Detector

- Measure DC voltage at N230/1 (-0.2 ± 0.1 V).
- Set $f_{RF} = 4$ MHz activate special function 1 (interruption-free level setting), check detector voltage at C325:

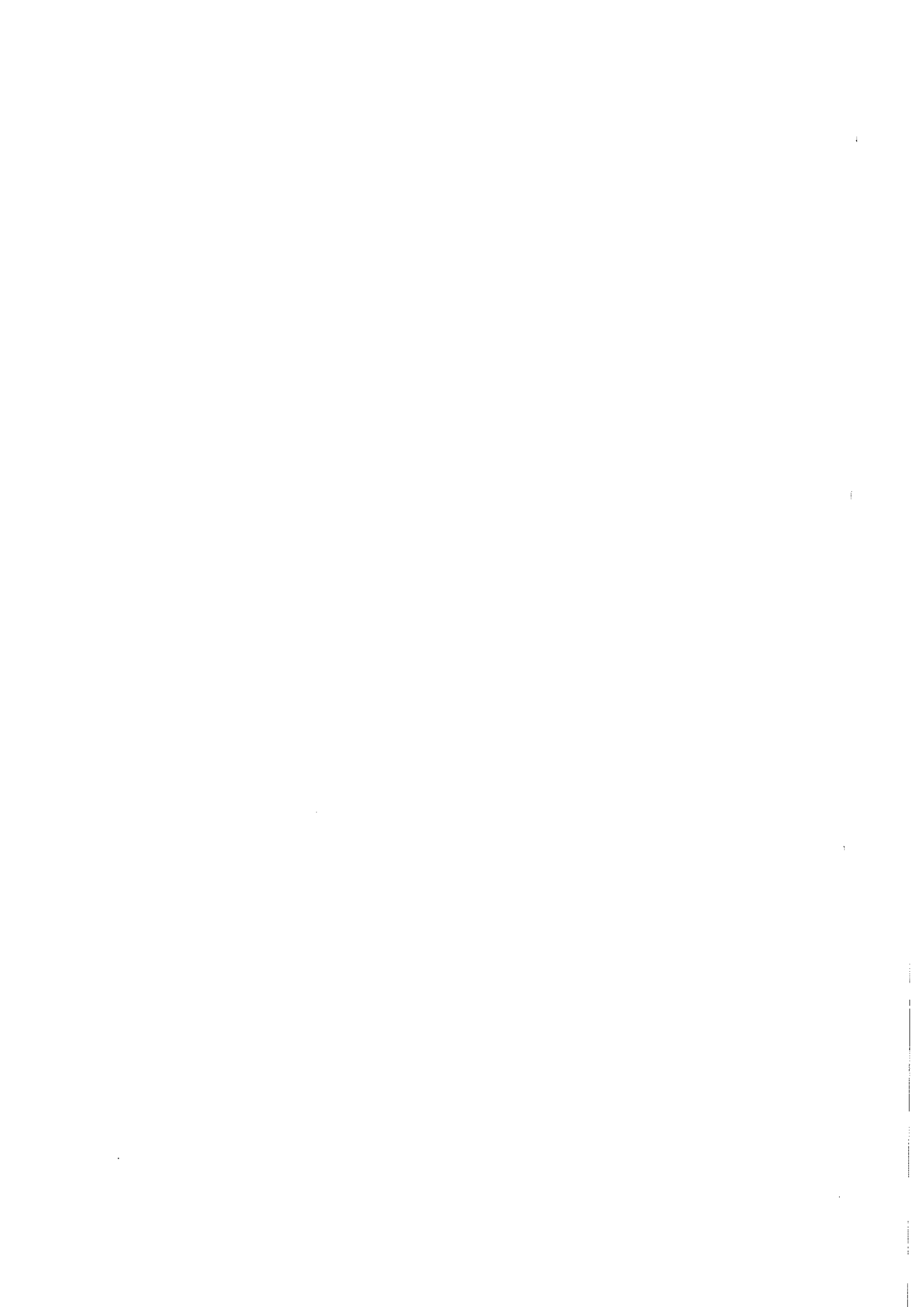
RF level	Reduction	Voltage at C325
16 dBm	0 dB	1.80 ± 0.18 V
13 dBm	3 dB	1.20 ± 0.12 V
10 dBm	6 dB	0.79 ± 0.08 V
7 dBm	9 dB	0.49 ± 0.05 V
4 dBm	12 dB	0.28 ± 0.03 V
2 dBm	14 dB	0.18 ± 0.02 V
-1 dBm	17 dB	0.07 ± 0.01 V
-4 dBm	20 dB	0.01 ± 0.01 V

5.3.5 Troubleshooting the Mixing Range

- The required harmonic ratio of the IF signal is given by the 150-MHz and 650-MHz filters ahead of the mixer, the attenuation of the harmonics must be >30 dB.
- Check the operating points of RF amplifier stages and check to see whether switching diodes in filters conduct or not (signal path switchover using special functions 21 (mixing range 125 MHz) and 22 (mixing range 15.625 MHz)).
- Remove jumper X31-X32 and measure IF gain at output X131, measure frequency responses of the IF lowpasses:
 - Special function 21 activated:
 - $f \leq 125$ MHz: IF gain = 13 ± 2 dB
 - $f \geq 400$ MHz: filter attenuation >70 dBc, referred to level at 10 MHz
 - Special function 22 activated:
 - $f \leq 15.625$ MHz: IF gain = 13 ± 2 dB
 - $f \geq 70$ MHz: Filter attenuation >70 dBc, referred to level at 10 MHz
- Check signal at LO mixer input using RF probe. An RF power of 20 ± 2 dBm must flow through C379, this corresponds to a voltage of $2.23 V_{rms} \pm 25\%$.



Schalteillisten
Stromläufe
Bestückungspläne
Part lists
Circuit diagrams
Components plans
Listes des pièces détachées
Schémas de Circuit
Plans des composants



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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	anhalten in contained in
C1	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C2	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C3	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C4	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C5	CC 18NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.3270	VITRAMON	VJ1206 Y 183 K FAT	
C6	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C7	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
..11					
C20	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C21	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
..24					
C25	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C27	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
..33					
C35	CC 6,8PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8236	VITRAMON	VJ1206 A 6R8 C FAT	
C36	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C37	CC 470PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8515	VITRAMON	VJ1206 A 471 F FAT	
C40	CC 3,3NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8909	VITRAMON	VJ1206 Y 332 K FAT	
C41	CC 22NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8467	VITRAMON	VJ1206 Y 233 K FAT	
C42	CC 3,3NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8909	VITRAMON	VJ1206 Y 332 K FAT	
C45	CC 1NF+-10%100V2K1200CHIP CAPACITOR	CC 082.7385	VITRAMON	VJ0805Y102KFA	
C46	CC 1NF+-10%100V2K1200CHIP CAPACITOR	CC 082.7385	VITRAMON	VJ0805Y102KFA	
C47	CC 1NF+-10%100V2K1200CHIP CAPACITOR	CC 082.7385	VITRAMON	VJ0805Y102KFA	
C60	CC 3,3NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8909	VITRAMON	VJ1206 Y 332 K FAT	
C62	CC 22NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8467	VITRAMON	VJ1206 Y 233 K FAT	
C63	CC 22NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8467	VITRAMON	VJ1206 Y 233 K FAT	
C64	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	
C65	CC 1,2PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6787	VITRAMON	VJ0805A1R2CFA	
C66	CC 1,2PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6787	VITRAMON	VJ0805A1R2CFA	
C67	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C70	CC 82PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8821	VITRAMON	VJ1206 A 820 F FAT	
C72	CC 82PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8821	VITRAMON	VJ1206 A 820 F FAT	
C73	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C74	CC 22NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8467	VITRAMON	VJ1206 Y 233 K FAT	
C75	CC 22NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8467	VITRAMON	VJ1206 Y 233 K FAT	
C76	CC 3,3NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8909	VITRAMON	VJ1206 Y 332 K FAT	
C77	CC 1,2PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6787	VITRAMON	VJ0805A1R2CFA	
C78	CC 1,2PF+-0,25PF50VNPO CH CHIP CAPACITOR	CC 099.6787	VITRAMON	VJ0805A1R2CFA	
C85	CC 100PF+-2%6X7N150 CAPACITOR	CC 087.6712	VALVO	2222 678 34101	
C161	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C162	CC 100PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8415	VITRAMON	VJ1206 A 101 F FAT	
C203	CC 18NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.3270	VITRAMON	VJ1206 Y 183 K FAT	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C205	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C206	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	
C209	CE 2,2UF+-20%20V 5X 4X 7 ELECTROLYTIC CAPACITOR	CE 022.8104	ROEDERSTEI	ETR 1 2,2/20 20%	
C210 . 215	LD FILT.20DB/10GHZ 500V # LOWPASS-FILTER	820.3425	OXLEY	DBZ2/C/10/500V	
C220	CC 1PF+-0,25PF50V NPO1206 CERAMIC CHIP CAPACITOR	CC 099.8667	VITRAMON	VJ1206 A 1RD C FAT	
C225	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C227	CC 18NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.3270	VITRAMON	VJ1206 Y 183 K FAT	
C228	CC 18NF+-10%50V X7R 0805 CERAMIC CHIP CAPACITOR	CC 099.8380	VITRAMON	VJ0805Y183KFA	
C250	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C251	CC 100NF+-10%50V5K1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C253 . 256	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C260	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 007.3940	VALVO	2222 122 34229	
C261	CC 100NF+-10%50V5K1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C270	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006	
C271	CC 100NF+-10%50V5K1200VIE CAPACITOR	CC 084.5350	UNION CARB	CK05BX104K	
C300	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C301	CC 27NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8473	VITRAMON	VJ1206 Y 273 K FAT	
C302	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C303	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C304	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C305	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C306	CC 10PF+-0,25PF50VNPO1206 CERAMIC CHIP CAPACITOR	CC 099.8480	VITRAMON	VJ1206 A 100 C FAT	
C307	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C308	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C309	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C310	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C311	CC 39PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8796	VITRAMON	VJ1206 A 390 F FAT	
C312	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C313	CC 4,7PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8213	VITRAMON	VJ1206 A 4R7 C FAT	
C314	CC 8,2PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8242	VITRAMON	VJ1206 A 8R2 C FAT	
C315	CC 4,7PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8213	VITRAMON	VJ1206 A 4R7 C FAT	
C316	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C317	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C318	CC 2,2PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8171	VITRAMON	VJ1206 A 2R2 C FAT	
C319	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C320	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C321	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C322	CC 1,5NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7417	VITRAMON	VJ1206 A 152 F FAT	
C325	LD FILT.20DB/10GHZ 500V # LOWPASS-FILTER	820.3425	OXLEY	DBZ2/C/10/500V	

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C330	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C339	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C340	CC 33PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8780	VITRAMON	VJ1206 A330F FAT	
C341	CC 10PF+-0,25PF50VNPO1206 CERAMIC CHIP CAPACITOR	CC 099.8480	VITRAMON	VJ1206 A 100 C FAT	
C342	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C343	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C348	CC 150PF+-1%50VNPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8509	VITRAMON	VJ1206 A 151 F FAT	
C349	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C350	CC 330PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8873	VITRAMON	VJ1206 A 331 F FAT	
C352	CC 150PF+-1%50VNPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8509	VITRAMON	VJ1206 A 151 F FAT	
C353	CC 18PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8767	VITRAMON	VJ1206 A 180 F FAT	
C354	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C355	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C356	CC 18PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8767	VITRAMON	VJ1206 A 180 F FAT	
C360	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C361	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C362	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C364	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C365	CC 47PF+-1%50V COG 1206 CERAMIC CHIP CAPACITOR	CC 099.8496	VITRAMON	VJ1206 A 470 F FAT	
C367	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C368	CC 12PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8744	VITRAMON	VJ1206 A 120 F FAT	
C369	CC 12PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8744	VITRAMON	VJ1206 A 120 F FAT	
C370	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C371	CC 27NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8473	VITRAMON	VJ1206 Y 273 K FAT	
C372	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C373	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C376	CC 27NF+-10%50VX7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8473	VITRAMON	VJ1206 Y 273 K FAT	
C377	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C379	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C380	CC 22PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8396	VITRAMON	VJ1206A220JFA	
C381	CC 8,2PF+-0,25PF50V NPO CERAMIC CHIP CAPACITOR	CC 007.8242	VITRAMON	VJ1206 A 8R2 C FAT	
C382	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C384	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C385	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C390	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C391	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C392	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	
C393	CC 150PF+-1%50VNPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8509	VITRAMON	VJ1206 A 151 F FAT	
C394	CC 220PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8850	VITRAMON	VJ1206 A 221 F FAT	

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C395	CC 270PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8867	VITRAMON	VJ1206 A 271 F FAT	
C398	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C400	CC 12PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8744	VITRAMON	VJ1206 A 120 F FAT	
C401	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITDR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C402	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C403	CE 1UF+-10%35V TANTALUM SMD-CAPACITOR	843.3221	SPRAGUE	195D 105 X9 035 D2	
C404	CC 680PF+-10%4X5R2000 CAPACITOR	CC 087.7019	VALVO	2222 63051 681	
C405	CE 1UF+-10%35V TANTALUM SMD-CAPACITOR	843.3221	SPRAGUE	195D 105 X9 035 D2	
C410	CC 12PF+-1%50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 099.8744	VITRAMON	VJ1206 A 120 F FAT	
C412	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	
C440	CE 1UF+-10%35V TANTALUM SMD-CAPACITOR	843.3221	SPRAGUE	195D 105 X9 035 D2	
C441	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C442	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C445	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	
C480	LD FILT.40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC	
C772	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
C773	CC 1NF+-1% 50V NPO 1206 CERAMIC CHIP CAPACITOR	CC 007.7398	VITRAMON	VJ1206 A 102 F FAT	
D1	BL SP8606BDG 2:1DIVID UHF DIVIDER	BL 092.9297	PLESSEY	SP8606BDG	
D20	BL UPB582C 4:1 DIVID PRESCALER	820.3390	NEC	UPB582C	
D30	BL CA3199E 4:1 DIVID DIVIDER	372.1106	RCA	CA3199E	
D200	BL PC74HCTOOP 4X2I.NAND QUAD 2-INPUT NAND GATE	BL 571.3394	VALVO	PC74HCTOOP	
D210	BL MM74HC86N 4X2IN.EXOR QUAD 2-INP.EXCL.OR GATE	BL 571.3159	NSC	MM74HC86N	
D230	BL MM74HC11N 3X3IN.ANDG TRIPLE 3-INPUT AND GATE	BL 099.9486	NSC	MM74HC11N	
D240	BL PC74HC238P 3TO8 L.DEC DECODER/DEMULTIPLEXER	BL 620.0847	VALVO	PC74HC238P	
D260	BM KSW2-46 HF-SWITCH GAASFET SWITCH	820.3419	MCL	KSW2-46	
D270	BM KSW2-46 HF-SWITCH GAASFET SWITCH	820.3419	MCL	KSW2-46	
D280	BM KSW2-46 HF-SWITCH GAASFET SWITCH	820.3419	MCL	KSW2-46	
D330	BM SRA1WH MIXER 0.7GHZ MIXER	BM 252.5363	MCL	SRA1WH	
D390	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D400	BJ AD7533CQ 10B.DA-CONV D/A-CONVERTER	BJ 300.8740	ANALOG DEV	AD7533CQ	
D405	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D410	BJ AD7541AKN 12B.DA-CONV D/A-CONVERTER	BJ 356.0467	ANALOG DEV	AD7541AKN	
D415	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D420	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	
D425	BJ DG212CJ 4X ANALOGSCH QUAD ANALOG SWITCH	372.6850	SILICONIX	DG212CJ	
D430	BJ DG211CJ 4X ANALOGSCH ANALOG SWITCH	801.8260	SILICONIX	DG211CJ	
D435	BJ DG212CJ 4X ANALOGSCH QUAD ANALOG SWITCH	372.6850	SILICONIX	DG212CJ	
D440	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
D445	BL MM74HC4051N 8CH. AN. MUX	BL 099.9670	NSC	MM74HC4051N	
D450	8CH. ANALOG MUX/DEMUX BJ AD7523JN 8B. DA-CONV D/A CONVERTER	801.8219	MICRO POW.	MP7523JN	
D455	BL PC74HC4094P 8ST. SH. REG	BL 099.9711	VALVO	PC74HC4094P	
D460	8ST. SHIFT A. STORE REGIST. BL PC74HC4094P 8ST. SH. REG	BL 099.9711	VALVO	PC74HC4094P	
D465	8ST. SHIFT A. STORE REGIST. BO LM124J 4XL. P. OPAMP	300.6353	NSC	LM124J	
D470	OPERATIONAL AMPLIFIER BO LM124J 4XL. P. OPAMP	300.6353	NSC	LM124J	
L5	LD 1,20UH10%, 180HMO, 620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L10	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L19	LD 1,20UH10%, 180HMO, 620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L20	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L40	LD 15,0UH10%, 2,800HMO, 157A CHOKE	LD 067.3001	DELEVAN	DROSSEL 1025-48	
L41	LD 15,0UH10%, 2,800HMO, 157A CHOKE	LD 067.3001	DELEVAN	DROSSEL 1025-48	
L42	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L43	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L60	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L61	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L62	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L70	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L71	LD 10 UH 10% 3R3 144 MA CHOKE	LD 026.4184	DELEVAN	DROSSEL 1025-44	
L72	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L73	LD 0,82UH10%, 0,850HMO, 420A CHOKE	LD 067.2857	DELEVAN	DROSSEL 1025-18	
L74	LD 0,68UH10%, 0,600HMO, 500A CHOKE	LD 067.2840	DELEVAN	DROSSEL 1025-16	
L79	LD 100NH10% OR 15 0,1A1206# SMD-MULTILAYER-INDUCTOR	LD 007.4818	TOKO	MLF 3216 D R1 K	
L160	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L250	LD 6,8UH 10% OR 375 0,81A CHOKE	LD 026.4103	JAHRE	72.10-6R80K	
L251	LD 1,20UH10%, 180HMO, 620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L260	LD 15UH 10% 1R2 0,46A CHOKE	LD 026.4149	JAHRE	72.10-15R0 K	
L261	LD 1,20UH10%, 180HMO, 620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L264	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L265	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L270	LD 15,0UH10%, 2,800HMO, 157A CHOKE	LD 067.3001	DELEVAN	DROSSEL 1025-48	
L271	LD 1,20UH10%, 180HMO, 620A CHOKE	LD 067.2870	DELEVAN	DROSSEL 1025-22	
L300	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L302	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L303 . . 306	LD 0,12UH10%, 0,090HM1, 300A CHOKE	LD 067.2757	DELEVAN	DROSSEL 1025-96	
L309	LD 1,00UH10%, 1,000HMO, 390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L317	ENTHALTEN IN/INCLUDED IN LEITERPLATTE/PCB				
L318	PRINTED COMPONENT ENTHALTEN IN/INCLUDED IN				

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
L320	LEITERPLATTE/PCB PRINTED COMPONENT LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L323	LL SPULE 72NH COIL	820.1016			820.1168
L330	ENTHALTEN IN/INCLUDED IN LEITERPLATTE/PCB PRINTED COMPONENT				
L331	LL SPULE 34,5NH COIL	820.1151			820.1168
L333	ENTHALTEN IN/INCLUDED IN LEITERPLATTE/PCB PRINTED COMPONENT				
L340	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L341	LD 0,18UH10%0,120HM1,120A CHOKE	LD 067.2770	DELEVAN	DROSSEL 1025-02	
L342	LD 0,18UH10%0,120HM1,120A CHOKE	LD 067.2770	DELEVAN	DROSSEL 1025-02	
L343	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL 1025-94	
L344	LD 0,18UH10%0,120HM1,120A CHOKE	LD 067.2770	DELEVAN	DROSSEL 1025-02	
L345	LD 0,18UH10%0,120HM1,120A CHOKE	LD 067.2770	DELEVAN	DROSSEL 1025-02	
L346	LD 0,68UH10%0,600HMO,500A CHOKE	LD 067.2840	DELEVAN	DROSSEL 1025-16	
L347	LD 0,68UH10%0,600HMO,500A CHOKE	LD 067.2840	DELEVAN	DROSSEL 1025-16	
L348	LD 0,82UH10%0,850HMO,420A CHOKE	LD 067.2857	DELEVAN	DROSSEL 1025-18	
L360	LD 0,047 UH 10% CHOKE	249.5995	INDUSTRIA	BAUREIHE 1025,0,047	
L363	LD 0,56UH10%0,500HMO,550A CHOKE	LD 067.2834	DELEVAN	DROSSEL 1025-14	
L370	ENTHALTEN IN/INCLUDED IN LEITERPLATTE/PCB PRINTED COMPONENT				
L371	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L372	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L373	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L375	ENTHALTEN IN/INCLUDED IN LEITERPLATTE/PCB PRINTED COMPONENT				
L376	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
L400	LD 1,00UH10%1,000HMO,390A CHOKE	LD 067.2863	DELEVAN	1025-20	
N40	BM MSA0404 BB. AMPL BROADBAND AMPLIFIER	822.0075	AVANTEK	MSA0404	
N50	BM MSA0404 BB. AMPL BROADBAND AMPLIFIER	822.0075	AVANTEK	MSA0404	
N80	BO LM393N 2X COMPAR COMPARATOR	BO 803.0696	NSC	LM393N	
N230	BO LF412CN 2XFET OPAMP OPERATIONAL AMPLIFIER	356.0521	NSC	LF412CN	
N340	BM MSA0404 BB. AMPL BROADBAND AMPLIFIER	822.0075	AVANTEK	MSA0404	
N390	BO TLO74IN 4XFET OPAMP OPERATIONAL AMPLIFIER	568.7528	TEXAS INST	TLO74IN	
N400	BO LF412CN 2XFET OPAMP OPERATIONAL AMPLIFIER	356.0521	NSC	LF412CN	
N410	BO LF411CN JFET OPAMP OPERATIONAL AMPLIFIER	349.3058	NSC	LF411CN	
N420	BO NE5532AFE 2XL.N.OPAMP OPERATIONAL AMPLIFIER	BO 356.0450	VALVO	NE5532AFE	
N430	BO LF412CN 2XFET OPAMP OPERATIONAL AMPLIFIER	356.0521	NSC	LF412CN	
P1	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
P3	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	

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P10	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P13	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P14	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P15	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P20	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
.31	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P40	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P41	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P42	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P43	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P46	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P1B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P10B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P13B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P14B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P15B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P20B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P21B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
.24B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P26B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P27B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P29B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P3B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P30B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P31B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P4A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P4B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P40B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P41B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P43B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P46B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P8A	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
P8B	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001		
R1	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T		
R2	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T		
R3	RG 1,82KOHM+01%TK100 1206 RESISTOR CHIP	RG 007.5720	DALE	CRCW1206-10 1K82 F-T		
R4	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T		
R5	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T		
R6	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T		
R7	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T		
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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R8	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R9	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	
R10	RG 392 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5672	DALE	CRCW1206-10 392R F-T	
R11	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R12	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R13	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R14	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R16	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R17	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R20	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T	
R21	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R22	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R23	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R24	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R25	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R26	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R27	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R28	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R29	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R30	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R31	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R32	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R33	RG 15,0 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5450	DALE	CRW1206-10 15R F-T	
R40	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
..43 R44	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R45	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
..48 R49	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R50	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
..53 R60	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R61	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R62	RL 0,21W 180 OHM2% UNGEW. RESISTOR	RL 092.5985	RESISTA	MK1 180OHM 2% UNGEW.	
R63	RL 0,35W 243 OHM+-1%TK50 DEPOS.-CARBON RESISTOR	RL 083.0126	DRALORIC	SMA0207/243OHM-F-D	
R65	RL 0,21W 180 OHM2% UNGEW. RESISTOR	RL 092.5985	RESISTA	MK1 180OHM 2% UNGEW.	
R66	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R67	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R68	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R70	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R71	RG 0-OHM WIDERSTAND-CHIP RESISTOR CHIP 0-OHM	RG 007.5108	DALE	CRCW1206-10 0R F-T	
R74	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	

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R75	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R76	RL 0,21W 180 OHM2% UNGEW. RESISTOR	RL 092.5985	RESISTA	MK1 180OHM 2% UNGEW.	
R77	RL 0,21W 180 OHM2% UNGEW. RESISTOR	RL 092.5985	RESISTA	MK1 180OHM 2% UNGEW.	
R78	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56,20HM-F-D	
R79	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R80	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R85	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R86	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	
R87	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMA0207/12,1K-F-D	
R90	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R91	RG 22,1KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5872	DALE	CRCW1206-10 22K1 F-T	
R93	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R200	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R201	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R203	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R204	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R205	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R206	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R207	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R210 ..215	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R219	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R220	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R221	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R222	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R223	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R224	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R225	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R227	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R228	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R230	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R231	RL 0,35W 39,2 OHM+-1%TK50 RESISTOR	RL 082.9420	DRALORIC	SMA0207/39,20HM-F-D	
R232	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R233	RL 0,35W 39,2 OHM+-1%TK50 RESISTOR	RL 082.9420	DRALORIC	SMA0207/39,20HM-F-D	
R234	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R236	RL 0,35W 8,25KOHM+-1%TK50 RESISTOR	RL 083.1239	DRALORIC	SMA0207/8,25K-F-D	
R237	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R240	RG 4,75KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5820	DALE	CRCW1206-10 4K75 F-T	
R241	RL 0,35W 39,2 OHM+-1%TK50 RESISTOR	RL 082.9420	DRALORIC	SMA0207/39,20HM-F-D	
R242	RL 0,35W 39,2 OHM+-1%TK50 RESISTOR	RL 082.9420	DRALORIC	SMA0207/39,20HM-F-D	

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R243	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/475OHM-F-D	
R244	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMAO207/475OHM-F-D	
R250 .255	RL 0,21W 470 OHM2% UNGEW. RESISTOR	RL 092.6030	RESISTA	MK1 470OHM 2% UNGEW.	
R260 .263	RL 0,21W 100 OHM2% UNGEW. RESISTOR	RL 092.5956	RESISTA	MK1 100OHM 2% UNGEW.	
R300	RG 18,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5466	DALE	CRCW1206-10 18R2 F-T	
R301	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R302	RL 0,21W 270 OHM2% UNGEW. RESISTOR	RL 092.6000	RESISTA	MK1 270OHM 2% UNGEW.	
R303	RG 27,4 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5508	DALE	CRCW1206-10 27R4 F-T	
R304	RG 33,2 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5520	DALE	CRCW1206-10 33R2 F-T	
R305	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	
R306	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R307	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	
R308	RG 22,1KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5872	DALE	CRCW1206-10 22K1 F-T	
R309	RG 100KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1948	DALE	CRCW1206-10 100K F-T	
R311	RG 75,0 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8855	DALE	CRCW1206-10 75R F-T	
R312	RG 82,5 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8861	DALE	CRCW1206-10 82R5 F-T	
R313	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R314	RS 0,5W100KOHM+-10%10X10X CERMET POTENTIOMETER T	RS 087.7583	BOURNS	3386F 100KOHM	
R315	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R316	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R317	RG 681 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.9080	DALE	CRCW1206-10 681R F-T	
R320	RL 0,35W 681 KOHM+-1%TK50 RESISTOR	RL 083.2735	DRALORIC	SMAO207/381K-F-C	
R322	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMAO207/2,74K-F-D	
R323	RL 0,35W 15,0KOHM+-1%TK50 RESISTOR	RL 083.1400	DRALORIC	SMAO207/15K-F-D	
R324	RL 0,35W 681 KOHM+-1%TK50 RESISTOR	RL 083.2735	DRALORIC	SMAO207/381K-F-C	
R325	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMAO207/100/HM-F-D	
R326	RL 0,35W 681 KOHM+-1%TK50 RESISTOR	RL 083.2735	DRALORIC	SMAO207/381K-F-C	
R327	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMAO207/22,10HM-F-D	
R328	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMAO207/100HM-F-D	
R330	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R331	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R332	RG 46,4 OHM+-2%TK200 1206 CHIP RESISTOR	006.8803	DRALORIC	CGB3216 46,4OHM2% TK	
R333	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R334	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R335	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R340	RL 0,35W 121 OHM+-1%TK50 RESISTOR	RL 082.9859	DRALORIC	SMAO207/121OHM-F-D	
R341	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	
R342	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R343	RG 475 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5695	DALE	CRCW1206-10 475R F-T	

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R344	RL 0,21W 10 OHM2% UNGEW. RESISTOR	RL 092.5833	RESISTA	MK1 100HM 2% UNGEW.	
R349	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56,20HM-F-D	
R350	RG 274 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.4460	DALE	CRCW1206-10 274K F-T	
R351	RG 56,2KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.1883	DALE	CRCW1206-10 56K2 F-T	
R360	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	
R361	RG 150 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5589	DALE	CRCW1206-10 150R F-T	
R362	RS 0,5W200 OHM+-10%10X10X CERMET POTENTIOMETER	RS 247.7949	BOURNS	3386X-1-201	
R364	RG 121 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8903	DALE	CRCW1206-10 121R F-T	
R365	RL 0,35W 150 OHM+-1%TK50 RESISTOR	RL 082.9942	DRALORIC	SMA0207/150OHM-F-D	
R366	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	
R367	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	
R368	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R370	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	
R371	RG 332 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5650	DALE	CRCW1206-10 332R F-T	
R372	RG 162 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8932	DALE	CRCW1206-10 162R F-T	
R373	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R374	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	
R375	RL 0,35W 68,1 OHM+-1%TK50 RESISTOR	RL 082.9636	DRALORIC	SMA0207/68,10HM-F-D	
R376	RL 0,35W 68,1 OHM+-1%TK50 RESISTOR	RL 082.9636	DRALORIC	SMA0207/68,10HM-F-D	
R377	RG 22,1 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5489	DALE	CRW1206-10 22R1 F-T	
R378	RG 182 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5595	DALE	CRCW1206-10 182R F-T	
R379	RG 200 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5608	DALE	CRCW1206-10 200R F-T	
R381	RL 0,35W 39,2 OHM+-1%TK50 RESISTOR	RL 082.9420	DRALORIC	SMA0207/39,20HM-F-D	
R382	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMA0207/47,50HM-F-D	
R383	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	
R384	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/100HM-F-D	
R385	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R388					
R389	RG 10,0 OHM+-1%TK100 1206 CHIP -RESISTOR	RG 006.8649	DALE	CRCW1206-10 10R F-T	
R390	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R391	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMA0207/22,10HM-F-D	
R392	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMA0207/22,10HM-F-D	
R393	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMA0207/22,10HM-F-D	
R394	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R395	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMA0207/22,10HM-F-D	
R396	RL 0,35W 475 OHM+-1%TK50 RESISTOR	RL 083.0390	DRALORIC	SMA0207/475OHM-F-D	
R397	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMA0207/22,10HM-F-D	
R398	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMA0207/22,10HM-F-D	
R399	RL 0,35W22,10 OHM+-1%TK50 RESISTOR	RL 082.9188	DRALORIC	SMA0207/22,10HM-F-D	
R400	RG 100 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8884	DALE	CRCW1206-10 100R F-T	

