

ADAPTIVE PRE-EMPHASIS LIMITER**179-500A**

Description	179-5012-A-4
Technical Specifications	179-5011-A-4
Adjustments	179-5003-A-4
Terminal Connections, page 1	179-5002-A-4
Terminal Connections, page 2	179-5002-A-4
Dual Gain Stage Module:	
Diagram	179-5032-A-4
Components Layout	179-5043-A-4
Parts List	179-5033-A-4
Main Board:	
Diagram, page 1	179-5030-A-3
Diagram, page 2	179-5030-A-3
Diagram, page 3	179-5030-A-3
Diagram, page 4	179-5030-A-3
Components Layout	179-5041-A-3
Parts List	179-5031-A-4
Parts List	179-5039-A-4
Leaded Components	
SMD Components	

2/19930202

NTP Elektronik A/S
Knapholm 7
DK-2730 Herlev, Denmark

Telephone: + 45 44 53 11 88
Telefax: + 45 44 53 11 70
Telex: 16378 ntp dk

Cable address: Electrolab
Postal account: 5 11 52 80
Reg. no.: 32426

NTP

179-5010-A-4

ADAPTIVE PRE-EMPHASIS LIMITER

179-500A

Description	179-5012-A-4
Technical Specifications	179-5011-A-4
Terminal Connections	179-5002-A-4
Dual Gain Stage Module:	
Diagram	179-5032-A-4
Components Layout	179-5043-A-4
Parts List	179-5033-A-4
Main Board:	
Diagram, page 1	179-5030-A-3
Diagram, page 2	179-5030-A-3
Diagram, page 3	179-5030-A-3
Diagram, page 4	179-5030-A-3
Components Layout	179-5041-A-3
Parts List	179-5031-A-4
Parts List	179-5039-A-4
Leaded Components	
SMD Components	

1/19930112

NTP Elektronik A/S
Knapholm 7
DK-2730 Herlev, Denmark

Telephone: +45 44 53 11 88
Telefax: +45 44 53 11 70
Telex: 16378 ntp dk

Cable address: Electrolab
Postal account: 5 11 52 80
Reg. no.: 32426

NTP

179-5010-A-4

ADAPTIVE PRE-EMPHASIS LIMITER

179-500A

Description	179-5012-A-4
Technical Specifications	179-5011-A-4
Terminal Connections	179-5002-A-4
Dual Gain Stage Module:	
Diagram	179-5032-A-4
Components Layout	179-5043-A-4
Parts List Leaded Components	179-5033-A-4
Parts List SMD Components	179-5037-A-4
Main Board:	
Diagram, page 1	179-5030-A-3
Diagram, page 2	179-5030-A-3
Diagram, page 3	179-5030-A-3
Diagram, page 4	179-5030-A-3
Components Layout	179-5041-A-3
Parts List Leaded Components	179-5031-A-4
Parts List SMD Components	179-5039-A-4

19920922

NTP Elektronik A/S
Knapholm 7
DK-2730 Herlev, Denmark

Telephone: + 45 44 53 11 88
Telefax: + 45 44 53 11 70
Telex: 16378 ntp dk

Cable address: Electrolab
Postal account: 5 11 52 80
Reg. no.: 32426

The 179-500A 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.

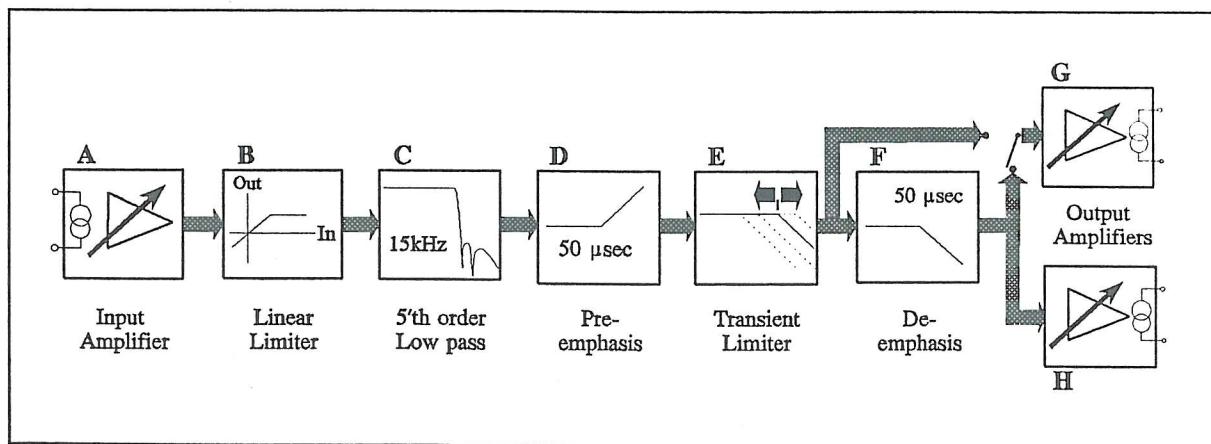
However, some signal types as e.g. spoken "S"-sounds, modern synthesized sounds, snare drums and piano attacks may exhibit high level signal components at relatively high frequencies.

Such signals tend to overload transmitting and receiving equipment and cause audible distortion (pumping effects). The Adaptive Preemphasis principle, as utilized by the NTP 179-500, 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 179-500 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 179-500.

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

- A) To reduce problems of hum-pickup and ground loops, the input stage of the 179-500 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 μ 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 μ sde-emphasis filter performing the inverse function to stage "D".

G & H) 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.

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.

The output stages offer individually front panel adjustable gain between -1.5dB and 9dB and further +/- 1.0 dB on-board adjustment.

Outputstage H is connected to the de-emphasizing stage F, and thus the frequency response from input of the 179-500 to output F is flat within +0.3/-0.5dB in the frequency range from 40Hz to 15kHz (as long as the transient limiter does not operate).

Outputstage G, however, is switchable between a flat frequency response 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.

In order to minimize the unavoidable yet unwanted audible effects of the limiter operation, the two independent limiter circuits in the 179-500 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 μ 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 μ s from the attack.

STEREO OPERATION, HOUSING AND LED INDICATION.

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

The 179-500 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 179-500 may therefore be used for direct upgrading of 179-400s in all frames manufactured by NTP. However, in such cases output "H" and some of the remotely controllable functions of the 179-500 will not be accessible.

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

NTP

The 179-500A 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.

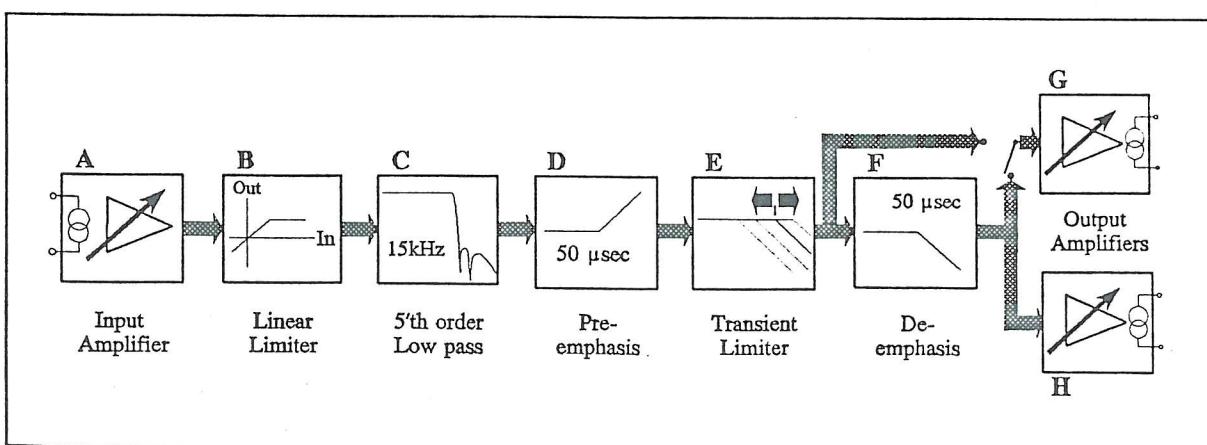
However, some signal types as e.g. spoken "S"-sounds, modern synthesized sounds, snare drums and piano attacks may exhibit high level signal components at relatively high frequencies.

Such signals tend to overload transmitting and receiving equipment and cause audible distortion (pumping effects). The Adaptive Preemphasis principle, as utilized by the NTP 179-500, 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 179-500 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 179-500.

