179-4010-A-4

NTP

# LIMITER AMPLIFIER

## 179-400A/B

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2/260291.


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# Limiter Amplifier

## 179-400A/B

Contents:


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| Electrical partslist | 179-4031-A-3 |


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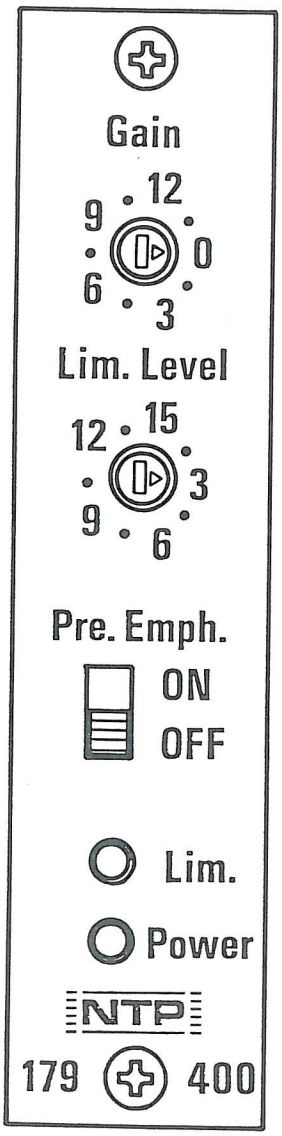


| | | |
|---|---|---|
| Målestok : 2:1 | Limiter Amplifier 179-400 | NTP ELEKTRONIK A/S |
| Konstruktør: P. J. | Frontplate Lay-out | |
| Tegnet : 9.11. 81.T.L | | 179-4009-A-4 |
| Godkendt : | | |
| Revideret : | | |

lelser

The use of a high quality VCA in this limiter has made possible the use of the forward regulation principle in the side chain. This in turn is the key to achieving extremely good static as well as dynamic distortion performance. The limiter may easily be tailored by the user to almost any application as limiter threshold, as well as gain is selectable on the front edge, while the programme dependant dual time constant of the recovery function may be programmed on the connector.
The compact design (EURO-bord), the balanced floating input and output, and the wide supply voltage range only add to the versatibility of the design.

| | | |
|---|---|---|
| Supply voltage | : | 22-32 V DC |
| Max. ripple voltage on supply | : | 300 mV p.p. |
| Current consumption | : | 55-80 mA |
| Input impedance, balanced floating | : | 20 kOhms ±10% |
| Input CMRR (15 kHz) | : | > 60 dB |
| Input overload level | : | +21dBu |
| Output impedance, balanced floating | : | < 40 Ohms |
| Minimum load resistance | : | 300 Ohms |
| Input gain, adjustable in 1,5dB steps | : | 0-13,5 dB ±0,3dB |
| Frequency range -0,5dB | : | 20Hz - 20kHz |
| Distortion 40Hz - 20kHz | : | < 0,1% THD |
| Output noise (fig. 6), 0dB gain | | |
| unweighted, 23kHz bandwidth | : | RMS -87dBu |
| weighted (CCIR 468-1, 1976) | : | Peak -76dBu |
| Output threshold level, adjustable in 1,5dB steps | : | 3-16,5dBu ±0,3dB |
| Limiting range | : | > 30dB |
| Attack time | : | 1,5ms (note 1) |
| Recovery time (dual) | : | 0,1s upon 20s |
| or with | | |
| External switch $T_1$ (Note 2, fig. 2-5) | : | 0,1-0,2-0,4-1-2-4s |
| $T_2$ | : | off-1-2-4-10-20s |
| Recovery delay | : | 50ms |
| "Bypass" control | : | Lim. function is disabled by connecting pin 16 to pin 31. Or by a switch in the E and F-versions. |
| Output overload level (Lim. function disabled) | : | +18dBu max. |

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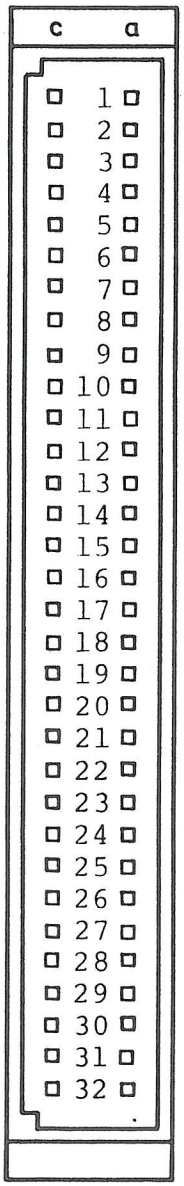
| | | |
|---|---|---|
| Pre-emphasis on threshold level (switch- ( fig. 7 ) able) | : | 50 us or off |
| Control voltage slope (stereo linking voltage) | : | 1V/5dB Note 3. |
| Meter output | : | 1 mA/20 dB |
| Meter impedance | : | < 5 kOhms |
| Lim.led current | : | approx. 10mA |
| Mechanical outlines | : | 100 x 160 mm euroboard |
| Connector | : | 64 pol. DIN pin conn. A-version, broad type. B-version, slim type. |




| | |
|---|---|
| 0°, 180° | input |
| | input screen (-VCC) |
| C, B, A | recovery time 2 |
| C, B, A | recovery time 1 |
| | -Vcc to recovery time switch |
| Cathode, Anode | Lim.led |
| | Lim. off |
| 0°, 180° | output |
| | Int.ref. (-Vcc + 9V) (Not to be used) |
| -, + | compressor meter |
| | Stereo control voltage (Ref. to pin no. 25) |
| | +Vcc |
| | -Vcc |
| | Screen |

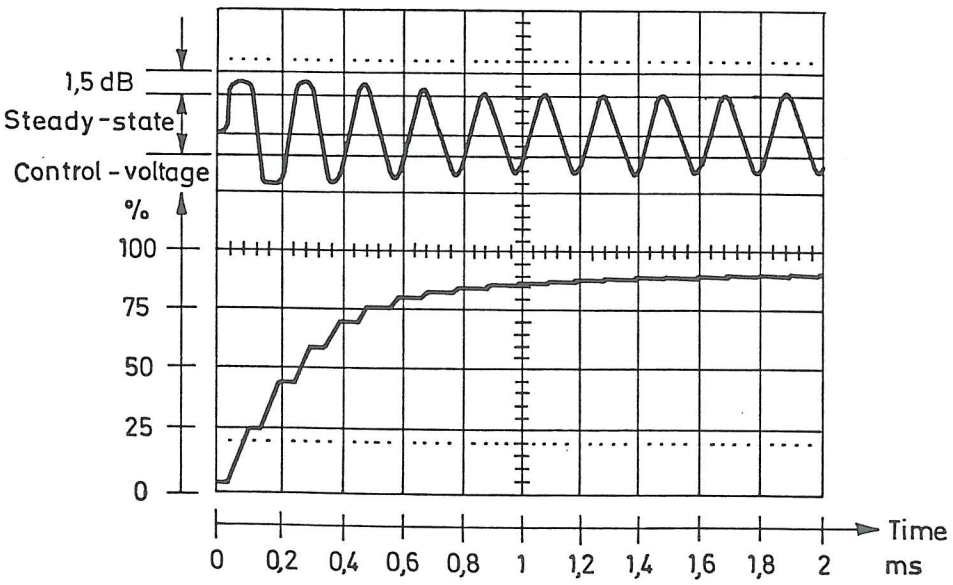
Row a and c connected in the A and E-version.
Both rows in the B and F-version connected.

ettelser 1. - 2. - 3. - 4

Note 1:

The attack time is the period of time it takes the control voltage to reach 90% of its steady-stste value, measured with 5kHz tone-bursts. Peaks shorter than 1,5 ms will be limited by a full-wave smooth clipping circuit to a value approximately 1,5dB higher than output threshold level with steady sinusodial input signal. Fig. 1.

Fig. 1: Output level and control voltage with 5 kHz tone-burst and input amplitude 10 dB above threshold level.



Note 2.

The recovery times are external switchable and follow the code-below:

| Recovery time 1 Position | | C | B | A |
|---|---|---|---|---|
| 0 | fixed | 1 | 1 | 1 |
| 1 | fixed | 1 | 1 | 0 |
| 2 | 100 ms | 1 | 0 | 1 |
| 3 | 200 ms | 1 | 0 | 0 |
| 4 | 400 ms | 0 | 1 | 1 |
| 5 | 1 s | 0 | 1 | 0 |
| 6 | 2 s | 0 | 0 | 1 |
| 7 | 4 s | 0 | 0 | 0 |

| Recovery time 2 Position | | C | B | A |
|---|---|---|---|---|
| 0 | fixed | 1 | 1 | 1 |
| 1 | fixed | 1 | 1 | 0 |
| 2 | off | 1 | 0 | 1 |
| 3 | 1 s | 1 | 0 | 0 |
| 4 | 2 s | 0 | 1 | 1 |
| 5 | 4 s | 0 | 1 | 0 |
| 6 | 10 s | 0 | 0 | 1 |
| 7 | 20 s | 0 | 0 | 0 |

Logic levels:
1 = open or 15-32V, 0 = -Vcc (max. = -Vcc +3V )

Note 3.

The control voltage of two units may be linked together to obtain equal gain-reduction.

Fig. 2 Recovery vs time and settings of $T_1$.