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R401	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R402	RL 0,35W 5,62KOHM+-1%TK50 RESISTOR	RL 082.2190	DRALORIC	SMA0207/5,62K-F-C	
R403	RS 0,5W20KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 087.7577	BOURNS	3386F-1-203	
R405	RG 825 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7259	DALE	CRCW1206-10 825R F-T	
R406	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R407	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R408	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R409	RL 0,35W 8,25KOHM+-1%TK50 RESISTOR	RL 083.1239	DRALORIC	SMA0207/8,25K-F-D	
R410	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R411	RL 0,35W 8,25KOHM+-1%TK50 RESISTOR	RL 083.1239	DRALORIC	SMA0207/8,25K-F-D	
R412	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R413	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R414	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R415	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R416	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D	
R418	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R419	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R420	RL 0,35W 1,30KOHM+-1%TK50 RESISTOR	RL 083.0678	DRALORIC	SMA0207/1,30K-F-D	
R421	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R422	RG 22,1KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5872	DALE	CRCW1206-10 22K1 F-T	
R423	RL 0,35W 30,1KOHM+-1%TK50 RESISTOR	RL 083.1639	DRALORIC	SMA0207/30,1K-F-C	
R424	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R425	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R426	RG 2,21KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5743	DALE	CRCW1206-10 2K21 F-T	
R427	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R428	RL 0,35W 10MOHM+-1%TK50 RESISTOR	RL 620.0318	RESISTA	MK2 10MOHM 1% TK50	
R429	RL 0,35W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMA0207/1,21K-F-D	
R430	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2,74K-F-D	
R432	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	
R433	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMA0207/10OHM-F-D	
R434	RL 0,35W 82,5KOHM+-1%TK50 RESISTOR	RL 082.2302	DRALORIC	SMA0207/82,5K-F-C	
R435	RL 0,35W 27,4KOHM+-1%TK50 RESISTOR	RL 082.2583	DRALORIC	SMA 0207/27,4K-F-C	
R438	RL 0,35W 1,74KOHM+-1%TK50 RESISTOR	RL 083.0784	DRALORIC	SMA0207/1,74K-F-D	
R440	RL 0,35W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMA0207/1,21K-F-D	
R441	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	
R442	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R443	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	
R444	RL 0,35W 1,50KOHM+-1%TK50 RESISTOR	RL 083.0732	DRALORIC	SMA0207/1,50K-F-D	
R445	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	

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R453	RL 0,35W 5,36KOHM+-1%TK50 RESISTOR	RL 082.2460	DRALORIC	SMA 0207/5,36K-F-C	
R455	RL 0,35W 27,4KOHM+-1%TK50 RESISTOR	RL 082.2583	DRALORIC	SMA 0207/27,4K-F-C	
R456	RL 0,35W 16,9KOHM+-1%TK50 RESISTOR	RL 083.1451	DRALORIC	SMA/207/16,9K-F-C	
R472	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMA0207/47,50HM-F-D	
T1	LU UEBERTRAGER TRANSFORMER	801.6416			
V1	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V2	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V3	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V4	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V20 ..24	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V25	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V26	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V27	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V28	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V29	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V30	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V31	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V60	AE 1N4690 5V6 0.3W ZDI# ZENER DIODE	AE 303.9124	SEMITRONIC	1N4690	
V61 ..64	AE MA4P274-287 200V PIN PIN DIODE	843.3238	MACOM	MA4P274-287	
V65	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V70	AK NE85637 N 12V 100MA TRANSISTOR	801.8231	NEC	NE85637	
V72	AE 1N4689 5V1 0.3W ZDI# ZENER DIODE	AE 303.9418	SEMITRONIC	1N4689 (HST. SES)	
V81	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V200	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	
V201	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	
V205	AD BAS32 75V OA20 UDI DIODE	AD 006.7288	VALVO	BAS32	
V206	AD BAS32 75V OA20 UDI DIODE	AD 006.7288	VALVO	BAS32	
V210	AE BZX79/C6V2 0,5W ZDI ZENER DIODE	AE 012.2461	VALVO	BZX79/C6V2	
V220	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V301	AK BFQ34T N 18V 150MA TRANSISTOR	801.8283	VALVO	BFQ34T	
V302	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V303	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V304	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V305	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V306	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V307	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V308	AE BAR14-1 2X 100V PIN PIN DIODE	820.3283	SIEMENS	BAR14-1	
V309	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	

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V310	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V311	AD BAS16 75V OA25 UDI DIODE	AD 007.4924	VALVO	BAS16	
V327	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V328	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V329	AE 1N4691 6V2 0.3W ZDI# ZENER DIODE	AE 568.1220	SEMITRONIC	1N4691(D035)	
V340 .344	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V360	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V361	AE BAT18 BER.SCH.DI.VHF DIODE	820.3260	VALVO	BAT18	
V362	AE 1N4691 6V2 0.3W ZDI# ZENER DIODE	AE 568.1220	SEMITRONIC	1N4691(D035)	
V363	AK BFQ34T N 18V 150MA TRANSISTOR	801.8283	VALVO	BFQ34T	
V364	AE HSMS2800 SCHOTTKY DIODE	AE 836.8421	HEWLETT-PA	HSMS2800	
V370	AE 1N4690 5V6 0.3W ZDI# ZENER DIODE	AE 303.9124	SEMITRONIC	1N4690	
V371	AK BFR96S N 15V 100MA TRANSISTOR	644.0830	VALVO	BFR96S	
V373	AK BFQ34T N 18V 150MA TRANSISTOR	801.8283	VALVO	BFQ34T	
V377	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V379	AE 1N4690 5V6 0.3W ZDI# ZENER DIODE	AE 303.9124	SEMITRONIC	1N4690	
V390	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V391	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V392	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V394	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V395	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V396	AK BC550B N 50V 100MA TRANSISTOR	AK 007.2050	SIEMENS	BC550B GURT,POL.CBE	
V397	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE	
V398	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V399	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	
V400	AE 1N827 6,2V REF DI REFERENCE DIODE	AE 418.0029	CDI	1N827	
V401	AE BZX79/C4V7 0,5W ZDI ZENER DIODE	AE 012.2432	AEG	BZX55/C4V7 GEG.	
V403	AE BZX79/5V6 0,5W ZDI ZENER DIODE	AE 012.2455	VALVO	BZX79/C5V6	
V405	AE BZX75/C1V4 STABISTOR ZENER DIODE	AE 086.9176	VALVO	BZX75/C1V4	
W1	DX KABEL W1 CABLE W1	820.0503			820.1174
W2	DX KABEL W2 CABLE	820.1180			820.1174
X31	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X32	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X33	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X41	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	
X81	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X82	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4507	BERG	NR. 75 403-001	
X93	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG.602.8804	

ROHDE & SCHWARZ

AI Datum
Date
22 0889

Schaltteilliste für
Parts list for

Sachnummer
Stock Nr.

Blatt
Page

**EE AUSGANGSTEIL
OUTPUT-MODULE**

820.0461.01 SA

14+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in	
X111	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG. 602.8804		
X121	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG. 602.8804		
X122	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG. 602.8804		
X131	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG. 602.8804		
X162	FJ EINBAUSTECKER F.GS SMB ANGLE CONNECTOR	FJ 602.8804	ROSENBERG	R&S-ZCHNG. 602.8804		
XB3	FP KURZSCHL.BUCHSE OFFEN SHORTING PLUG	FP 342.1895	BERG	76264-101		
X13A	FP STECKERLEISTE 32POL. MULTIPOINT CONNECTOR	FP 514.4550	PANDUIT	100-232-033/999		
X32B	FP KURZSCHL.BUCHSE OFFEN SHORTING PLUG	FP 342.1895	BERG	76264-101		
Z80	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z250	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z260	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z270	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z300	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z301	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z302	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z303	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z320	LD 5MHZ/20DB 10A CHOKE	LD 453.4404	OXLEY	DBZ4/P/22000		
Z355	LD 5MHZ/20DB 10A CHOKE	LD 453.4404	OXLEY	DBZ4/P/22000		
Z390	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z391	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z398	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z400	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1		
Z410	LD FILT. 40DB/10GHZ10A300V LOWPASS-FILTER	911.0705	OXLEY	DBZ 2/C/100/500VDC		
Z420	LD 5MHZ/20DB 10A CHOKE	LD 453.4404	OXLEY	DBZ4/P/22000		
					- ENDE -	
ROHDE & SCHWARZ		Äl	Datum Date	Schalteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
		22	0889	EE AUSGANGSTEIL OUTPUT-MODULE	820.0461.01 SA	15-



RF-VERSTAERKER 1

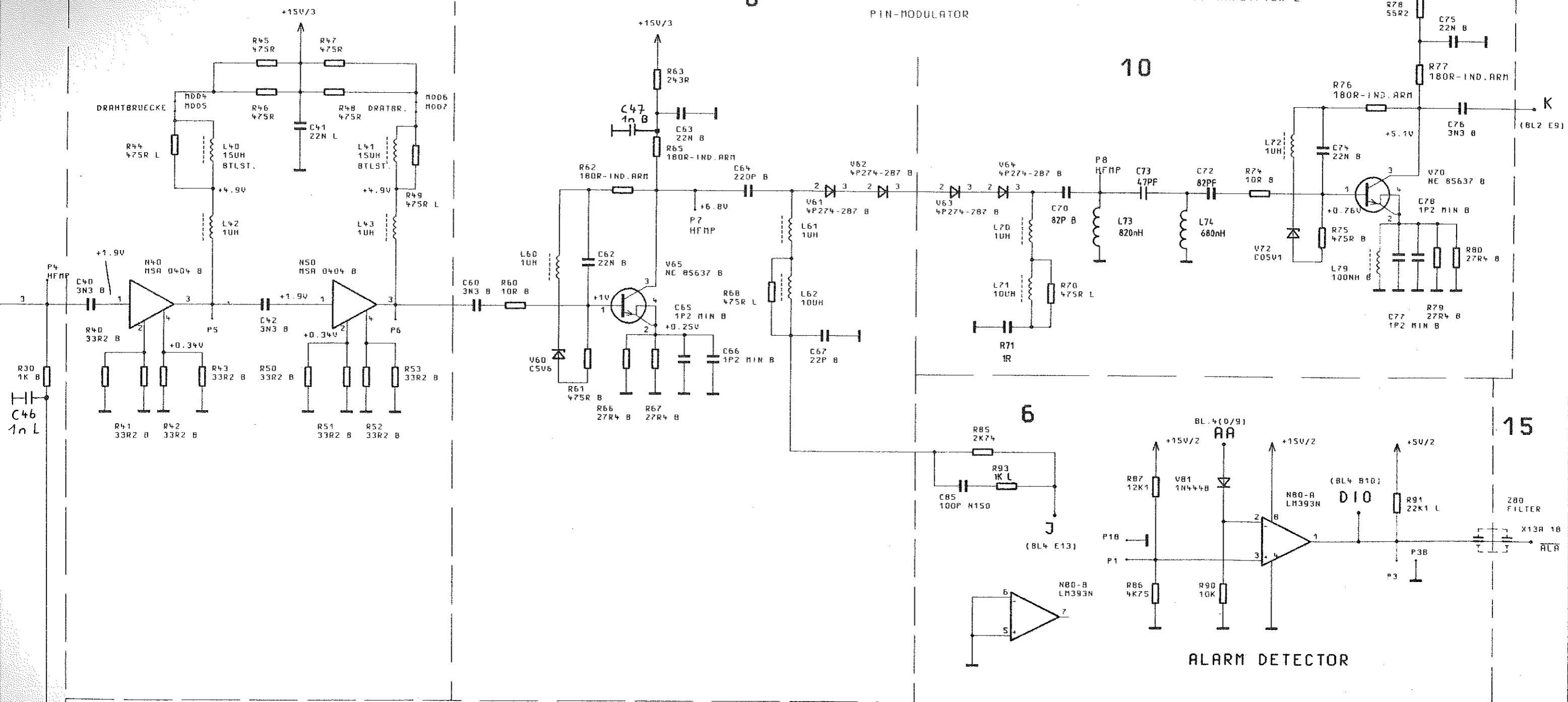
RF-AMPLIFIER 1

PIN-MODULATOR

PIN-MODULATOR

RF-VERSTAERKER 2

RF-AMPLIFIER 2



STROMLAUF GILT FUER VAR.02

CIRCUIT DIAGRAM IS VALID FOR MOD.02

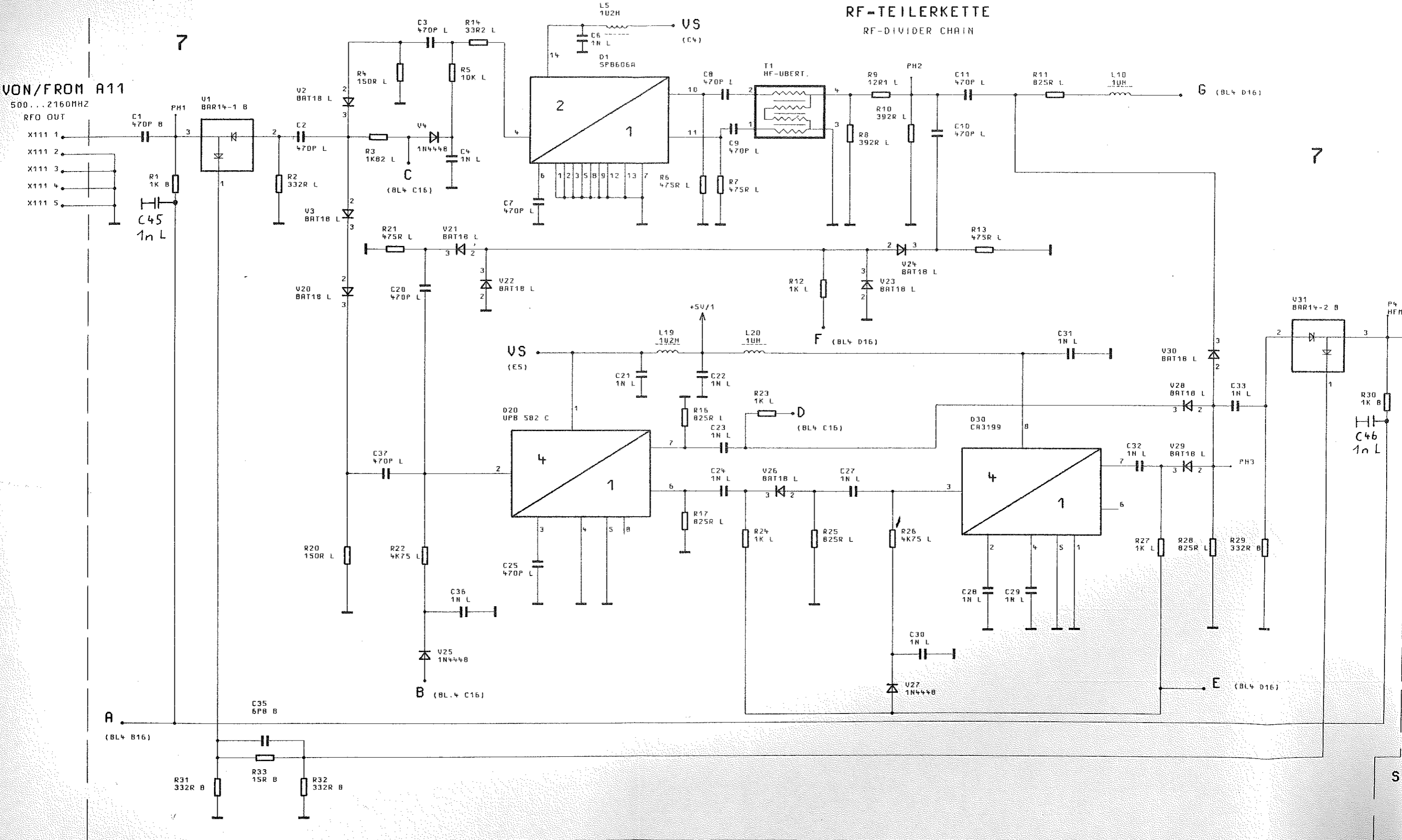
ACHTUNG: EGB!
 ELEKTROSTATISCH GEFAHRDETE
 BAUELEMENTE ERFORDERN EINE
 BESONDERE HANDHABUNG.

ATTENTION: ESD!
 ELECTROSTATIC SENSITIVE
 DEVICES REQUIRE A SPECIAL
 HANDLING.

Q	---	---	---	1KGB	TAG	NAME	BENENNUNG		
A	39845	10.88	HO	BEARB.		HO	AUSGANGSTEIL OUTPUT-MODULE		
B	39845	16.12.88	HO	GEPR.		HO			
C	39845	22.12.88	HO	NORM					
D	39845	02.89	HO	PLOTT	3. 2.89	*			
F	41825	8.89	HO						
							ZEICHN.-NR.	BLATT-NR.	
REND. IND. RENDERUNGSMITTEILUNG DATUM NAME							ROHDE & SCHWARZ ZU GERÄT SMGU	820.0461.01S	1 v. 4 BL
							REG.-I.V.	EPSTE Z	
							819.0010		

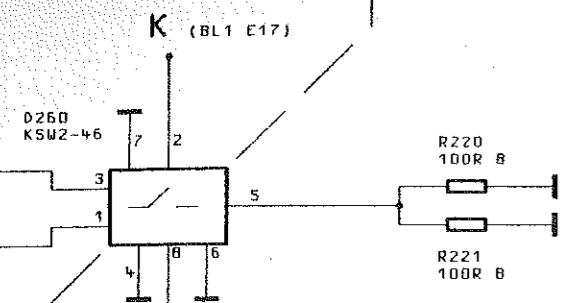
VON/FROM A11
500...2160MHZ
RFO OUT

RF-TEILERKETTE
RF-DIVIDER CHAIN

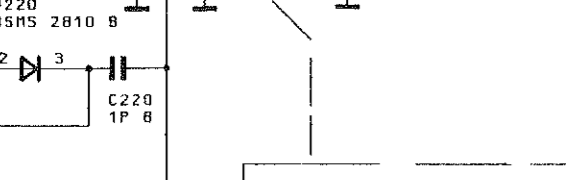
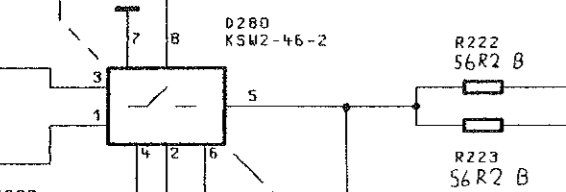
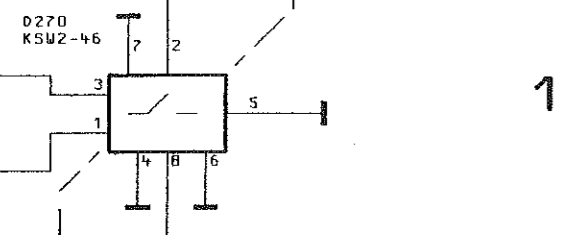


PULSMODULATOR
PULSMODULATOR

11



12



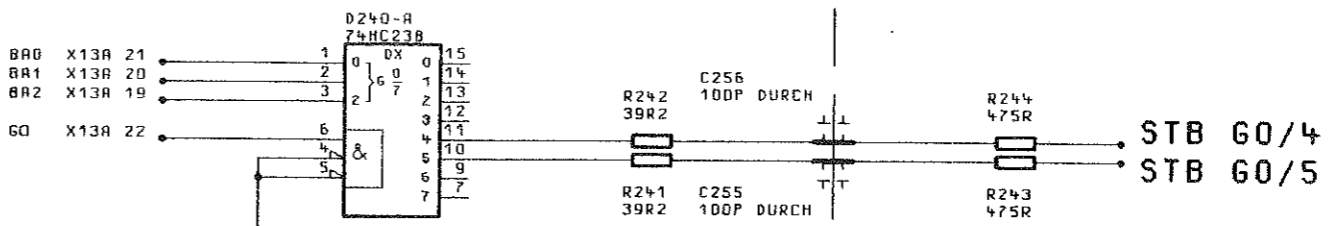
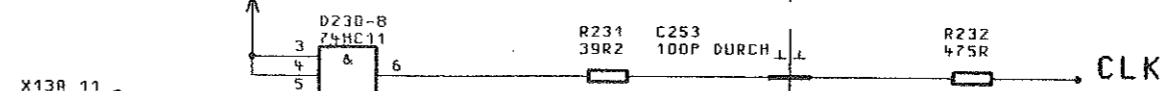
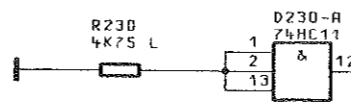
ZU/TO A12
15...2160MHZ
FIL IN

- X121 1
- X121 2
- X121 3
- X121 4
- X121 5

DATENTRANSFER
DATA TRANSFER

6

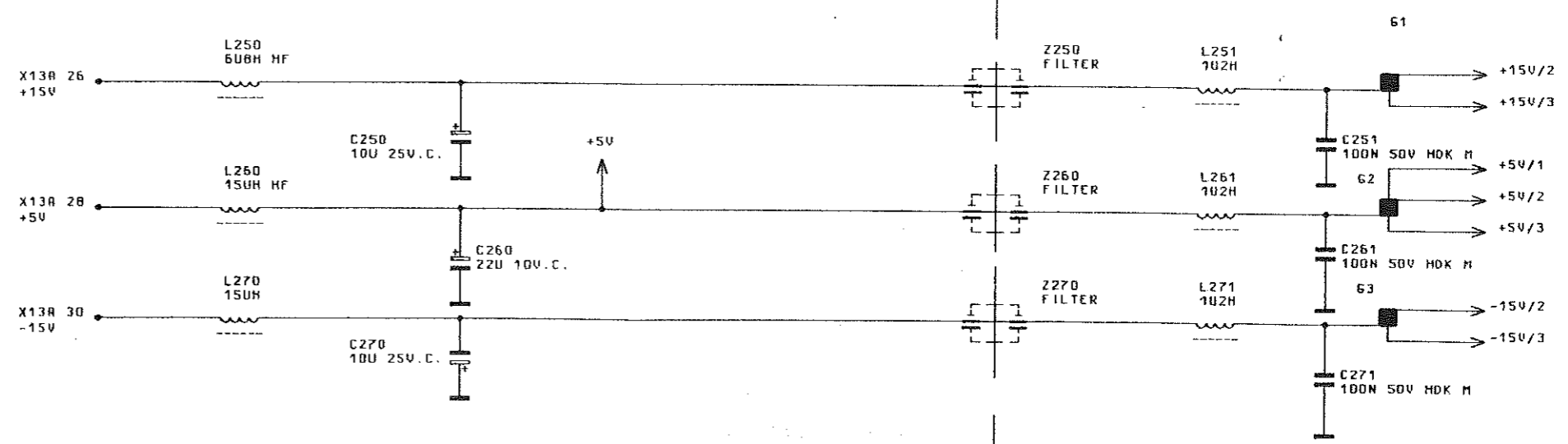
15



15

- X13A 10
- X13A 12
- X13A 14
- X13A 16
- X13A 23
- X13A 25
- X13A 27
- X13A 29
- X13A 31

STROMVERSORGUNG
POWER SUPPLY



STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

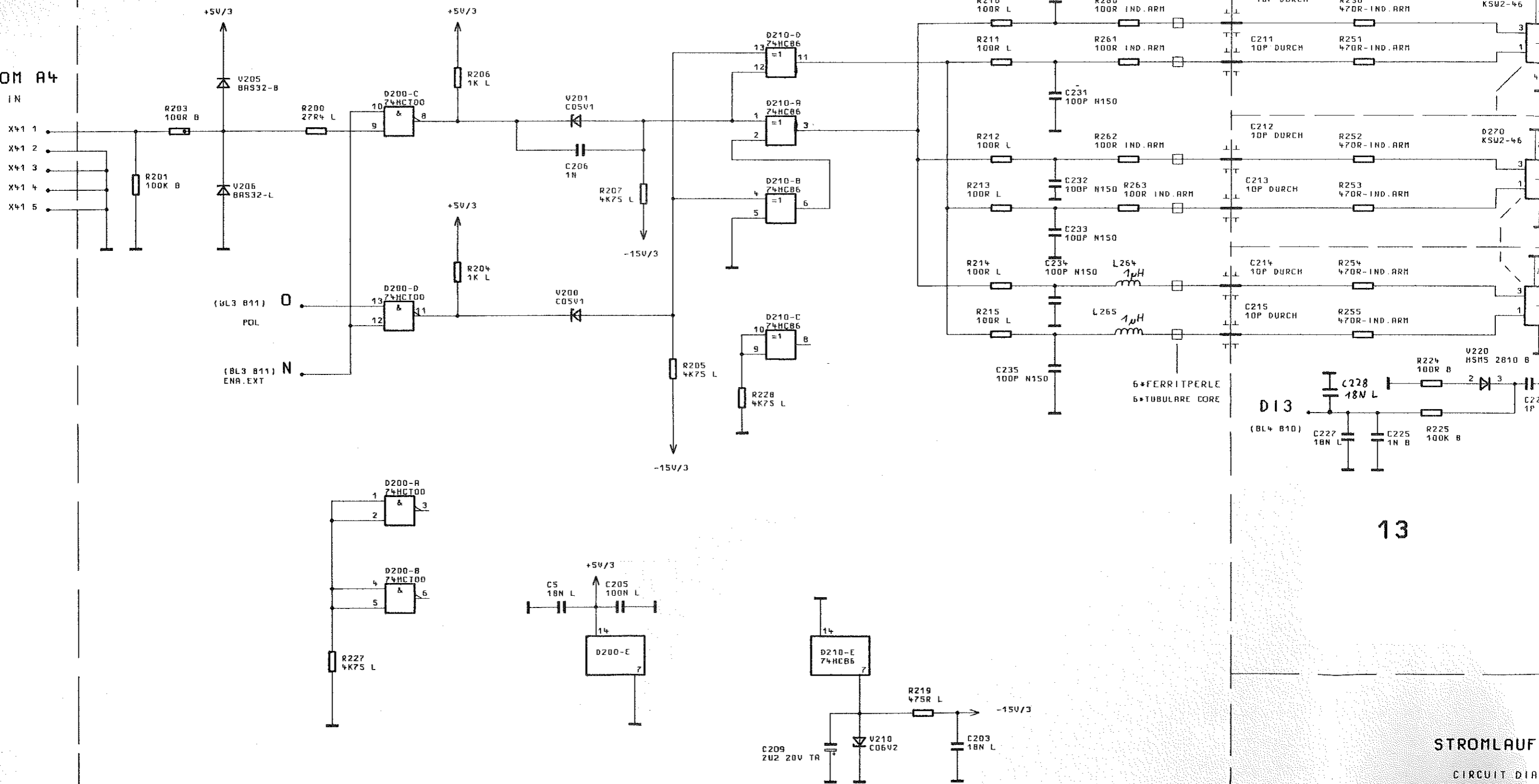
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

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B	39845	16.12.88	HO	GEPR.	HO		
C	39845	22.12.88	HO	NORN			
E	39845	4.89	HO	PLOTT	3. 2.89		
F	41825	8.89	HO				
REND. IND.		RENDERUNGS-NITTEILUNG	DATUM	NAME	ROHDE&SCHWARZ		ZEICHN.-NR.
					820.0461.01S		BLATT-NR.
					ZU GERÄT	SM6U	2
					RES. I. V.	819.0010	ERSTE Z.