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

- A) To reduce problems of hum-pickup and ground loops, the input stage of the 179-500 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 μ 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 μ sde-emphasis filter performing the inverse function to stage "D".

G & H) 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.

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.

The output stages offer individually front panel adjustable gain between -1.5dB and 9dB and further +/- 1.0 dB on-board adjustment.

Outputstage H is connected to the de-emphasizing stage F, and thus the frequency response from input of the 179-500 to output F is flat within +0.3/-0.5dB in the frequency range from 40Hz to 15kHz (as long as the transient limiter does not operate).

Outputstage G, however, is switchable between a flat frequency response 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.

In order to minimize the unavoidable yet unwanted audible effects of the limiter operation, the two independent limiter circuits in the 179-500 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 μ sis obtained and the release time is a combination of 40 and 5 msec's release times.

For very transient sounds - e.g. claves and drum rim-shots - the fast attack time assures correct limitation of the initial transients while the fast 5 msec recovery time avoids "muffling" of the succeeding parts of the sound not requiring limitation.

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.

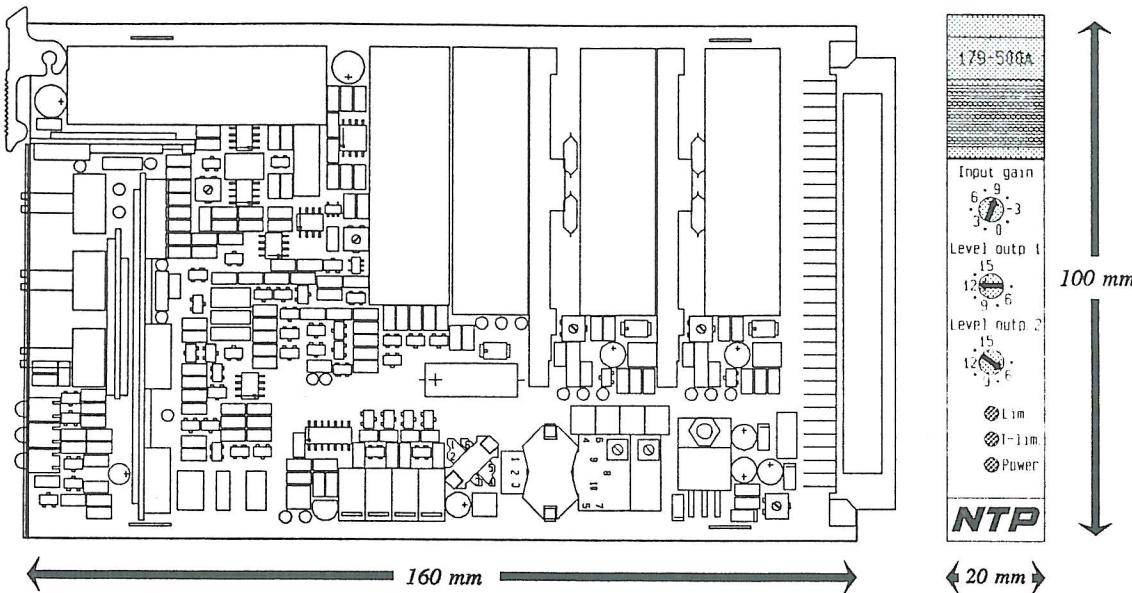
Still following the example, the limit threshold of the transient limiter (stage "E") is on-board adjustable between + 10 dBu and + 15 dBu. If the limit threshold is adjusted to + 12 dBu the very fast dynamics of the transient limiter ensures that even ultra fast transients are limited to a maximum of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

STEREO OPERATION, HOUSING AND LED INDICATION.

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

The 179-500 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 179-500 may therefore be used for direct upgrading of 179-400s in all frames manufactured by NTP. However, in such cases output "H" and some of the remotely controllable functions of the 179-500 will not be accessible.

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



The 179-500 adheres to the IRT "Pflichtenheft 5/5.1". Unless otherwise specified, the following specifications are measured at output "H", $\Delta f = 40\text{Hz}-15\text{kHz}$, $R_L = 300\Omega$ and $U_{in} = 6\text{dBu}$, 500 Hz.

INPUT: impedance	> 10 kΩ
CMRR (Rs = 600 Ω, DIN 45 404)	> 60 dB
Input overload threshold	> 22 dBu
OUTPUT: impedance	< 30Ω
CMRR, DIN 45 404	> 60 dB
Symmetry	> 40 dB
Nominal level ("G") @ 10KHz, deemph off	10.5 dBu ± 0.2 dB
Nominal level ("H") @ 500Hz, monitor output	6.0 dBu ± 0.2 dB
Frequency range: ($U_{in} = -15\text{dBu}$)	
40Hz - 10kHz	± 0.3 dB
10 - 15kHz	+ 0.3/-0.5 dB
19 kHz	< -40 dB
> 19 kHz	< -30 dB
Uniformity between individual 179-500 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°
Noise:	
Output "G" weigh. w/o de-emph:	< -66 dBqp (typ: -70 dBqp)
Output "G" unweigh. RMS w/o DE	< -75 dBu (typ: -79 dBu)
Output "H" weigh.	< -74 dBqp (typ: -78 dBqp)
Output "H" unweigh. RMS	< -86 dBu (typ: -89 dBu)

NTP

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

Gain @ 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

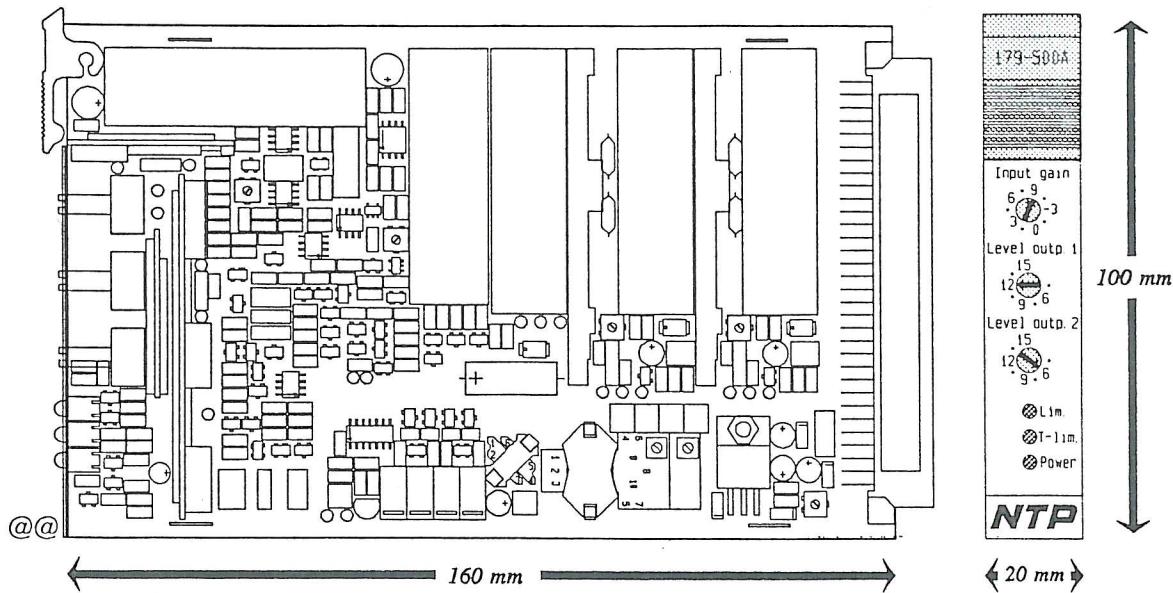
Linear Limiter:
 Clipping level beyond steady state: + 1.5 dB
 Attack time to 1dB: 1.5ms
 Release time to 1dB: 4-20s (automatic)

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:
 Output "G": disable/enable de-emphasis
 Output "H": de-emphasis always enabled
 Deviation from ideal value: < ± 0.1 dB

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

NTP



The 179-500 adheres to the IRT "Pflichtenheft 5/5.1". Unless otherwise specified, the following specifications are measured at output "H", $\Delta f = 40\text{Hz}-15\text{kHz}$, $R_L = 300\Omega$ and $U_{in} = 6\text{dBu}$, 500 Hz.

