

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

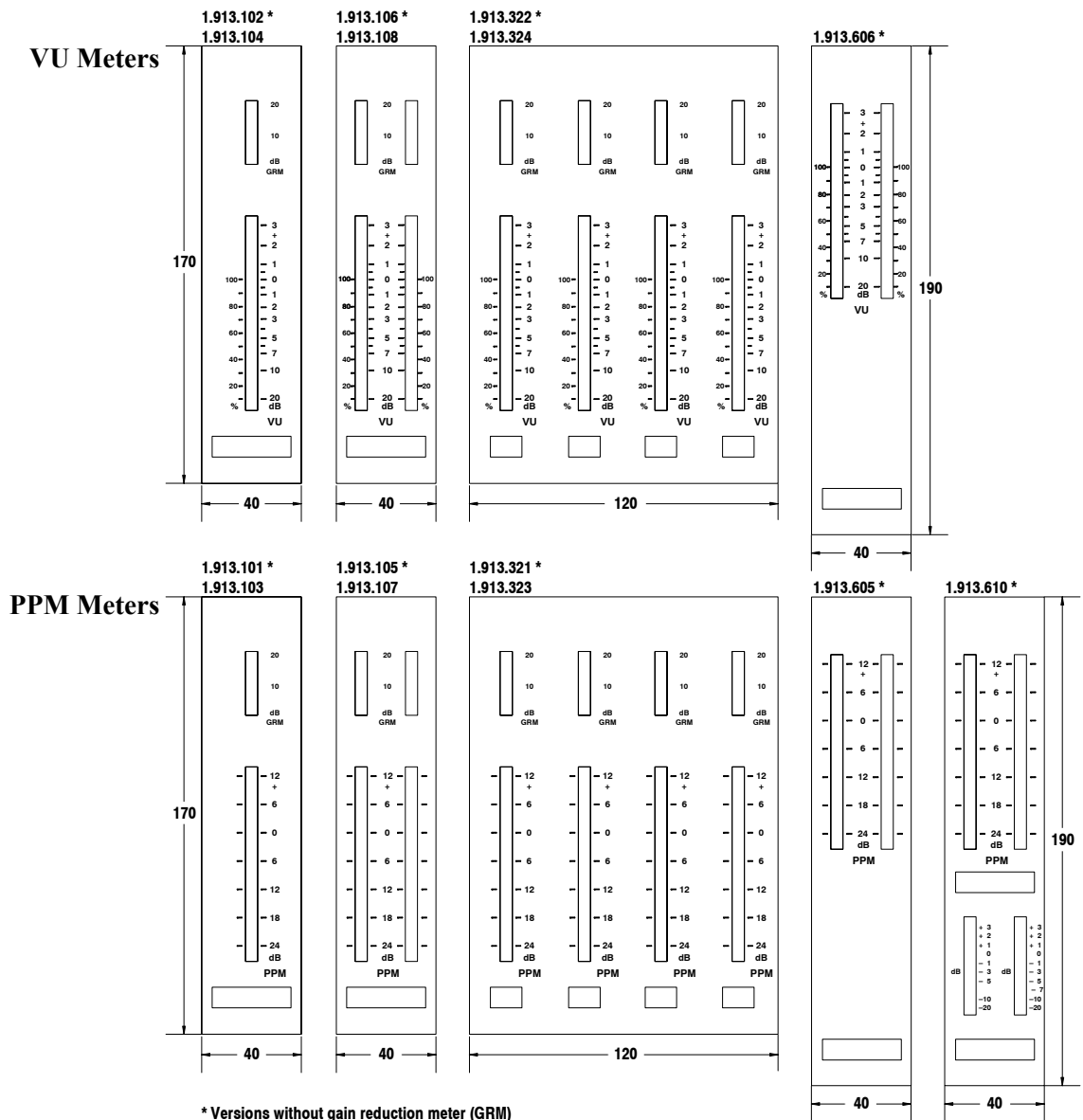
These instructions apply to the following assemblies:

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

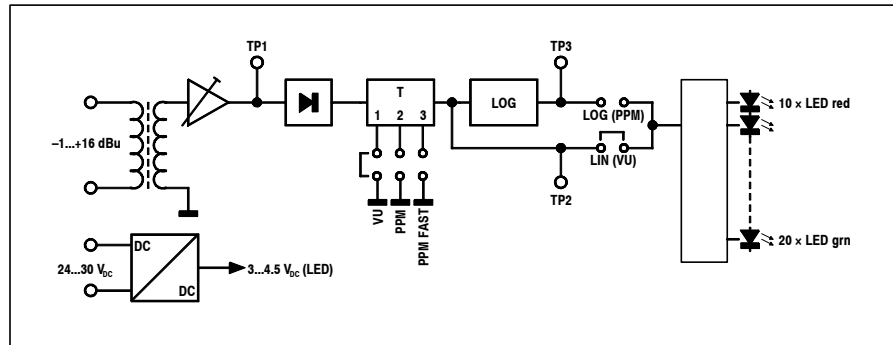
- PPM:** The peak program meter is a quasi-peak value instrument with long decay time. When a signal voltage corresponding to a level of 0 dB is applied for 10 ms, the resulting indication is -1 dB. Decay time (0 to -20 dB) is 1.7 s.
- VU Meter:** The VU meter indicates signals according to the standard 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 _{rms}			
	Sensitivity for reference indication	-1 dBu ... +16 dBu		
Input impedance	>10 k Ω			
Supply		\pm 15 V _{DC}	+24 V _{DC}	
Current consumption without GRM (p. ch., bar display mode)	Quiescent:	45 mA	35 mA	
	Full load:	80 mA	80 mA	
Current consumption with GRM (p. ch., bar display mode)	Quiescent:	55 mA	45 mA	
	Full load:	105 mA	105 mA	
VU Meter (1.913.293):	Indication range	-20 VU ... +3 VU		
	Accuracy (conditions: -10...+3 VU, 0...+50° C, 31.5 Hz...16 kHz)	\pm 1 segment		
	Response time to -1 VU	207 ms \pm 30 ms		
PPM (1.913.293):	Indication range	-30 dBu ... +15 dBu		
	Accuracy (conditions: -30...+15 VU, 0...+50° C, 31.5 Hz...16 kHz)	\pm 1 segment		
	Dynamic behavior			
	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 μ s burst	Indication:	-1 dB	
Decay time: 0...-20 dB	1.7 s \pm 0.3 s			
GRM (1.913.294):	Input voltage range	min. control: 0 V ... +2 V _{DC}		
		max. control: 0 V ... +11 V _{DC}		
Dimensions:	1- and 2-channel units, dark front panel (w x h x d)		40 x 170 x 97 mm	
	2-channel units, bright front panel (w x h x d)		40 x 190 x 97 mm	
	4-channel units, dark front panel (w x h x d)		120 x 170 x 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 V_{DC}),
 $4.1 \pm 0.1 \text{ V}_{\text{DC}}$ (supply: +30 V_{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.

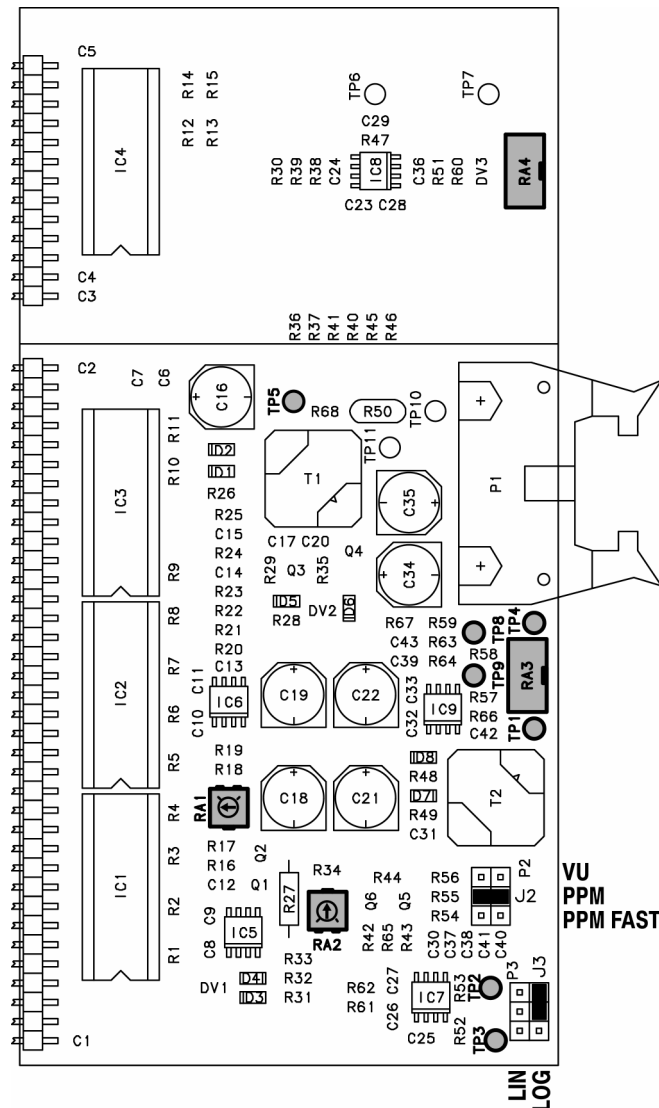
Line Level: Feed generator output signal with your line level (1 kHz, range: -1...+16 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9).
 Adjust RA3 until all green LEDs are on. The red LEDs must be dark.
 (TP3: $2.5 \pm 0.1 \text{ V}_{\text{DC}}$).

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.

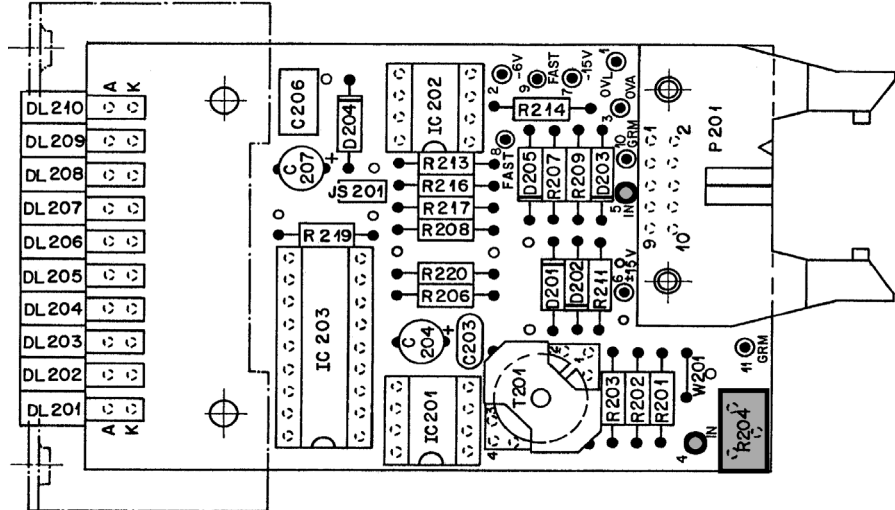
Log Converter (PPM only): Set J2 to PPM, J3 to LOG.
 Feed generator output signal (1 kHz, +6 dBu) to the input (pins 5 and 7 of P1, or TP8 and TP9).
 Connect DC voltmeter to test points TP2 (hot) and TP4 (ground). Adjust with RA3 to $1.18 \pm 0.05 V_{DC}$.
 RA1 and RA2: Basic setting according to the 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 $560 \pm 20 \text{ mV}_{DC}$. 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.