$T_2$ = off tone-burst = 10s

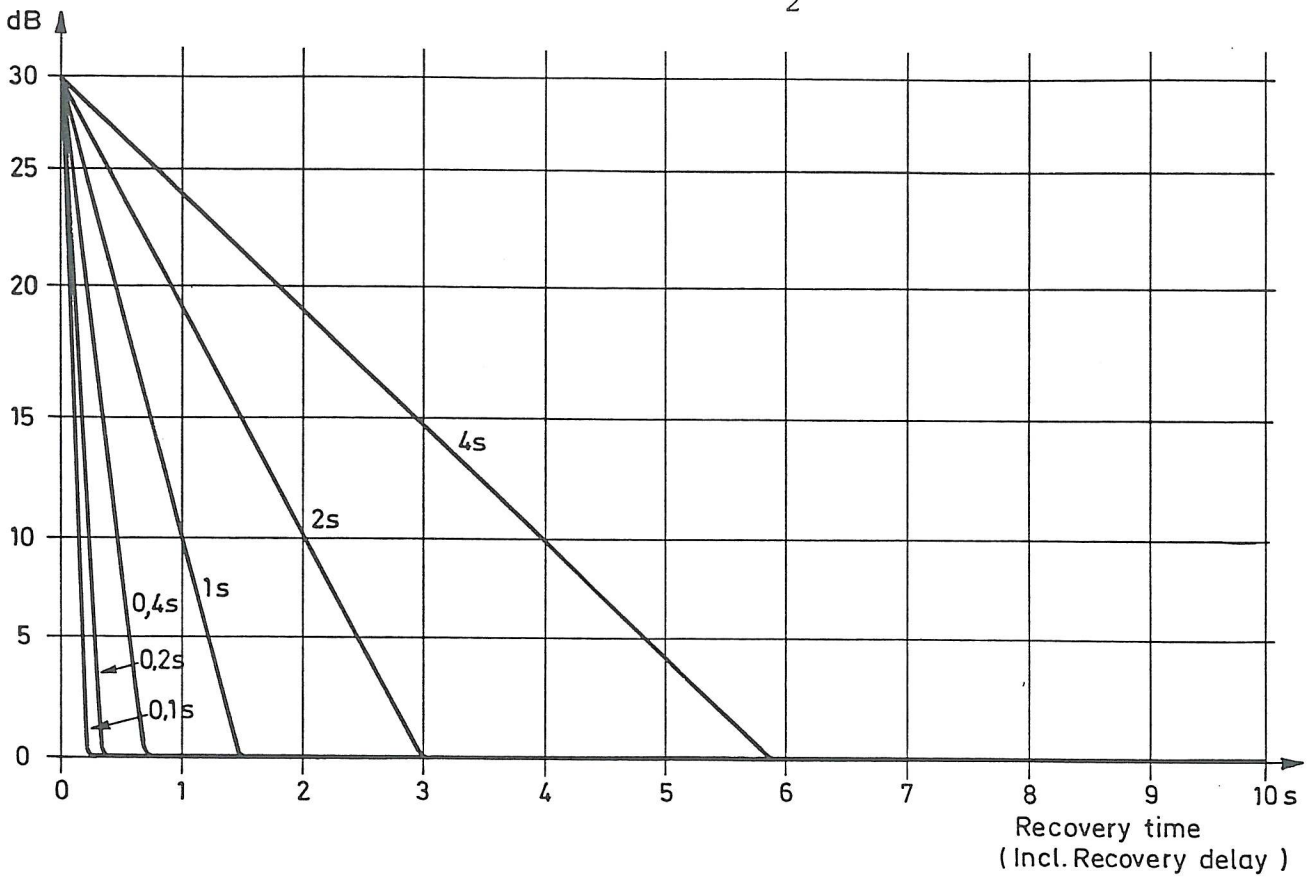



Fig. 3 Recovery vs time and settings of $T_2$.

$T_1$ = 0,1s tone-burst = 10s

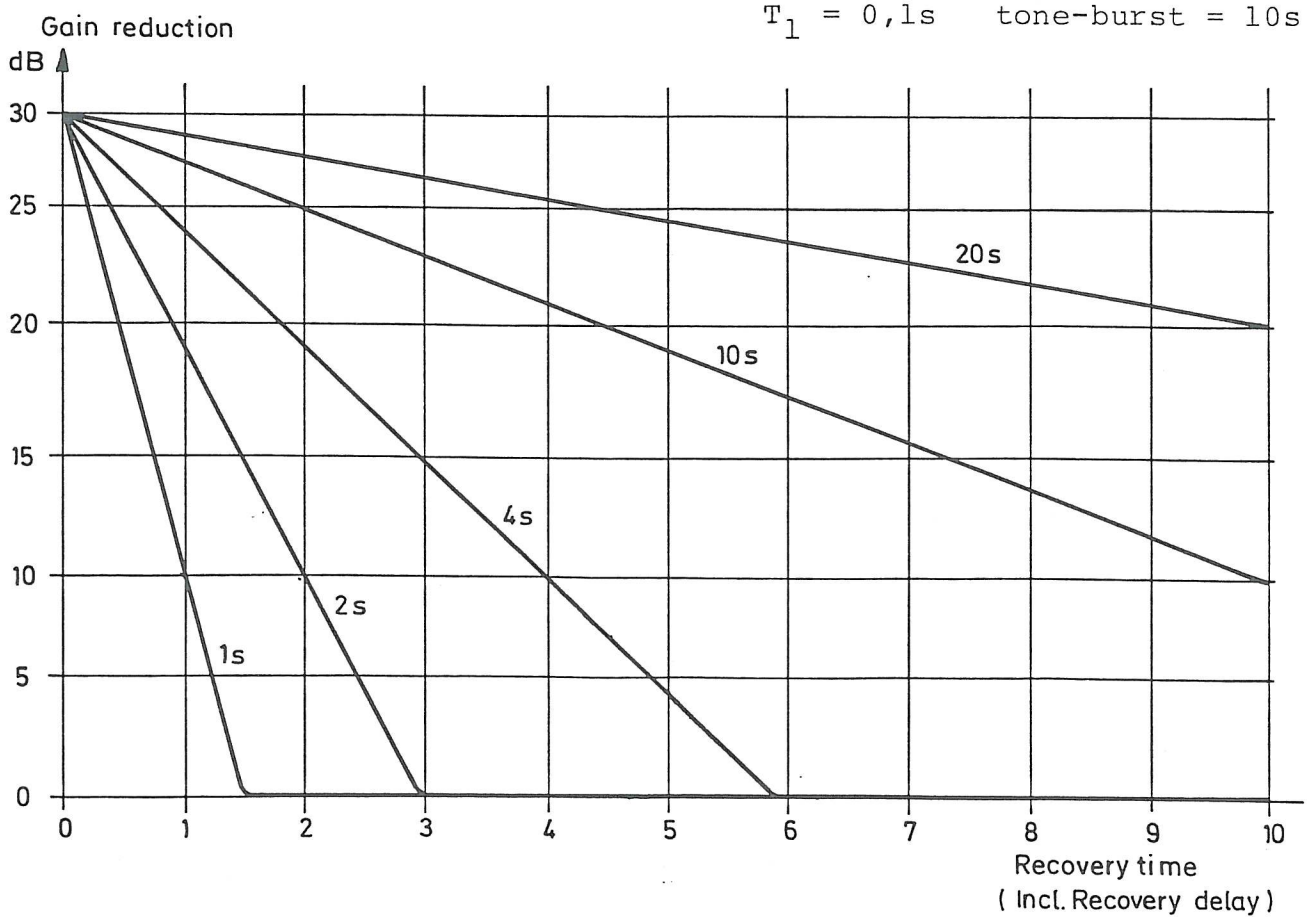


Fig. 4 Recovery vs time and tone-burst length.

$T_1$ = 1s $T_2$ = 10s

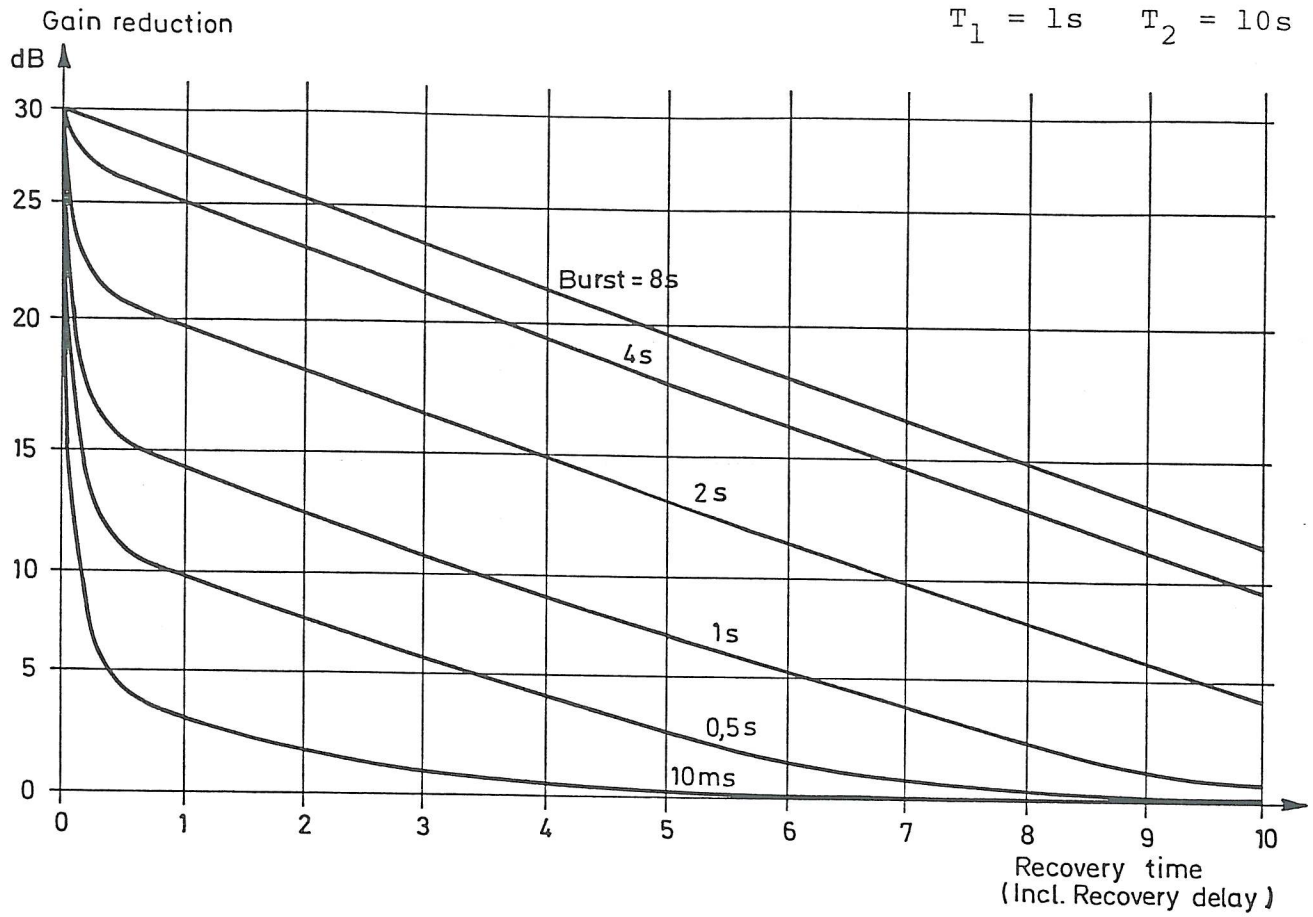



Fig. 5 Recovery vs time and tone-burst length.