INPUT: impedance	> 10 kΩ
CMRR ($R_s = 600 \Omega$, DIN 45 404)	> 60 dB
Input overload threshold	> 22 dBu
OUTPUT: impedance	< 30Ω
CMRR, DIN 45 404	> 60 dB
Symmetry	> 40 dB
Nominal level ("G") @ 10KHz, deemphase off	10.5 dBu ± 0.2 dB
Nominal level ("H") @ 500Hz, monitor output	6.0 dBu ± 0.2 dB
Frequency range: ($U_{in} = -15\text{dBu}$)	
40Hz - 10kHz	± 0.3 dB
10 - 15kHz	+ 0.3/-0.5 dB
19 kHz	< -40 dB
> 19 kHz	< -30 dB
Uniformity between individual 179-500 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°
Noise:	
Output "G" weigh. w/o de-emph:	< -66 dBqp (typ:-70 dBqp)
Output "G" unweigh. RMS w/o DE	< -75 dBu (typ:-79 dBu)
Output "H" weigh.	< -74 dBqp (typ:-78 dBqp)
Output "H" unweigh. RMS	< -86 dBu (typ:-89 dBu)

NTP

THD @ Uin = 6dBu, 40Hz - 15kHz	< 0.1%
Gain @ 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
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:	5-40mS (automatic)
Output "G":	disable/enable de-emphasis
Output "H":	de-emphasis always enabled
Deviation from ideal value:	< ± 0.1 dB
Power supply range	22-28 VDC
Current consumption	< 200 mA (typ. 150 mA)
Physical size:	160x100x20mm (LxBxH)

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.

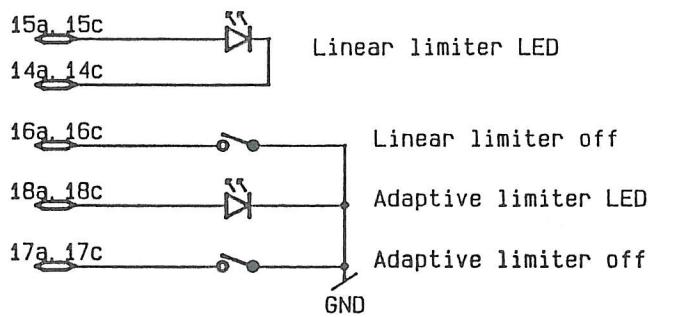
Settings:	Input Gain = 0;	Output Level (outp. 1&2) = 6
	Lim. = ON (term. no. 16 = NC)	T-lim. = ON (pin 17 = NC)
	Deemphasis = OFF	

Input signal:	+12 dBu, f = 10 kHz
---------------	---------------------

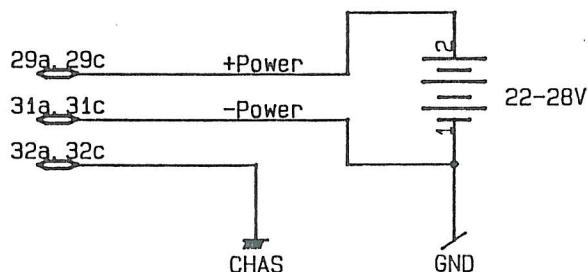
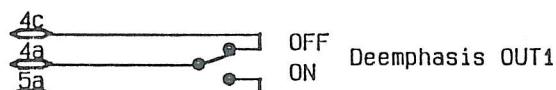
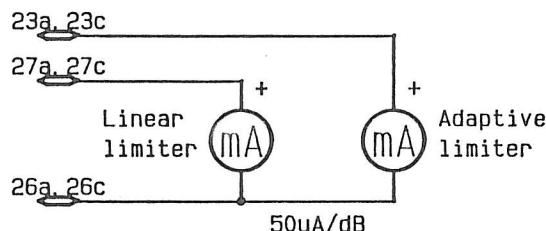
Adjust P201 to Uout = +10 dBu on output 1 (terminals 19 & 20)

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

	row c	pin	row a
c			
a			
1			
		Input 0°	Input 0°
		Input 180°	Input 180°
		Screen	Screen
		Deemphasis OFF ch 1, to 4a	Deemphasis ON/OFF, common
		N.C.	Deemphasis ON ch 1, to 4a
		N.C.	N.C.
		Lim LED, to -	Lim LED, to -
		Lim LED, to +	Lim LED, to +
		/Lim OFF, to GND	/Lim OFF, to GND
		/T-lim OFF, to GND	/T-lim OFF, to GND
		T-lim LED, to +	T-lim LED, to +
		Output 1 0°	Output 1 0°
		Output 1 180°	Output 1 180°
		Output 2 0°	Output 2 0°
		Output 2 180°	Output 2 180°
		Meter T-lim, to +	Meter T-lim, to +
		T-lim, stereo connection	T-lim, stereo connection
		Ref., stereo connection	Ref. stereo connection
		Meter Common, Lim/T-lim, to -	Meter Common, Lim/T-lim, to -
		Meter Lim to +	Meter Lim, to +
		Lin, stereo connection	Lin, stereo connection
		+ Vcc	+ Vcc
		N.C.	N.C.
		- Vcc	- Vcc
		Chassis	Chassis
32			
Seen from rear side of frame			



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

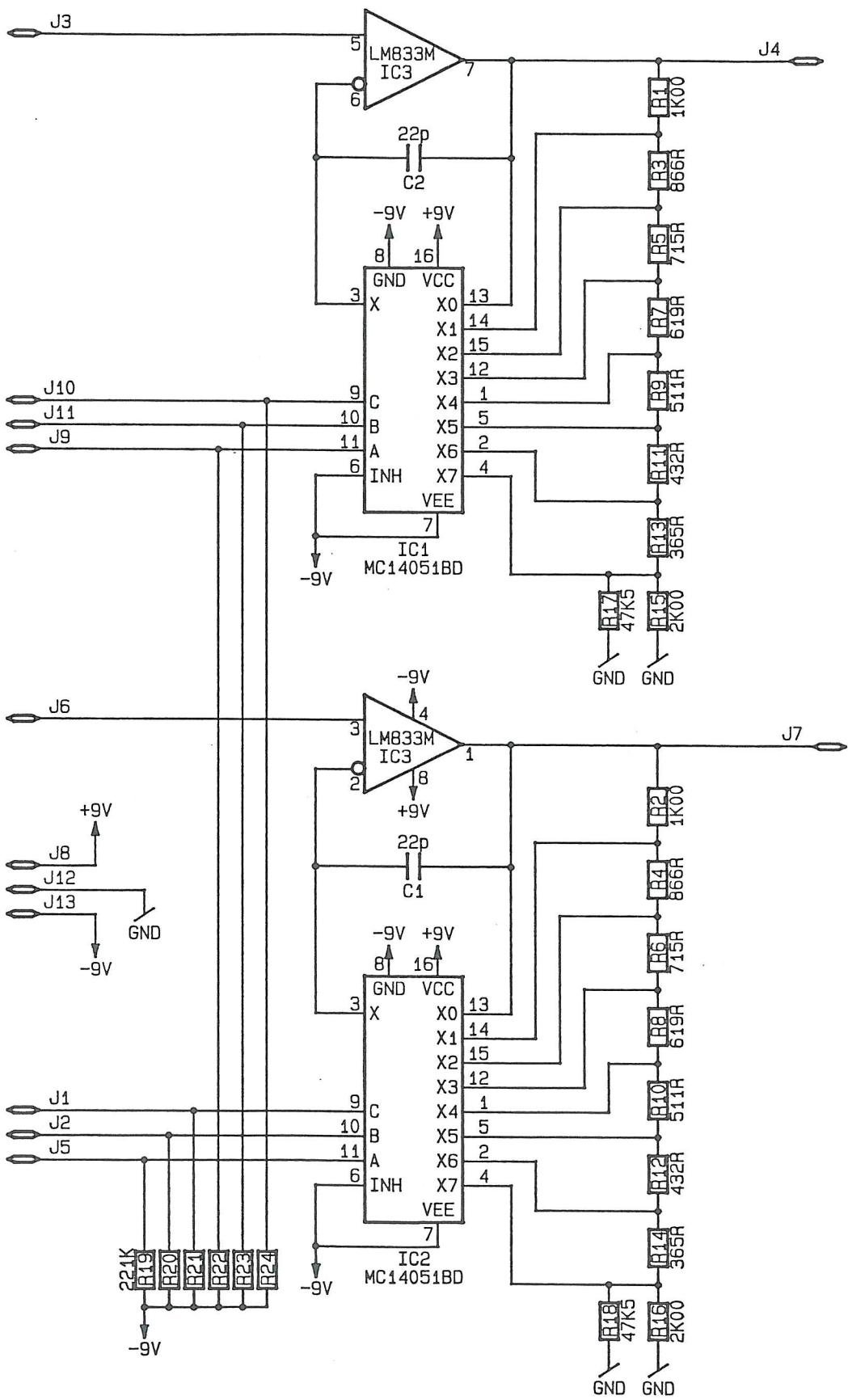
Blank piece:	Material:	Treatment:	Page: 2 of 2
Scale :			
Tolerance :			
Design : HTO			
Layout : 930121			
Revised :			
Transient Limiter 179-500A External connections, mono			NTP
			179-5002-A-4

