

**VU/PPM LED Level Meter Modules**

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Diagrams	PCB No.	Diagram	Component Layout	Parts List
VU/PPM 30 LED with GRM	1.913.293.00	1.913.293.00	1.913.293.00	1.913.293.00
VU/PPM 30 LED	1.913.294.00			1.913.294.00
LED PPM Meter (10 LED)	1.913.291.00	1.913.291.00	1.913.291.00	1.913.291.00

**Scope of Validity**

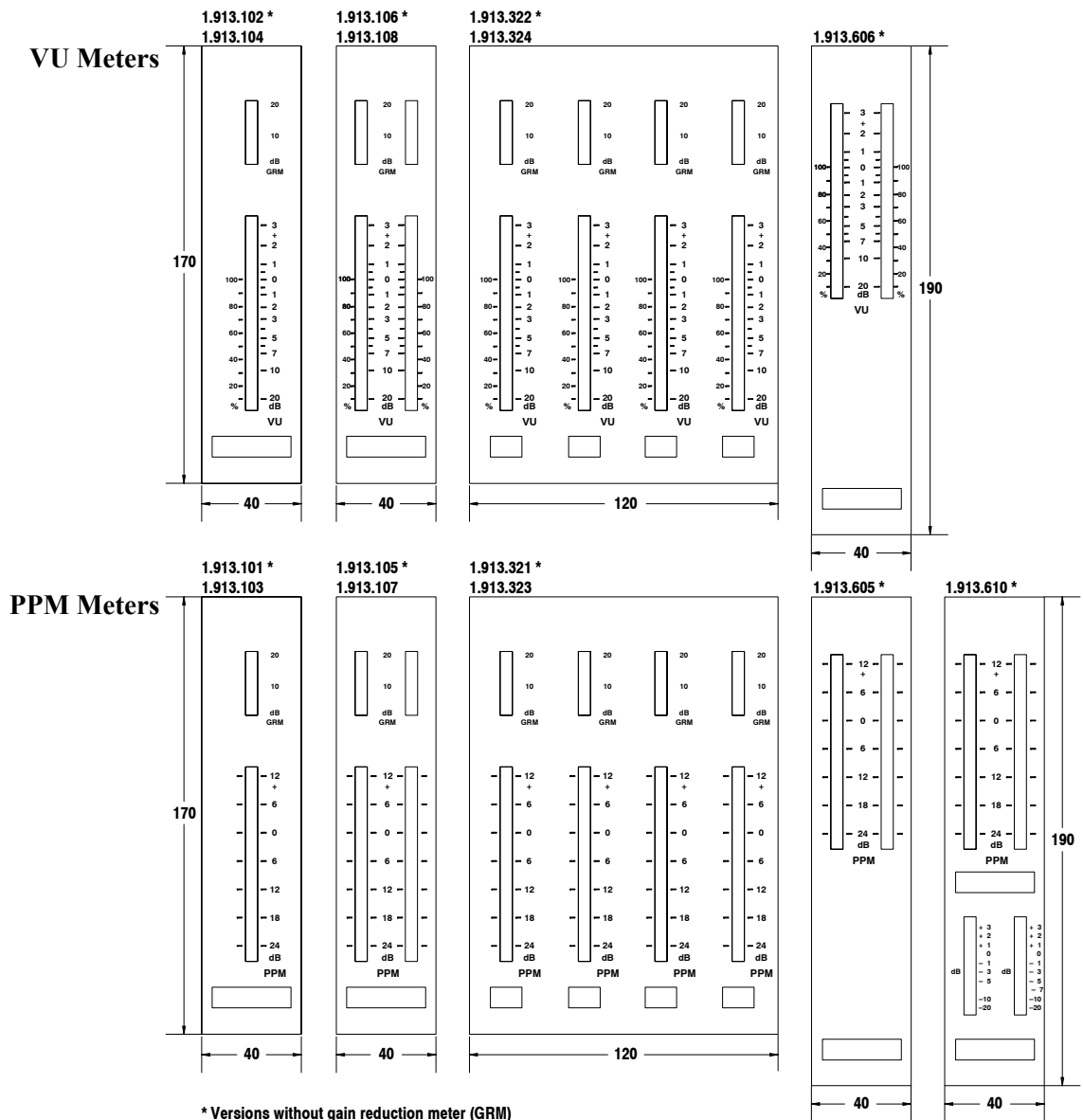
These instructions apply to the following assemblies:

Display	1 Channel, dark front panel	2 Channels, dark front panel	2 Channels, bright front panel	4 Channels, dark front panel	PCB No.
PPM	1.913.101	1.913.105	1.913.605	1.913.321	1.913.294
VU	1.913.102	1.913.106	1.913.606	1.913.322	1.913.294
PPM w. GRM	1.913.103	1.913.107	-	1.913.323	1.913.293
VU w. GRM	1.913.104	1.913.108	-	1.913.324	1.913.293
PPM w. additional small level meter	-	-	1.913.610	-	1.913.294, 1.913.291

**1 General**

The Level Meter units with 30 LEDs have been developed for installation in the display panel of Studer Mixing Consoles. Instruments with VU (volume unit) and PPM (peak program meter) characteristics, with or without gain reduction meter (GRM) are available. Instead of bar-graph indication, also dot indication is optionally available.

The instruments listed below are equipped with the PCBs 1.913.294 (VU or PPM) or 1.913.293 (VU or PPM with gain reduction meter) according to the table above. Please consult the circuit diagram relating to the corresponding assembly number.



**2 Functional Description**

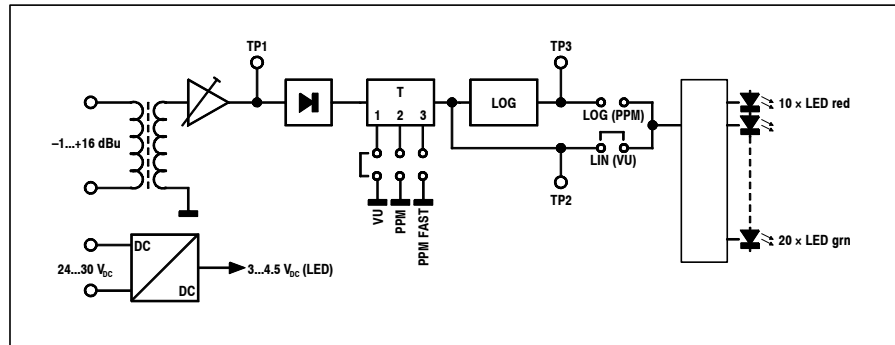
- PPM:** The peak program meter is a quasi-peak value instrument with long decay time. When a signal voltage corresponding to a level of 0 dB is applied for 10 ms, the resulting indication is -1 dB. Decay time (0 to -20 dB) is 1.7 s.
- VU Meter:** The VU meter indicates signals according to the standard defined by ANSI 1954. When a signal with a duration of 300 ms is applied, the indication is 99% of the reference value. Rise and decay times on a VU meter are identical. The factory-set lead is +6 dB.
- Gain Reduction Meter:** When the limiter/compressor is switched on, the GRM indicates the magnitude of the gain reduction.
- Small PPM:** The assembly 1.913.610 contains an additional small PPM meter with 10 LEDs, normally used for AUX level indication.
- Bar/Dot Display Selection:** On each of the PCBs, selection of bar or dot display mode is provided. All level meters are factory-set to bar display mode; dot display mode is unusual and recommended only if extra-low current consumption is required.

