Contents:

1 Safety and warranty

1.1 Safety

-Warning
Inside the PPA 1200, AC voltages up to 240 V may be present !

-Connection to the mains voltage
The PPA 1200's chassis is connected to ground by the grounding conductor in the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle. When this ground connection is not present or interrupted, all accessible parts of the amplifier can cause an electrical shock.

-Fuses
To avoid fire hazard, only replace fuses by the same type and value.

-Servicing
Do not perform internal service or adjustments unless there is another person present, capable of rendering first aid and reanimation.
Try to perform all service work with mains power off. Remove mains plug to be sure that there are no internal voltages present.

1.2 Warranty

SUMMARY

Stage Accompany warrants to the original commercial purchaser of each new Stage Accompany product, from the date of purchase by the original purchaser until the end of the warranty period, that the product is free of defects in materials or workmanship.

WARRANTY PERIOD

The warranty period on all Stage Accompany products is five years from the date of the first consumer purchase, with the exception of:
- all electrical products: three years from the date of the first consumer purchase;
- cone assemblies in the loudspeaker and diaphragms in the Compact Drivers: one year from the date of the first consumer purchase;
- movable parts, such as castors, locks, handles, hinges, fans, etc: one year from the date of the first consumer purchase;
- computers and associated peripherals: six months from the date of the first consumer purchase.

HOW TO VALIDATE THE WARRANTY

To validate warranty, fill out the enclosed warranty card and return it to Stage Accompany within ten days of the purchase date.
The purchaser must always keep the original bill of sale to establish the date of purchase.

ITEMS EXCLUDED FROM WARRANTY

Appeal on warranty will be voided in case :

- of defects caused by influence from the outside, accident, misuse, neglect or influence of water;
- the serial number on the warranty and/or product has been defaced, altered or removed;
- of damage due to shipment;
- of damage resulting from neglection of instructions listed in the user manual;
- of damage caused by incorrect, abnormal or abuse during delivery;
- the unit has been repaired (or shown signs of repair) by someone not authorised by Stage Accompany;
- if the warranty registration card has not been returned to Stage Accompany within 10 days of purchase;
- the original bill of sale can not be presented whenever warranty service is required;
- the cause of damage is unknown

WHAT WE WILL DO

Shipment of the product to a Stage Accompany dealer is at the risk and responsibility of the customer.
Stage Accompany will pay all labour and material expenses for all repairs covered by this warranty. Stage Accompany will not pay the cost of shipment to the Stage Accompany dealer or to the factory. However Stage Accompany will pay the return shipping charges if repairs are covered by the warranty.

CAUTION

Warranty work can only be performed at our authorised service centers or at our factory. Every repair or attempted repair by a non authorised party will void the warranty.

Stage Accompany reserves the right to alter specifications without prior notice.

2 Description of the amplifier

The PPA 1200 is a microprocessor controlled power amplifier with the following features:

-high output power
12 output devices per channel with a dissipation capacity of 2400 W provide for an output power of 350 W into 8 Ω, 600 W into 4 Ω or 900 W into 2 Ω.

-low distortion
Typical distortion is less than 0.008 % at 1 kHz.

-high speed
Fast circuitry results in a slew rate of more than 40 V/uS.

-seperate power supplies
Each channel has its own high power supply to ensure a high channel separation and full power output at any time.

-dynamic damping control
The output signal can be monitored through sensor lines to obtain a maximal damping and a minimal source impedance at the loudspeaker terminals. The PPA 1200 has a typical damping factor of 10000 at 1 kHz which is about 50 times higher than any conventional amplifier.

-dc servo circuitry
A special DC circuit reduces output offset to a minimum.

-processor control
A microprocessor controls and guards the amplifier functions and status. Input attenuation is also controlled by the uP which results in high accuracy (linearity ±0.05 dB between 0 and -20 dB) and no loss of performance caused by potentiometers.

-auto energy control
The average output power to the loudspeaker can be limited to a factory preset or user adjustable level without hardly changing the dynamic behaviour of the program material.

-new heavy duty output connectors
The amplifier is provided with two four terminal Neutrik XLR speakon connectors with a rating of 30 A per contact to ensure a solid connection between amplifier and load.

3 Taking the PPA 1200 apart

In most servicing cases, it will be sufficient to remove the amplifier modules. After this you will have access to all other boards.
First be sure that the mains plug is removed from the receptacle.
Then remove the eight top panel screws (fig 1). Now the top panel can be removed and the two heatsinks of the poweramp modules will be visible.

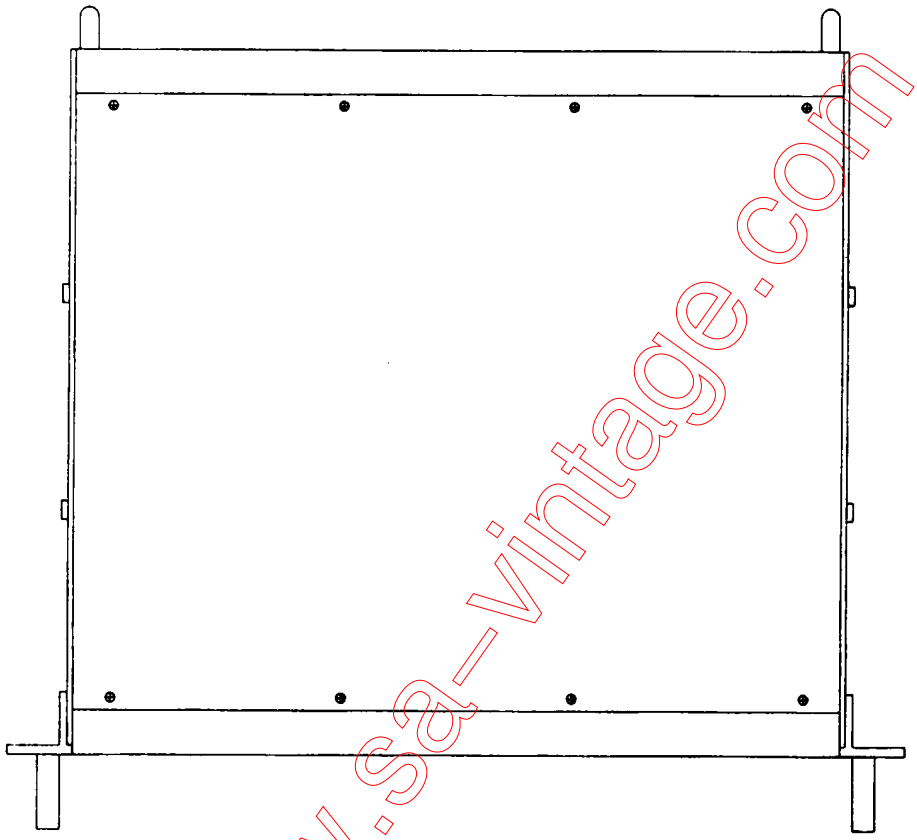


Fig 1 Top side of the PPA 1200

The poweramp modules can be taken out by removing the six screws on top of the heatsink and the two screws in the side panel of the amplifier (fig 2).
If you want to take out the complete module, remove all connectors to the preamp and poweramp board.
Access to the front board can be obtained by removing the two screws of the front bar at the side panels of the PPA 1200 (fig 3). After removing the bar the front panel can be taken out.
Fig 4 shows the best way to do adjustments to the preamp and poweramp boards. The heatsinks are placed vertically on the front and back bar. Fasten the heatsinks solidly so they will not fall over while servicing.

