

**DUAL TRANSIENT LIMITER****179-570A**

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## Description.

The Dual Transient Limiter 179-570 is a 1U, 19" rack unit housing two 179-500 transient limiter cards. For detailed information on the limiter functions please refer to the card documentation included in this manual.

### Power Supply:

The unit includes a mains power supply for the inserted cards. To allow for power back-up from a no-break station battery a separate 24 V dc input is also provided (through the "REMOTE CONTROL" connector). The "POWER" switch placed behind the front cover only operates on the mains supply. Likewise the Power LED is only active when powered from the mains supply.

### Stereo/Mono Operation:

The two transient limiters may either be operated as two individual mono channels or as a stereo pair.

In stereo operation the gain control voltages may be linked to obtain gain tracking. The control voltages generated by the linear limiter sections and the transient limiter sections may be linked separately.

The selection is made on the rear of the frame by setting the stereo link switch "LIM" and/or "T-LIM" in position ON.

As a starting point it is recommendable to set the "LIM" switch in the "ON" position and the "T-LIM" switch in the "OFF" position.

### Preemphasis:

Each channel has an output (OUT 2) that can provide adaptive preemphasis (50 us) in applications where a fixed preemphasis is to be substituted. This mode of operation is selected by setting the switches "PREEMPH" in "BOOST" position.

In most applications the two switches shall be in "NORM" position.

### Bypass:

The unit contains a relay operated bypass function which connects the outputs directly to the inputs.

The bypass function is active under the following conditions:

- a. - when the unit is not powered.
- b. - when one or both boards are not in place.
- c. - when the "BYPASS" switch behind the front cover is depressed.

### Remote Control:

All remote control functions/indications featured by the limiter cards are accessible through the "REMOTE CONTROL" connector on the rear side.

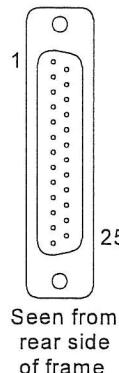
# NTP

## Technical Specifications

Supply Voltage	:	115-230V AC nom.
Power Consumption	:	Max. 20W
Mechanical Outline	:	44,1 x 482,6 x 303,3 mm (H x W x D)
Weight (with Cards)	:	5,6 kgs

For the cards, see later in this manual.

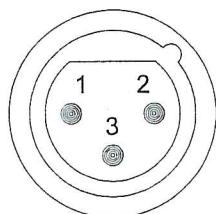
The remote control connector  
is a 25 pole D-connector, male



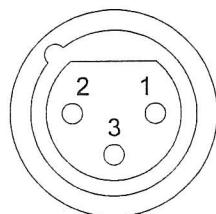
pin nos.. a indicates channel A - b indicates channel B

1 Chassis	7b Lim LED, to -	13a Lim LED, to -	19b Lim LED, to +
2 24V DC	8 N.C.	14 0V DC	20 N.C.
3b Meter comm, to -	9a Meter comm, to -	15 N.C.	21 N.C.
4b Meter T-lim, to +	10a Meter T-lim, to +	16b Meter lim, to +	22a Meter lim, to +
5b T-Lim LED, to +	11a T-lim LED, to +	17 N.C.	23 N.C.
6b /Lim off, to GND	12a /Lim off, to GND	18b /T-lim off, to GND	24a /T-Lim off, to GND
			25a Lim LED, to +

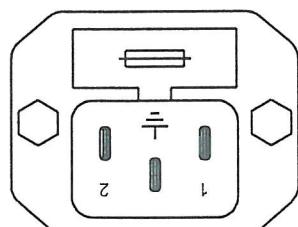
Output connector, 3p XLR, male



Input connector, 3p XLR, female



Mains connector



1 Screen, chassis

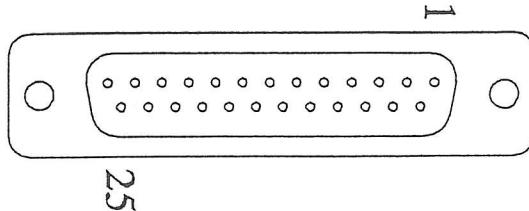
2 0°

3 180°

1 Screen, chassis

2 Neutral

3 Phase

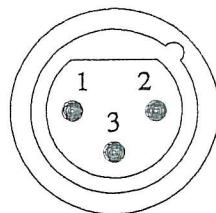


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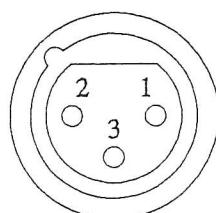
pin nos.. a indicates channel A - b indicates channel B

1 Chassis	7 b Lim LED, to -	13 a Lim LED, to -	19 b Lim LED, to +j
2 24V DC	8 N.C.	14 0V DC	20 N.C.
3 b Meter comm, to -	9 a Meter comm, to -	15 N.C.	21 N.C.
4 b Meter T-lim, to +	10 a Meter T-lim, to +	16 b Meter lim, to +	22 a Meter lim, to +
5 b T-Lim LED, to +	11 a T-lim LED, to +	17 N.C.	23 N.C.
6 b /Lim off, to GND	12 a /Lim off, to GND	18 b /T-lim off, to GND	24 a /T-Lim off, to GND
			25 a Lim LED, to +

Output connector, 3p XLR, male



Input connector, 3p XLR, female

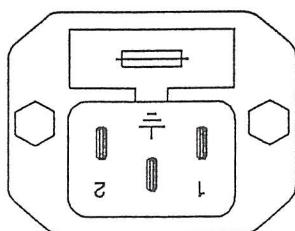


1 Screen, chassis

2 0°

3 180°

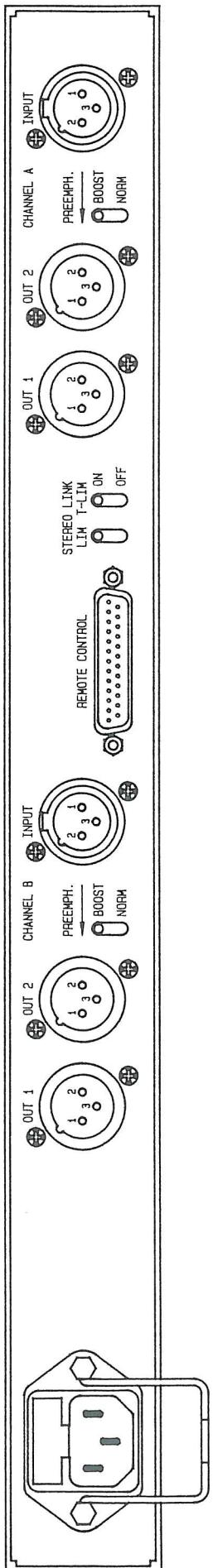
Mains connector



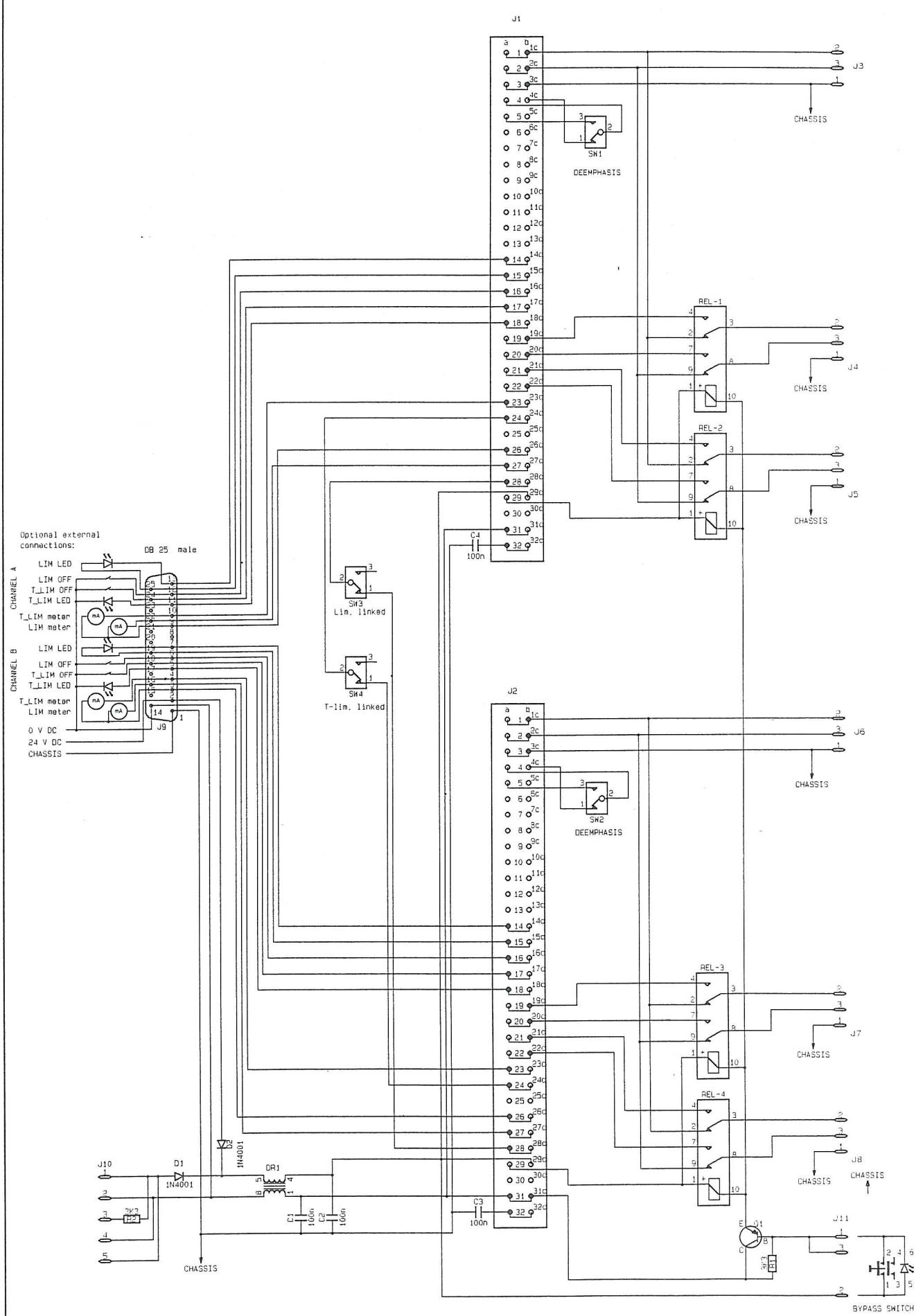
1  $\equiv$  Screen, chassis

2 Neutral

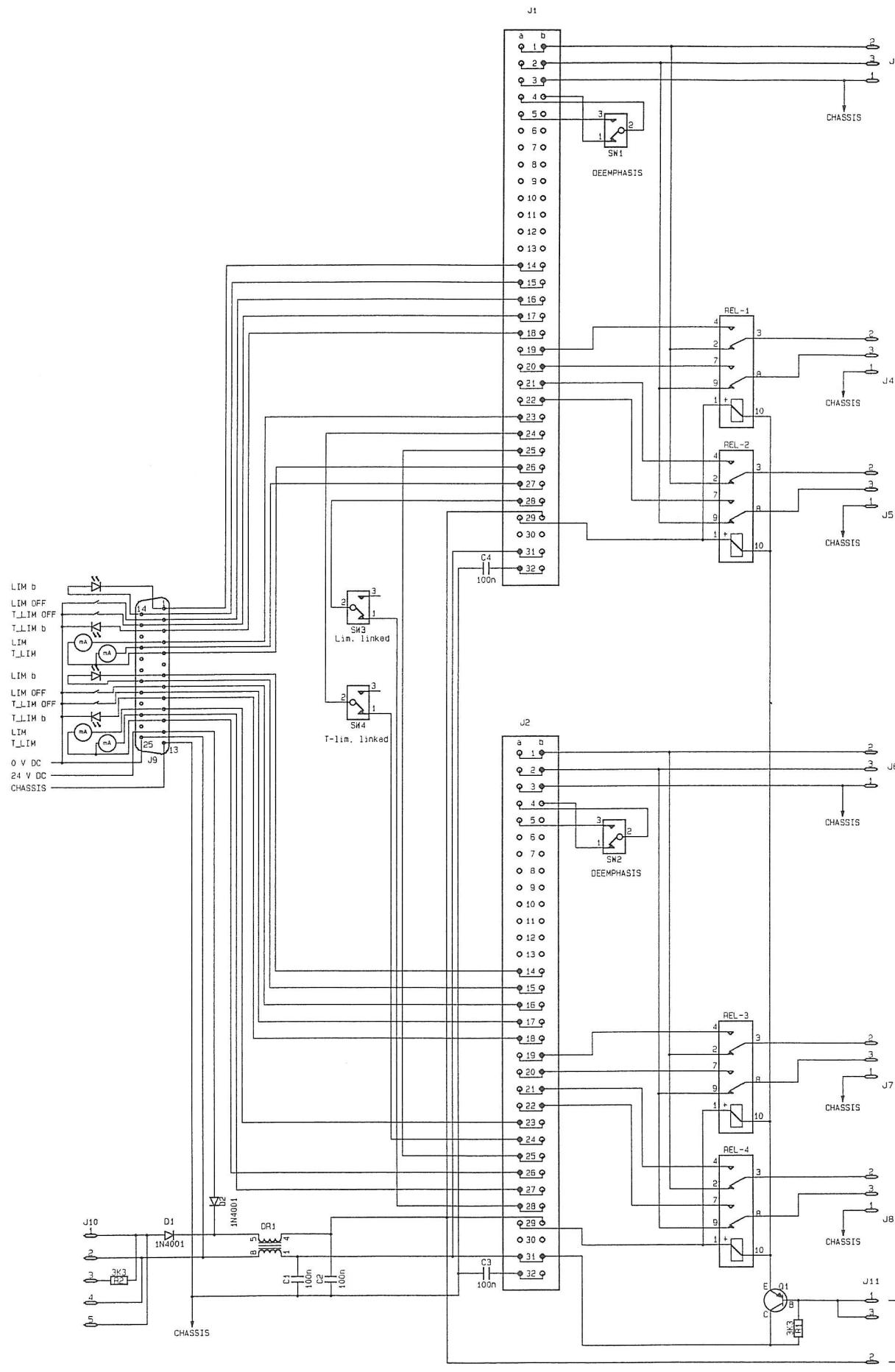
3 Phase



Blank piece:	Material:	Treatment:	Page 1 of 1
Scale :			
Tolerance :			
Design : BU	Dual Transient Limiter	179-570A	<b>NTP</b>
Layout : 940304.j1	Rearplate Layout		179-5708-A-3
Revised :			

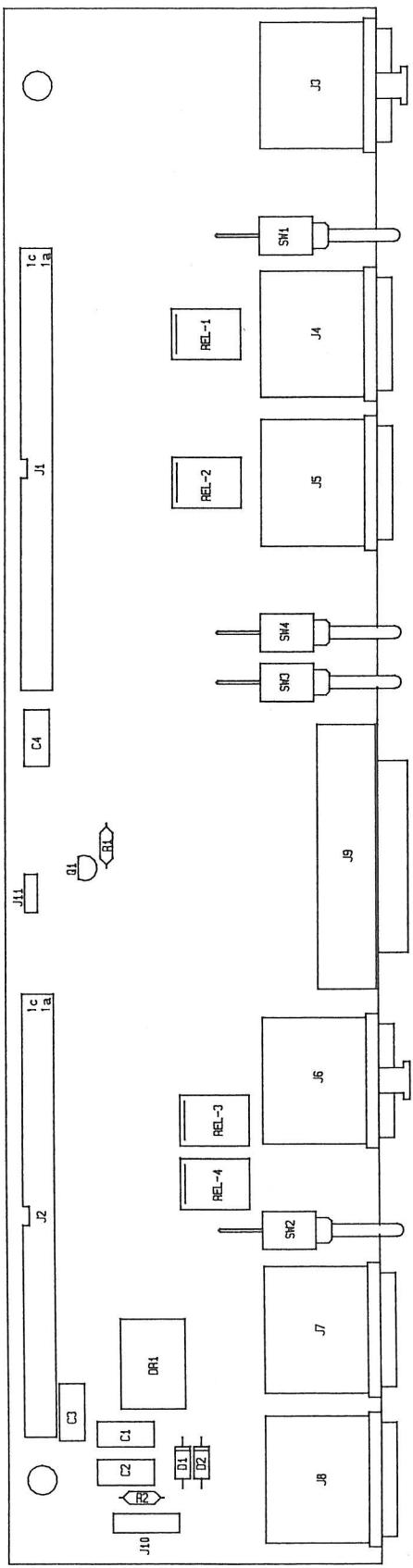


Blank piece:	Material:	Treatment:	Page:
Scale :			61
Tolerance :			
Design : BJ			
Layout : 930915			
Revised 1/960924			
Main Board Diagram			<b>NTP</b>
			179-5730-A-4



Blank piece:	Material:	Treatment:	Page:
Scale :			
Tolerance :			
Design :	BJ		
Layout :	930915		
Revised :			
Main Board Diagram			<b>NTP</b>
			179-5730-A-4

NTP 179-5740A 11 931217



Blank piece:

Material:

Treatment:

Page of

Scale :

Tolerance :

Design :

Layout :

Revised :