PCB No.	Bar Display Mode (Default Factory Setting)	Dot Display Mode
1.913.293.00 (VU/PPM 30 LED w. GRM)	insert: R3, R8, R10, R15 remove: R4, R9, R11, R14	insert: R4, R9, R11, R14 remove: R3, R8, R10, R15
1.913.294.00 (VU/PPM 30 LED)	insert: R3, R8, R10 remove: R4, R9, R11	insert: R4, R9, R11 remove: R3, R8, R10
1.913.291.00 (PPM 10 LED)	insert jumper JS201	remove jumper JS201

**3 Technical Specifications**

General:	0 dBu $\pm$ 0.775 V <sub>rms</sub>			
	<b>Sensitivity for reference indication</b>	-1 dBu ... +16 dBu		
<b>Input impedance</b>	>10 k $\Omega$			
<b>Supply</b>		$\pm$ 15 V <sub>DC</sub>	+24 V <sub>DC</sub>	
<b>Current consumption without GRM (p. ch., bar display mode)</b>	Quiescent:	45 mA	35 mA	
	Full load:	80 mA	80 mA	
<b>Current consumption with GRM (p. ch., bar display mode)</b>	Quiescent:	55 mA	45 mA	
	Full load:	105 mA	105 mA	
<b>VU Meter (1.913.293):</b>	<b>Indication range</b>	-20 VU ... +3 VU		
	<b>Accuracy (conditions: -10...+3 VU, 0...+50° C, 31.5 Hz...16 kHz)</b>	$\pm$ 1 segment		
	<b>Response time to -1 VU</b>	207 ms $\pm$ 30 ms		
<b>PPM (1.913.293):</b>	<b>Indication range</b>	-30 dBu ... +15 dBu		
	<b>Accuracy (conditions: -30...+15 VU, 0...+50° C, 31.5 Hz...16 kHz)</b>	$\pm$ 1 segment		
	<b>Dynamic behavior</b>			
	Jumper "normal" 0 dB, 10 ms burst	Indication:	-1 dB $\pm$ 0.5 dB	
	0 dB, 3 ms burst	Indication:	-4 dB $\pm$ 1 dB	
	Jumper "fast" 0 dB, 100 $\mu$ s burst	Indication:	-1 dB	
<b>Decay time: 0...-20 dB</b>	1.7 s $\pm$ 0.3 s			
<b>GRM (1.913.294):</b>	<b>Input voltage range</b>	min. control: 0 V ... +2 V <sub>DC</sub>		
		max. control: 0 V ... +11 V <sub>DC</sub>		
<b>Dimensions:</b>	1- and 2-channel units, dark front panel (w $\times$ h $\times$ d)		40 $\times$ 170 $\times$ 97 mm	
	2-channel units, bright front panel (w $\times$ h $\times$ d)		40 $\times$ 190 $\times$ 97 mm	
	4-channel units, dark front panel (w $\times$ h $\times$ d)		120 $\times$ 170 $\times$ 97 mm	

## 4 VU/PPM Meter Block Diagram



**VU/PPM meter block diagram:** VU/PPM/PPM FAST and LIN/LOG settings are established with jumpers J2 and J3, respectively.

## 5 Alignment

**Required Instruments:** AC voltmeter,  $R_i \geq 20 \text{ k}\Omega$   
 DC voltmeter,  $R_i \geq 100 \text{ k}\Omega$   
 AF generator, 31.5 Hz ... 16 kHz, 0...16 dBu; attenuator with 10 dB increments.

**DC/DC Converter Check:** Connect DC voltmeter to TP5 (hot) and TP4 (ground). Feed generator output signal with line level (-1...+16 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9); all green LEDs are on.  
 DC voltmeter reading should be:  
 $3.1 \pm 0.1 \text{ V}_{\text{DC}}$  (supply: +24  $\text{V}_{\text{DC}}$ ),  
 $4.1 \pm 0.1 \text{ V}_{\text{DC}}$  (supply: +30  $\text{V}_{\text{DC}}$ ).

**Input Range:** Feed generator output signal with line level (1 kHz, -1...+16 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9).  
 Connect AC voltmeter to test points TP1 (hot) and TP4 (ground). Reading must be adjustable with RA3 to  $290 \pm 10 \text{ mV}_{\text{AC}}$  for the complete input level range.

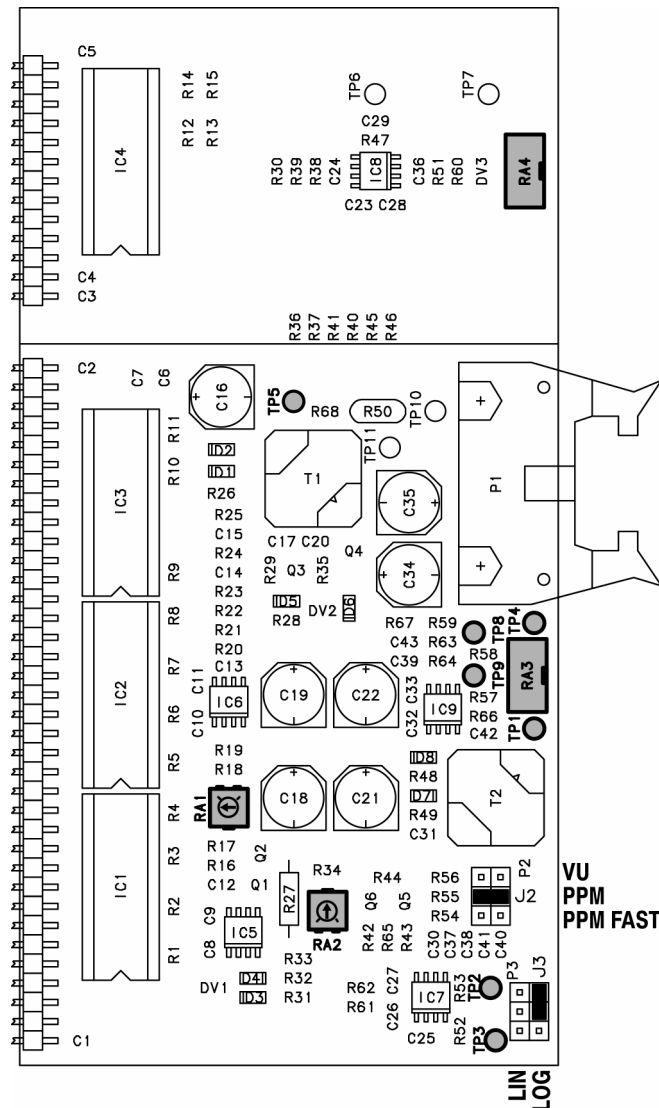
**Line Level:** Feed generator output signal with your line level (1 kHz, range: -1...+16 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9).  
 Adjust RA3 until all green LEDs are on. The red LEDs must be dark.  
 (TP3:  $2.5 \pm 0.1 \text{ V}_{\text{DC}}$ ).

**Rectifier and Indication:** Set J2 to VU, J3 to LIN.  
 Feed generator output signal with your line level (1 kHz, usually 0 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9).  
 Connect AC voltmeter to test points TP1 (hot) and TP4 (ground). Adjust with RA3 to  $290 \pm 10 \text{ mV}_{\text{AC}}$ . All green LEDs must be on.  
 Connect DC voltmeter to test points TP2 (hot) and TP4 (ground); the meter should read  $-380 \pm 15 \text{ mV}_{\text{DC}}$ .  
 Connect DC voltmeter to test points TP3 (hot) and TP4 (ground); the meter should read  $+2.575 \pm 0.100 \text{ V}_{\text{DC}}$ . All green LEDs must be on.  
*Check:* Set generator output for a DC voltmeter reading of  $3.8 \pm 0.1 \text{ V}_{\text{DC}}$ . All LEDs must be on. Set generator output for a DC voltmeter reading of  $170 \pm 20 \text{ mV}_{\text{DC}}$ . Only the lowest LED must be on.