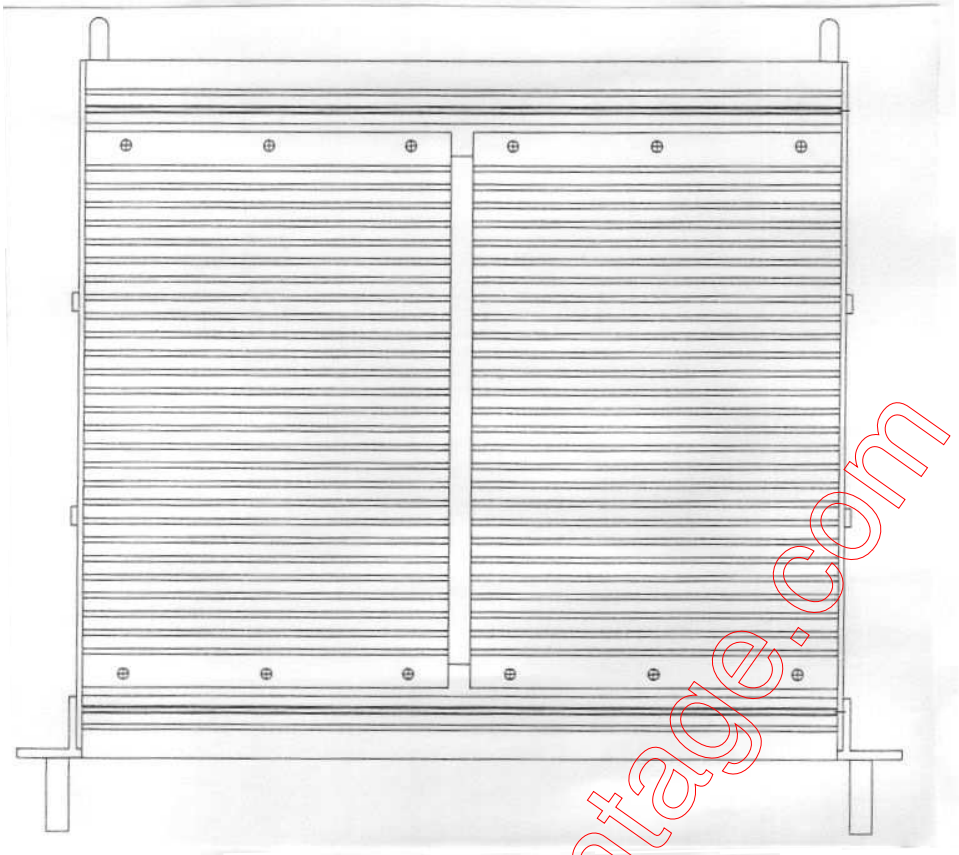


Fig 2 PPA 1200 with removed top panel

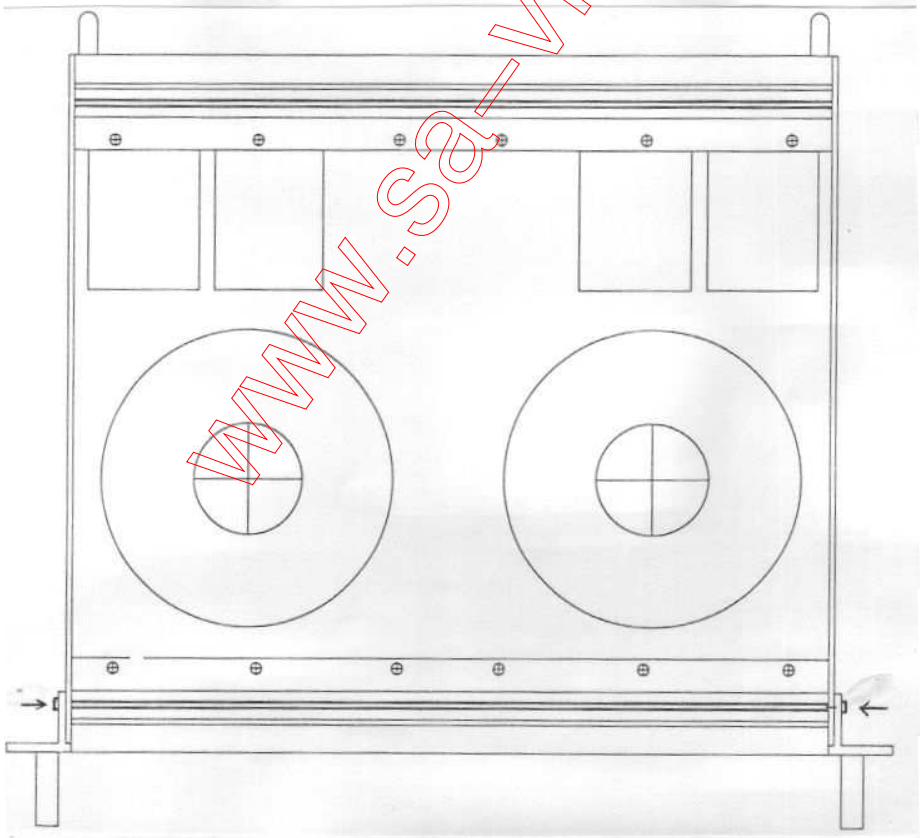


Fig 3 PPA 1200 with removed amplifier modules

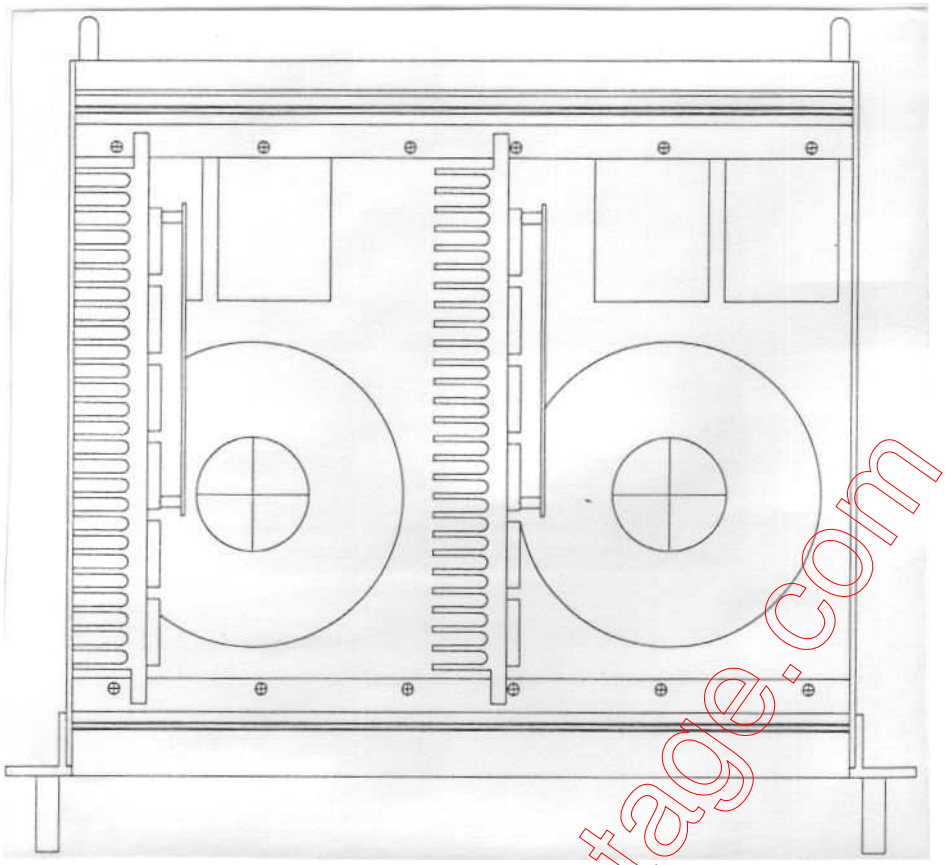
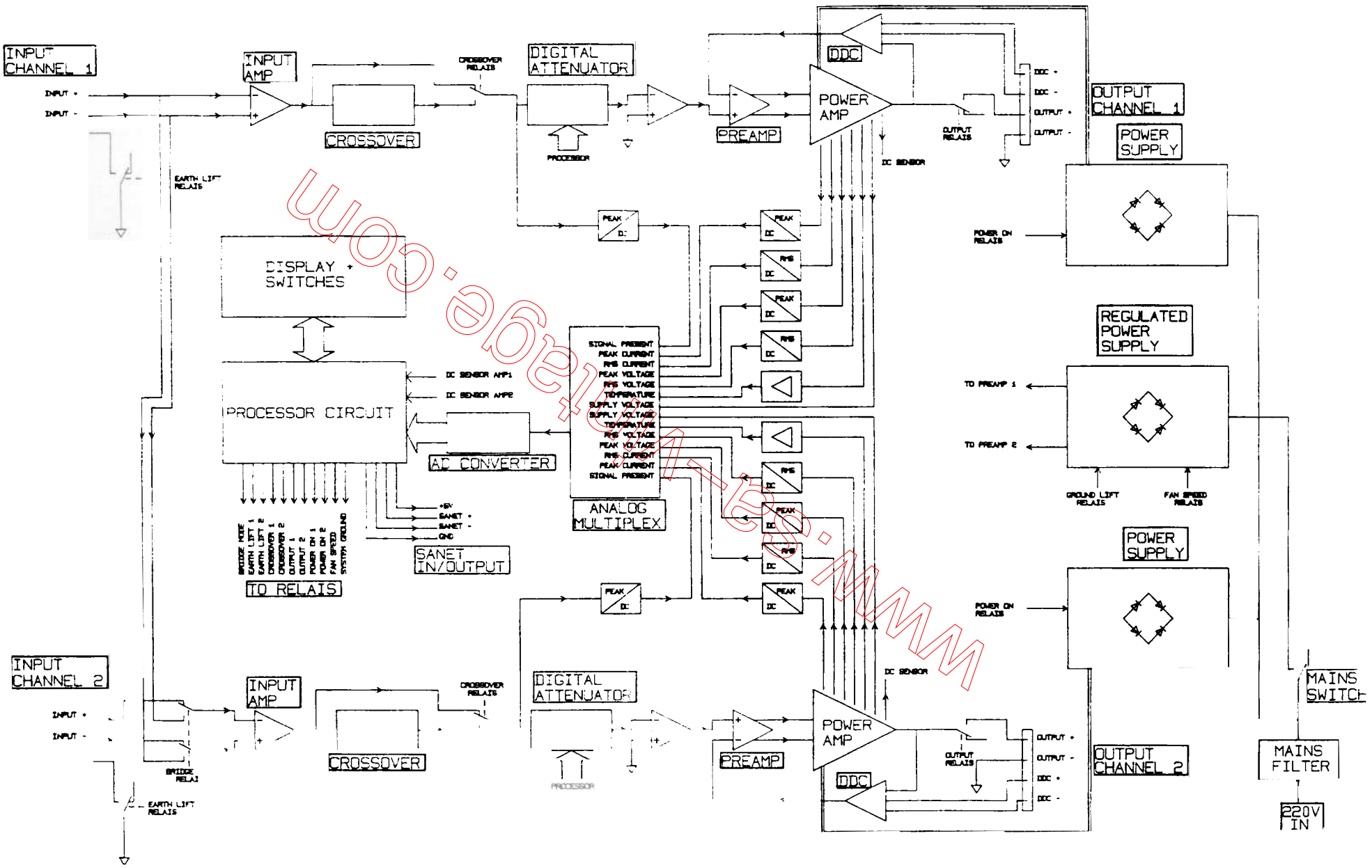
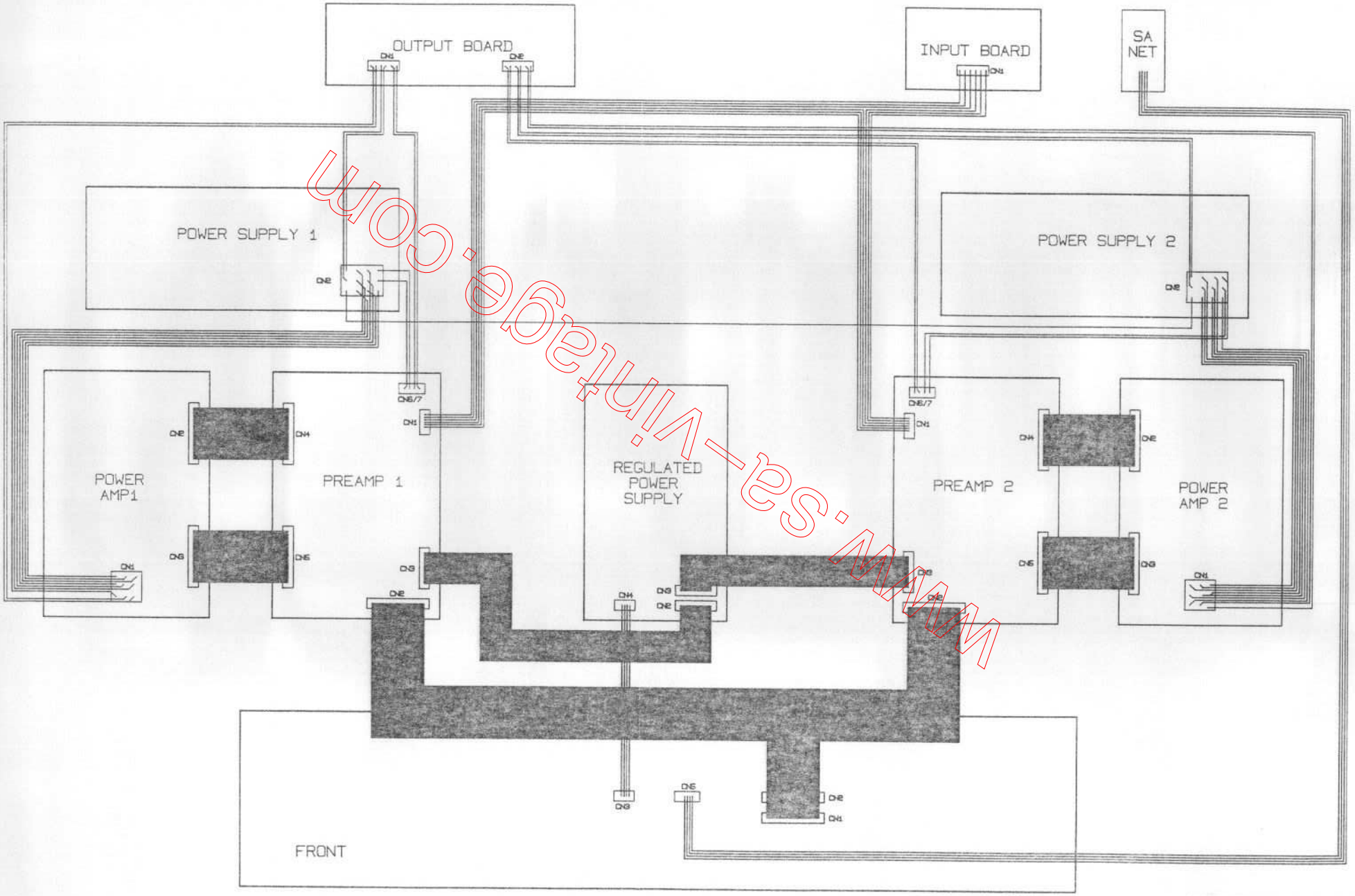