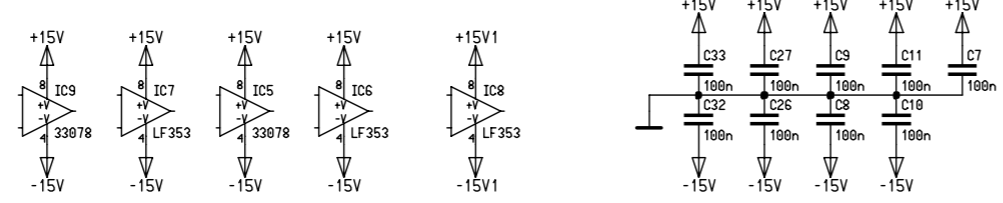
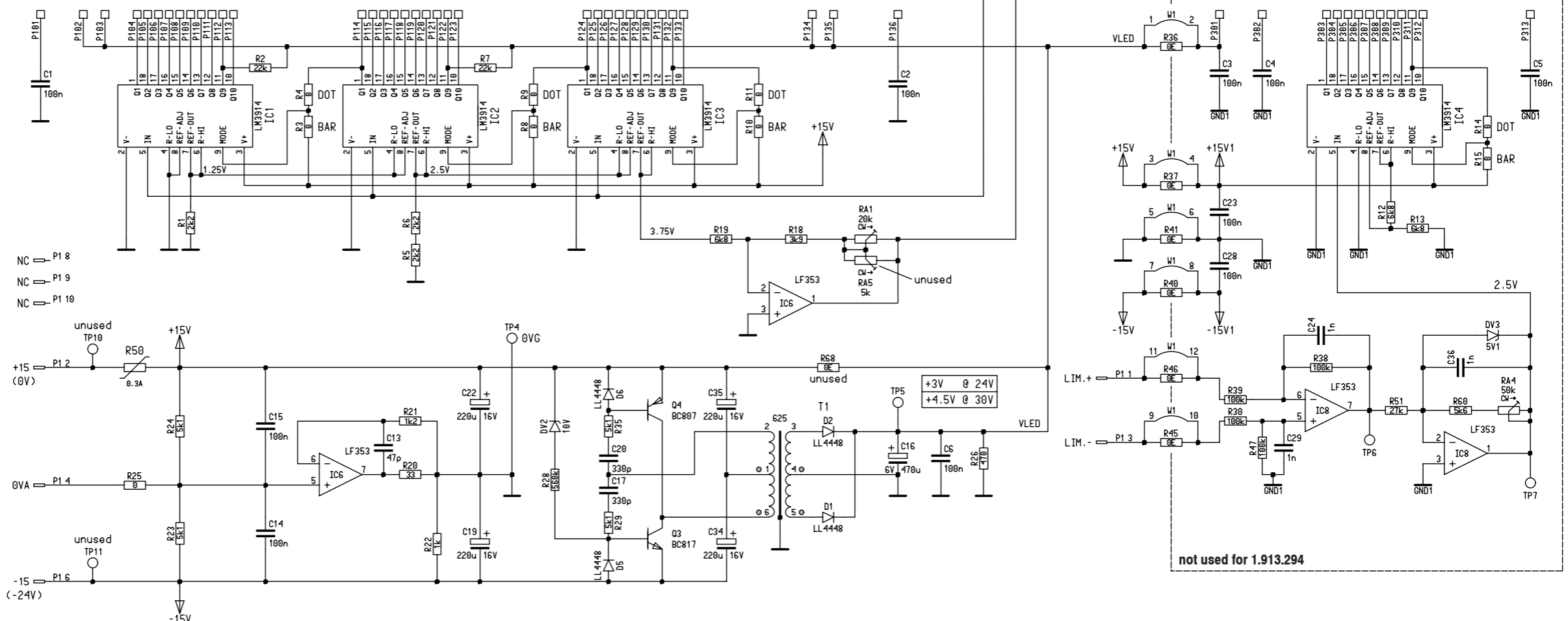
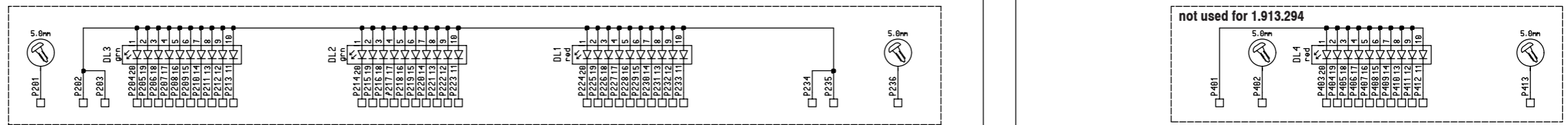
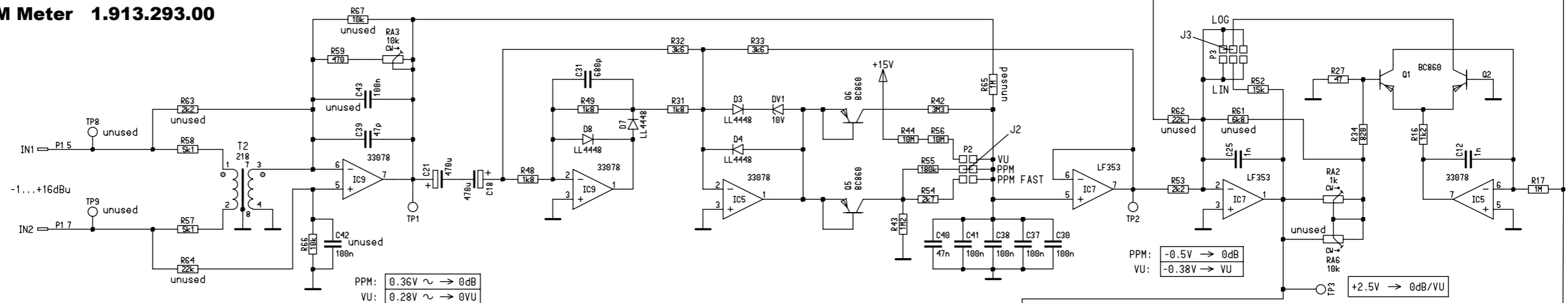
GRM (if included): Connect the Meter Unit to the console.
 Feed a test signal via an input channel. Set the level on the master output to nominal level +20 dB.
 Switch the limiter on.
 Align with RA4 to a GRM indication of 20 dB.