NTP

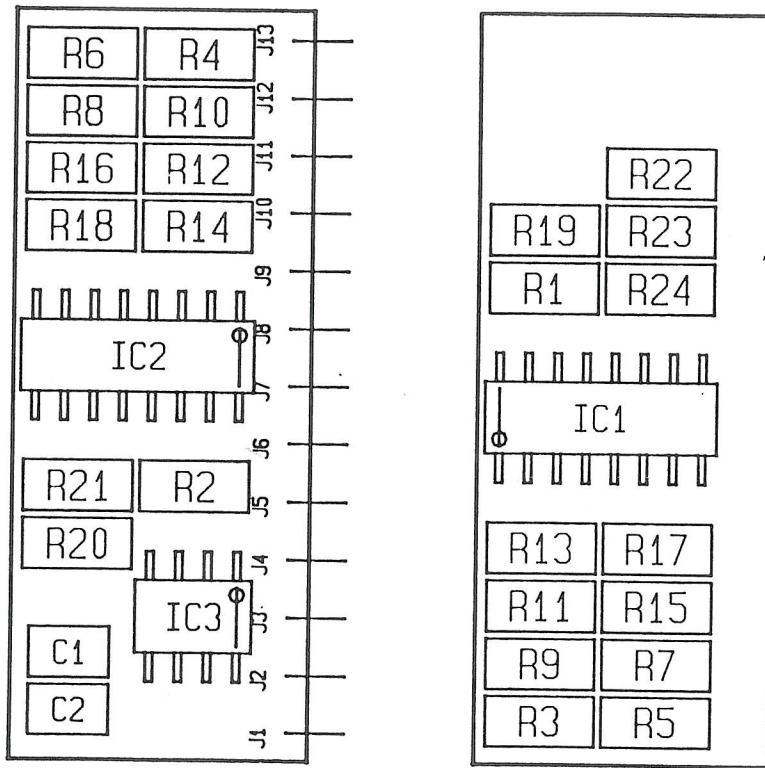
The Card is terminated via a 64-pin Euro connector, male

	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
		5	Deemphasis ON ch 1, to 4a
		6	N.C.
		7	N.C.
		8	N.C.
		9	N.C.
		10	N.C.
		11	N.C.
		12	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
32	Chassis	32	Chassis

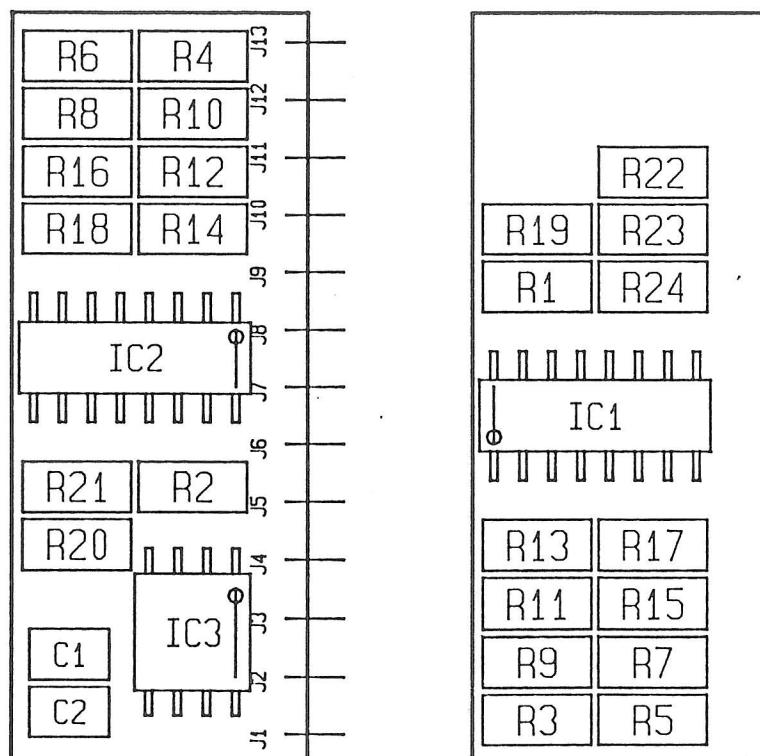
Seen from
rear side
of frame



Blank piece:	Material:	Treatment:	Page: 1 of 1
Scale :			
Tolerance :			
Design : HTO			
Layout : 921002			
Revised :			
Transient Limiter Output Gain Stage Module Diagram			NTP
			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



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

Multi 12.01.93 10:26 PARTS LIST 179-5033A Side 1

NTP 179-5033A DUAL GAIN STAGE MODULE

REF. NO	NTP-ID.	DESCRIPTION	QTY	PARTS LIST
C 1	XCCC-0222G	CAP CERAMIC 50V 22PF 20%	1	SIEMENS B37940
C 2	XCCC-0222G	CAP CERAMIC 50V 22PF 20%	1	SIEMENS B37940
IC 1	XICA-4051A	ANALOG MULTIPLEXER	1	MOTOROLA
IC 2	XICA-4051A	ANALOG MULTIPLEXER	1	MOTOROLA
IC 3	XILA-0833A	DUAL OP-AMPLIFIER	1	NATIONAL
J 1-13	KMN-1301	CONTACT PIN 13P	1	CONELEC
R 1	XRMD-4100C	RESISTOR METAL 1206 1.00K 1%	1	PHILIPS RC 02G
R 2	XRMD-4100C	RESISTOR METAL 1206 1.00K 1%	1	PHILIPS RC 02G
R 3	XRMD-3866C	RESISTOR METAL 866R 1%	1	PHILIPS RC02H
R 4	XRMD-3866C	RESISTOR METAL 866R 1%	1	PHILIPS RC02H
R 5	XRMD-3715C	RESISTOR METAL 715R 1%	1	PHILIPS RC02H
R 6	XRMD-3715C	RESISTOR METAL 715R 1%	1	PHILIPS RC02H
R 7	XRMD-3619C	RESISTOR METAL 619R 1%	1	PHILIPS RC02H
R 8	XRMD-3619C	RESISTOR METAL 619R 1%	1	PHILIPS RC02H
R 9	XRMD-3511C	RESISTOR METAL 511R 1%	1	PHILIPS RC02H
R 10	XRMD-3511C	RESISTOR METAL 511R 1%	1	PHILIPS RC02H
R 11	XRMD-3432C	RESISTOR METAL 432R 1%	1	PHILIPS RC02H
R 12	XRMD-3432C	RESISTOR METAL 432R 1%	1	PHILIPS RC02H
R 13	XRMD-3365C	RESISTOR METAL 365R 1%	1	PHILIPS RC02H
R 14	XRMD-3365C	RESISTOR METAL 365R 1%	1	PHILIPS RC02H
R 15	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILIPS RC 02G
R 16	XRMD-4200C	RESISTOR METAL 2.00K 1%	1	PHILIPS RC 02G
R 17	XRMD-5475C	RESISTOR METAL 1206 47K5 1%	1	PHILIPS RC 02G
R 18	XRMD-5475C	RESISTOR METAL 1206 47K5 1%	1	PHILIPS RC 02G
R 19	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H
R 20	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H
R 21	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H
R 22	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H
R 23	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H
R 24	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H
10	179-5042A	PRINT BOARD	1	CAD

NTP Parts List

as of date /2-/ 1993.

Page / of /.