Fig 4 Set up for adjustments





STAGE ACCOMPANY
TITLE: FPA 1066 SIGNAL CONNECTIONS
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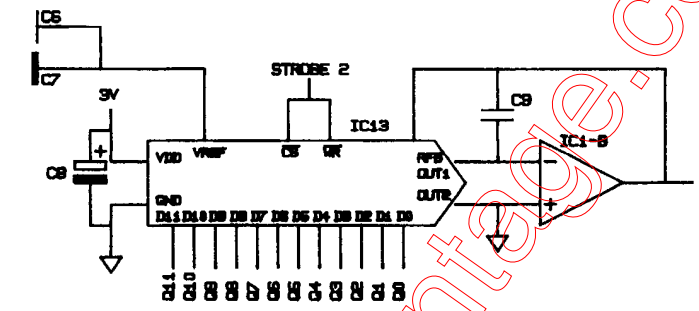
In a standard amplifier the low pass amplifier (channel 1) contains a high pass filter at 20 Hz and a low pass filter at 1 kHz.
The high pass amplifier contains a high pass filter at 1 kHz.
However, there are two dedicated versions of the PPA 1200 available to drive the SA4549 studiomonitor. Both the amplifiers only have one preset marked 4549 low and 4549 high.
The low version is equiped with a 100 Hz, 6 dB/oct low pass filter (channel 1 as well as channel 2) and the high version is a standard amplifier equiped with a special frequency correction for the 4549

The digital attenuator

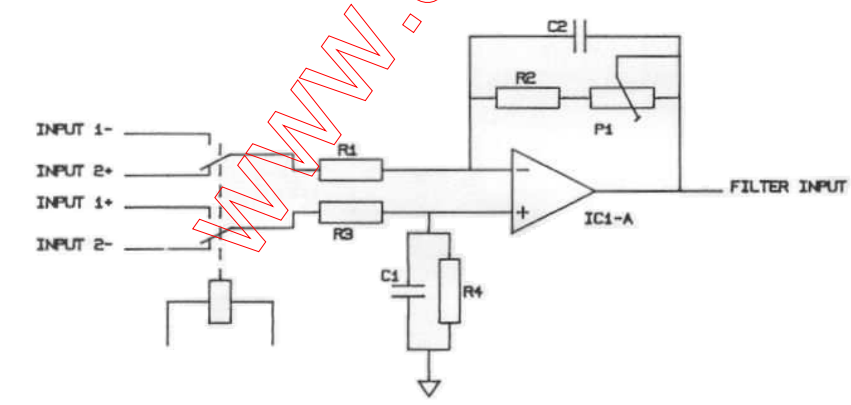
The digital attenuator (Fig 11) i and inputs a DA converter a



l attenuator

determines the level of attenuation. This level can be calculated with the formula

$$A = 20 * \log \frac{n}{}$$



peak value is stored into C15. This

The circuit a is nearly the
integrate output of IC4-
The outpu crossover circuit y situation is he ters can he peak converter
1 V outpu contains the in. pass channel 2
The curr the s

need normal rectifying. The two signals, current + and current - are substracted in IC7-a and the common mode voltage (that is the output voltage) is being removed. The ouput signal of IC7-a is a negative dc signal proportional to the ouput current.

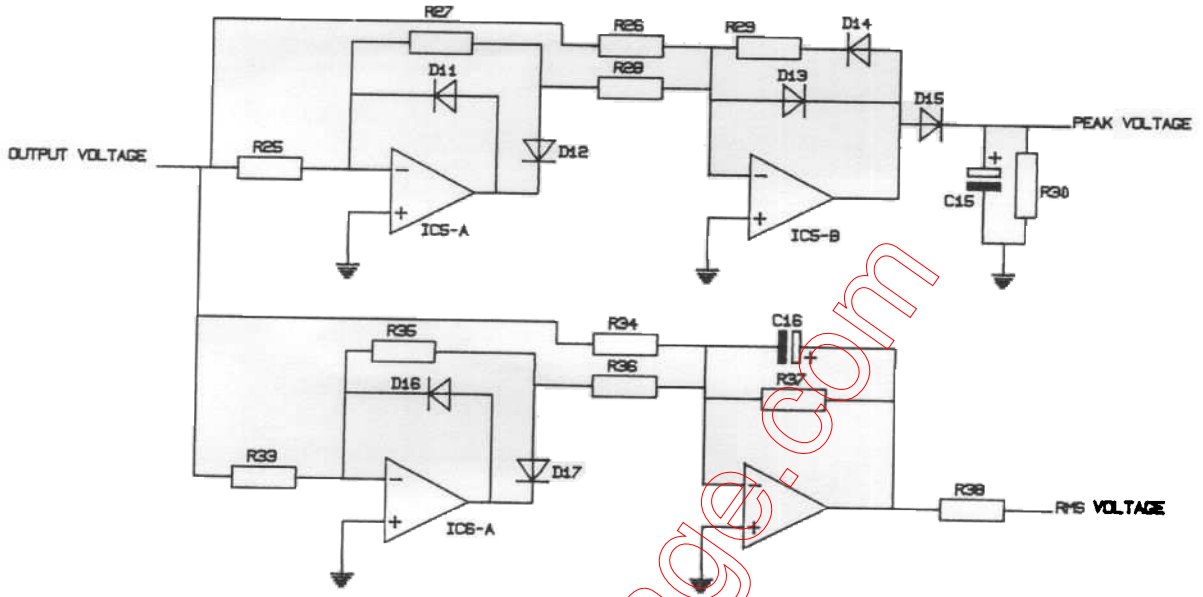


Fig 12 voltage converters

Fig 13 current converters

With trimmer P2 offsets caused by the amplifiers bias current and output offset can be trimmed out of the circuit.
The rest of the converter is dimensioned so that 5 A output current produces 1 V at both the converter outputs.

The DC detector

In fig 14 the DC detector is shown.
The amplifier output voltage is divided by R109 and R40 and integrated by the combination R109 / C17 / C18. The signal, which can be positive or negative, is fed to the window comparator IC10 / IC11. IC10 detects

positive and IC11 negative DC. One of the comparator outputs becomes 0 V when the DC sense level exceeds 3.2 V

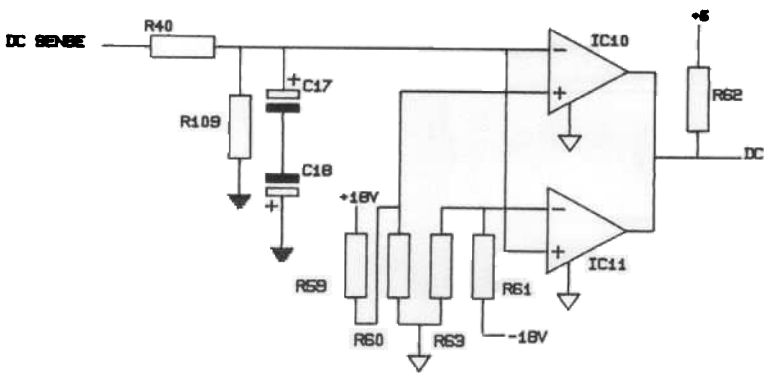


Fig 14 DC detector

The poweramp driver

The basic electronics of the poweramp driver are shown in figure 15. T9 forms a current source together with R74 and Z5. The collector current is ± 12 mA. This source provides drain current for the dual fet T4.
The input of the amplifier is connected to the gate of the left fet, the feedback network to the gate of the right one. In a steady situation both input and feedback voltages are 0V so both the gate-drain voltages are the same. The current of T9 will be equally divided over the two fets, so I1 = I2 = 6 mA.
I1 passes a current mirror composed with R75, D28 and T11.
I2 passes two current mirrors, one composed with D28, R76, and T10 and the other with T15 and T16.
In a steady situation I1 = I2 so all current pushed out of T11 is pulled into T16 and both the drive currents will be zero.
With a rising input voltage, I1 becomes larger than I2, and not all the current produced by T11 can be pulled into T16. The residual current will be pushed into the power amplifier as drive current.
With a negative input voltage, I2 is larger than I1 and drive current will be pulled out of the power amplifier.
The feedback network is shown in fig 16. The total feedback voltage is composed out of five different signals.
Low frequency feedback is provided by the DDC network. DDC+ represents the voltage at the loudspeaker positive terminal, DDC- the voltage at the negative terminal. These signals pass a differential amplifier and a low pass filter at 3500 Hz.
High frequency feedback is provided directly from the power amplifier's output through R111. This signal has already passed a high pass filter (3500 Hz) on the poweramp board.
DC stability is achieved with the DC servo circuit around IC2.
HF stability is provided by the feedback through C61.

R92 provides additional feedback which is only used when turning the poweramp on. At first, the amplifiers output relays are not activated so the DDC circuit can not be used for LF feedback. Feedback is then achieved through R92. When the output relays are activated, the DDC circuit provides feedback again and relay 4 will be activated, which disables the extra feedback.

5.2 The power amplifier board

Fig. 17 shows the basic setup of the power amplifier.