PULS-MODULATOR ANSTEUERUNG

PULSMODULATOR CONTROL

VON/FROM A4
PULSE IN



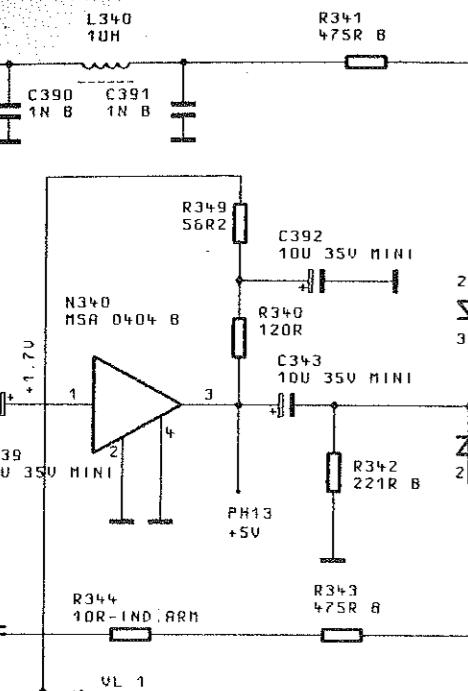
PULSMO
PULSMO

STROMLAUF
CIRCUIT DIAG

14

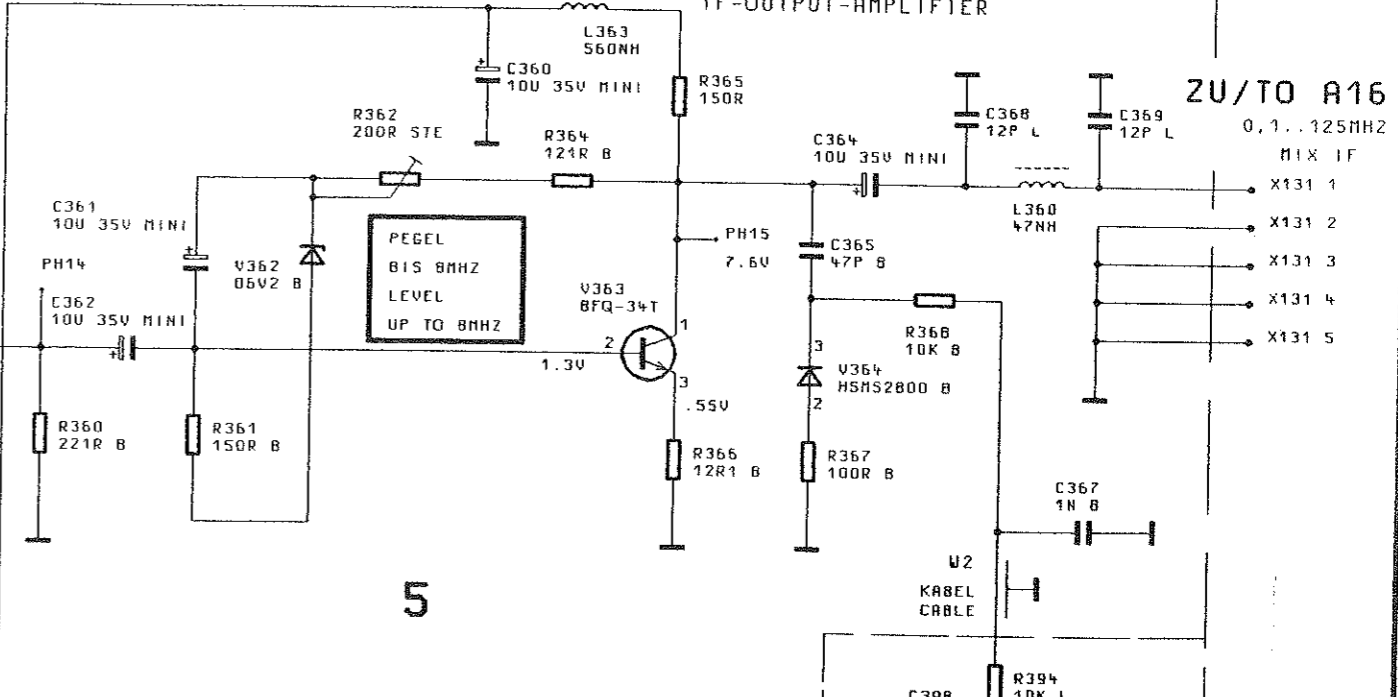
13

IF-VERSTÄRKER
IF-AMPLIFIER



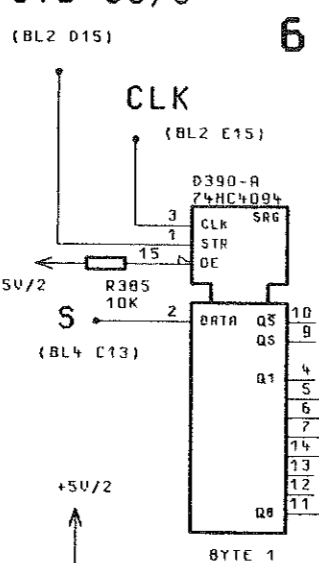
18MHZ-FILTER

IF-AUSGANGSVERSTÄRKER
IF-OUTPUT-AMPLIFIER

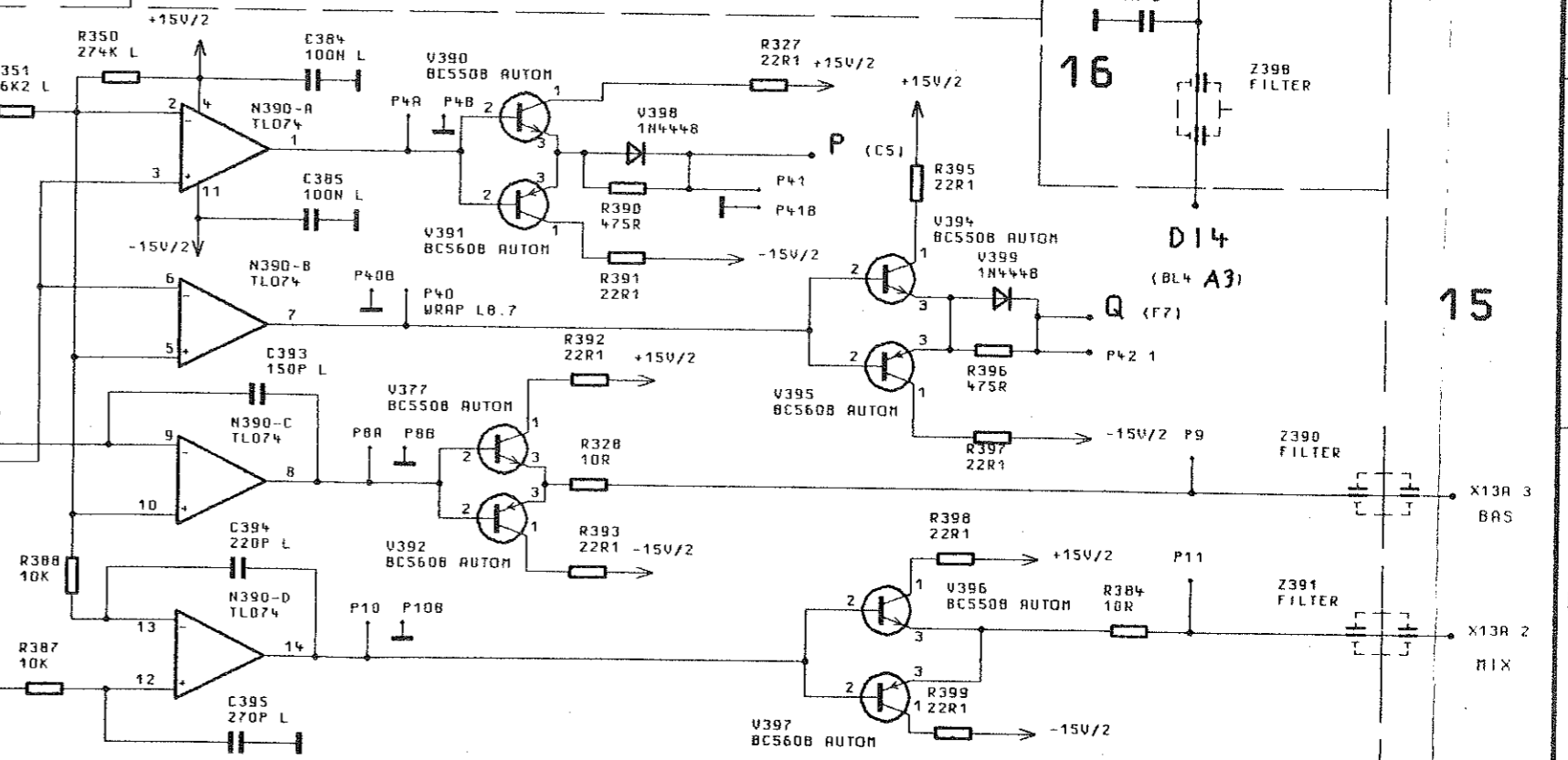


5

STB 60/5
(BL2 D15)



STEUERSpanNUNGEN
CONTROL VOLTAGES



15

STROMLAUF GILT FUER VAR.02

CIRCUIT DIAGRAM IS VALID FOR MOD.02

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

D	---	----	---	1KGB	TAG	NAME	BENENNUNG
A	39845	10.08	HO	BEARB.		HO	AUSGANGSTEIL OUTPUT-MODULE
B	39845	16.12.88	HO	GEPR.		HO	
C	39845	22.12.88	HO	NORM			
D	39845	27.2.89	HO	PLOTT	J. 2.89	*	
E	39845	4.89	HO				

REND. IND.	RENDERUNGS-NITTEILUNG	DATUM	NAME	ROHDE & SCHWARZ		ZEICHN.-NR.	BLATT-NR.
				ZU GERÄT	SMGU	820.0461.01S	3
				REG. I. V.	819.0010	ERSTE Z.	V. 4. BL.

VON FROM A12
130..645MHZ
MIX RF
X122 1
X122 2
X122 3
X122 4
X122 5

1 RF-VERSTAECKER 3 RF-AMPLIFIER 3

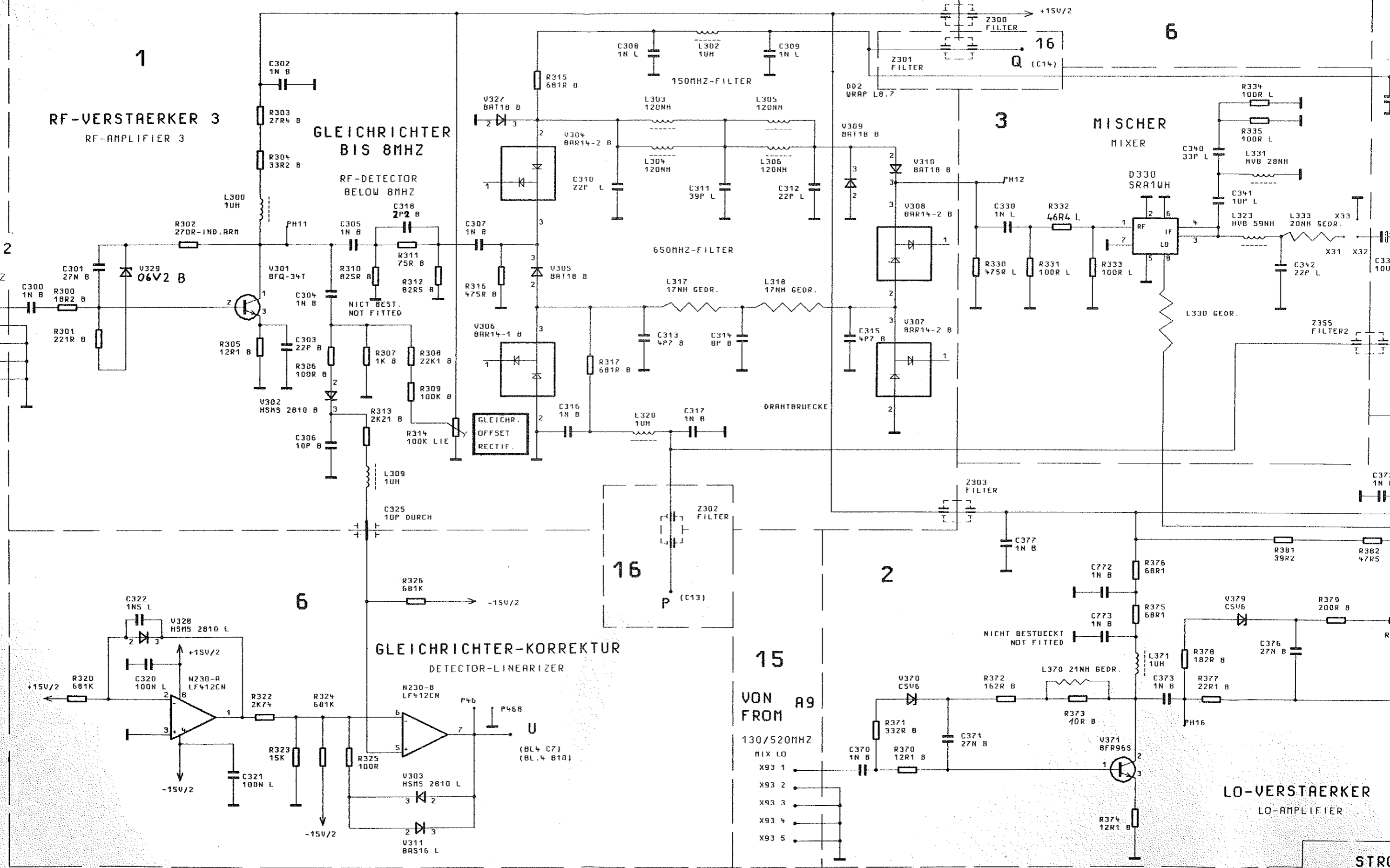
2 GLEICHRICHTER BIS 8MHZ RF-DETECTOR BELOW 8MHZ

3 650MHZ-FILTER

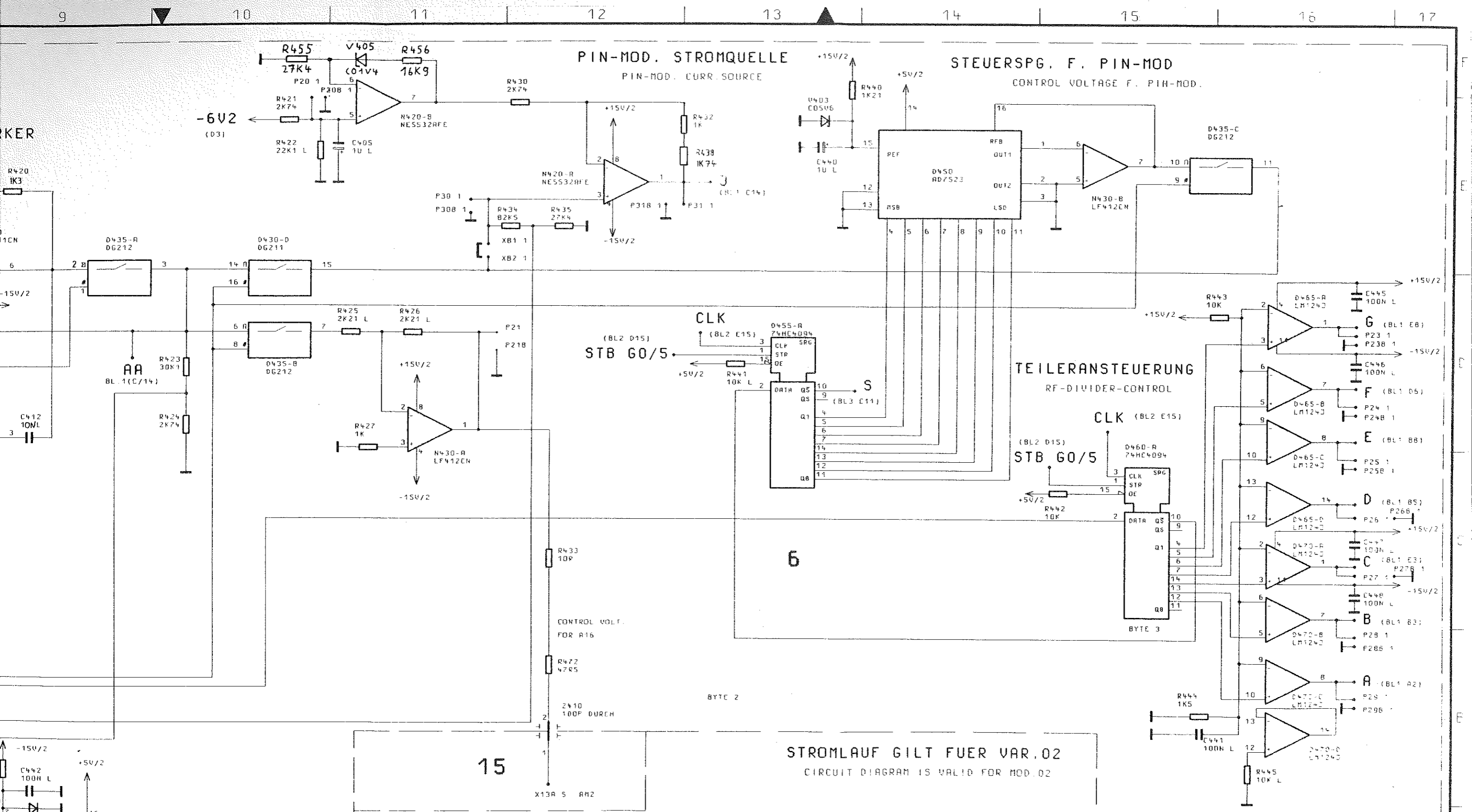
4 MISCHER MIXER

5 GLEICHRICHTER-KORREKTUR DETECTOR-LINEARIZER

6 LO-VERSTAECKER LO-AMPLIFIER



STROM
CIRCUIT



ACHTUNG: EGB!
 ELEKTROSTATISCH GEFÄHRDETE
 BAUELEMENTE ERFORDERN EINE
 BESONDERE HANDHABUNG.

ATTENTION: ESD!
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 DEVICES REQUIRE A SPECIAL
 HANDLING.

STROMLAUF GILT FUER VAR.02
 CIRCUIT DIAGRAM IS VALID FOR MOD.02

D	---	---	---	1KGB	TAG	NAME	BENENNUNG	
A	39845	10.88	HO	BEARB.		HO	AUSGANGSTEIL OUTPUT-MODULE	
B	39845	16.12.88	HO	GEPR.		HO		
C	39845	22.12.88	HO	NOPR				
D	39845	02.89	HO	PLOTT	3 2 89	*		
E	39845	4.89	HO				ZEICHN.-NR 820.0461.015	
F	41825	8.89	HO					
REND. IND.	ÄNDERUNGS-MITTEILUNG	DATUM	NAME	ROHDE & SCHWARZ ZU SEITE 1 SMGU		RES. I. V.	819.0010	
							ERSTE Z.	4

MODULATIONSGRADTEILER MODULATION ATTENUATOR

PEGEL D/A-WANDLER LEVEL D/A-CONVERTER

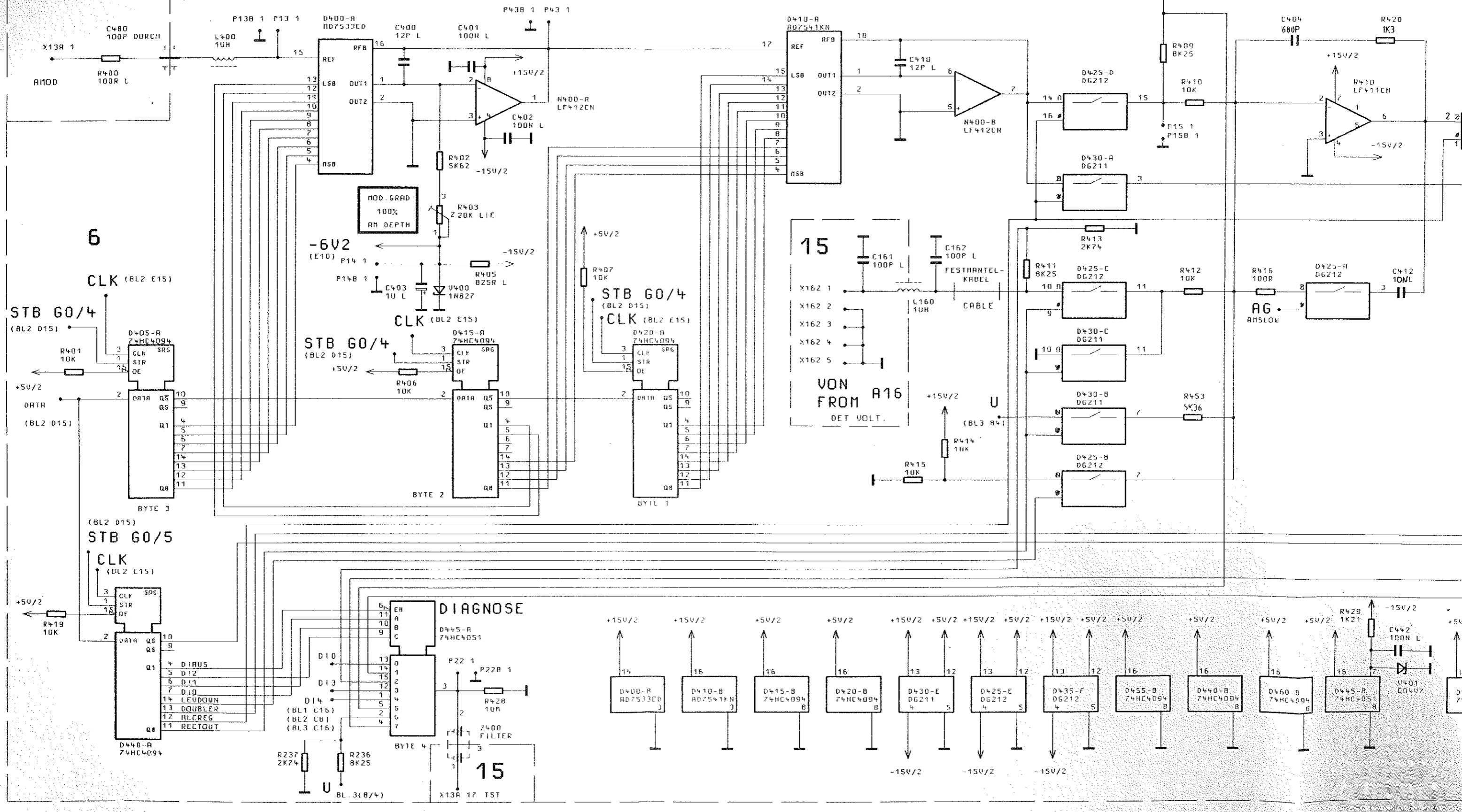
REGELVERSTAEKER ALC-AMPLIFIER

15

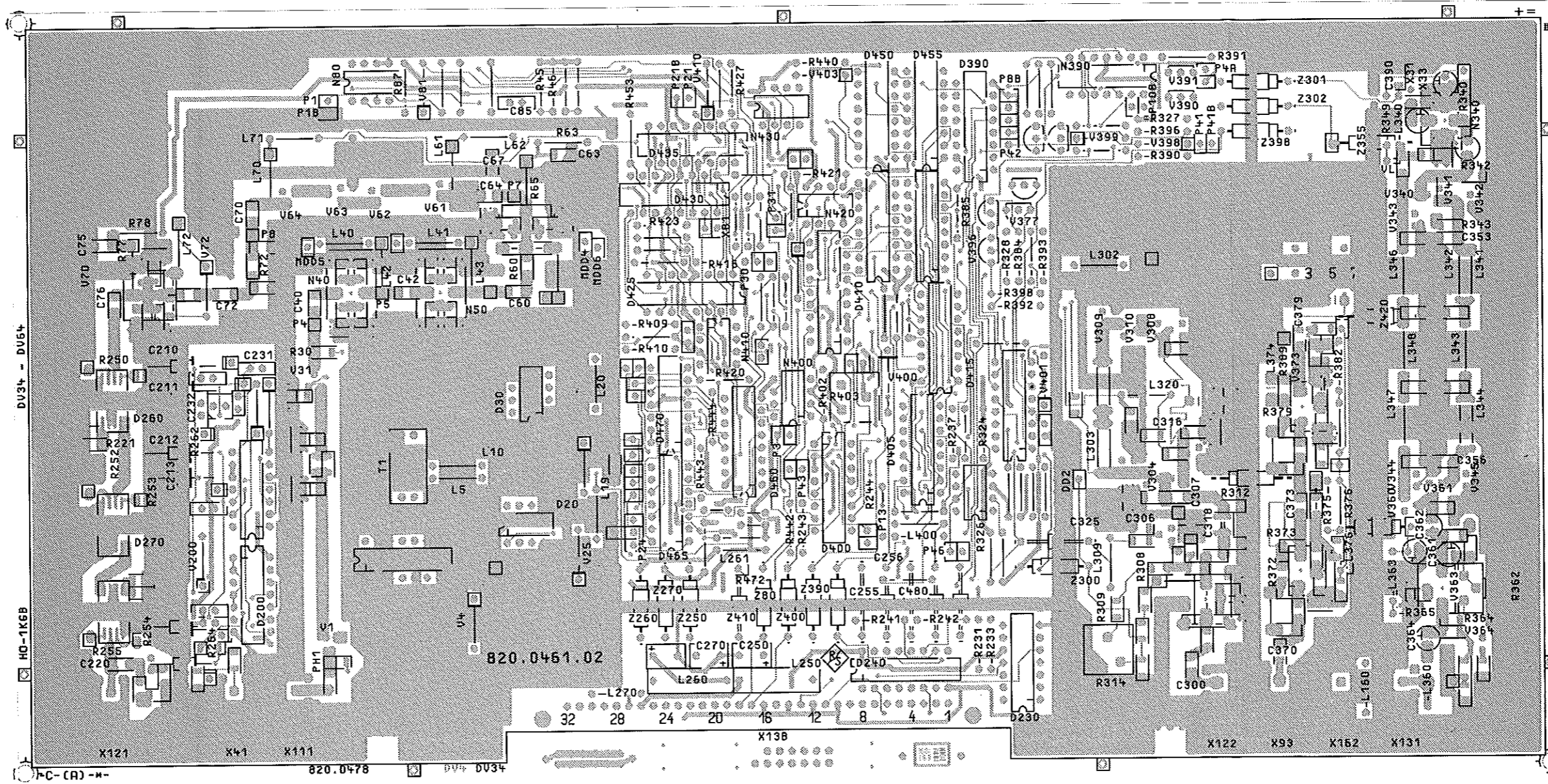
6

15

15



Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



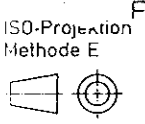
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VARIANTENERKLÄRUNG / VERSION
VAR 02 - GRUNDAUSFÜHRUNG / BASIC MODEL

C	39845	01.89	HO	Mafte ohne Toleranzangabe	Maßstab 1 : 1		
					Halbzeug, Werkstoff		
				1KGB Tag Name	Benennung	Z	
				Bearb. 01.89 HO	AUSGANGSTEIL		
				Gepr.			
				Norm			
				 zu Gerät SMGU	Zeichn.-Nr.	Blatt-Nr.	
					820.0461.02	2	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	reg. i. V. 819.0010 V	erste Z.	v. Bl.	

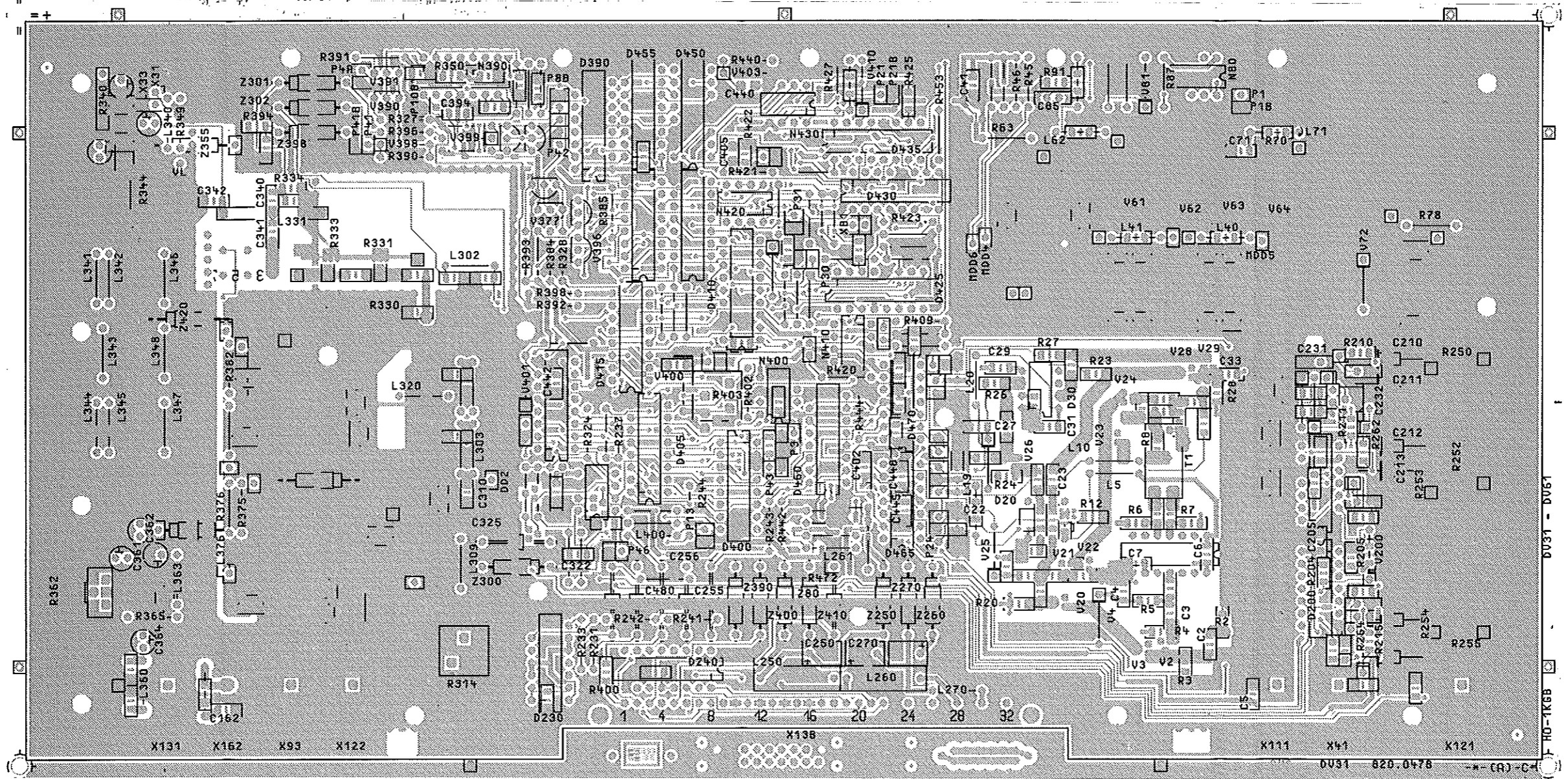


ACHTUNG EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung
ATTENTION ESD!
Electrostatic sensitive devices require a special handling



ISO-Projektion Methode E

Ansicht und Leitungsführung Lötseite
View of tracks on solder side



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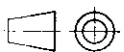
VARIANTENERKLÄRUNG / VERSION
VAR 02 - GRUNDAUSFÜHRUNG / BASIC MODEL

C	39845	01.89	HO	Maße ohne Toleranzangabe	Maßstab 1 : 1	
					Halbzeug, Werkstoff	
				1KGB	Tag	Name
				Bearb.	01.89	HO
				Gepr.		
				Norm		
					Benennung	
					AUSGANGSTEIL	
					Zeichn.-Nr.	Blatt-Nr.
					820.0461.02	3
					reg. i. V. 819.0010 V	v. Bl.
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU		erste Z.



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Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.
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ISO-Projektion
Methode E





ROHDE & SCHWARZ

SERVICE DOCUMENTS

4,4 GHz RF-Amplifier

836.0766.02

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5.2.2	Checking the S Parameters S11 and S21
5.2.3	Checking the Level Frequency Response
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5.3.1.1	Switching Voltages on Input Selector
5.3.1.2	Operating Points of Driver and Output Stages
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5.3.2	RF Test
5.4	Interfaces 5.3
5.4.1	Analog Interfaces
5.4.2	Digital Interfaces
	Circuit diagrams
	Parts lists
	Components plans

5 Service Manual "4.4 GHz RF Amplifier"

5.1 Function Description

(See circuit diagram 836.0766 S, Fig. 5-1 and complete function diagram of the instrument)

An RF signal applied to the input connector X131, X163 or X164 reaches the amplifier via the input selector. The amplifier consists of an RF section (driver stage and output stage) for the frequency range 15 MHz to 4320 MHz, an AF amplifier for the range up to 15 MHz connected by a branching filter. The signal, amplified by approx. 20 dB, is then fed to the level detector via a resistive directional coupler and rectified. The rectified signal is output at X162 after passing through a compensation circuit and an amplifier. The signal is used for level control and amplitude modulation. The RF signal is attenuated by approx. 3.5 dB in the level detector and is then available at the RF output socket X161. In addition to the AF amplifier, working point control and compensation circuit, the amplifier board (836.1062) also contains a logic level converter for driving the input selector. The RF unit of the module is designed using thin-film technology and coupled to the amplifier board via the feed-through filters Z8 to Z22.

5.2 Testing and Adjustment

Adjustment of the amplitude modulation and level must be carried out on the complete instrument if the RF amplifier board has been replaced or if modifications have been made on the board (cf. 4.3 Testing and Adjustment).

Note that with all tests levels up to 25 dBm may occur at the output connector X161 of the amplifier.

5.2.1 Adjustment of Detector Linearity (See fig. 5-4)

The AM distortion must be first be adjusted using potentiometer R72 (AM linear):

- Connect a power meter and a modulation analyzer with a distortion meter to the RF connector of the instrument via a 6-dB power divider.
- Set frequency to 500 MHz, level to 1 dBm on power meter.
- Switch on AM internal with 80 % modulation depth at 1 kHz.
- Switch on special function 1 (interruption-free level setting).
- Record the level now displayed on the power meter as the reference value.
- Adjust AM distortion to minimum (<2 %).
- Reduce output level on SMHU by 10 or 20 dB. Check the reduction on the power meter and correct using R85 (U-DET linear) if the deviation is >1 dB. Repeat the distortion adjustment following both reductions.
- The adjustment becomes much more comfortable when the modulation voltage is measured at the corresponding output of the modulation analyzer and supervised using an oscilloscope.

The linearity of the electronic level reduction can then be set using potentiometer R85 (U-DET linear):

- Connect power meter to RF connector of instrument.
- Set frequency to 500 MHz, level to 13 dBm.
- Switch on special function 76 and note level display P_{ref} , or switch to relative display.
- Switch on special function 77. The generator level is then reduced by 25 dB.
- Adjust R85 for a level of $P_{nominal} = P_{ref} - 25$ dB on the power meter
- Repeat adjustment until a reduction in level of 25 dB \pm 0.1 dB is achieved.