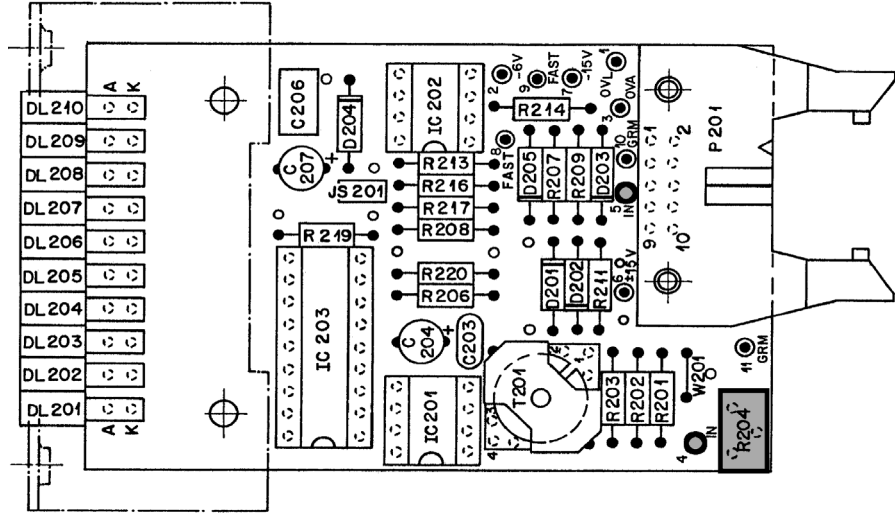
**Log Converter (PPM only):** Set J2 to PPM, J3 to LOG.  
 Feed generator output signal (1 kHz, +6 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9).  
 Connect DC voltmeter to test points TP2 (hot) and TP4 (ground). Adjust with RA3 to  $1.18 \pm 0.05 V_{DC}$ .  
 RA1 and RA2: Basic setting according to the arrows in the diagram below.  
 Procedure:

1. Upper value setting: Adjust with RA2 to  $3.06 \pm 0.10 V_{DC}$ . All green LEDs and four red LEDs must be on (+6 dB indication).
2. Set generator output to -24 dBu (i.e., attenuate the +6 dBu setting from above by 30 dB).
3. Lower value setting: Adjust with RA1 to  $560 \pm 20 mV_{DC}$ . Only the four lowest green LEDs must be on (-24 dB indication).
4. These two settings are interdependent, therefore repeat steps 1...3 several times.

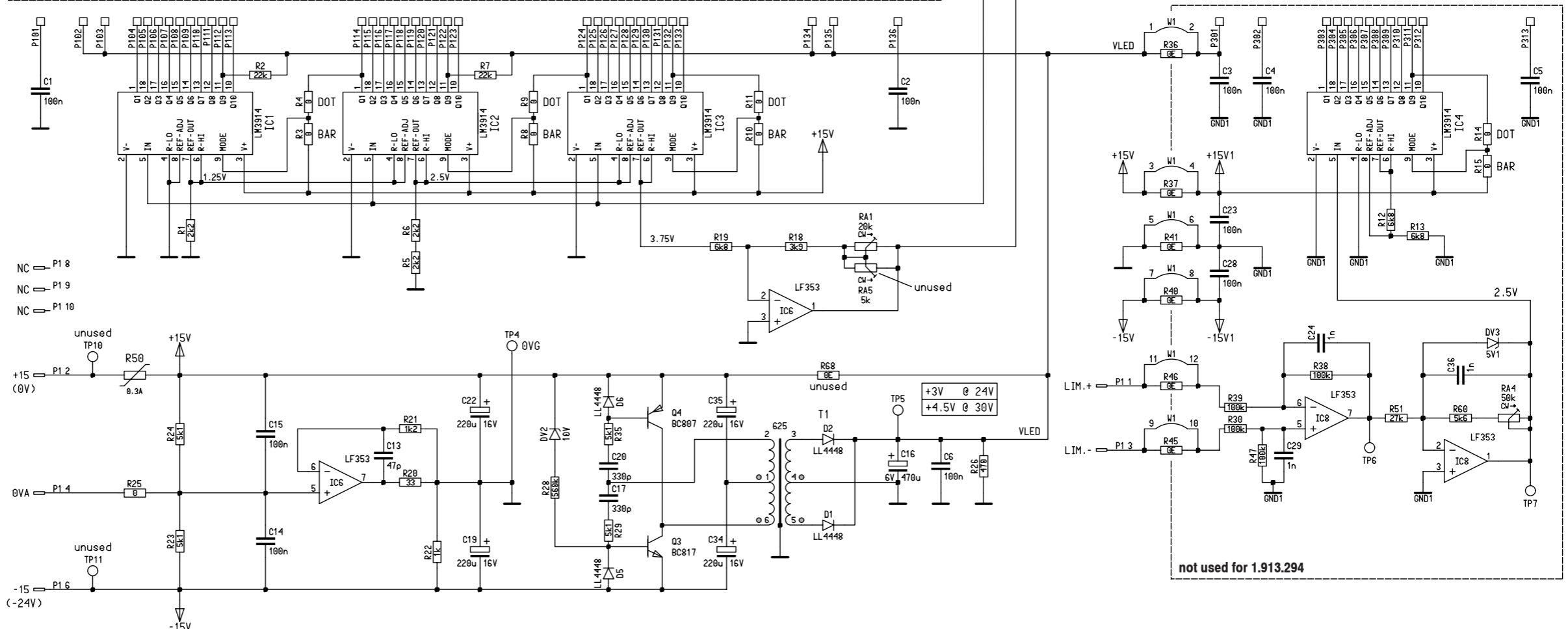
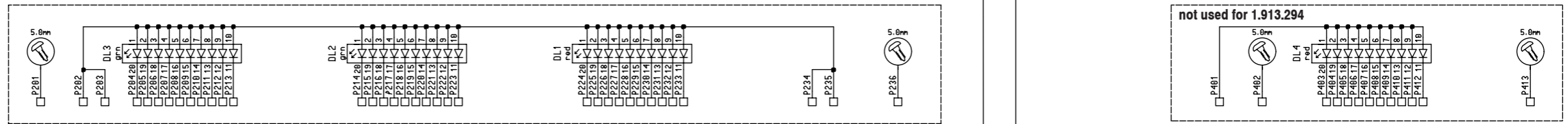
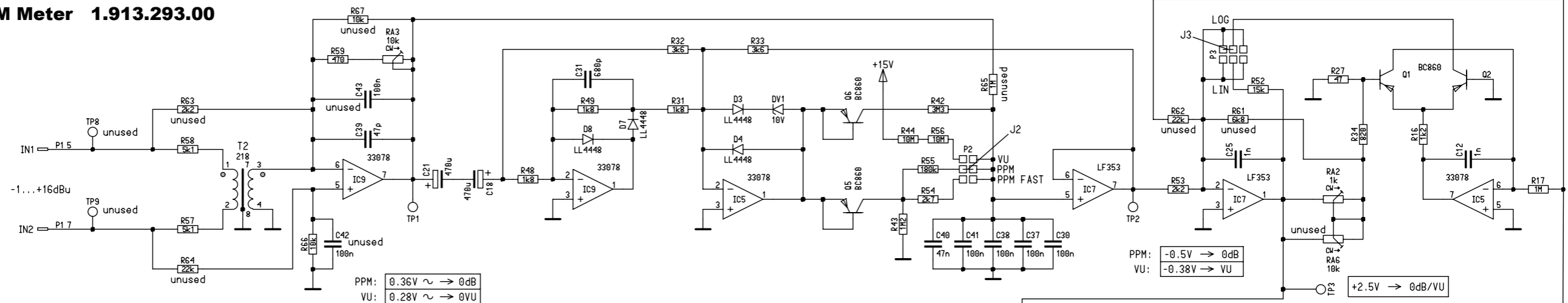
**GRM (if included):** Connect the Meter Unit to the console.  
 Feed a test signal via an input channel. Set the level on the master output to nominal level +20 dB.  
 Switch the limiter on.  
 Align with RA4 to a GRM indication of 20 dB.