List No.: 179-5033-A-4

Multi 02.10.92 14:27

Side 1

PARTS LIST 179-5033A

NTP 179-5033A DUAL GAIN STAGE MODULE

PARTS LIST

REF.NO.	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
J 1-13	179-5037A KMN-1301	CARD W SMD COMPONENTS CONTACT PIN 13P	1 1	179-5037A CONELEC	179-5037A KMN-1301

PARTS LIST 179-5033A

SLUT

NTP Parts List

as of date 2-10-1992

Page / of /

List No.: 179-5033-A-4

Multi 02.10.92 14:33

PARTS LIST 179-5037A

Side 1

NTP 179-5037A CARD W SMD COMPONENTS

PARTS LIST

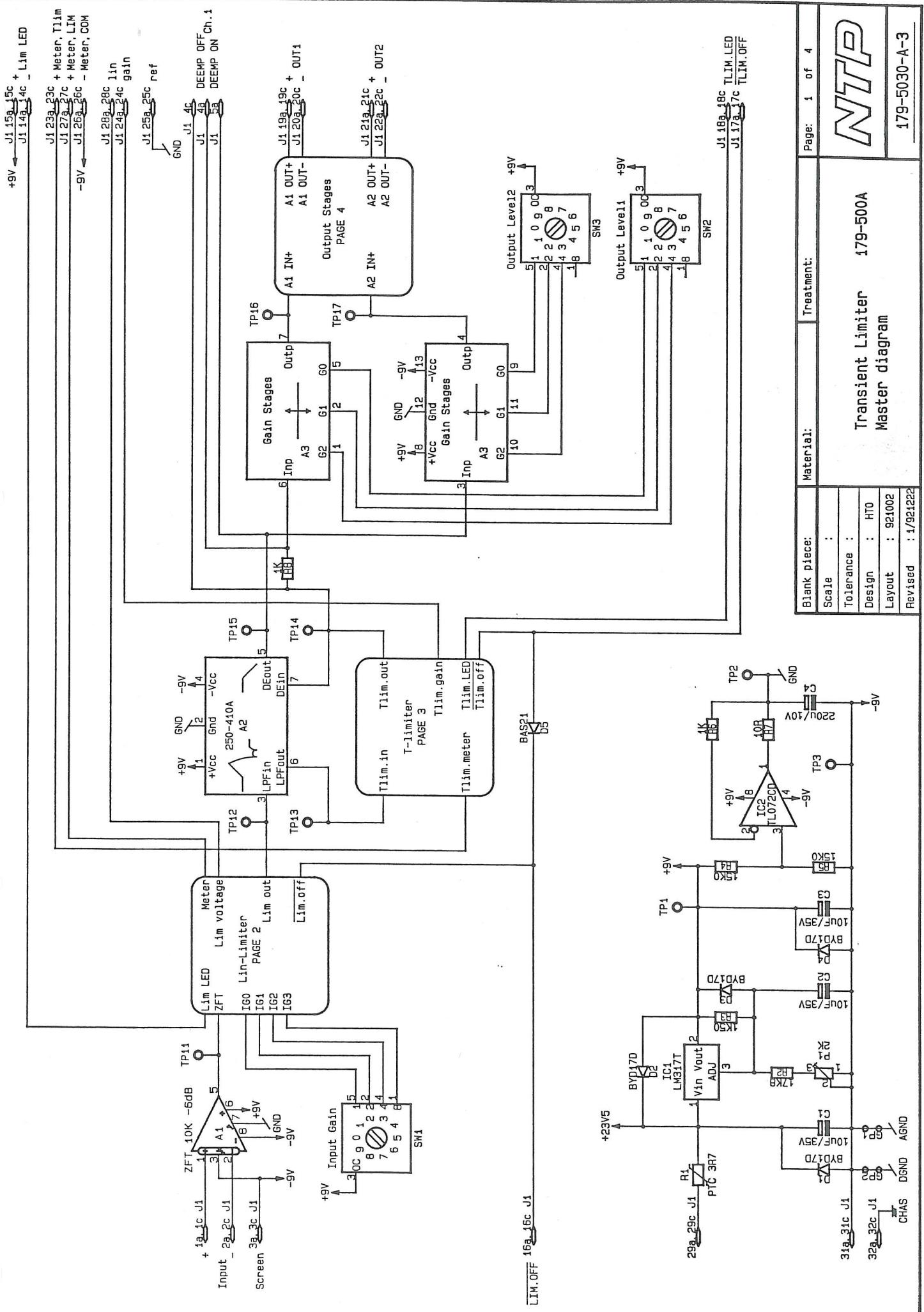
REF. NO.	NTP-ID.	DESCRIPTION	QTY	MANUFACT/DRW.NO.	PART NO.
10	179-5042A	PRINT BOARD	1	CAD	179-5042A
C 1	XCCC-0222G	CAP CERAMIC 50V 22PF 20%	1	SIEMENS B37940	J5220 J62
C 2	XCCC-0222G	CAP CERAMIC 50V 22PF 20%	1	SIEMENS B37940	J5220 J62
IC 1	XICA-4051A	ANALOG MULTIPLEXER	1	MOTOROLA	MC 14051BD
IC 2	XICA-4051A	ANALOG MULTIPLEXER	1	MOTOROLA	MC 14051BD
IC 3	XILA-0833A	DUAL OP-AMPLIFIER	1	NATIONAL	LMB33M
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-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 20	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 21	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 22	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 23	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%
R 24	XRMD-6221C	RESISTOR METAL 221K 1%	1	PHILIPS RC02H	RC01 221K 1%

