179-5700-A-4

R146

User Guide

for

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 cower 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.

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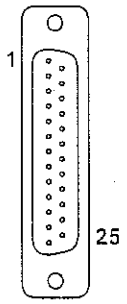
Technical Specifications

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

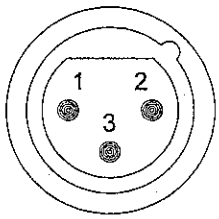


Seen from
rear side
of frame

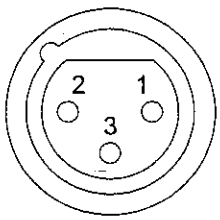
pin nos.. a indicates channel A - b indicates channel B

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

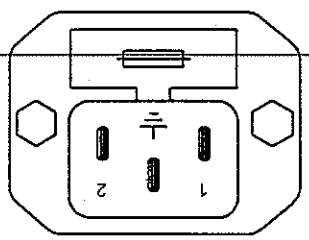


1 Screen, chassis

2 0°

3 180°

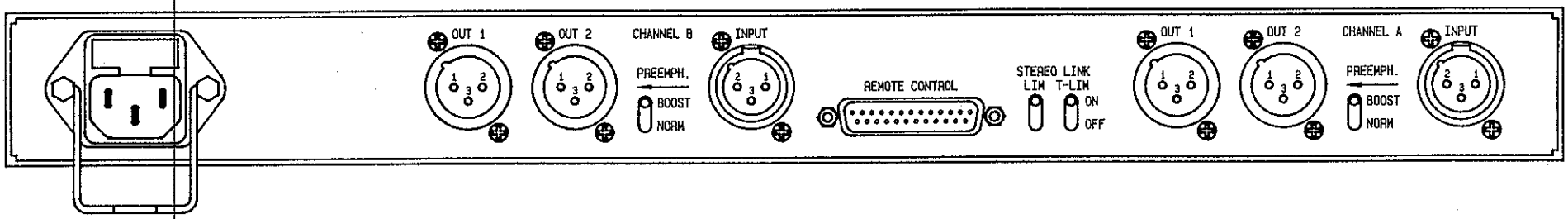
Mains connector



⏚ Screen, chassis

2 Neutral

3 Phase



Blank piece:	Material:	Treatment:	Page 1 of 1
Scale :	Dual Transient Limiter 179-570A Rearplate Layout		NTP
Tolerance :			
Design : BJ			
Layout : 940304.jl			179-5708-A-3
Revised :			

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 inversly 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.

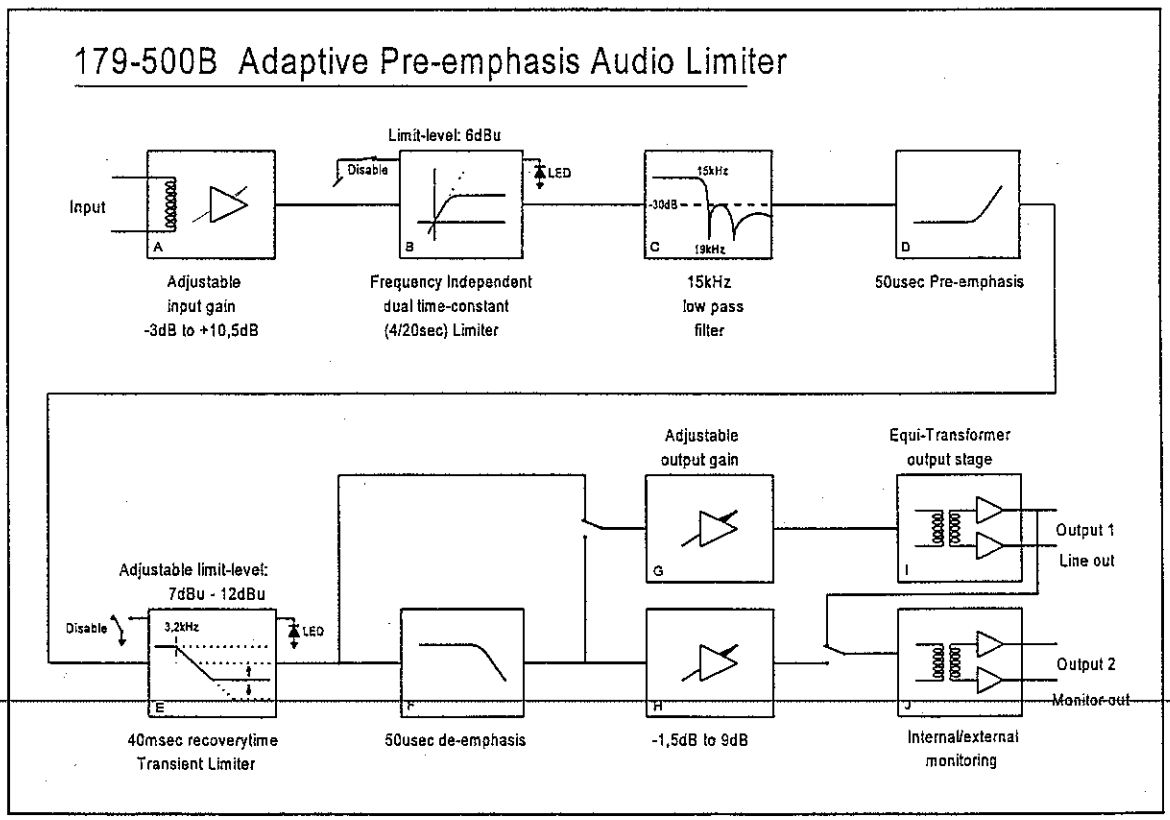
However, some signal types as e.g. spoken "S"-sounds, modern synthesized sounds, snare drums and piano attacks may exhibit high level signal components at relatively high frequencies.