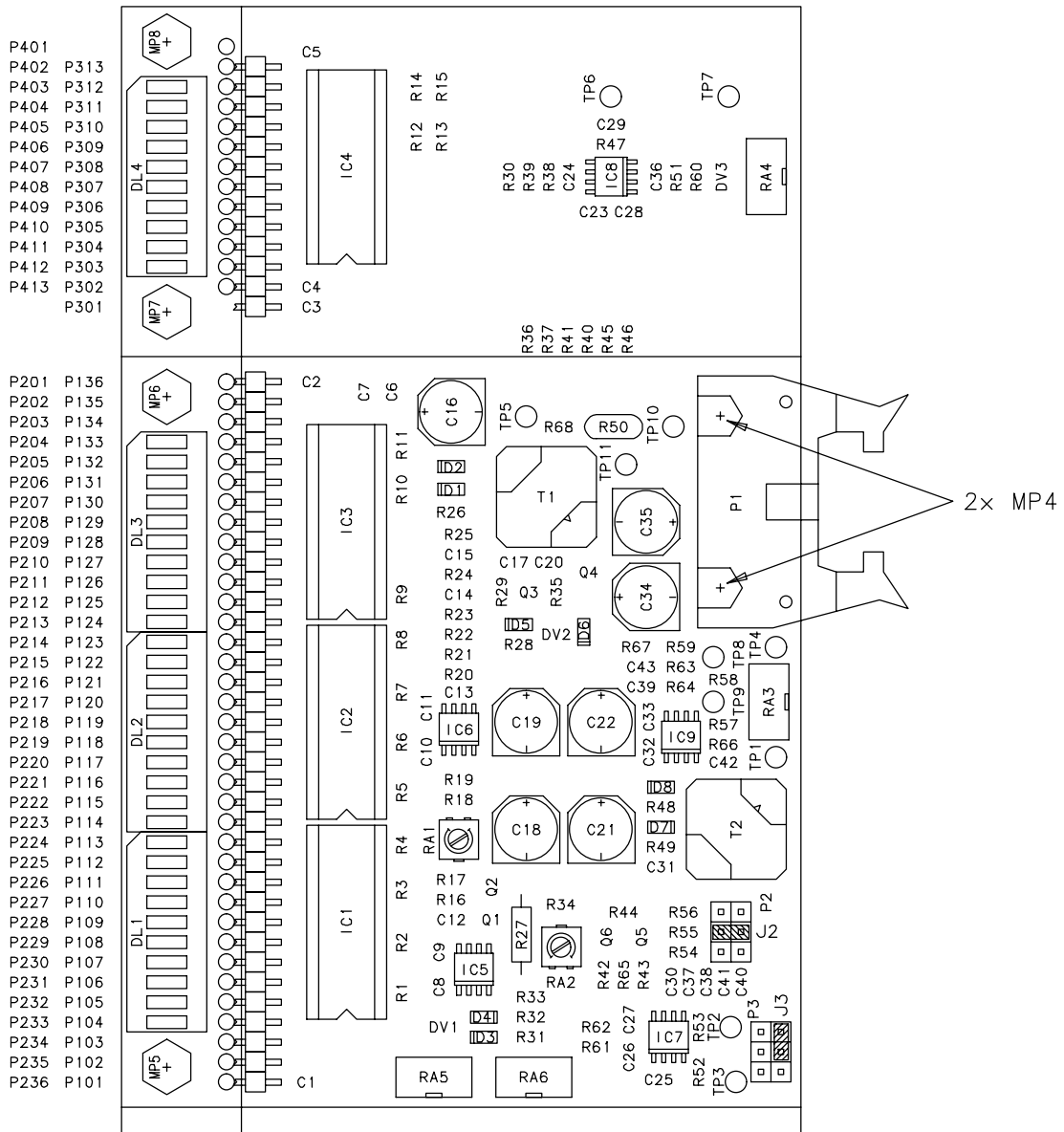
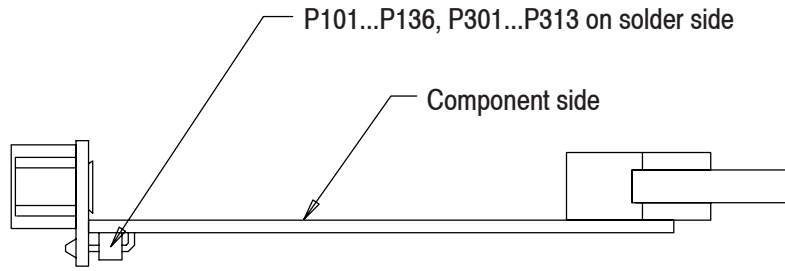
**Line Level for 1.913.291:** Feed generator output signal with your line level (1 kHz, range: +6...+15 dBu) to the input (pins 5 and 7 of P201, or TP5 and TP4). Adjust R204 until all green LEDs are on. The red LEDs must be dark.



VU/PPM/GRM Meter 1.913.293.00



**VU/PPM/GRM Meter 1.913.293.00**



Accompanying documents: Zugehörige Unterlagen: PL	General tolerance: Freimasstoleranz:	Scale: Maßstab: 1:1	Edition Ausgabe 29.10.2001	ZT	ML	HW	⊙
Substitute for: Ersatz fuer:			Date Datum	Visa Gez.	Checked Gepr.	Seen Ges.	Index
<b>STUDER</b> REGENSDORF	Description: Benennung: VU/PPM/GRM METER , ESE		Page: Seite: 1 / 1	Number: Number: 1.913.293.00			