5.2.2 Checking the S Parameters S11 and S21

- Connect analyzer to X131 and X161, set frequency on SMHU to 1 MHz and check S11, S21 according to Fig. 5-2.
- Repeat measurement at input X163 with a set frequency of 1 GHz.
- Set a frequency of 3 GHz, connect input X164 and check S11, S21 according to Fig. 5-3.

5.2.3 Checking the Level Frequency Response

- Connect RF power meter to RF connector of instrument.
- Set level to 13 dBm.
- Switch on special function 55 (RF level correction off).
- In the frequency range from 100 kHz to 4.32 GHz, the level on the power meter must not deviate by more than \pm 2 dB from 13 dBm.
- Switch on special function 56 (RF level correction on).

5.2.4 Checking the Harmonic Ratio

- Connect spectrum analyzer to RF connector of instrument. With an output level of 13 dBm, the harmonics must be $>$ 30 dB down on the fundamental over the whole frequency range.

5.3 Troubleshooting

5.3.1 DC Voltage Check

5.3.1.1 Switching Voltages on Input Selector

Check the switching voltages as in 4.2.

5.3.1.2 Operating Points of Driver and Output Stages

On Filter	Function	Voltage
Z13	V gate, driver stage	-2 to 0 V
Z14	V drain, driver stage	7.3 to 7.7 V
Z15	V gate, output stage	-2 to 0 V
Z16	V drain, output stage	7.3 to 7.7 V

The flow of current can be indirectly determined by measuring the voltage drop between MP1 and MP2 or between MP3 and MP4 on the amplifier board:

- Driver stage: 200 mA corresponding to 200 mV into 1 Ω (MP1 and 2)
- Output stage: 400 mA corresponding to 200 mV into 0.5 Ω (MP3 and 4)
- Tolerance range: \pm 20 mV

5.3.1.3 Detector Output Voltage

The detector output voltage at X162 is 2.8 ± 0.4 V at a frequency of 100 MHz and a level of 13 dBm. It can be scanned via the diagnosis test point 67 (special function 167).

5.3.2 RF Test

The signal path between one of the RF inputs and the RF output X161 can be checked at low frequencies by following the signal using an oscilloscope:

- With frequencies below 10 MHz, check the signal path from input X131 via the AF amplifier on the amplifier board.
- With a frequency of 30 MHz, check the signal path via the RF amplifiers.

5.4 Interfaces

(See block diagram 5-1)

5.4.1 Analog Interfaces

Designation	Function	Frequency	Level (typ.)
X131	RF input	0.1 to 125 MHz	-5 to 0 dBm
X161	RF output	0.1 to 4320 MHz	10.5 to 16 dBm
X162	Detector output	DC to 100 kHz	0 to 6 V
X163	RF input	15.625 to 2160 MHz	-5 to 0 dBm
X164	RF input	2160 to 4320 MHz	-5 to 0 dBm

5.4.2 Digital Interfaces

Designation	Function
RF163 ON RF164 ON	Switchover of RF inputs according to following table

Selected *RF path	Signal at		Signal (in V) at				
	*RF path		Z6	Z7	Z8	Z9	Z10
X131 to X161	L	L	0	-6	0	-6	
X163 to X161	L	H	-6	0	0	-6	
X164 to X161	H	L	0	-6	-6	0	

TTL: H = High
L = Low

Tolerances: 0 V +0.5 V
-0.5 V
-6 V +2.0 V
-1.0 V

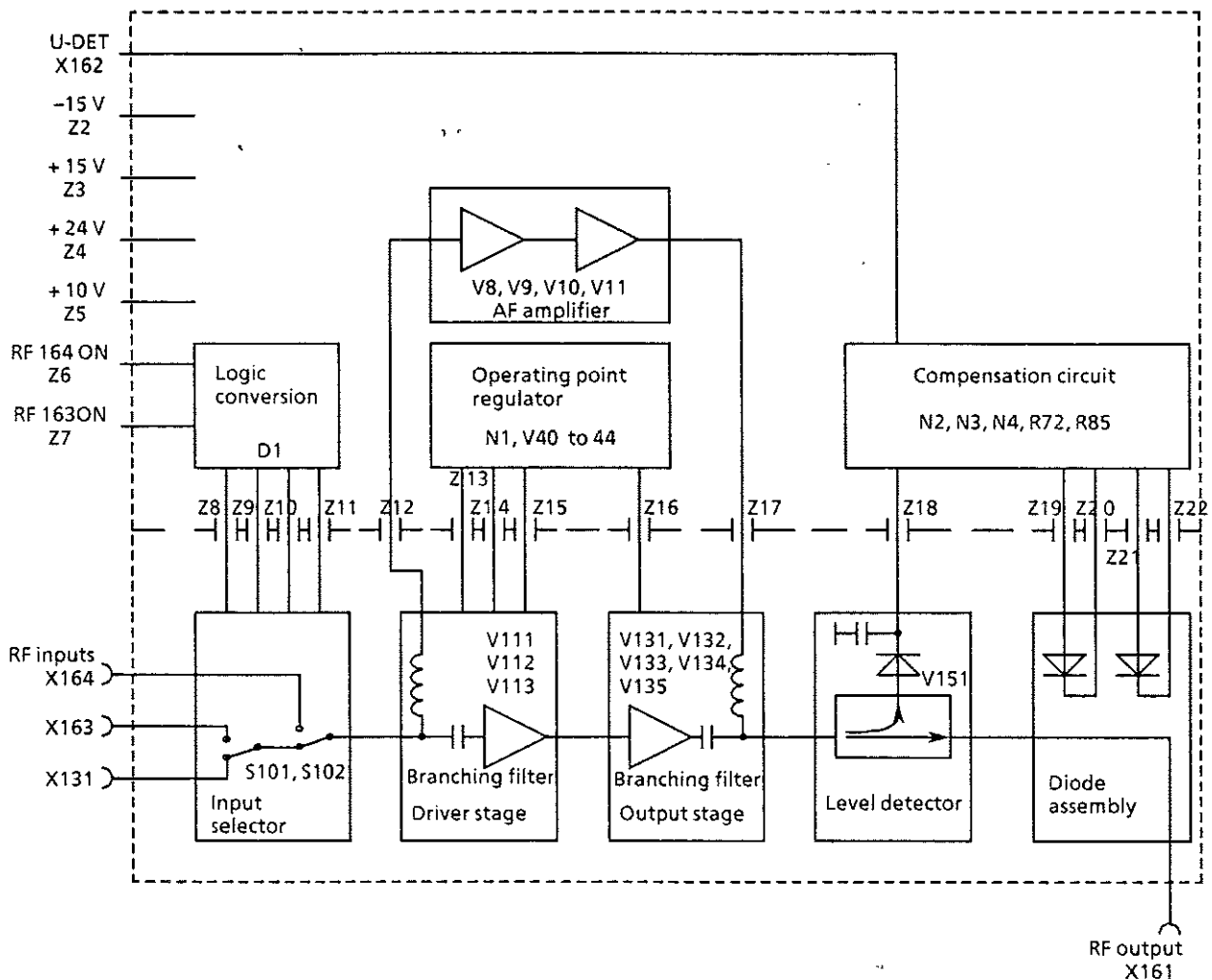


Fig. 5-1 Block diagram "4.4 GHz RF amplifier"

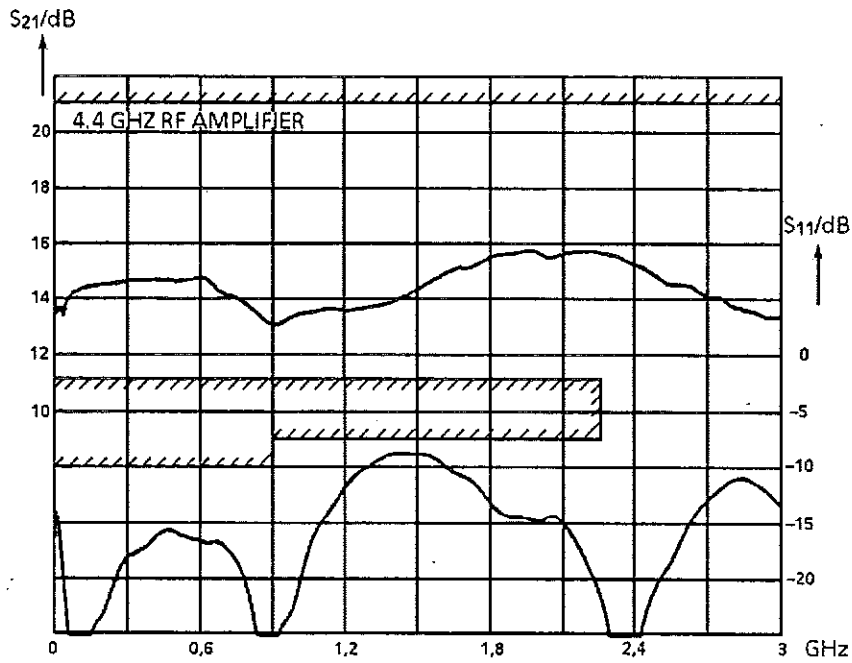


Fig. 5-2 $|S_{11}|, |S_{21}|$ for X131 to X161 or X163 to X161, typical curves and tolerance masks

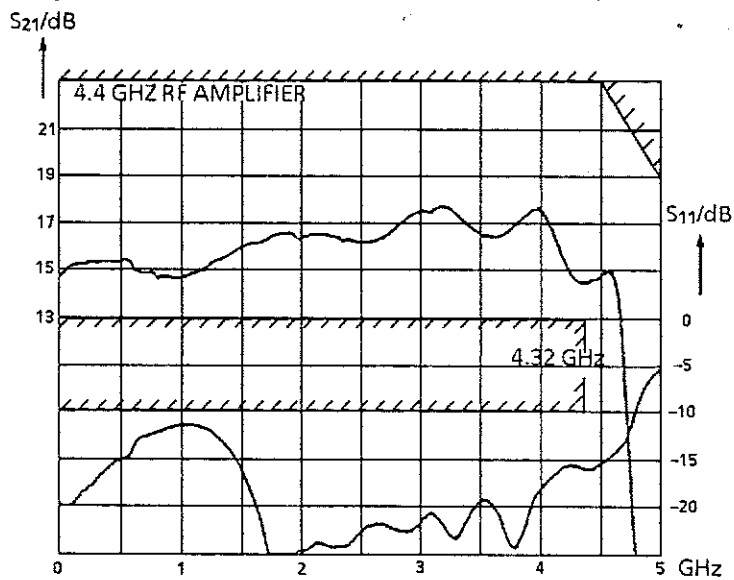


Fig. 5-3 $|S_{11}|, |S_{21}|$ for X164 to X161, typical curves and tolerance masks

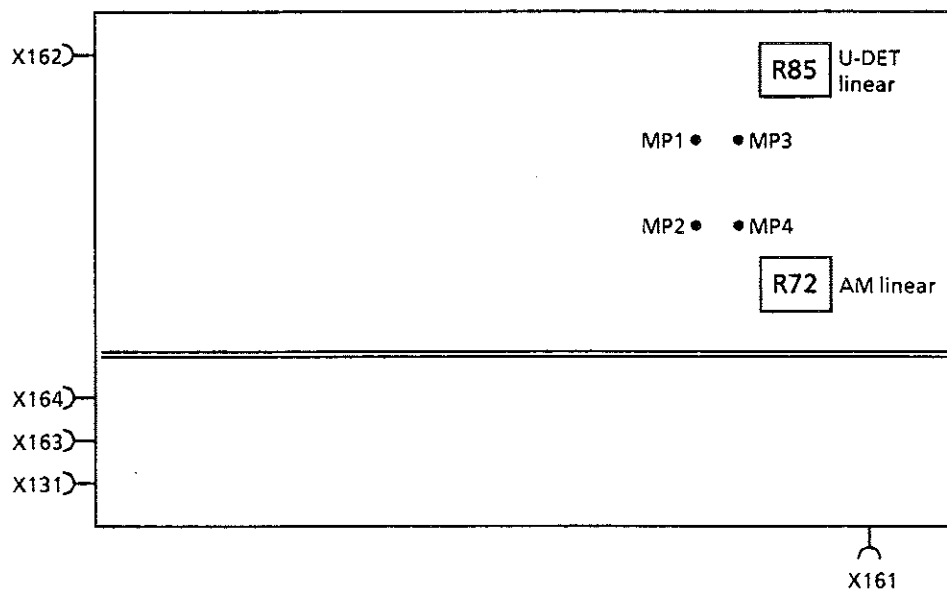


Fig. 5-4 Trimming and adjusting points





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**Schalteillisten
Stromläufe
Bestückungspläne
Part lists
Circuit diagrams
Components plans
Listes des pièces détachées
Schémas de Circuit
Plans des composants**

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
A251	BD EINGANGSUMSCHALTER INPUT SWITCH	836.1162.02			
A252	BD TREIBERSTUFE DRIVER STAGE	836.1210.02			
A253	BD ENDSTUFE OUTPUT STAGE	836.1333.02			
A254	BD PEGEL-DETEKTOR LEVEL DETECTOR	836.1427.02			
A255	BD DIODENSUBSTRAT DIODE SUBSTRAT	836.1462.02			
A256	ED VERSTAERKERPLATTE AMPLIFIER-BOARD	836.1062.02			
C1	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	836.1062.01
C2	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	836.1062.01
C3	CE 100UF+-20%25V RD8X9,5 ELECTROLYTIC CAPACITOR	803.0580	MATSUSHITA	ECE-A1ESS-101	836.1062.01
C4	CE 100UF+-20%25V RD8X9,5 ELECTROLYTIC CAPACITOR	803.0580	MATSUSHITA	ECE-A1ESS-101	836.1062.01
C8	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	836.1062.01
C9	CC 68PF+-2%6X7NPO CAPACITOR	CC 087.6529	VALVO	2222 678 10689	836.1062.01
C10	CC 10PF+-0,25PF3X4NPO CAPACITOR	CC 087.6429	VALVO	2222 678 09109	836.1062.01
C11	CC 10NF+-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103	836.1062.01
C12	CK 680NF+-10%50VRM MKT CAPACITOR	CK 099.2981	WIMA	MKS2/50/0,68UF/10%	836.1062.01
C13	CK 680NF+-10%50VRM MKT CAPACITOR	CK 099.2981	WIMA	MKS2/50/0,68UF/10%	836.1062.01
C15	CC 4,7NF+-10%6X9R2000 CAPACITOR	CC 087.7102	VALVO	2222 63051 472	836.1062.01
C16	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	836.1062.01
C17	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	836.1062.01
C18	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	836.1062.01
C20	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	836.1062.01
C21	CC 68PF+-2%6X7NPO CAPACITOR	CC 087.6529	VALVO	2222 678 10689	836.1062.01
C22	CE 10UF+-20%35V RD5X5 ELECTROLYTIC CAPACITOR	803.0667	NATION PAN	ECE-A1VKS-100	836.1062.01
C23	CC 47PF+-2%5X6NPO CAPACITOR	CC 087.6506	VALVO	2222 678 10479	836.1062.01
C41	CE 100UF+-20%25V RD8X9,5 ELECTROLYTIC CAPACITOR	803.0580	MATSUSHITA	ECE-A1ESS-101	836.1062.01
C42	CE 100UF+-20%25V RD8X9,5 ELECTROLYTIC CAPACITOR	803.0580	MATSUSHITA	ECE-A1ESS-101	836.1062.01
C50	CK 470NF+-5%63V5RM MKT CAPACITOR	CK 099.2975	WIMA	MKS2/63/0,47UF/5%	836.1062.01
C54	CK 470NF+-5%63V5RM MKT CAPACITOR	CK 099.2975	WIMA	MKS2/63/0,47UF/5%	836.1062.01
C58	CC 1NF+-10%63V K2000 CERAMIC CAPACITOR	CC 022.0784	VALVO	2222 63051 102	836.1062.01
C60	CE 47UF+-10%10V EIA7343 TANTALUM SMD-CAPACITOR	CE 007.7300	SPRAGUE	293D 476 X9 010 D2T	836.1062.01
C61	CE 47UF+-10%10V EIA7343 TANTALUM SMD-CAPACITOR	CE 007.7300	SPRAGUE	293D 476 X9 010 D2T	836.1062.01
C62	CE 47UF+-10%10V EIA7343 TANTALUM SMD-CAPACITOR	CE 007.7300	SPRAGUE	293D 476 X9 010 D2T	836.1062.01
C111	CC 330PF+-10%50V1BX CHIP CAPACITOR	093.2138	VITRAMON	VJ0504Y331KFA	836.1210.01
C112	CC 2,2NF+-10%50V1K1200 CAPACITOR	093.2238	VITRAMON	VJ0504Y222KFA	836.1210.01
C113	CC 1NF+-10%50V1K1200 CAPACITOR	093.2215	VITRAMON	VJ0504Y102KFA	836.1210.01
C114	CC 10NF+-10% 50V W5R CHIP CAPACITOR	093.2180	VITRAMON	VJ0504Y103KFA	836.1210.01
C115	CC 2,2NF+-10%50V1K1200 CAPACITOR	093.2238	VITRAMON	VJ0504Y222KFA	836.1210.01
C121	CC 1NF+-10%50V1K1200 CAPACITOR	093.2215	VITRAMON	VJ0504Y102KFA	836.1210.01

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	21	0689	ZE HF-VERSTAERKER 4,4 GHZ RF AMPLIFIER	836.0766.01 SA	1+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in	
C131	CC 2,2NF+-10%50V1K1200 CAPACITOR	093.2238	VITRAMON	VJO504Y222KFA	836.1333.01	
C133	CC 2,2NF+-10%50V1K1200 CAPACITOR	093.2238	VITRAMON	VJO504Y222KFA	836.1333.01	
C134	CC 470PF+-10%50V1K1200 CAPACITOR	093.2196	VITRAMON	VJO504Y471KFA	836.1333.01	
C151	CX 100PF+-20%100VTK50 CHIP MIS CAPACITOR	093.4460	ALPHA IND	SC9103NMSTYLE -817	836.1427.01	
C153	CX 22PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4447	ALPHA IND	SC9103JMSTYLE149-817	836.1427.01	
D1	BL MM74HC86N 4X2IN.EXOR QUAD 2-INP.EXCL.OR GATE	BL 571.3159	NSC	MM74HC86N	836.1062.01	
L1	LD 100 UH10%8,000HMO,084A CHOKE	LD 067.3101	DELEVAN	DROSSEL1025-68	836.1062.01	
L2	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	836.1062.01	
L3	LD 100 UH10%8,000HMO,084A CHOKE	LD 067.3101	DELEVAN	DROSSEL1025-68	836.1062.01	
L4	LD 5,60UH10%1,800HMO,195A CHOKE	LD 067.2957	DELEVAN	DROSSEL1025-38	836.1062.01	
L5	LD 15,0UH10%2,800HMO,157A CHOKE	LD 067.3001	DELEVAN	DROSSEL1025-48	836.1062.01	
L6	LD 4,7UH BEI 1,35AO,240HM CHOKE	LD 026.4084	JAHRE	72.10-4R7OK	836.1062.01	
L80	LD 100NH 10% 0,080HM 1,4A CHOKE	LD 067.2740	DELEVAN	DROSSEL1025-94	836.1062.01	
L111	LD FERRITSPULE 1000NH COIL	836.1510			836.1533	
L112	LD FERRITSPULE COIL	836.1527			836.1533	
L131	LD FERRITSPULE COIL	836.1527			836.1540	
L132	LD FERRITSPULE 1000NH COIL	836.1510			836.1540	
N1	BD ARBEITSPUNKTREGELUNG OPERATING POINT CTRL	815.6313.04			836.1062.01	
N2	BO OP27GZ LOW N.OPAMP OPERATIONAL AMPLIFIER	BO 393.2599	PMI	OP27GZ	836.1062.01	
N3	BO OP27GZ LOW N.OPAMP OPERATIONAL AMPLIFIER	BO 393.2599	PMI	OP27GZ	836.1062.01	
N4	BO OP27GZ LOW N.OPAMP OPERATIONAL AMPLIFIER	BO 393.2599	PMI	OP27GZ	836.1062.01	
R1	RL 0,35W 3,01KOHM+-1%TK50 RESISTOR	RL 083.0961	DRALORIC	SMA0207/3,01K-F-D	836.1062.01	
R2	RL 0,35W 3,01KOHM+-1%TK50 RESISTOR	RL 083.0961	DRALORIC	SMA0207/3,01K-F-D	836.1062.01	
R3	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	836.1062.01	
R4	RL 0,35W 4,75KOHM+-1%TK50 RESISTOR	RL 083.1097	DRALORIC	SMA0207/4,75K-F-D	836.1062.01	
R5 .8	RL 0,21W 1,0KOHM2% UNGEW. RESISTOR	RL 092.6075	RESISTA	MK1 1K 2% UNGEW.	836.1062.01	
R9	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	836.1062.01	
R10 ..13	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMA0207/100K-F-C	836.1062.01	
R20	RL 0-OHM-WIDERST. 0204 0-OHM RESISTOR	RL 069.0000	DRALORIC	OMA 0204	836.1062.01	
R21	RL 0,35W 51,1 OHM+-1%TK50 RESISTOR	RL 082.9536	DRALORIC	SMA0207/51,10HM-F-D	836.1062.01	
R22	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	836.1062.01	
R23	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	836.1062.01	
R24	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	836.1062.01	
R25	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3,32K-F-D	836.1062.01	
R26	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	836.1062.01	
R27	RL 0,21W 120 OHM2% UNGEW. RESISTOR	RL 092.5962	RESISTA	MK1 120OHM 2% UNGEW.	836.1062.01	
R28	RL 0,21W 120 OHM2% UNGEW. RESISTOR	RL 092.5962	RESISTA	MK1 120OHM 2% UNGEW.	836.1062.01	
ROHDE & SCHWARZ		ÄI	Schaltteilliste für Parts list for		Sachnummer Stock Nr.	Blatt Page
		21	Datum Date	ZE HF-VERSTÄRKER 4,4 GHz RF AMPLIFIER	836.0766.01 SA	2+

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
R29	RL 0,35W 56,2 OHM+-1%TK50 RESISTOR	RL 082.9571	DRALORIC	SMA0207/56, 20HM-F-D	836.1062.01
R30	RL 0,35W 51,1 OHM+-1%TK50 RESISTOR	RL 082.9536	DRALORIC	SMA0207/51, 10HM-F-D	836.1062.01
R31	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D	836.1062.01
R50	RL 0,35W 1,0 OHM+-1%TK50 METALFILMRESISTOR	RL 099.7860	RESISTA	MK2 1,00 OHM 1% TK50	836.1062.01
R51	RL 0,35W 1,500HM+-1%TK50 METALFILMRESISTOR	RL 099.7902	RESISTA	MK2 1,50 OHM 1% TK50	836.1062.01
R52	RL 0,35W 1,0 OHM+-1%TK50 METALFILMRESISTOR	RL 099.7860	RESISTA	MK2 1,00 OHM 1% TK50	836.1062.01
R53	RL 0,35W 1,0 OHM+-1%TK50 METALFILMRESISTOR	RL 099.7860	RESISTA	MK2 1,00 OHM 1% TK50	836.1062.01
R54	RL 0,35W 1,210HM+-1%TK50 METALFILMRESISTOR	RL 099.7883	RESISTA	MK2 1,21 OHM 1% TK50	836.1062.01
R56	RL 0,35W 1,0 OHM+-1%TK50 METALFILMRESISTOR	RL 099.7860	RESISTA	MK2 1,00 OHM 1% TK50	836.1062.01
R57	RL 0,21W 820 OHM2% UNGEW. RESISTOR	RL 092.6069	RESISTA	MK1 820OHM 2% UNG.	836.1062.01
R58	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	836.1062.01
R59	RL 0,35W 2,43KOHM+-1%TK50 RESISTOR	RL 083.0884	DRALORIC	SMA0207/2, 43K-F-D	836.1062.01
R60	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	836.1062.01
R61	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	836.1062.01
R70	RL 0,21W 47 OHM2% UNGEW. RESISTOR	RL 092.5910	RESISTA	MK1 47OHM 2% UNGEW.	
R71	RL 0-OHM-WIDERST. 0204 O-OHM RESISTOR	RL 069.0000	DRALORIC	OMA 0204	836.1062.01
R72	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7903	BOURNS	3386F-1-103	836.1062.01
R73	RL 0,35W 1MOHM+-1%TK50 RESISTOR	RL 082.7862	DRALORIC	SMA0207/1M-F-D	836.1062.01
R74	RL 0,35W 1MOHM+-1%TK50 RESISTOR	RL 082.7862	DRALORIC	SMA0207/1M-F-D	836.1062.01
R75	RL 0,35W 3,32KOHM+-1%TK50 RESISTOR	RL 083.0990	DRALORIC	SMA0207/3, 32K-F-D	836.1062.01
R76	RL 0,35W 2,74KOHM+-1%TK50 RESISTOR	RL 083.0926	DRALORIC	SMA0207/2, 74K-F-D	836.1062.01
R78	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMA0207/1K-F-C	836.1062.01
R79	RL 0,35W 1,21KOHM+-1%TK50 RESISTOR	RL 083.0655	DRALORIC	SMA0207/1, 21K-F-D	836.1062.01
R81	RL 0-OHM-WIDERST. 0204 O-OHM RESISTOR	RL 069.0000	DRALORIC	OMA 0204	836.1062.01
R82	RL 0,35W 1MOHM+-1%TK50 RESISTOR	RL 082.7862	DRALORIC	SMA0207/1M-F-D	836.1062.01
R85	RS 0,5W10KOHM+-10%10X10X5 CERMET POTENTIOMETER T	RS 247.7903	BOURNS	3386F-1-103	836.1062.01
R86	RL 0,35W 22,1KOHM+-1%TK50 RESISTOR	RL 083.1545	DRALORIC	SMA/207/22, 1K-F-C	836.1062.01
S101	BM KSW2-46 HF-SWITCH GAASFET SWITCH	820.3419	MCL	KSW2-46	836.1162.01
S102	BM KSW2-46 HF-SWITCH GAASFET SWITCH	820.3419	MCL	KSW2-46	836.1162.01
V1	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	836.1062.01
V2	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	836.1062.01
V3	AE BZX79/C6V2 0,5W ZDI ZENER DIODE	AE 012.2461	VALVO	BZX79/C6V2	836.1062.01
V5	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	836.1062.01
V6	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	836.1062.01
V7	AD 1N4448 75V OA15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET	836.1062.01
V8	AK 2N2219A N 40V 800MA TRANSISTOR	AK 083.6953	VALVO	2N2219A	836.1062.01
V9	AK 2N2905A P 60V 600MA TRANSISTOR	AK 010.3919	VALVO	2N2905A	836.1062.01
V10	AK 2N2219A N 40V 800MA TRANSISTOR	AK 083.6953	VALVO	2N2219A	836.1062.01

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Date:

21 0689

Schaltteilliste für
Parts list for

ZE HF-VERSTÄRKER 4,4 GHz
RF AMPLIFIER

Sachnummer
Stock Nr.