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.

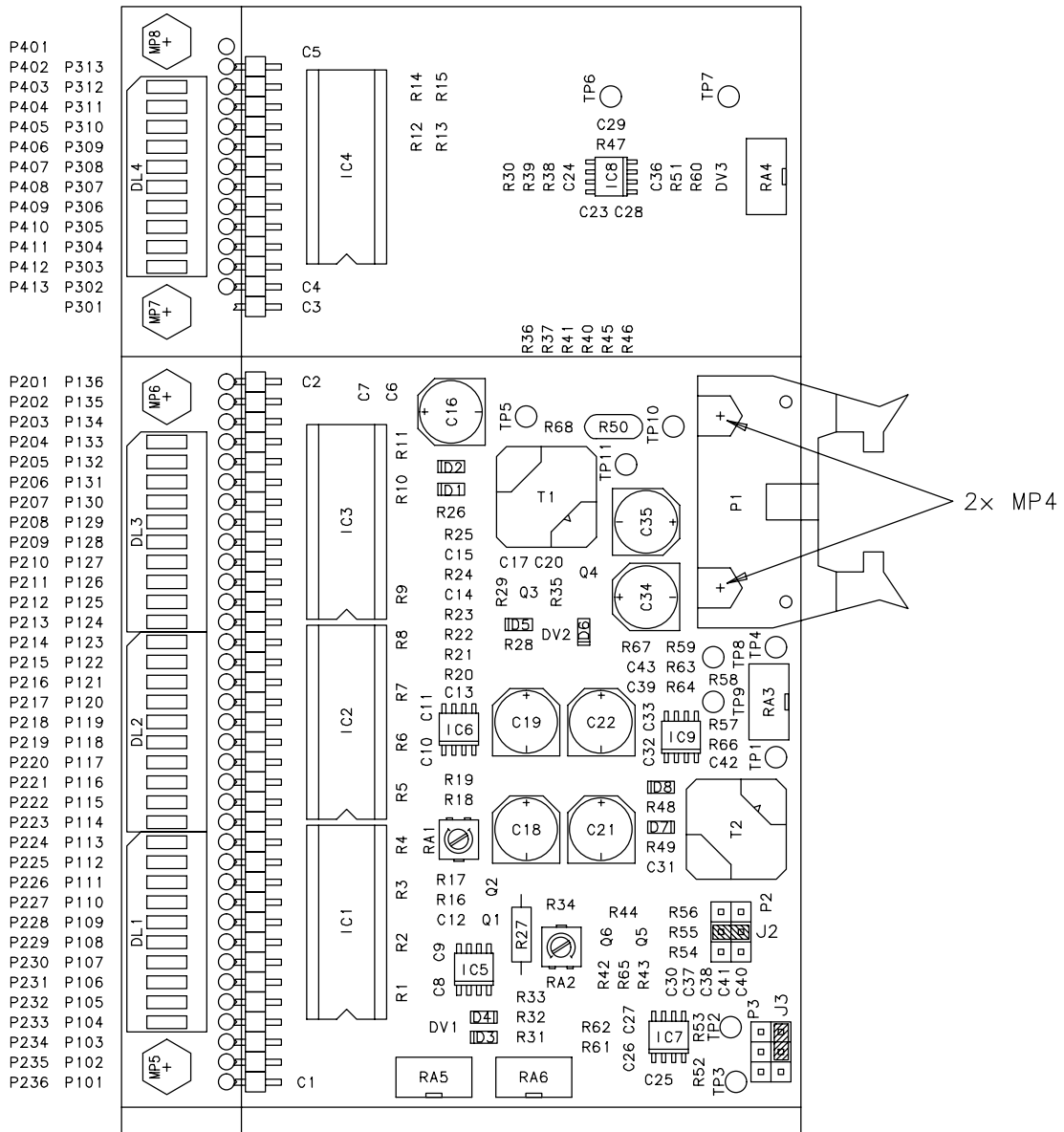
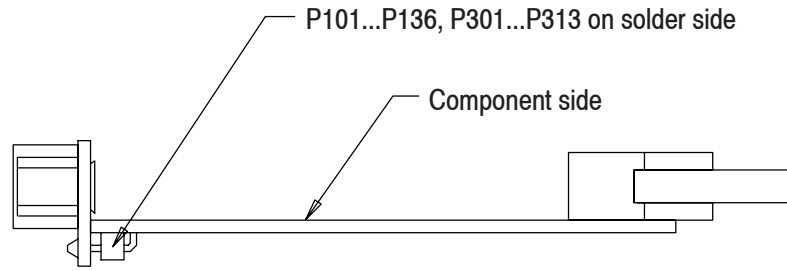