**VU/PPM/GRM Meter 1.913.293.00 ( 4)**

Idx. Pos.	Part No.	Qty.	Type/Val.	Description	Idx. Pos.	Part No.	Qty.	Type/Val.	Description
0 C 1	59.60.3337	1	pce	100n	0 P 124	54.11.0125	1	pce	1p
0 C 2	59.60.3337	1	pce	100n	0 P 125	54.11.0125	1	pce	1p
0 C 3	59.60.3337	1	pce	100n	0 P 126	54.11.0125	1	pce	1p
0 C 4	59.60.3337	1	pce	100n	0 P 127	54.11.0125	1	pce	1p
0 C 5	59.60.3337	1	pce	100n	0 P 128	54.11.0125	1	pce	1p
0 C 6	59.60.3337	1	pce	100n	0 P 129	54.11.0125	1	pce	1p
0 C 7	59.60.3337	1	pce	100n	0 P 130	54.11.0125	1	pce	1p
0 C 8	59.60.3337	1	pce	100n	0 P 131	54.11.0125	1	pce	1p
0 C 9	59.60.3337	1	pce	100n	0 P 132	54.11.0125	1	pce	1p
0 C 10	59.60.3337	1	pce	100n	0 P 133	54.11.0125	1	pce	1p
0 C 11	59.60.3337	1	pce	100n	0 P 134	54.11.0125	1	pce	1p
0 C 12	59.60.2373	1	pce	1n0	0 P 135	54.11.0125	1	pce	1p
0 C 13	59.60.2241	1	pce	47p	0 P 136	54.11.0125	1	pce	1p
0 C 14	59.60.3337	1	pce	100n	0 P 301	54.11.0125	1	pce	1p
0 C 15	59.60.3337	1	pce	100n	0 P 302	54.11.0125	1	pce	1p
0 C 16	59.68.0033	1	pce	470u	0 P 303	54.11.0125	1	pce	1p
0 C 17	59.60.2361	1	pce	330p	0 P 304	54.11.0125	1	pce	1p
0 C 18	59.68.0033	1	pce	470u	0 P 305	54.11.0125	1	pce	1p
0 C 19	59.68.0073	1	pce	220u	0 P 306	54.11.0125	1	pce	1p
0 C 20	59.60.2361	1	pce	330p	0 P 307	54.11.0125	1	pce	1p
0 C 21	59.68.0033	1	pce	470u	0 P 308	54.11.0125	1	pce	1p
0 C 22	59.68.0073	1	pce	220u	0 P 309	54.11.0125	1	pce	1p
0 C 23	59.60.3337	1	pce	100n	0 P 310	54.11.0125	1	pce	1p
0 C 24	59.60.2373	1	pce	1n0	0 P 311	54.11.0125	1	pce	1p
0 C 25	59.60.2373	1	pce	1n0	0 P 312	54.11.0125	1	pce	1p
0 C 26	59.60.3337	1	pce	100n	0 P 313	54.11.0125	1	pce	1p
0 C 27	59.60.3337	1	pce	100n	0 Q 1	50.60.1002	1	pce	BC860C
0 C 28	59.60.3337	1	pce	100n	0 Q 2	50.60.1002	1	pce	BC860C
0 C 29	59.60.2373	1	pce	1n0	0 Q 3	50.60.0050	1	pce	BC817-25
0 C 30	59.60.3337	1	pce	100n	0 Q 4	50.60.1050	1	pce	BC807-25
0 C 31	59.60.2369	1	pce	680p	0 Q 5	50.60.1002	1	pce	BC860C
0 C 32	59.60.3337	1	pce	100n	0 Q 6	50.60.1002	1	pce	BC860C
0 C 33	59.60.3337	1	pce	100n	0 R 1	57.60.1222	1	pce	2k2
0 C 34	59.68.0073	1	pce	220u	0 R 2	57.60.1223	1	pce	22k
0 C 35	59.68.0073	1	pce	220u	0 R 3	57.60.1000	1	pce	0R0
0 C 36	59.60.2373	1	pce	1n0	0 R 4				not used 1 pce 0R0
0 C 37	59.60.3337	1	pce	100n	0 R 5	57.60.1222	1	pce	2k2
0 C 38	59.60.3337	1	pce	100n	0 R 6	57.60.1222	1	pce	2k2
0 C 39	59.60.2241	1	pce	47p	0 R 7	57.60.1223	1	pce	22k
0 C 40	59.60.3333	1	pce	47n	0 R 8	57.60.1000	1	pce	0R0
0 C 41	59.60.3337	1	pce	100n	0 R 9				not used 1 pce 0R0
0 D 1	50.60.8001	1	pce	4448	0 R 10	57.60.1000	1	pce	0R0
0 D 2	50.60.8001	1	pce	4448	0 R 11				not used 1 pce 0R0
0 D 3	50.60.8001	1	pce	4448	0 R 12	57.60.1682	1	pce	6k8
0 D 4	50.60.8001	1	pce	4448	0 R 13	57.60.1682	1	pce	6k8
0 D 5	50.60.8001	1	pce	4448	0 R 14				not used 1 pce 0R0
0 D 6	50.60.8001	1	pce	4448	0 R 15	57.60.1000	1	pce	0R0
0 D 7	50.60.8001	1	pce	4448	0 R 16	57.60.1122	1	pce	1k2
0 D 8	50.60.8001	1	pce	4448	0 R 17	57.60.1105	1	pce	1M0
0 DL 1	50.04.2150	1	pce	MV57164	0 R 18	57.60.1392	1	pce	3k9
0 DL 2	50.04.2161	1	pce	GRN	0 R 19	57.60.1682	1	pce	6k8
0 DL 3	50.04.2161	1	pce	GRN	0 R 20	57.60.1330	1	pce	33R
0 DL 4	50.04.2150	1	pce	MV57164	0 R 21	57.60.1122	1	pce	1k2
0 DV 1	50.60.9017	1	pce	10V	0 R 22	57.60.1102	1	pce	1k0
0 DV 2	50.60.9017	1	pce	10V	0 R 23	57.60.1512	1	pce	5k1
0 DV 3	50.60.9010	1	pce	5V1	0 R 24	57.60.1512	1	pce	5k1
4 DV 4	50.04.1112	1	pce	5V1	2 R 25				not used 1 pce 0R0
0 IC 1	50.11.0119	1	pce	LM3914	0 R 26	57.60.1471	1	pce	470R
0 IC 2	50.11.0119	1	pce	LM3914	0 R 27	57.99.0252	1	pce	47
0 IC 3	50.11.0119	1	pce	LM3914	0 R 28	57.60.1564	1	pce	560k
0 IC 4	50.11.0119	1	pce	LM3914	0 R 29	57.60.1512	1	pce	5k1
0 IC 5	50.61.0204	1	pce	MC33078	0 R 30	57.60.1104	1	pce	100k
0 IC 6	50.61.0207	1	pce	LF353	0 R 31	57.60.1182	1	pce	1k8
3 IC 7	50.61.0209	1	pce	LF412	0 R 32	57.60.1362	1	pce	3k6
0 IC 8	50.61.0207	1	pce	LF353	0 R 33	57.60.1362	1	pce	3k6
1 IC 9	50.61.0204	1	pce	MC33078	0 R 34	57.60.1821	1	pce	820R
0 J 2	54.01.0021	1	pce	Jumper	0 R 35	57.60.1512	1	pce	5k1
0 J 3	54.01.0021	1	pce	Jumper	0 R 36	57.60.1000	1	pce	0R0
0 MP 1	1.913.293.11	1	pce	VU/PPM/GRM METER PCB	0 R 37	57.60.1000	1	pce	0R0
0 MP 2	1.913.293.10	1	pce	NR-ETIKETTE 5 * 20	0 R 38	57.60.1104	1	pce	100k
0 MP 3	43.01.0108	1	pce	Label	0 R 39	57.60.1104	1	pce	100k
0 MP 4	28.99.0119	2	pce	ROHRNIETE D 2.5*0.15* 9	0 R 40	57.60.1000	1	pce	0R0
0 MP 5	1.010.057.22	1	pce	M3*7.4	0 R 41	57.60.1000	1	pce	0R0
0 MP 6	1.010.057.22	1	pce	M3*7.4	0 R 42	57.60.1335	1	pce	3M3
0 MP 7	1.010.057.22	1	pce	M3*7.4	0 R 43	57.60.1125	1	pce	1M2
0 MP 8	1.010.057.22	1	pce	M3*7.4	0 R 44	57.60.1106	1	pce	10M
4 MP 9	43.10.0113	1	pce	D	0 R 45	57.60.1000	1	pce	0R0
0 P 1	54.14.2011	1	pce	10p	0 R 46	57.60.1000	1	pce	0R0
0 P 2	54.11.0136	1	pce	2*3p	0 R 47	57.60.1104	1	pce	100k
0 P 3	54.11.0136	1	pce	2*3p	0 R 48	57.60.1182	1	pce	1k8
0 P 102	54.11.0125	1	pce	1p	0 R 49	57.60.1182	1	pce	1k8
0 P 103	54.11.0125	1	pce	1p	0 R 50	57.92.7012	1	pce	0.3A
0 P 104	54.11.0125	1	pce	1p	0 R 51	57.60.1273	1	pce	27k
0 P 105	54.11.0125	1	pce	1p	0 R 52	57.60.1153	1	pce	15k
0 P 106	54.11.0125	1	pce	1p	0 R 53	57.60.1222	1	pce	2k2
0 P 107	54.11.0125	1	pce	1p	0 R 54	57.60.1272	1	pce	2k7
0 P 108	54.11.0125	1	pce	1p	0 R 55	57.60.1184	1	pce	180k
0 P 109	54.11.0125	1	pce	1p	0 R 56	57.60.1106	1	pce	10M
0 P 110	54.11.0125	1	pce	1p	0 R 57	57.60.1512	1	pce	5k1
0 P 111	54.11.0125	1	pce	1p	0 R 58	57.60.1512	1	pce	5k1
0 P 112	54.11.0125	1	pce	1p	0 R 59	57.60.1471	1	pce	470R
0 P 113	54.11.0125	1	pce	1p	0 R 60	57.60.1562	1	pce	5k6
0 P 114	54.11.0125	1	pce	1p	0 R 66	57.60.1103	1	pce	10k
0 P 115	54.11.0125	1	pce	1p	0 RA 1	58.60.0121	1	pce	20k
0 P 116	54.11.0125	1	pce	1p	0 RA 2	58.60.0113	1	pce	1k0
0 P 117	54.11.0125	1	pce	1p	0 RA 3	58.01.9103	1	pce	10k
0 P 118	54.11.0125	1	pce	1p	0 RA 4	58.01.9503	1	pce	50k
0 P 119	54.11.0125	1	pce	1p	0 T 1	1.022.625.00	1	pce	
0 P 120	54.11.0125	1	pce	1p	0 T 2	1.022.218.00	1	pce	1 : 1
0 P 121	54.11.0125	1	pce	1p	0 TP 1	54.02.0471	1	pce	
0 P 122	54.11.0125	1	pce	1p	0 TP 2	54.02.0471	1	pce	
0 P 123	54.11.0125	1	pce	1p	0 TP 3	54.02.0471	1	pce	
					0 TP 4	54.02.0471	1	pce	

