Level meter VU/PPM 30 LED and gain reduction meter 10 LED

CONTENTS

SCOPE OF VALIDITY

This manual applies to the following modules:

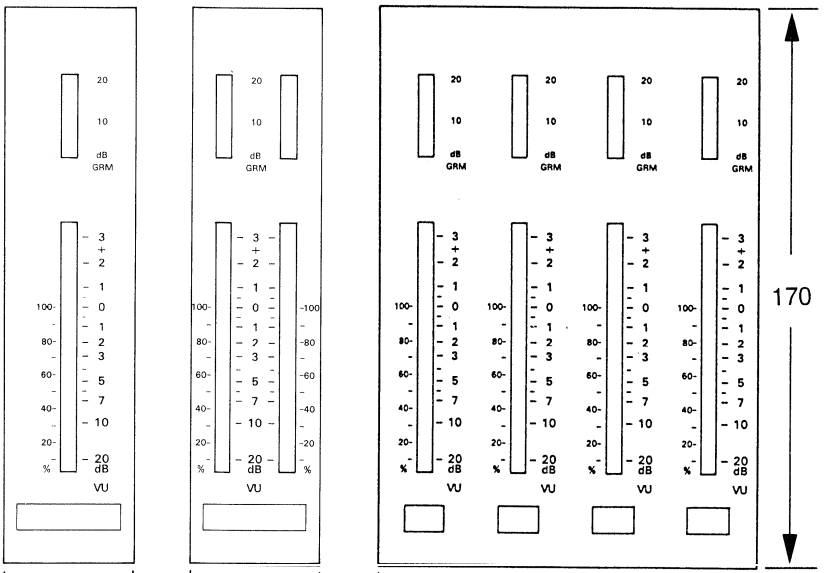
Display	1 Channel	2 Channels	4 Channels	PCB Nr.
PPM	1.913.101	1.913.105	1.913.321	1.913.295
VU	1.913.102	1.913.106	1.913.322	1.913.295
PPM / GRM	1.913.103	1.913.107	1.913.323	1.913.295/297
VU / GRM	1.913.104	1.913.108	1.913.324	1.913.295/297

1. General

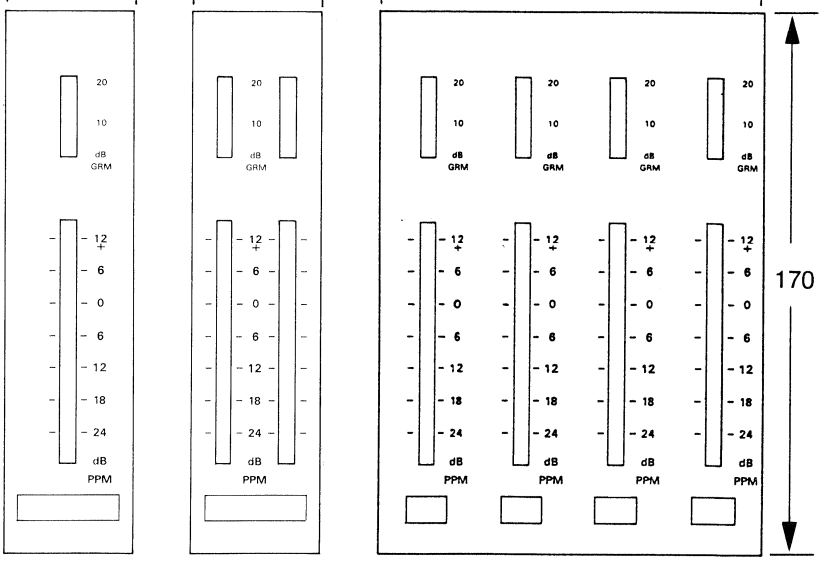
The **STUDER output meter VU-PPM 30 LED** has been developed for installation into the display panel of STUDER mixing consoles. Instruments with VU (volume unit) or PPM (peak program meter) characteristic are available. In place of the bar indication, an optional dot indication is available.
The instruments listed below are equipped with the two PCBs 1.913.295 (VU/PPM) and 1.913.297 (GRM) corresponding to the table on page 1. The circuit diagram relating to the corresponding circuit board number should be consulted.

«Volume Unit Meters»

1.913.102* 1.913.106* 1.913.322*
1.913.104 1.913.108 1.913.324



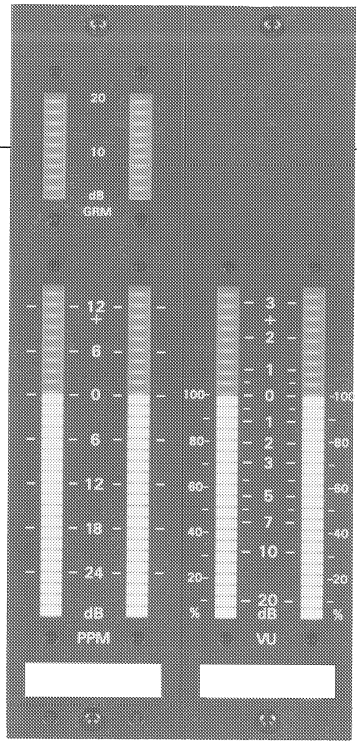
«Peak Program Meters»



1.913.101* 1.913.105* 1.913.321*
1.913.103 1.913.107 1.913.323

* = Version without gain reduction meter (GRM)

VU / PPM 30 LED



2. Functional description

PPM:

The peak program meter is a quasi-peak value instrument with a long release time. When a signal voltage corresponding to a level of 0 dB is applied for 10 ms, the resulting indication should be -1 dB.
The desired decay time to -20dB 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 should be 99% of the reference value. The rise and decay time on the 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.