Connector Board  
Components Layout

**NTP**

179-5741-A-3

## CONNECTOR BOARD

## PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO. PART NO.
10	179-5740A	PRINT BOARD	1	CAD 179-5740A
C 1	CLH-0510	CAP POLYESTER 10NF/630V	1	ROE MKT 1822 1822 310/63
C 2	CLH-0510	CAP POLYESTER 10NF/630V	1	ROE MKT 1822 1822 310/63
C 3	CLH-0510	CAP POLYESTER 10NF/630V	1	ROE MKT 1822 1822 310/63
C 4	CLH-0510	CAP POLYESTER 10NF/630V	1	ROE MKT 1822 1822 310/63
D 1	QDS-4002	DIODE, SILICIUM	1	F-126 1N 4002
D 2	QDS-4002	DIODE, SILICIUM	1	F-126 1N 4002
DR 1	FNA-0005	NOISE FILTER	1	RADIOHM 42V202000
J 1	KRM-6401	64P MALE PCB CONNECTOR	1	LEOCO 2575P64VUA0
J 2	KRM-6401	64P MALE PCB CONNECTOR	1	LEOCO 2575P64VUA0
J 3	KAF-0309	XLR CONNECTOR, FEMALE 3POLE	1	NEUTRIK NC3FK-H
J 4	KAM-0309	XLR CONNECTOR, MALE 3POLE	1	NEUTRIK NC3MK-H
J 5	KAM-0309	XLR CONNECTOR, MALE 3POLE	1	NEUTRIK NC3MK-H
J 6	KAF-0309	XLR CONNECTOR, FEMALE 3POLE	1	NEUTRIK NC3FK-H
J 7	KAM-0309	XLR CONNECTOR, MALE 3POLE	1	NEUTRIK NC3MK-H
J 8	KAM-0309	XLR CONNECTOR, MALE 3POLE	1	NEUTRIK NC3MK-H
J 9	KDM-2506	D CONN. MALE 25P ANGLE	1	DBPF-25P-V6 DBPF-25P-V6
J 10	KMM-0506	CONNECTOR 5POLE MALE	1	CANNON G09 KMM-0506
J 11	KMM-0303	CONNECTOR 3POLE MALE	1	CANNON G09 KMM-0303
Q 1	QBP-32716	TRANSISTOR, PNP	1	TO-92 BC327-16
R 1	RMA-4332	RESISTOR METAL 3K32 0.4W 1%	1	PHILIPS MR25 2322 151 53322
R 2	RMA-4332	RESISTOR METAL 3K32 0.4W 1%	1	PHILIPS MR25 2322 151 53322
REL 1	ERC-0505B	MINI RELAY, 24V 2 SHIFTS	1	NEC EA2-24
REL 2	ERC-0505B	MINI RELAY, 24V 2 SHIFTS	1	NEC EA2-24
REL 3	ERC-0505B	MINI RELAY, 24V 2 SHIFTS	1	NEC EA2-24
REL 4	ERC-0505B	MINI RELAY, 24V 2 SHIFTS	1	NEC EA2-24
SW 1	STC-0121	TOGGLE SWITCH SPDT	1	CD WW 13,5
SW 2	STC-0121	TOGGLE SWITCH SPDT	1	CD WW 13,5
SW 3	STC-0121	TOGGLE SWITCH SPDT	1	CD WW 13,5
SW 4	STC-0121	TOGGLE SWITCH SPDT	1	CD WW 13,5

**NTP Parts List**

as of date 24.3 1994

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List No.: 179-5731-A-4

NTP 179-570A DUAL TRANSIENT LIMITER

PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
1	179-5731A	CONNECTOR BOARD	1	179-5731-A-3	179-5731A
10	179-5751A	BASE PLATE, PRINTED	1	179-5751-A-3X	179-5751A
20	179-5752A	FRONT PLATE, PRINTED	1	179-5752-A-3X	179-5752A
30	231-3054A	BOTTOM PLATE	1	230-3054-A-2	231-3054A
40	231-4054A	TOP PLATE	1	230-4054-A-2	231-4054A
50	231-0055B	FRONT PLATE, UNIT, ACRYLIC	1	230-0055-B-3X	231-0055B
60	231-0056A	ROD FOR FRONTPLATE UNIT, BLA	1	231-0056-A-3X	231-0056A
70	MEB-0001	THUMB SCREW AS THREADEDBUSHE	2	ELMA	63-047
80	MSU-2004	SCREW 2 X 4 UHJ	8	HFC 30	2 X4 UHJ
90	MSV-2504	SCREW 2, 5 X 4 MM	12	HFC	HFC1875 2,5X4
100	FNA-0004	NOISEFILTER W FUSE	1	SCHAFFNER	FN360E-1/06
110	SSJ-0001	MAINS SWITCH W GREEN LED	1	MIYAMA	BN 07223 8100
120	SSJ-0002	2POLE SWITCH W RED LED	1	MIYAMA	07 233 6000
130	KMF-0307	3POLE CRIMP SOCKET	1	KMF-0307	3M CHG
140	KMF-0507	5POLE CRIMP SOCKET	1	KMF-0507	3M CHG
150	AAA-0029	POWER SUPPLY 230V/24V 15VA	1	COSEL	P15E-24
160	KUB-0002	CRIMP FOR MAINS CONN. FEMALE	1	RP	383200
170	KUB-0001	JACKET FOR MAINS CONN. FEMAL	1	BULGIN PN	PN 11328
180	KRA-0008	NIPPLE FOR D-CONN.	1	D-20418-2	D-20418-2
190	MTP-3006	SCREW CROSS HEAD 3 X 6 PHJX	12	HFC	41 3 X 6 PHJX
200	MSC-2506	SCREW 2, 5 X 6 CHJZ	4	HFC	9033 2.5 X 6 CHJ
210	179-5761A	FLATCABLE W CONNECTORS	2	179-5761-A-4	179-5761A
220	WPM-75010	MAIN CABLE, BLACK	1	S.22/CC32 2MTR	3X0.75 + JORD

**NTP Parts List**as of date 24.3.1994.Page 1 of 1.List No.: 179-5704-A-4

The 179-500B is an analog audio limiter specifically designed to solve the rather complex problems of audio level limiting in systems utilizing the well known pre-emphasis/de-emphasis technique.

By boosting audio frequencies above 3 kHz before transmission and attenuate inversely after reception the pre/de-emphasis technique offers an improved signal-to-noise ratio in the high frequency region.

Traditional audio signals (e.g: symphonic music) exhibit high frequency roll-off which causes no problems for the pre/de-emphasis technique.

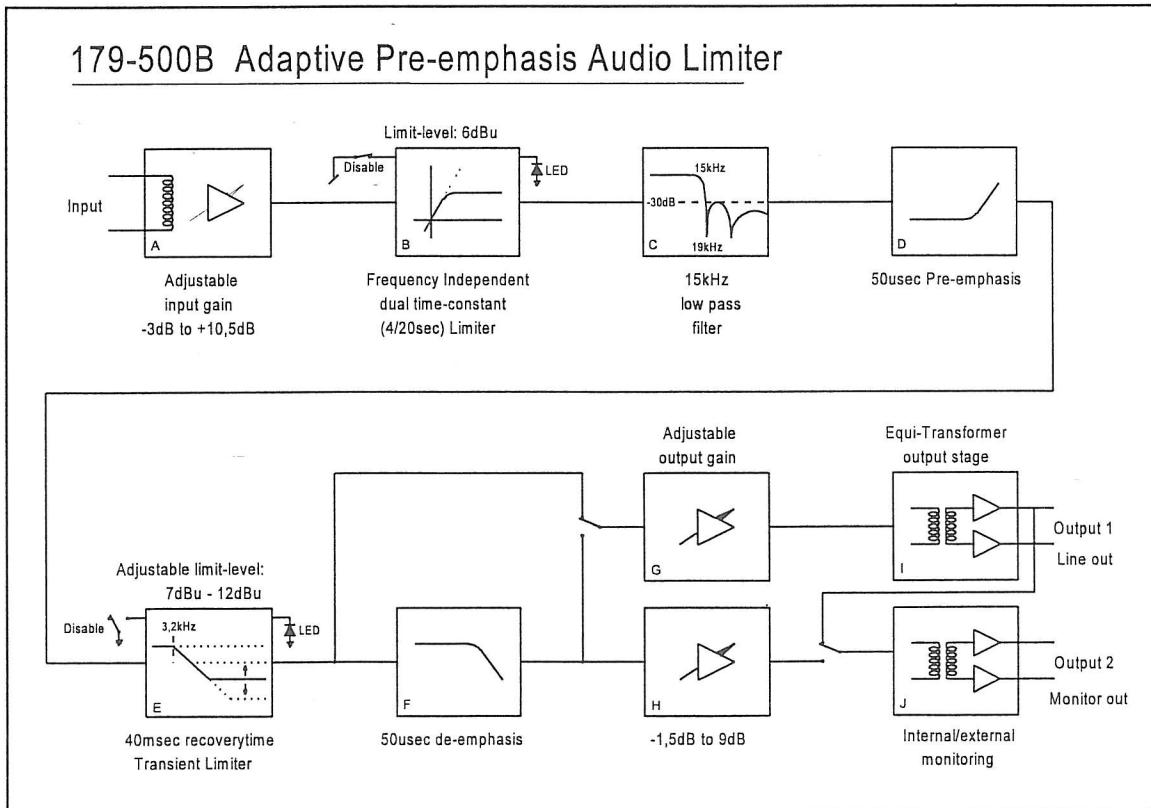
However, some signal types as e.g. spoken "S"-sounds, modern synthesized sounds, snare drums and piano attacks may exhibit high level signal components at relatively high frequencies.

Such signals tend to overload transmitting and receiving equipment and cause audible distortion (pumping effects). The Adaptive Preemphasis principle, as utilized by the NTP 179-500B, offers correct limitation of audio signals intended for FM or TV transmission while reducing unwanted audible attenuation of the mid- and low frequency region (pumping).

This is made possible because the transient limiter stage of the 179-500B operates by controlling the corner frequency of a low-pass filter rather than attenuating all frequencies equally.

Consequently an audio signal containing high level components at high frequencies will be limited by adjusting the corner frequency of the low-pass filter sufficiently low to avoid violation of the limiting threshold.

The result is a high subjective audio level while avoiding high frequency distortion caused by overload of transmitter/reciver circuitries.



*Functional block diagram of the 179-500.*

**THE MAIN FUNCTIONAL PARTS OF THE 179-500B.**

The functional block diagram illustrates the principles of operation of the 179-500B (adhering to the IRT "Pflichtenheft 5/5.1").

- A) To reduce problems of hum-pickup and ground loops, the input stage of the 179-500B is transformer balanced and earth free. The input gain is front panel adjustable between -3 and +9 dB, in steps of 1.5 dB and further on board adjustable +/- 1.0 dB.
- B) Following the input stage is a frequency independent limiter stage with a fixed limiting threshold of +6dBu (1,55 V RMS)
- C) The next stage is an advanced, very stable 5'th order 15kHz Elliptical low pass filter. To avoid problems with interference of any 19kHz FM carrier, the filter is quite steep and obtains an attenuation of more than 40 dB at 19kHz (typically more than 50 dB). This filter effectively eliminates unwanted influence on the transient limiter stage from frequencies higher than 15kHz.
- D) Following this is a 50 $\mu$ s pre-emphasis filter which accurately (within +/- 0.1 dB) resembles the corresponding filters used for FM audio transmission as well as mono TV sound and analog stereo TV sound.
- E) The next stage is the transient limiter stage. As the frequency independent limiter stage (B) ensures correct limitation of the basissignal, the transient limiter stage only operates on frequencies higher than approximately 2 kHz.  
The function of this stage is actually a de-emphasis (first order low pass filter) with variable corner frequency. The corner frequency is dynamically adapted to the signal, thus ensuring correct limitation.  
The limiting threshold is on-board adjustable from 1.0 to 6.0 dB beyond the limiting threshold of stage "B". By connection of relevant pins on the IEC connector this stage may be by-passed.
- F) The 50 $\mu$ s de-emphasis filter performing the inverse function to stage "D".
- G & H) The output stages offer individually front panel adjustable gain between -1.5dB and 9dB.

I & J) Two Equi-transformer based output stages. The equi-transformer principle retains all the advantages of traditional transformer balanced output stages while avoiding the conventional large inductors in the signal path. These stages contain +/- 1.0 dB on-board adjustment.

In this way full earth-free operation is obtained while phase distortion is reduced significantly when driving large capacitive loads as for instance long distances of twisted pair wires feeding a transmitter.

Because phase distortion may change the peak levels of a signal it is particularly important to avoid this type of distortion in the parts of the signal chain following the limiting device.

Output 1, the Line Output, is switchable between a flat frequency response, (as long as the transient limiter does not operate), and a pre-emphasized frequency response enabling connection to a transmitter without built-in pre-emphasis circuitry.

Switching is accomplished by interconnecting relevant pins on the IEC connector and this function may consequently be controlled remotely.

Output 2, the Monitor Output, is either connected to the de-emphasizing stage F through gain setting stage "H", and thus the frequency response from input of the 179-500B to output F is flat, or connected to the Line Output (stage I) to give a true monitoring of this output, and then, the output will follow the frequency response of this output. The setup of the Monitor Output is made on the PCB.

In order to minimize the unavoidable yet unwanted audible effects of the limiter operation, the two independent limiter circuits in the 179-500B features individual, programme dependent dynamic properties.

The linear limiter stage ("B") features a fast attack time of 1.5 msec. Limitation of any overshoot within these first 1.5 msec is accomplished by a soft-clipping circuit featuring a clipping level of 1.5 dB beyond the steady-state clipping level of 6 dBu. Within intervals of such short duration, the unwanted effects from soft-clipping circuits are hardly audible.

The release time of the linear limiter stage is automatically controlled in accordance with the dynamic properties of the sound signal thus minimizing "breathing" and "pumping" effects.

Basically the release function is a combination of two different release functions each featuring a fixed release time (one is 4 seconds - the other is 20 seconds).

Short and few overridings of the limiting threshold results in a release time close to 4 seconds. In such situations a relatively short release time is desired to shorten the audible attenuation of the sound signals following the signal overriding the limiting threshold.

However, if several consecutive overridings occur a short release time will tend to generate "pumping" effects. To avoid this, the release time is automatically increased in such situations - in extreme cases up to 20 seconds.

The attack- and release functions of the transient limiter is basically similar to those of the frequency independent limiter ("B").

However, in order to optimize the limiter dynamics for operation on transients an ultra fast attack time of less than 250 $\mu$ sec's is obtained and the release time is 40 msec's.

The soft-clipping circuit limits any ultra fast peaks to 0.5 dB beyond steady-state limitation.

## CHOOSING LIMITING THRESHOLDS.

The limiting threshold of the linear limiter (stage "B") is fixed at +6 dBu (1.55 Volt RMS).

However, other limiting thresholds may be set by adjusting input- and output gains in the stages "A", "G" and "H".

For example, if a limiting threshold of +9 dBu is required, the input gain of stage "A" is set to a gain of -3 dB and the gain of the output stage "G" or "H" is accordingly set to +3 dB.

This also means, that the linear limiter will limit very fast, high level peaks to a maximum level of 10.5 dBu within the first 1.5 ms after the attack.

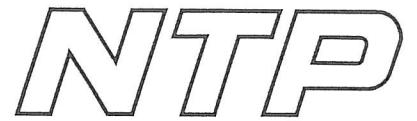
Still following the example, the limit threshold of the transient limiter (stage "E") is on-board adjustable between +10 dBu and +15 dBu. If the limit threshold is adjusted to +12 dBu the very fast dynamics of the transient limiter ensures that even ultra fast transients are limited to a maximum of +12.5 dBu within the first 250  $\mu$ s from the attack.

## CHOOSING MONITOR MODE

The mode of Monitor Output (2) is selected with 2 jumpers (J2 and J3), allocated between A301 and A303 on the card.

When the 2 jumpers are placed near the edge of the card, the Monitor Output is connected to the Gain stage "H" and thus making internal monitoring, with possibility of setting the gain at the output.

In the opposit case, when the 2 jumpers are placed at the far position from the edge of the card, the Monitor Output is connected to the output of the Line Output (1), and then, making a true monitoring at this output, however, no gain setting is possible on the Monitor Output, except for the fine adjustment in the Output stage "J" ( $\pm 1$  dB).



## STEREO OPERATION, HOUSING AND LED INDICATION.

By connecting relevant pins on the IEC connectors of two 179-500B units true stereo operation is obtained. In this way both channels will be attenuated equally avoiding stereo image shifting and other unwanted artifacts.

The 179-500B unit is a super-compact 4T Eurocard (160 x 100 x 20 mm) and as such mechanically fully compatible with the NTP 179-400 limiter. The pin-out of the IEC connector is compatible with the 179-400 (except pin A4 and A5) and the 179-500B may therefore be used for direct upgrading of 179-400s in all frames manufactured by NTP. However, in such cases the Monitor Output (stage "J") and some of the remotely controllable functions of the 179-500B will not be accessible.

The 3 LED's placed in the front panel of the 179-500B indicate respectively: "power ON" and "limiter in active operation" for each of the two internal limiter stages.

# NTP

The 179-500B is an analog audio limiter specifically designed to solve the rather complex problems of audio level limiting in systems utilizing the well known pre-emphasis/de-emphasis technique.

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Traditional audio signals (e.g. symphonic music) exhibit high frequency roll-off which causes no problems for the pre/de-emphasis technique.