$T_1$ = 4s $T_2$ = 10s

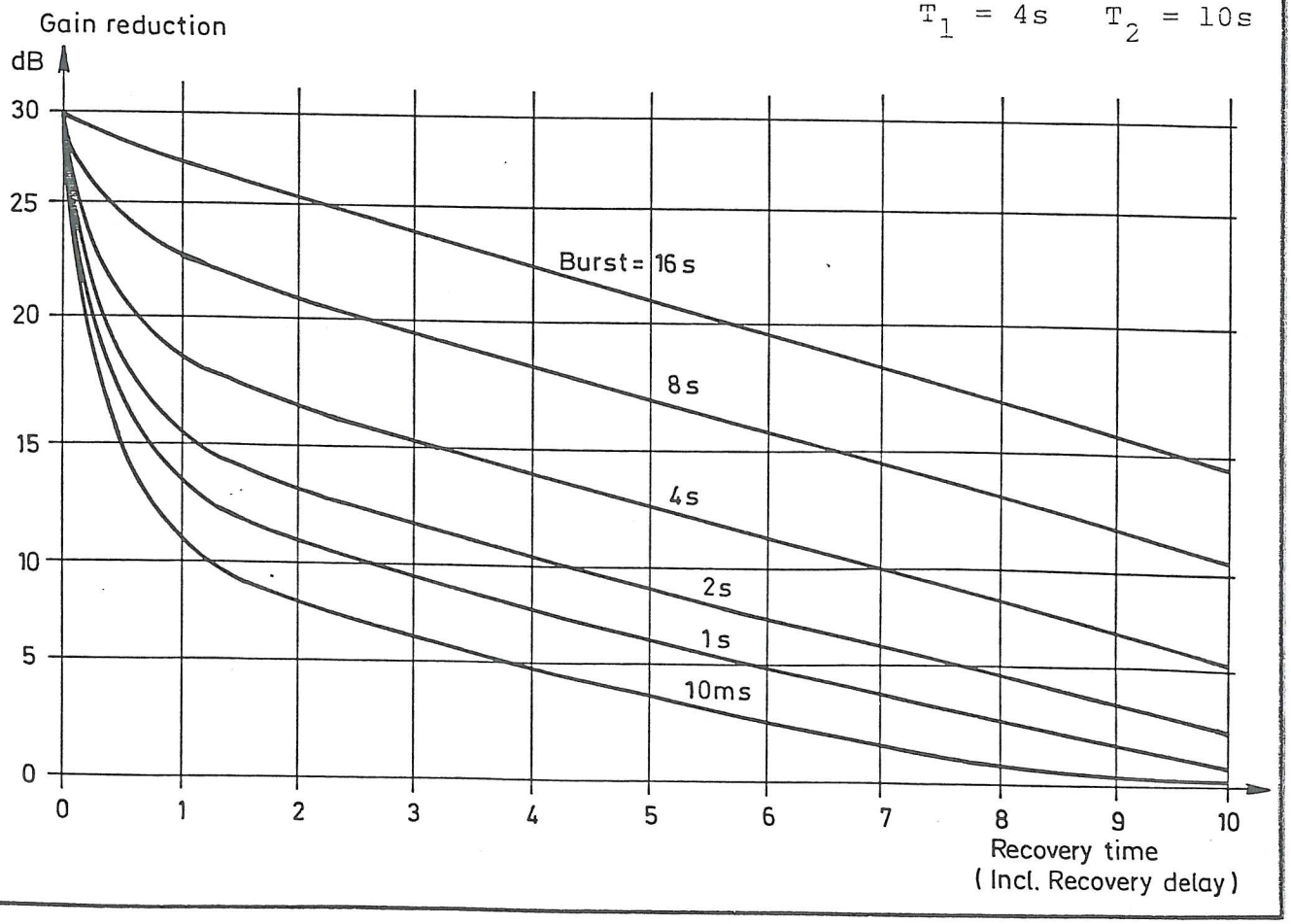
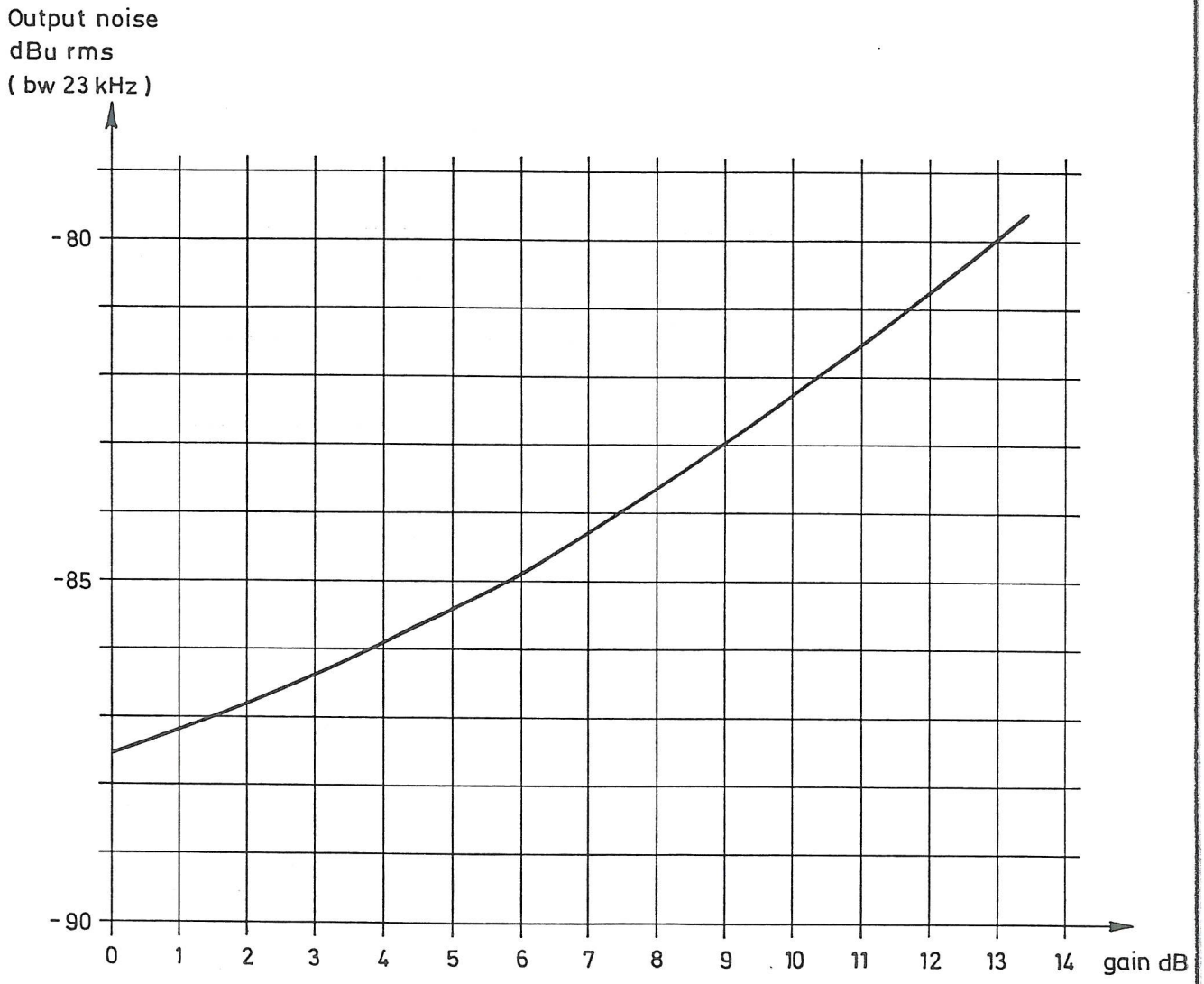
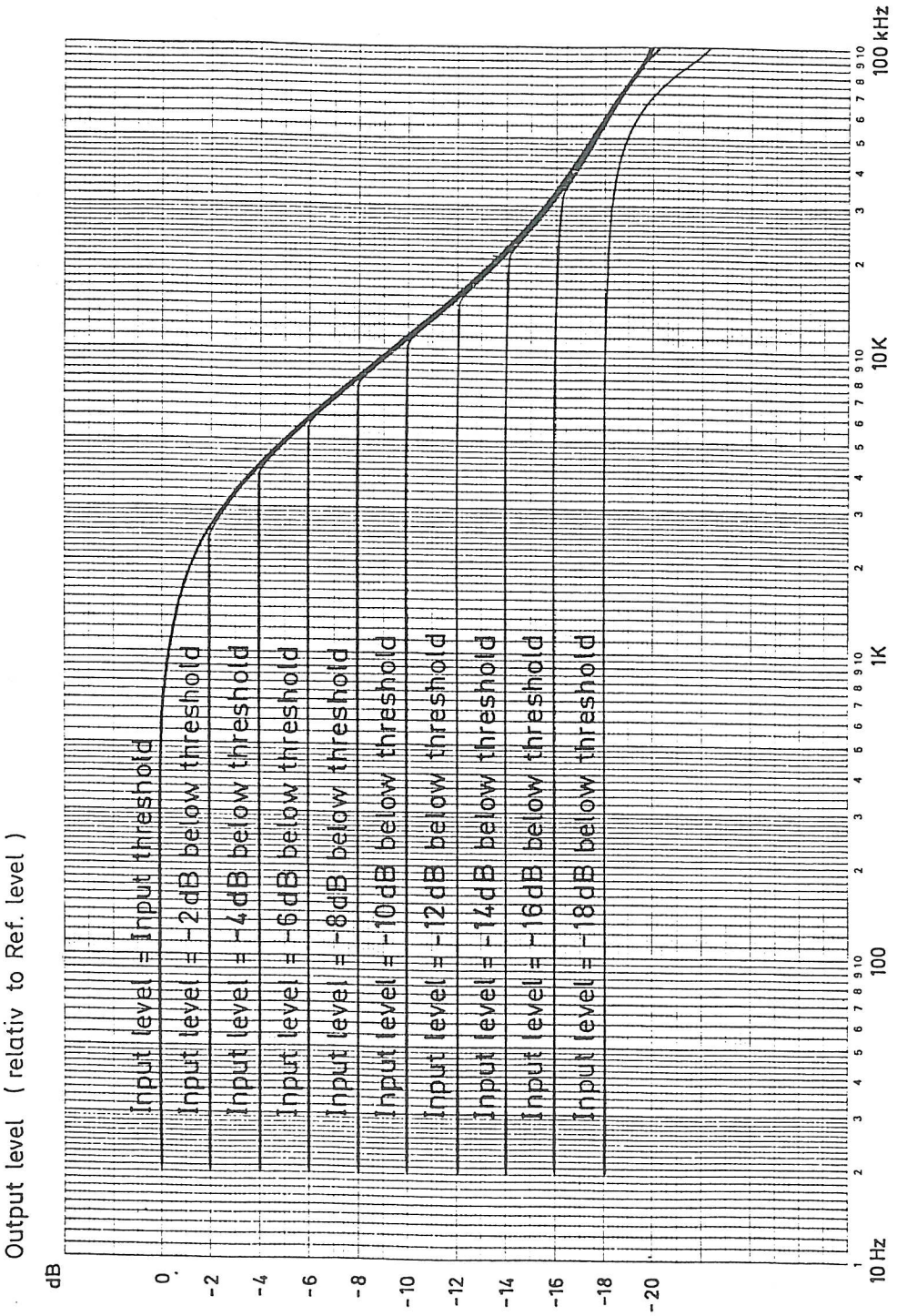


Fig. 6.