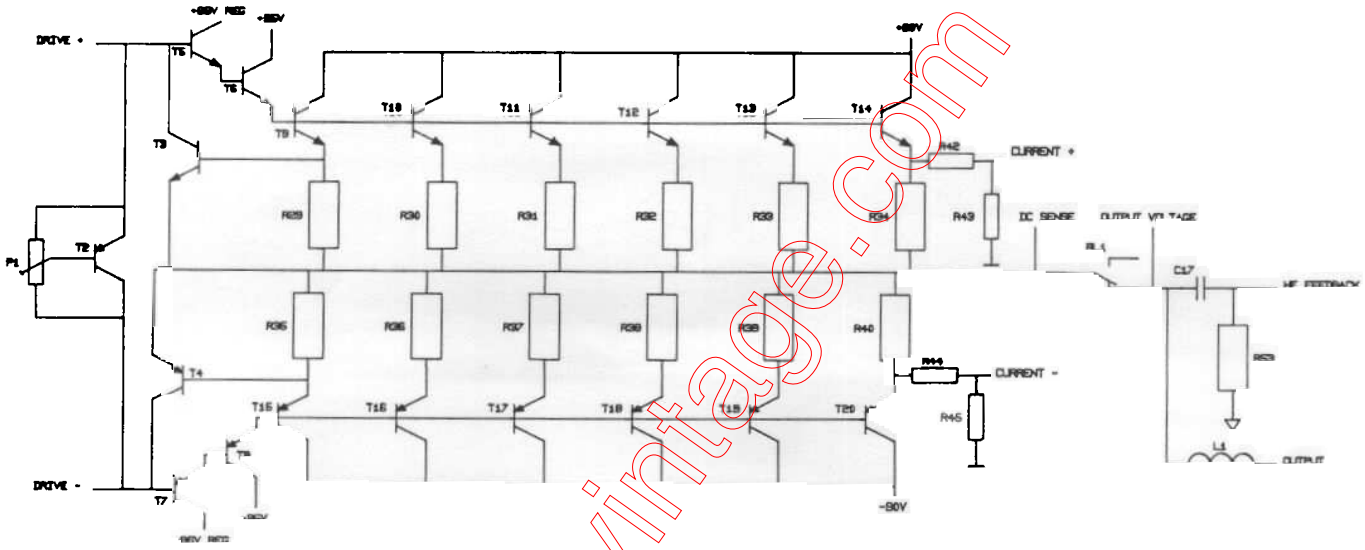


Fig 17 power amplifier

The driver circuit provides two signals, drive + and drive −. The positive drive current is boosted by T5 and T6 and fed to the NPN power transistors T9..T14. The negative drive current is boosted by T7 and T8 and fed to T15..T20.
T2 is set as a constant voltage source and provides the bias current for the amplifier.
Current limiting is handled by T3 and T4. When the current drawn from the amplifier rises, the voltage across R29 and R35 rises too. At the moment this voltage reaches ± 0.65 V, T3 and T4 start to conduct and limit the drive current for the power stage. Current limiting is depending on the output voltage. At 0 V output the maximum current is ± 6 A rising to ± 25 A at 50 V.
The voltage dividers R42/R43 and R44/R45 provide the signal for the current measurement. The voltages across R43 and R45 are proportional to the current drawn out of the amp.

5.3 The power supply board

Each power amplifier has its own unregulated power supply which delivers 4 different voltages.
Two high power 90 V voltages for the amplifiers power stage and two low power 95 V voltages for the drive transistors.
The high power voltages are rectified by a high power bridge which is for dissipation reasons not mounted on the pc board but on the amplifiers bottom panel. The energy is stored in two 10 mF / 100 V

capacitors.
The low power voltages are on board rectified and the capacitive filters are placed on top of the high power voltages.
All capacitors are discharged by resistors when the power has been switched off.
The power supply board also contains two relays that connect the mains voltage to the primary winding of the transformer.

5.4 The regulated power supply board

The regulated power supply provides 6 different low power voltages for both the two preamplifiers, all relays and the digital circuits.
First there are two 86 V voltages to feed the power amplifiers driver circuits.

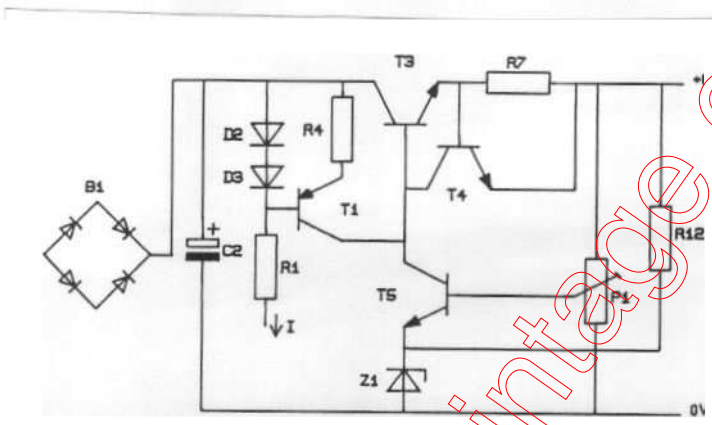


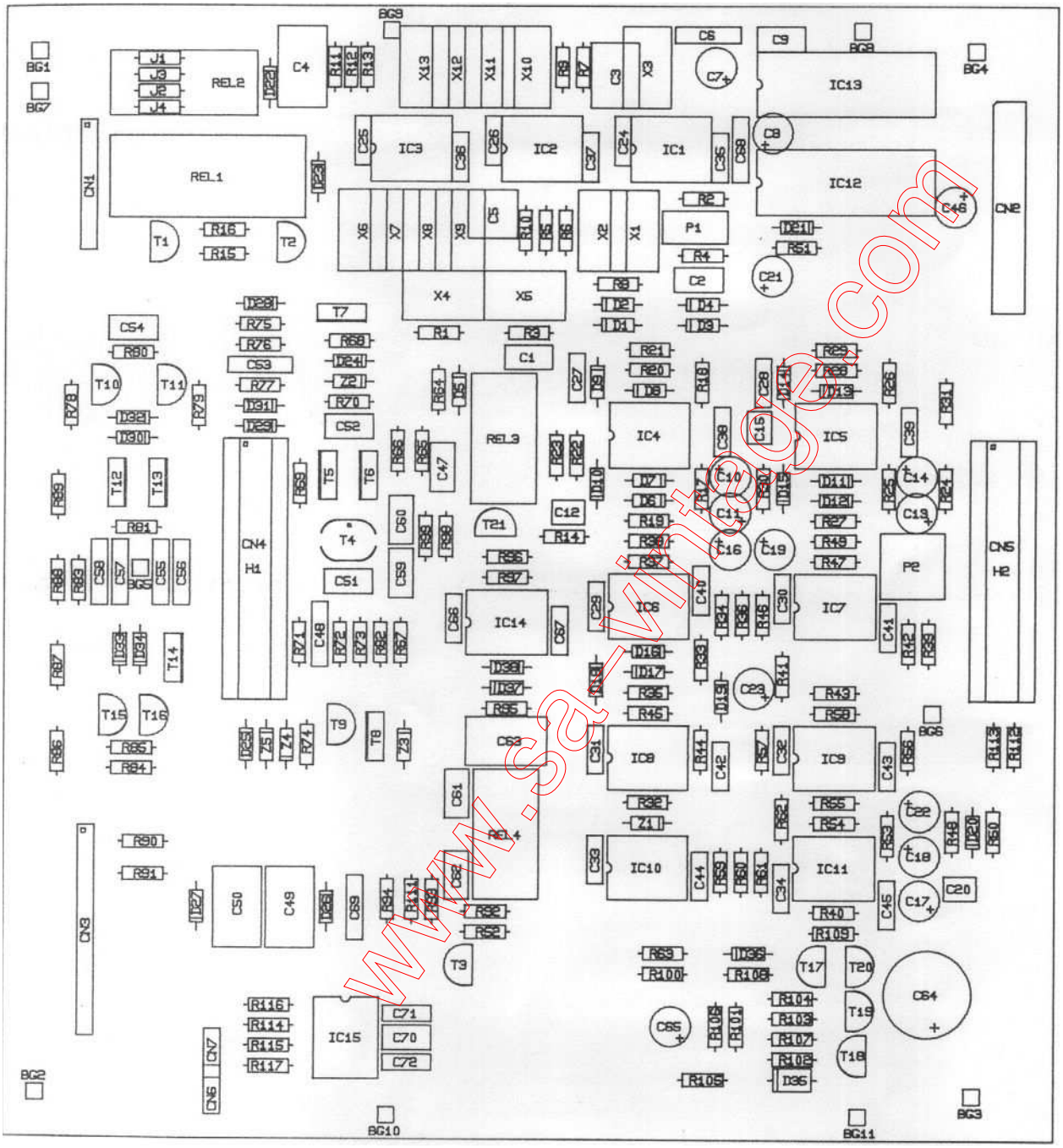
Fig 18 high voltage regulator

In this circuit (fig 18) T3 is the regulating transistor. Its base is fed by a current source build around T1, R4, D2 and D3. The base current is regulated by T5 which senses the output voltage through P1. With P1 the output voltage can be set. Current protection is arranged with T4. With increasing output current, the voltage drop across R7 increases too and T4 will start conducting and deflecting T3's base current.
The negative 86 V supply is build excactly the same.
The 18 V supplies are straightforward with two integrated circuits.
The 5 V digital supply is extended with transistor T11 to make larger currents possible. The unregulated voltage (10 V) is used as relay supply.
The board is also equiped with two relays, one to switch the fan to high speed (rel2) and another (rel1) to connect the amplifiers ground to chassis.