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.

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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 50µs 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 50µs 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 particularily 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-emphasing 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 proporties.

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 proporties 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 250µsec'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 µs 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.

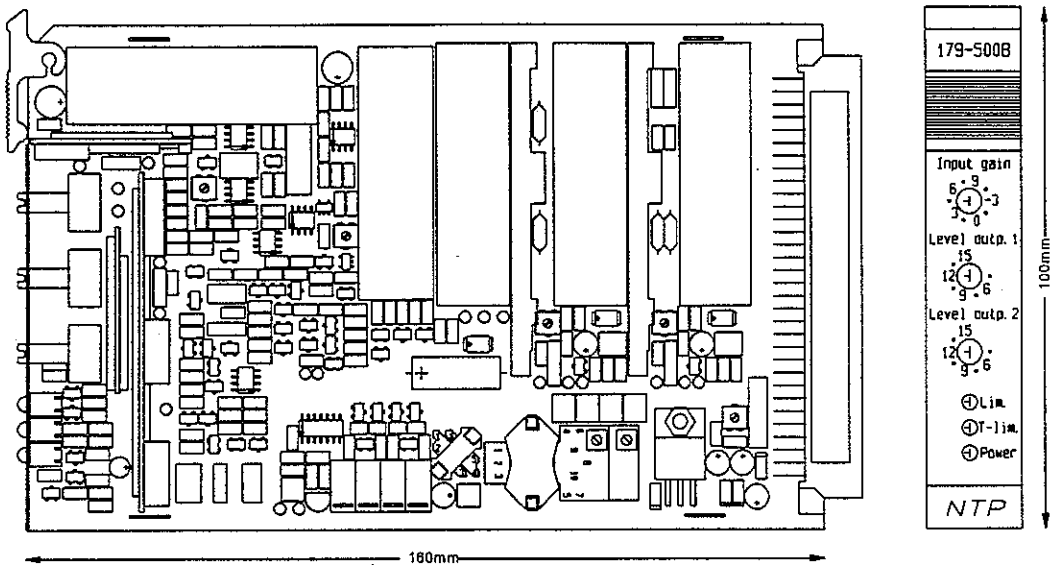
In the opposit case, when the 2 jumpers are placed at the far position from the edge of the card, the Monitor Output is connected to the output of the Line Output (1), and then, making a true monitoring at this output, however, no gain setting is possible on the Monitor Output, except for the fine adjustment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



*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, Δf=40Hz-15kHz, R_L=300Ω and Uin=6dBu, 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 (Line Out) @ 10KHz, deemphase off	10.5 dBu ± 0.2 dB
Nominal level (Monitor Out) @ 500Hz	6.0 dBu ± 0.2 dB
Frequency range: (Uin=-15dBu)	
40Hz - 10kHz	±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: (Uin=-15dBu):	
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, nominel:	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:	
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 consuption	<200 mA (typ. 150 mA)
Physical size:	160x100x20mm (LxHxW)