3. Technical data

PCB 1.913.295

General:

0 dBu ≙ 0.775 V_{eff}

Input sensitivity of the reference indication:		-1 dBu...+16 dBu		
Input impedance		>10 kΩ		
Supply:		DC ±15 V	or	DC +24 V
Current consumption:	Quiescent	45mA	/	35 mA
	Medium load	58mA	/	56mA
	Full load	80mA	/	80 mA

VU-meter:

Indicating range:	-20VU...+30VU
Accuracy:	±1 segment
(precond.:-10VU...+3VU/0°...50°C/31.5Hz...16kHz)	
Response time to -1VU:	207(±30)ms

PP-meter:

Indicating range:	-30dBu...+15dBu
Accuracy:	±1 segment
(precond.:-30dB...+15dB/0°...50°C/31.5Hz...16kHz)	
Dynamic behavior:	
Jumper normal: 0dB for 10 ms	→indication: -1dB ±0.5dB
Jumper normal: 0dB for 3ms	→indication: -4dB ±1dB
Jumper fast: 0dB for ~100µs	→indication: 1dB
Decay time 0...-20dB:	1.7(±0.3)s

Circuit board sizes:

Height x depth, with connector:	96 mm x 95 mm
Width:	18 mm
Center between M3 mounting holes:	85.1 mm (3.35")

4. Block diagram

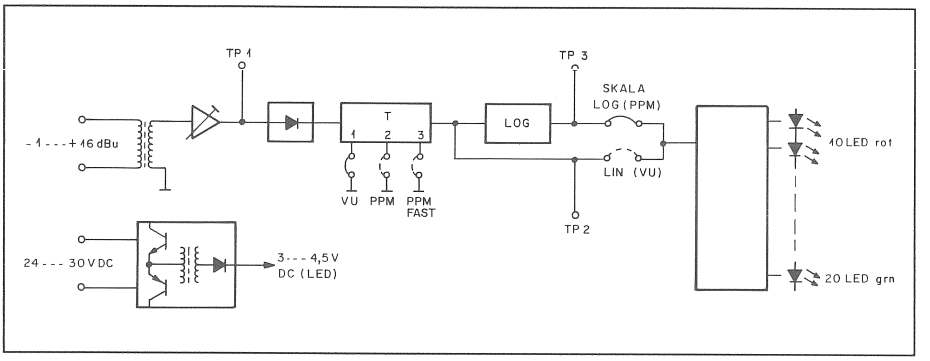


Fig. 2 **VU-PPM block diagram:** The settings VU/PPM/PPM fast or lin/log are established with the jumpers JS 1 and JS 2 respectively (see Fig. 3)

5. Alignment instructions VU/PP meter PCB 1.913.295

Measuring instruments:

AC voltmeter Ri ≥ 20 kΩ
DC voltmeter Ri ≥100 kΩ, preferably digital VM
Generator, 31.5Hz...16kHz, 0...16dBu; attenuator with 10dB increments.

Alignment elements

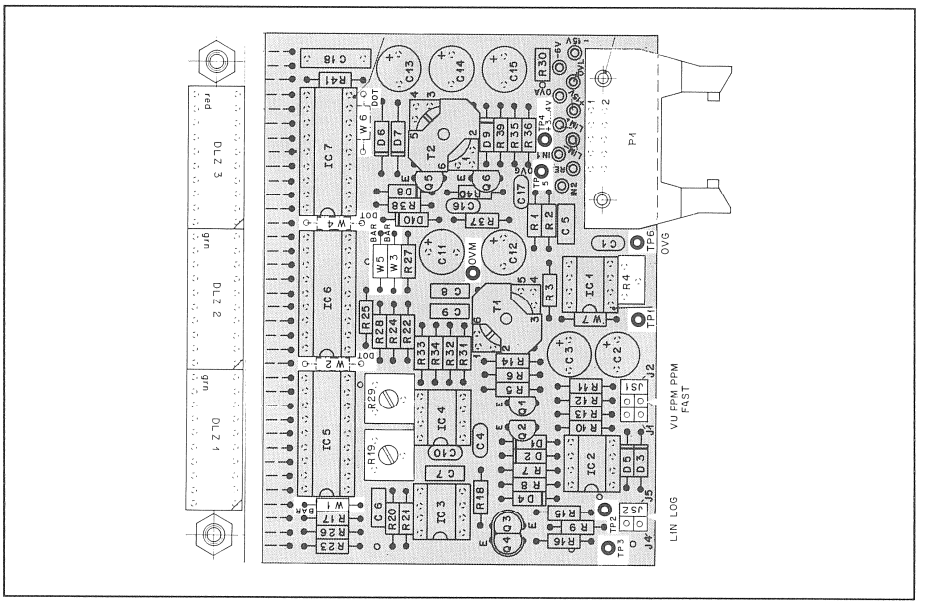


Fig. 3 Alignment elements of the VU/PPM 30 LED

Aligning the line level:

From the generator feed line level (-1dBu ... +16dBu) to the input. Align with R4 until all green LEDs are light and the red LEDs are still dark.
[on TP3: 2.5(±0.1)V]

6. Maintenance instructions

PCB 1.913.295

Test input range:

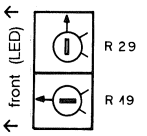
Generator: 1 kHz on input, level: -1dBu ... +16 dBu
AC VM: Hot to TP 1, cold to TP 6 (0V G)
U_{TP1} adjustable with R4 to 290(±10)mV AC

Rectifier and indication:

Both jumpers set to the VU/LIN position.
Generator: 1kHz with 0dBu level on input
U_{TP1}: Adjust with R4 to 290(±2)mV AC. All green LEDs must be light.
DC VM: Hot to TP2, cold to TP6.
U_{TP2} = -380(±15)mV DC
DC VM: Hot to TP3, cold to TP6
U_{TP3} = +2.575(±0.1)V DC. All green LEDs are light.
Check: Adjust the generator level in such a way that:
U_{TP3} = +3.8(±0.1)V DC. All diodes are light.
U_{TP3} = +0.17(±0.02)V DC. Only the lowest green LED is light.

Logarithmation (PPM):

Both jumpers are set to PPM/LOG.
Generator: 1kHz with +6dBu level on input.
Set U_{TP2} with R4 to 1.18(±0.05V) DC.
The two trimmers have the following basic setting:



Alignment procedure:

DC VM: hot to TP3, cold to TP6.
A: Align the upper value with R19. Desired: U_{TP3} = 3.06(±0.10)V.
All green LEDs and 4 red LEDs are light. Indication +6dB.
B: Attenuation by 30 dB with attenuator.
C: Align the lower value with R29. Desired: U_{TP3} = 0.56(±0.02)V.
4 green LEDs are light. Indication -24 dB
Repeat the procedure A → B → C → A → ... several times.

DC/DC converter:

To check, connect the DC VM hot to TP4, cold to TP5. Generator with line level on input causes all green LEDs to light.

Supply voltage:	+24 V DC	→TP4 = 3.1(±0.1)V
	+30 V DC	→TP4 = 4.1(±0.1)V

7. Gain reduction meter PCB 1.913.297

Connecting the GRM:

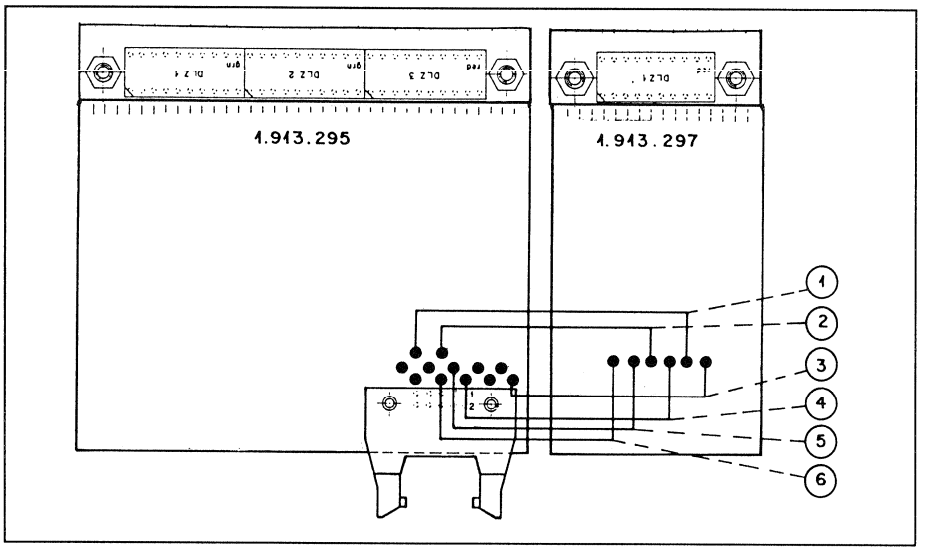


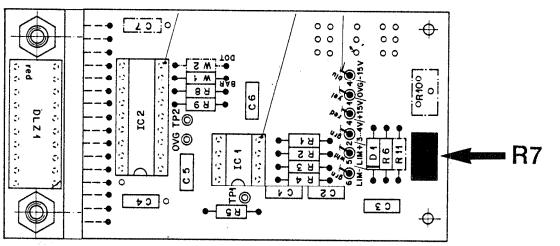
Fig. 4 Connection GRM - VU/PPM.