Output noise
dBu rms
( bw 23 kHz )
-80
-85
-90
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
gain dB

22.7.1986.

Fig. 7.

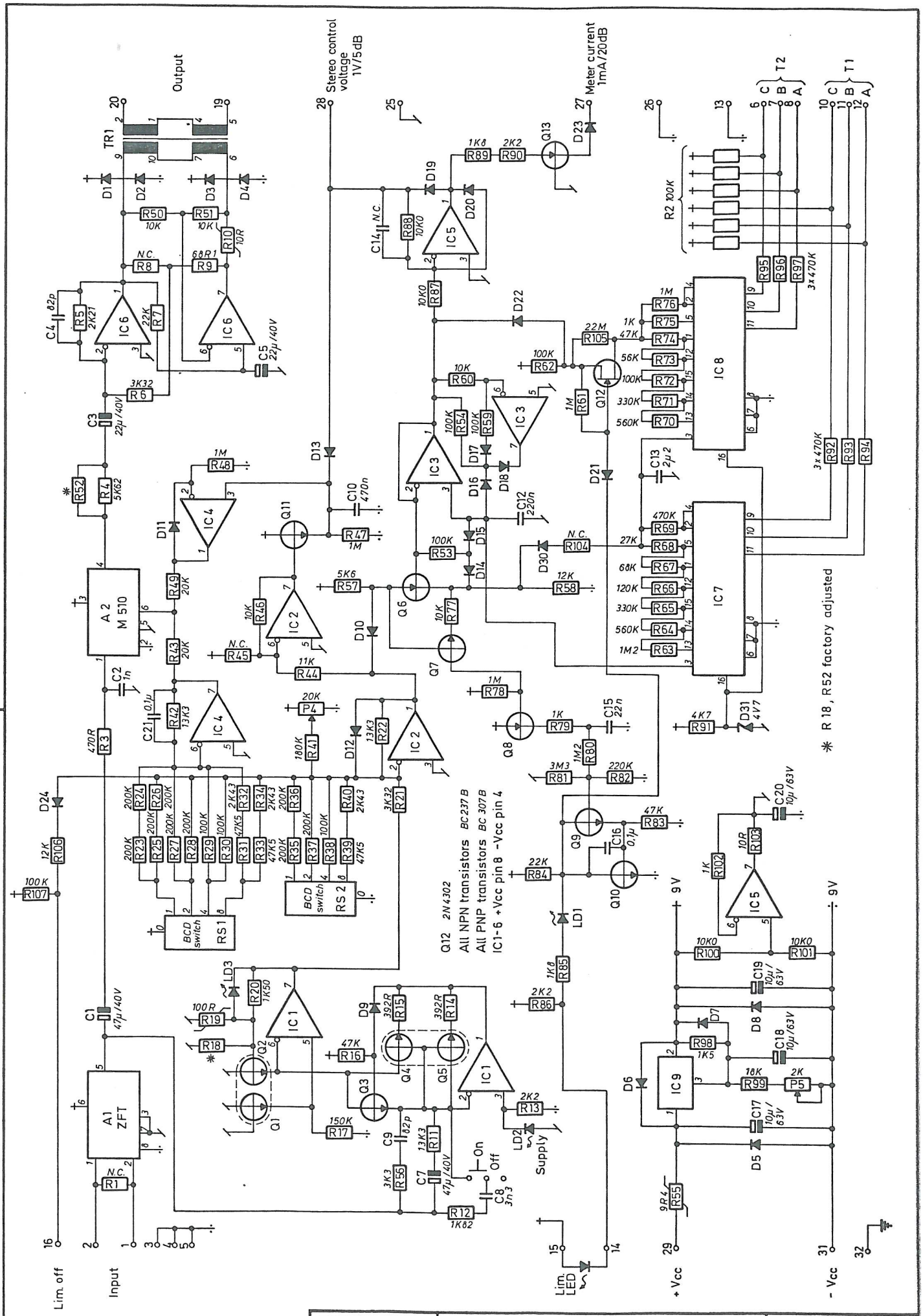



Threshold level with 50 µs pre-emphassis us. frequency and input level

Normally the limiter amplifier will stay correctly adjusted, except when component has failed and has been replaced; then it may be necessary to make certain adjustments.

$P_5$ adjusts the supply voltage, 18V $\pm$0.1V

$P_4$ adjusts the limiting threshold




| | |
|---|---|
| Målestok : | |
| Konstruktør : P. J. | |
| Tegnet : 28.10.81.TL | |
| Godkendt : | |
| Revideret : 3/2.1189 | |

Limiter Amplifier 179-400

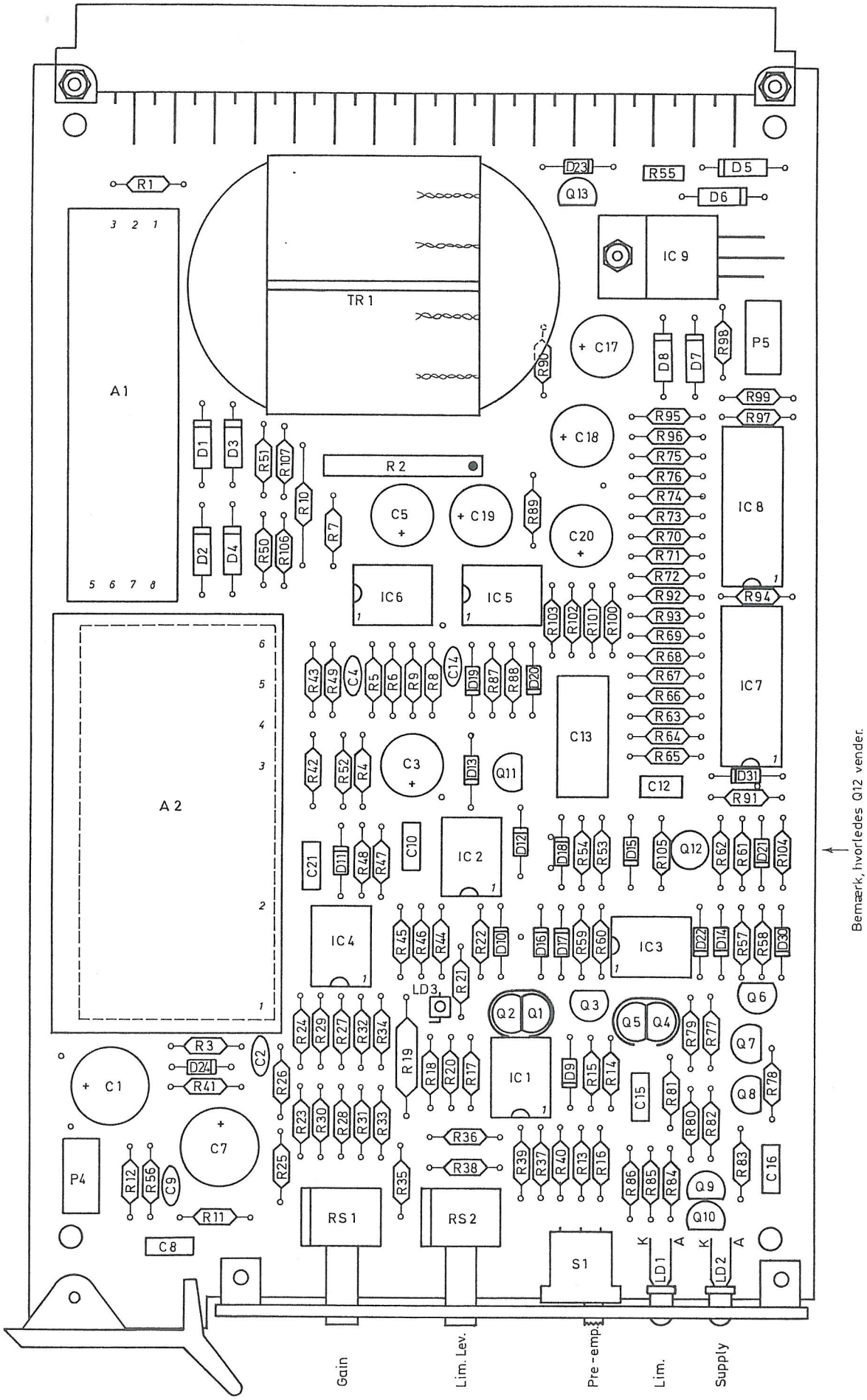
Schematic diagram

NTP ELEKTRONIK A/S

179-4030-A-3

AGF 1257

Rettelser




| | |
|---|---|
| Mål | : 100 x 160 |
| Konstruktør: | P. J. |
| Tegnet | : 30.10.81.T.L. |
| Godkendt | : |
| Revideret | : 3/941201 |