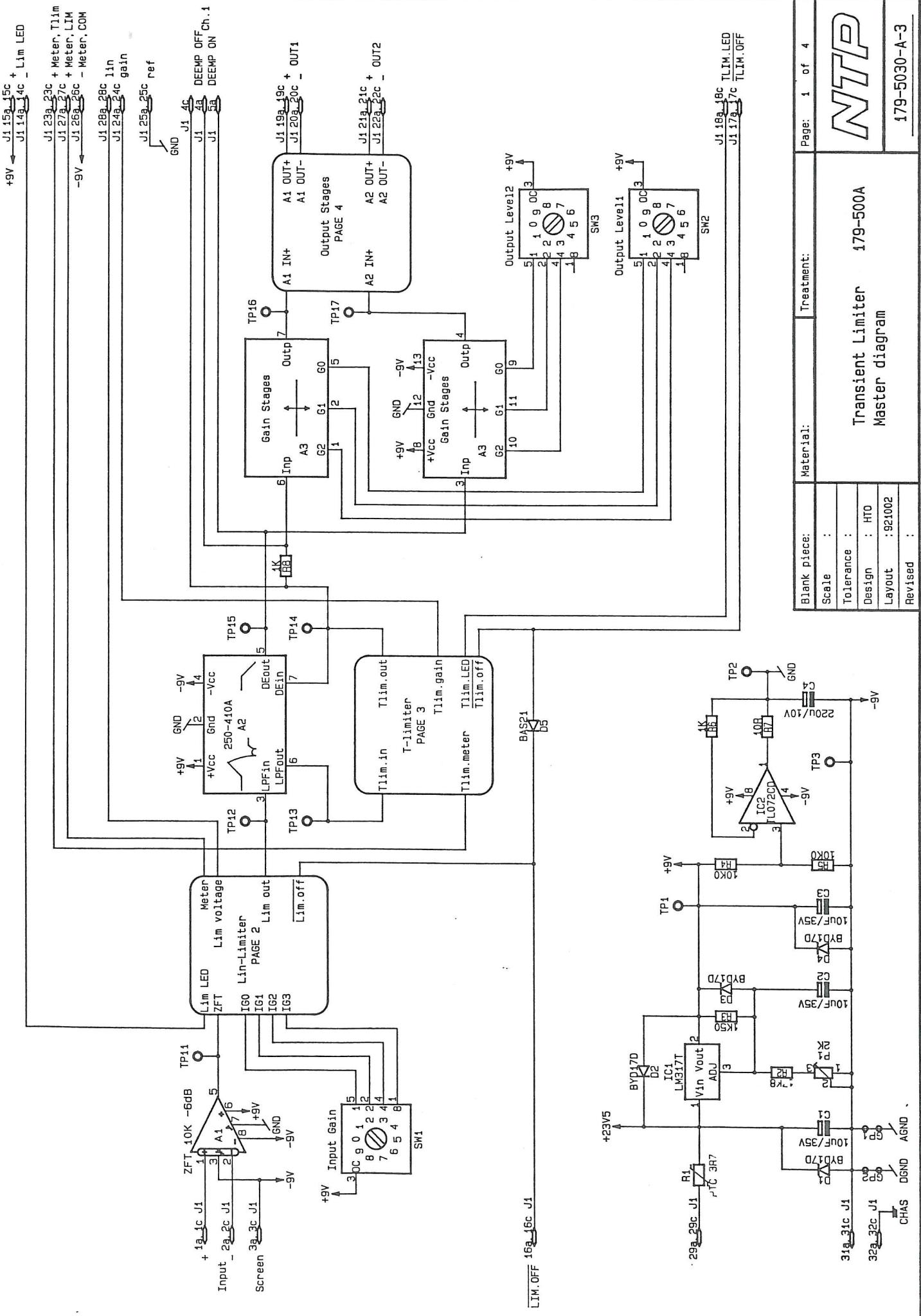
NTP Parts List

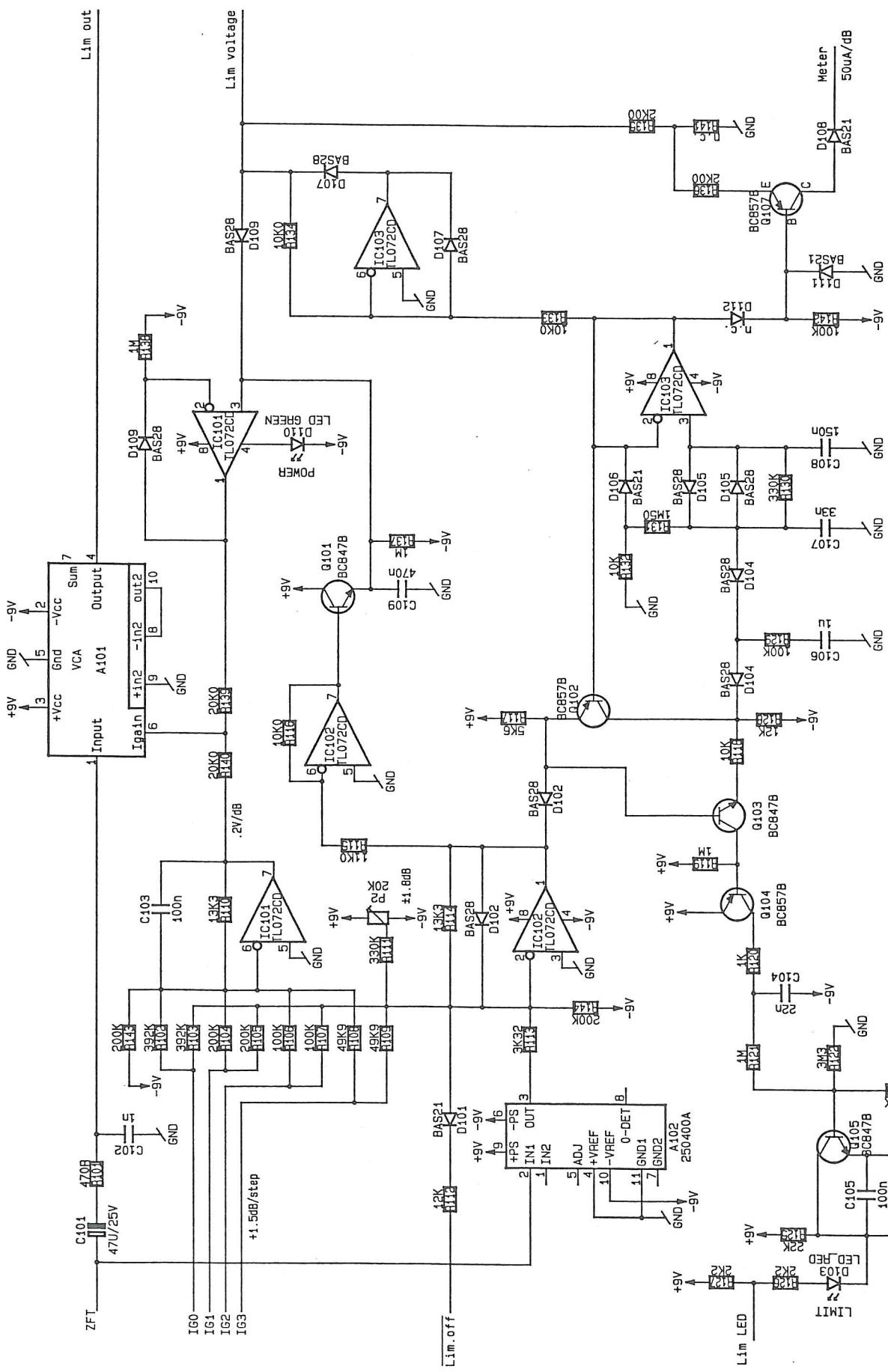
as of date 2-10 1992

Page / of /

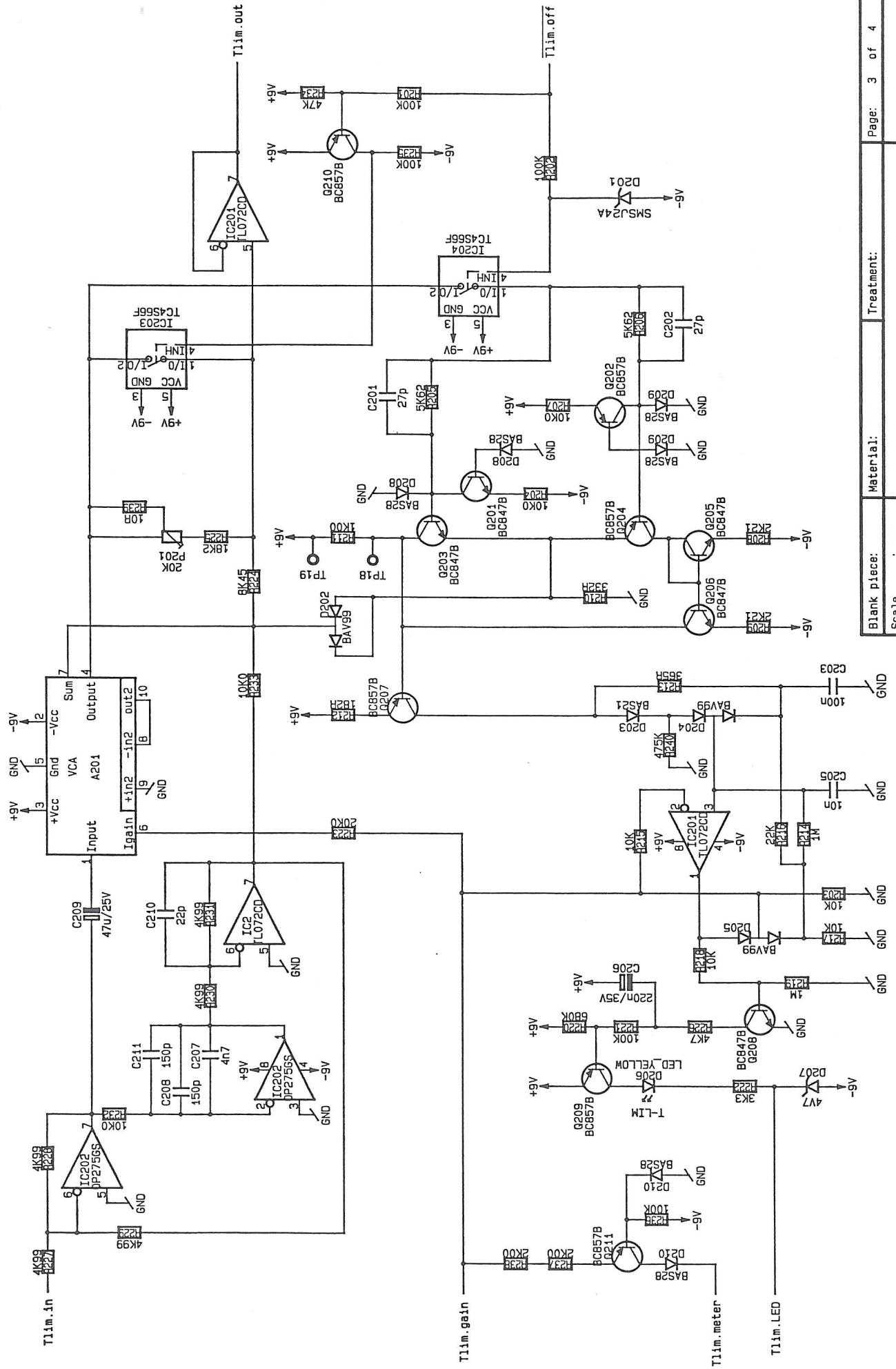
List No.: 179-5037-A-4



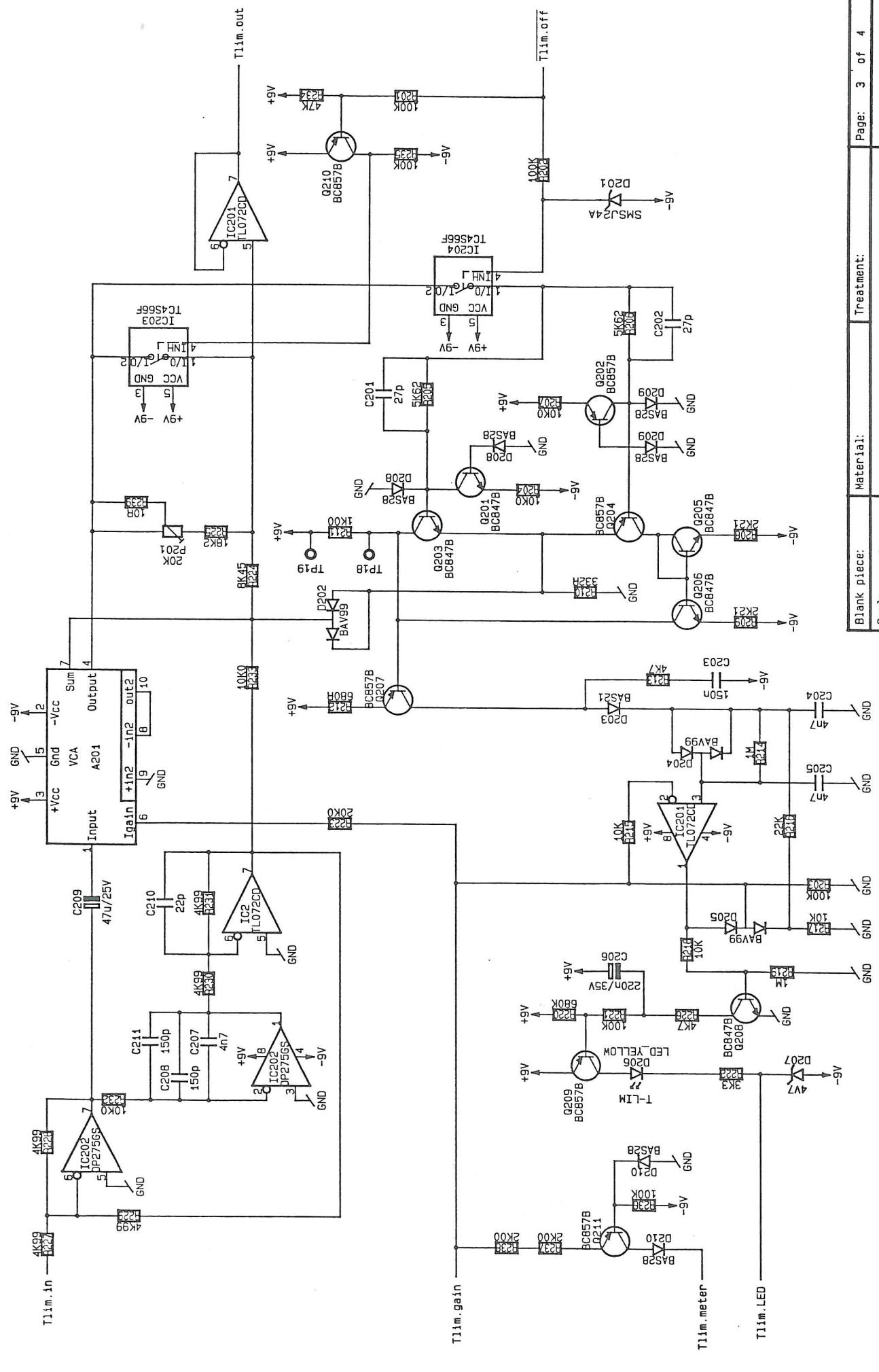




Blank piece:	Material:	Treatment:	Page: 2 of 4
Scale :			NTP
Tolerance :		Transient Limiter Linear limiter part	
Design :	HTO	179-500A	
Layout :	92102	Schematic diagram	
Revised :			179-5030-A-3