836.0766.01 SA

Blatt
Page:

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Kennz. Comp.No	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V11	AK 2N2905A P 60V 600MA TRANSISTOR	AK 010.3919	VALVO	2N2905A	836.1062.01
V40	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	836.1062.01
V41	AE BZX55/B5V1 0,5W ZDI ZENER DIODE	AE 262.5837	VALVO	BZX55/B5V1	836.1062.01
V42	AE 5082-2800 SCHOTTKY DIODE	AE 012.9066	HEWLETT-P.	5082-2800	836.1062.01
V43	AE BZT03/C8V2 3.2W ZDI ZENER DIODE	AE 007.4899	VALVO	BZT03/C8V2	836.1062.01
V44	AE BZT03/C8V2 3.2W ZDI ZENER DIODE	AE 007.4899	VALVO	BZT03/C8V2	836.1062.01
V45	AD 1N4148M 75V OA08 UDI DIODE	012.1536	TEXAS	1N4148JAN	836.1062.01
V111	AM 8X FSX52W 12V GAASFET GAAS FET V112, V113 (SIEHE AUCH/SEE ALSO: V131-V135)	836.3536	FUJITSU	FSX52W/101 (OKTETT)	836.1210.01
V131	BEMERKUNG / PLEASE NOTE V132-V135 ENTHALTEN IM SATZ VON CONTAINED IN SET OF V111				836.1333.01
V151	AX HSCH5336 SCHOTTKYDI SCHOTTKY DIODE BEAM LEAD	093.4201	HEWLETT	HSCH5336	836.1427.01
V171	AX HSCH5336 SCHOTTKYDI SCHOTTKY DIODE BEAM LEAD	093.4201	HEWLETT	HSCH5336	836.1462.01
V172	AX HSCH5336 SCHOTTKYDI SCHOTTKY DIODE BEAM LEAD	093.4201	HEWLETT	HSCH5336	836.1462.01
W10	DX KABEL W10 CABLE W10	836.1056			
X2 ..22	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	836.1062.01
X131	FJ EINBAUBUCHSE SMA CONNECTOR SMA	920.0140			836.0789.01
X161	FJ EINBAUBUCHSE SMA CONNECTOR SMA	920.0140			836.0789.01
X162	FJ EINBAUSTECKER SYST.SMC CONNECTOR SMC	FJ 070.0151	RADIALL	112554	
X162	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	836.1062.01
X163	FJ EINBAUBUCHSE SMA CONNECTOR SMA	920.0140			836.0789.01
X164	FJ EINBAUBUCHSE SMA CONNECTOR SMA	920.0140			836.0789.01
XMA1	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	836.1062.01
XMA2	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	836.1062.01
XMA3	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	836.1062.01
XMP1 ...P4	VL STECKLOETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	836.1062.01
Z2 ..7	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	836.1085.01
Z8 ..11	LD TIEFPASSFILTER LOWPASS FILTER	843.3950			
Z12	ZM GLASDURCHFUEHRUNG FEAD THROUGH	916.0984			
Z13 ..16	LD TIEFPASSFILTER LOWPASS FILTER	843.3950			
Z17	ZM GLASDURCHFUEHRUNG FEAD THROUGH	916.0984			
Z18	ZM GLASDURCHFUEHRUNG FEAD THROUGH	916.0984			
Z19	LD TIEFPASSFILTER LOWPASS FILTER	843.3950			
Z20	LD TIEFPASSFILTER LOWPASS FILTER	843.3950			
Z21	ZM GLASDURCHFUEHRUNG FEAD THROUGH	916.0984			
Z22	ZM GLASDURCHFUEHRUNG FEAD THROUGH	916.0984			

- ENDE -

ROHDE & SCHWARZ	Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
	21	0689	ZE HF-VERSTAERKER 4,4 GHZ RF AMPLIFIER	836.0766.01 SA	4-

R-PLATTE

ARBEITSPUNKTHYBRID 815.6313

ARBEITSPUNKTREGELUNG OPERATION POINT CONTROL

KOMPENSATIONSSCHALTUNG COMPENSATION CIRCUIT

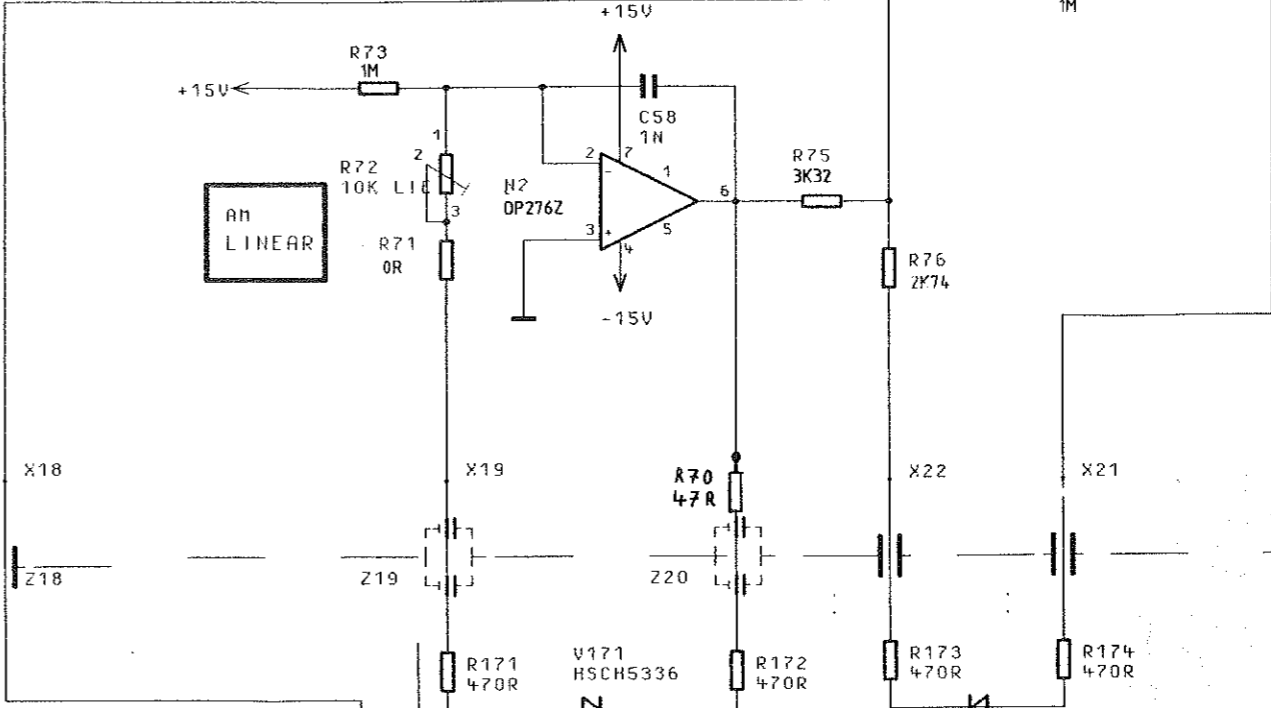
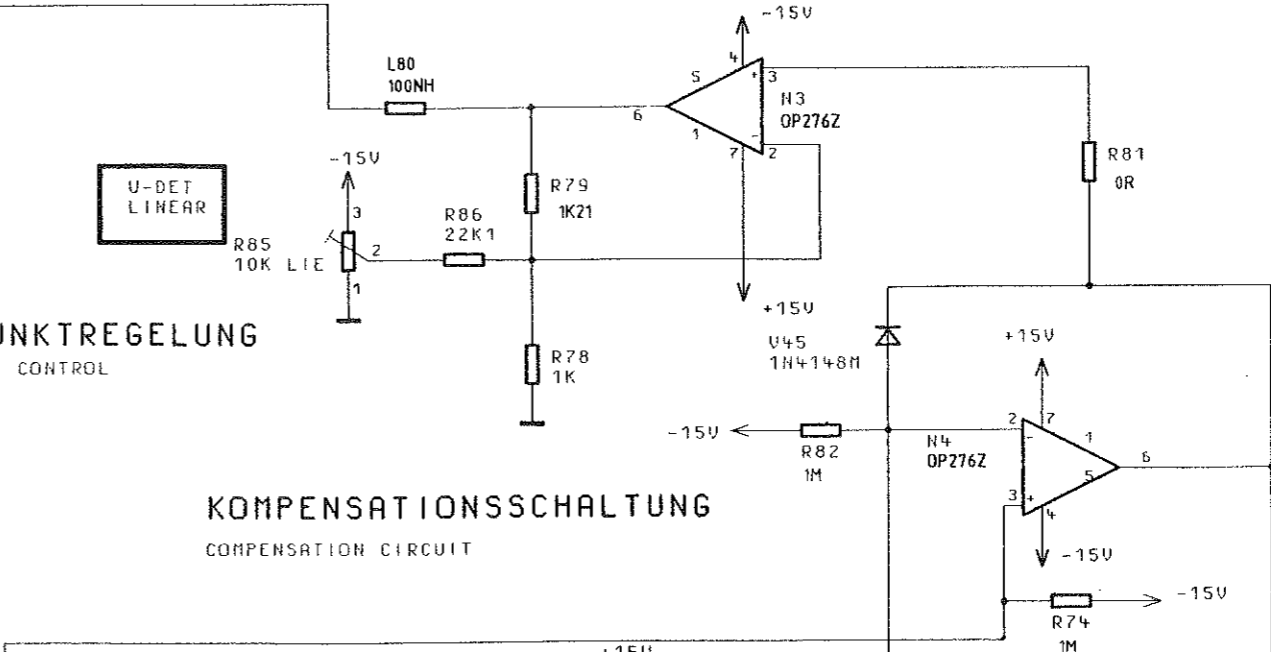
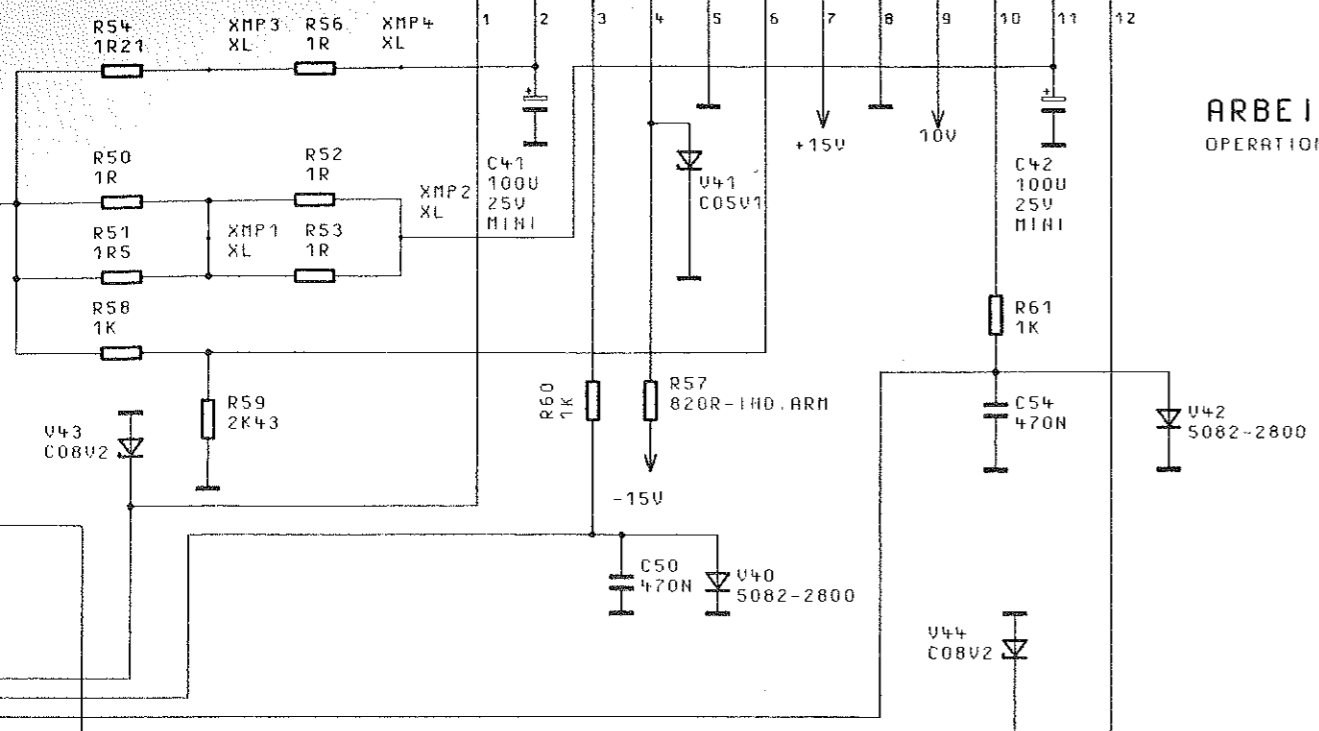
PEGEL-DETEKTOR LEVEL DETECTOR

DIODENSUBSTRAT DIODE SUBSTRATE

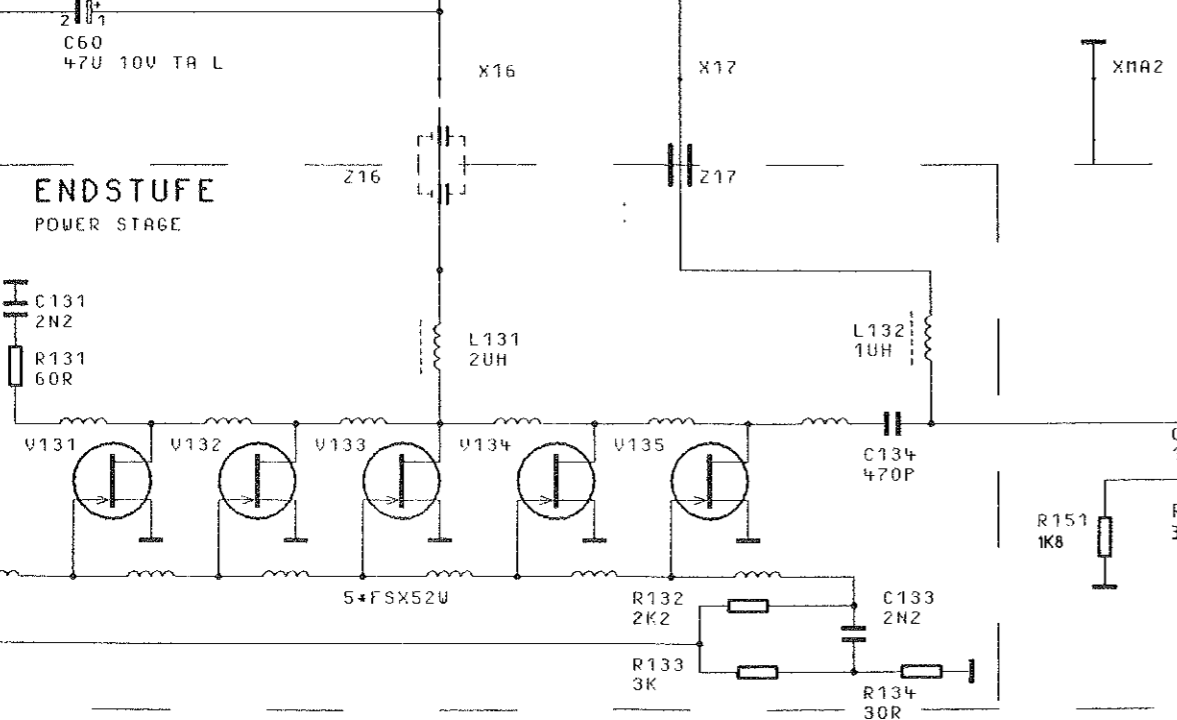
STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02


ZUR EICHLUNG A18
TO RF-ATTENUATOR

X161
0.01-
4320MHZ




ENDSTUFE POWER STAGE



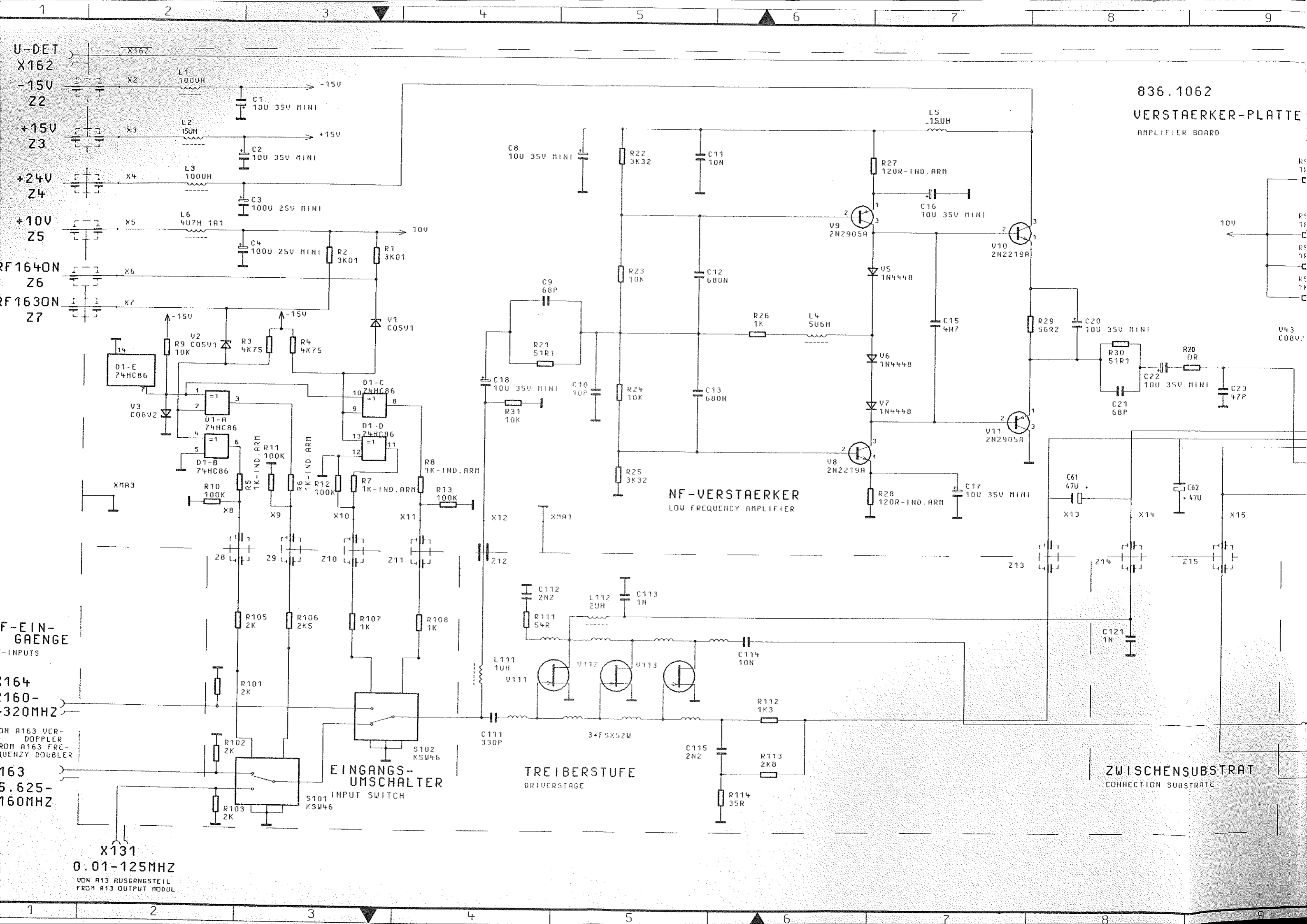


ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

A	39849	10.88	JN	1KGB	TAG	NAME	BENENNUNG
B	39849	12.88	JN	BEARB.		JN	RF-VERSTÄRKER 4.4GHZ RF-AMPLIFIER 4.4GHZ
C	41826	5.89	JN	GEPR.		JN	
				NORM			
					PLOTT	2. 9.88	*
REND. IND.		RENDERUNGS-MITTEILUNG	DATUM	NAME			ZEICHN.-NR. 836.0766.015
					ZU GERÄT	SMHU	REG. I. V. 835.8011
							ERSTE Z.

BLATT-NR.
1
v. 1 BL.



836.1062
VERSTÄRKER-PLATTE
 AMPLIFIER BOARD

NF-VERSTÄRKER
 LOW FREQUENCY AMPLIFIER

TREIBERSTUFE
 DRIVERSTAGE

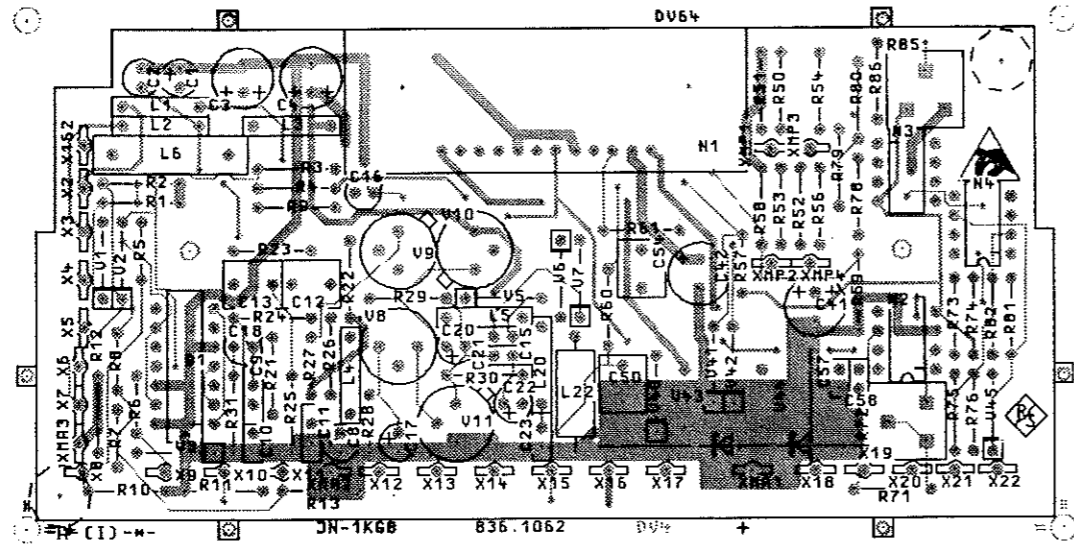
EINGANGS-UMSCHALTER
 INPUT SWITCH

ZWISCHENSUBSTRAT
 CONNECTION SUBSTRATE

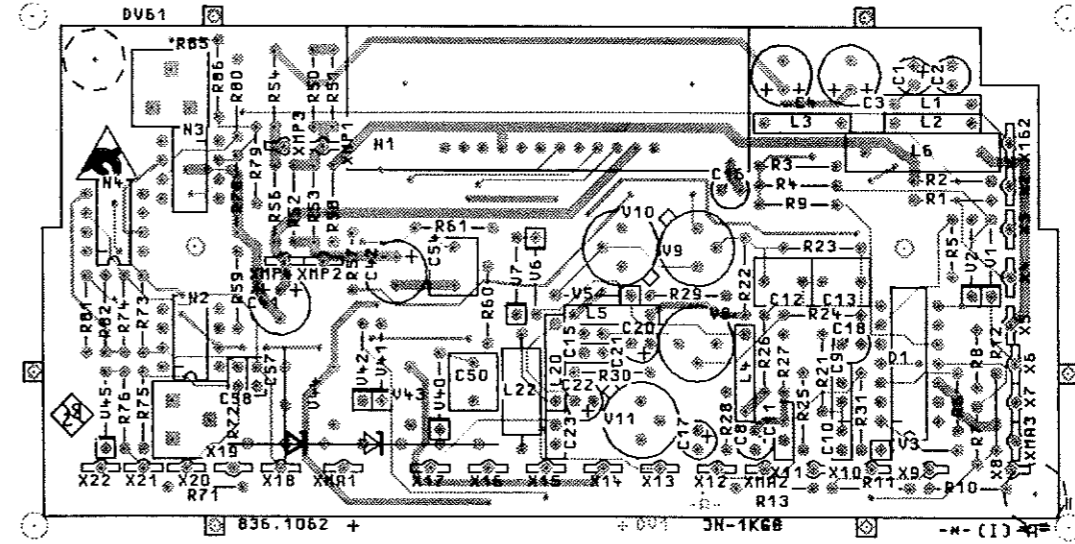
X131
 0.01-125MHZ
 VON A13 AUSGANGSTEIL
 FROM A13 OUTPUT MODUL

A
B
C
D
E
F

Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



Ansicht und Leitungsführung Lötseite
View of tracks on solder side

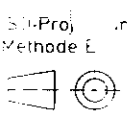


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ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION ESD!
Electrostatic sensitive devices require a special handling.

		Maße ohne Toleranzangabe		Maßstab 1 : 1	
				Halbzeug, Werkstoff	
		1KGB	Tag	Name	Benennung
		Bearb.	08.88	JN	Z
		Gepr.			
		Norm			
		ROHDE & SCHWARZ		Zeichn.-Nr.	
				836.1062	
And. Zust.	Anderungs-Mitteilung	Tag	Name	Blatt-Nr.	
				2	
				v. 2 Bl.	
		zu Gerät SMHU		reg. i. V.	835.8011 V erste Z.





ROHDE & SCHWARZ

SERVICE DOCUMENTS

Doubler

835.8763.02

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5 Service Manual "Doubler"

5.1 Function Description

(See circuit diagram 835.8763 S and block diagram 5-1)

The RF signal FIL OUT (X123) from the module "Filter bank" is directly connected to the output NOR OUT (X163) in the fundamental frequency range ($f \leq 2160$ MHz).

In doubler mode ($f > 2160$ MHz), the input signal (7 to 9 dBm) is amplified, the frequency is doubled, amplified again and applied to the filter module via a modulator. The input level at X123 is set by the μ P through a DAC on the module "Output unit" (see "Local levelling" on the module "Output unit").

Detectors at the input of the doubler and ahead of the modulator monitor the RF level. The DC voltages can be scanned using the instrument selftest.

The switching signals required are decoded on the module "Control 836.2269" from the serial interface to the μ P and stored.

5.1.1 Doubler Board

The control lines, supply voltages, control signals and diagnostics lines are switched from the module "Control" to the modules of the doubler via the doubler board. The doubler contains two current sources and voltage regulators for setting the operating point of transistors V101 and V102.

5.1.2 Input Module

The RF signal provided by the module "Filter bank" at X123 is applied to output X163 in the frequency range $15.625 \text{ MHz} \leq f \leq 2160 \text{ MHz}$ via the PIN diodes V61 to V63.

In the frequency range $2160 \text{ MHz} < f \leq 4320 \text{ MHz}$ (doubler mode), the input signal ($1080 \text{ MHz} < f_{in} \leq 2160 \text{ MHz}$) is connected via the PIN diodes V64 to V66 to the two-stage amplifier N71 to N73, amplified there by approx. 11 dB to a level of approx. 19 dBm and applied to the input of the doubler assembly.

The RF voltage at the amplifier output is detected by diode V81.

5.1.3 Doubler

The doubler consists of balancing transformers tuned to the frequency range as well as a diode quartet and is implemented on a ceramic substrate. The diode bridge V91 is fitted on the rear side of the substrate.

5.1.4 Modulator Module

The output signal of the doubler is amplified to approx. 18 dBm via V101 and V102. This signal is detected by V110 via a directional coupler with an insertion loss of 13 dB and applied to the PIN modulator V111 to V118. In doubler mode, the output level of the device and the amplitude modulation are controlled via this modulator.

5.1.5 Filter Module

This consists of three bandpasses and two controllable selectors and is used to suppress subharmonics and higher harmonics present in the doubler spectrum. The metal layer on the rear side of the substrate is connected to the housing ground by spring-mounted mats.

5.2 Testing and Adjustment

Adjustments are not required on the module.

After replacing the module, the control level of the doubler should be recalibrated by calling special function 66 (local levelling).

5.2.1 Testing of RF Path X123 → X163

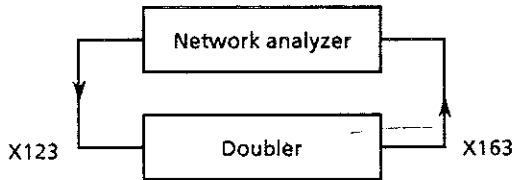


Fig. 5-1 Test setup

- In order to connect the path, set a frequency of $16 \text{ MHz} < f < 2160 \text{ MHz}$ on the instrument.
- Check the transmission curve using a network analyzer.
- The stop-band attenuation can be measured if a frequency $f > 2160 \text{ MHz}$ is set on the device.

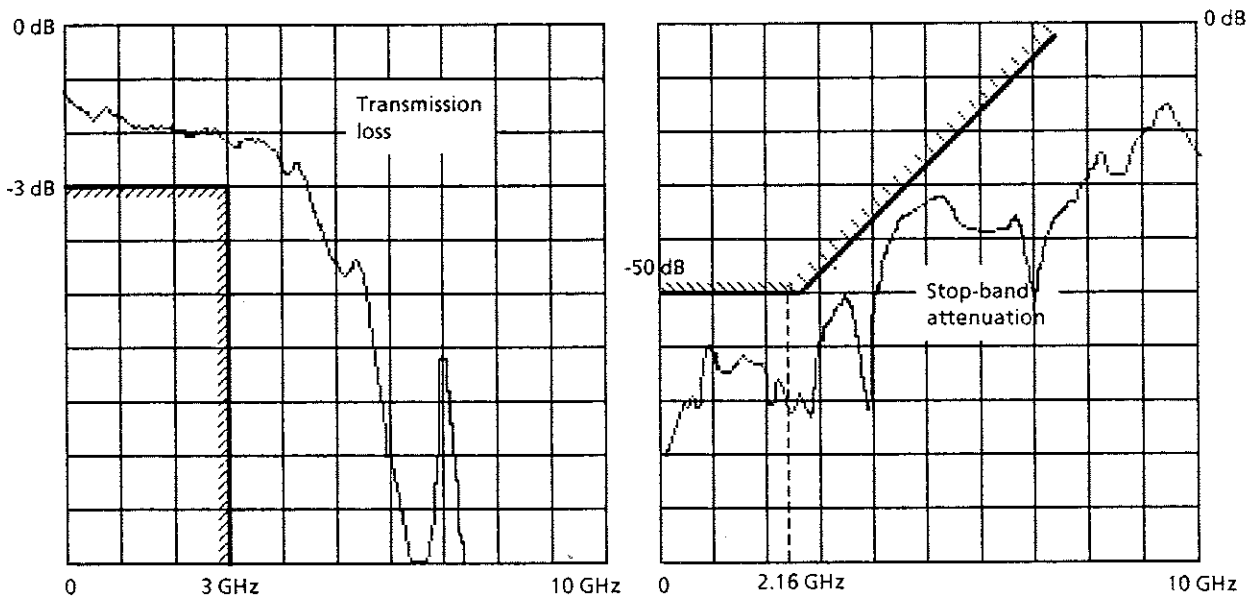


Fig. 5-2 |S21| from X123 to X163 versus frequency

5.2.2 Checking the RF Level at Output X164

- Unscrew cable W164 from X164, connect power meter or spectrum analyzer to X164.
- Check the available RF power according to Fig. 5-3, the frequency is set on the instrument.

Note:

By isolating the connection from X164 to the output amplifier, the PIN controller on the modulator module is set connected through. A voltage >4 V must be measured at filter Z42 (DOUBLERMOD).

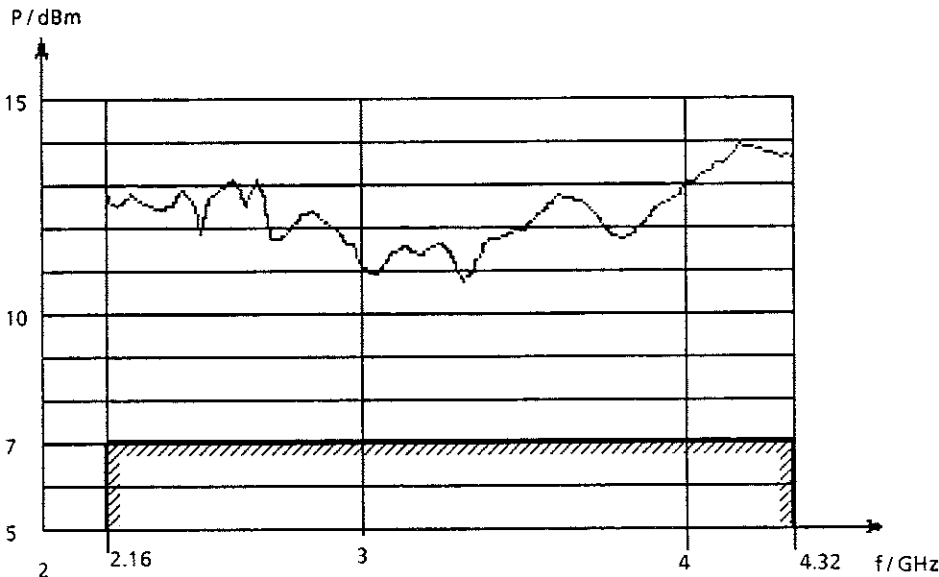


Fig. 5-3 Output power at X164 versus frequency

5.2.3 Testing the Modulator Dynamic Range

- Unscrew cable W164 from X164, connect spectrum analyzer to X164.
- Set a frequency $2160 \text{ MHz} < f \leq 4320 \text{ MHz}$ on the instrument.
- Note the available RF power.
- Short-circuit the control line DOUBLERMOD filter Z42 to the housing ground and note the RF power.
- It must be possible to reduce the RF level by more than 40 dB.

5.2.4 Checking the Subharmonics

- Unscrew cable W164 from X164, connect spectrum analyzer to X164.
- Set a frequency on the instrument according to the following table.
- Measure the RF level at frequencies of $1 \times f$, $0.5 \times f$ and $1.5 \times f$.
- Check the nonharmonics according to the following table.

Frequency f	dBs down at 0.5 x f	dBs down at 1.5 x f
2161 MHz	—	<-60 dBc at 3241.5 MHz
2720 MHz	<-60 dBc at 1360 MHz	—
2721 MHz	—	<-60 dBc at 4081.5 MHz
3440 MHz	<-60 dBc at 1720 MHz	—
3441 MHz	—	<-60 dBc at 5161.5 MHz
4320 MHz	<-60 dBc at 2160 MHz	—

5.2.5 Testing the Diagnostics Voltage DRIVER-DIA

- Set a frequency on the instrument according to Fig. 5-4.
- The voltage at X25 must be within the defined tolerances.