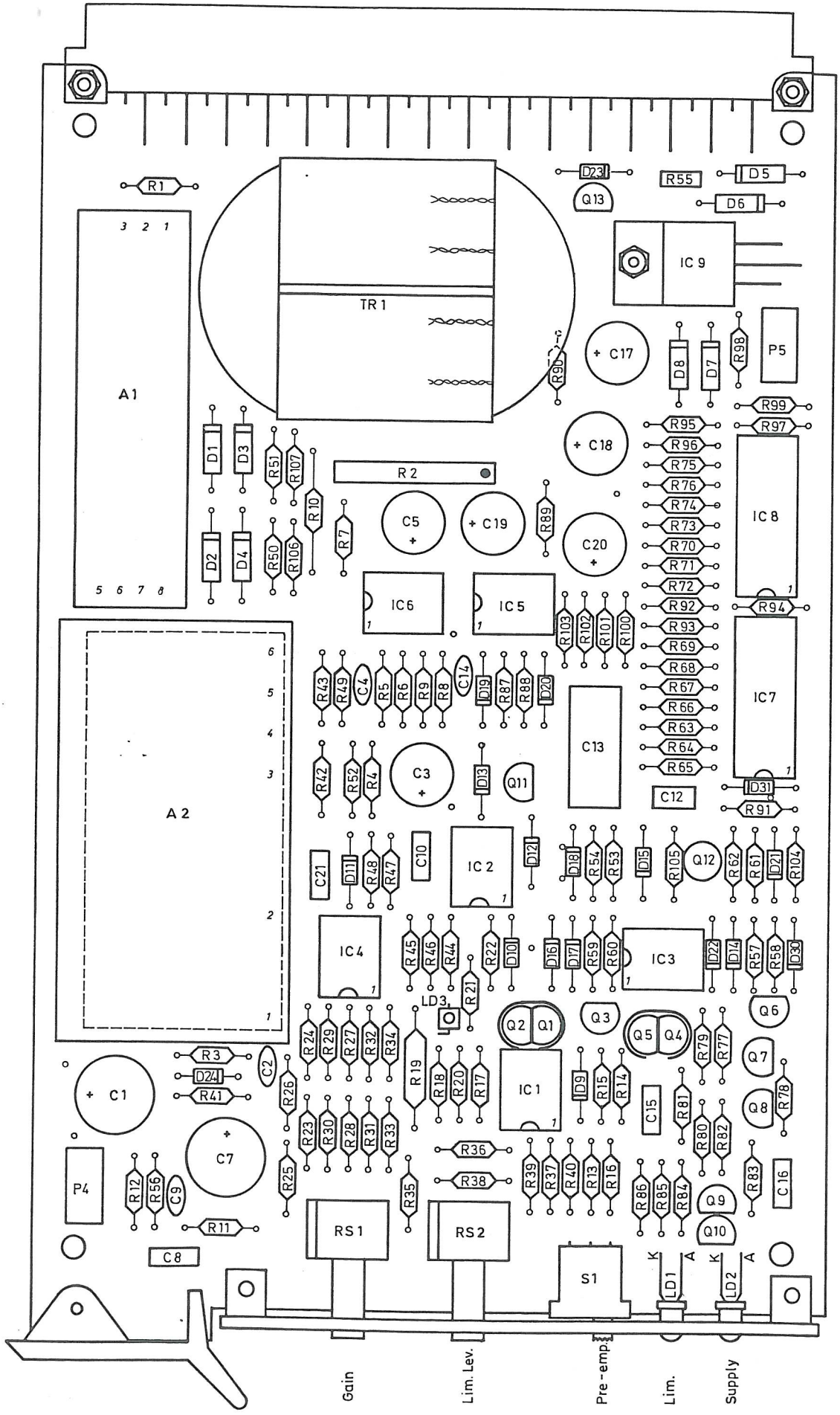
Limiter Amplifier 179-400

Components Lay-out

NTP

NTP ELEKTRONIK A/S

179-4041-A-3




| | |
|---|---|
| Mål | : 100 x 160 |
| Konstruktør | : P. J. |
| Tegnet | : 30.10.81.T.L. |
| Godkendt | : |
| Revideret | : 2 |

Limiter Amplifier 179-400

Components Lay-out

NTP

NTP ELEKTRONIK A/S

179-4041-A-3

NTP 179-40X LIMITER AMPLIF. BAS. NO CONN. PARTS LIST

| REF.NO | | NTP-ID. | DESCRIPTION | QTY | MANUFACT/DRW.NO. | PART NO. |
|---|---|---|---|---|---|---|
| | 1 | 179-4040 | P.C.BOARD | 1 | CAD | 179-4040 |
| | 2 | 179-4054 | FRONTPLATE | 1 | 179-4054-A-4 | 179-4054 |
| | 3 | 179-4051 | STAY FOR FRONTPLATE | 2 | 179-4051-A-4 | 179-4051 |
| | 4 | 179-4053 | SCREEN PLATE | 1 | 179-4053-A-4 | 179-4053 |
| | 5 | 179-4055 | ISOLATIONS PLATE | 1 | 179-4055-A-4 | 179-4055 |
| | 6 | 179-4056 | SCREENPLATE | 1 | 179-4056-A-4 | 179-4056 |
| | 7 | 512-1151 | SOLDERING POST | 4 | 512-1151-A-4 | 512-1151 |
| | 10 | MMA-0030 | NUT STEEL 3 MM | 2 | HFC 9832 | DIN 934 3MG |
| | 11 | MSB-2003 | SCREW BIX 2 X 3 | 4 | BIX | LKCS 2 X 3 |
| | 12 | MSB-3006 | SCREW BIX 3 X 6 | 1 | BIX | LKCS 3 X 6 |
| | 13 | MSC-2504 | SCREW 2,5 X 4 CHJ | 2 | HFC 9033 | 2.5X4 CHJ |
| | 15 | MTU-2504 | SCREW CROSS HEAD 2.5 X 4 UHJ | 2 | HFC 9040 | 2.5 X 4 UHJX |
| | 16 | MYA-0001 | CARD EJECTOR | 1 | VERO | C12409/1 TOP |
| A | 1 | 250-300J | ZFT-MODULE, 20K | 1 | 250-3041-J-4 | 250-300J |
| A | 2 | 250-520B | VCA MODULE | 1 | 250-5241-B-4 | 250-520B |
| C | 1 | CFG-0847 | CAP ELECTROLYTIC 47UF/40V | 1 | SIEMENS B41316 | B41316 A7476 V |
| C | 2 | CCA-0410 | CAP CERAMIC 1NF/63V | 1 | PH 2222 629 | 2222 629 02102 |
| C | 3 | CFG-0822 | CAP ELECTROLYTIC 22UF/40V | 1 | SIEMENS B41316 | B41316 A7226 V |
| C | 4 | CCB-0282 | CAP CERAMIC 82PF/100V | 1 | PH 2222 632 | 2222 632 58829 |
| C | 5 | CFG-0822 | CAP ELECTROLYTIC 22UF/40V | 1 | SIEMENS B41316 | B41316 A7226 V |
| C | 7 | CFG-0847 | CAP ELECTROLYTIC 47UF/40V | 1 | SIEMENS B41316 | B41316 A7476 V |
| C | 8 | CKK-0433 | CAP POLYESTER 3.3NF/400V | 1 | SIEMENS B32560 | B32560 D6332 J |
| C | 9 | CCB-0282 | CAP CERAMIC 82PF/100V | 1 | PH 2222 632 | 2222 632 58829 |
| C | 10 | CKH-0647 | CAP POLYESTER 470NF/100V | 1 | SIEMENS B32560 | B32560 D1474 J |
| C | 12 | CKH-0622 | CAP POLYESTER 220NF/100V | 1 | SIEMENS B32560 | B32560 D1224 J |
| C | 13 | CKQ-0722 | CAP POLYESTER 2.2UF/100V | 1 | SIEMENS B32562 | B32562 D1225 J |
| C | 15 | CKI-0522 | CAP POLYESTER 22NF/250V | 1 | SIEMENS B32560 | B32560 D3223 J |
| C | 16 | CKH-0610 | CAP POLYESTER 100NF/100V | 1 | SIEMENS B32560 | B32560 D1104 J |
| C | 17 | CFH-0810 | CAP ELECTROLYTIC 10UF/63V | 1 | SIEMENS B41316 | B41316 A8106 V |
| C | 18 | CFH-0810 | CAP ELECTROLYTIC 10UF/63V | 1 | SIEMENS B41316 | B41316 A8106 V |
| C | 19 | CFH-0810 | CAP ELECTROLYTIC 10UF/63V | 1 | SIEMENS B41316 | B41316 A8106 V |
| C | 20 | CFH-0810 | CAP ELECTROLYTIC 10UF/63V | 1 | SIEMENS B41316 | B41316 A8106 V |
| C | 21 | CKH-0610 | CAP POLYESTER 100NF/100V | 1 | SIEMENS B32560 | B32560 D1104 J |
| D | 1 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 2 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 3 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 4 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |

**NTP Parts List**
as of date 22-3 1991.
Page 1 of 6.
List No.: 179-4031-A-4

NTP 179-40X LIMITER AMPLIF. BAS. NO CONN. PARTS LIST

| REF.NO | | NTP-ID. | DESCRIPTION | QTY | MANUFACT/DRW.NO. | PART NO. |
|---|---|---|---|---|---|---|
| D | 5 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 6 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 7 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 8 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 9 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 10 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 11 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 12 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 13 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 14 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 15 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 16 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 17 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 18 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 19 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 20 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 21 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 22 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 23 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 24 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 31 | QZD-0047 | ZENERDIODE 4,7V | 1 | DO-35 | ZPD 4,7 |
| IC | 1 | ILA-412 | OP-AMP | 1 | NAT. LF412 | LF 412 |
| IC | 2 | ILA-412 | OP-AMP | 1 | NAT. LF412 | LF 412 |
| IC | 3 | ILA-353 | OP-AMP | 1 | NAT. LF353 | LF 353 |
| IC | 4 | ILA-353 | OP-AMP | 1 | NAT. LF353 | LF 353 |
| IC | 5 | ILA-353 | OP-AMP | 1 | NAT. LF353 | LF 353 |
| IC | 6 | ILA-5532 | OP-AMP | 1 | TEX. NE5532P | NE 5532P |
| IC | 7 | ICA-4051 | 8-CHANNEL ANALOG MULTIPLX. | 1 | RCA CD4051BE | RCA CD4051BE |
| IC | 8 | ICA-4051 | 8-CHANNEL ANALOG MULTIPLX. | 1 | RCA CD4051BE | RCA CD4051BE |
| IC | 9 | ILR-317T | SPÆNDINGS REGULATOR | 1 | TEX. TO-220 | LM 317T |
| LD | 1 | OES-0106 | LED RED 1x1 | 1 | SIEMENS CQV 11 | Q62703-573 |
| LD | 2 | OES-0108 | LED GREEN 1x1 | 1 | SIEMENS CQV 15 | Q62703 Q586 |
| LD | 3 | OES-0116 | LED GREEN 1x1 | 1 | SIEMENS LD 471 | Q62703-Q102 |
| P | 4 | RFD-5200 | TRIMPOTENTIOMETER 20K | 1 | BOURNS 3386 | 3386H-1-203 |
| P | 5 | RFD-4200 | TRIMPOTENTIOMETER 2K | 1 | BOURNS 3386 | 3386H-1-202 |
| Q | 3 | QBN-0237 | TRANSISTOR, NPN | 1 | TO-92 | BC237 B |
| Q | 6 | QBP-0307 | TRANSISTOR, PNP | 1 | TO-92 | BC307 |

**NTP Parts List**

as of date 22-3 1991.