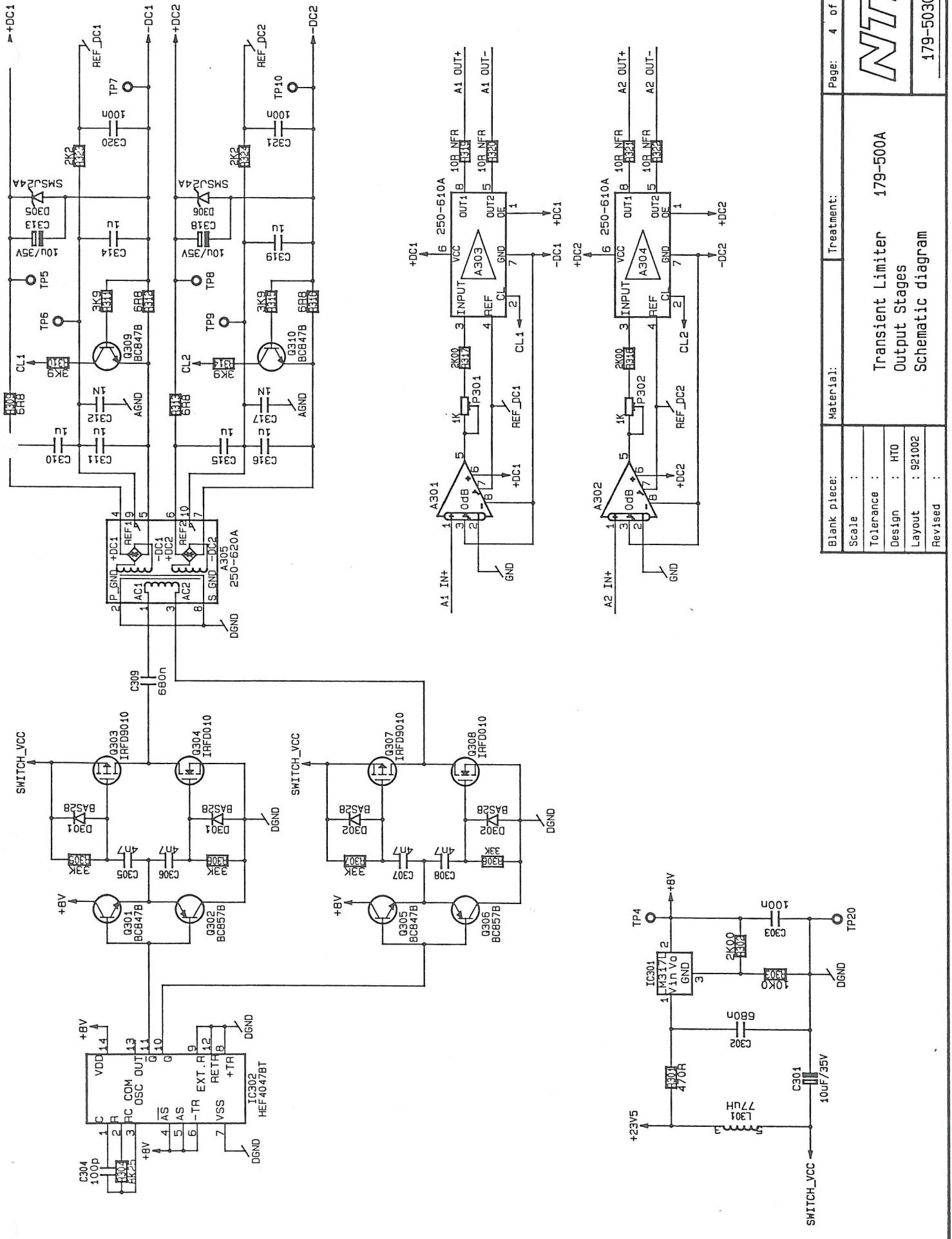


Blank piece:	Material:	Treatment:
Scale :		179-500A
Tolerance :		NTP
Design :		GPE limiter part
Layout :		Schematic diagram
Revised :		179-5030-A-3
		1/921222



Transient Limiter
GPE limiter part
Schematic diagram
179-500A

Blank piece:	Material:	Treatment:
Scale :		Transient Limiter
Tolerance :		GPE limiter part
Design :	H10	Schematic diagram
Layout :	921002	
Revised :		