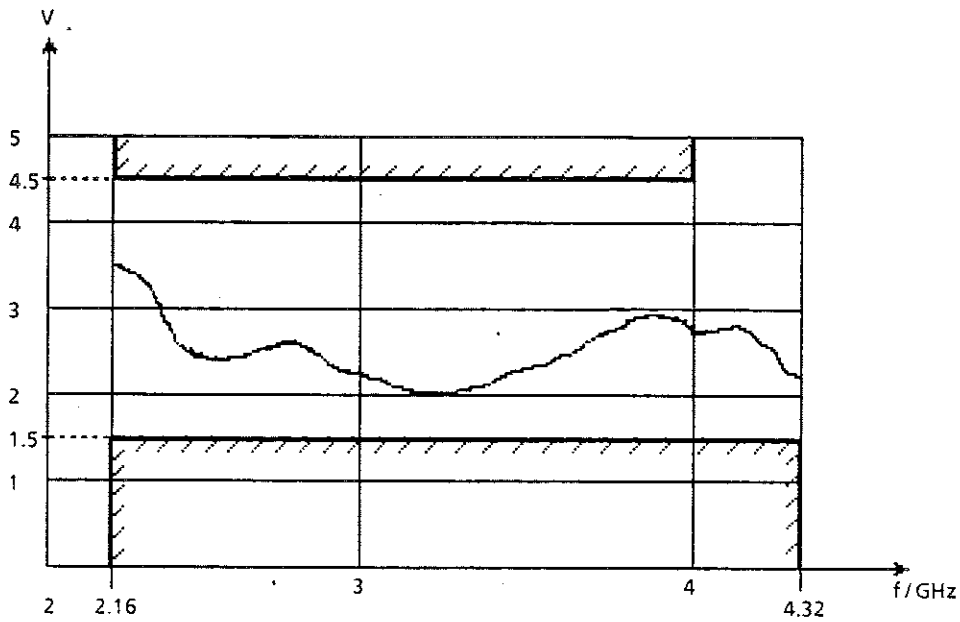


Bild 5-4 Voltage at X25 versus frequency

5.2.6 Checking the Diagnostics Voltage DOUBLER-DIA

- Set a frequency on the instrument according to Fig. 5-5.
- The voltage at X26 must be within the defined tolerances.

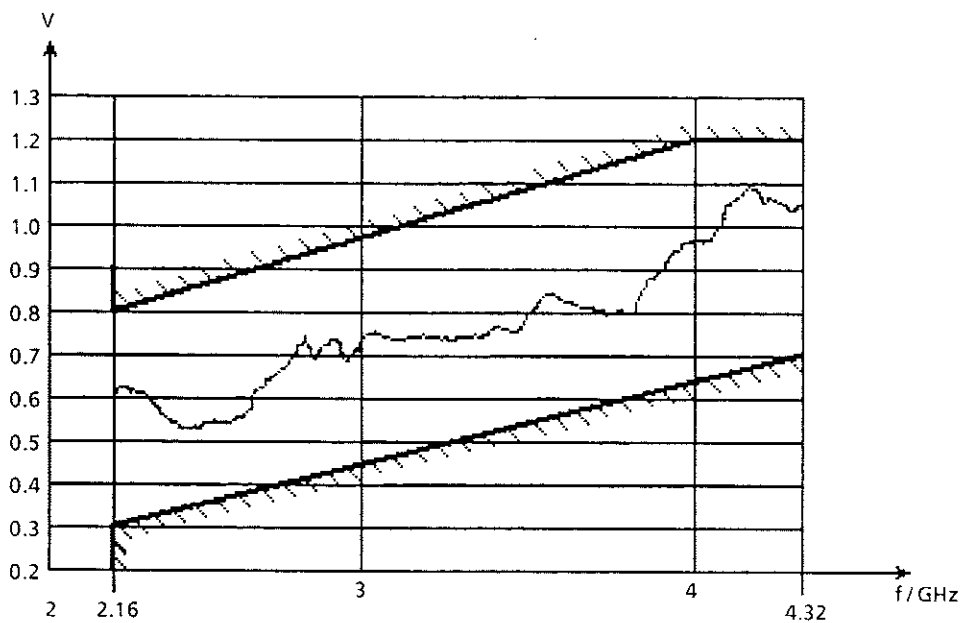


Fig. 5-5 Voltage at X26 versus frequency

5.3 Troubleshooting

Note:

An hysteresis of max. 1 MHz may occur at the frequency range limits depending on the last frequency setting.

Conventions:

Frequency range FB1: $15 \text{ MHz} \leq f \leq 2160 \text{ MHz}$
 Frequency range FB2: $2160 \text{ MHz} < f \leq 2720 \text{ MHz}$
 Frequency range FB3: $2720 \text{ MHz} < f \leq 3440 \text{ MHz}$
 Frequency range FB4: $3440 \text{ MHz} < f \leq 4320 \text{ MHz}$

Level H: between 12 V and 15.2 V

Level L: between -15.2 V and -12 V

The test points refer to the circuit diagram.

Instrument faults whose cause may be in the module "Doubler" are e.g.:

Fault	Source
Output level too low in FB1	Input module, switching diodes
Output level too low in FB2	Filter module, BP1
Output level too low in FB3	Filter module, BP2
Output level too low in FB4	Filter module, BP3
Subharmonics too high	Input module, switching diodes, doubler substrate, filter module

First check the interface data at the filters and the diagnostics voltages.

5.3.1 Troubleshooting the Doubler Board

Check the voltages in the corresponding frequency ranges according to the following table:

Test point	Designation	FB1	FB2	FB3	FB4
X28	DOUBLER-15P	L	H	H	H
X27	DOUBLER-15N	H	L	L	L
X31	BP1ON-P	L	H	L	L
X30	BP2ON-P	L	L	H	L
X29	BP3ON-P	L	L	L	H

Check the current sources V4 and V5 and also V10 and V11 by measuring the voltage drop across R21 and R14; the voltage regulators with V1 and V7 keep the drain voltages of the FETs V101 and V102 constant:

Test point	Measured value
MP9	$V(+10 \text{ V}) - 0.9 \text{ V} \pm 0.1 \text{ V}$
MP10	$V(+10 \text{ V}) - 0.9 \text{ V} \pm 0.1 \text{ V}$
X10	7.5 V to 8.5 V
X11	7.5 V to 8.5 V
X8	-0.9 V to -4.0 V
X9	-0.9 V to -4.0 V

5.3.2 Troubleshooting the Input Module

The function of the input selector can be checked in frequency ranges FB1 and FB2:

Test point	FB1	FB2..4
MP1 at C51	$3.1 \pm 0.3 \text{ V}$	$3.6 \pm 0.3 \text{ V}$
MP at C66	$5.5 \pm 0.3 \text{ V}$	$-13.6 \pm 1.6 \text{ V}$
MP at C63	$-8.6 \pm 1 \text{ V}$	$5.2 \pm 0.3 \text{ V}$

The amplifier stages N71 to N73 can be checked using the voltage drop across the DC resistors:

Test point	Measured value
MP2	$10.1 \pm 0.8 \text{ V}$
MP3	$11.1 \pm 0.8 \text{ V}$
MP4	$11.1 \pm 0.8 \text{ V}$

5.3.3 Troubleshooting the Modulator Module

Check the operating points of transistors V101 and V102 (see also 5.3.1).

The PIN diodes V111 to V118 can be checked using the voltage at MP5 and MP6: a voltage of 0.34 ± 0.05 V is present at MP5 and MP6 after applying a voltage of +10 V to X32 DOUBLERMOD.

5.3.4 Troubleshooting the Filter Module

Check the voltages at MP7 and MP8:

	MP7.8
FB1	-13.6 ± 1.6 V
FB2	-1.1 ± 0.1 V
FB3	-1.1 ± 0.1 V
FB4	-1.1 ± 0.1 V



ROHDE & SCHWARZ

Schaltheillisten
Stromläufe
Bestückungspläne
Part lists
Circuit diagrams
Components plans
Listes des pièces détachées
Schémas de Circuit
Plans des composants

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in	
A261	BD EINGANGSMODUL INPUT MODULE	835.9518.02				
A262	BD VERDOPPLER DOUBLER	835.9660.02				
A263	BD MODULATOR MODULATOR	835.9718.02				
A265	BD SCHALTER 1P3T-B SWITCH	836.0014.02				
A267	ZM TRENNW.EINGANG.MODUL PARTITION	835.8811.02				
A268	ZM TRENNWAND MODULATOR PARTITION	835.8840.02				
A269	ZM TRENNWAND FILTER PARTITION	835.8870.02				
A270	ED VERDOPPLER-PLATTE DOUPLER-BOARD	835.9360.02				
A272	ZM FILTERTRAEGER FILTER CARRIER	835.9160.02				
C1	CE 1UF+-10%35V TANTALUM SMD-CAPACITOR	843.3221	SPRAGUE	195D 105 X9 035 D2	835.9360.01	
C2	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	835.9360.01	
C3	CE 1UF+-10%35V TANTALUM SMD-CAPACITOR	843.3221	SPRAGUE	195D 105 X9 035 D2	835.9360.01	
C4	CE 1UF+-10%35V TANTALUM SMD-CAPACITOR	843.3221	SPRAGUE	195D 105 X9 035 D2	835.9360.01	
C5	CE 1UF+-10%35V TANTALUM SMD-CAPACITOR	843.3221	SPRAGUE	195D 105 X9 035 D2	835.9360.01	
C6	CE 1UF+-10%35V TANTALUM SMD-CAPACITOR	843.3221	SPRAGUE	195D 105 X9 035 D2	835.9360.01	
C7	CC 10NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITDR	CC 099.8521	VITRAMON	VJ1206 Y 103 K FAT	835.9360.01	
C8	CE 1UF+-10%35V TANTALUM SMD-CAPACITOR	843.3221	SPRAGUE	195D 105 X9 035 D2	835.9360.01	
C13	CC 100NF+-10%50V X7R 1206 CERAMIC CHIP CAPACITOR	CC 007.5237	VITRAMON	VJ1206 Y 104 K FAT	835.9360.01	
C51	CC 1NF+-10%100V2K1200CHIP CAPACITOR	CC 082.7385	VITRAMON	VJ0805Y102KFA	835.9518.01	
C62	CC 1NF+-10%50V1K1200 CAPACITOR	093.2215	VITRAMON	VJ0504Y102KFA	835.9518.01	
C63	CC 100PF+-10%50V1NPO CHIP CAPACITOR	093.2144	VITRAMON	VJ0504A101KFA	835.9518.01	
C66	CC 1NF+-10%100V2K1200CHIP CAPACITOR	CC 082.7385	VITRAMON	VJ0805Y102KFA	835.9518.01	
C67	CC 10NF+-10% 50V W5R CHIP CAPACITOR	093.2180	VITRAMON	VJ0504Y103KFA	835.9518.01	
C68	CC 10NF+-10% 50V W5R CHIP CAPACITOR	093.2180	VITRAMON	VJ0504Y103KFA	835.9518.01	
C69	CC 10NF+-10% 50V W5R CHIP CAPACITOR	093.2180	VITRAMON	VJ0504Y103KFA	835.9518.01	
C71	CC 100PF+-10%50V1NPO CHIP CAPACITOR	093.2144	VITRAMON	VJ0504A101KFA	835.9518.01	
C72	CC 100PF+-10%50V1NPO CHIP CAPACITOR	093.2144	VITRAMON	VJ0504A101KFA	835.9518.01	
C81	CC 100PF+-10%50V1NPO CHIP CAPACITOR	093.2144	VITRAMON	VJ0504A101KFA	835.9518.01	
C82	CC 100PF+-10%50V1NPO CHIP CAPACITOR	093.2144	VITRAMON	VJ0504A101KFA	835.9518.01	
C83	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9518.01	
C101	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9718.01	
C102	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9718.01	
C111	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9718.01	
C112	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9718.01	
C113	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9718.01	
C113	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9718.01	
C114	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9718.01	
C116	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9718.01	
ROHDE & SCHWARZ		Äl	Schaltteilliste für Parts list for		Sachnummer Stock Nr.	Blatt Page
		Date				
		18	0489	ZE VERDOPPLERMODUL FREQUENCY DOUBLER	835.8763.01 SA	1+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
C121	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9718.01
C122	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9718.01
C131	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9860.01
C132	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9860.01
C133	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9860.01
C134	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9960.01
C151	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	836.0014.01
C152	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	836.0014.01
C153	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	836.0014.01
C154	CX 10PF+-20%100V TK50Q0,5 CHIP MIS CAPACITOR	093.4476	ALPHA IND	SC9103GMSTYLE149-817	835.9960.01
C251	CC 3PF+-0,5PF50V1,5NPO CAPACITOR	093.3228	VITRAMON	VJO504A3RODFA	835.9447.01
L71	LD FERRITSPULE 2UH COIL	836.0114			835.9518.01
L81	LD FERRITSPULE 2UH COIL	836.0114			835.9518.01
L82	LD FERRITSPULE 2UH COIL	836.0114			835.9518.01
N71 . .73	BM MSA0520 BB.AMPL BROADBAND AMPLIFIER	820.3431	AVANTEK	MSA0520	835.9518.01
R1	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	835.9360.01
R10	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	835.9360.01
R11	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	835.9360.01
R12	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	835.9360.01
R13	RG 10 KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0793	DALE	CRCW1206-10 10K F-T	835.9360.01
R14	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	835.9360.01
R15	RG 1000 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.7271	DALE	CRCW1206-10 1K F-T	835.9360.01
R16	RG 18,2KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5850	DALE	CRCW1206-10 18K2 F-T	835.9360.01
R17	RG 1,5 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5714	DALE	CRCW1206-10 1K5 F-T	835.9360.01
R18	RG 3,32KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5789	DALE	CRCW1206-10 3K32 F-T	835.9360.01
R19	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	835.9360.01
R20	RG 8,25KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0770	DALE	CRCW1206-10 8K25 F-T	835.9360.01
R21	RG 12,1 OHM+-1%TK100 1206 CHIP RESISTOR	RG 006.8661	DALE	CRCW1206-10 12R1 F-T	835.9360.01
R25	RG 18,2KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5850	DALE	CRCW1206-10 18K2 F-T	835.9360.01
R26	RG 1,5 KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5714	DALE	CRCW1206-10 1K5 F-T	835.9360.01
R27	RG 3,32KOHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5789	DALE	CRCW1206-10 3K32 F-T	835.9360.01
R28	RG 221 OHM+-1%TK100 1206 RESISTOR CHIP	RG 007.5614	DALE	CRCW1206-10 221R F-T	835.9360.01
R29	RG 8,25KOHM+-1%TK100 1206 CHIP RESISTOR	RG 007.0770	DALE	CRCW1206-10 8K25 F-T	835.9360.01
V1	AK BCX71J P 45V 200MA TRANSISTOR	AK 007.2096	VALVO	BCX71J	835.9360.01
V2	AE BZV55/C4V7 0.5W ZDI ZENER DIODE	AE 006.9822	VALVO	BZV55/C4V7	835.9360.01
V3	AD BAS32 75V OA20 UDI DIODE	AD 006.7288	VALVO	BAS32	835.9360.01
V4	AK BCX68-16 N 20V 1 A TRANSISTOR	AK 801.8383	SIEMENS	BCX68-16	835.9360.01

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in
V5	AK BCX71J P 45V 200MA TRANSISTOR	AK 007.2096	VALVO	BCX71J	835.9360.01
V6	AD BAS32 75V 0A20 UDI DIODE	AD 006.7288	VALVO	BAS32	835.9360.01
V7	AK BCX71J P 45V 200MA TRANSISTOR	AK 007.2096	VALVO	BCX71J	835.9360.01
V8	AD BAS32 75V 0A20 UDI DIODE	AD 006.7288	VALVO	BAS32	835.9360.01
V9	AE BZV55/C4V7 0.5W ZDI ZENER DIODE	AE 006.9822	VALVO	BZV55/C4V7	835.9360.01
V10	AK BCX68-16 N 20V 1 A TRANSISTOR	AK 801.8383	SIEMENS	BCX68-16	835.9360.01
V11	AK BCX71J P 45V 200MA TRANSISTOR	AK 007.2096	VALVO	BCX71J	835.9360.01
V12	AD BAS32 75V 0A20 UDI DIODE	AD 006.7288	VALVO	BAS32	835.9360.01
V61 ..66	AX 5082-0030 PINDI.CHIP PIN DIODE CHIP	093.4124	HEWLETT-P.	5082-0030	835.9518.01
V81	AX BAT16-046 SCHKY.CHIP SCHOTTKY DIODE CHIP	093.4360	SIEMENS	BAT16-046-CHIP	835.9518.01
V91	AE DMJ6575 4XS-BANDMIX QUAD S-BAND MIXER	836.3520	ALPHA-IND.	DMJ6575	835.9660.01
V101	AM FSX52WF 12V GAASFET GAAS FET	806.8998	FUJITSU	FSX52WF	835.9718.01
V102	AM FSX52WF 12V GAASFET GAAS FET	806.8998	FUJITSU	FSX52WF	835.9718.01
V110	AX HSCH5336 SCHOTTKYDI SCHOTTKY DIODE BEAM LEAD	093.4201	HEWLETT	HSCH5336	835.9718.01
V111 ..118	AX MA47389 PINDI.CHIP PIN DIODE CHIP	093.2744	MICROWAVE	MA47389	835.9718.01
V131 ..139	AX MA47389 PINDI.CHIP PIN DIODE CHIP	093.2744	MICROWAVE	MA47389	835.9860.01
V151 ..159	AX MA47389 PINDI.CHIP PIN DIODE CHIP	093.2744	MICROWAVE	MA47389	836.0014.01
W30	DX KABEL W30 CABLE W30	835.9318			
X2 ..32	VL STECKLETOESE 7,5X1,1 PLUG-IN SOLDERING LUG	VL 078.2747	-	R&S-ZCHNG.078.2747	835.9360.01
X123	FJ EINBAUBUCHSE SYST.SMA CONNECTOR SMA	FJ 911.0357	RADIALL	R125 630	835.8786
X163	FJ EINBAUBUCHSE SYST.SMA CONNECTOR SMA	FJ 911.0357	RADIALL	R125 630	835.8786
X164	FJ EINBAUBUCHSE SYST.SMA CONNECTOR SMA	FJ 911.0357	RADIALL	R125 630	835.8786
Z2 ..7	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	835.8811.01
Z8 ..12	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	835.8840.01
Z13	LD FILT.20DB/10GHZ 500V # LOWPASS-FILTER	820.3425	OXLEY	DBZ2/C/10/500V	835.8840.01
Z14	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z15	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z16	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	835.8870.01
Z17	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	835.8870.01
Z18	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z19	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	835.8870.01
Z20	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	835.8870.01
Z21	LD 10GHZ 50DB100V10A4RDX9 LEAD THROUGH FILTER	LD 451.4636	OXLEY	SLT5/P/2000/REF.1	
Z32 ..41	LD TIEFPASSFILTER LOWPASS FILTER	843.3950			
Z42	LD FILT.20DB/10GHZ 500V # LOWPASS-FILTER	820.3425	OXLEY	DBZ2/C/10/500V	835.8786
Z131	BD BANDPASS 1 BANDPASS 1	835.9901.02			
Z133	BD BANDPASS 3 BANDPASS 3	835.9960.02			

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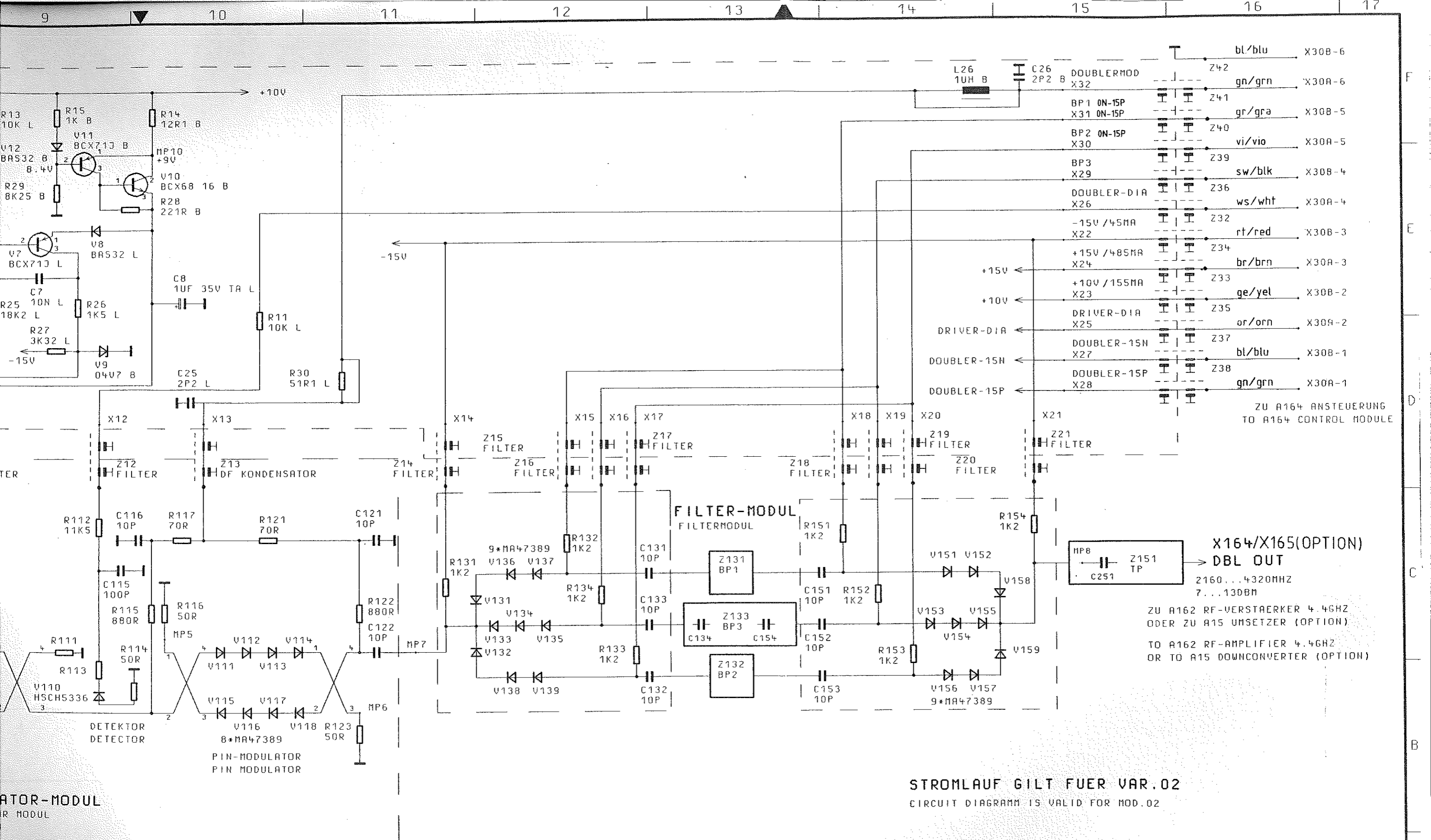
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Date
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Schaltteilliste für
Parts list for
**ZE VERDOPPLERMODUL
FREQUENCY DOUBLER**

Sachnummer
Stock Nr.
835.8763.01 SA

Blatt
Page
3+

Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in	
Z134	BD TIEFPASS LOWPASS FILTER	835.9447.02			835.8786 - ENDE -	
ROHDE & SCHWARZ		Äl	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
		18	0489	ZE VERDOPPLERMODUL FREQUENCY DOUBLER	835.8763.01 SA	4-



ATOR-MODUL
R MODUL

DETEKTOR
DETECTOR

PIN-MODULATOR
PIN MODULATOR

FILTER-MODUL
FILTERMODUL

X164/X165(OPTION)
DBL OUT

ZU A162 RF-VERSTAECKER 4.4GHZ
ODER ZU A15 UMSETZER (OPTION)
TO A162 RF-AMPLIFIER 4.4GHZ
OR TO A15 DOWNCONVERTER (OPTION)

ACHTUNG: EGB!
ELEKTROSTATISCH GEFAEHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

A	39848	04.89	JN	1KGB	TAG	NAME	BENENNUNG	
				BEARB.		JN	VERDOPPLER FREQUENCY-DOUBLER	
				GEPR.		JN		
				NORM				
				PLOTT	2. 9.88	*		
							ZEICHN.-NR.	BLATT-NR.
							835.8763.015	1
REND. IND.	ÄNDERUNGS-MITTEILUNG	ORT UN	NAME	ZU GERÄT SMHU		REG.-I.V.	835.8011	ERSTE Z.

VERDOPPLER-PLATTE

DOUBLER BOARD

835.9360

VON A12 FILTERSATZ
FROM A12 FILTERSET

**X123
FIL OUT**

15.6...2160MHZ
-5...5DBM

ZU A162 RF-VERSTÄRKER 4.4GHZ
ODER ZU A15 UMSETZER (OPTION)
TO A162 RF-AMPLIFIER 4.4GHZ
OR TO A15 DOWNCONVERTER (OPTION)

**X163
NOR OUT
X166 (OPTION)**

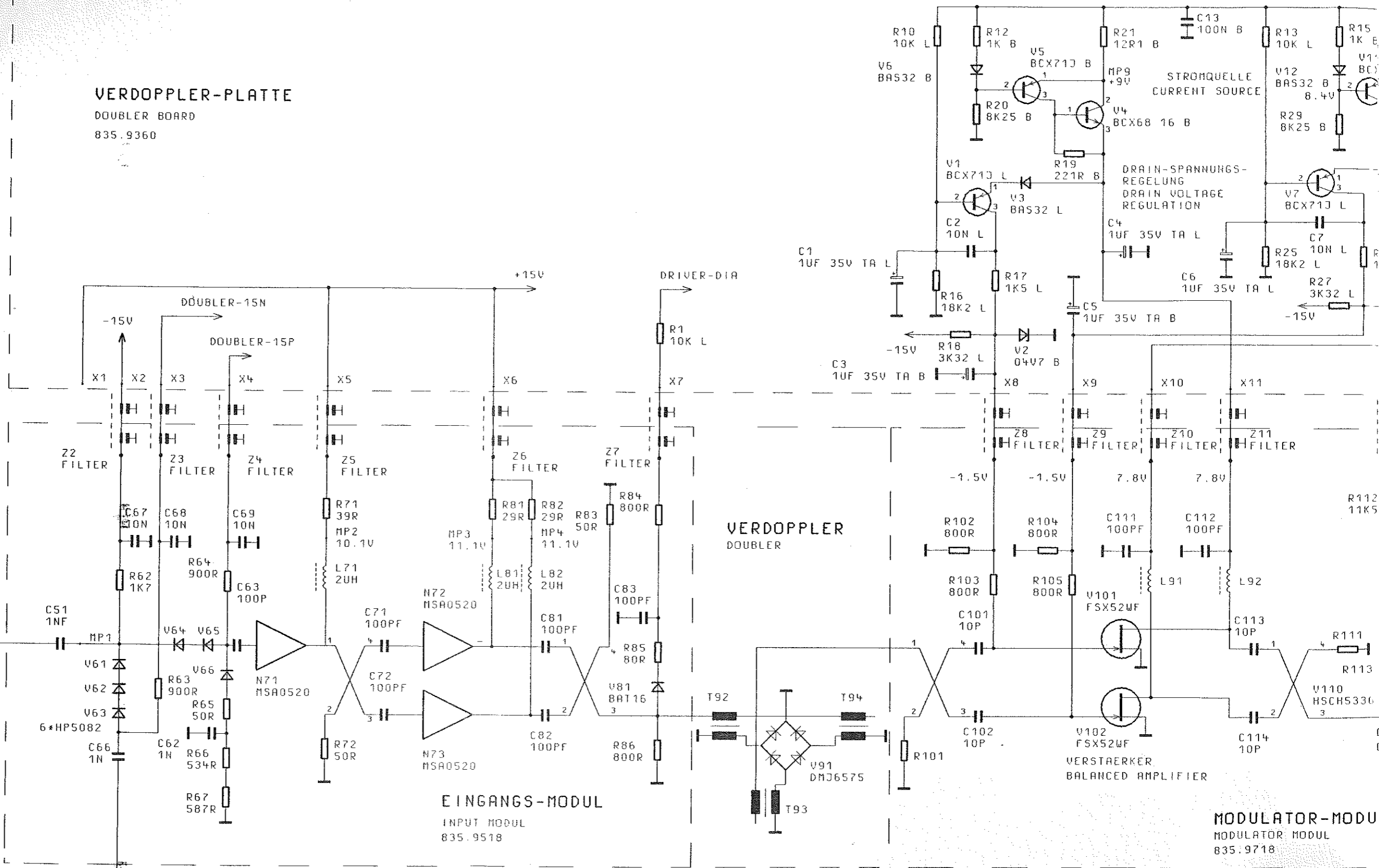
15.6...2160MHZ
-5...5DBM

EINGANGS-MODUL

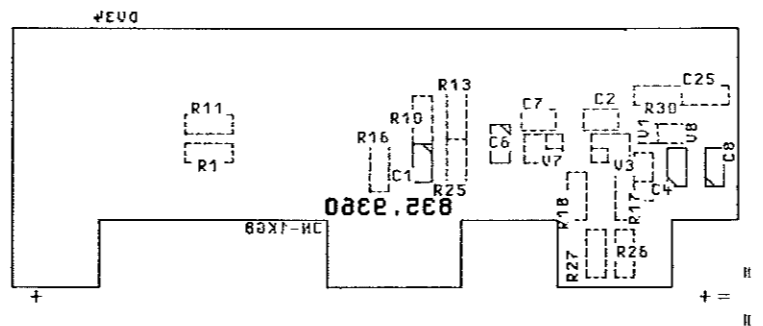
INPUT MODUL
835.9518

VERDOPPLER DOUBLER


MODULATOR-MODUL
MODULATOR MODUL
835.9718



FÜR DIESE ZEICHNUNG BEHALTEN WIR UNS ALLE RECHTE VOR.
 DIESE ZEICHNUNG IST FÜR DEN DRUCK BEHALTEN. VERÄNDERUNGEN KÖNNEN NUR DURCH REF. DES DATENSATZES ERFOLGEN.




Variantenklärung / VERSION
 VAR02 - Grundaussführung / BASIC MODEL



ACHTUNG: EGB!
 ELEKTROSTATISCH GEFÄHRDETE
 BAUELEMENTE ERFORDERN EINE
 BESONDERE HANDHABUNG.

**EINBAU UND BETRIEB
 NACH HVC 250**

		MASSE OHNE TOLERANZANGABE		MASSSTAB 1 : 1	
		-0.2 MM		WERKSTOFF	
		1 KGB	TAG	NAME	BENENNUNG
		BEARB.		JH	VERDOPPLER-PLATTE DOUPLER-BOARD
		GEPR.		JH	
		KOPF			
		PLOTT	10. 9.88	*	
		 ROHDE & SCHWARZ		ZEICHN.-NR.	
				835.9360.01 ED	
REK. IND.	RENDPUNGS-NITTEILUNG	DATUM	NAME	ZU BEPRET	SMHU
				REG.-I.V.	835.8011
				ERSTE Z.	
				BLATT-NR.	2
				V. 2	EL.



ROHDE & SCHWARZ

SERVICE DOCUMENTS

Control

836.2269.02



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5 Service Manual "Control"

5.1 Function Description

(See circuit diagram 836.2269 S)

5.1.1 Digital Interface

The control contains the microprocessor interface for the modules "RF amplifier 2.2 GHz/4.4 GHz" and "Doublers".

The incoming serial data are stored in D4. The HCMOS levels are converted by N1 and N2 into the required control levels. The interface module D2 is used to address the diagnostics line TST to which various voltages can be connected using D30.

5.1.2 + 10-V Supply

A stable voltage of +10 V is generated by reference diode V1 and the operational amplifier N3-A. This serves as a reference voltage for the +10 V supply circuit comprising the transistors V4 and V5. A voltage of -4.95 V is available at the output of N3-B.