Conductor assignment of the connection cable:

	Color	Signal
1	yellow	0 VG
2	green	+3...+4,5 V
3	blue	- 15 V
4	red	+15 V
5	white	LIM +
6	grey	LIM -

Aligning the GRM:

- Limiter switched off
- Feed a test signal via an input channel. Set the level on the master output to nominal level +20 dB.
- Switch on the limiter
- Align with R7 to a GRM indication of +20 dB.



Technical data:

Supply The GRM indicator is supplied by the switching regulator of the basic unit 1.913.295: 24 ... 30 VDC.

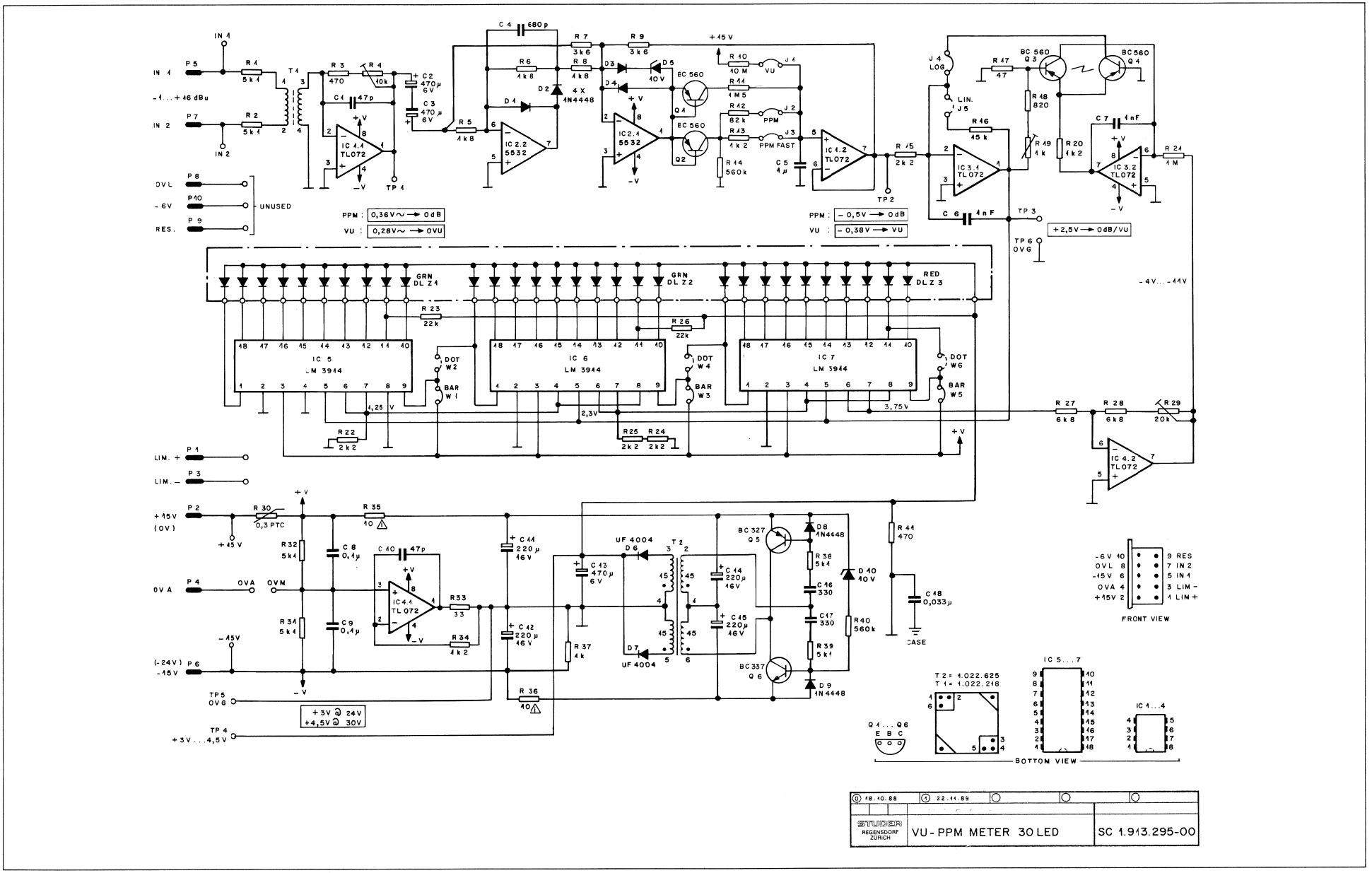
Current consumption: quiescent 10mA
full load 25mA

Indication Voltage range: min. control 0V ... +2V DC
max. control 0V ... +11V DC

Circuit board dimensions:
Height x depth: 45 mm x 85 mm
Width: 18 mm
Center between M3 mounting holes: 39.4 mm (1.55")