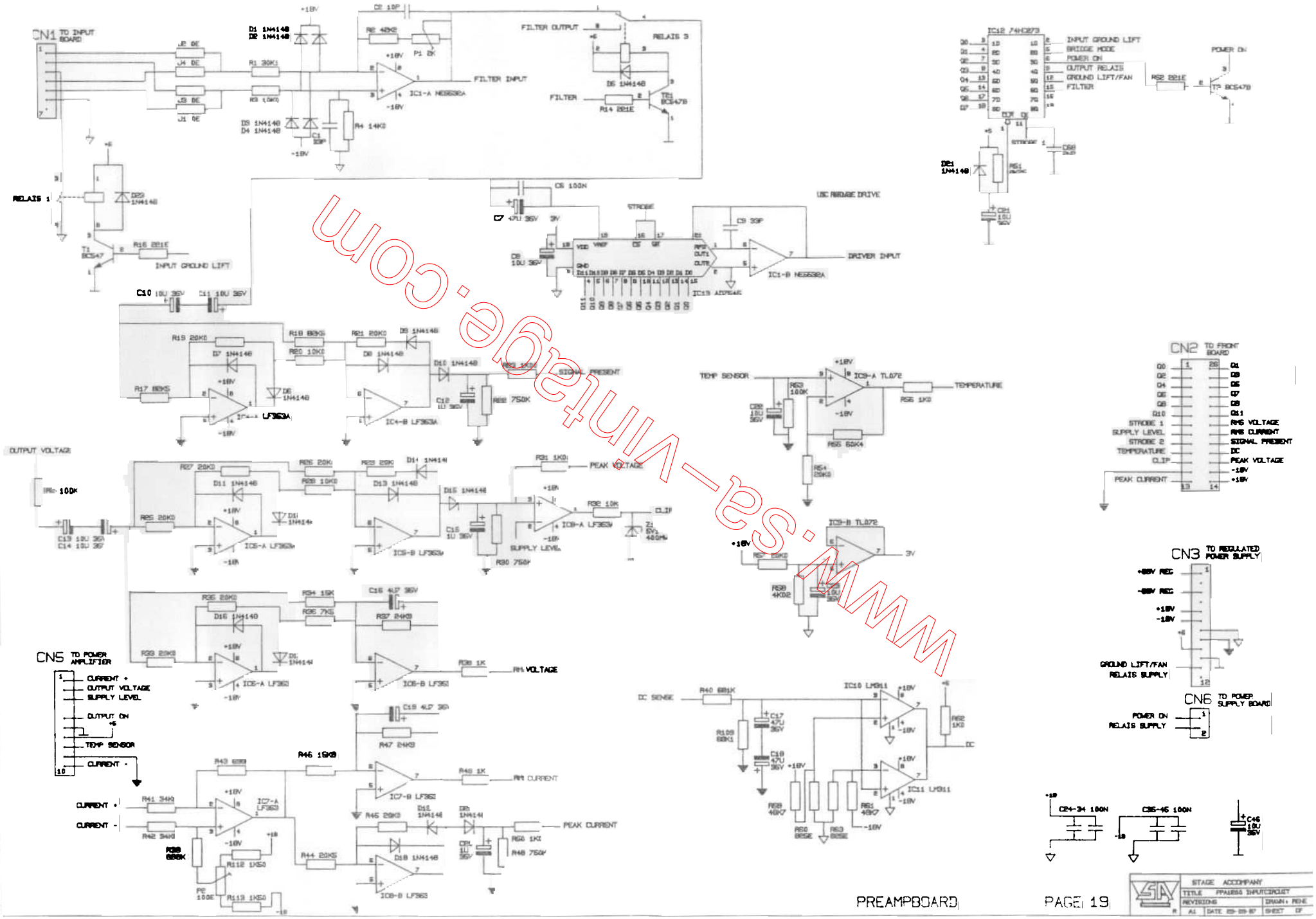
5.5 The front board

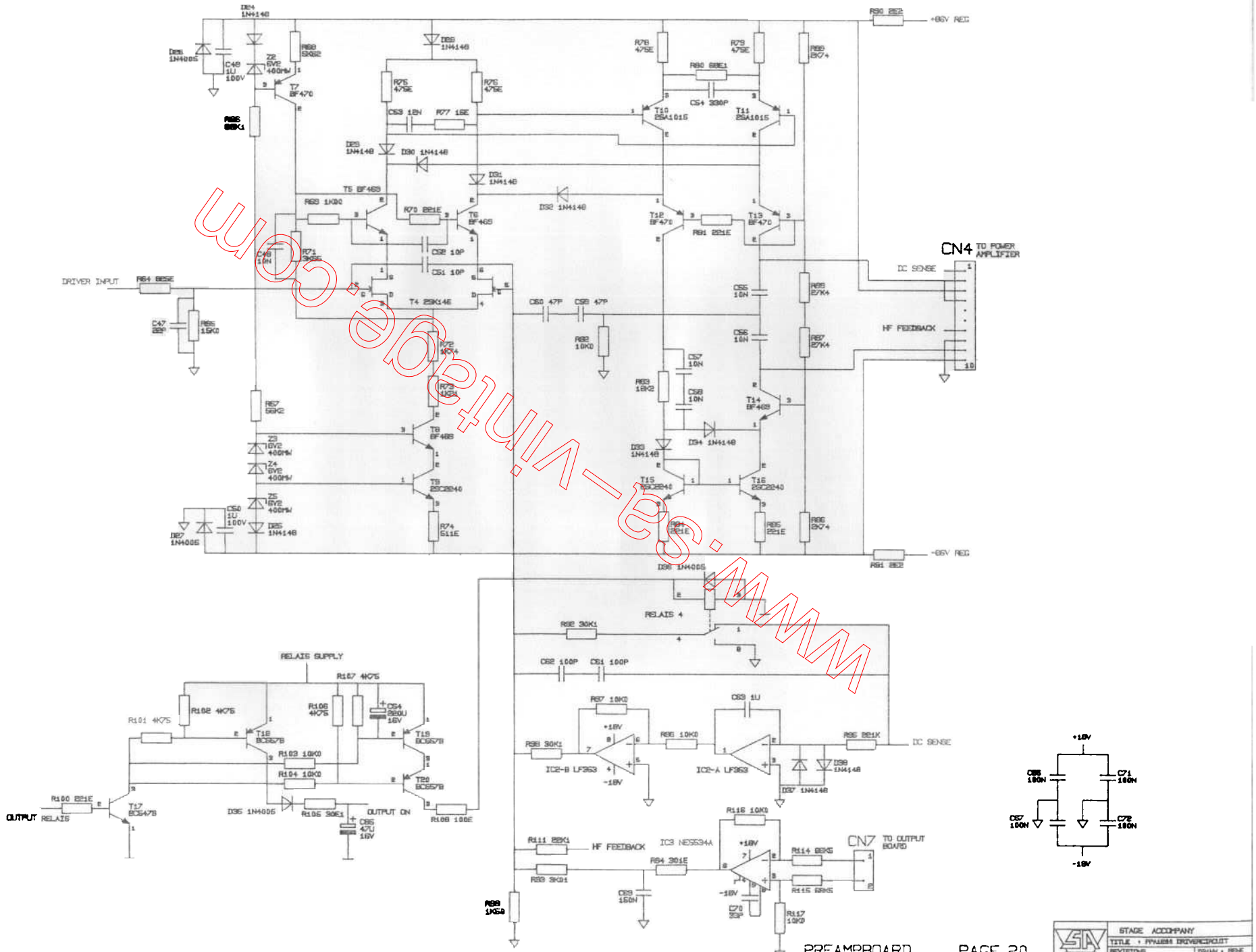
The front board contains the processor circuit, the displays the switches and the AD converter.

The processor circuit (see page 30) contains a microprocessor, decoding logic, power down protection, memory and the SAnet interface.
The processor has three different kinds of memory on board. IC3 is an EPROM which contains the software for starting the processor ,testing the other memories and downloading the system software.
IC36, an EEPROM, contains the system software and can be programmed on board without removing it.
IC4 is a RAM which contains program variables, e.g. the settings of the controls of the amplifier. This IC is provided with battery backup to save the settings when the mains power is switched off. The battery has an approximate life time of 10 years.
IC5 and IC6 are protection IC's to save memory contents when power is switched on and off.
IC7 is the SAnet transceiver which is the direct interface between SAnet and the processor.
The rest of the front board circuit is shown at page 29.
IC11..IC18 are the latches that drive the seven segment displays.
IC19..IC21 are the latches that drive the leds.
The latches IC23 and IC24 drive the digital IC's on the preamp boards. This Q(uiet)-bus is only activated when there is data available for the circuits on the preamp board. Other activities off the D(ata)-bus are blocked.
Any changes in the settings of the switches are passed to the D-bus by IC25 and IC26. IC31 passes the clip and DC information.
IC27 and IC28 are decoders that select the appropiate latch to accept data from the D-bus.
The AD converter is build around IC30, IC32, IC33 and IC34. IC30 is a multiplexer that selects the input signal. The signal is then passed to a buffer and comparator IC33 compares the input signal with the reference signal produced by DA converter IC34.



PAGE 18 PREAMP BOARD




DRIVER INPUT
CN4 TO POWER AMPLIFIER
DC SENSE
HF FEEDBACK
+85V REG
-85V REG
RELAIS 4
RELAIS SUPPLY
OUTPUT RELAIS
OUTPUT ON
IC2-B LF353
IC2-A LF353
IC3 NE5534A
CN7 TO OUTPUT BOARD
+18V
-18V
PREAMPBOARD
PAGE 20
STAGE ACCOMPANY
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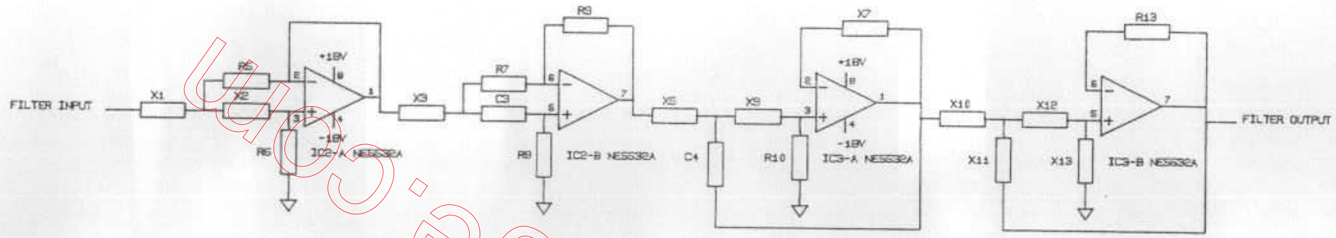

LOW PASS FILTER 1KHZ

COMPONENT	TYPE	VALUE
X1	C MKM	470N
R5	R	28K7
X2	C MKM	470N
X7	R	0E
R6	R	31K6
X3	C MKM	470N
R7	R	21K5
C3	C MKM	470N
R8	R	54K9
R9	R	0E
X5	R	15K4
C4	C FOIL	10N
X9	R	13K0
R10	C FOIL	10N
X10	R	21K5
X11	C FOIL	10N
X12	R	21K5
X13	C FOIL	3N9
R13	R	0E

HIGH PASS FILTER 1KHZ

COMPONENT	TYPE	VALUE
X1	R	0E
R5	/	/
X2	R	0E
X7	R	0E
R6	/	/
X3	R	0E
R7	R	10K0
C3	/	/
R8	/	0E
R9	R	10K0
X5	C FOIL	10N
C4	R	16K5
X9	C FOIL	10N
R10	R	17K8
X10	C FOIL	10N
X11	R	12K1
X12	C FOIL	10N
X13	R	30K1
R13	R	0E

SA 4549 SUB LOW

COMPONENT	TYPE	VALUE
X1	C MKM	470N
R5	R	28K7
X2	C MKM	470N
X7	R	0E
R6	R	31K6
X3	C MKM	470N
R7	R	21K5
C3	C MKM	470N
R8	R	54K9
R9	R	0E
X5	R	0E
C4		
X9	R	0E
R10		
X10	R	0E
X11		
X12	R	16K2
X13	C MKM	150N
R13	R	0E