VU/PPM/GRM Meter 1.913.293.00



Erstellt	29.10.2001	ZT	29.01.2002	ZT					
PAGE 1 OF 1									
STUDER					VU/PPM/GRM METER			SC 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
STUDER REGENSDORF	Description: Benennung: VU/PPM/GRM METER , ESE	Z	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	CER 50V, 10%, X7R, 0805	0 P 124	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 2	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 125	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 3	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 126	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 4	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 127	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 5	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 128	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 6	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 129	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 7	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 130	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 8	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 131	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 9	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 132	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 10	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 133	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 11	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 134	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 12	59.60.2373	1 pce	1n0	CER 50V, 5%, COG, 0805	0 P 135	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 13	59.60.2241	1 pce	47p	CER 50V, 5%, COG, 0603	0 P 136	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 14	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 301	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 15	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 302	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 16	59.68.0033	1 pce	470u	EL 6V, 8.0*10.7	0 P 303	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 17	59.60.2361	1 pce	330p	CER 50V, 5%, COG, 0805	0 P 304	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 18	59.68.0033	1 pce	470u	EL 6V, 8.0*10.7	0 P 305	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 19	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7	0 P 306	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 20	59.60.2361	1 pce	330p	CER 50V, 5%, COG, 0805	0 P 307	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 21	59.68.0033	1 pce	470u	EL 6V, 8.0*10.7	0 P 308	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 22	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7	0 P 309	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 23	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 310	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 24	59.60.2373	1 pce	1n0	CER 50V, 5%, COG, 0805	0 P 311	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 25	59.60.2373	1 pce	1n0	CER 50V, 5%, COG, 0805	0 P 312	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 26	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 P 313	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel
0 C 27	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 Q 1	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0 C 28	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 Q 2	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0 C 29	59.60.2373	1 pce	1n0	CER 50V, 5%, COG, 0805	0 Q 3	50.60.0050	1 pce	BC817-25	NPN 45V 800mA SOT 23
0 C 30	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 Q 4	50.60.1050	1 pce	BC807-25	PNP 45V 800mA SOT 23
0 C 31	59.60.2369	1 pce	680p	CER 50V, 5%, COG, 0805	0 Q 5	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0 C 32	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 Q 6	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0 C 33	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 R 1	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0 C 34	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7	0 R 2	57.60.1223	1 pce	22k	MF, 1%, 0204, E24
0 C 35	59.68.0073	1 pce	220u	EL 16V, 8.0*10.7	0 R 3	57.60.1000	1 pce	0R0	MF, 0204
0 C 36	59.60.2373	1 pce	1n0	CER 50V, 5%, COG, 0805	0 R 4	not used	1 pce	0R0	MF, 0204
0 C 37	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 R 5	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0 C 38	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 R 6	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0 C 39	59.60.2241	1 pce	47p	CER 50V, 5%, COG, 0603	0 R 7	57.60.1223	1 pce	22k	MF, 1%, 0204, E24
0 C 40	59.60.3333	1 pce	47n	CER 50V, 10%, X7R, 0805	0 R 8	57.60.1000	1 pce	0R0	MF, 0204
0 C 41	59.60.3337	1 pce	100n	CER 50V, 10%, X7R, 0805	0 R 9	not used	1 pce	0R0	MF, 0204
0 D 1	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80	0 R 10	57.60.1000	1 pce	0R0	MF, 0204
0 D 2	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80	0 R 11	not used	1 pce	0R0	MF, 0204
0 D 3	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80	0 R 12	57.60.1682	1 pce	6k8	MF, 1%, 0204, E24
0 D 4	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80	0 R 13	57.60.1682	1 pce	6k8	MF, 1%, 0204, E24
0 D 5	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80	0 R 14	not used	1 pce	0R0	MF, 0204