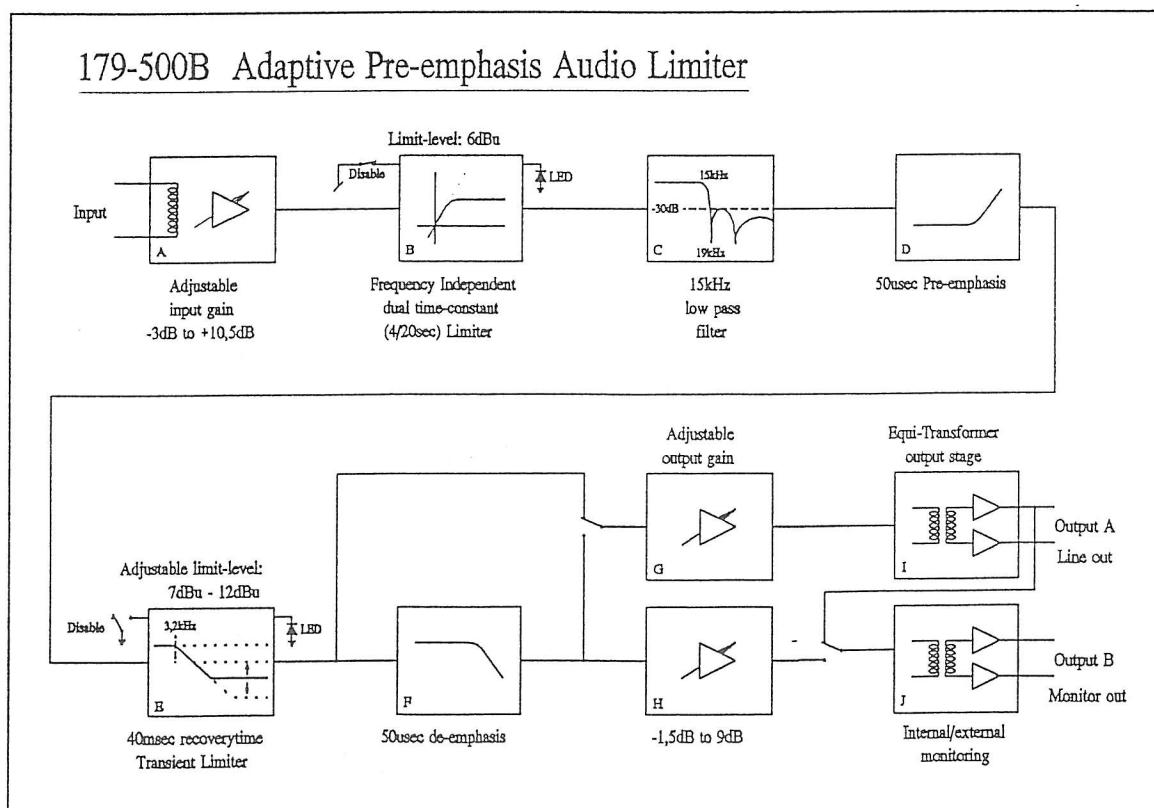
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Consequently an audio signal containing high level components at high frequencies will be limited by adjusting the corner frequency of the low-pass filter sufficiently low to avoid violation of the limiting threshold.

The result is a high subjective audio level while avoiding high frequency distortion caused by overload of transmitter/reciver circuitries.



Functional block diagram of the 179-500.

# NTP

## THE MAIN FUNCTIONAL PARTS OF THE 179-500B.

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B) Following the input stage is a frequency independent limiter stage with a fixed limiting threshold of +6dBu (1.55 V RMS)

C) The next stage is an advanced, very stable 5'th order 15kHz Elliptical low pass filter. To avoid problems with interference of any 19kHz FM carrier, the filter is quite steep and obtains an attenuation of more than 40 dB at 19kHz (typically more than 50 dB). This filter effectively eliminates unwanted influence on the transient limiter stage from frequencies higher than 15kHz.

D) Following this is a 50 $\mu$ spre-emphasis filter which accurately (within +/- 0.1 dB) resembles the corresponding filters used for FM audio transmission as well as mono TV sound and analog stereo TV sound.

E) The next stage is the transient limiter stage. As the frequency independent limiter stage (B) ensures correct limitation of the basissignal, the transient limiter stage only operates on frequencies higher than approximately 2 kHz.

The function of this stage is actually a de-emphasis (first order low pass filter) with variable corner frequency. The corner frequency is dynamically adapted to the signal, thus ensuring correct limitation. The limiting threshold is on-board adjustable from 1.0 to 6.0 dB beyond the limiting threshold of stage "B". By connection of relevant pins on the IEC connector this stage may be by-passed.

F) The 50 $\mu$ sde-emphasis filter performing the inverse function to stage "D".

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In this way full earth-free operation is obtained while phase distortion is reduced significantly when driving large capacitive loads as for instance long distances of twisted pair wires feeding a transmitter. Because phase distortion may change the peak levels of a signal it is particularly important to avoid this type of distortion in the parts of the signal chain following the limiting device.

Output A, the Line Output, is switchable between a flat frequency response, (as long as the transient limiter does not operate), and a pre-emphasized frequency response enabling connection to a transmitter without built-in pre-emphasis circuitry.

Switching is accomplished by interconnecting relevant pins on the IEC connector and this function may consequently be controlled remotely.

Output B, the Monitor Output, is either connected to the de-emphasizing stage F through gain setting stage "H", and thus the frequency response from input of the 179-500B to output F is flat, or connected to the Line Output (stage I) to give a true monitoring of this output, and then, the output will follow the frequency response of this output. The setup of the Monitor Output is made on the PCB.

In order to minimize the unavoidable yet unwanted audible effects of the limiter operation, the two independent limiter circuits in the 179-500B features individual, programme dependent dynamic properties.

The linear limiter stage ("B") features a fast attack time of 1.5 msec. Limitation of any overshoot within these first 1.5 msec is accomplished by a soft-clipping circuit featuring a clipping level of 1.5 dB beyond the steady-state clipping level of 6 dBu. Within intervals of such short duration, the unwanted effects from soft-clipping circuits are hardly audible.

The release time of the linear limiter stage is automatically controlled in accordance with the dynamic properties of the sound signal thus minimizing "breathing" and "pumping" effects.

Basically the release function is a combination of two different release functions each featuring a fixed release time (one is 4 seconds - the other is 20 seconds).

Short and few overridings of the limiting threshold results in a release time close to 4 seconds. In such situations a relatively short release time is desired to shorten the audible attenuation of the sound signals following the signal overriding the limiting threshold.

However, if several consecutive overridings occur a short release time will tend to generate "pumping" effects. To avoid this, the release time is automatically increased in such situations - in extreme cases up to 20 seconds.

The attack- and release functions of the transient limiter is basically similar to those of the frequency independent limiter ("B").

However, in order to optimize the limiter dynamics for operation on transients an ultra fast attack time of less than 250 $\mu$ sec's is obtained and the release time is 40 msec's.

The soft-clipping circuit limits any ultra fast peaks to 0.5 dB beyond steady-state limitation.

#### CHOOSING LIMITING THRESHOLDS.

The limiting threshold of the linear limiter (stage "B") is fixed at +6 dBu (1,55 Volt RMS).

However, other limiting thresholds may be set by adjusting input- and output gains in the stages "A", "G" and "H".

For example, if a limiting threshold of +9 dBu is required, the input gain of stage "A" is set to a gain of -3 dB and the gain of the output stage "G" or "H" is accordingly set to +3 dB.

This also means, that the linear limiter will limit very fast, high level peaks to a maximum level of 10.5 dBu within the first 1.5 ms after the attack.

Still following the example, the limit threshold of the transient limiter (stage "E") is on-board adjustable between +10 dBu and +15 dBu. If the limit threshold is adjusted to +12 dBu the very fast dynamics of the transient limiter ensures that even ultra fast transients are limited to a maximum of +12.5 dBu within the first 250  $\mu$ s from the attack.

#### CHOOSING MONITOR MODE

The mode of Monitor Output (B) is selected with 2 jumpers (J2 and J3), allocated between A301 and A303 on the card.

When the 2 jumpers are placed near the edge of the card, the Monitor Output is connected to the Gain stage "H" and thus making internal monitoring, with possibility of setting the gain at the output.

In the opposit case, when the 2 jumpers are placed at the far position from the edge of the card, the Monitor Output is connected to the output of the Line Output "A", and then, making a true monitoring at this output, however, no gain setting is possible on the Monitor Output, except for the fine adjustment in the Output stage "J" ( $\pm 1$  dB).

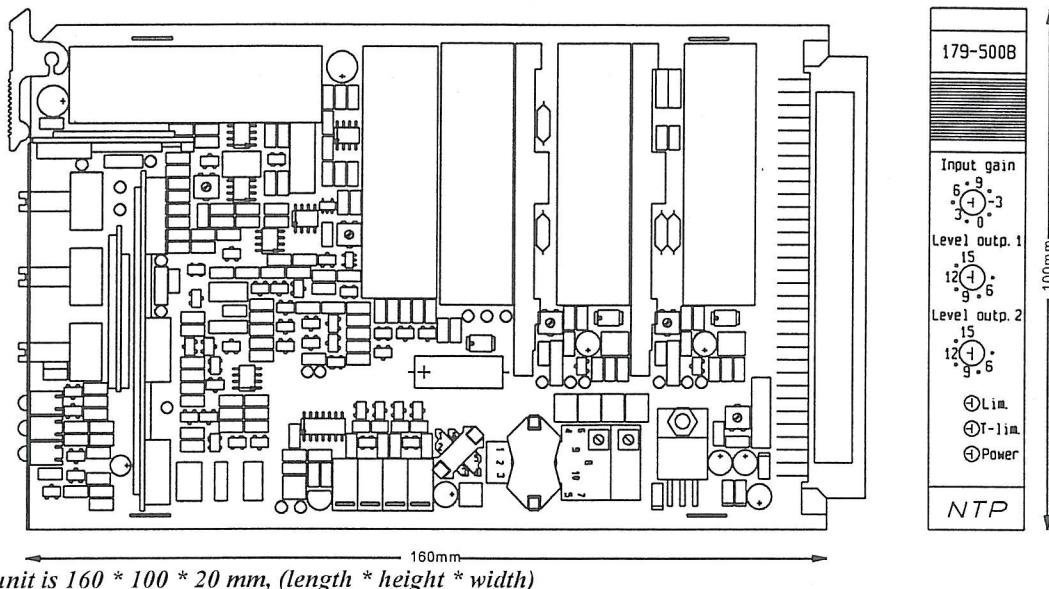
# NTP

## STEREO OPERATION, HOUSING AND LED INDICATION.

By connecting relevant pins on the IEC connectors of two 179-500B units true stereo operation is obtained. In this way both channels will be attenuated equally avoiding stereo image shifting and other unwanted artifacts.

The 179-500B unit is a super-compact 4T Eurocard (160 x 100 x 20 mm) and as such mechanically fully compatible with the NTP 179-400 limiter. The pin-out of the IEC connector is compatible with the 179-400 (except pin A4 and A5) and the 179-500B may therefore be used for direct upgrading of 179-400s in all frames manufactured by NTP. However, in such cases the Monitor Output (stage "J") and some of the remotely controllable functions of the 179-500B will not be accessible.

The 3 LED's placed in the front panel of the 179-500B indicate respectively: "power ON" and "limiter in active operation" for each of the two internal limiter stages.



Size of unit is 160 \* 100 \* 20 mm, (length \* height \* width)

The 179-500B adheres to the IRT "Pflichtenheft 5/5.1". Unless otherwise specified, the following specifications are measured at the Monitor Output (2), internal monitor mode,  $\Delta f=40\text{Hz}-15\text{kHz}$ ,  $R_L=300\Omega$  and  $U_{in}=6\text{dBu}$ , 500 Hz.

<b>INPUT:</b> impedance	>10 k $\Omega$
CMRR (Rs=600 $\Omega$ , DIN 45 404)	>60 dB
Input overload threshold	>22 dBu

<b>OUTPUT:</b> impedance	<30 $\Omega$
CMRR, DIN 45 404	>60 dB
Symmetry	>40 dB
Nominal level (Line Out) @ 10KHz, deemphase off	10.5 dBu $\pm$ 0.2 dB
Nominal level (Monitor Out) @ 500Hz	6.0 dBu $\pm$ 0.2 dB

<b>Frequency range:</b> ( $U_{in}=-15\text{dBu}$ )	
40Hz - 10kHz	$\pm 0.3$ dB
10 - 15kHz	+0.3/-0.5 dB
19 kHz	<-40 dB
>19 kHz	<-30 dB

<b>Uniformity between individual 179-500B units,</b>	
<b>Level/Phase difference:</b> ( $U_{in}=-15\text{dBu}$ ):	
40Hz - 100Hz	better than 0.3 dB / 10°
100Hz - 6.4 kHz	better than 0.1 dB / 5°
6.4 - 12.8 kHz	better than 0.2 dB / 10°
12.8 - 15 kHz	better than 0.4 dB / 15°

**Noise:**

Output "G" weigh. w/o de-emph:	<-66 dBqp (typ:-70 dBqp)
Output "G" unweigh. RMS w/o de-emph:	<-75 dBu (typ:-79 dBu)
Output "H" weigh.	<-74 dBqp (typ:-78 dBqp)
Output "H" unweigh. RMS	<-86 dBu (typ:-89 dBu)

THD @ Uin=6dBu, 40Hz - 15kHz <0.1%

**Gain setting @ 1 kHz, nominal:**

Front adj. input gain - (in 1.5dB steps):	0 ±0.2 dB
Front adj. output gain - (in 1.5dB steps):	-3 to +9dB ±0.2dB
On-card adjusting range:	-1.5 to +9dB ±0.2dB ≥±1.0 dB

**Linear Limiter:**

Clipping level beyond steady state:	+1.5 dB
Attack time to 1dB:	1.5ms
Release time to 1dB:	4-20s (automatic)

**Transient Limiter:**

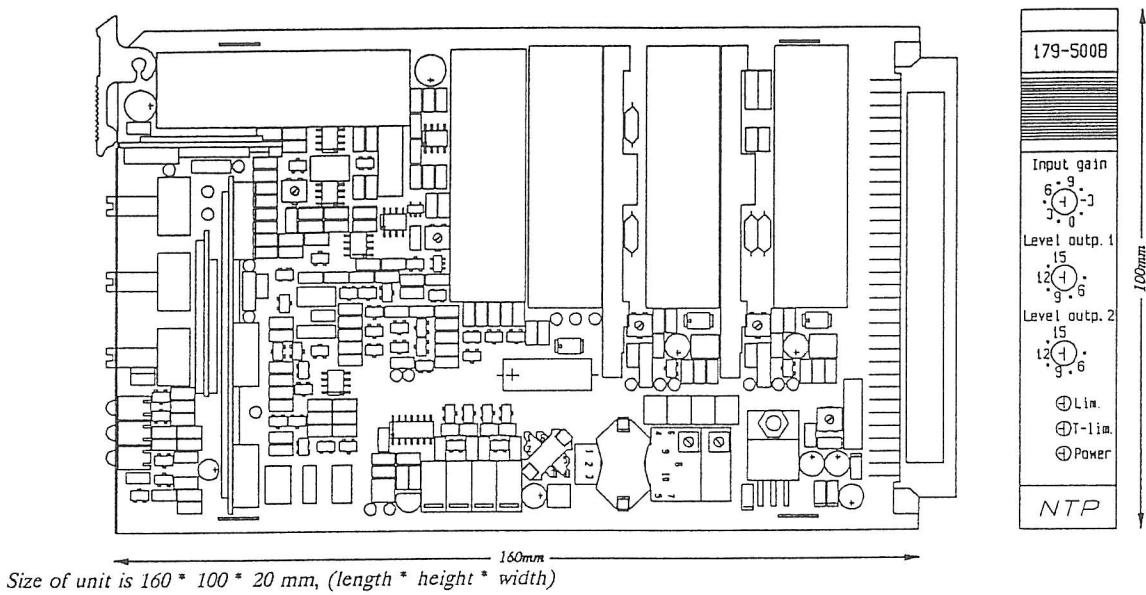
Limit threshold beyond linear limiter threshold:	+1.0 to 6.0 dB
Clipping threshold beyond transient limiter threshold:	0.5 dB ±0.5 dB
Attack time to 0.5dB:	<250 µS
Recovery time to 0.5dB:	40mS

**De-emphasis:**

Line Output (1):	disable/enable de-emphasis
Monitor Output (2):	de-emphasis always enabled in internal mode/ depending on Line Output setting in external mode
Deviation from ideal value:	<±0.1 dB

Power supply range	22-28 VDC
Current consumption	<200 mA (typ. 150 mA)
Physical size:	160x100x20mm (LxHxW)

# NTP



The 179-500B adheres to the IRT "Pflichtenheft S/5.1". Unless otherwise specified, the following specifications are measured at the Monitor Output (B), internal monitor mode,  $\Delta f = 40\text{Hz}-15\text{kHz}$ ,  $R_L = 300\Omega$  and  $U_{in} = 6\text{dBu}$ , 500 Hz.