SA4549 HIGH PASS

COMPONENT	TYPE	VALUE
X1	R	0E
R5	/	/
X2	R + C FOIL	10K0 + 4N7
X7	R	0E
R6	R	10K0
X3	R	0E
R7	R	10K
C3	/	/
R8	/	0E
R9	R	10K0
X5	C FOIL	10N
C4	R	16K5
X9	C FOIL	10N
R10	R	17K8
X10	C FOIL	10N
X11	R	12K1
X12	C FOIL	10N
X13	R	30K1
R13	R	0E

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REVISIONS : MOD 1 | DRAWN : RENE
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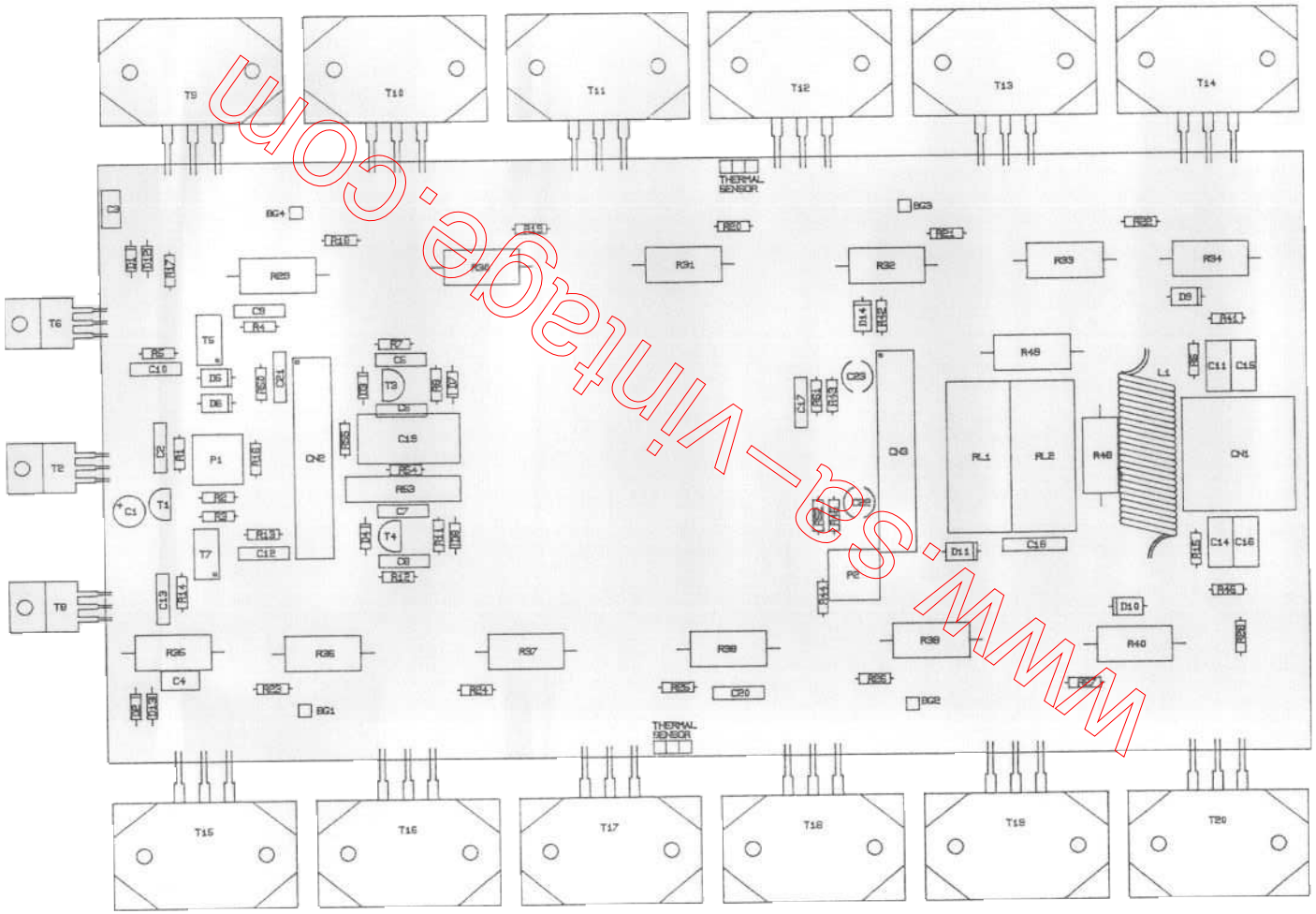
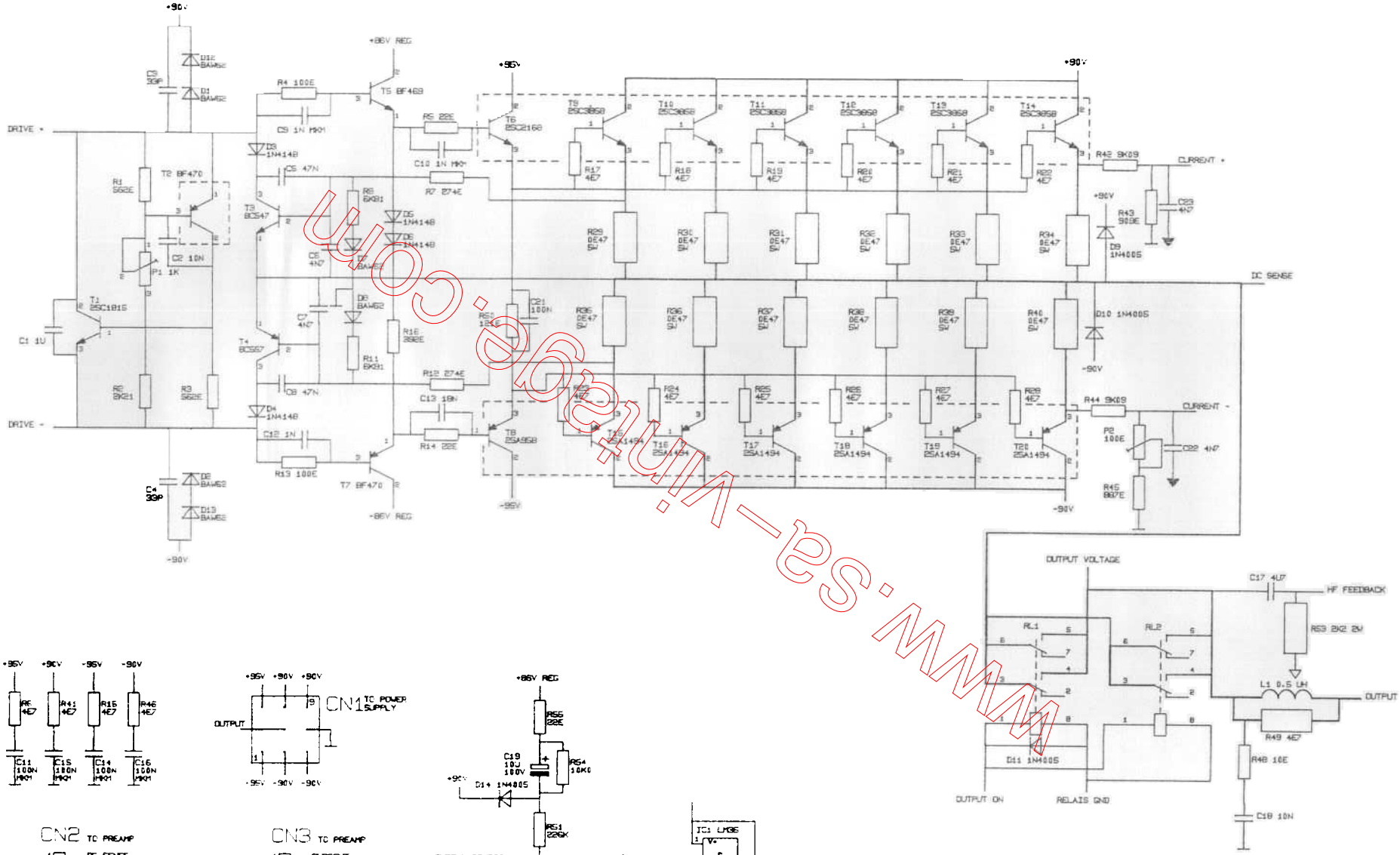


PAGE 22 POWERAMP BOARD



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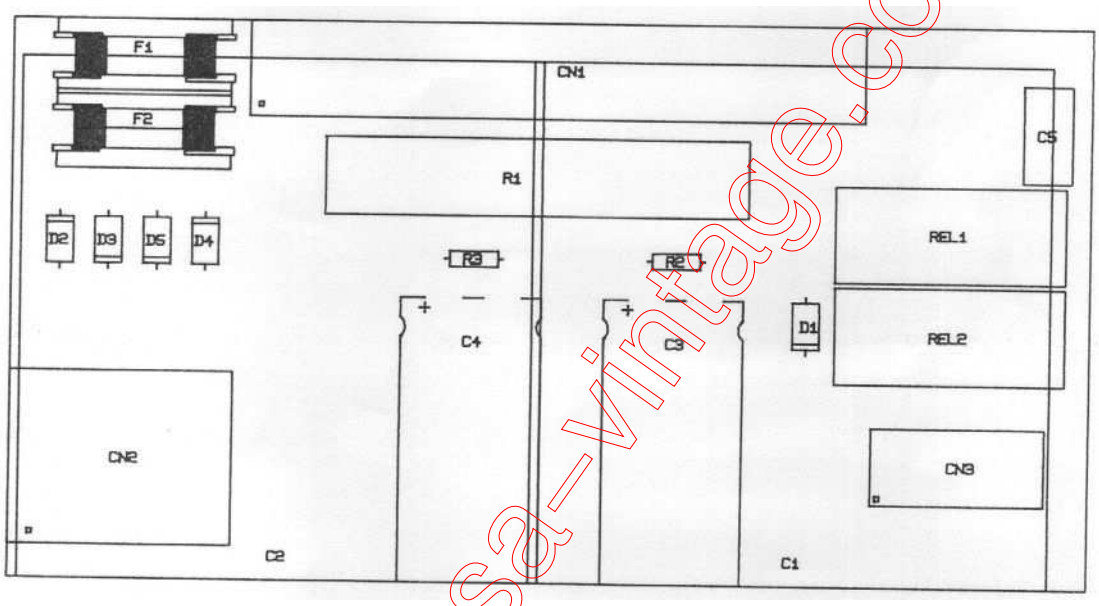
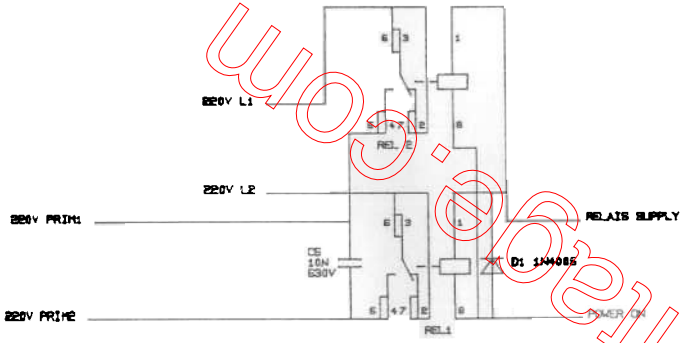
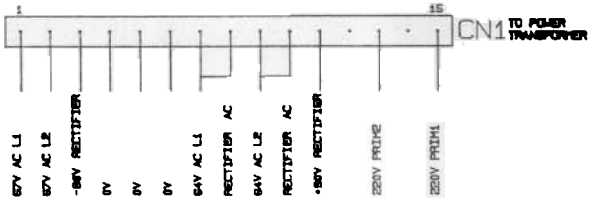
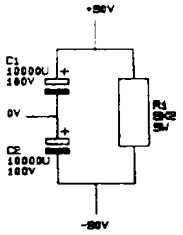
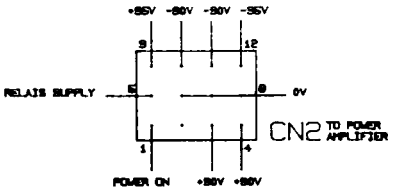