**VU/PPM/GRM Meter 1.913.293.00 ( 4)**

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Idx. Pos.	Part No.	Qty.	Type/Val.	Description
0	TP 5	54.02.0471	1 pce	Stift d 1.5 * 5.5 löf
0	TP 6	not used	1 pce	Stift d 1.5 * 5.5 löf
0	TP 7	not used	1 pce	Stift d 1.5 * 5.5 löf

Idx. Pos.	Part No.	Qty.	Type/Val.	Description
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End of List

**Comments:**

- (01) Offset-voltage of IC 9 LF 353 too large  
->replaced by MC
- (02) R25 not used
- (03) IC7 LF353 replaced by LF412
- (04) DV4 added

**VU/PPM Meter mod. 1.913.294.00 ( 3)**

Idx. Pos.	Part No.	Qty.	Type/Val.	Description
0 C 1	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 2	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 6	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 7	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 8	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 9	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 10	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 11	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 12	59.60.2373	1 pce	1n0	CER 50V, 5%, COG, 0805
0 C 13	59.60.2241	1 pce	47p	CER 50V, 5%, COG, 0603
0 C 14	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 15	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 16	59.68.0033	1 pce	470u	EL 6V, 8.0*10.7
0 C 17	59.60.2361	1 pce	330p	CER 50V, 5%, COG, 0805
0 C 18	59.68.0033	1 pce	470u	EL 6V, 8.0*10.7
0 C 19	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7
0 C 20	59.60.2361	1 pce	330p	CER 50V, 5%, COG, 0805
0 C 21	59.68.0033	1 pce	470u	EL 6V, 8.0*10.7
0 C 22	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7
0 C 25	59.60.2373	1 pce	1n0	CER 50V, 5%, COG, 0805
0 C 26	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 27	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 30	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 31	59.60.2369	1 pce	680p	CER 50V, 5%, COG, 0805
0 C 32	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 33	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 34	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7
0 C 35	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7
0 C 37	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 38	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 C 39	59.60.2241	1 pce	47p	CER 50V, 5%, COG, 0603
0 C 40	59.60.3333	1 pce	47n	CER 50V, 10%, X7R, 0805
0 C 41	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805
0 D 1	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0 D 2	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0 D 3	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0 D 4	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0 D 5	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0 D 6	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0 D 7	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0 D 8	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80
0 DL 1	50.04.2150	1 pce		10*LED-Bargraf rot diffus
0 DL 2	50.04.2161	1 pce		DLZ MV 54 164,LTA1000G 10*D GN
0 DL 3	50.04.2161	1 pce		DLZ MV 54 164,LTA1000G 10*D GN
0 DV 1	50.60.9017	1 pce	10V	5%, 0.2W, SOT 23
0 DV 2	50.60.9017	1 pce	10V	5%, 0.2W, SOT 23
3 DV 4	50.04.1112	1 pce	5V1	Zener, 5%, 0.5W, DO-35
0 IC 1	50.11.0119	1 pce		IC LM 3914 N,
0 IC 2	50.11.0119	1 pce		IC LM 3914 N,
0 IC 3	50.11.0119	1 pce		IC LM 3914 N,
0 IC 5	50.61.0204	1 pce		Dual Op-Amp low noise
0 IC 6	50.61.0207	1 pce		Dual Op-Amp JFET SO 8
0 IC 7	50.61.0207	1 pce		Dual Op-Amp JFET SO 8
1 IC 9	50.61.0204	1 pce		Dual Op-Amp low noise
0 J 2	54.01.0021	1 pce		Jumper
0 J 3	54.01.0021	1 pce		Jumper
0 MP 1	1.913.293.11	1 pce		VU/PPM/GRM METER PCB
0 MP 2	1.913.294.10	1 pce		NR-ETIKETTE 5 * 20
0 MP 3	43.01.0108	1 pce		ESE-Warnschild
0 MP 4	28.99.0119	2 pcs		ROHRNIETE D 2.5*0.15* 9
0 MP 5	1.010.057.22	1 pce	M3*7.4	Nietmutter sw 6
0 MP 6	1.010.057.22	1 pce	M3*7.4	Nietmutter sw 6
3 MP 7	43.10.0112	1 pce		C Revisions-Etikette 5mm h/blau
0 P 1	54.14.2011	1 pce	10p	Winkelstecker Au
0 P 2	54.11.0136	1 pce	2*3p	Pin 0.63*0.63, RM2.54
0 P 3	54.11.0136	1 pce	2*3p	Pin 0.63*0.63, RM2.54
0 P 101	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 102	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 103	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 104	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 105	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 106	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 107	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 108	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 109	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 110	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 111	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 112	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 113	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 114	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 115	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 116	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 117	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 118	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 119	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 120	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 121	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 122	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 123	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 124	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 125	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 126	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 127	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 128	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 129	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 130	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 131	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 132	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 133	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 134	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 135	54.11.0125	1 pce	1p	Pin, 1reihig, winkel
0 P 136	54.11.0125	1 pce	1p	Pin, 1reihig, winkel