0 D 6	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80	0 R 15	57.60.1000	1 pce	0R0	MF, 0204
0 D 7	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80	0 R 16	57.60.1122	1 pce	1k2	MF, 1%, 0204, E24
0 D 8	50.60.8001	1 pce	4448	200mA 75V 4ns SOD 80	0 R 17	57.60.1105	1 pce	1M0	MF, 1%, 0204, E24
0 DL 1	50.04.2150	1 pce	MV57164	10*LED-Bargraf rot diffus	0 R 18	57.60.1392	1 pce	3k9	MF, 1%, 0204, E24
0 DL 2	50.04.2161	1 pce	GRN	DLZ MV 54 164, LTA1000G 10*D GN	0 R 19	57.60.1682	1 pce	6k8	MF, 1%, 0204, E24
0 DL 3	50.04.2161	1 pce	GRN	DLZ MV 54 164, LTA1000G 10*D GN	0 R 20	57.60.1330	1 pce	33R	MF, 1%, 0204, E24
0 DL 4	50.04.2150	1 pce	MV57164	10*LED-Bargraf rot diffus	0 R 21	57.60.1122	1 pce	1k2	MF, 1%, 0204, E24
0 DV 1	50.60.9017	1 pce	10V	5%, 0.2W, SOT 23	0 R 22	57.60.1102	1 pce	1k0	MF, 1%, 0204, E24
0 DV 2	50.60.9017	1 pce	10V	5%, 0.2W, SOT 23	0 R 23	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0 DV 3	50.60.9010	1 pce	5V1	5%, 0.2W, SOT 23	0 R 24	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
4 DV 4	50.04.1112	1 pce	5V1	Zener, 5%, 0.5W, DO-35	2 R 25	not used	1 pce	0R0	MF, 0204
0 IC 1	50.11.0119	1 pce	LM3914	IC LM 3914 N,	0 R 26	57.60.1471	1 pce	470R	MF, 1%, 0204, E24
0 IC 2	50.11.0119	1 pce	LM3914	IC LM 3914 N,	0 R 27	57.99.0252	1 pce	47	MF 10%, +4500ppm
0 IC 3	50.11.0119	1 pce	LM3914	IC LM 3914 N,	0 R 28	57.60.1564	1 pce	560k	MF, 1%, 0204, E24
0 IC 4	50.11.0119	1 pce	LM3914	IC LM 3914 N,	0 R 29	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0 IC 5	50.61.0204	1 pce	MC33078	Dual Op-Amp low noise	0 R 30	57.60.1104	1 pce	100k	MF, 1%, 0204, E24
0 IC 6	50.61.0207	1 pce	LF353	Dual Op-Amp JFET SO 8	0 R 31	57.60.1182	1 pce	1k8	MF, 1%, 0204, E24
3 IC 7	50.61.0209	1 pce	LF412	Dual Op-Amp JFET SO 8	0 R 32	57.60.1362	1 pce	3k6	MF, 1%, 0204, E24
0 IC 8	50.61.0207	1 pce	LF353	Dual Op-Amp JFET SO 8	0 R 33	57.60.1362	1 pce	3k6	MF, 1%, 0204, E24
1 IC 9	50.61.0204	1 pce	MC33078	Dual Op-Amp low noise	0 R 34	57.60.1821	1 pce	820R	MF, 1%, 0204, E24
0 J 2	54.01.0021	1 pce	Jumper	0.63*0.63mm, Au	0 R 35	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0 J 3	54.01.0021	1 pce	Jumper	0.63*0.63mm, Au	0 R 36	57.60.1000	1 pce	0R0	MF, 0204
0 MP 1	1.913.293.11	1 pce		VU/PPM/GRM METER PCB	0 R 37	57.60.1000	1 pce	0R0	MF, 0204
0 MP 2	1.913.293.10	1 pce		NR.-ETIKETTE 5 * 20	0 R 38	57.60.1104	1 pce	100k	MF, 1%, 0204, E24
0 MP 3	43.01.0108	1 pce	Label	ESE-Warnschild	0 R 39	57.60.1104	1 pce	100k	MF, 1%, 0204, E24
0 MP 4	28.99.0119	2 pcs		ROHRNIETE D 2.5*0.15* 9	0 R 40	57.60.1000	1 pce	0R0	MF, 0204
0 MP 5	1.010.057.22	1 pce	M3*7.4	Nietmutter sw 6	0 R 41	57.60.1000	1 pce	0R0	MF, 0204
0 MP 6	1.010.057.22	1 pce	M3*7.4	Nietmutter sw 6	0 R 42	57.60.1335	1 pce	3M3	MF, 1%, 0204, E24
0 MP 7	1.010.057.22	1 pce	M3*7.4	Nietmutter sw 6	0 R 43	57.60.1125	1 pce	1M2	MF, 1%, 0204, E24
0 MP 8	1.010.057.22	1 pce	M3*7.4	Nietmutter sw 6	0 R 44	57.60.1106	1 pce	10M	MF, 1%, 0204, E24
4 MP 9	43.10.0113	1 pce	D	Revisions-Etikette 5mm h/blau	0 R 45	57.60.1000	1 pce	0R0	MF, 0204
0 P 1	54.14.2011	1 pce	10p	Winkelstecker Au	0 R 46	57.60.1000	1 pce	0R0	MF, 0204
0 P 2	54.11.0136	1 pce	2*3p	Pin 0.63*0.63, RM2.54	0 R 47	57.60.1104	1 pce	100k	MF, 1%, 0204, E24
0 P 3	54.11.0136	1 pce	2*3p	Pin 0.63*0.63, RM2.54	0 R 48	57.60.1182	1 pce	1k8	MF, 1%, 0204, E24
0 P 102	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 49	57.60.1182	1 pce	1k8	MF, 1%, 0204, E24
0 P 103	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 50	57.92.7012	1 pce	0.3A	PTC 60V
0 P 104	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 51	57.60.1273	1 pce	27k	MF, 1%, 0204, E24
0 P 105	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 52	57.60.1153	1 pce	15k	MF, 1%, 0204, E24
0 P 106	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 53	57.60.1222	1 pce	2k2	MF, 1%, 0204, E24
0 P 107	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 54	57.60.1272	1 pce	2k7	MF, 1%, 0204, E24
0 P 108	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 55	57.60.1184	1 pce	180k	MF, 1%, 0204, E24
0 P 109	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 56	57.60.1106	1 pce	10M	MF, 1%, 0204, E24
0 P 110	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 57	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0 P 111	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 58	57.60.1512	1 pce	5k1	MF, 1%, 0204, E24
0 P 112	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 59	57.60.1471	1 pce	470R	MF, 1%, 0204, E24
0 P 113	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 60	57.60.1562	1 pce	5k6	MF, 1%, 0204, E24
0 P 114	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 R 66	57.60.1103	1 pce	10k	MF, 1%, 0204, E24
0 P 115	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 RA 1	58.60.0121	1 pce	20k	SMD 20%, 0.25W, Cermet
0 P 116	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 RA 2	58.60.0113	1 pce	1k0	SMD 20%, 0.25W, Cermet
0 P 117	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 RA 3	58.01.9103	1 pce	10k	Cermet, 10%, 0.5W, vertical
0 P 118	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 RA 4	58.01.9503	1 pce	50k	Cermet, 10%, 0.5W, vertical
0 P 119	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 T 1	1.022.625.00	1 pce		SCHALTTRAFO 3:1
0 P 120	54.11.0125	1 pce	1p	Pin, 1reiHg, winkel	0 T 2	1.022.218.00	1 pce	1 : 1	ENGANGSTRAFO 1 : 1
0									