<b>INPUT:</b> impedance	> 10 k $\Omega$
CMRR ( $R_s = 600 \Omega$ , DIN 45 404)	> 60 dB
Input overload threshold	> 22 dBu

<b>OUTPUT:</b> impedance	< 30 $\Omega$
CMRR, DIN 45 404	> 60 dB
Symmetry	> 40 dB
Nominal level (Line Out) @ 10KHz, deemphase off	10.5 dBu $\pm$ 0.2 dB
Nominal level (Monitor Out) @ 500Hz	6.0 dBu $\pm$ 0.2 dB

Frequency range: ( $U_{in} = -15\text{dBu}$ )	
40Hz - 10kHz	$\pm 0.3$ dB
10 - 15kHz	+ 0.3/- 0.5 dB
19 kHz	< -40 dB
> 19 kHz	< -30 dB

Uniformity between individual 179-500B units,	
Level/Phase difference: ( $U_{in} = -15\text{dBu}$ ):	
40Hz - 100Hz	better than 0.3 dB / 10°
100Hz - 6.4 kHz	better than 0.1 dB / 5°
6.4 - 12.8 kHz	better than 0.2 dB / 10°
12.8 - 15 kHz	better than 0.4 dB / 15°

<b>Noise:</b>	
Output "G" weigh. w/o de-emph:	< -66 dBqp (typ:-70 dBqp)
Output "G" unweigh. RMS w/o de-emph:	< -75 dBu (typ:-79 dBu)
Output "H" weigh.	< -74 dBqp (typ:-78 dBqp)
Output "H" unweigh. RMS	< -86 dBu (typ:-89 dBu)

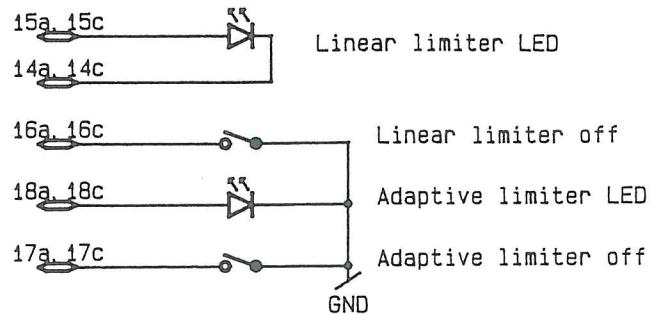
THD @ $U_{in} = 6\text{dBu}$ , 40Hz - 15kHz	< 0.1%
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# NTP

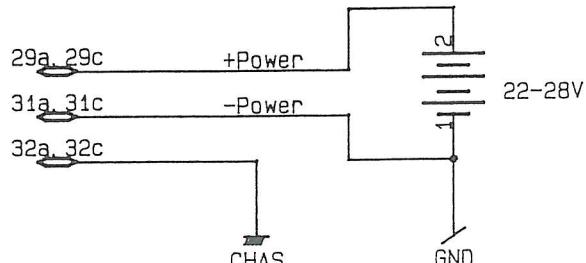
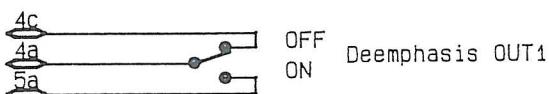
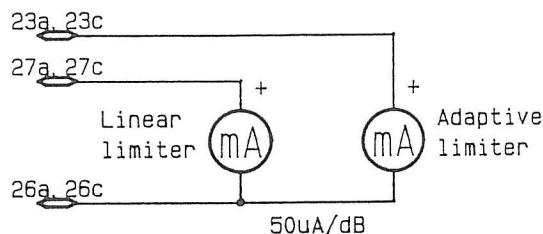
Gain setting @ 1 kHz, nominal:	0 ± 0.2 dB
Front adj. input gain - (in 1.5dB steps):	-3 to +9dB ± 0.2dB
Front adj. output gain - (in 1.5dB steps):	-1.5 to +9dB ± 0.2dB
On-card adjusting range:	> ± 1.0 dB
<b>Linear Limiter:</b>	
Clipping level beyond steady state:	+ 1.5 dB
Attack time to 1dB:	1.5ms
Release time to 1dB:	4-20s (automatic)
<b>Transient Limiter:</b>	
Limit threshold beyond linear limiter threshold:	+ 1.0 to 6.0 dB
Clipping threshold beyond transient limiter threshold:	0.5 dB ± 0.5 dB
Attack time to 0.5dB:	< 250 µS
Recovery time to 0.5dB:	40mS
<b>De-emphasis:</b>	
Line Output A):	disable/enable de-emphasis
Monitor Output B:	de-emphasis always enabled in internal mode/ depending on Line Output setting in external mode
Deviation from ideal value:	< ± 0.1 dB
Power supply range	22-28 VDC
Current consuption	< 200 mA (typ. 150 mA)
Physical size:	160x100x20mm (LxHxW)

The Card is terminated via a 64-pin Euro connector, male

		row c	pin	row a
c	a			
1				
		Input 0°	1	Input 0°
		Input 180°	2	Input 180°
		Screen	3	Screen
		Deemphasis OFF ch 1, to 4a	4	Deemphasis ON/OFF, common
		N.C.	5	Deemphasis ON ch 1, to 4a
		N.C.	6	N.C.
		N.C.	7	N.C.
		N.C.	8	N.C.
		N.C.	9	N.C.
		N.C.	10	N.C.
		N.C.	11	N.C.
		N.C.	12	N.C.
		N.C.	13	N.C.
		Lim LED, to -	14	Lim LED, to -
		Lim LED, to +	15	Lim LED, to +
		/Lim OFF, to GND	16	/Lim OFF, to GND
		/T-lim OFF, to GND	17	/T-lim OFF, to GND
		T-lim LED, to +	18	T-lim LED, to +
		Output 1 0°	19	Output 1 0°
		Output 1 180°	20	Output 1 180°
		Output 2 0°	21	Output 2 0°
		Output 2 180°	22	Output 2 180°
		Meter T-lim, to +	23	Meter T-lim, to +
		T-lim, stereo connection	24	T-lim, stereo connection
		Ref., stereo connection	25	Ref. stereo connection
		Meter Common, Lim/T-lim, to -	26	Meter Common, Lim/T-lim, to -
		Meter Lim to +	27	Meter Lim, to +
		Lin, stereo connection	28	Lin, stereo connection
		+ Vcc	29	+ Vcc
		N.C.	30	N.C.
		- Vcc	31	- Vcc
		Chassis	32	Chassis
Seen from rear side of frame				
32				



28a\_28c Vc lin. limiter  
 24a\_24c Vc adap. limiter  
 25a\_25c Vc reference } Control voltages to stereo channel

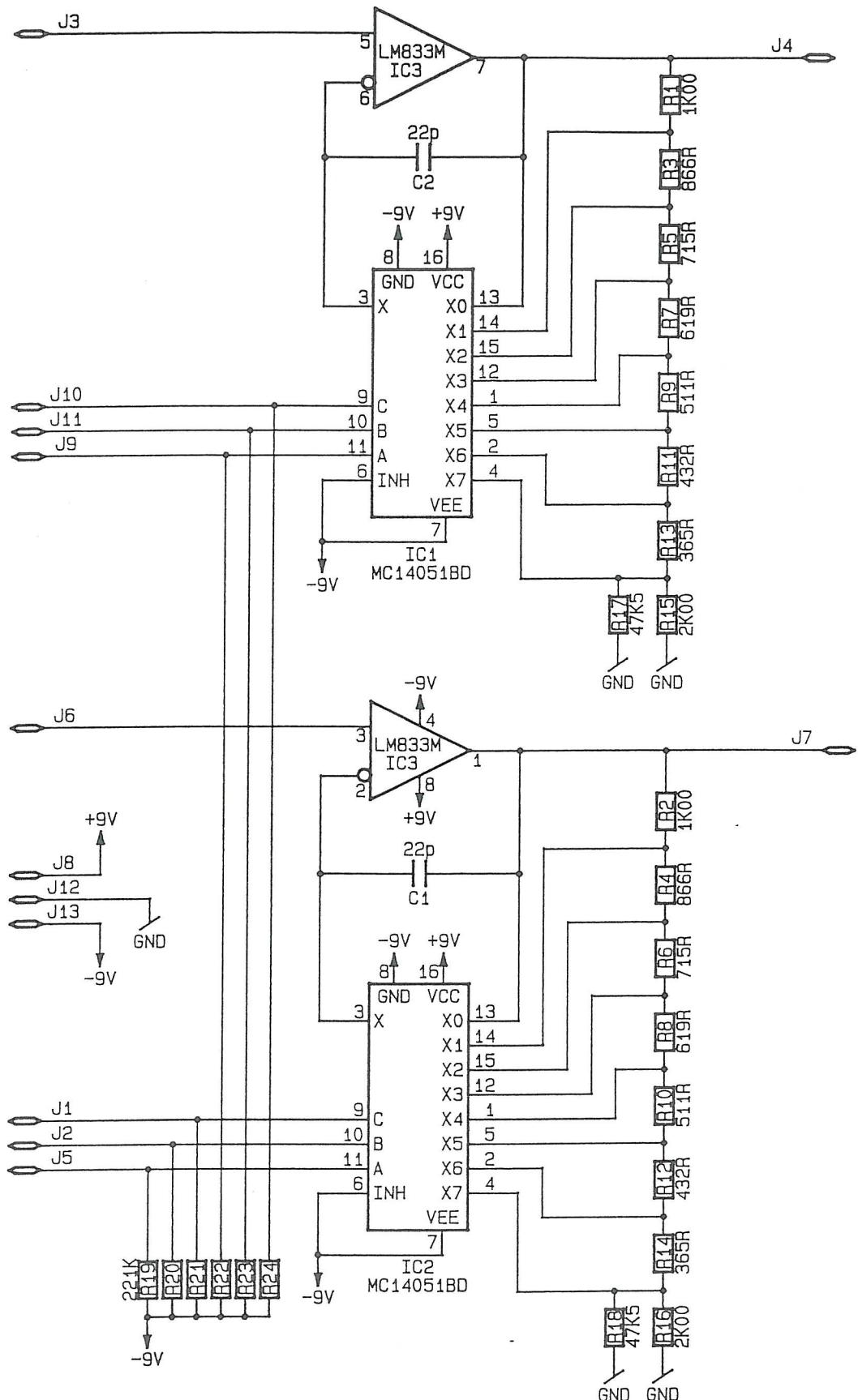


19a\_19c Noninv.  
 20a\_20c Inv. OUT1

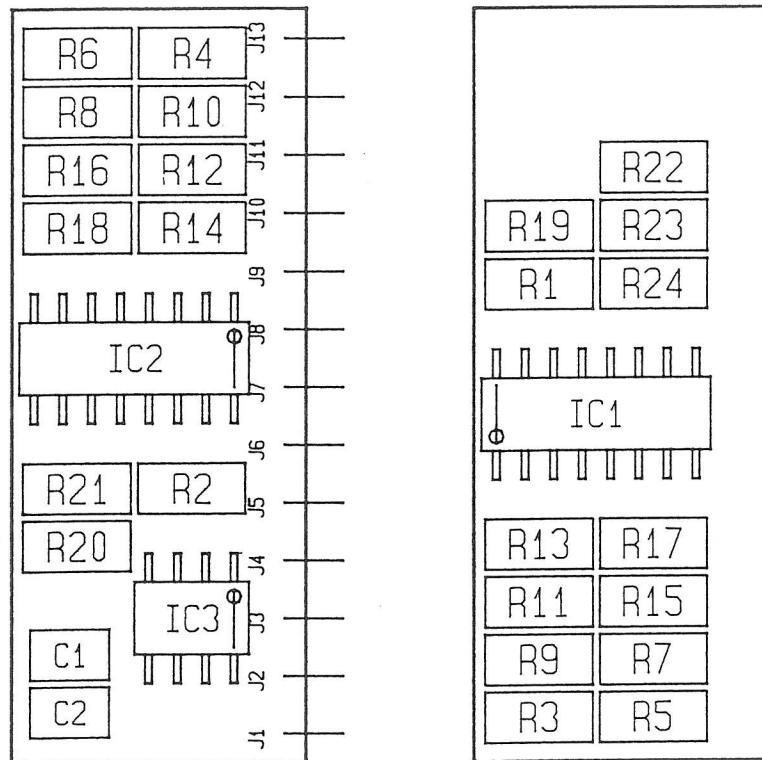
21a\_21c Noninv.  
 22a\_22c Inv. OUT2

1a\_1c Noninv.  
 2a\_2c Inv. -Input  
 3a\_3c Screen  
 CHAS

Blank piece:	Material:	Treatment:	Page: 2 of 2
Scale :			
Tolerance :			
Design : HTO			
Layout : 930121	Transient Limiter 179-500A External connections, mono		
Revised :			NTP 179-5002-A-4



Blank piece:	Material:	Treatment:	Page: 1 of 1
Scale :			
Tolerance :			
Design : HTO			
Layout : 921002	Transient Limiter Output Gain Stage Module Diagram	179-500A 179-5042A	<b>NTP</b>
Revised :			179-5032-A-4



Blank piece:	Material:	Treatment:	Page 1 of 1
Scale : 3:1			
Tolerance :		Transient Limiter	179-500A
Design : HTO		Output Gain Stage modul	179-5042A
Layout : 920720		Component Lay-out	
Revised : 1/930128			NTP
			179-5043-A-4

Multi 1 01.93 10:26 PARTS LIST 17 5033A Side 1

NTP 179-5033A DUAL GAIN STAGE MODULE

PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
C 1	XCCC-0222G	CAP CERAMIC 50V 22PF 20%	1	SIEMENS B37940	J5220 J62
C 2	XCCC-0222G	CAP CERAMIC 50V 22PF 20%	1	SIEMENS B37940	J5220 J62
IC 1	XICA-4051A	ANALOG MULTIPLEXER	1	MOTOROLA	MC 14051BD
IC 2	XICA-4051A	ANALOG MULTIPLEXER	1	MOTOROLA	MC 14051BD
IC 3	XILA-0833A	DUAL OP-AMPLIFIER	1	NATIONAL	LM833M
J 1-13	KMN-1301	CONTACT PIN 13P	1	CONELEC	KMN-1301
R 1	XRMD-4100C	RESISTOR METAL 1206 1.00K 1%	1	PHILIPS RC 02G	RC 02G 1.00K1%
R 2	XRMD-4100C	RESISTOR METAL 1206 1.00K 1%	1	PHILIPS RC 02G	RC 02G 1.00K1%
R 3	XRMD-3866C	RESISTOR METAL 866R 1%	1	PHILIPS RC02H	RC02 866R 1%
R 4	XRMD-3866C	RESISTOR METAL 866R 1%	1	PHILIPS RC02H	RC02 866R 1%
R 5	XRMD-3715C	RESISTOR METAL 715R 1%	1	PHILIPS RC02H	RC02 715R 1%
R 6	XRMD-3715C	RESISTOR METAL 715R 1%	1	PHILIPS RC02H	RC02 715R 1%
R 7	XRMD-3619C	RESISTOR METAL 619R 1%	1	PHILIPS RC02H	RC02 619R 1%
R 8	XRMD-3619C	RESISTOR METAL 619R 1%	1	PHILIPS RC02H	RC02 619R 1%
R 9	XRMD-3511C	RESISTOR METAL 511R 1%	1	PHILIPS RC02H	RC02 511R 1%
R 10	XRMD-3511C	RESISTOR METAL 511R 1%	1	PHILIPS RC02H	RC02 511R 1%
R 11	XRMD-3432C	RESISTOR METAL 432R 1%	1	PHILIPS RC02H	RC02 432R 1%
R 12	XRMD-3432C	RESISTOR METAL 432R 1%	1	PHILIPS RC02H	RC02 432R 1%
R 13	XRMD-3365C	RESISTOR METAL 365R 1%	1	PHILIPS RC02H	RC02 365R 1%
R 14	XRMD-3365C	RESISTOR METAL 365R 1%	1	PHILIPS RC02H	RC02 365R 1%
R 15	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILIPS RC 02G	RC 02G 2.00K1%
R 16	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILIPS RC 02G	RC 02G 2.00K1%
R 17	XRMD-5475C	RESISTOR METAL 1206 47K5 1%	1	PHILIPS RC 02G	RC 02G 47K5 1%
R 18	XRMD-5475C	RESISTOR METAL 1206 47K5 1%	1	PHILIPS RC 02G	RC 02G 47K5 1%
R 19	XRMD-62221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 20	XRMD-62221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 21	XRMD-62221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 22	XRMD-62221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 23	XRMD-62221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 24	XRMD-62221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
10	179-5042A	PRINT BOARD	1	CAD	179-5042A

**NTP Parts List**

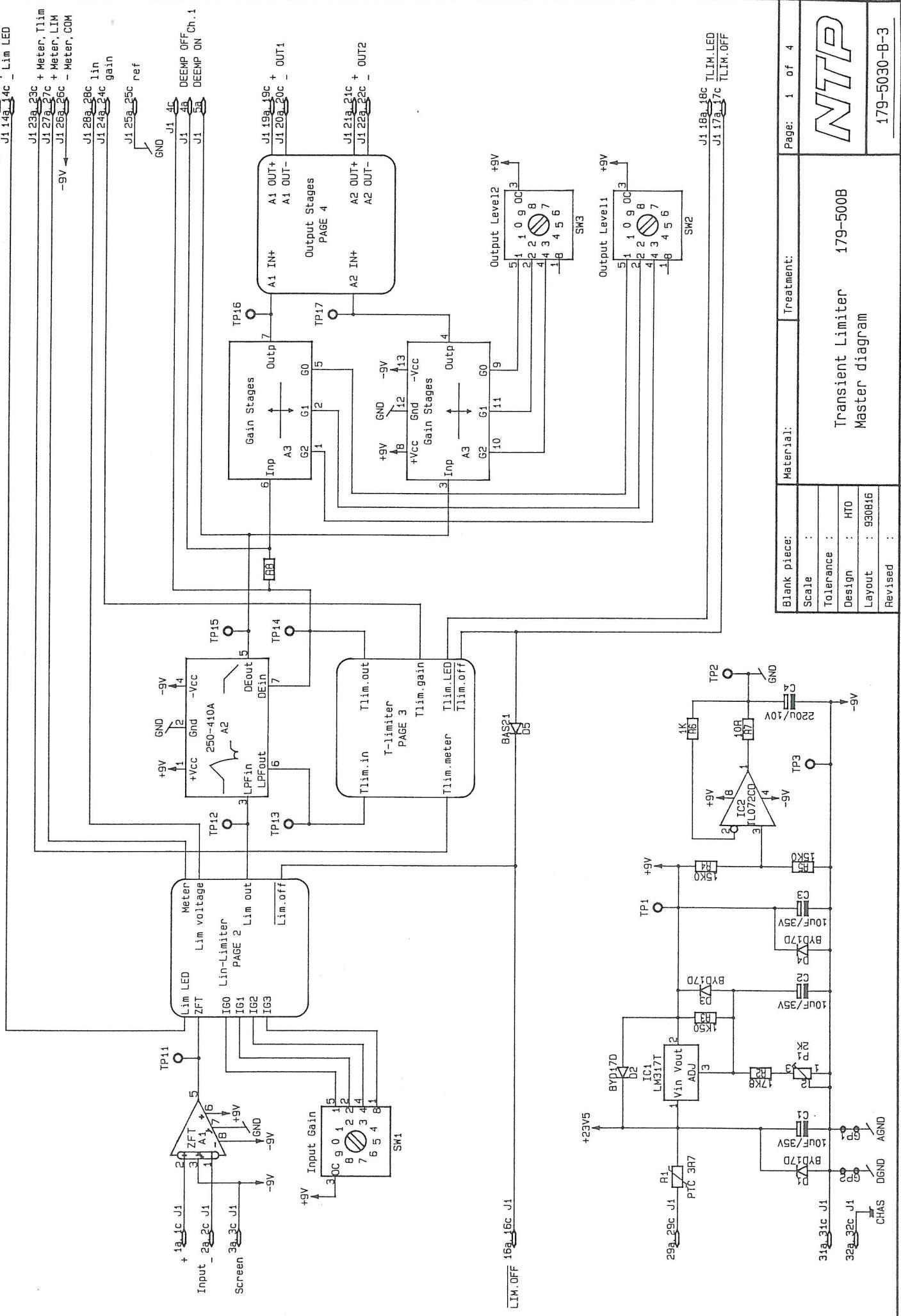
as of date 12-1 1993.

Page / of /.