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)	

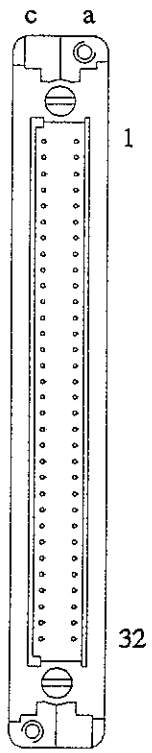
Limit level, linear limiter.
P2 on the main board adjusts the threshold level of the linear limiter. Normally the threshold level is selected on the front switch (Input Gain) however small corrections can be made by adjusting P2. The following procedure describes the standard factory adjustment.

Settings:	Input Gain = 0; Lim. = ON (term. no. 16 = NC)	Output Level (outp. 1&2) = 6 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.

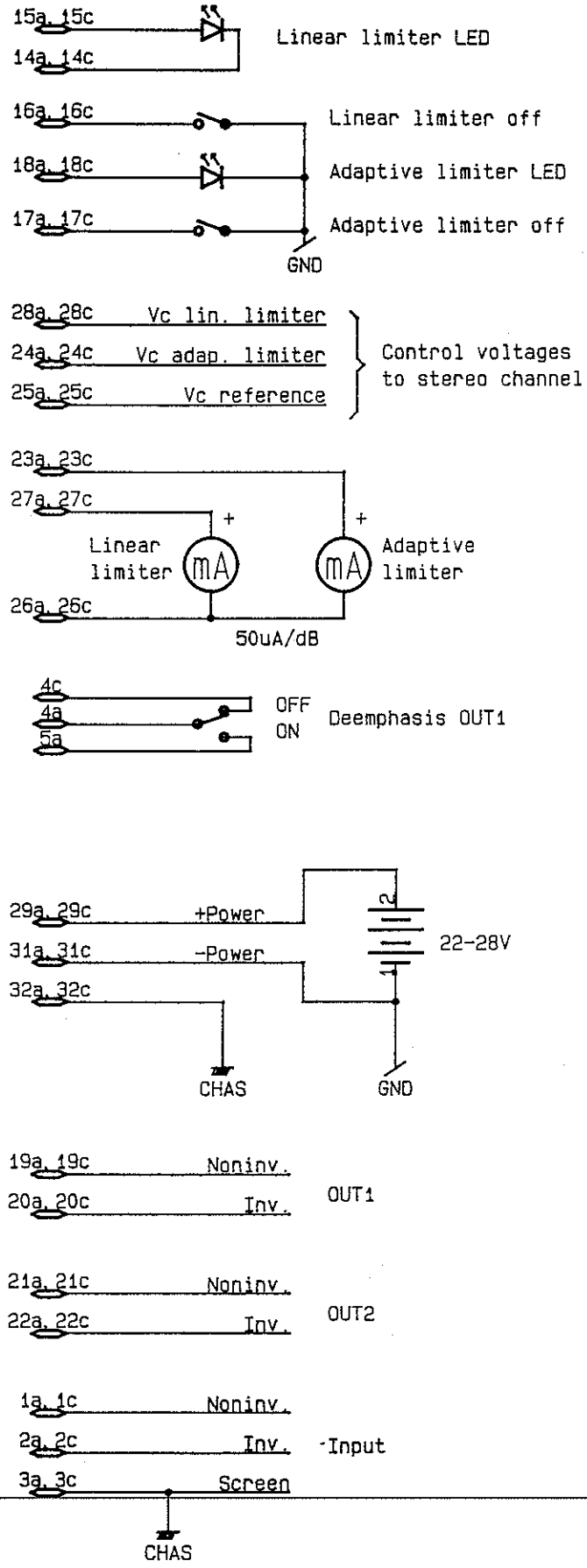
Settings:	Input Gain = 0; Lim. = ON (term. no. 16 = NC) Deemphasis = OFF	Output Level (outp. 1&2) = 6 T-lim. = ON (pin 17 = NC)
Input signal: +12 dBu, f = 10 kHz		
Adjust P201 to Uout = +10 dBu on output 1 (terminals 19 & 20)		

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



Seen from rear side of frame

row c	pin	row a
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



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