VU/PPM/GRM Meter 1.913.293.00 (4)

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

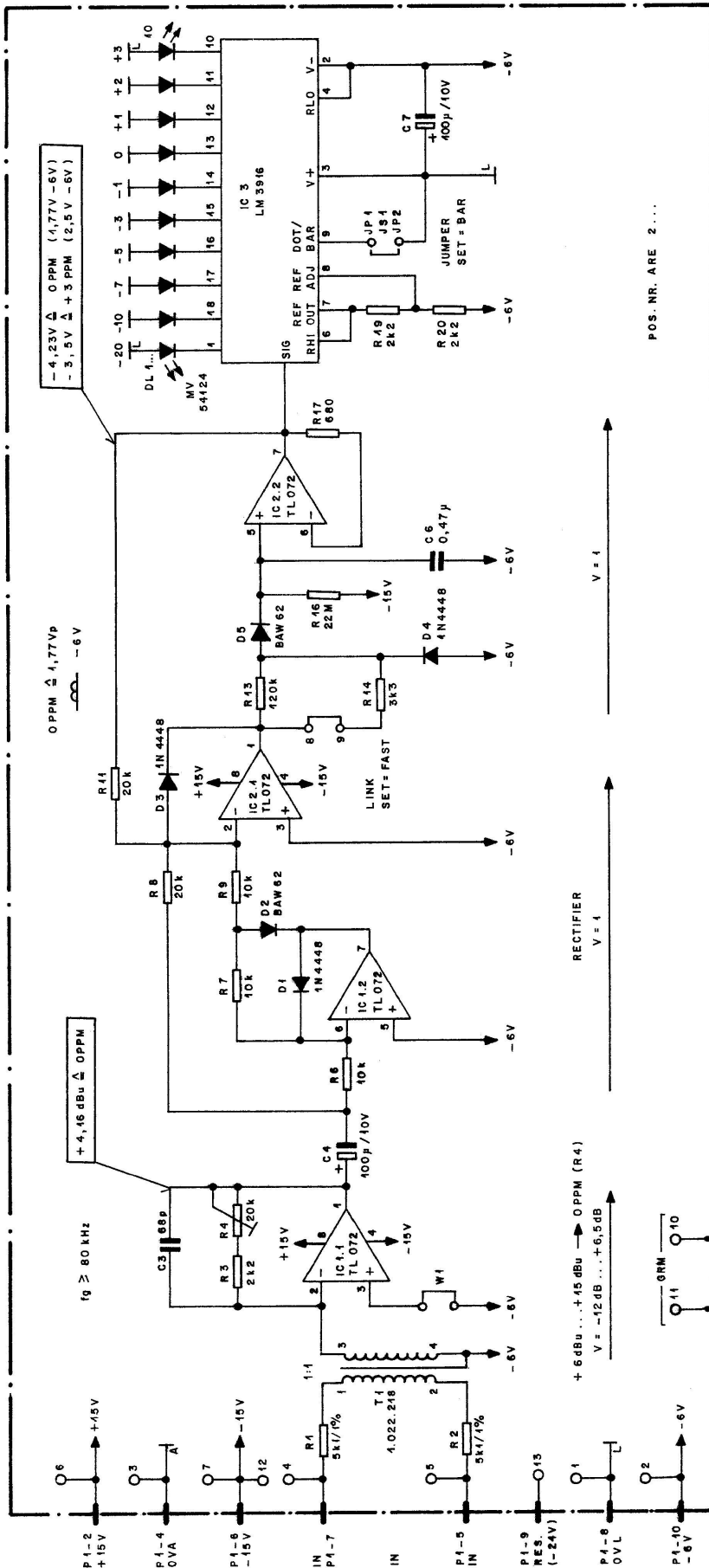
Idx. Pos.	Part No.	Qty.	Type/Val.	Description
0 Q 1	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0 Q 2	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 23
0 Q 3	50.60.0050	1 pce	BC817-25	NPN 45V 800mA SOT 23
0 Q 4	50.60.1050	1 pce	BC807-25	PNP 45V 800mA SOT 23
0 Q 5	50.60.1002	1 pce	BC860C	PNP 45V 100mA SOT 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