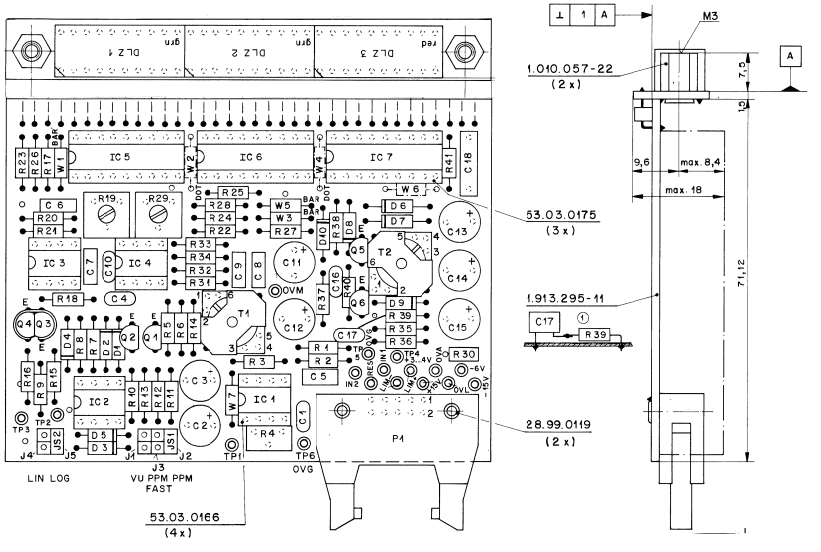
8. Diagrams / Schemata

VU- / PP - Meter 30 LED 1.913.295.00



STUDER REGENSDORF ZÜRICH	VU - PPM METER 30 LED	SC 1.913.295-00

VU- / PP - Meter 30 LED 1.913.295.00



IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	C....01	59.34.2470	47 pF	CE	
	C....02	59.22.2471	470 uF 6V	EL	
	C....03	59.22.2471	470 uF 6V	EL	
	C....04	59.32.2681	680 pF	CE	
	C....05	59.06.5105	1 uF 5%	PE	
	C....06	59.06.5102	1 nF 5%	PE	
	C....07	59.06.5102	1 nF 5%	PE	
	C....08	59.06.0104	0.1 uF	PE	
	C....09	59.06.0104	0.1 uF	PE	
	C....10	59.34.2470	47 pF	CE	
	C....11	59.22.4221	220 uF 16V	EL	
	C....12	59.22.4221	220 uF 16V	EL	
	C....13	59.22.2471	470 uF 6V	EL	
	C....14	59.22.4221	220 uF 16V	EL	
	C....15	59.22.4221	220 uF 16V	EL	
(00)	C....16	59.34.4221	330 PF 5%	CE	
(01)	C....16	59.34.4331	330 PF 5%	CE	
(00)	C....17	59.34.4221	330 PF 5%	CE	
(01)	C....17	59.34.4331	330 PF 5%	CE	
	C....18	59.31.8333	33 nF 400V	PE	
	D....01	50.04.0125	1N4448	SI	any
	D....02	50.04.0125	1N4448	SI	any
	D....03	50.04.0125	1N4448	SI	any
	D....04	50.04.0125	1N4448	SI	any
(00)	D....05	50.04.1114	ZPD 10 FALSCHE REIHENFOLGE D5...8		ANY
(01)	D....05	50.04.1114	ZPD 10 .5W 10V	SI	any
(01)	D....06	50.04.0138	UF4004 1A 400V	SI	any
(01)	D....07	50.04.0138	UF4004 1A 400V	SI	any
(01)	D....08	50.04.0125	1N4448	SI	any
	D....09	50.04.0125	1N4448	SI	any
	D....10	50.04.1114	ZPD 10 .5W 10V	SI	any
	DL2..01	50.04.2161	10 LED	DISPLAY GREEN	HP
(00)	DL2..02	50.04.2150	10 LED	DISPLAY GREEN	HP
(01)	DL2..02	50.04.2161	10 LED	DISPLAY GREEN	HP
	DL2..03	50.04.2150	10 LED	DISPLAY RED	HP

IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	R....38	57.11.3512	5.1 kOhm	0.25W	
	R....39	57.11.3512	5.1 kOhm	0.25W	
	R....40	57.11.3564	560 kOhm	0.25W	
(00)	R....41	57.11.3122	1.2 kOhm	0.25W	
(02)	R....41	57.11.3471	470 Ohm	0.25W	
	T....01	1.022.218.00		input trafo 1:1	St
	T....02	1.022.625.00		switch trafo 3:1	
	W....01	57.11.3000		Wire link BAR, W2 DOT	
	W....03	57.11.3000		Wire link BAR, W4 DOT	
	W....05	57.11.3000		Wire link BAR, W6 DOT	
	W....07	57.11.3000		Wire link connection	

(01) 88/09/11 Update
(02) 89/12/11 Improvement of grs load (R41) Sc index (01)
Improvement of crosstalk to the input (C17/R39)