List No.: 179-5033-A-Y

SLUT

PARTS LIST 179-5033A



Transient Limiter  
Master diagram

179-500B

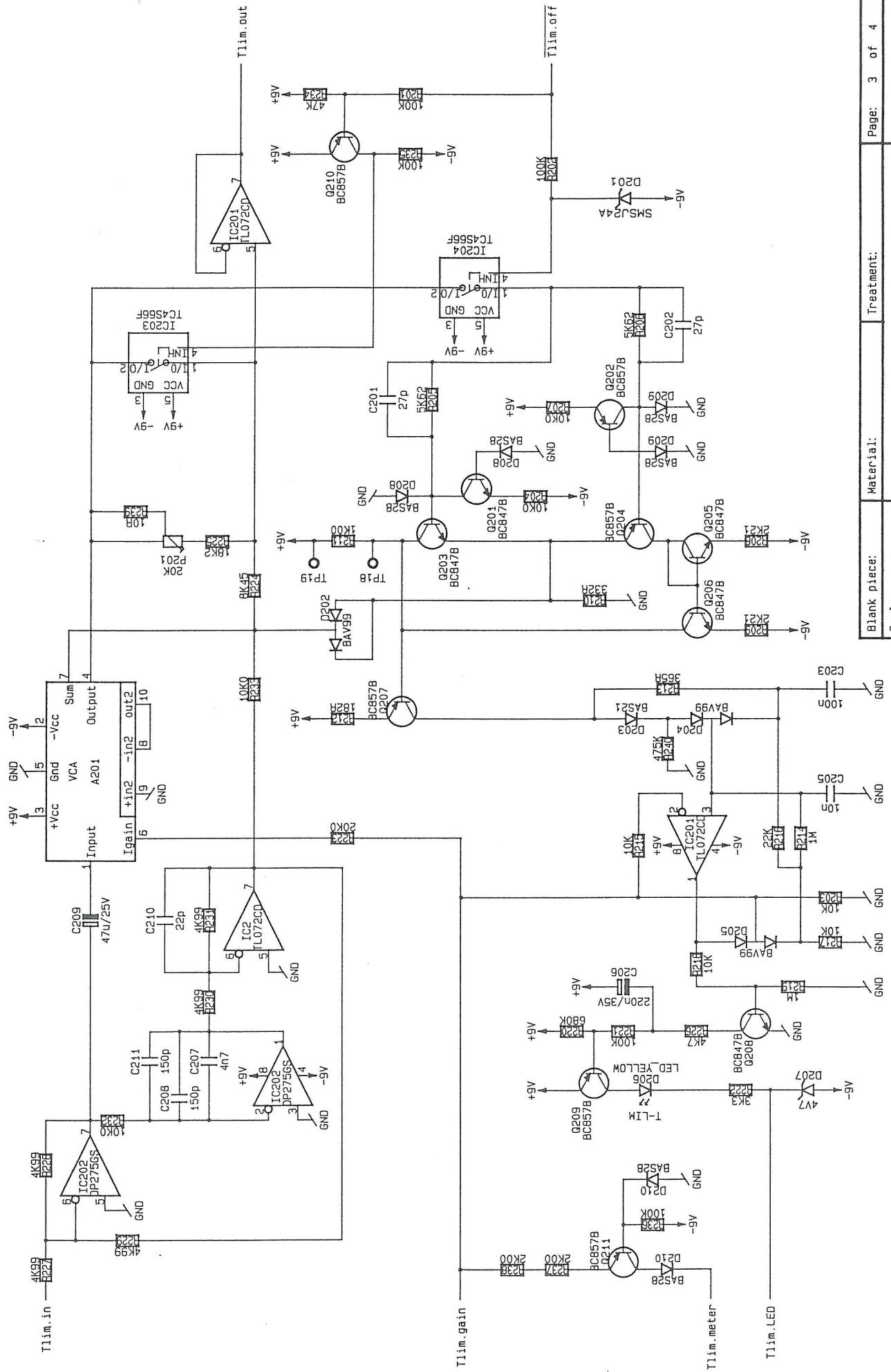
Page: 1 of 4

NTP

179-5030-B-3

Blank piece:	Material:	Treatment:	Page: 1 of 4
Scale :			
Tolerance :			
Design : H10			
Layout : 930816			
Revised :			





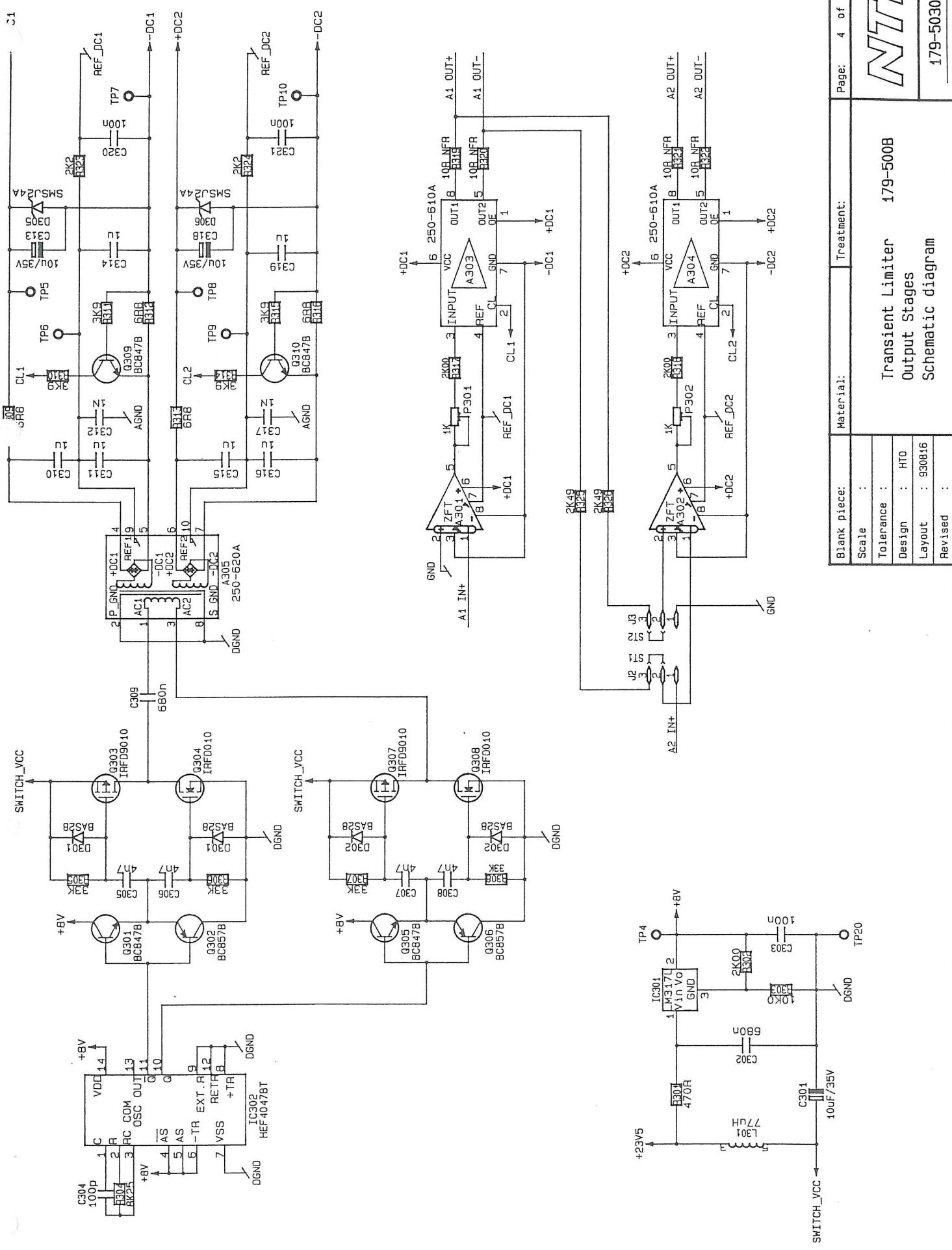
Blank piece: Material:

Page: 3 of 4

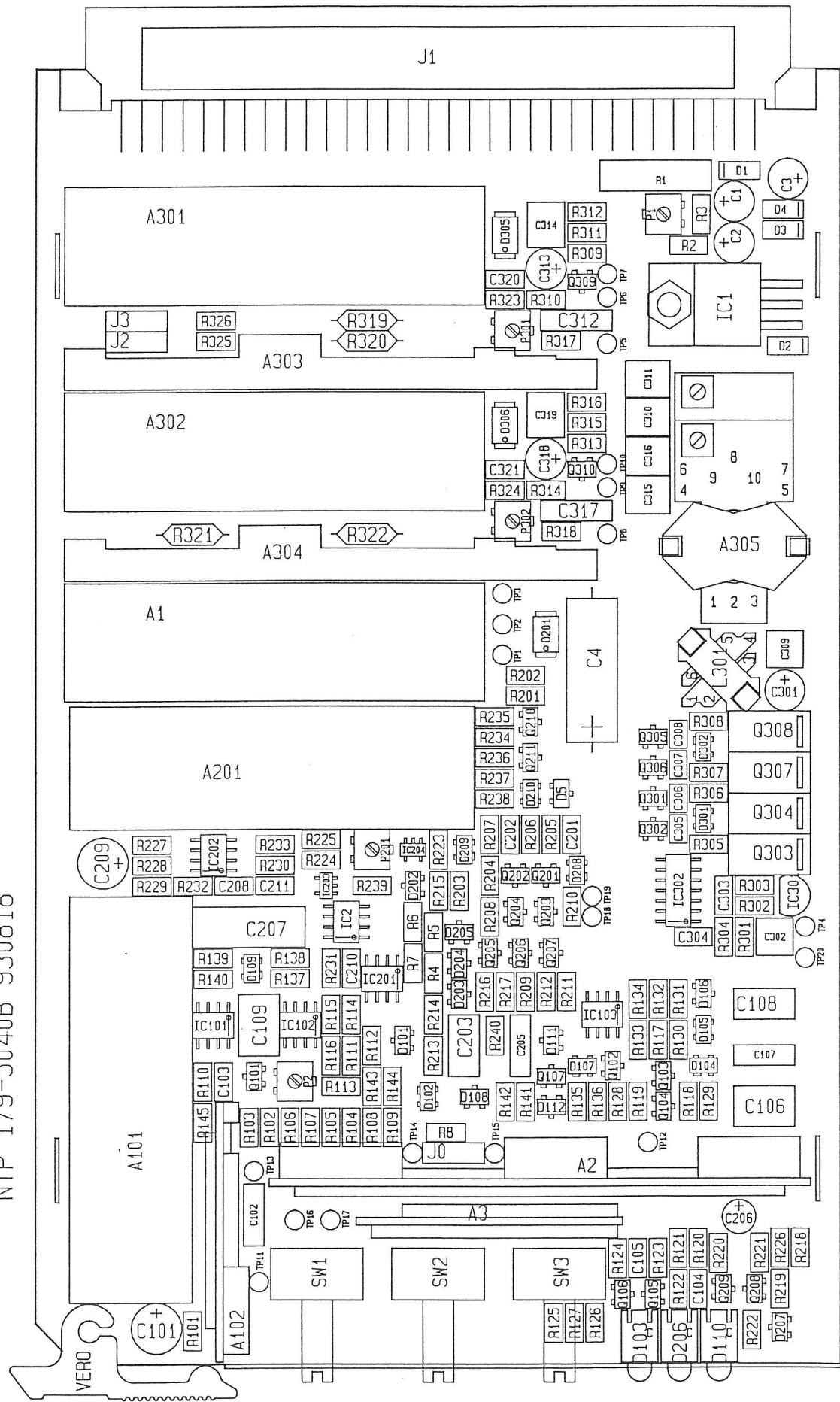
13

Transient Limiter  
GPE limiter part  
Schematic diagram

Revised : \_\_\_\_\_  
\_\_\_\_\_  
1/y-5030-B-3



NTP 179-5040B 930818



Blank piece:	Material:	Treatment:	Page	1 of 1
Scale :	2:1	Transient Limiter	179-500B	<i>NTP</i>
Tolerance :		Main Card	179-5040B	
Design :	H10	Components Layout		
Layout :	930818ito			
Revised :				179-5041-B-3

Multi .12.94 9:57

NTP 179-500B TRANSIENT LIMITER CARD

PARTS LIST

Side 1

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
PARTS LIST					
5	250-3057	INSULATION PLATE, ZFT MODULE	3	250-3057-A-4	250-3057
10	179-5055	COVER PLATE	1	179-5055-A-3	179-5055
20	179-5057A	CARD EJECTOR	1	179-5057-A-4	179-5057A
21	MFF-0030	WASHER	1	HFC 1245	1245 3,5
30	179-5058A	ISOLATION PLATE	1	179-5058-A-4	179-5058A
40	179-5054A	FRONT PLATE, PRINTED	1	179-5054-A-4	179-5054-A-4
45	179-5099B	LABEL	1	179-5099-B-4	179-5099B
50	299-1055	BUSCHING	1	299-1055-A-4	299-1055
60	MAB-0005	RIVET	1	B2.5X0.25X8.5	81-25085-7300
70	MAB-0005	RIVET	1	B2.5X0.25X8.5	81-25085-7300
80	MSB-2004	SCREW BIX 2 X 4	1	BIX	LKCS 2 X 4
90	MAS-2512	SPANPIN	1	DIN 1481	2.5 X 12MM
100	MET-0005	STAY	1	ELMA	1923-01
110	MSB-3006	SCREW BIX 3 X 6	1	BIX	LKCS 3 X 6
120	MSC-3005	SCREW 3 X 5 CHJZ	1	HFC 9033	3X 5 CHJZ
A 1000	179-5039B	CARD W SMD COMPONENTS	1	179-5014-B-3	179-5039B
A 1	250-350F	ZFT-MODULE	1	250-3541/74-F4	250-350F
A 2	250-410A	LPF MODULE(LOW PASS FILT.)	1	250-4174-A-4	250-410A
A 3	179-5033A	DUAL GAIN STAGE MODULE	1	179-5043-A-4	179-5033A
A 101	250-520C	VCA MODULE	1	250-5274-C-4	250-520C
A 102	250-400A	ADL MODULE (A/D DC LOG)	1	250-4074-A-4	250-400A
A 201	250-520C	VCA MODULE	1	250-5274-C-4	250-520C
A 301	250-350H	ZFT-MODULE 0 DB	1	250-3541-F-4	250-350H
A 302	250-350H	ZFT-MODULE 0 DB	1	250-3541-F-4	250-350H
A 303	250-610A	TEST OUTPUT MODULE	1	250-6141-A-4	250-610A TEST
A 304	250-610A	TEST OUTPUT MODULE	1	250-6141-A-4	250-610A TEST
A 305	250-620C	AC/DC POWER SUPPLY MODULE	1	250-6241-C-4	250-620C
C 1	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF/35V Ø5X7
C 2	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF/35V Ø5X7
C 3	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF/35V Ø5X7
C 4	CFA-0922	CAP ELECTROLYTIC 220UF/10V	1	SIEMENS B41283	10UF/35V Ø5X7 C3227-T
C 101	CFC-0847	ELECTROLYTIC CAPACIT. 47UF 2	1	MARCONI	CE SSM 1E470
C 102	CKB-0410	CAP POLYESTER 1NF/100V	1	WTMA FKS	FKS 2 INF

**NTP Parts List**

as of date 7-12-1994

Page / of 3.