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List No.: 179-4031-A-4

NTP 179-40X LIMITER AMPLIF. BAS. NO CONN. PARTS LIST

| REF.NO | NTP-ID. | DESCRIPTION | QTY | MANUFACT/DRW.NO. | PART NO. |
|---|---|---|---|---|---|
| Q 7 | QBN-0237 | TRANSISTOR, NPN | 1 | TO-92 | BC237 B |
| Q 8 | QBP-0307 | TRANSISTOR, PNP | 1 | TO-92 | BC307 |
| Q 9 | QBN-0237 | TRANSISTOR, NPN | 1 | TO-92 | BC237 B |
| Q 10 | QBN-0237 | TRANSISTOR, NPN | 1 | TO-92 | BC237 B |
| Q 11 | QBN-0237 | TRANSISTOR, NPN | 1 | TO-92 | BC237 B |
| Q 12 | QFN-4302 | FET | 1 | QFN-4302 | 2N 4302 |
| Q 13 | QBP-0307 | TRANSISTOR, PNP | 1 | TO-92 | BC307 |
| Q 1/2 | QBM-0237-2 | TRANSISTORPAIR,NPN | 1 | TO 92 | BC 237 PAR |
| Q 4/5 | QBM-0237-2 | TRANSISTORPAIR,NPN | 1 | TO 92 | BC 237 PAR |
| R 2 | RAB-6100 | RESISTOR NETWORK 100K 2% | 1 | SIL 8PIN RÆK | 4308R 101 104 |
| R 3 | RCA-3470 | RESISTOR CARBON 470R 0.66W 5 | 1 | MBB 0207 | MBB 0207 470R |
| R 4 | RMA-4562 | RESISTOR METAL 5K62 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 55622 |
| R 5 | RMA-4221 | RESISTOR METAL 2K21 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52212 |
| R 6 | RMA-4332 | RESISTOR METAL 3K32 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 53322 |
| R 7 | RCA-5220 | RESISTOR CARBON 22K 0.66W 5% | 1 | MBB 0207 | MBB 0207 22K |
| R 9 | RMA-2681 | RESISTOR METAL 68R1 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 56819 |
| R 10 | RTA-2100 | RESISTOR PTC 10R 0.13W 2% | 1 | PTC GT-55 | LP 1/8 10R |
| R 11 | RMA-5133 | RESISTOR METAL 13K3 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51333 |
| R 12 | RMA-4182 | RESISTOR METAL 1K82 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51822 |
| R 13 | RCA-4220 | RESISTOR CARBON 2K2 0.66W 5% | 1 | MBB 0207 | MBB 0207 2K2 |
| R 14 | RMA-3392 | RESISTOR METAL 392R 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 53921 |
| R 15 | RMA-3392 | RESISTOR METAL 392R 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 53921 |
| R 16 | RCA-5470 | RESISTOR CARBON 47K 0.66W 5% | 1 | MBB 0207 | MBB 0207 47K |
| R 17 | RMA-6150 | RESISTOR METAL 150K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51504 |
| R 19 | RWB-3100 | RESISTOR WIRE-WOUND 100R 1W | 1 | VITROHM 253-9 | 253-9 100R |
| R 20 | RMA-4150 | RESISTOR METAL 1K5 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51502 |
| R 21 | RMA-4332 | RESISTOR METAL 3K32 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 53322 |
| R 22 | RMA-5133 | RESISTOR METAL 13K3 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51333 |
| R 23 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 24 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 25 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 26 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 27 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 28 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 29 | RMA-6100 | RESISTOR METAL 100K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51004 |
| R 30 | RMA-6100 | RESISTOR METAL 100K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51004 |
| R 31 | RMA-5475 | RESISTOR METAL 47K5 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 54753 |

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NTP 179-40X LIMITER AMPLIF. BAS. NO CONN. PARTS LIST

| REF.NO | NTP-ID. | DESCRIPTION | QTY | MANUFACT/DRW.NO. | PART NO. |
|---|---|---|---|---|---|
| R 32 | RMA-4243 | RESISTOR METAL 2K43 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52432 |
| R 33 | RMA-5475 | RESISTOR METAL 47K5 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 54753 |
| R 34 | RMA-4243 | RESISTOR METAL 2K43 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52432 |
| R 35 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 36 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 37 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 38 | RMA-6100 | RESISTOR METAL 100K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51004 |
| R 39 | RMA-5475 | RESISTOR METAL 47K5 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 54753 |
| R 40 | RMA-4243 | RESISTOR METAL 2K43 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52432 |
| R 41 | RCA-6180 | RESISTOR CARBON 180K 0.66W 5 | 1 | MBB 0207 | MBB 180K |
| R 42 | RMA-5133 | RESISTOR METAL 13K3 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51333 |
| R 43 | RMA-5200 | RESISTOR METAL 20K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52003 |
| R 44 | RMA-5110 | RESISTOR METAL 11K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51103 |
| R 46 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 47 | RCA-7100 | RESISTOR CARBON 1M 0.66W 5% | 1 | MBB 0207 | MBB 0207 1M |
| R 48 | RCA-7100 | RESISTOR CARBON 1M 0.66W 5% | 1 | MBB 0207 | MBB 0207 1M |
| R 49 | RMA-5200 | RESISTOR METAL 20K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52003 |
| R 50 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 51 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 53 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | MBB 0207 | MBB 0207 100K |
| R 54 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | MBB 0207 | MBB 0207 100K |
| R 55 | RTC-1940 | RESISTOR PTC 9R4 | 1 | PTC Q63100 | P2390 C970 |
| R 56 | RCA-4330 | RESISTOR CARBON 3K3 0.66W 5% | 1 | MBB 0207 | MBB 0207 3K3 |
| R 57 | RCA-4560 | RESISTOR CARBON 5K6 0.66W 5% | 1 | MBB 0207 | MBB 0207 5K6 |
| R 58 | RCA-5120 | RESISTOR CARBON 12K 0.66W 5% | 1 | MBB 0207 | MBB 0207 12K |
| R 59 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | MBB 0207 | MBB 0207 100K |
| R 60 | RCA-5100 | RESISTOR CARBON 10K 0.66W 5% | 1 | MBB 0207 | MBB 0207 10K |
| R 61 | RCA-7100 | RESISTOR CARBON 1M 0.66W 5% | 1 | MBB 0207 | MBB 0207 1M |
| R 62 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | MBB 0207 | MBB 0207 100K |
| R 63 | RCA-7120 | RESISTOR CARBON 1M2 0.66W 5% | 1 | MBB 0207 | MBB 0207 1M2 |
| R 64 | RCA-6560 | RESISTOR CARBON 560K 0.66W 5 | 1 | MBB 0207 | MBB 0207 560K |
| R 65 | RCA-6330 | RESISTOR CARBON 330K 0.66W 5 | 1 | MBB 0207 | MBB 0207 330K |
| R 66 | RCA-6120 | RESISTOR CARBON 120K 0.66W 5 | 1 | MBB 0207 | MBB 0207 120K |
| R 67 | RCA-5680 | RESISTOR CARBON 68K 0.66W 5% | 1 | MBB 0207 | MBB 0207 68K |
| R 68 | RCA-5270 | RESISTOR CARBON 27K 0.66W 5% | 1 | MBB 0207 | MBB 0207 27K |
| R 69 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | MBB 0207 | MBB 0207 470K |
| R 70 | RCA-6560 | RESISTOR CARBON 560K 0.66W 5 | 1 | MBB 0207 | MBB 0207 560K |

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NTP 179-40X LIMITER AMPLIF. BAS. NO CONN. PARTS LIST

| REF.NO | NTP-ID. | DESCRIPTION | QTY | MANUFACT/DRW.NO. | PART NO. |
|---|---|---|---|---|---|
| R 71 | RCA-6330 | RESISTOR CARBON 330K 0.66W 5 | 1 | MBB 0207 | MBB 0207 330K |
| R 72 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | MBB 0207 | MBB 0207 100K |
| R 73 | RCA-5560 | RESISTOR CARBON 56K 0.66W 5% | 1 | MBB 0207 | MBB 0207 56K |
| R 74 | RCA-5470 | RESISTOR CARBON 47K 0.66W 5% | 1 | MBB 0207 | MBB 0207 47K |
| R 75 | RCA-4100 | RESISTOR CARBON 1K 0.66W 5% | 1 | MBB 0207 | MBB 0207 1K |
| R 76 | RCA-7100 | RESISTOR CARBON 1M 0.66W 5% | 1 | MBB 0207 | MBB 0207 1M |
| R 77 | RCA-5100 | RESISTOR CARBON 10K 0.66W 5% | 1 | MBB 0207 | MBB 0207 10K |
| R 78 | RCA-7100 | RESISTOR CARBON 1M 0.66W 5% | 1 | MBB 0207 | MBB 0207 1M |
| R 79 | RCA-4100 | RESISTOR CARBON 1K 0.66W 5% | 1 | MBB 0207 | MBB 0207 1K |
| R 80 | RCA-7120 | RESISTOR CARBON 1M2 0.66W 5% | 1 | MBB 0207 | MBB 0207 1M2 |
| R 81 | RCA-7330 | RESISTOR CARBON 3M3 0.66W 5% | 1 | MBB 0207 | MBB 0207 3M3 |
| R 82 | RCA-6220 | RESISTOR CARBON 220K 0.66W 5 | 1 | MBB 0207 | MBB 0207 220K |
| R 83 | RCA-5470 | RESISTOR CARBON 47K 0.66W 5% | 1 | MBB 0207 | MBB 0207 47K |
| R 84 | RCA-5220 | RESISTOR CARBON 22K 0.66W 5% | 1 | MBB 0207 | MBB 0207 22K |
| R 85 | RCA-4180 | RESISTOR CARBON 1K8 0.66W 5% | 1 | MBB 0207 | MBB 0207 1K8 |
| R 86 | RCA-4220 | RESISTOR CARBON 2K2 0.66W 5% | 1 | MBB 0207 | MBB 0207 2K2 |
| R 87 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 88 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 89 | RCA-4180 | RESISTOR CARBON 1K8 0.66W 5% | 1 | MBB 0207 | MBB 0207 1K8 |
| R 90 | RCA-4220 | RESISTOR CARBON 2K2 0.66W 5% | 1 | MBB 0207 | MBB 0207 2K2 |
| R 91 | RCA-4470 | RESISTOR CARBON 4K7 0.66W 5% | 1 | MBB 0207 | MBB 0207 4K7 |
| R 92 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | MBB 0207 | MBB 0207 470K |
| R 93 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | MBB 0207 | MBB 0207 470K |
| R 94 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | MBB 0207 | MBB 0207 470K |
| R 95 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | MBB 0207 | MBB 0207 470K |
| R 96 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | MBB 0207 | MBB 0207 470K |
| R 97 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | MBB 0207 | MBB 0207 470K |
| R 98 | RCA-4150 | RESISTOR CARBON 1K5 0.66W 5% | 1 | MBB 0207 | MBB 0207 1K5 |
| R 99 | RCA-5180 | RESISTOR CARBON 18K 0.66W 5% | 1 | MBB 0207 | MBB 0207 18K |
| R 100 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 101 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 102 | RCA-4100 | RESISTOR CARBON 1K 0.66W 5% | 1 | MBB 0207 | MBB 0207 1K |
| R 103 | RCA-2100 | RESISTOR CARBON 10R 0.66W 5% | 1 | MBB 0207 | MBB 0207 10R |
| R 105 | RXA-8220 | RESISTOR HIGHVOLT 22M 0.25W | 1 | PHILIPS VR25 | 2322 241 13226 |
| R 106 | RCA-5120 | RESISTOR CARBON 12K 0.66W 5% | 1 | MBB 0207 | MBB 0207 12K |
| R 107 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | MBB 0207 | MBB 0207 100K |
| RS 1 | SRB-0004 | ROTARY SWITCH 9 POS YELLOW | 1 | HOPT & S. 422 | 020 |