5.1.3 Voltage-controlled Current Source

The modulation signal AM2 from the subassembly "Output section" is connected to the current source N4-B via the FET switch D20 and N4-A. The output current flowing through X1.2 is proportional to the difference in voltage between V(P3.1) and V(X3.2).

5.2 Testing and Adjustment

Note: A hysteresis of max. 1 MHz occurs at the frequency range limits. The value of the hysteresis depends on the last frequency setting.

5.2.1 Adjustment of + 10 V Supply

Measure the voltage between P2.1 and reference point P5 and adjust to 10.40 ± 0.05 V using R25.

5.2.2 Adjusting the Internal Impedance of the Current Source

- a) Connect pins 1 and 2 with jumper X3A.
- b) Remove jumper X1A and plug onto X2.
- c) Connect ammeter to pins 1 and 2 of jumper X1.
- d) Note current I1.
- e) Remove jumper at X2 and note current I2.
- f) Adjust potentiometer R40 so that $I_1 = I_2$; required accuracy: $|I_2/I_1 - 1| < 0.005$
- g) Repeat d) to f) until the stated accuracy is achieved.
- h) Plug jumper X3A onto pins 2 and 3, and jumper X1A onto pins 2 and 3.

5.2.3 Testing the Lines

Check the interface data in the corresponding frequency ranges:

Designations of frequency and level ranges:

FB1	$0.1 \text{ MHz} \leq f < 15 \text{ MHz}$
FB2	$15 \text{ MHz} \leq f < 2160 \text{ MHz}$
FB3	$2160 \text{ MHz} \leq f \leq 2720 \text{ MHz}$
FB4	$2720 \text{ MHz} \leq f \leq 3440 \text{ MHz}$
FB5	$3440 \text{ MHz} \leq f \leq 4320 \text{ MHz}$
H	$3.5 \text{ V} \leq V \leq 5.2 \text{ V}$
L	$0 \text{ V} \leq V \leq 1.5 \text{ V}$
H1	$12 \text{ V} \leq V \leq 15.2 \text{ V}$
L1	$-15.2 \text{ V} \leq V \leq -12 \text{ V}$
H2	$-1.8 \text{ V} \leq V \leq 0 \text{ V}$
L2	$-6.3 \text{ V} \leq V \leq -4.2 \text{ V}$
X	High or Low
A	$0 \text{ V} \leq V \leq 5.3 \text{ V}$

Test point	FB1	FB2	FB3	FB4	FB5
D4-A/Q1	L	L	H	H	H
D4-A/Q2	H	H	H	H	L
D4-A/Q3	H	H	H	L	H
D4-A/Q4	H	H	L	H	H
D4-A/Q5	L	L	L	L	L
D4-A/Q6	H	H	L	L	L
D4-A/Q7	L	H	L	L	L
D4-A/Q8	L	L	H	H	H
X10A-7	L	L	H	H	H
X10B-6	L	H	L	L	L
X20B-4	H2	H2	H2	H2	H2
X30B-5	L	L	H	L	L
X30A-5	L	L	L	H	L
X30B-4	L	L	L	L	H
X30B-1	H	H	L	L	L
X30A-1	L	L	H	H	H
P4	+5 V	+5 V	A	A	A

5.3 Troubleshooting

Check positions of jumpers.

Remove cables from X10, X20 and X30.

Check open circuit voltages on the lines according to 5.2.3.

Check FET switches S1, S2 and S3 (D20).

High at control input = switch ON

Low at control input = switch OFF

Check current through jumper X1 which is a function of the voltage at X3.1 given by the following equation:

$$I_{\text{nominal}} = (V(P3.1) - V(X3.1))/R44$$



ROHDE & SCHWARZ

Schalteillisten
Stromläufe
Bestückungspläne
Part lists
Circuit diagrams
Components plans
Listes des pièces détachées
Schémas de Circuit
Plans des composants

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Kennz. Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in	
C1	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006		
C2	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006		
C3	CE 22UF-10+50% 63V 9X13 ELECTROLYTIC CAPACITOR	CE 006.7120	ROEDERST	EK 00 CB 222 J		
C4	CE 22UF+-20%10V SAL ELECTR.CAPACITOR	CE 007.3940	VALVO	2222 122 34229		
C5	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%		
C6	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%		
C7	CK 1UF+-10%50V5RM MKT CAPACITOR	CK 099.2998	WIMA	MKS2/50/1UF/10%		
C8	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103		
C9	CC 10NF-20+50%7X8R4000 CAPACITOR	CC 087.7525	VALVO	2222 63051 64051103		
C10	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%		
C20	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%		
C21	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%		
C22	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%		
C23	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006		
C24	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006		
C25	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%		
C30	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%		
C31	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006		
C37	CK 100NF+-5%63V5RM MKT CAPACITOR	CK 099.2930	WIMA	MKS/2/63/0,1UF/5%		
C38	CE 10UF+-20%25V SAL ELECTR.CAPACITOR	CE 007.3934	VALVO	2222 122 30006		
D1	BL PC74HC238P 3T08 L.DEC DECODER/DEMULPLEXER	BL 620.0847	VALVO	PC74HC238P		
D2	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P		
D4	BL PC74HC4094P 8ST.SH.REG 8ST.SHIFT A.STORE REGIST.	BL 099.9711	VALVO	PC74HC4094P		
D10	BJ DG212CJ 4X ANALOGSCH QUAD ANALOG SWITCH	372.6850	SILICONIX	DG212CJ		
D20	BJ DG212CJ 4X ANALOGSCH QUAD ANALOG SWITCH	372.6850	SILICONIX	DG212CJ		
D30	BL MM74HC4051N 8CH.AN.MUX 8CH.ANALOG MUX/DEMUX	BL 099.9670	NSC	MM74HC4051N		
L1	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60		
L2	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60		
L3	LD 47,0UH10%4,500HMO,110A CHOKE	LD 067.3060	DELEVAN	DROSSEL1025-60		
L4	LD 10UH BEI 0,81A 0,660HM CHOKE	LD 026.4126	JAHRE	72.10-10ROK		
L5	LD 10UH BEI 0,81A 0,660HM CHOKE	LD 026.4126	JAHRE	72.10-10ROK		
L6	LD 4,7UH BEI 1,35AO,240HM CHOKE	LD 026.4084	JAHRE	72.10-4R7OK		
L7	LD 10UH BEI 0,81A 0,660HM CHOKE	LD 026.4126	JAHRE	72.10-10ROK		
L8	LD 10UH BEI 0,81A 0,660HM CHOKE	LD 026.4126	JAHRE	72.10-10ROK		
L9	LD 4,7UH BEI 1,35AO,240HM CHOKE	LD 026.4084	JAHRE	72.10-4R7OK		
L10	LD 4,7UH BEI 1,35AO,240HM CHOKE	LD 026.4084	JAHRE	72.10-4R7OK		
L11	LD 4,7UH BEI 1,35AO,240HM CHOKE	LD 026.4084	JAHRE	72.10-4R7OK		
ROHDE & SCHWARZ		Äl	Datum	Schaltteilliste für Parts list for	Sachnummer Stock Nr.	Blatt Page
			Date			
		07	1089	ED ANSTEUERPLATTE CONTROL/MODUL	836.2269.01 SA	1+

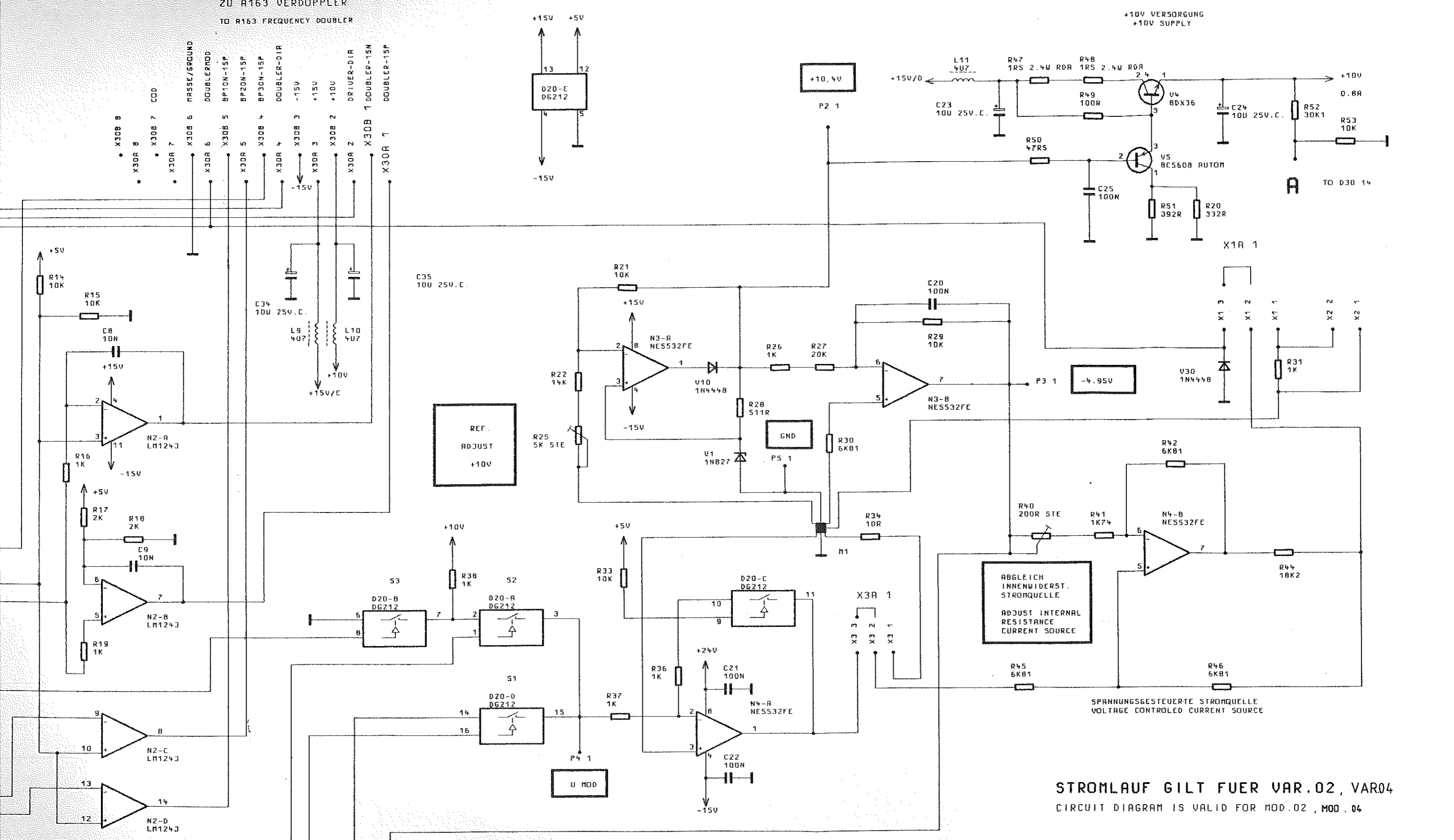
Kennz Comp.No.	Benennung Designation	Sachnummer Stock No.	Hersteller Manufacturer	Bezeichnung Designation	enthalfen in contained in
N1	BO LM124J 4XL.P.OPAMP OPERATIONAL AMPLIFIER	300.6353	NSC	LM124J	
N2	BO LM124J 4XL.P.OPAMP OPERATIONAL AMPLIFIER	300.6353	NSC	LM124J	
N3	BO NE5532AFE 2XL.N.OPAMP OPERATIONAL AMPLIFIER	BO 356.0450	VALVO	NE5532AFE	
N4	BO NE5532AFE 2XL.N.OPAMP OPERATIONAL AMPLIFIER	BO 356.0450	VALVO	NE5532AFE	
P1 . . 5	VL WIRE-WRAP PIN WIRE-WRAP PIN	VL 088.4542	BERG	NR. 75 403-003	
R1	RL 0,35W 140 KOHM+-1%TK50 RESISTOR	RL 083.2106	DRALORIC	SMAO207/140K-F-C	
R2	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R3	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMAO207/47,5OHM-F-D	
R4	RL 0,35W 30,1KOHM+-1%TK50 RESISTOR	RL 083.1639	DRALORIC	SMAO207/30,1K-F-C	
R5	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	
R6	RL 0,35W 20,0KOHM+-1%TK50 RESISTOR	RL 083.1522	DRALORIC	SMA/207/20K-F-C	
R7	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R8	RL 0,35W 113KOHM+-1%TK50 RESISTOR	RL 082.2248	DRALORIC	SMAO207/113K-F-C	
R9	RL 0,35W 100KOHM+-1%TK50 RESISTOR	RL 082.1764	DRALORIC	SMAO207/100K-F-C	
R10	RL 0,35W 12,1KOHM+-1%TK50 RESISTOR	RL 083.1351	DRALORIC	SMAO207/12,1K-F-D	
R11 . . 15	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R16	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R17	RL 0,35W 2,00KOHM+-1%TK50 RESISTOR	RL 083.0826	DRALORIC	SMAO207/2,00K-F-D	
R18	RL 0,35W 2,00KOHM+-1%TK50 RESISTOR	RL 083.0826	DRALORIC	SMAO207/2,00K-F-D	
R19	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R20	RL 0,35W 332 OHM+-1%TK50 RESISTOR	RL 083.0255	DRALORIC	SMAO207/332OHM-F-D	
R21	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R22	RL 0,35W 14,0KOHM+-1%TK50 RESISTOR	RL 083.1374	DRALORIC	SMAO207/14K-F-D	
R25	RS 0,5W5KOHM+-10%10X10X5 CERMET POTENTIOMETER	RS 247.7978	BOURNS	3386X-1-502	
R26	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R27	RL 0,35W 20,0KOHM+-1%TK50 RESISTOR	RL 083.1522	DRALORIC	SMA/207/20K-F-C	
R28	RL 0,35W 511 OHM+-1%TK50 RESISTOR	RL 083.0426	DRALORIC	SMAO207/511OHM-F-D	
R29	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R30	RL 0,35W 6,81KOHM+-1%TK50 RESISTOR	RL 082.2560	DRALORIC	SMA O207/6,81K-F-C	
R31	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R33	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMAO207/10K-F-D	
R34	RL 0,35W 10,0 OHM+-1%TK50 RESISTOR	RL 082.8852	DRALORIC	SMAO207/100HM-F-D	
R36	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R37	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R38	RL 0,35W 1KOHM+-1%TK50 RESISTOR	RL 082.2160	DRALORIC	SMAO207/1K-F-C	
R40	RS 0,5W200 OHM+-10%10X10X CERMET POTENTIOMETER	RS 247.7949	BOURNS	3386X-1-201	
R41	RL 0,35W 1,74KOHM+-1%TK50 RESISTOR	RL 083.0784	DRALORIC	SMAO207/1,74K-F-D	
R42	RL 0,35W 6,81KOHM+-1%TK50 RESISTOR	RL 082.2560	DRALORIC	SMA O207/6,81K-F-C	

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Kennz. Comp.No	Benennung Designation	Sachnummer Stock No	Hersteller Manufacturer	Bezeichnung Designation	enthalten in contained in	
R43	RL 0,35W 1MOHM+-1%TK50 RESISTOR	RL 082.7862	DRALORIC	SMA0207/1M-F-D		
R44	RL 0,35W 18,2KOHM+-1%TK50 RESISTOR	RL 083.1480	DRALORIC	SMA/207/18,2K-F-C		
R45	RL 0,35W 6,81KOHM+-1%TK50 RESISTOR	RL 082.2560	DRALORIC	SMA 0207/6,81K-F-C		
R46	RL 0,35W 6,81KOHM+-1%TK50 RESISTOR	RL 082.2560	DRALORIC	SMA 0207/6,81K-F-C		
R47	RD 2.4 W 1,5 OHM +-3% WIRE WOUND RESISTOR	RD 067.9274	SAGE	1200S/1,53HM/3%		
R48	RD 2.4 W 1,5 OHM +-3% WIRE WOUND RESISTOR	RD 067.9274	SAGE	1200S/1,53HM/3%		
R49	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D		
R50	RL 0,35W 47,5 OHM+-1%TK50 RESISTOR	RL 082.9507	DRALORIC	SMA0207/47,5OHM-F-D		
R51	RL 0,35W 392 OHM+-1%TK50 RESISTOR	RL 082.2183	DRALORIC	SMA0207/392K-F-C		
R52	RL 0,35W 30,1KOHM+-1%TK50 RESISTOR	RL 083.1639	DRALORIC	SMA0207/30,1K-F-C		
R53	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D		
R55	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D		
R56	RL 0,35W 10,0KOHM+-1%TK50 RESISTOR	RL 083.1297	DRALORIC	SMA0207/10K-F-D		
R57	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D		
R58	RL 0,35W 100 OHM+-1%TK50 RESISTOR	RL 082.6543	DRALORIC	SMA0207/100/HM-F-D		
V1	AE 1N827 6,2V REF DI REFERENCE DIODE	AE 418.0029	CDI	1N827		
V4	AL BDX36 N 60V 5A0 TRANSISTOR	AL 332.4291	VALVO	BDX36		
V5	AK BC560B P 45V 100MA TRANSISTOR	AK 007.2044	SIEMENS	BC560B GURT,POL.CBE		
V8	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET		
V9	AE BZX79/C4V7 0,5W ZDI ZENER DIODE	AE 012.2432	AEG	BZX55/C4V7 GEG.		
V10	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET		
V30	AD 1N4448 75V 0A15 UDI DIODE	AD 012.0700	TEXAS INST	1N4448 GEGURTET		
X1	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 3-POLIG/3 PINS	FP 242.3600	BINDER	742-5-11-0178-00-36		
X2	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 2-POLIG/2 PINS	FP 242.3600	BINDER	742-5-11-0178-00-36		
X3	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 3-POLIG/3 PINS	FP 242.3600	BINDER	742-5-11-0178-00-36		
X4	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 2-POLIG/2 PINS	FP 242.3600	BINDER	742-5-11-0178-00-36		
X1A	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302		
X10A	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR	FP 243.3578	BINDER	742-5-11-0187-00-36		
X10B	FP STECKERL.ABGEW.36-POL. ANGLE PIN CONNECTOR	FP 087.9105	BINDER	742-5-11-0191-00-36		
X20A	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 5-POLIG/5 PINS	FP 242.3600	BINDER	742-5-11-0178-00-36		
X20B	FP INDIREKT.STECKERL.36P. PIN CONNECTOR 5-POLIG/5 PINS	FP 242.3600	BINDER	742-5-11-0178-00-36		
X3A	FP KURZSCHLUSSBUCHSE SHORTING PLUG	FP 491.7042	PK	452-70302		
X30A	FP WINKELSTECKERLEIST.36P ANGLE PIN CONNECTOR	FP 243.3578	BINDER	742-5-11-0187-00-36		
X30B	FP STECKERL.ABGEW.36-POL. ANGLE PIN CONNECTOR	FP 087.9105	BINDER	742-5-11-0191-00-36		
X4A	FP KURZSCHLUSSBUCHSE SHORTING PLUG NUR VAR/ONLY MOD: 04	FP 491.7042	PK	452-70302		
- ENDE -						
ROHDE & SCHWARZ		AI	Datum Date	Schaltteilliste für Parts list for	Sachnummer Stock Nr	Blatt Page
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ZU A163 VERDOPPLER
TO A163 FREQUENCY DOUBLER



STROMLAUF GILT FUER VAR.02, VAR04
CIRCUIT DIAGRAM IS VALID FOR MOD.02, MOD.04

ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDLUNG.
ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

A	39848	10.88	SP	1KGU	TAG	NAM	BENENNUNG
B	41826	10.89	Ho	BEARB.		MK	ANSTEUERUNG CONTROL/MODUL
				GEPR.		MK	
				NORM			
				PLOTT	26.10.88	*	
REND. IND.	BEREICHUNG-NITTEILUNG	DATUM	NAM				ZEICHN.-NR. 836.2269.015
				ZU GERÄT	SMGU	RES. I. V.	819.0010
						ERSTE Z.	

BLATT-NR.
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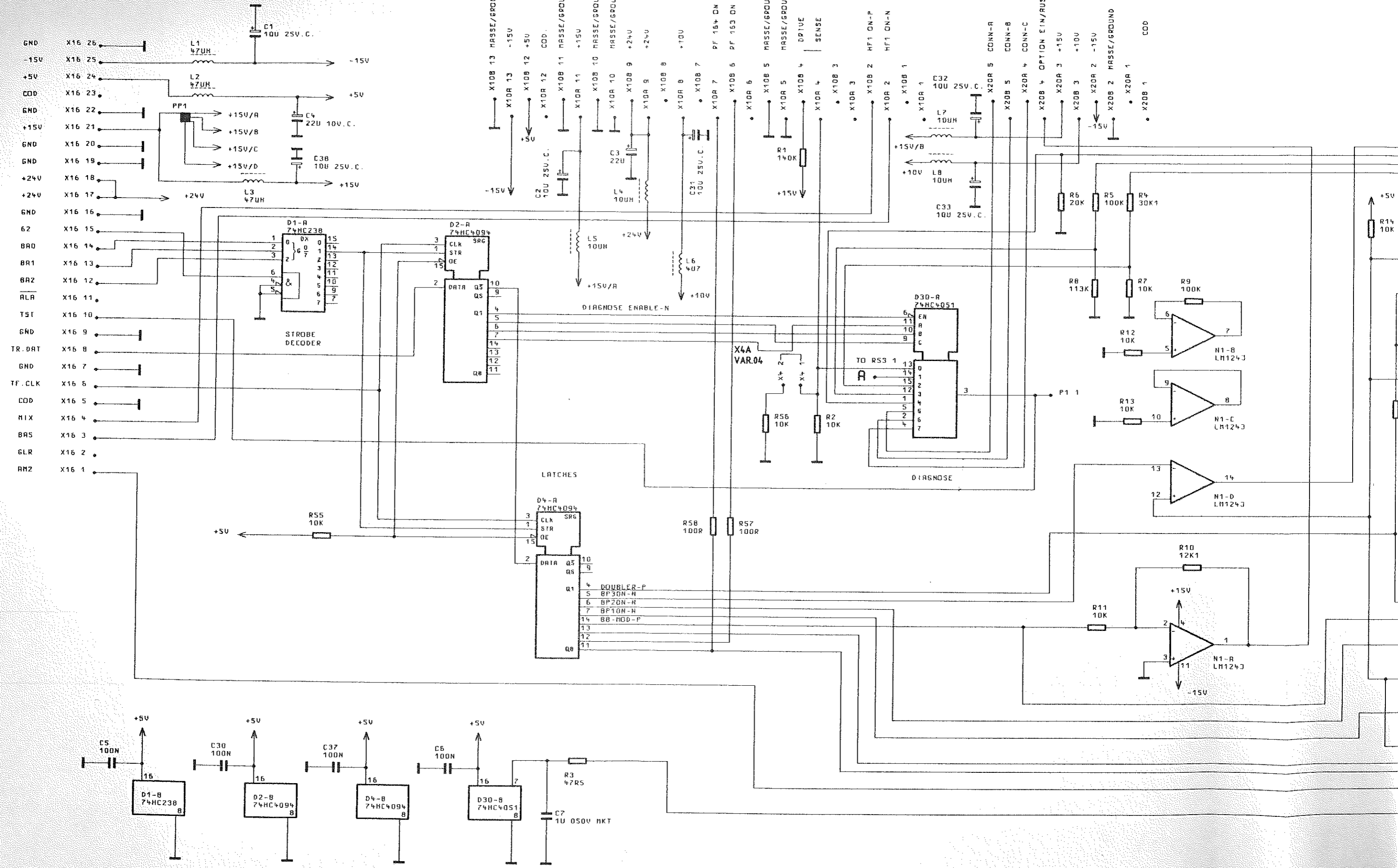
ZU A161/A162 VERSTAEKER 2GHZ/4GHZ

ZU A15 UMSETZER (OPTION)

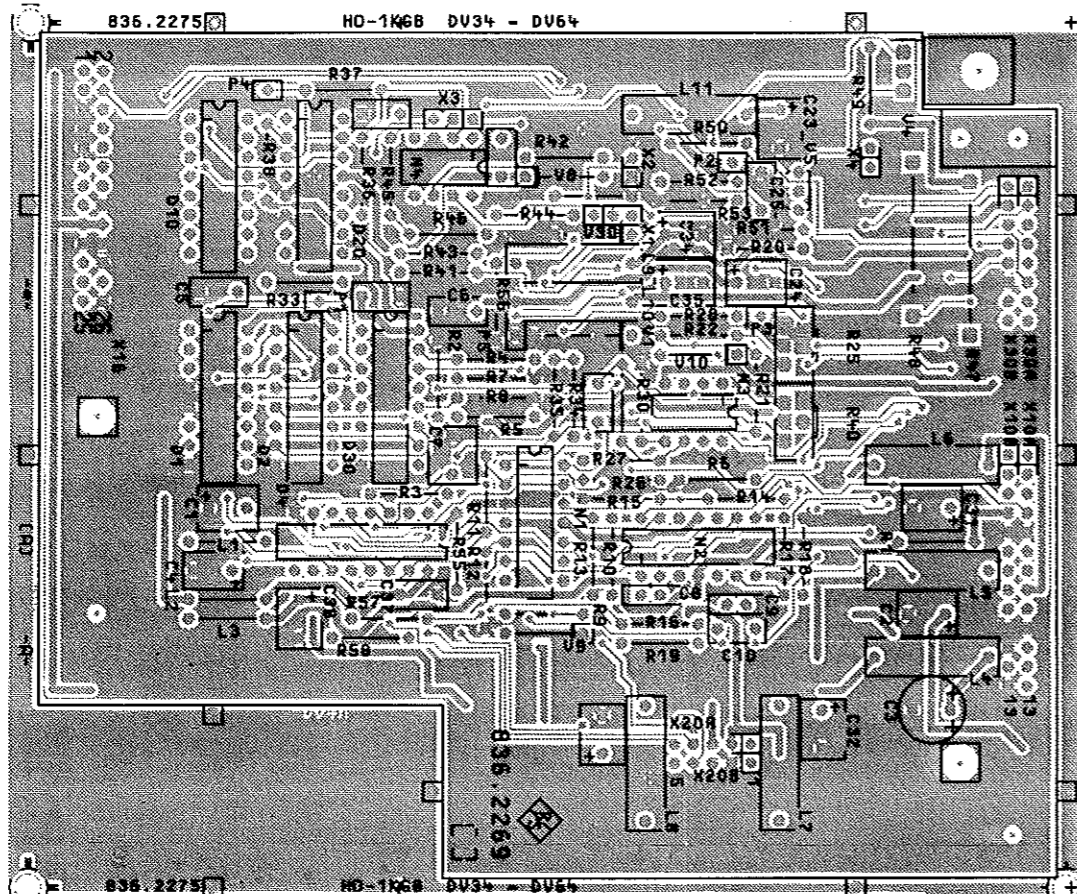
TO A161/A162 AMPLIFIER 2GHZ/4GHZ

TO A15 DOWN CONVERTER (OPTION)

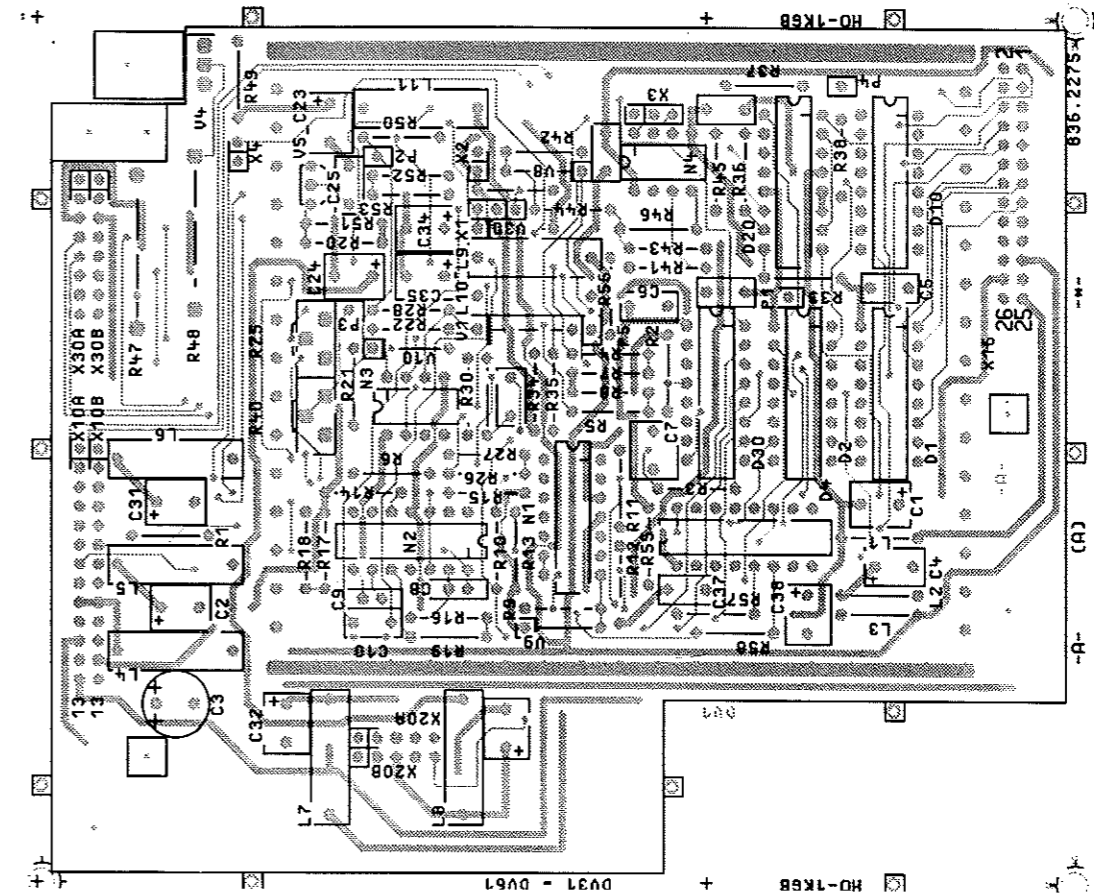
FROM A2 MOTHERBOARD



Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



Ansicht und Leitungsführung Lötseite
View of tracks on solder side

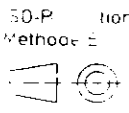


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ACHTUNG: EGB!
Elektrostatisch gefährdete Bauelemente erfordern eine besondere Handhabung.
ATTENTION ESD!
Electrostatic sensitive devices require a special handling.