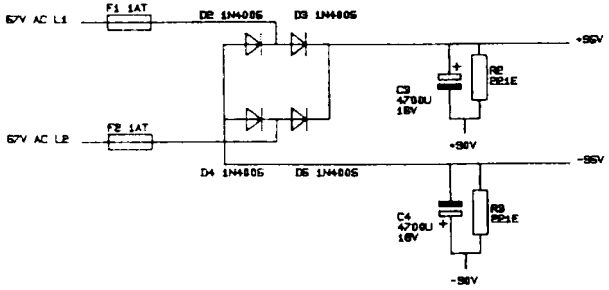
PAGE 24 POWER SUPPLY BOARD

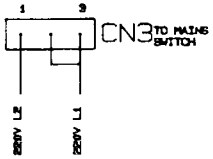












POWER SUPPLY BOARD

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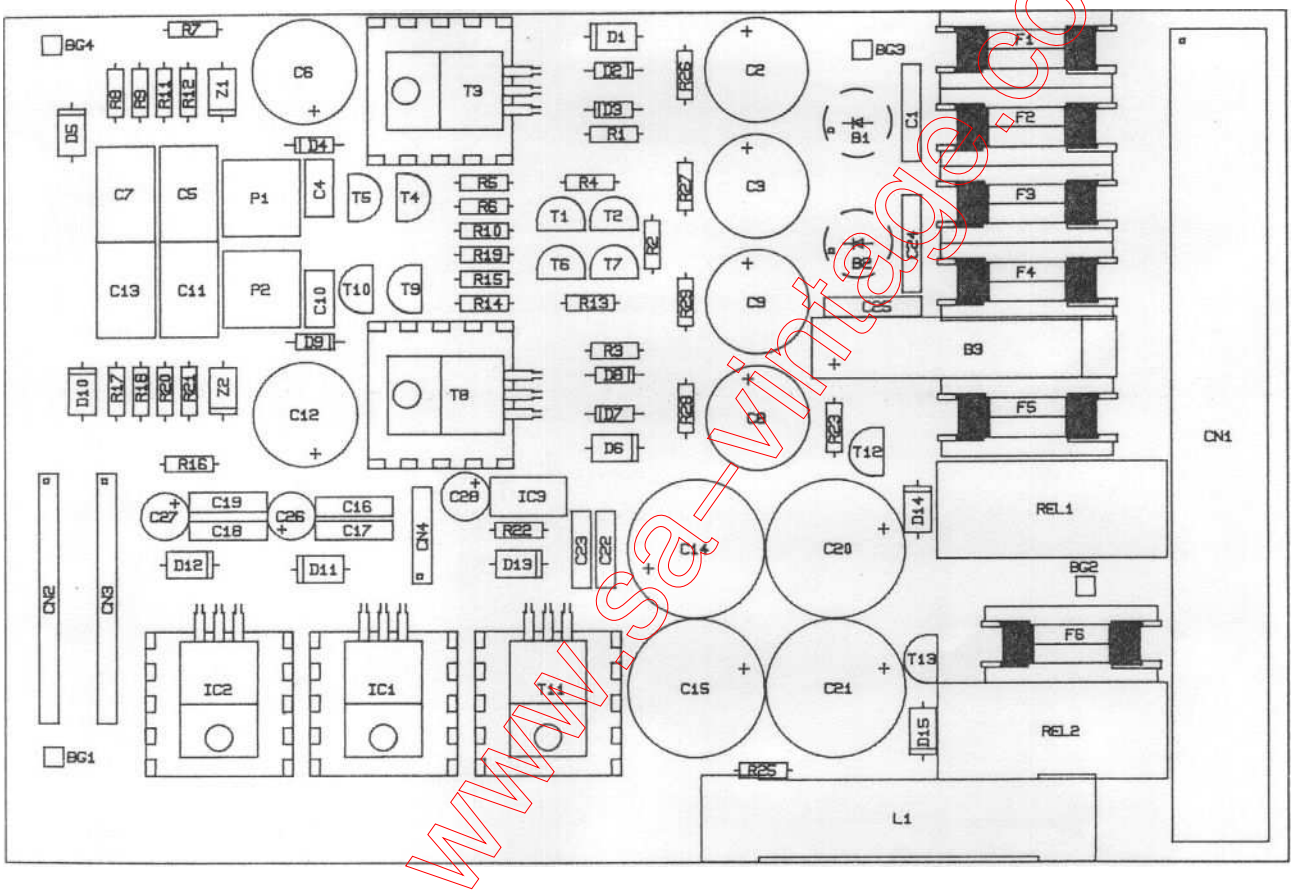
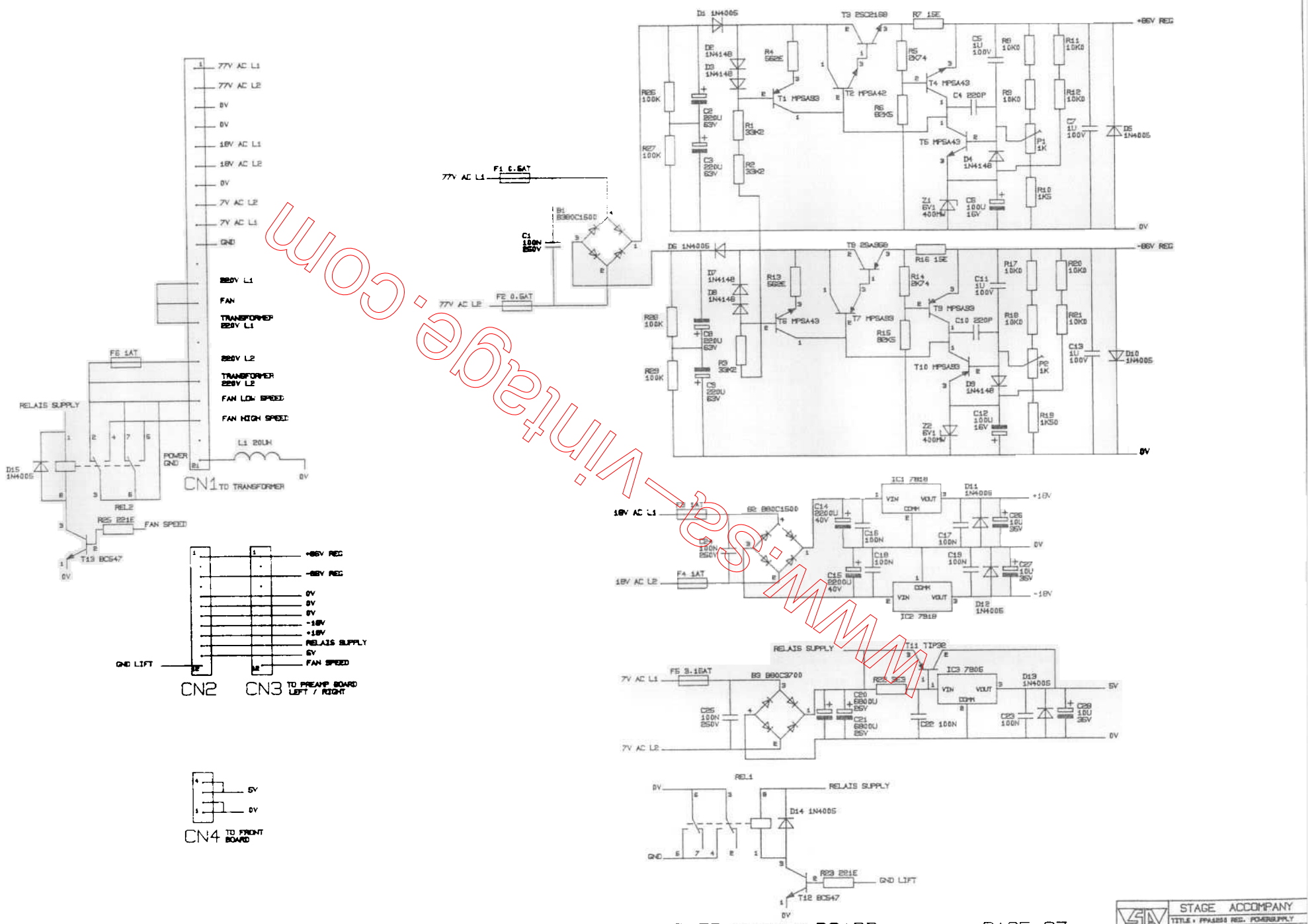
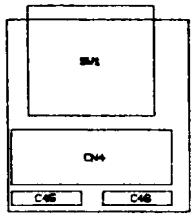