CE=Ceramic, CF=Cachon Film, EL=Electrolytic, MF=Metal Film,
PE=Polyester, PP=Polypropylen, PS=Polystyrol

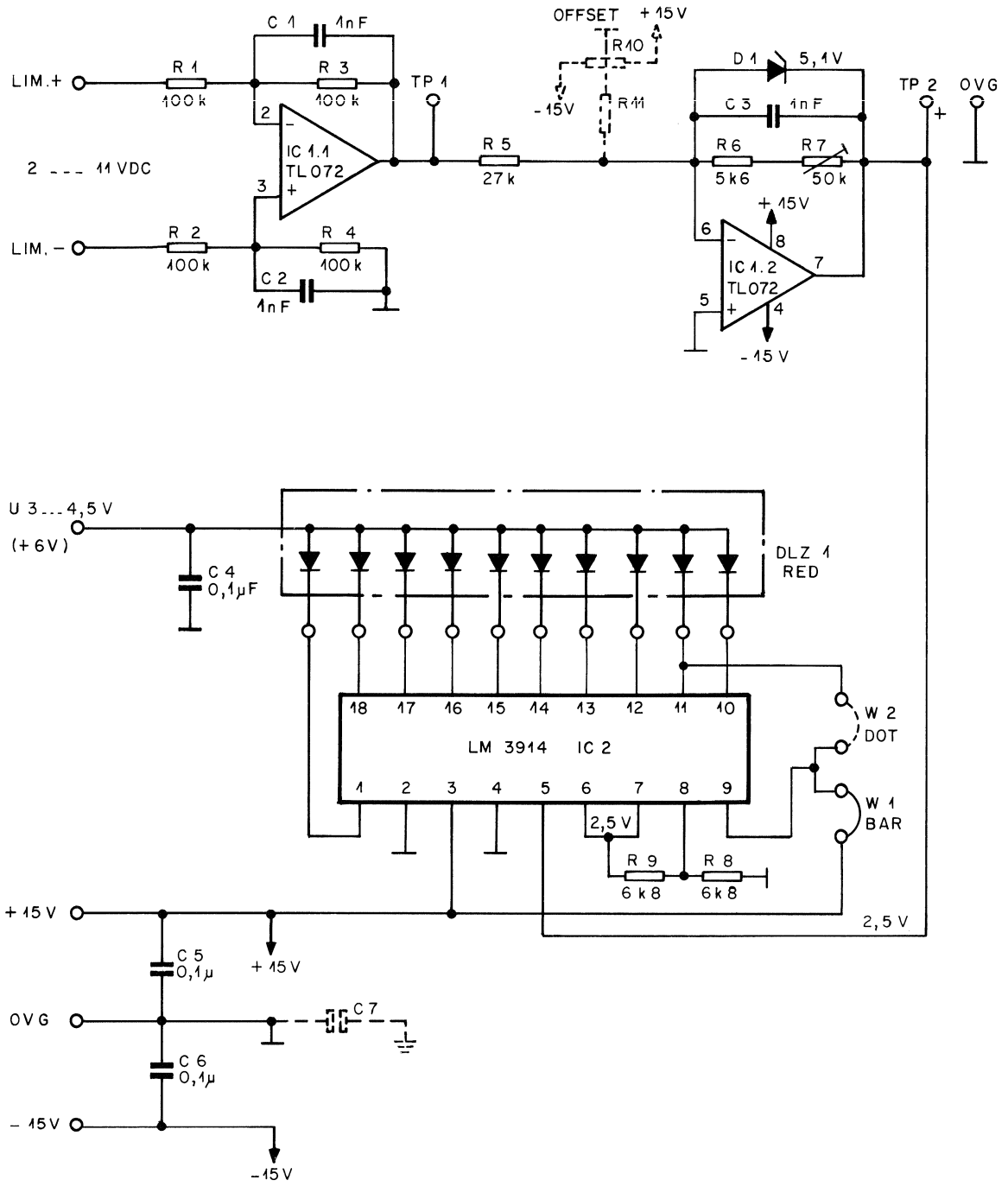
MANUFACTURER: Bu=Burndy, Ex=Exar, Fc=Fairchild, GI=General Instrument
HP=Hewlett Packard, ITT=Intermetall, Mot=Motorola,
NS=National Semiconductors, Ph=Philips, Ra=Raytheon,
Sig=Signetics, Si=Siemens , St=Studer,
TI=Texas Instrument,