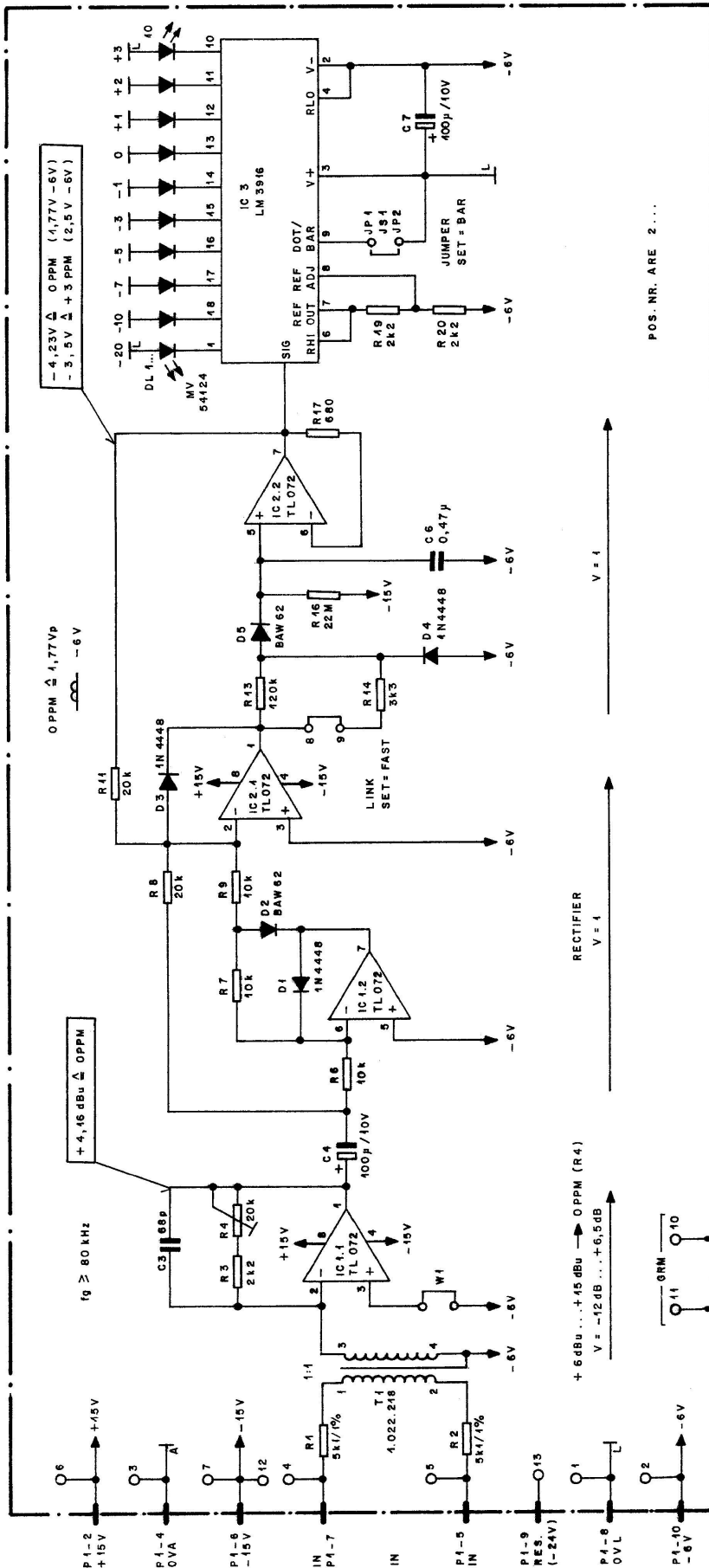
Idx. Pos.	Part No.	Qty.	Type/Val.	Description
0 Q 1	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0 Q 2	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0 Q 3	50.60.0050	1 pce	BC817-25	NPN 45V 800mA SOT 23
0 Q 4	50.60.1050	1 pce	BC807-25	PNP 45V 800mA SOT 23
0 Q 5	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0 Q 6	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0 R 1	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0 R 2	57.60.1223	1 pce	22k	MF, 1%, 0204, E24
0 R 3	57.60.1000	1 pce	0R0	MF, 0204
0 R 4		1 pce	not used	MF, 0204
0 R 5	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0 R 6	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0 R 7	57.60.1223	1 pce	22k	MF, 1%, 0204, E24
0 R 8	57.60.1000	1 pce	0R0	MF, 0204
0 R 9		1 pce	not used	MF, 0204
0 R 10	57.60.1000	1 pce	0R0	MF, 0204
0 R 11		1 pce	not used	MF, 0204
0 R 16	57.60.1122	1 pce	1k2	MF, 1%, 0204, E24
0 R 17	57.60.1105	1 pce	1M0	MF, 1%, 0204, E24
0 R 18	57.60.1392	1 pce	3k9	MF, 1%, 0204, E24
0 R 19	57.60.1682	1 pce	6k8	MF, 1%, 0204, E24
0 R 20	57.60.1330	1 pce	33R	MF, 1%, 0204, E24
0 R 21	57.60.1122	1 pce	1k2	MF, 1%, 0204, E24
0 R 22	57.60.1102	1 pce	1k0	MF, 1%, 0204, E24
0 R 23	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0 R 24	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
2 R 25		1 pce	not used	MF, 0204
0 R 26	57.60.1471	1 pce	470R	MF, 1%, 0204, E24
0 R 27	57.99.0252	1 pce	47	MF 10%, +4500ppm
0 R 28	57.60.1564	1 pce	560k	MF, 1%, 0204, E24
0 R 29	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0 R 31	57.60.1182	1 pce	1k8	MF, 1%, 0204, E24
0 R 32	57.60.1362	1 pce	3k6	MF, 1%, 0204, E24
0 R 33	57.60.1362	1 pce	3k6	MF, 1%, 0204, E24
0 R 34	57.60.1821	1 pce	820R	MF, 1%, 0204, E24
0 R 35	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0 R 42	57.60.1335	1 pce	3M3	MF, 1%, 0204, E24
0 R 43	57.60.1125	1 pce	1M2	MF, 1%, 0204, E24
0 R 44	57.60.1106	1 pce	10M	MF, 1%, 0204, E24
0 R 48	57.60.1182	1 pce	1k8	MF, 1%, 0204, E24
0 R 49	57.60.1182	1 pce	1k8	MF, 1%, 0204, E24
0 R 50	57.92.7012	1 pce	0.3A	PTC 60V
0 R 52	57.60.1153	1 pce	15k	MF, 1%, 0204, E24
0 R 53	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0 R 54	57.60.1272	1 pce	2k7	MF, 1%, 0204, E24
0 R 55	57.60.1184	1 pce	180k	MF, 1%, 0204, E24
0 R 56	57.60.1106	1 pce	10M	MF, 1%, 0204, E24
0 R 57	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0 R 58	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0 R 59	57.60.1471	1 pce	470R	MF, 1%, 0204, E24
0 R 66	57.60.1103	1 pce	10k	MF, 1%, 0204, E24
0 RA 1	58.60.0121	1 pce	20k	SMD 20%, 0.25W, Cermet
0 RA 2	58.60.0113	1 pce	1k0	SMD 20%, 0.25W, Cermet
0 RA 3	58.01.9103	1 pce	10k	Cermet, 10%, 0.5W, vertical
0 T 1	1.022.625.00	1 pce		SCHALTSTRAFO 3:1
0 T 2	1.022.218.00	1 pce	1 : 1	EINGANGSTRAFO 1 : 1
0 TP 1	54.02.0471	1 pce		Stift d 1.5 * 5.5 lötl
0 TP 2	54.02.0471	1 pce		Stift d 1.5 * 5.5 lötl
0 TP 3	54.02.0471	1 pce		Stift d 1.5 * 5.5 lötl
0 TP 4	54.02.0471	1 pce		Stift d 1.5 * 5.5 lötl
0 TP 5	54.02.0471	1 pce		Stift d 1.5 * 5.5 lötl

End of List

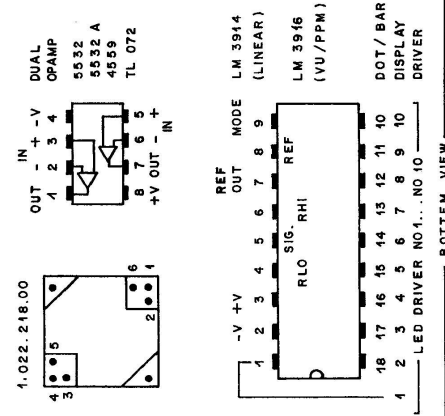
Comments:

- (01) Offset-voltage of IC 9 LF 353 too large  
->replaced by MC 33078
- (02) R25 not used
- (03) DV4 added

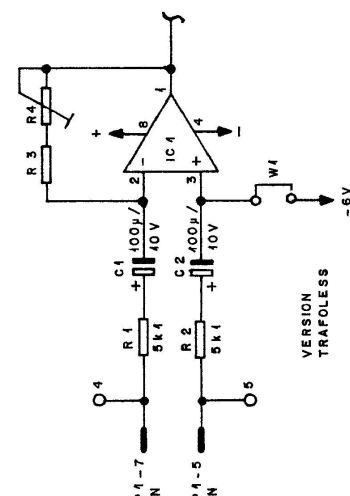
LED PPM Meter (10 LED) 1.913.291.00



POS. NR. ARE 2...