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NTP 179-40X LIMITER AMPLIF. BAS. NO CONN. PARTS LIST

| REF.NO | | NTP-ID. | DESCRIPTION | | QTY | MANUFACT/DRW.NO. | PART NO. |
|---|---|---|---|---|---|---|---|
| RS | 2 | SRB-0004 | ROTARY SWITCH 9 POS YELLOW | | 1 | HOPT & S. 422 | 020 |
| S | 1 | SSE-0112 | SLIDE SWITCH SPDT | | 1 | ALCO TSS | 11 DG RA |
| TR | 1 | LTL-0008 | OUTPUTTRANSFORMER | 1.2 | 1 | LUNDAHL 5011 | LL 5011 |

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| REF.NO | | NTP-ID. | DESCRIPTION | QTY | MANUFACT/DRW.NO. | PART NO. |
|---|---|---|---|---|---|---|
| | 1 | 179-4040 | P.C.BOARD | 1 | 179-4040-A-3 | 179-4040 |
| | 2 | 179-4054 | FRONTPLATE | 1 | 179-4054-A-4 | 179-4054 |
| | 3 | 179-4051 | STAY FOR FRONTPLATE | 2 | 179-4051-A-4 | 179-4051 |
| | 4 | 179-4053 | SCREEN PLATE | 1 | 179-4053-A-4 | 179-4053 |
| | 5 | 179-4055 | ISOLATIONS PLATE | 1 | 179-4055-A-4 | 179-4055 |
| | 6 | 179-4056 | SCREENPLATE | 1 | 179-4056-A-4 | 179-4056 |
| | 7 | 512-1151 | SOLDERING POST | 4 | 512-1151-A-4 | 512-1151 |
| | 8 | KEM-6406 | EUROCONNECTOR 64P ANGLE, MAL | 1 | ELCO 8257 | 8257 096 000 |
| | 9 | MMA-0025 | NUT STEEL 2.5 MM | 2 | HFC-9032 | 6 KT |
| | 10 | MMA-0030 | NUT STEEL 3 MM | 2 | HFC 9832 | DIN 934 3MG |
| | 11 | MSB-2003 | SCREW BIX 2 X 3 | 4 | BIX | LKCS 2 X 3 |
| | 12 | MSB-3006 | SCREW BIX 3 X 6 | 1 | BIX | LKCS 3 X 6 |
| | 13 | MSC-2504 | SCREW 2,5 X 4 CHJ | 2 | HFC 9033 | 2.5X4 CHJ |
| | 14 | MSC-2510 | SCREW 2,5 X 10 CHJZ | 2 | HFC 9033 | 2.5 X 10 CHJ |
| | 15 | MTU-2504 | SCREW CROSS HEAD 2.5 X 4 UHJ | 2 | HFC 9040 | 2.5 X 4 UHJX |
| | 16 | MYA-0001 | CARD EJECTOR | 1 | VERO | C12409/1 TOP |
| A | 1 | 250-300J | ZFT-MODULE, 20K | 1 | 250-300J | 250-300J |
| A | 2 | 250-520B | VCA MODULE | 1 | 250-5241-B-4 | 250-520B |
| C | 1 | CFG-0847 | CAP ELECTROLYTIC 47UF/40V | 1 | SIEMENS B41316 | B41316 A7476 V |
| C | 2 | CCA-0410 | CAP CERAMIC 1NF/63V | 1 | PH 2222 629 | 2222 629 02102 |
| C | 3 | CFG-0822 | CAP ELECTROLYTIC 22UF/40V | 1 | SIEMENS B41316 | B41316 A7226 V |
| C | 4 | CCB-0282 | CAP CERAMIC 82PF/100V | 1 | PH 2222 632 | 2222 632 58829 |
| C | 5 | CFG-0822 | CAP ELECTROLYTIC 22UF/40V | 1 | SIEMENS B41316 | B41316 A7226 V |
| C | 7 | CFG-0847 | CAP ELECTROLYTIC 47UF/40V | 1 | SIEMENS B41316 | B41316 A7476 V |
| C | 8 | CKK-0433 | CAP POLYESTER 3.3NF/400V | 1 | SIEMENS B32560 | B32560 D6332 J |
| C | 9 | CCB-0282 | CAP CERAMIC 82PF/100V | 1 | PH 2222 632 | 2222 632 58829 |
| C | 10 | CKK-0510 | CAP POLYESTER 10NF/400V | 1 | SIEMENS B32560 | B32560 D6103 J |
| C | 12 | CKH-0622 | CAP POLYESTER 220NF/100V | 1 | SIEMENS B32560 | B32560 D1224 J |
| C | 13 | CKQ-0722 | CAP POLYESTER 2.2UF/100V | 1 | SIEMENS B32562 | B32562 D1225 J |
| C | 15 | CKI-0522 | CAP POLYESTER 22NF/250V | 1 | SIEMENS B32560 | B32560 D3223 J |
| C | 16 | CKH-0610 | CAP POLYESTER 100NF/100V | 1 | SIEMENS B32560 | B32560 D1104 J |
| C | 17 | CFH-0810 | CAP ELECTROLYTIC 10UF/63V | 1 | SIEMENS B41316 | B41316 A8106 V |
| C | 18 | CFH-0810 | CAP ELECTROLYTIC 10UF/63V | 1 | SIEMENS B41316 | B41316 A8106 V |
| C | 19 | CFH-0810 | CAP ELECTROLYTIC 10UF/63V | 1 | SIEMENS B41316 | B41316 A8106 V |
| C | 20 | CFH-0810 | CAP ELECTROLYTIC 10UF/63V | 1 | SIEMENS B41316 | B41316 A8106 V |
| C | 21 | CKH-0610 | CAP POLYESTER 100NF/100V | 1 | SIEMENS B32560 | B32560 D1104 J |
| D | 1 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 2 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 3 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 4 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |

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| REF.NO | | NTP-ID. | DESCRIPTION | QTY | MANUFACT/DRW.NO. | PART NO. |
|---|---|---|---|---|---|---|
| D | 5 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 6 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 7 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 8 | QDS-4002 | DIODE, SILICIUM | 1 | F-126 | 1N 4002 |
| D | 9 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 10 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 11 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 12 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 13 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 14 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 15 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 16 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 17 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 18 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 19 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 20 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 21 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 22 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 23 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 24 | QDS-4148 | DIODE, SILICIUM | 1 | QDS-4148 | 1N 4148 |
| D | 31 | QZD-0047 | ZENERDIODE 4,7V | 1 | DO-35 | ZPD 4,7 |
| IC | 1 | ILA-412 | OP-AMP | 1 | NAT. LF412 | LF 412 |
| IC | 2 | ILA-412 | OP-AMP | 1 | NAT. LF412 | LF 412 |
| IC | 3 | ILA-353 | OP-AMP | 1 | NAT. LF353 | LF 353 |
| IC | 4 | ILA-353 | OP-AMP | 1 | NAT. LF353 | LF 353 |
| IC | 5 | ILA-353 | OP-AMP | 1 | NAT. LF353 | LF 353 |
| IC | 6 | ILA-5532 | OP-AMP | 1 | TEX. NE5532P | NE 5532P |
| IC | 7 | ICA-4051 | 8-CHANNEL ANALOG MULTIPLX. | 1 | RCA CD4051BE | RCA CD4051BE |
| IC | 8 | ICA-4051 | 8-CHANNEL ANALOG MULTIPLX. | 1 | RCA CD4051BE | RCA CD4051BE |
| IC | 9 | ILR-317T | SPÆNDINGS REGULATOR | 1 | TEX. TO-220 | LM 317T |
| LD | 1 | OES-0106 | LED RED 1x1 | 1 | SIEMENS CQV 11 | Q62703-573 |
| LD | 2 | OES-0108 | LED GREEN 1x1 | 1 | SIEMENS CQV 15 | Q62703 Q586 |
| LD | 3 | OES-0116 | LED GREEN 1x1 | 1 | SIEMENS LD 471 | Q62703-Q102 |
| P | 4 | RFD-5200 | TRIMPOTENTIOMETER 20K | 1 | BOURNS 3386 | 3386H-1-203 |
| P | 5 | RFD-4200 | TRIMPOTENTIOMETER 2K | 1 | BOURNS 3386 | 3386H-1-202 |
| Q | 3 | QBN-0237 | TRANSISTOR, NPN | 1 | TO-92 | BC237 B |
| Q | 6 | QBP-0307 | TRANSISTOR, PNP | 1 | TO-92 | BC307 |
| Q | 7 | QBN-0237 | TRANSISTOR, NPN | 1 | TO-92 | BC237 B |
| Q | 8 | QBP-0307 | TRANSISTOR, PNP | 1 | TO-92 | BC307 |
| Q | 9 | QBN-0237 | TRANSISTOR, NPN | 1 | TO-92 | BC237 B |