ORIG 88/09/12 (01) 88/09/22 (02) 89/11/22

IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	IC...01	50.09.0101	TL 072	dua. op. amp.	NS/TI
	IC...02	50.09.0105	RE5532	dua. op. amp. N	NS/Ra
	IC...03	50.09.0101	TL 072	dua. op. amp.	NS/TI
	IC...04	50.09.0101	TL 072	dua. op. amp.	NS/TI
	IC...05	50.11.0119	LM3914	led bar/dot lin.	NS
	IC...06	50.11.0119	LM3914	led bar/dot lin.	NS
	IC...07	50.11.0119	LM3914	led bar/dot lin.	NS
	JP...01	54.01.0020	2 pos	plug	
	JP...02	54.01.0020	2 pos	plug	
	JP...03	54.01.0020	2 pos	plug	
	JP...04	54.01.0020	2 pos	plug	
	JP...05	54.01.0020	2 pos	plug	
	JS...01	54.01.0021		jumper	
	JS...02	54.01.0021		jumper	
	MP...01	1.913.295.11	1 pcs	VU-PPM Meter 30 LED PCB	St
	MP...02	1.010.057.22	2 pcs	Hexagon post M3x7.4	
	MP...03	28.99.0.19	2 pcs	tubular rivets D 2.5 x 10	
	MP...04	53.03.0.06	4 pcs	8-pin IC-socket	
	MP...05	53.03.0.75	3 pcs	18-pin IC-socket	
	MP...06	54.11.0.32	36 pcs	connection	
	MP...07	54.02.0471	17 pcs	plug (Rund - Stecketift)	
	MP...08	50.20.2001	1 pcs	clip	
	P....01	54.14.2011	2x5 pin	pcb connector for ribbon cable	
	Q....01	50.03.0496	BC 560	PNP	any
	Q....02	50.03.0496	BC 560	PNP	any
	Q....03	50.03.0496	BC 560	PNP typ C, beta 290-570	Ph/Si
	Q....04	50.03.0496	BC 560	PNP typ C, beta 290-570	Ph/Si
	Q....05	50.03.0351	BC 327	-25 PNP .8A	any
	Q....06	50.03.0340	BC 337	-25 NPN .8A	any
	R....01	57.11.3512	5.1 kOhm	1% 0.25W	
	R....02	57.11.3512	5.1 kOhm	1% 0.25W	

IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
(00)	R....03	57.11.3681	680 OHM	0.25W	
(01)	R....03	57.11.3471	470 OHM	0.25W	
	R....04	58.01.9.03	10 kOhm	10% 0.50W trim	
	R....05	57.11.3.82	1.8 kOhm	1% 0.25W	
	R....06	57.11.3.82	1.8 kOhm	1% 0.25W	
	R....07	57.11.3362	3.6 kOhm	1% 0.25W	
	R....08	57.11.3.82	1.8 kOhm	1% 0.25W	
(00)	R....09	57.11.3.82	1.8 KOHM	1% 0.25W	
(01)	R....09	57.11.3362	3.6 kOhm	1% 0.25W	
	R....10	57.11.5.06	10 MOhm	10% 0.25W	
	R....11	57.11.5.55	1.5 MOhm	5% 0.50W	
	R....12	57.11.3823	82 kOhm	0.25W	
	R....13	57.11.3.22	1.2 kOhm	0.25W	
	R....14	57.11.3564	560 kOhm	1% 0.25W	
	R....15	57.11.3222	2.2 kOhm	1% 0.25W	
	R....16	57.11.3.53	15 kOhm	1% 0.25W	
	R....17	57.99.0252	47 Ohm	10% 0.25W Tk +4500ppm	St
	R....18	57.11.3821	820 Ohm	0.25W	
	R....19	58.01.8.02	1 kOhm	10% 0.50W trim	
	R....20	57.11.3.22	1.2 kOhm	0.25W	
	R....21	57.11.3.05	1 MOhm	5% 0.25W	
	R....22	57.11.3222	2.2 kOhm	1% 0.25W	
	R....23	57.11.3223	22 kOhm	0.25W	
	R....24	57.11.3222	2.2 kOhm	1% 0.25W	
	R....25	57.11.3222	2.2 kOhm	1% 0.25W	
	R....26	57.11.3223	22 kOhm	0.25W	
	R....27	57.11.3682	6.8 kOhm	0.25W	
	R....28	57.11.3682	6.8 kOhm	0.25W	
	R....29	58.01.8203	20 kOhm	0.50W trim	
	R....30	57.92.7001	0.3 Ohm	0.50A	
	R....31	57.11.3512	5.1 kOhm	1% 0.25W	
	R....32	57.11.3512	5.1 kOhm	1% 0.25W	
	R....33	57.11.3330	33 Ohm	0.25W	
	R....34	57.11.3.22	1.2 kOhm	0.25W	
	R....35	57.19.0100	10 Ohm	5% 0.33W fusible resistor /!\	
	R....36	57.19.0100	10 Ohm	5% 0.33W fusible resistor /!\	
	R....37	57.11.3122	1.2 kOhm	0.25W	