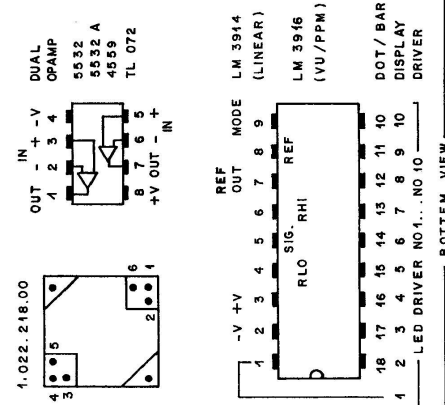
Comments:

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

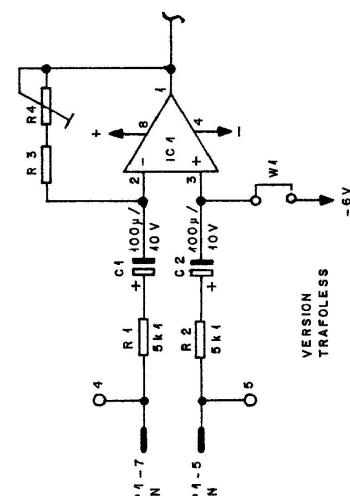
LED PPM Meter (10 LED) 1.913.291.00



POS. NR. ARE 2...

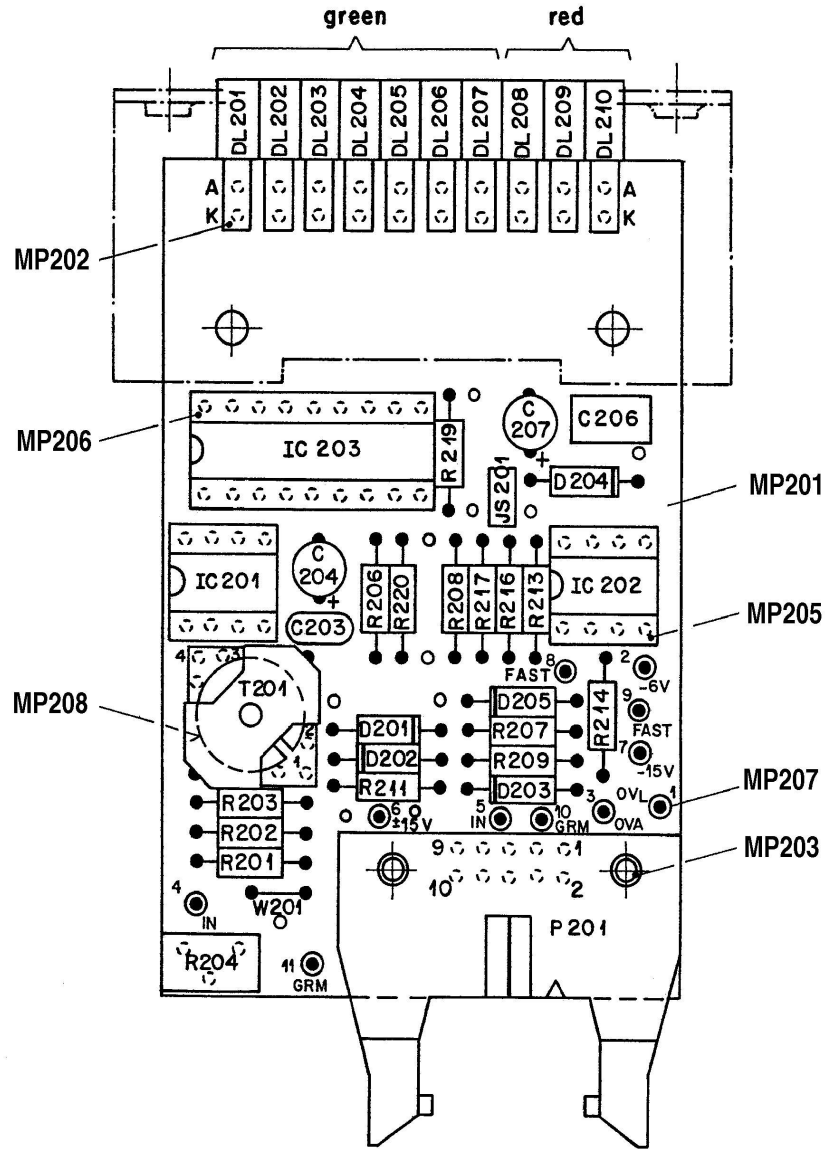


P	NO NAME	REMARK (PCB CONNECTOR)
P..1	1 GRM	INPUT GRM
P..1	2 +10V	+ SUPPLY
P..1	3 GRM	INPUT GRM
P..1	4 OV-A	GROUND AUDIO
P..1	5 IN	INPUT AUDIO
P..1	6 -45V	- SUPPLY
P..1	7 IN	INPUT AUDIO
P..1	8 OV-L	GROUND SIGN. (LOGIC)
P..1	9 RES.	RESERVE (-24V)
P..1	10 -6V	- SUPPLY



VERSION TRAFOLESS

LED PPM Meter (10 LED) 1.913.291.00



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

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					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					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					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					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					not used
0	R 211		57.11.3203	20k					MF, 1%, 0207
0	R 212		not used	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					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					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					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