List No.: 179-5031-B-4

## NTP 179-500B TRANSIENT LIMITER CARD

## PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
C 106	CKA-0710	CAP POLYESTER 1UF/50V	1	WIMA MKS	MKS 2 1UF
C 107	CKA-0533	CAP POLYESTER 33NF/50V	1	WIMA MKS	MKS 2 33NF
C 108	CKC-0615	CAP POLYESTER 150NF/63V	1	WIMA MKS	MKS 2 150NF
C 109	CKC-0647	CAP POLYESTER 470NF/63V	1	WIMA MKS	MKS 2 470NF
C 203	CKB-0610	CAP POLYESTER 100NF/100V	1	WIMA MKS	MKS2 100N/100V
C 204	CAA-0000	CAPACITOR, NOT USED	1	CAA-0000	CAA-0000
C 205	CKB-0510	CAP POLYESTER 10NF/100V	1	WIMA FKS	FKS 2 10NF
C 206	CTF-0622	CAP TANTALUM 220NF/35V	1	ERO ETP	ETP 1A 220NF
C 207	CND-0447	CAP POLYSTYRENE 4.7NF/63V	1	PH 2222	424 44702
C 209	CFC-0847	ELECTROLYTIC CAPACIT. 47UF 2	1	MARCON	CE SSM 1E470
C 301	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF / 35V Ø5X7
C 302	CKD-0668	CAPACITOR, POLYESTER 680NF 5	1	WIMA MKS	02 0 .68/20/50
C 309	CKD-0668	CAPACITOR, POLYESTER 680NF 5	1	WIMA MKS	02 0 .68/20/50
C 310	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
C 311	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
C 312	CKL-0410	CAP POLYESTER 1NF 630V 20%	1	WIMA 1NF/630V	MKS33 1N 20%
C 313	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF / 35V Ø5X7
C 314	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
C 315	CRD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
C 316	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
C 317	CKL-0410	CAP POLYESTER 1NF 630V 20%	1	WIMA 1NF/630V	MKS33 1N 20%
C 318	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF / 35V Ø5X7
C 319	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
D 103	OES-0130	LIGHT EMITT. DIODE, RED	1	HP	HLMP-1700-101
D 110	OES-0131	LIGHT EMITT. DIODE, GREEN	1	HP	HLMP-1790-101
D 206	OES-0132	LIGHT EIFT. DIODE, YELLOW	1	HP	HLMP-1719-101
IC 1	ILR-317T	SPÆNDINGS REGULATOR	1	TEX.	TO-220
IC 301	ILR-317L	SPÆNDINGS REGULATOR	1	NAT.	TO-92
J 1	KEM-6406	EUROCONNECTOR 64P ANGLE, MAL	1	ELCO	8257
J 2	KMM-0301	MOLEX CONN. 3P MAL WRAP	1	MOLEX A4030	4030 22-3-2032
J 3	KMM-0301	MOLEX CONN. 3P MAL WRAP	1	MOLEX A4030	4030 22-3-2032
L 301	277-3070	CHOKE	1	277-3070-A-4	277-3070
Q 303	QFV-9010	HEX FET P-CHANNEL ENHANCEMEN	1	IOR	IRFD9010

**NTP Parts List**

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PARTS LIST 179-500B

Side 3

NTP 179-500B TRANSIENT LIMITER CARD

PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW. NO.	PART NO.
Q 304	QFV-0010C	HEXFET N-CHAN. ENHANCEMENT	1	IOR	IRFD 010
Q 307	QFV-9010	HEX FET P-CHANNEL ENHANCEMENT	1	IOR	IRFD9010
Q 308	QFV-0010C	HEXFET N-CHAN. ENHANCEMENT	1	IOR	IRFD 010
R 1	RTC-1370	RESISTOR PTC 3R7	1	PTC Q63100	P2390 C950
R 319	RYA-2100	RESISTOR FUSIBLE 10R 0.33W 5	1	PHILLIPS NFR25	2322 205 23109
R 320	RYA-2100	RESISTOR FUSIBLE 10R 0.33W 5	1	PHILLIPS NFR25	2322 205 23109
R 321	RYA-2100	RESISTOR FUSIBLE 10R 0.33W 5	1	PHILLIPS NFR25	2322 205 23109
R 322	RYA-2100	RESISTOR FUSIBLE 10R 0.33W 5	1	PHILLIPS NFR25	2322 205 23109
ST 1	KFJ-0002	B-JUMPER	1	DUPONT DUBOX	76265-101
ST 2	KFJ-0002	B-JUMPER	1	DUPONT DUBOX	76265-101
SW 1	SRB-0004	ROTARY SWITCH 9 POS YELLOW	1	HOPT & S.	422 020
SW 2	SRB-0004	ROTARY SWITCH 9 POS YELLOW	1	HOPT & S.	422 020
SW 3	SRB-0004	ROTARY SWITCH 9 POS YELLOW	1	HOPT & S.	422 020
TP 1	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 2	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 3	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 4	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 5	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 6	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 7	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 8	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 9	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 10	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 11	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 12	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 13	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 14	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 15	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 16	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 17	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 18	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 19	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 20	MHT-0001	TESTPOINT	1	VERO	20-2137D

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NTP 179-500B TRANSIENT LIMITER CARD

PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
5	250-3057	INSULATION PLATE , ZFT MODULE	3	250-3057-A-4	250-3057
10	179-5055	COVER PLATE	1	179-5055-A-3	179-5055
20	179-5057A	CARD EJECTOR	1	179-5057-A-4	179-5057A
21	MFF-0030	WASHER	1	HFC 1245	1245 3,5
30	179-5058A	ISOLATION PLATE	1	179-5058-A-4	179-5058A
40	179-5054A	FRONT PLATE , PRINTED	1	179-5054-A-4	179-5054-A-4
45	179-5099B	LABEL	1	179-5099-B-4	179-5099B
50	299-1055	BUSCHING	1	299-1055-A-4	299-1055
60	MAB-0005	RIVET	1	B2.5X0.25X8.5	81-25085-7300
70	MAB-0005	RIVET	1	B2.5X0.25X8.5	81-25085-7300
80	MSB-2004	SCREW BIX 2 X 4	1	BIX	LKCS 2 X 4
90	MAS-2512	SPANPIN	1	DIN 1481	2.5 X 12MM
100	MET-0005	STAY	1	ELMA	1923-01
110	MSB-3006	SCREW BIX 3 X 6	1	BIX	LKCS 3 X 6
120	MSC-3005	SCREW 3 X 5 CHJZ	1	HFC 9033	3X 5 CHJZ
A 1000	179-5039B	CARD W SMD COMPONENTS	1	179-5014-B-3	179-5039B
A 1	250-350F	ZFT-MODULE	1	250-3541/74-F4	250-350F
A 2	250-410A	LPF MODULE(LOW PASS FILT.)	1	250-4174-A-4	250-410A
A 3	179-5033A	DUAL GAIN STAGE MODULE	1	179-5043-A-4	179-5033A
A 101	250-520C	VCA MODULE	1	250-5274-C-4	250-520C
A 102	250-400A	ADL MODULE (A/D DC LOG)	1	250-4074-A-4	250-400A
A 201	250-520C	VCA MODULE	1	250-5274-C-4	250-520C
A 301	250-350H	ZFT-MODULE 0 DB	1	250-3541-F-4	250-350H
A 302	250-350H	ZFT-MODULE 0 DB	1	250-3541-F-4	250-350H
A 303	250-610A	TEST OUTPUT MODULE	1	250-6141-A-4	250-610A TEST
A 304	250-610A	TEST OUTPUT MODULE	1	250-6141-A-4	250-610A TEST
A 305	250-620A	AC/DC CONVERTER MODULE	1	250-6241-A-4	250-620A
C 1	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF / 35V Ø5X7
C 2	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF / 35V Ø5X7
C 3	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF / 35V Ø5X7
C 4	CFA-0922	CAP ELECTROLYTIC 220UF/10V	1	SIEMENS B41283	C3227-T
C 101	CFC-0847	ELECTROLYTIC CAPACIT. 47UF 2	1	MARCON	CE SSM 1E470
C 102	CRB-0410	CAP POLYESTER 1NF/100V	1	WIMA FRSS	FRS 2 INF

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## TRANSIENT LIMITER CARD

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW. NO.	PART NO.
C 106	CKA-0710	CAP POLYESTER 1UF/50V	1	WIMA MKS	MKS 2 1UF
C 107	CKA-0533	CAP POLYESTER 33NF/50V	1	WIMA MKS	MKS 2 33NF
C 108	CKC-0615	CAP POLYESTER 150NF/63V	1	WIMA MKS	MKS 2 150NF
C 109	CKC-0647	CAP POLYESTER 470NF/63V	1	WIMA MKS	MKS 2 470NF
C 203	CKB-0610	CAP POLYESTER 100NF/100V	1	WIMA MKS	MKS2 100N/100V
C 204	CAA-0000	CAPACITOR, NOT USED	1	CAA-0000	CAA-0000
C 205	CKB-0510	CAP POLYESTER 10NF/100V	1	WIMA FKS	FKS 2 10NF
C 206	CTF-0622	CAP TANTALUM 220NF/35V	1	ERO ETP	ETP 1A 220NF
C 207	CND-0447	CAP POLYSTYRENE 4.7NF/63V	1	PH 2222 424	2222 424 44702
C 209	CFC-0847	ELECTROLYTIC CAPACIT. 47UF 2	1	MARCON	CE SSM 1E470
C 301	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF/35V Ø5X7
C 302	CKD-0668	CAPACITOR, POLYESTER 680NF 5	1	WIMA MKS	02 0.68/20/50
C 309	CKD-0668	CAPACITOR, POLYESTER 680NF 5	1	WIMA MKS	02 0.68/20/50
C 310	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
C 311	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
C 312	CKL-0410	CAP POLYESTER 1NF 630V 20%	1	WIMA 1NF/630V	MKS33 1N 20%
C 313	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF/35V Ø5X7
C 314	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
C 315	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
C 316	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
C 317	CKL-0410	CAP POLYESTER 1NF 630V 20%	1	WIMA 1NF/630V	MKS33 1N 20%
C 318	CGI-0810	CAP ELECTROLYTIC 10UF/35V	1	PANASONIC K	10UF/35V Ø5X7
C 319	CKD-0710	CAP POLYESTER 1UF 50V 20%	1	WIMA 1UF/50V	MKS02 1UF 20%
D 103	OES-0130	LIGHT EMITT. DIODE, RED	1	HP	HLMP-1700-101
D 110	OES-0131	LIGHT EMITT. DIODE, GREEN	1	HP	HLMP-1790-101
D 206	OES-0132	LIGHT EITT. DIODE, YELLOW	1	HP	HLMP-1719-101
IC 1	ILR-3171	SPENDINGS REGULATOR	1	TEX. 10-220	LM 317T
IC 301	ILR-3171	SPENDINGS REGULATOR	1	NAT. TO-92	LM 317L
J 1	KEM-6406	EUROCONNECTOR 64P ANGLE, MAL	1	ELCO 8257	8257 096 000
J 2	KMM-0301	MOLEX CONN. 3P MAL WRAP	1	MOLEX A4030	4030 22-3-2032
J 3	KMM-0301	MOLEX CONN. 3P MAL WRAP	1	MOLEX A4030	4030 22-3-2032
L 301	277-3070	CHOKE	1	277-3070-A-4	277-3070
Q 303	QFV-9010	HEX FET P-CHANNEL ENHANCEMEN	1	IOR	IRFD9010

**NTP Parts List**

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List No.: /79-5031-B-4

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PARTS LIST 17: 00B

NTP 179-500B TRANSIENT LIMITER CARD

PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	Q'TY	MANUFACT/DRW. NO.	PART NO.
Q 304	QFV-0010C	HEXFET N-CHAN. ENHANCEMENT	1	IOR	IRFD 010
Q 307	QFV-9010	HEX FET P-CHANNEL ENHANCEMENT	1	IOR	IRFD9010
Q 308	QFV-0010C	HEXFET N-CHAN. ENHANCEMENT	1	IOR	IRFD 010
R 1	RTC-1370	RESISTOR PTC 3R7	1	PTC Q63100	P2390 C950
R 319	RYA-2100	RESISTOR FUSIBLE 10R 0.33W 5	1	PHILLIPS NFR25	2322 205 23109
R 320	RYA-2100	RESISTOR FUSIBLE 10R 0.33W 5	1	PHILLIPS NFR25	2322 205 23109
R 321	RYA-2100	RESISTOR FUSIBLE 10R 0.33W 5	1	PHILLIPS NFR25	2322 205 23109
R 322	RYA-2100	RESISTOR FUSIBLE 10R 0.33W 5	1	PHILLIPS NFR25	2322 205 23109
ST 1	KFJ-0002	B-JUMPER	1	DUPONT DUBOX	76265-101
ST 2	KFJ-0002	B-JUMPER	1	DUPONT DUBOX	76265-101
SW 1	SRB-0004	ROTARY SWITCH 9 POS YELLOW	1	HOPT & S. 422	020
SW 2	SRB-0004	ROTARY SWITCH 9 POS YELLOW	1	HOPT & S. 422	020
SW 3	SRB-0004	ROTARY SWITCH 9 POS YELLOW	1	HOPT & S. 422	020
TP 1	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 2	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 3	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 4	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 5	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 6	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 7	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 8	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 9	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 10	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 11	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 12	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 13	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 14	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 15	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 16	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 17	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 18	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 19	MHT-0001	TESTPOINT	1	VERO	20-2137D
TP 20	MHT-0001	TESTPOINT	1	VERO	20-2137D

**NTP Parts List**  
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SLUT

PARTS LIST 179-500B

## Adjustments.

The 179-500 limiter includes a number of trim potentiometers.

These are factory adjusted and should only be readjusted due to repair and component replacement.

The following description thus serves an informative purpose only .

## VCA-modules.

Two trim potentiometers are located on each of the two VCA-modules. They are carefully adjusted for minimum VCA-distortion and should not be touched.

## DC/DC converter.

The Ferrite core included in the DC/DC converter is fitted with two small multilayer boards, each with a potentiometer. These are adjusted for minimum residual noise on the two outputs and should not be touched.

## DC-supply.

P1 on the main board adjusts the internal supply voltage (+ 18 V with respect to external 0 V).

Misalignment of this potentiometer may influence the limit levels of both limiter sections.

## Gain adjustments.

The overall gain (at levels below limit threshold) can be adjusted on P301 and P302 (output 1 and 2 respectively). The following procedure describes the standard factory adjustment.

Settings: Input Gain = 0; Output Level (1&2) = 6; Lim. = OFF (term. no. 16 to GND)

Input signal: 0 dBu, f = 100 Hz

Adjust P301 to Uout = 0 dBu on output 1 (terminals 19 & 20)

Adjust P302 to Uout = 0 dBu on output 2 (terminals 21 & 22)

## Limit level, linear limiter.

P2 on the main board adjusts the threshold level of the linear limiter. Normally the threshold level is selected on the front switch (Input Gain) however small corrections can be made by adjusting P2. The following procedure describes the standard factory adjustment.

Settings: Input Gain = 0; Output Level (outp. 1&2) = 6  
Lim. = ON (term. no. 16 = NC) T-lim. = off (pin 17 to GND)

Input signal: +12 dBu, f = 100 Hz

Adjust P2 to Uout = +6 dBu on output 1 (terminals 19 & 20)

Note: Adjusting P2 may influence the gap between linear limiter and transient limiter thresholds.

## Limit level, transient limiter.

Due to the built-in preemphasis function the output level (on output 1) can reach + 10 dBu at high frequencies (10 kHz) before limitation.

This threshold can be adjusted on P201 on the main board.

Settings: Input Gain = 0; Output Level (outp. 1&2) = 6  
Lim. = ON (term. no. 16 = NC) T-lim. = ON (pin 17 = NC)  
Deemphasis = OFF

Input signal: +12 dBu, f = 10 kHz

Adjust P201 to Uout = +10 dBu on output 1 (terminals 19 & 20)

## NTP 179-5039B CARD W SMD COMPONENTS

## PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO. PART NO.
100	179-5040B	PRINT BOARD	1	CAD 179-5040B
C 103	XCCD-0610GC	CAP CERAMIC 50V 100NF 20%	1	SIEMENS B37873 K5104 M62
C 104	X CDDL-0522FB	CAP CERAMIC 22NF 10%	1	SIEMENS B37872 K5223-K62
C 105	XCCD-0610GC	CAP CERAMIC 50V 100NF 20%	1	SIEMENS B37873 K5104 M62
C 201	XCCD-0227G	COND. CERAMIC 50V 27PF 20% N	1	PHILLIPS 2222-15279
C 202	XCCD-0227G	COND. CERAMIC 50V 27PF 20% N	1	PHILLIPS 2222-15279
C 208	XCCD-0315E	CAP CERAMIC 63V 150PF 5%	1	ROEDERSTEIN PCC106P 150P5%
C 210	XCCD-0222F	CAP CERAMIC 63V 22PF 5%	1	SIEMENS B37871 K5220-J62
C 211	XCCD-0315E	CAP CERAMIC 63V 150PF 5%	1	ROEDERSTEIN PCC106P 150P5%
C 303	XCCD-0610GC	CAP CERAMIC 50V 100NF 20%	1	SIEMENS B37873 K5104 M62
C 304	XCCD-0310G	CAP CERAMIC 50V 1206 100PF 2	1	SIEMENS B37871 J5101-M9
C 305	XCCC-0447GD	CAP CERAMIC 50V 4.7NF 20%	1	SIEMENS B37701 J5472 M9
C 306	XCCC-0447GD	CAP CERAMIC 50V 4.7NF 20%	1	SIEMENS B37701 J5472 M9
C 307	XCCC-0447GD	CAP CERAMIC 50V 4.7NF 20%	1	SIEMENS B37701 J5472 M9
C 308	XCCC-0447GD	CAP CERAMIC 50V 4.7NF 20%	1	SIEMENS B37701 J5472 M9
C 320	XCCD-0610GC	CAP CERAMIC 50V 100NF 20%	1	SIEMENS B37873 K5104 M62
C 321	XCCD-0610GC	CAP CERAMIC 50V 100NF 20%	1	SIEMENS B37873 K5104 M62
D 1	XQDS-0017F	DIODE, HIGH CURRENT	1	PHILLIPS BYD17D-115
D 2	XQDS-0017F	DIODE, HIGH CURRENT	1	PHILLIPS BYD17D-115
D 3	XQDS-0017F	DIODE, HIGH CURRENT	1	PHILLIPS BYD17D-115
D 4	XQDS-0017F	DIODE, HIGH CURRENT	1	PHILLIPS BYD17D-115
D 5	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILLIPS BAS 21
D 101	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILLIPS BAS 21
D 102	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS BAS28 Q62702 A163
D 104	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS BAS28 Q62702 A163
D 105	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS BAS28 Q62702 A163
D 106	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILLIPS BAS 21
D 107	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS BAS28 Q62702 A163
D 108	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILLIPS BAS 21
D 109	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS BAS28 Q62702 A163
D 111	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILLIPS BAS 21
D 112	XQZZ-0023	NOT MOUNTED	1	XQZZ-0023 MICROSEMI
D 201	XQTZ-0027B	TRANSIENT DIODE	1	SMSJ24A

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PARTS LIST 179-5039B

Side 2

NTP 179-5039B CARD W SMD COMPONENTS

PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
D 202	XQDS-0099B	DIODE, DUAL	1	SIEMENS	BAV99
D 203	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILLIPS	BAS 21
D 204	XQDS-0099B	DIODE, DUAL	1	SIEMENS	BAV99
D 205	XQDS-0099B	DIODE, DUAL	1	SIEMENS	BAV99
D 207	XQZD-0047B	ZENER DIODE 4V7	1	PHILLIPS	BZX84C4V7
D 208	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS	BAS28
D 209	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS	BAS28
D 210	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS	BAS28
D 301	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS	BAS28
D 302	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS	BAS28
D 305	XQTZ-0027B	TRANSIENT DIODE	1	MICROSEMI	SMSJ24A
D 306	XQTZ-0027B	TRANSIENT DIODE	1	MICROSEMI	SMSJ24A
IC 2	XILA-0072A	OPERATIONAL AMPLIFIER	1	TEXAS	TL072CD
IC 101	XILA-0072A	OPERATIONAL AMPLIFIER	1	TEXAS	TL072CD
IC 102	XILA-0072A	OPERATIONAL AMPLIFIER	1	TEXAS	TL072CD
IC 103	XILA-0072A	OPERATIONAL AMPLIFIER	1	TEXAS	TL072CD
IC 201	XILA-0072A	OPERATIONAL AMPLIFIER	1	TEXAS	TL072CD
IC 202	XILA-0275A	DUAL OPERATIONAL AMPLIFIER	1	ANALOG DEV	OP 275GS
IC 203	XICA-4S66A	ANALOG SWITCH X1	1	TOSHIBA	TC4S66F
IC 204	XICA-4S66A	ANALOG SWITCH X1	1	TOSHIBA	TC4S66F
IC 302	XICA-4047A	MONO/ASTABLE MULTIVIBRATOR	1	PHILLIPS	HEF
P 1	XRFB-4200G	POTENTIOMETER 2K 20%	1	TOCOS	HEF4047BT
P 2	XRFB-5200G	POTENTIOMETER 20K 20%	1	TOCOS	G4 A 202 M
P 201	XRFB-5200G	POTENTIOMETER 20K 20%	1	TOCOS	G4 A 203 M
P 301	XRFB-4100G	POTENTIOMETER 1 K 20%	1	TOCOS	G4 A 203 M
P 302	XRFB-4100G	POTENTIOMETER 1 K 20%	1	TOCOS	G4 A 102 M
Q 101	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 102	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 103	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 104	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 105	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 106	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 107	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B