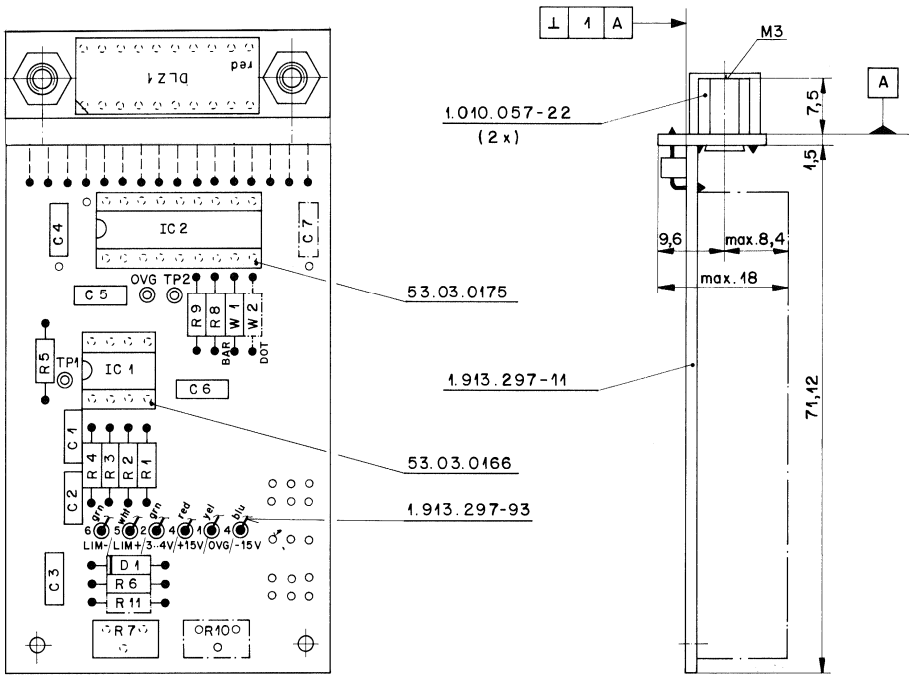
Gain Reduction Meter 1.913.297.00



SPECIFICATIONS : UNIT WILL SUPPLYED BY VU/PPM METER 1.913.295.00 / 24V...30V
CURRENT WILL INCREASE BY → IDLE : 10mA / LOAD : 25mA

⓪ 13.11.89				
STUDER REGENSDORF ZÜRICH	GRM METER 10 LED			SC 1.913.297.00

Gain Reduction Meter 1.913.297.00



Schilder 1.913.297-04/43.01.0108
aufgeklebt nach Fabrikationsmuster.

IND.	POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
	C....01	59.06.5102	1 nF	5% PE	
	C....02	59.06.5102	1 nF	5% PE	
	C....03	59.06.5102	1 nF	5% PE	
	C....04	59.06.0104	0.1 uF	PE	
	C....05	59.06.0104	0.1 uF	PE	
	C....06	59.06.0104	0.1 uF	PE	
	D....01	50.04.1112	ZPD 5.1	V .5W 5.1V SI	any
	DLZ..01	50.04.2150	10 LED	DISPLAY RED	HP
	IC...01	50.09.0101	TL 072	dual op. amp.	NS,TI
	IC...02	50.11.0119	LM3914	led bar/dot lin.	NS
	MP...01	1.913.297.11	1 pcs	GRM METER 10 LED PCB	St
	MP...02	1.010.057.22	2 pcs	Hexagon post M3*7.4	
	MP...03	53.03.0166	1 pcs	8-pin IC-socket	
	MP...04	53.03.0175	1 pcs	18-pin IC-socket	
	MP...05	54.11.0132	16 pcs	connection	
	MP...06	54.02.0471	9 pcs	plug (Rund - Steckstift)	
	MP...07	1.913.297.93	Li-Li	6 cable connections	St
	R....01	57.11.3104	100 kOhm	1% 0.25W	
	R....02	57.11.3104	100 kOhm	1% 0.25W	
	R....03	57.11.3104	100 kOhm	1% 0.25W	
	R....04	57.11.3104	100 kOhm	1% 0.25W	
(00)	R....05	57.11.3473	47 kOhm	0.25W	
(01)	R....05	57.11.3273	27 kOhm	0.25W	
(00)	R....06	57.11.3103	10 kOhm	0.25W	
(01)	R....06	57.11.3562	5.6 kOhm	0.25W	
	R....07	58.01.9503	50 kOhm	10% 0.50W trim	
	R....08	57.11.3682	6.8 kOhm	1% 0.25W	
	R....09	57.11.3682	6.8 kOhm	1% 0.25W	
	W....01	57.11.3000		Wire link BAR, W2 DOT	

(01)89/11/22 min. 0V...2V Range

CE=Ceramic, CF=Carbon Film, EL=Electrolytic, MF=Metal Film,
PE=Polyester, PP=Polypropylen, PS=Polystyrol

MANUFACTURER: Bu=Burndy, Ex=Exar, Fc=Fairchild, GI=General Instrument
HP=Hewlett Packard, ITT=Intermetall, Mot=Motorola,
NS=National Semiconductors, Ph=Philips, Ra=Raytheon,
Sig=Signetics, Si=Siemens , St=Studer,
TI=Texas Instrument

ORIG 88/10/31 (01) 89/11/22