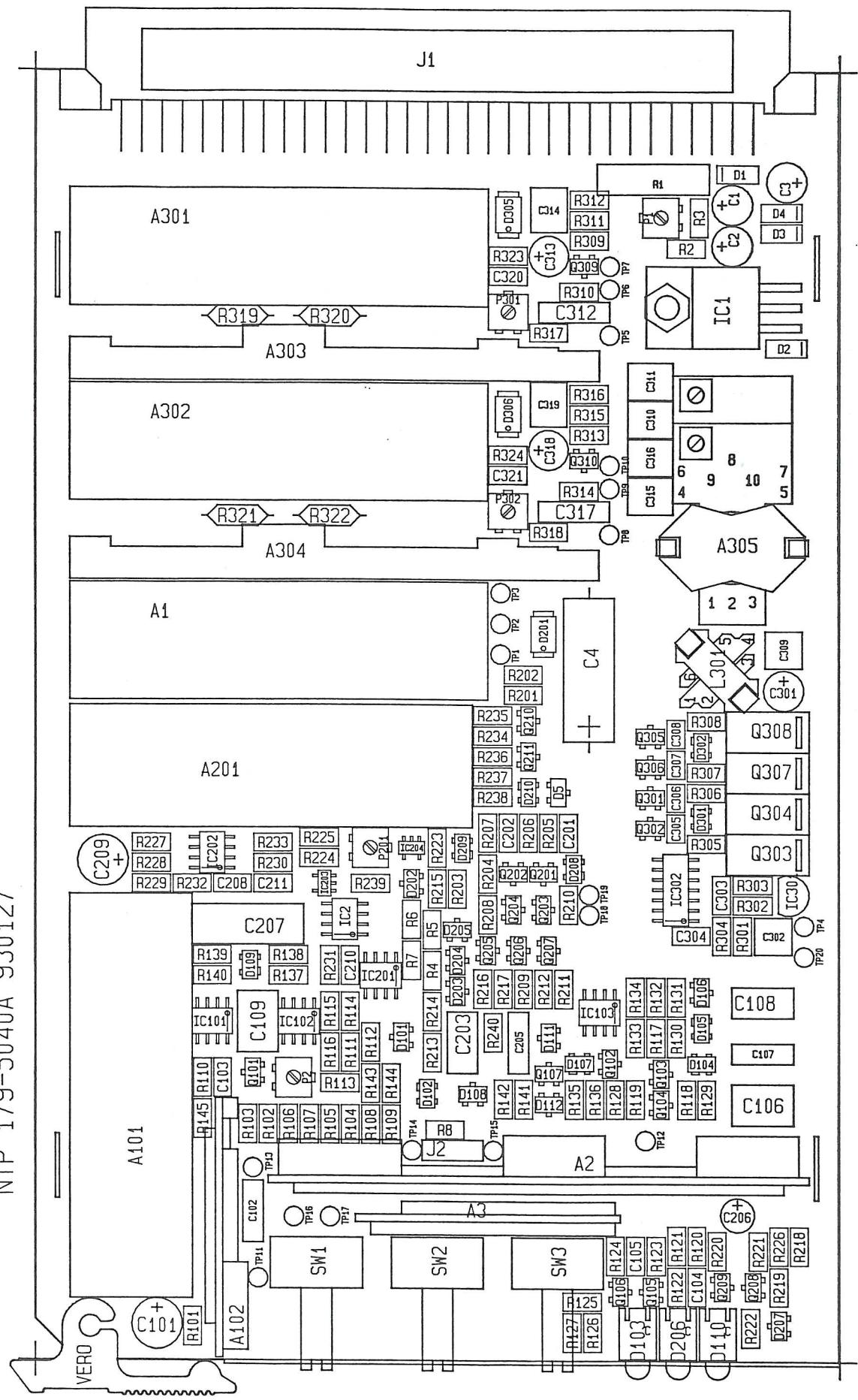


Blank piece:	Material:	Treatment:	Page:
Scale :			4 of 4
Tolerance :			
Design : HT0			
Layout : 921002			
Revised :			

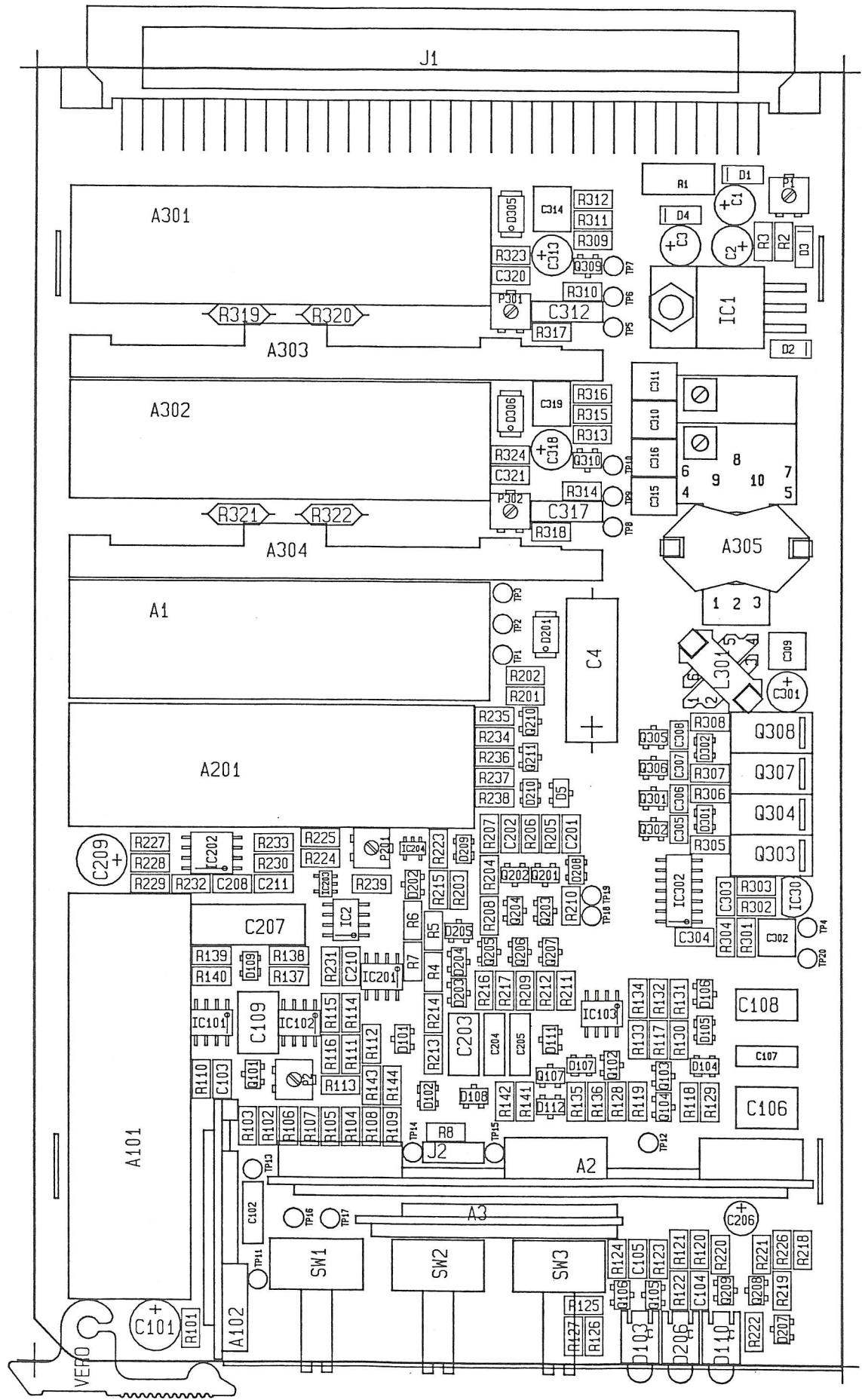
NTP

179-5030-A-3

NTP 179-5040A 930127



Blank piece:	Material:	Treatment:	Page	1 of 1
Scale :	2 : 1			
Tolerance :		Transient Limiter Main Card	179-500A 179-5040A	NTP
Design :	H10			
Layout :	920626	Component Lay-out		179-5041-A-3
Revised	2/930129			



Blank piece:	Material:	Treatment:	Page	1 of 1
Scale :	2:1	Transient Limiter	179-500A	<i>NTP</i>
Tolerance :		Main Card	179-5040A	
Design :	H10	Component Lay-out		
Layout :	920626			179-5041-A-3
Revised :				