**NTP Parts List**

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PARTS LIST 179-039B

Side 3

NTP 179-5039B CARD W SMD COMPONENTS

PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
Q 201	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 202	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 203	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 204	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 205	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 206	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 207	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 208	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 209	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 210	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 211	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 301	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 302	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 305	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 306	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 309	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 310	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
R 2	XRMD-5178C	RESISTOR METAL 1.50K 1%	1	PHILLIPS	RC 02G
R 3	XRMD-4150C	RESISTOR METAL 1.50K 1%	1	PHILLIPS	RC02H 1K5 1%
R 4	XRMA-5150A	RESISTOR METAL 15.0K 0.1%	1	BEYSCH	0204 50 50 15.0K 0.1%
R 5	XRMA-5150A	RESISTOR METAL 15.0K 0.1%	1	BEYSCH	0204 50 50 15.0K 0.1%
R 6	XRMD-4100E	RESISTOR METAL 1K 5%	1	PHILLIPS	RC01 1K 5%
R 7	XRMD-2100E	RESISTOR METAL 10R 5%	1	PHILLIPS	RC01 10R 5%
R 8	XRMD-0000	RESISTOR, NOT USED	1	XRMD-0000	XRMD-0000
R 101	XRMD-3470C	RESISTOR METAL 470R 1%	1	PHILLIPS	RC 02G
R 102	XRMD-6392C	RESISTOR METAL 392K 1%	1	PHILLIPS	RC02H
R 103	XRMD-6392C	RESISTOR METAL 392K 1%	1	PHILLIPS	RC02H
R 104	XRMD-6200C	RESISTOR METAL 200K 1%	1	PHILLIPS	RC01
R 105	XRMD-6200C	RESISTOR METAL 200K 1%	1	PHILLIPS	RC01
R 106	XRMD-6100C	RESISTOR METAL 100K 1%	1	PHILLIPS	RC 02G
R 107	XRMD-6100C	RESISTOR METAL 100K 1%	1	PHILLIPS	RC 02G
R 108	XRMD-5499C	RESISTOR METAL 49.9K 1%	1	PHILLIPS	RC01
R 109	XRMD-5499C	RESISTOR METAL 49.9K 1%	1	PHILLIPS	RC01

**NTP Parts List**

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PARTS LIST 179-5039B

Side 4

NTP 179-5039B CARD W SMD COMPONENTS

PARTS LIST

REF. NO.	NTP-ID.	DESCRIPTION	QTY	PARTS LIST	MANUFACT/DRW.NO.	PART NO.
R 110	XRMD-5133C	RESISTOR METAL 13.3K 1%	1	PHILIPS RC 02G	RC 02G 13.3K1%	
R 111	XRMD-6330E	RESISTOR METAL 330K 5%	1	PHILIPS RC01	RC01 330K 5%	
R 112	XRMD-5120E	RESISTOR METAL 12K 5%	1	PHILIPS RC01	RC01 12K 5%	
R 113	XRMD-4332C	RESISTOR METAL 3.32K 1%	1	PHILIPS RC 02G	RC 02G 3.32K1%	
R 114	XRMD-5133C	RESISTOR METAL 13.3K 1%	1	PHILIPS RC 02G	RC 02G 13.3K1%	
R 115	XRMD-5110C	RESISTOR METAL 11.0K 1%	1	PHILIPS RC 02G	RC 02G 11.0K1%	
R 116	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILIPS RC 02G	RC 02G 10.0K1%	
R 117	XRMD-4560E	RESISTOR METAL 5.6K 5%	1	PHILIPS RC01	RC01 5.6K 5%	
R 118	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILIPS RC01	RC01 10K 5%	
R 119	XRMD-7100E	RESISTOR METAL 1M 5%	1	PHILIPS RC01	RC01 1M 5%	
R 120	XRMD-4100E	RESISTOR METAL 1K 5%	1	PHILIPS RC01	RC01 1K 5%	
R 121	XRMD-7100E	RESISTOR METAL 1M 5%	1	PHILIPS RC01	RC01 1M 5%	
R 122	XRMD-7330E	RESISTOR METAL 3.3M 5%	1	PHILIPS RC01	RC01 3.3M 5%	
R 123	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%	
R 124	XRMD-5470E	RESISTOR METAL 47K 5%	1	PHILIPS RC01	RC01 47K 5%	
R 125	XRMD-5220E	RESISTOR METAL 22K 5%	1	PHILIPS RC01	RC01 22K 5%	
R 126	XRMD-4220E	RESISTOR METAL 2.2K 5%	1	PHILIPS RC01	RC01 2.2K 5%	
R 127	XRMD-4220E	RESISTOR METAL 2.2K 5%	1	PHILIPS RC01	RC01 2.2K 5%	
R 128	XRMD-5120E	RESISTOR METAL 12K 5%	1	PHILIPS RC01	RC01 12K 5%	
R 129	XRMD-6100C	RESISTOR METAL 100K 1%	1	PHILIPS RC 02G	RC 02G 100K1%	
R 130	XRMD-6330E	RESISTOR METAL 330K 5%	1	PHILIPS RC01	RC01 330K 5%	
R 131	XRMD-7150C	RESISTOR METAL 1.50M 1%	1	PHILIPS RC02H	RC01 1.50M 1%	
R 132	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILIPS RC01	RC01 10K 5%	
R 133	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILIPS RC 02G	RC 02G 10.0K1%	
R 134	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILIPS RC 02G	RC 02G 10.0K1%	
R 135	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILIPS RC 02G	RC 02G 2.00K1%	
R 136	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILIPS RC 02G	RC 02G 2.00K1%	
R 137	XRMD-7100E	RESISTOR METAL 1M 5%	1	PHILIPS RC01	RC01 1M 5%	
R 138	XRMD-7100E	RESISTOR METAL 1M 5%	1	PHILIPS RC01	RC01 1M 5%	
R 139	XRMD-5200C	RESISTOR METAL 20.0K 1%	1	PHILIPS RC02H	RC02 20.0K	
R 140	XRMD-5200C	RESISTOR METAL 20.0K 1%	1	PHILIPS RC02H	RC02 20.0K	
R 141	XRMD-0000	RESISTOR, NOT USED	1	XRMD-0000	XRMD-0000	
R 142	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILIPS RC01	RC01 100K 5%	

**NTP Parts List**

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## NTP 179-5039B CARD W SMD COMPONENTS

## PARTS LIST

REF. NO.	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
R 143	XRMD-6200C	RESISTOR METAL 200K 1%	1	PHILIPS RC01	RC01 200K 1%
R 144	XRMD-6200C	RESISTOR METAL 200K 1%	1	PHILIPS RC01	RC01 200K 1%
R 145	XRMD-5102C	RESISTOR METAL 1206 10K2 1%	1	PHILIPS RC 02G	RC 02G 10K2 1%
R 201	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILIPS RC01	RC01 100K 5%
R 202	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILIPS RC01	RC01 100K 5%
R 203	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILIPS RC01	RC01 10K 5%
R 204	XRMD-5100C	RESISTOR METAL 10 . 0K 1%	1	PHILIPS RC 02G	RC 02G 10 . 0K1%
R 205	XRMD-4562C	RESISTOR METAL 5 . 62K 1%	1	PHILIPS RC 02G	RC 02G 5 . 62K1%
R 206	XRMD-4562C	RESISTOR METAL 5 . 62K 1%	1	PHILIPS RC 02G	RC 02G 5 . 62K1%
R 207	XRMD-5100C	RESISTOR METAL 10 . 0K 1%	1	PHILIPS RC 02G	RC 02G 10 . 0K1%
R 208	XRMD-4221C	RESISTOR METAL 2 . 21K 1%	1	PHILIPS RC 02G	RC 02G 2 . 21K1%
R 209	XRMD-4221C	RESISTOR METAL 2 . 21K 1%	1	PHILIPS RC 02G	RC 02G 2 . 21K1%
R 210	XRMD-3332C	RESISTOR METAL 332R 1%	1	PHILIPS RC 02G	RC 02G 332R1%
R 211	XRMD-4100C	RESISTOR METAL 1206 1.00K 1%	1	PHILIPS RC 02G	RC 02G 1 . 00K1%
R 212	XRMD-3150C	RESISTOR METAL 150R 1%	1	PHILIPS RC 02G	RC 02G 150R1%
R 213	XRMD-3365C	RESISTOR METAL 365R 1%	1	PHILIPS RC02H	RC02 365R 1%
R 214	XRMD-8100E	RESISTOR METAL 10M 5%	1	PHILIPS RC01	RC01 10M 5%
R 215	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILIPS RC01	RC01 10K 5%
R 216	XRMD-5220E	RESISTOR METAL 22K 5%	1	PHILIPS RC01	RC01 22K 5%
R 217	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILIPS RC01	RC01 10K 5%
R 218	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILIPS RC01	RC01 10K 5%
R 219	XRMD-7100E	RESISTOR METAL 1M 5%	1	PHILIPS RC01	RC01 1M 5%
R 220	XRMD-6680E	RESISTOR METAL 680K 5%	1	PHILIPS RC01	RC01 680K 5%
R 221	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILIPS RC01	RC01 100K 5%
R 222	XRMD-4330E	RESISTOR METAL 3 . 3K 5%	1	PHILIPS RC01	RC01 3 . 3K 5%
R 223	XRMD-5200C	RESISTOR METAL 20 . 0K 1%	1	PHILIPS RC02H	RC02 20 . 0K
R 224	XRMD-4845C	RESISTOR METAL 8 . 45K 1%	1	PHILIPS RC02	RC01 8 . 45K 1%
R 225	XRMD-5182C	RESISTOR METAL 1206 18K2 1%	1	PHILIPS RC 02G	RC 02G 18K2 1%
R 226	XRMD-4470E	RESISTOR METAL 4 . 7K 5%	1	PHILIPS RC01	RC01 4 . 7K 5%
R 227	XRMD-4499C	RESISTOR METAL 4 . 99K 1%	1	PHILIPS RC 02G	RC 02G 4 . 99K1%
R 228	XRMD-4499C	RESISTOR METAL 4 . 99K 1%	1	PHILIPS RC 02G	RC 02G 4 . 99K1%
R 229	XRMD-4499C	RESISTOR METAL 4 . 99K 1%	1	PHILIPS RC 02G	RC 02G 4 . 99K1%
R 230	XRMD-4499C	RESISTOR METAL 4 . 99K 1%	1	PHILIPS RC 02G	RC 02G 4 . 99K1%

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Multi 02.09.94 11: 8 PARTS LIST 179-5039B

Side 6

NTP 179-5039B CARD W SMD COMPONENTS

PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
R 231	XRMD-4499C	RESISTOR METAL 4.99K 1%	1	PHILLIPS RC 02G	RC 02G 4.99K1%
R 232	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILLIPS RC 02G	RC 02G 10.0K1%
R 233	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILLIPS RC 02G	RC 02G 10.0K1%
R 234	XRMD-5470E	RESISTOR METAL 47K 5%	1	PHILLIPS RC01	RC01 47K 5%
R 235	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILLIPS RC01	RC01 100K 5%
R 236	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILLIPS RC01	RC01 100K 5%
R 237	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILLIPS RC 02G	RC 02G 2.00K1%
R 238	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILLIPS RC 02G	RC 02G 2.00K1%
R 239	XRMD-2100E	RESISTOR METAL 10R 5%	1	PHILLIPS RC01	RC01 10R 5%
R 240	XRMD-6475C	RESISTOR METAL 475K 1%	1	PHILLIPS RC02H	RC02 475K 1%
R 301	XRMD-3470E	RESISTOR METAL 2.00R 5%	1	PHILLIPS RC01	RC01 470R 5%
R 302	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILLIPS RC 02G	RC 02G 2.00K1%
R 303	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILLIPS RC 02G	RC 02G 10.0K1%
R 304	XRMD-4825C	RESISTOR METAL 8.25K 1%	1	PHILLIPS RC02	RC01 8.25K 1%
R 305	XRMD-5330E	RESISTOR METAL 33K 5%	1	PHILLIPS RC01	RC01 33K 5%
R 306	XRMD-5330E	RESISTOR METAL 33K 5%	1	PHILLIPS RC01	RC01 33K 5%
R 307	XRMD-5330E	RESISTOR METAL 33K 5%	1	PHILLIPS RC01	RC01 33K 5%
R 308	XRMD-5330E	RESISTOR METAL 33K 5%	1	PHILLIPS RC01	RC01 33K 5%
R 309	XRMD-1680E	RESISTOR METAL 6.8R 5%	1	PHILLIPS RC01	RC01 6.8R 5%
R 310	XRMD-4390E	RESISTOR METAL 3.9K 5%	1	PHILLIPS RC01	RC01 3.9K 5%
R 311	XRMD-4390E	RESISTOR METAL 3.9K 5%	1	PHILLIPS RC01	RC01 3.9K 5%
R 312	XRMD-1680E	RESISTOR METAL 6.8R 5%	1	PHILLIPS RC01	RC01 6.8R 5%
R 313	XRMD-1680E	RESISTOR METAL 6.8R 5%	1	PHILLIPS RC01	RC01 6.8R 5%
R 314	XRMD-4390E	RESISTOR METAL 3.9K 5%	1	PHILLIPS RC01	RC01 3.9K 5%
R 315	XRMD-4390E	RESISTOR METAL 3.9K 5%	1	PHILLIPS RC01	RC01 3.9K 5%
R 316	XRMD-1680E	RESISTOR METAL 6.8R 5%	1	PHILLIPS RC01	RC01 6.8R 5%
R 317	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILLIPS RC 02G	RC 02G 2.00K1%
R 318	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILLIPS RC 02G	RC 02G 2.00K1%
R 323	XRMD-4220E	RESISTOR METAL 2.2K 5%	1	PHILLIPS RC01	RC01 2.2K 5%
R 324	XRMD-4220E	RESISTOR METAL 2.2K 5%	1	PHILLIPS RC01	RC01 2.2K 5%
R 325	XRMD-4249C	RESISTOR METAL 2.49K 1%	1	PHILLIPS RC 02G	RC 02G 2.49K1%
R 326	XRMD-4249C	RESISTOR METAL 2.49K 1%	1	PHILLIPS RC 02G	RC 02G 2.49K1%

**NTP Parts List**

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SLUT

PARTS LIST 179-5039B

## CARD W SMD COMPONENTS

## PARTS LIST

REF.NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
100	179-5040B	PRINT BOARD	1	CAD	179-5040B
C 103	XCCD-0610GC	CAP CERAMIC 50V 100NF 20%	1	SIEMENS B37873	K5104 M62
C 104	XDD-0522FB	CAP CERAMIC 22NF 10%	1	SIEMENS B37872	K5223-K62
C 105	XCCD-0610GC	CAP CERAMIC 50V 100NF 20%	1	SIEMENS B37873	K5104 M62
C 201	XCCD-0227G	COND. CERAMIC 50V 27PF 20% N	1	PHILIPS	2222-15279
C 202	XCCD-0227G	CAP CERAMIC 50V 27PF 20% N	1	PHILIPS	2222-15279
C 208	XCCD-0315E	CAP CERAMIC 63V 150PF 5%	1	ROEDERSTEIN	PCC106P 150P5%
C 210	XCCD-0222F	CAP CERAMIC 63V 22PF 5%	1	SIEMENS B37871	K5220-J62
C 211	XCCD-0315E	CAP CERAMIC 63V 150PF 5%	1	ROEDERSTEIN	PCC106P 150P5%
C 303	XCCD-0610GC	CAP CERAMIC 50V 100NF 20%	1	SIEMENS B37873	K5104 M62
C 304	XCCD-0310G	CAP CERAMIC 50V 1206 100PF 2	1	SIEMENS B37871	J5101-M9
C 305	XCCC-0447GD	CAP CERAMIC 50V 4.7NF 20%	1	SIEMENS B37701	J5472 M9
C 306	XCCC-0447GD	CAP CERAMIC 50V 4.7NF 20%	1	SIEMENS B37701	J5472 M9
C 307	XCCC-0447GD	CAP CERAMIC 50V 4.7NF 20%	1	SIEMENS B37701	J5472 M9
C 308	XCCC-0447GD	CAP CERAMIC 50V 4.7NF 20%	1	SIEMENS B37701	J5472 M9
C 320	XCCD-0610GC	CAP CERAMIC 50V 100NF 20%	1	SIEMENS B37873	K5104 M62
C 321	XCCD-0610GC	CAP CERAMIC 50V 100NF 20%	1	SIEMENS B37873	K5104 M62
D 1	XQDS-0017F	DIODE, HIGH CURRENT	1	PHILIPS	BYD17D-115
D 2	XQDS-0017F	DIODE, HIGH CURRENT	1	PHILIPS	BYD17D-115
D 3	XQDS-0017F	DIODE, HIGH CURRENT	1	PHILIPS	BYD17D-115
D 4	XQDS-0017F	DIODE, HIGH CURRENT	1	PHILIPS	BYD17D-115
D 5	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILIPS	BAS 21
D 101	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILIPS	BAS 21
D 102	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS BAS28	Q62702 A163
D 104	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS BAS28	Q62702 A163
D 105	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS BAS28	Q62702 A163
D 106	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILIPS	BAS 21
D 107	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS BAS28	Q62702 A163
D 108	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILIPS	BAS 21
D 109	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS BAS28	Q62702 A163
D 111	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILIPS	BAS 21
D 112	XQZZ-0023	NOT MOUNTED	1	XQZZ-0023	XQZZ-0023
D 201	XQTZ-0027B	TRANSIENT DIODE	1	MICROSEMI	SMSU24A