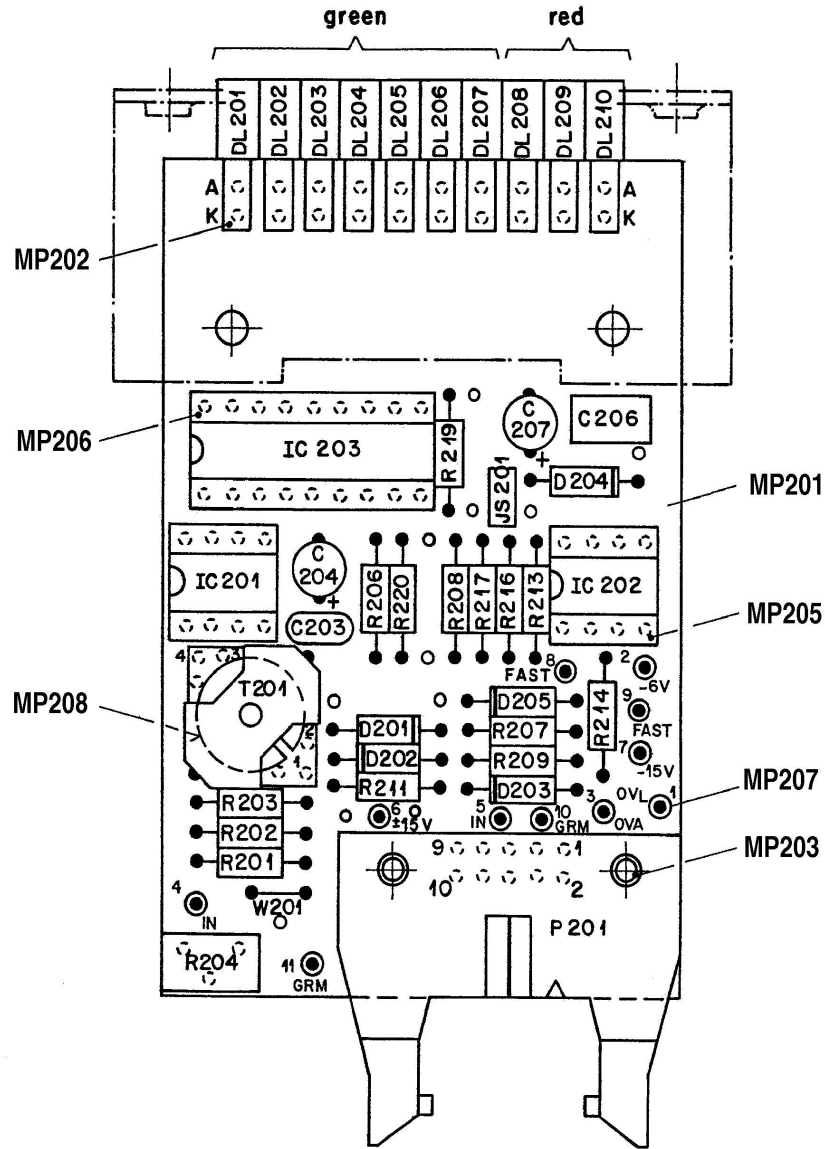


P	NO NAME	REMARK (PCB CONNECTOR)
P..1	1 GRM	INPUT GRM
P..1	2 +10V	+ SUPPLY
P..1	3 GRM	INPUT GRM
P..1	4 OV-A	GROUND AUDIO
P..1	5 IN	INPUT AUDIO
P..1	6 -45V	- SUPPLY
P..1	7 IN	INPUT AUDIO
P..1	8 OV-L	GROUND SIGN. (LOGIC)
P..1	9 RES.	RESERVE (-24V)
P..1	10 -6V	- SUPPLY



VERSION TRAFOLESS

**LED PPM Meter (10 LED) 1.913.291.00**



Werkstoff	Norm-Nr.:	Oberfläche		Güte:						③
	DIN-Bez.:	Beh.:								②
	Abmessung:									①
Zugehörige Unterlagen:		Freimasstoleranz:	Maßstab:	Ausgabe		22.10.87	A.Ho	B. Ho	Ja	④
<b>PL</b>		±		Datum	Gez.	Gepr.	Ges.	Index		
Ersatz für:		Ersetzt durch:		Kopie für:						
<b>STUDER</b> REGENSDORF ZÜRICH		Benennung: <b>LED PPM METER ESE</b>				Nummer: <b>1.913.291-00</b>				

**LED PPM Meter (10 LED) 1.913.291.00 ( 1)**

Idx. Pos.	Part No.	Qty.	Type/Val.	Description	Idx. Pos.	Part No.	Qty.	Type/Val.	Description
0	C 201		not used	not used					
0	C 202		not used	not used					
0	C 203	59.34.2680	68p	CER 63V, 5%, N150					
0	C 204	59.22.3101	100u	EL 10V 20% RM5					
0	C 205		not used	not used					
0	C 206	59.06.5474	470n	PETP, 63V, 5%, RM5					
0	C 207	59.22.3101	100u	EL 10V 20% RM5					
0	D 201	50.04.0125	1N4448	75V, 150mA, 4ns, DO-35					
0	D 202	50.04.0132	BAW62	D BAW 62					
1	D 203	50.04.0125	1N4448	75V, 150mA, 4ns, DO-35					
1	D 204	50.04.0125	1N4448	75V, 150mA, 4ns, DO-35					
0	D 205	50.04.0132	BAW62	D BAW 62					
0	D 206		not used	not used					
0	DL 201	50.04.2146	MV54124A	LED green					
0	DL 202	50.04.2146	MV54124A	LED green					
0	DL 203	50.04.2146	MV54124A	LED green					
0	DL 204	50.04.2146	MV54124A	LED green					
0	DL 205	50.04.2146	MV54124A	LED green					
0	DL 206	50.04.2146	MV54124A	LED green					
0	DL 207	50.04.2146	MV54124A	LED green					
0	DL 208	50.04.2119	MV57124A	LED red					
0	DL 209	50.04.2119	MV57124A	LED red					
0	DL 210	50.04.2119	MV57124A	LED red					
0	IC 201	50.09.0101	TL072	Dual op-amp biFET					
0	IC 202	50.09.0101	TL072	Dual op-amp biFET					
0	IC 203	50.11.0144	LM3916	LED Bar/Dot driver					
0	JP 201	54.01.0020	1p	Pin, 1reihig, gerade					
0	JP 202	54.01.0020	1p	Pin, 1reihig, gerade					
0	JS 201	54.01.0021	Jumper	0.63*0.63mm, Au					
0	MP 201	1.913.290.11	1 pce	LED METER PCB					
0	MP 202	1.010.012.50	10 pcs	LED-spacer universal					
0	MP 203	28.99.0119	2 pcs	ROHRNIETE D 2.5*0.15* 9					
0	MP 204		not used	not used					
0	MP 205	53.03.0166	2 pcs	8p DIL-socket 0.3"					
0	MP 206	53.03.0175	1 pce	18p DIL 0.3", lötl, gerade					
0	MP 207	54.02.0471	11 pcs	Stift d 1.5 * 5.5 lötl					
0	MP 208	1.010.004.61	1 pce	RM5 Isolierscheibe d=10					
0	P 201	54.14.2011	10p	Winkelstecker Au					
0	R 201	57.11.3512	5k1	MF, 1%, 0207					
0	R 202	57.11.3512	5k1	MF, 1%, 0207					
0	R 203	57.11.4222	2k2	MF, 2%, 0207					
0	R 204	58.01.9203	20k	Cermet, 10%, 0.5W, vertical					
0	R 205		not used	not used					
			<i>replaced by W 201</i>						
0	R 206	57.11.4103	10k	MF, 2%, 0207					
0	R 207	57.11.4103	10k	MF, 2%, 0207					
0	R 208	57.11.3203	20k	MF, 1%, 0207					
0	R 209	57.11.4103	10k	MF, 2%, 0207					
0	R 210		not used	not used					
0	R 211	57.11.3203	20k	MF, 1%, 0207					
0	R 212		not used	not used					
			<i>replaced by D 203</i>						
0	R 213	57.11.4823	82k	MF, 2%, 0207					
0	R 214	57.11.4332	3k3	MF, 2%, 0207					
0	R 215		not used	not used					
			<i>replaced by D 205</i>						
0	R 216	57.11.6226	22M	MF, 10%, 0207					
0	R 217	57.11.4681	680R	MF, 2%, 0207					
0	R 218		not used	not used					
0	R 219	57.11.4222	2k2	MF, 2%, 0207					
0	R 220	57.11.4222	2k2	MF, 2%, 0207					
0	R 221		not used	not used					
0	T 201	1.022.218.00	1 : 1	EINGANGSTRAFO 1 : 1					
0	W 201	1.010.321.64	RM5.0	U shaped wire 0.6mm					

End of List

Comments:

(01) D203, D204 changed