Maße ohne Toleranzangabe		Maßstab 1 : 1	
		Halbzeug, Werkstoff	
1KGU	Tag	Name	Benennung
Bearb.	08.88		ANSTEUERUNG
Gepr.			
Norm			
		Zeichn.-Nr.	Blatt-Nr.
		836.2269	2
And. Zust.	Anderungs-Mitteilung	Tag	Name
zu Gerät		reg. i V	erste Z
SMGU			





ROHDE & SCHWARZ

SERVICE DOCUMENTS

Precision Attenuator

835.8234.02



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5.1.2	Setting the Precision Attenuator
5.2	Testing and Adjustment 5.3
5.2.1	RF Test and Testing of Control Circuit
5.2.2	Testing and Adjustment of Overvoltage Protection
5.3	Troubleshooting 5.3
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5.3.2	Setting Pulse for Attenuator Elements
5.3.3	Control Pulse for Overvoltage Protection
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Circuit diagrams
Parts lists
Components plans



5 Service Manual "Precision Attenuator"

5.1 Function Description

(See circuit diagram 819.1016 S, Fig. 5-1 and complete function diagram of the instrument)

5.1.1 Precision Attenuator with Integrated Overvoltage Protection

The precision attenuator is connected between the output amplifier and the instrument output. It can be used to attenuate the signal by 137.5 dB in steps of 2.5 dB. Smaller level steps can be set using the electronic level control. The precision attenuation has seven elements with values of 2.5, 5, 10, 2*20 and 2*40 dB, an overvoltage protection assembly and a 50-Ω terminator. Each element can be selected or bypassed using a contact group consisting of three contacts. Each of these contact groups is activated by a rocker which is driven by an electromagnet and held by a permanent magnet.

Behind the attenuators on the attenuator board in the direction of the instrument output (see Fig. 5-1) are the overvoltage protection assembly and then the RF OFF switch. The RF OFF switch is opened directly in the event of an overvoltage. It can also be triggered by the controller using a special function (cf. 5.1.2 c), Control of diagnostics). This must not be confused with the function LEV RF OFF which does not activate the RF OFF switch but switches the precision attenuator to full attenuation.

The overvoltage protection assembly protects the attenuators and the output amplifier from high RF and DC voltages applied to the output connector X181. In addition, the detector integrated in the overvoltage protection assembly can carry out diagnostics of the attenuator elements with the associated contact groups. This diagnostics facility can be called using a special function.

5.1.2 Setting the Precision Attenuator

a) Setting the attenuator elements

The attenuator setting is selected by means of serial data transmission. The control bits are shifted via the data line (X18-5 TR-DAT) by the clock (X18-3 TF-CLK) into the shift register D110 on the control circuit 819.1016. A strobe signal is decoded in D100 by applying the module address to inputs BA2, BA1, BA0 (X18-8,9,10) and activation of the group line G2(X18-11). The outputs of the shift register are set by the strobe of D100 and the required attenuation is set. The electromagnets for the contact groups are controlled via the power gates D121 to D124.

b) Control of overvoltage protection

An overvoltage applied to the output connector is detected by a peak-value detector on the overvoltage protection assembly. A comparator N110 is triggered and sets the flip-flop D120 which directly activates the RF OFF switch via V117 and D124. During the response time of the RF OFF switch, the PIN diodes on the overvoltage protection assembly short-circuit the overvoltage. A high direct current is applied to the PIN diodes by the two monostables V111 and V113. The controller is informed of the overload via the interrupt line INT.ATT (X18-1). This interrupt is reset if the RF OFF switch is activated by the controller. The RF OFF switch can be closed again manually using the level on key combination.

c) Control of diagnostics

In the case of diagnostics, the RF OFF switch at the output of the precision attenuator is opened and a 50-Ω termination selected (cf. Figs. 5-1 and 5-2). The diodes on the overvoltage protection assembly are driven as peak-value detectors via N100. The rectified voltage is then available on the diagnostics line TST (X18-7). The attenuator elements with the associated contact groups can thus be checked.

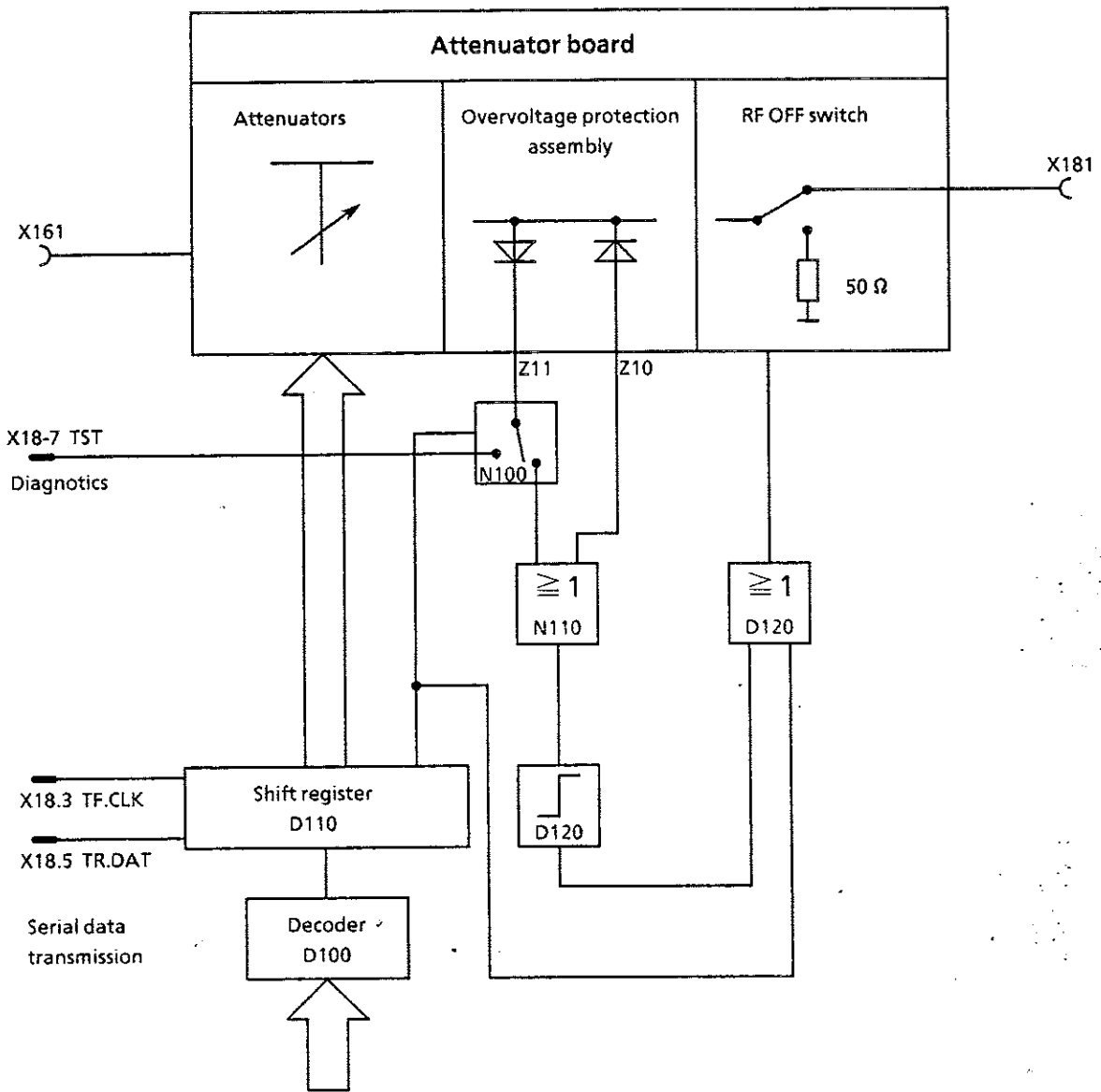


Fig. 5-1 Block diagram "Precision attenuator"

5.2 Testing and Adjustment

Adjustments must be carried out on the instrument after every change or modification on the subassembly (cf. 4.3).

5.2.1 RF Test and Testing of Control Circuit

- Connect network analyzer to X161 and X181.
- Set 13 dBm on the instrument.
- Check VSWR and loss.

In the frequency range up to 2200 MHz, the VSWR must not exceed a value of 1.5 and the loss 1.5 dB. In the range from 2200 to 4320 MHz, the VSWR must not exceed a value of 2 and the loss 3 dB.

Also refer to Section 3.2.12 for testing the attenuator elements and the control circuit.

5.2.2 Testing and Adjustment of Overvoltage Protection

a) Static test of overvoltage protection assembly

- Disconnect plug X41 from precision attenuator setting circuit.
- Set output level to -122 dBm.
- Using an ohmmeter (range up to 2 M Ω), check the diodes on the overvoltage protection assembly in the forward and reverse directions. The resistance must be infinite in the reverse direction. The measurement must be made between the output connector X181 and the loop-through filters Z10 and Z11.

b) Adjustment of overvoltage protection with AC voltage

- Set output level to -122 dBm.
- Feed in a signal with a level of 27 dBm at 25 MHz into the output connector X181 (e.g. using an SMLU).
- Adjust potentiometer R110 so that the RF OFF switch just responds.

c) Testing the overvoltage protection for DC voltages

- Manually close the RF OFF switch again using the LEVEL ON key combination.
- Apply ± 15 V to the output connector of the instrument via a 50- Ω resistor. The RF OFF switch must open for both positive and negative voltages (overload indication in display).

5.3 Troubleshooting

5.3.1 Control Code

If a desired output level cannot be set on the instrument, check the correct control code for each attenuator element on shift register D110 (see Fig. 5-2).

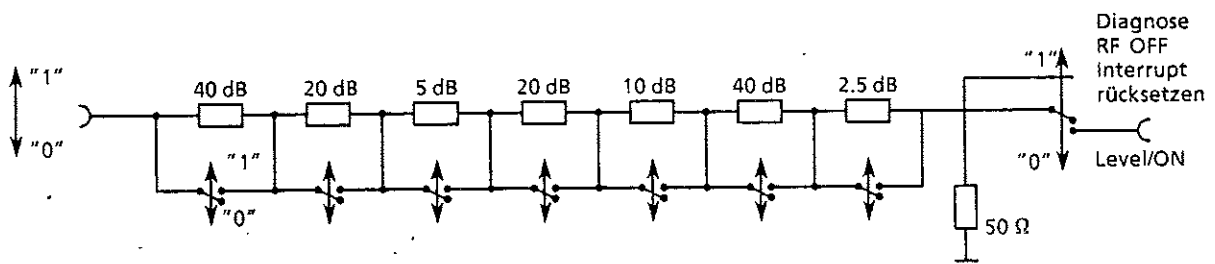
5.3.2 Setting Pulse for Attenuator Elements

If the pulse observed at the electromagnets D121 to D124 is not the same as the pulse shown in Fig. 5-3, there is an attenuation error in the control circuit and not in the attenuators and the associated contact groups.

5.3.3 Control Pulse for Overvoltage Protection

- Disconnect plug X41 and thus isolate the connection between the precision attenuator control circuit and the loop-through filters Z10 and Z11.
- Switch on special function 197 (test point "Precision attenuator"). The waveforms shown in Fig. 5-4 can then be measured at plug X141.

Level setting	Control code on shift register D110 (74 HC 4094)							
	Pin 4 Q ₁	Pin 5 Q ₂	Pin 6 Q ₃	Pin 7 Q ₄	Pin 14 Q ₅	Pin 13 Q ₆	Pin 12 Q ₇	Pin 11, 9 Q _{8, Q₉}
13 dBm	1	1	1	1	1	1	1	0
10.5 dBm	1	1	1	1	1	1	0	0
8 dBm	1	1	0	1	1	1	1	0
3 dBm	1	1	1	1	0	1	1	0
-7 dBm	1	1	1	0	1	1	1	0
-27 dBm	1	1	1	1	1	0	1	0
-67 dBm	0	1	1	1	1	0	1	0
-107 dBm	0	0	1	0	1	0	1	0
-124.5 dBm	0	0	0	0	0	0	0	0



"1" ≙ 5 V; "0" ≙ 0 V

Fig. 5-2 Setting the precision attenuator

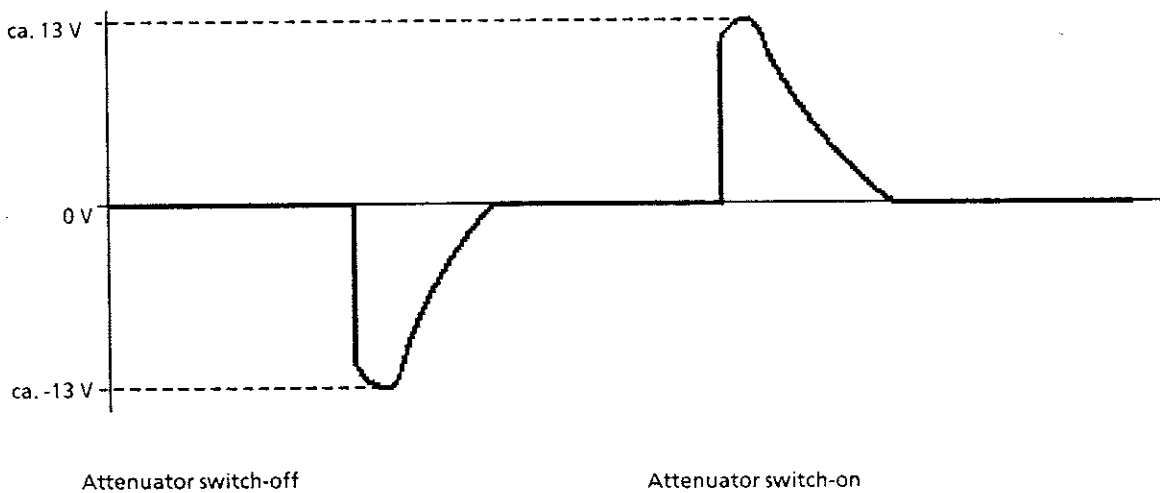
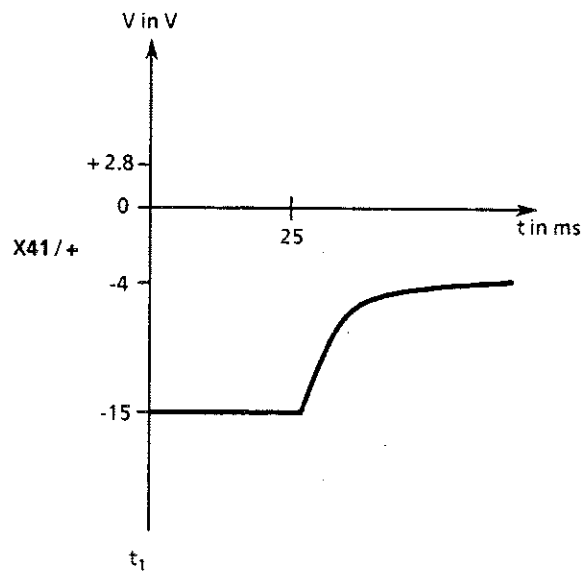
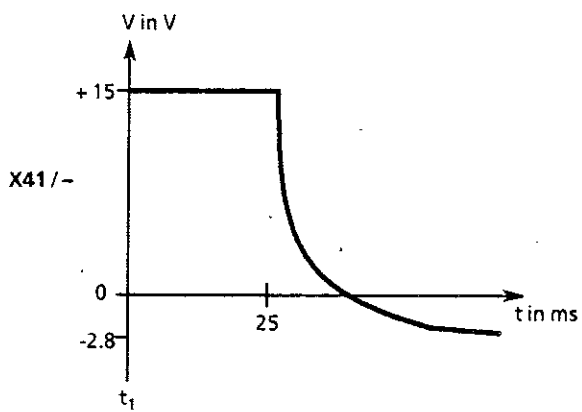


Fig. 5-3



t_1 = switch-on point of special function

Fig. 5-4 Ansteuerpuls des Überspannungsschutzes

5.4 Interfaces

Analog interfaces:

Designation	Function
X161	Connection of output amplifier
X181	Connection of instrument output
X18-7 TST	Diagnostics

Digital interfaces:

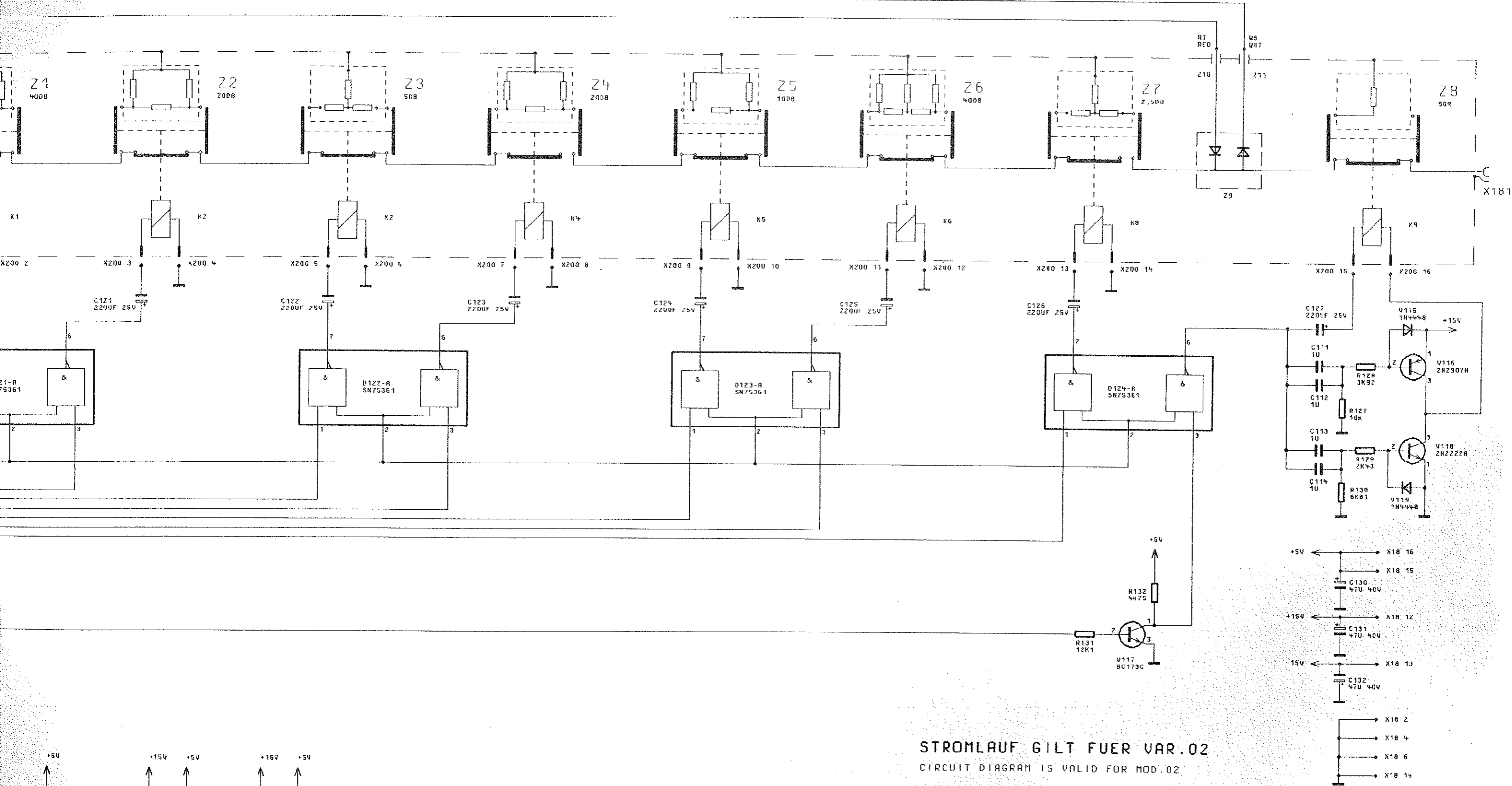
Designation	Function
X18-1 INT.ATT	Interrupt
X18-3 TF.CLK	Serial clock
X18-5 TR.DAT	Serial data
X18-8 BA2	Subassembly selection
X18-9 BA1	Subassembly selection
X18-10 BA0	Subassembly selection
X18-11 G2	Group line



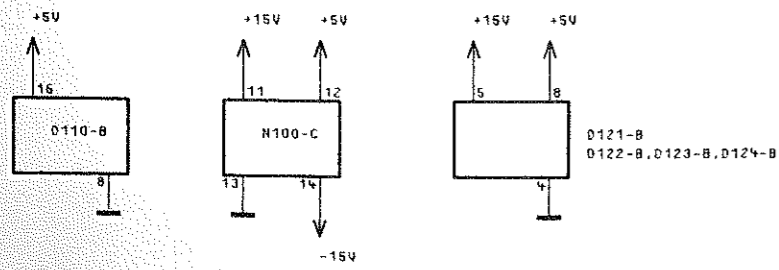


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Schalteillisten
Stromläufe
Bestückungspläne
Part lists
Circuit diagrams
Components plans
Listes des pièces détachées
Schémas de Circuit
Plans des composants



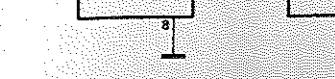
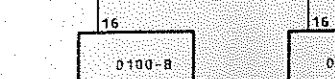
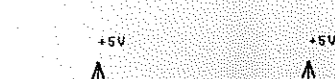
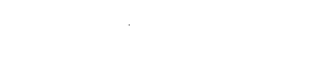
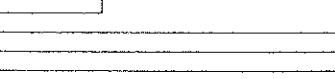
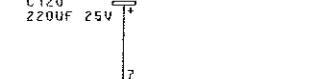
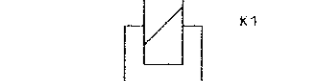
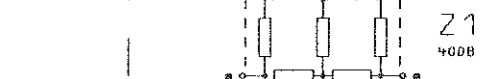
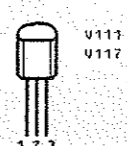
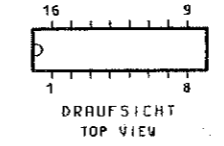
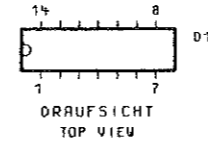
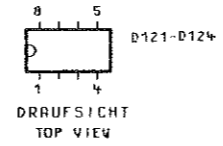
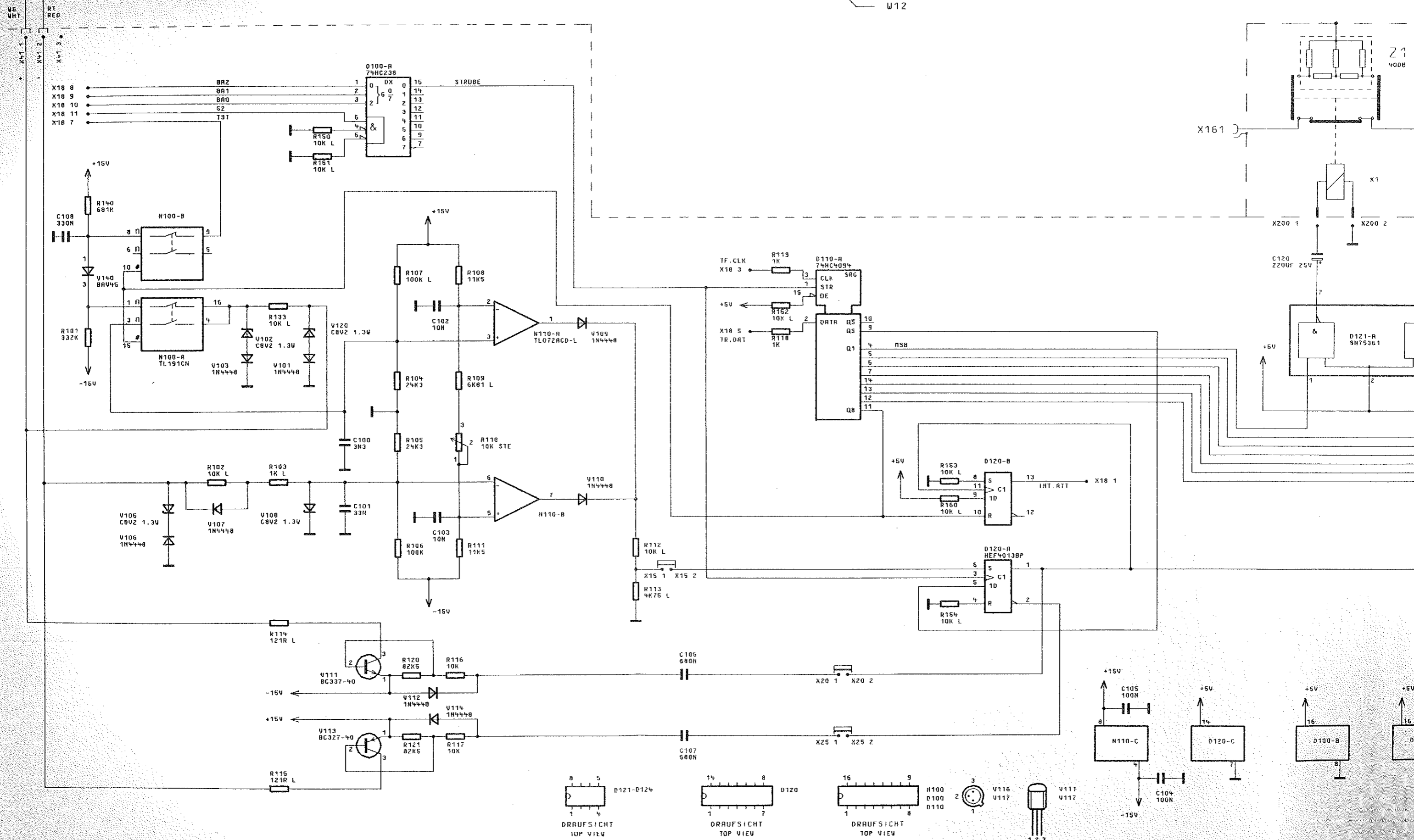
STROMLAUF GILT FUER VAR.02
CIRCUIT DIAGRAM IS VALID FOR MOD.02.



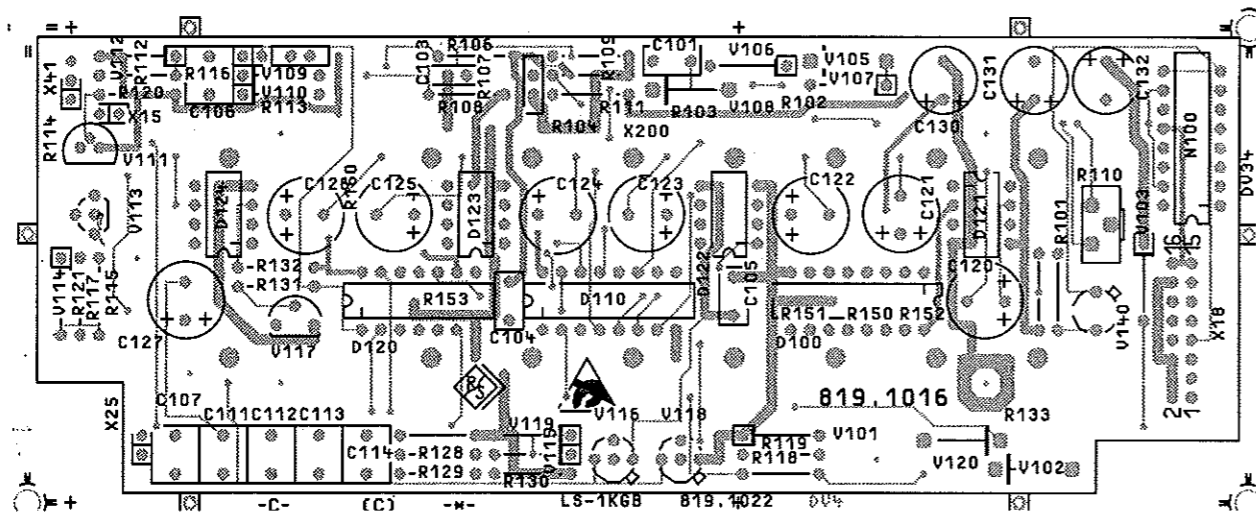
ACHTUNG: EGB!
ELEKTROSTATISCH GEFÄHRDETE
BAUELEMENTE ERFORDERN EINE
BESONDERE HANDHABUNG.

ATTENTION: ESD!
ELECTROSTATIC SENSITIVE
DEVICES REQUIRE A SPECIAL
HANDLING.

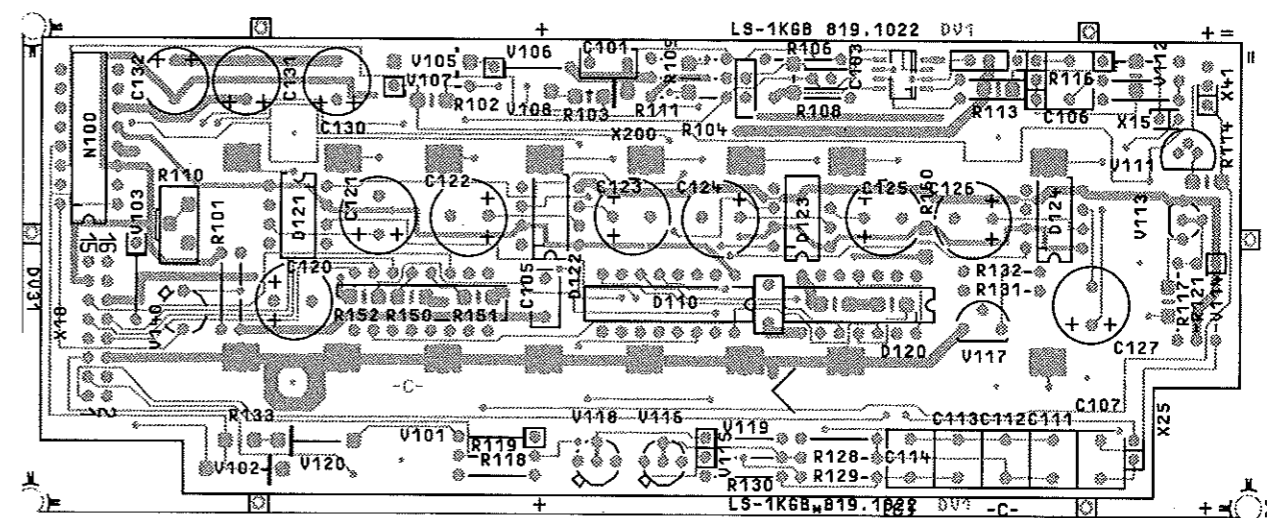
A	41825	7.89	LS	1KGB	TAG	NAME	BENENNUNG
				BEARB.		LS	EICHLLEITUNG RF-ATTENUATOR
				GEPR.		LS	
				NORM		*	
				PLOTT	13. 7.89		
REND. IND.	RENDERUNGS-MITTEILUNG	DATUM	NAME	 ROHDE & SCHWARZ ZU GERÄT SMGU		ZEICHN.-NR.	
						819.1016.015	
				REG. I. V.	819.0010	ERSTE Z.	1



Ansicht und Leitungsführung Bauteilseite
View of tracks on component side



Ansicht und Leitungsführung Lötseite
View of tracks on solder side



Für diese Unterlage behalten wir uns alle Rechte vor.



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

				Maße ohne Toleranzangabe		Maßstab 1 : 1	
						Halbzeug, Werkstoff	
				1KGB	Tag	Name	Benennung EICHLITUNG RF-ATTENUATOR
				Bearb.	09.88	LS	
				Gepr.			
				Norm			
						Zeichn.-Nr. 819.1016	
						Blatt-Nr. 2	
Änd. Zust.	Änderungs-Mitteilung	Tag	Name	zu Gerät SMGU		reg. i. V. 819.0010 V	erste Z.

ISO-Projektion Methode E