**NTP Parts List**

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NTP 179-5039B PARTS LIST

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CARD W SMD COMPONENTS

PARTS LIST

Side 2

REF.NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
D 202	XQDS-0099B	DIODE, DUAL	1	SIEMENS	BAV99
D 203	XQDS-0021B	DIODE, GENERAL PURPOSE	1	PHILLIPS	BAS 21
D 204	XQDS-0099B	DIODE, DUAL	1	SIEMENS	BAV99
D 205	XQDS-0099B	DIODE, DUAL	1	SIEMENS	BAV99
D 207	XQZD-0047B	ZENER DIODE 4V7	1	PHILLIPS	BZX84C4V7
D 208	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS	BAS28
D 209	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS	BAS28
D 210	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS	BAS28
D 301	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS	BAS28
D 302	XQDS-0028T	SI-SWITCHING DIODE ARRAY	1	SIEMENS	BAS28
D 305	XQTZ-0027B	TRANSIENT DIODE	1	MICROSEMI	SMSJ24A
D 306	XQTZ-0027B	TRANSIENT DIODE	1	MICROSEMI	SMSJ24A
IC 2	XILA-0072A	OPERATIONAL AMPLIFIER	1	TEXAS	TL072CD
IC 101	XILA-0072A	OPERATIONAL AMPLIFIER	1	TEXAS	TL072CD
IC 102	XILA-0072A	OPERATIONAL AMPLIFIER	1	TEXAS	TL072CD
IC 103	XILA-0072A	OPERATIONAL AMPLIFIER	1	TEXAS	TL072CD
IC 201	XILA-0072A	OPERATIONAL AMPLIFIER	1	TEXAS	TL072CD
IC 202	XILA-0275A	DUAL OPERATIONAL AMPLIFIER	1	ANALOG DEV	OP 275GS
IC 203	XICA-4S66A	ANALOG SWITCH X1	1	TOSHIBA	TC4S66F
IC 204	XICA-4S66A	MONO / ASTABLE MULTIVIBRATOR	1	PHILLIPS	HEF4047BT
IC 302	XICA-4047A	POTENIOMETER 2K 20%	1	TOCOS	G4 A 202 M
P 1	XRFB-4200G	POTENIOMETER 20K 20%	1	TOCOS	G4 A 203 M
P 2	XRFB-5200G	POTENIOMETER 20K 20%	1	TOCOS	G4 A 203 M
P 201	XRFB-5200G	POTENIOMETER 20K 20%	1	TOCOS	G4 A 102 M
P 301	XRFB-4100G	POTENIOMETER 1 K 20%	1	TOCOS	G4 A 102 M
P 302	XRFB-4100G	POTENIOMETER 1 K 20%	1	TOCOS	G4 A 102 M
Q 101	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 102	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 103	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 104	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B
Q 105	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 106	XQBN-0847B	TRANSISTOR NPN	1	PHILLIPS	BC847B
Q 107	XQBP-0857B	TRANSISTOR PNP	1	PHILLIPS	BC857B

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## NTP 179-5039B CARD W SMD COMPONENTS

## PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW. NO. PART NO.
Q 201	XQBN-0847B	TRANSISTOR NPN	1	PHILIPS BC847B
Q 202	XQBP-0857B	TRANSISTOR PNP	1	PHILIPS BC857B
Q 203	XQBN-0847B	TRANSISTOR NPN	1	PHILIPS BC847B
Q 204	XQBP-0857B	TRANSISTOR PNP	1	PHILIPS BC857B
Q 205	XQBN-0847B	TRANSISTOR NPN	1	PHILIPS BC847B
Q 206	XQBN-0847B	TRANSISTOR NPN	1	PHILIPS BC847B
Q 207	XQBP-0857B	TRANSISTOR PNP	1	PHILIPS BC857B
Q 208	XQBN-0847B	TRANSISTOR NPN	1	PHILIPS BC847B
Q 209	XQBP-0857B	TRANSISTOR PNP	1	PHILIPS BC857B
Q 210	XQBP-0857B	TRANSISTOR PNP	1	PHILIPS BC857B
Q 211	XQBP-0857B	TRANSISTOR PNP	1	PHILIPS BC857B
Q 301	XQBN-0847B	TRANSISTOR NPN	1	PHILIPS BC847B
Q 302	XQBP-0857B	TRANSISTOR PNP	1	PHILIPS BC857B
Q 305	XQBN-0847B	TRANSISTOR NPN	1	PHILIPS BC847B
Q 306	XQBP-0857B	TRANSISTOR PNP	1	PHILIPS BC857B
Q 309	XQBN-0847B	TRANSISTOR NPN	1	PHILIPS BC847B
Q 310	XQBN-0847B	TRANSISTOR NPN	1	PHILIPS BC847B
R 2	XRMD-5178C	RESISTOR METAL 17.8K 1%	1	PHILIPS RC 02G
R 3	XRMD-4150C	RESISTOR METAL 1.50K 1%	1	PHILIPS RC02H
R 4	XRMA-5150A	RESISTOR METAL 15.0K 0.1%	1	BEYSCH 0204 50
R 5	XRMA-5150A	RESISTOR METAL 15.0K 0.1%	1	BEYSCH 0204 50
R 6	XRMD-4100E	RESISTOR METAL 1K 5%	1	PHILIPS RC01
R 7	XRMD-2100E	RESISTOR METAL 10R 5%	1	PHILIPS RC01
R 8	XRMD-0000	RESISTOR, NOT USED	1	XRMD-0000
R 101	XRMD-3470C	RESISTOR METAL 470R 1%	1	PHILIPS RC 02G
R 102	XRMD-6392C	RESISTOR METAL 392K 1%	1	PHILIPS RC02H
R 103	XRMD-6392C	RESISTOR METAL 392K 1%	1	PHILIPS RC02H
R 104	XRMD-6200C	RESISTOR METAL 200K 1%	1	PHILIPS RC01
R 105	XRMD-6200C	RESISTOR METAL 200K 1%	1	PHILIPS RC01
R 106	XRMD-6100C	RESISTOR METAL 100K 1%	1	PHILIPS RC 02G
R 107	XRMD-6100C	RESISTOR METAL 100K 1%	1	PHILIPS RC 02G
R 108	XRMD-5499C	RESISTOR METAL 49.9K 1%	1	PHILIPS RC01
R 109	XRMD-5499C	RESISTOR METAL 49.9K 1%	1	PHILIPS RC01

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NTP 179-5039B CARD W SMD COMPONENTS

## PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
R 110	XRMD-5133C	RESISTOR METAL 13.3K 1%	1	PHILIPS RC 02G	RC 02G 13.3K1%
R 111	XRMD-6330E	RESISTOR METAL 330K 5%	1	PHILIPS RC01	RC01 330K 5%
R 112	XRMD-5120E	RESISTOR METAL 12K 5%	1	PHILIPS RC01	RC01 12K 5%
R 113	XRMD-4332C	RESISTOR METAL 3.32K 1%	1	PHILIPS RC 02G	RC 02G 3.32K1%
R 114	XRMD-5133C	RESISTOR METAL 13.3K 1%	1	PHILIPS RC 02G	RC 02G 13.3K1%
R 115	XRMD-5110C	RESISTOR METAL 11.0K 1%	1	PHILIPS RC 02G	RC 02G 11.0K1%
R 116	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILIPS RC 02G	RC 02G 10.0K1%
R 117	XRMD-4560E	RESISTOR METAL 5.6K 5%	1	PHILIPS RC01	RC01 5.6K 5%
R 118	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILIPS RC01	RC01 10K 5%
R 119	XRMD-7100E	RESISTOR METAL 1M 5%	1	PHILIPS RC01	RC01 1M 5%
R 120	XRMD-4100E	RESISTOR METAL 1K 5%	1	PHILIPS RC01	RC01 1K 5%
R 121	XRMD-7100E	RESISTOR METAL 1M 5%	1	PHILIPS RC01	RC01 1M 5%
R 122	XRMD-7330E	RESISTOR METAL 3.3M 5%	1	PHILIPS RC01	RC01 3.3M 5%
R 123	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 124	XRMD-5470E	RESISTOR METAL 47K 5%	1	PHILIPS RC01	RC01 47K 5%
R 125	XRMD-5220E	RESISTOR METAL 22K 5%	1	PHILIPS RC01	RC01 22K 5%
R 126	XRMD-4420E	RESISTOR METAL 2.2K 5%	1	PHILIPS RC01	RC01 2.2K 5%
R 127	XRMD-4420E	RESISTOR METAL 2.2K 5%	1	PHILIPS RC01	RC01 2.2K 5%
R 128	XRMD-5120E	RESISTOR METAL 12K 5%	1	PHILIPS RC01	RC01 12K 5%
R 129	XRMD-6100C	RESISTOR METAL 100K 1%	1	PHILIPS RC 02G	RC 02G 100K1%
R 130	XRMD-6330E	RESISTOR METAL 330K 5%	1	PHILIPS RC01	RC01 330K 5%
R 131	XRMD-7150C	RESISTOR METAL 1.50M 1%	1	PHILIPS RC02H	RC01 1.50M 1%
R 132	XRMD-51100E	RESISTOR METAL 10K 5%	1	PHILIPS RC01	RC01 10K 5%
R 133	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILIPS RC 02G	RC 02G 10.0K1%
R 134	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILIPS RC 02G	RC 02G 10.0K1%
R 135	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILIPS RC 02G	RC 02G 2.00K1%
R 136	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILIPS RC 02G	RC 02G 2.00K1%
R 137	XRMD-71100E	RESISTOR METAL 1M 5%	1	PHILIPS RC01	RC01 1M 5%
R 138	XRMD-71100E	RESISTOR METAL 1M 5%	1	PHILIPS RC01	RC01 1M 5%
R 139	XRMD-52200C	RESISTOR METAL 20.0K 1%	1	PHILIPS RC02H	RC02 20.0K
R 140	XRMD-52200C	RESISTOR METAL 20.0K 1%	1	PHILIPS RC02H	RC02 20.0K
R 141	XRMD-0000	RESISTOR, NOT USED	1	XRMD-0000	
R 142	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILIPS RC01	RC01 100K 5%

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## CARD W SMD COMPONENTS

## PARTS LIST

REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
R 143	XRMD-6200C	RESISTOR METAL 200K 1%	1	PHILLIPS RC01	RC01 200K 1%
R 144	XRMD-6200C	RESISTOR METAL 200K 1%	1	PHILLIPS RC01	RC01 200K 1%
R 145	XRMD-5102C	RESISTOR METAL 1206 10K2 1%	1	PHILLIPS RC 02G	RC 02G 10K2 1%
R 201	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILLIPS RC01	RC01 100K 5%
R 202	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILLIPS RC01	RC01 100K 5%
R 203	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILLIPS RC01	RC01 10K 5%
R 204	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILLIPS RC 02G	RC 02G 10.0K1%
R 205	XRMD-4562C	RESISTOR METAL 5.62K 1%	1	PHILLIPS RC 02G	RC 02G 5.62K1%
R 206	XRMD-4562C	RESISTOR METAL 5.62K 1%	1	PHILLIPS RC 02G	RC 02G 5.62K1%
R 207	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILLIPS RC 02G	RC 02G 10.0K1%
R 208	XRMD-4221C	RESISTOR METAL 2.21K 1%	1	PHILLIPS RC 02G	RC 02G 2.21K1%
R 209	XRMD-4221C	RESISTOR METAL 2.21K 1%	1	PHILLIPS RC 02G	RC 02G 2.21K1%
R 210	XRMD-3332C	RESISTOR METAL 332R 1%	1	PHILLIPS RC 02G	RC 02G 332R1%
R 211	XRMD-4100C	RESISTOR METAL 1206 1.00K 1%	1	PHILLIPS RC 02G	RC 02G 1.00K1%
R 212	XRMD-3150C	RESISTOR METAL 150R 1%	1	PHILLIPS RC 02G	RC 02G 150R1%
R 213	XRMD-3365C	RESISTOR METAL 365R 1%	1	PHILLIPS RC02H	RC02 365R 1%
R 214	XRMD-8100E	RESISTOR METAL 10M 5%	1	PHILLIPS RC01	RC01 10M 5%
R 215	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILLIPS RC01	RC01 10K 5%
R 216	XRMD-5220E	RESISTOR METAL 22K 5%	1	PHILLIPS RC01	RC01 22K 5%
R 217	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILLIPS RC01	RC01 10K 5%
R 218	XRMD-5100E	RESISTOR METAL 10K 5%	1	PHILLIPS RC01	RC01 10K 5%
R 219	XRMD-7100E	RESISTOR METAL 1M 5%	1	PHILLIPS RC01	RC01 1M 5%
R 220	XRMD-6680E	RESISTOR METAL 680K 5%	1	PHILLIPS RC01	RC01 680K 5%
R 221	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILLIPS RC01	RC01 100K 5%
R 222	XRMD-4330E	RESISTOR METAL 3.3K 5%	1	PHILLIPS RC01	RC01 3.3K 5%
R 223	XRMD-5200C	RESISTOR METAL 20.0K 1%	1	PHILLIPS RC02H	RC02 20.0K
R 224	XRMD-4845C	RESISTOR METAL 8.45K 1%	1	PHILLIPS RC02	RC01 8.45K 1%
R 225	XRMD-5182C	RESISTOR METAL 1206 18K2 1%	1	PHILLIPS RC 02G	RC 02G 18K2 1%
R 226	XRMD-4470E	RESISTOR METAL 4.7K 5%	1	PHILLIPS RC01	RC01 4.7K 5%
R 227	XRMD-4499C	RESISTOR METAL 4.99K 1%	1	PHILLIPS RC 02G	RC 02G 4.99K1%
R 228	XRMD-4499C	RESISTOR METAL 4.99K 1%	1	PHILLIPS RC 02G	RC 02G 4.99K1%
R 229	XRMD-4499C	RESISTOR METAL 4.99K 1%	1	PHILLIPS RC 02G	RC 02G 4.99K1%
R 230		RESISTOR METAL 4.99K 1%	1		

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REF. NO	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
R 231	XRMD-4499C	RESISTOR METAL 4.99K 1%	1	PHILLIPS RC 02G	RC 02G 4.99K1%
R 232	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILLIPS RC 02G	RC 02G 10.0K1%
R 233	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILLIPS RC 02G	RC 02G 10.0K1%
R 234	XRMD-5470E	RESISTOR METAL 47K 5%	1	PHILLIPS RC01	RC01 47K 5%
R 235	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILLIPS RC01	RC01 100K 5%
R 236	XRMD-6100E	RESISTOR METAL 100K 5%	1	PHILLIPS RC01	RC01 100K 5%
R 237	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILLIPS RC 02G	RC 02G 2.00K1%
R 238	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILLIPS RC 02G	RC 02G 2.00K1%
R 239	XRMD-2100E	RESISTOR METAL 10R 5%	1	PHILLIPS RC01	RC01 10R 5%
R 240	XRMD-6475C	RESISTOR METAL 475K 1%	1	PHILLIPS RC02H	RC02 475K 1%
R 301	XRMD-3470E	RESISTOR METAL 470R 5%	1	PHILLIPS RC01	RC01 470R 5%
R 302	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILLIPS RC 02G	RC 02G 2.00K1%
R 303	XRMD-5100C	RESISTOR METAL 10.0K 1%	1	PHILLIPS RC 02G	RC 02G 10.0K1%
R 304	XRMD-4825C	RESISTOR METAL 8.25K 1%	1	PHILLIPS RC02	RC01 8.25K 1%
R 305	XRMD-5330E	RESISTOR METAL 33K 5%	1	PHILLIPS RC01	RC01 33K 5%
R 306	XRMD-5330E	RESISTOR METAL 33K 5%	1	PHILLIPS RC01	RC01 33K 5%
R 307	XRMD-5330E	RESISTOR METAL 33K 5%	1	PHILLIPS RC01	RC01 33K 5%
R 308	XRMD-5330E	RESISTOR METAL 33K 5%	1	PHILLIPS RC01	RC01 33K 5%
R 309	XRMD-1680E	RESISTOR METAL 6.8R 5%	1	PHILLIPS RC01	RC01 6.8R 5%
R 310	XRMD-4390E	RESISTOR METAL 3.9K 5%	1	PHILLIPS RC01	RC01 3.9K 5%
R 311	XRMD-4390E	RESISTOR METAL 3.9K 5%	1	PHILLIPS RC01	RC01 3.9K 5%
R 312	XRMD-1680E	RESISTOR METAL 6.8R 5%	1	PHILLIPS RC01	RC01 6.8R 5%
R 313	XRMD-1680E	RESISTOR METAL 6.8R 5%	1	PHILLIPS RC01	RC01 6.8R 5%
R 314	XRMD-4390E	RESISTOR METAL 3.9K 5%	1	PHILLIPS RC01	RC01 3.9K 5%
R 315	XRMD-4390E	RESISTOR METAL 3.9K 5%	1	PHILLIPS RC01	RC01 3.9K 5%
R 316	XRMD-1680E	RESISTOR METAL 6.8R 5%	1	PHILLIPS RC01	RC01 6.8R 5%
R 317	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILLIPS RC 02G	RC 02G 2.00K1%
R 318	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILLIPS RC 02G	RC 02G 2.00K1%
R 323	XRMD-4220E	RESISTOR METAL 2.2K 5%	1	PHILLIPS RC01	RC01 2.2K 5%
R 324	XRMD-4220E	RESISTOR METAL 2.2K 5%	1	PHILLIPS RC01	RC01 2.2K 5%

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