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| REF.NO | NTP-ID. | DESCRIPTION | QTY | MANUFACT/DRW.NO. | PART NO. |
|---|---|---|---|---|---|
| Q 10 | QBN-0237 | TRANSISTOR, NPN | 1 | TO-92 | BC237 B |
| Q 11 | QBN-0237 | TRANSISTOR, NPN | 1 | TO-92 | BC237 B |
| Q 12 | QFN-4302 | FET | 1 | QFN-4302 | 2N 4302 |
| Q 13 | QBP-0307 | TRANSISTOR, PNP | 1 | TO-92 | BC307 |
| Q 1/2 | QBM-0237-2 | TRANSISTORPAIR,NPN | 1 | TO 92 | BC 237 PAR |
| Q 4/5 | QBM-0237-2 | TRANSISTORPAIR,NPN | 1 | TO 92 | BC 237 PAR |
| R 2 | RAB-6100 | RESISTOR NETWORK 100K 2% | 1 | SIL 8PIN RÆK | 4308R 101 104 |
| R 3 | RCA-3470 | RESISTOR CARBON 470R 0.66W 5 | 1 | SBB 0207 | SBB 0207 470R |
| R 4 | RMA-4562 | RESISTOR METAL 5K62 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 55622 |
| R 5 | RMA-4221 | RESISTOR METAL 2K21 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52212 |
| R 6 | RMA-4332 | RESISTOR METAL 3K32 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 53322 |
| R 7 | RCA-5220 | RESISTOR CARBON 22K 0.66W 5% | 1 | SBB 0207 | SBB 0207 22K |
| R 9 | RMA-2681 | RESISTOR METAL 68R1 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 56819 |
| R 10 | RTA-2100 | RESISTOR PTC 10R 0.13W 2% | 1 | PTC GT-55 | LP 1/8 10R |
| R 11 | RMA-5133 | RESISTOR METAL 13K3 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51333 |
| R 12 | RMA-4182 | RESISTOR METAL 1K82 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51822 |
| R 13 | RCA-4220 | RESISTOR CARBON 2K2 0.66W 5% | 1 | SBB 0207 | SBB 0207 2K2 |
| R 14 | RMA-3392 | RESISTOR METAL 392R 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 53921 |
| R 15 | RMA-3392 | RESISTOR METAL 392R 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 53921 |
| R 16 | RCA-5470 | RESISTOR CARBON 47K 0.66W 5% | 1 | SBB 0207 | SBB 0207 47K |
| R 17 | RMA-6150 | RESISTOR METAL 150K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51504 |
| R 19 | RWB-3100 | RESISTOR WIRE-WOUND 100R 1W | 1 | VITROHM 253-9 | 253-9 100R |
| R 20 | RMA-4150 | RESISTOR METAL 1K5 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51502 |
| R 21 | RMA-4332 | RESISTOR METAL 3K32 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 53322 |
| R 22 | RMA-5133 | RESISTOR METAL 13K3 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51333 |
| R 23 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 24 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 25 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 26 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 27 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 28 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 29 | RMA-6100 | RESISTOR METAL 100K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51004 |
| R 30 | RMA-6100 | RESISTOR METAL 100K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51004 |
| R 31 | RMA-5475 | RESISTOR METAL 47K5 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 54753 |
| R 32 | RMA-4243 | RESISTOR METAL 2K43 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52432 |
| R 33 | RMA-5475 | RESISTOR METAL 47K5 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 54753 |
| R 34 | RMA-4243 | RESISTOR METAL 2K43 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52432 |
| R 35 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 36 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |
| R 37 | RMA-6200 | RESISTOR METAL 200K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52004 |

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| REF.NO | NTP-ID. | DESCRIPTION | QTY | MANUFACT/DRW.NO. | PART NO. |
|---|---|---|---|---|---|
| R 38 | RMA-6100 | RESISTOR METAL 100K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51004 |
| R 39 | RMA-5475 | RESISTOR METAL 47K5 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 54753 |
| R 40 | RMA-4243 | RESISTOR METAL 2K43 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52432 |
| R 41 | RCA-6180 | RESISTOR CARBON 180K 0.66W 5 | 1 | SBB 0207 | SBB 0207 180K |
| R 42 | RMA-5133 | RESISTOR METAL 13K3 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51333 |
| R 43 | RMA-5200 | RESISTOR METAL 20K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52003 |
| R 44 | RMA-5110 | RESISTOR METAL 11K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51103 |
| R 46 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 47 | RCA-7100 | RESISTOR CARBON 1M 0.66W 5% | 1 | SBB 0207 | SBB 0207 1M |
| R 48 | RCA-7100 | RESISTOR CARBON 1M 0.66W 5% | 1 | SBB 0207 | SBB 0207 1M |
| R 49 | RMA-5200 | RESISTOR METAL 20K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 52003 |
| R 50 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 51 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 53 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | SBB 0207 | SBB 0207 100K |
| R 54 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | SBB 0207 | SBB 0207 100K |
| R 55 | RTC-1940 | RESISTOR PTC 9R4 | 1 | PTC Q63100 | P2390 C970 |
| R 56 | RCA-4330 | RESISTOR CARBON 3K3 0.66W 5% | 1 | SBB 0207 | SBB 0207 3K3 |
| R 57 | RCA-4560 | RESISTOR CARBON 5K6 0.66W 5% | 1 | SBB 0207 | SBB 0207 5K6 |
| R 58 | RCA-5120 | RESISTOR CARBON 12K 0.66W 5% | 1 | SBB 0207 | SBB 0207 12K |
| R 59 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | SBB 0207 | SBB 0207 100K |
| R 60 | RCA-5100 | RESISTOR CARBON 10K 0.66W 5% | 1 | SBB 0207 | SBB 0207 10K |
| R 61 | RCA-7100 | RESISTOR CARBON 1M 0.66W 5% | 1 | SBB 0207 | SBB 0207 1M |
| R 62 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | SBB 0207 | SBB 0207 100K |
| R 63 | RCA-7120 | RESISTOR CARBON 1M2 0.66W 5% | 1 | SBB 0207 | SBB 0207 1M2 |
| R 64 | RCA-6560 | RESISTOR CARBON 560K 0.66W 5 | 1 | SBB 0207 | SBB 0207 560K |
| R 65 | RCA-6330 | RESISTOR CARBON 330K 0.66W 5 | 1 | SBB 0207 | SBB 0207 330K |
| R 66 | RCA-6120 | RESISTOR CARBON 120K 0.66W 5 | 1 | SBB 0207 | SBB 0207 120K |
| R 67 | RCA-5680 | RESISTOR CARBON 68K 0.66W 5% | 1 | SBB 0207 | SBB 0207 68K |
| R 68 | RCA-5270 | RESISTOR CARBON 27K 0.66W 5% | 1 | SBB 0207 | SBB 0207 27K |
| R 69 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | SBB 0207 | SBB 0207 470K |
| R 70 | RCA-6560 | RESISTOR CARBON 560K 0.66W 5 | 1 | SBB 0207 | SBB 0207 560K |
| R 71 | RCA-6330 | RESISTOR CARBON 330K 0.66W 5 | 1 | SBB 0207 | SBB 0207 330K |
| R 72 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | SBB 0207 | SBB 0207 100K |
| R 73 | RCA-5560 | RESISTOR CARBON 56K 0.66W 5% | 1 | SBB 0207 | SBB 0207 56K |
| R 74 | RCA-5470 | RESISTOR CARBON 47K 0.66W 5% | 1 | SBB 0207 | SBB 0207 47K |
| R 75 | RCA-4100 | RESISTOR CARBON 1K 0.66W 5% | 1 | SBB 0207 | SBB 0207 1K |
| R 76 | RCA-7100 | RESISTOR CARBON 1M 0.66W 5% | 1 | SBB 0207 | SBB 0207 1M |
| R 77 | RCA-5100 | RESISTOR CARBON 10K 0.66W 5% | 1 | SBB 0207 | SBB 0207 10K |
| R 78 | RCA-7100 | RESISTOR CARBON 1M 0.66W 5% | 1 | SBB 0207 | SBB 0207 1M |
| R 79 | RCA-4100 | RESISTOR CARBON 1K 0.66W 5% | 1 | SBB 0207 | SBB 0207 1K |

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|---|---|---|---|---|---|
| R 80 | RCA-7120 | RESISTOR CARBON 1M2 0.66W 5% | 1 | SBB 0207 | SBB 0207 1M2 |
| R 81 | RCA-7330 | RESISTOR CARBON 3M3 0.66W 5% | 1 | SBB 0207 | SBB 0207 3M3 |
| R 82 | RCA-6220 | RESISTOR CARBON 220K 0.66W 5 | 1 | SBB 0207 | SBB 0207 220K |
| R 83 | RCA-5470 | RESISTOR CARBON 47K 0.66W 5% | 1 | SBB 0207 | SBB 0207 47K |
| R 84 | RCA-5220 | RESISTOR CARBON 22K 0.66W 5% | 1 | SBB 0207 | SBB 0207 22K |
| R 85 | RCA-4180 | RESISTOR CARBON 1K8 0.66W 5% | 1 | SBB 0207 | SBB 0207 1K8 |
| R 86 | RCA-4220 | RESISTOR CARBON 2K2 0.66W 5% | 1 | SBB 0207 | SBB 0207 2K2 |
| R 87 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 88 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 89 | RCA-4180 | RESISTOR CARBON 1K8 0.66W 5% | 1 | SBB 0207 | SBB 0207 1K8 |
| R 90 | RCA-4220 | RESISTOR CARBON 2K2 0.66W 5% | 1 | SBB 0207 | SBB 0207 2K2 |
| R 91 | RCA-4470 | RESISTOR CARBON 4K7 0.66W 5% | 1 | SBB 0207 | SBB 0207 4K7 |
| R 92 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | SBB 0207 | SBB 0207 470K |
| R 93 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | SBB 0207 | SBB 0207 470K |
| R 94 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | SBB 0207 | SBB 0207 470K |
| R 95 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | SBB 0207 | SBB 0207 470K |
| R 96 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | SBB 0207 | SBB 0207 470K |
| R 97 | RCA-6470 | RESISTOR CARBON 470K 0.66W 5 | 1 | SBB 0207 | SBB 0207 470K |
| R 98 | RCA-4150 | RESISTOR CARBON 1K5 0.66W 5% | 1 | SBB 0207 | SBB 0207 1K5 |
| R 99 | RCA-5180 | RESISTOR CARBON 18K 0.66W 5% | 1 | SBB 0207 | SBB 0207 18K |
| R 100 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 101 | RMA-5100 | RESISTOR METAL 10K 0.4W 1% | 1 | PHILIPS MR25 | 2322 151 51003 |
| R 102 | RCA-4100 | RESISTOR CARBON 1K 0.66W 5% | 1 | SBB 0207 | SBB 0207 1K |
| R 103 | RCA-2100 | RESISTOR CARBON 10R 0.66W 5% | 1 | SBB 0207 | SBB 0207 10R |
| R 105 | RXA-8220 | RESISTOR HIGHVOLT 22M 0.25W | 1 | PHILIPS VR25 | 2322 241 13226 |
| R 106 | RCA-5120 | RESISTOR CARBON 12K 0.66W 5% | 1 | SBB 0207 | SBB 0207 12K |
| R 107 | RCA-6100 | RESISTOR CARBON 100K 0.66W 5 | 1 | SBB 0207 | SBB 0207 100K |
| RS 1 | SRB-0004 | ROTARY SWITCH 9 POS YELLOW | 1 | HOPT & S. 422 | 020 |
| RS 2 | SRB-0004 | ROTARY SWITCH 9 POS YELLOW | 1 | HOPT & S. 422 | 020 |
| S 1 | SSE-0112 | SLIDE SWITCH SPDT | 1 | ALCO TSS | 11 DG RA |
| TR 1 | LTL-0008 | OUTPUTTRANSFORMER 1.2 | 1 | LUNDAHL 5011 | LL 5011 |

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