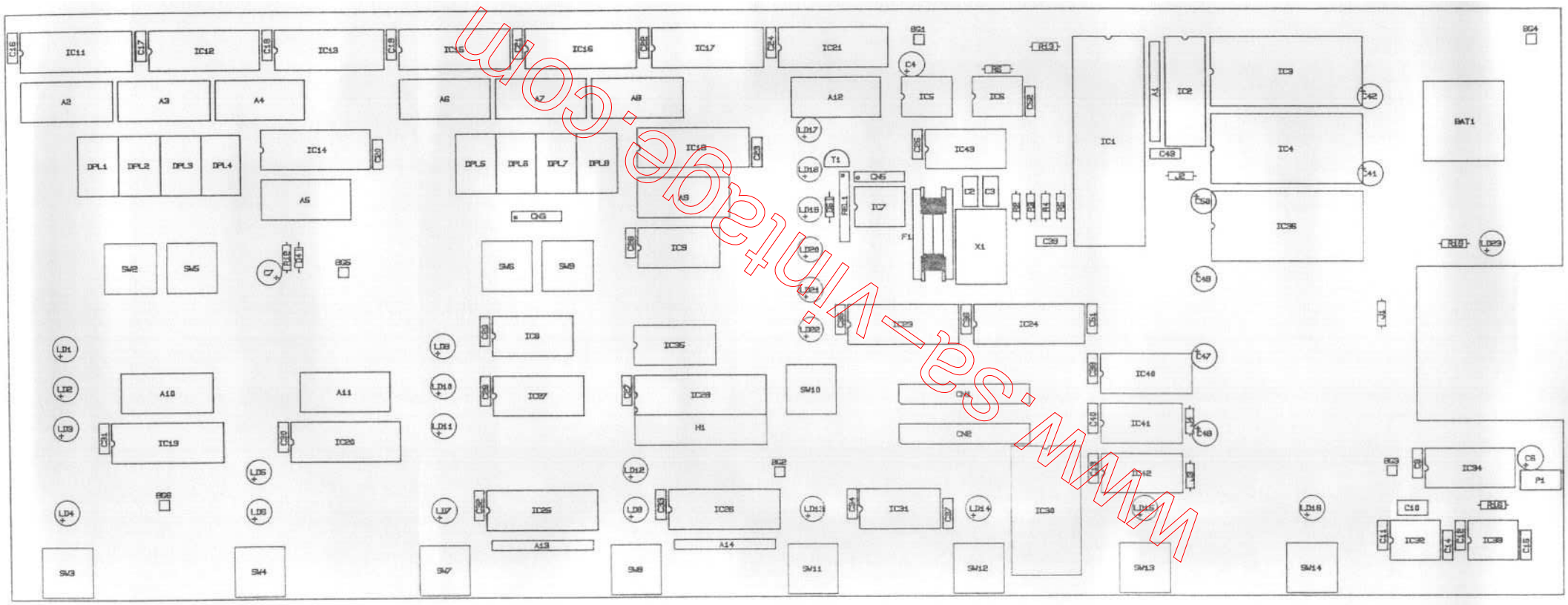
PAGE 26 REGULATED POWER SUPPLY BOARD



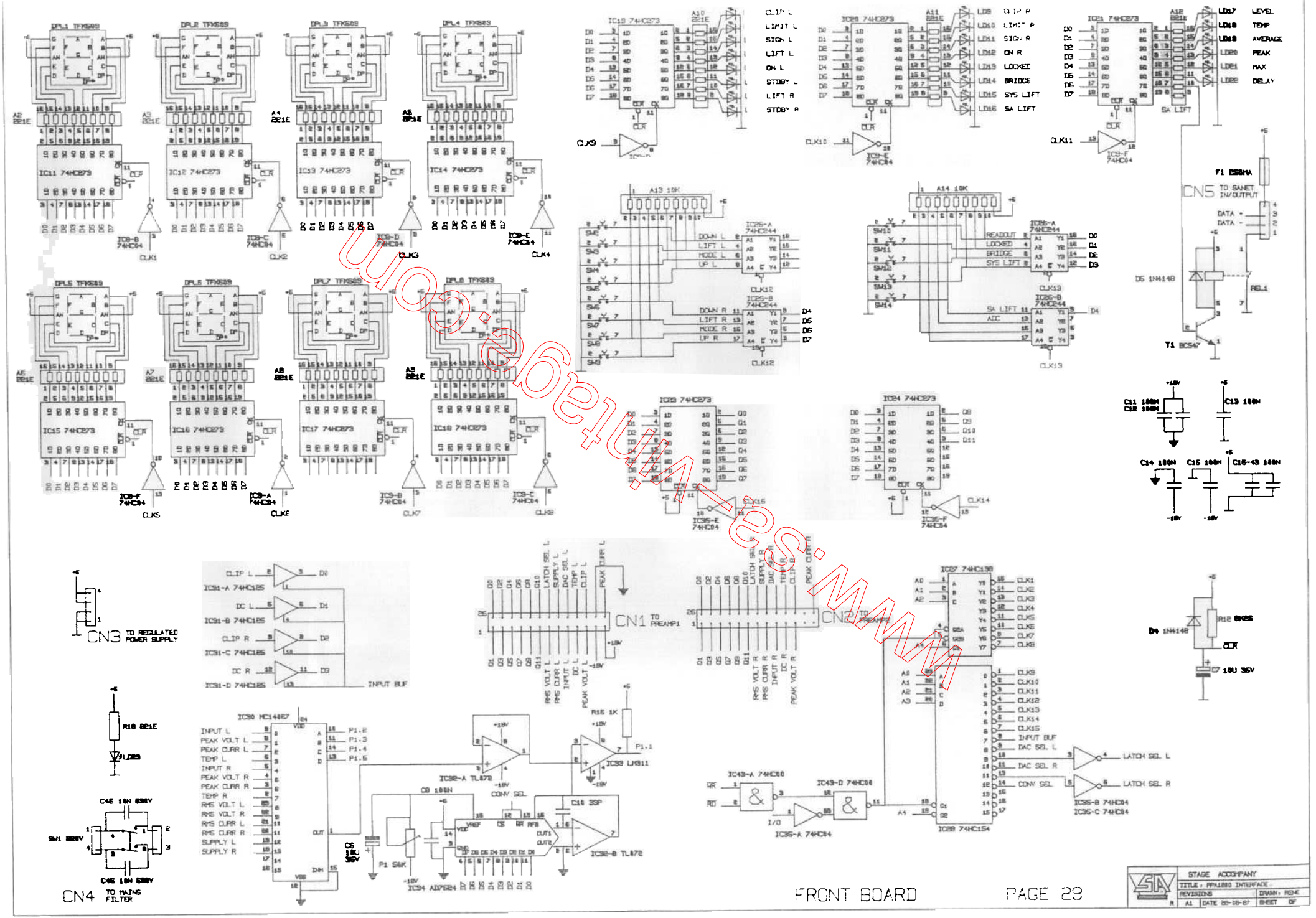
REGULATED POWER SUPPLY BOARD

STAGE ACCOMPANY
TITLE : PPA1858 REG. POWERSUPPLY
REVISIONS
A1 DATE 88-06-87
DRAWN : RENE
SHEET OF



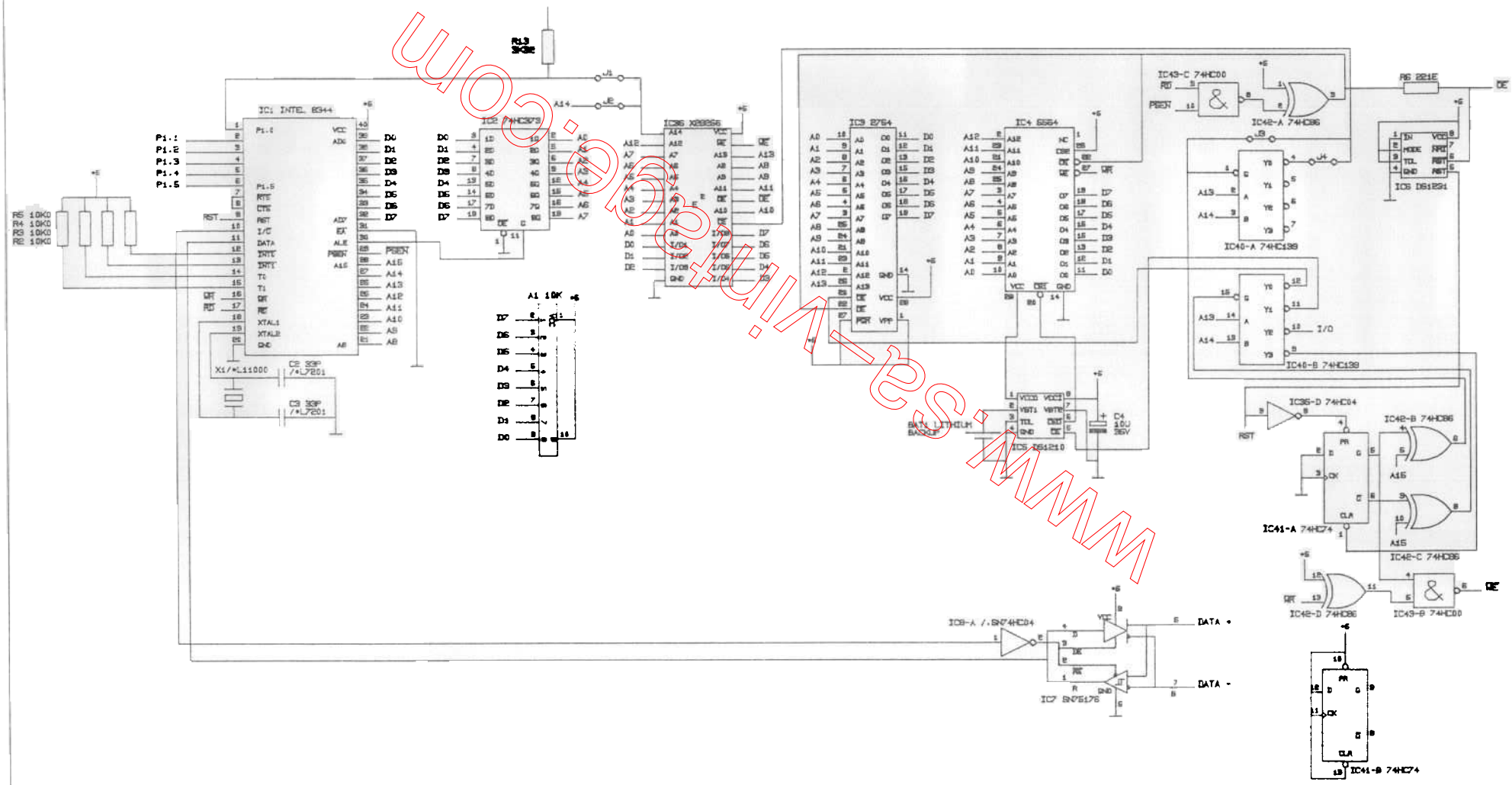


PAGE 28 FRONT BOARD



FRONT BOARD PAGE 29

STAGE ACCOMPANY		
TITLE: PPA1200 INTERFACE		
REVISIONS		DRAWN: RENE
R	A1	DATE 30-06-07 SHEET OF



FRONT BOARD PAGE 30

STAGE ACCOMPANY
TITLE : PPA1800 CONTROLLER
REVISIONS DRAWN : RENE
A1 DATE 02-08-07 SHEET OF

7 Basic operation of the software

Power turn on

First the regulated power supply is turned on. The processor circuit starts and checks the contents of the EEPROM memory.
If the data is not ok, BOOT E is diplayed and all actions stop.
If the data is ok, the last settings of the amplifier before it was turned off are restored.

Power turn on with the SAnet ground and system ground buttons depressed simultaneously

The regulated power supply is turned on and the processor starts. BOOT P is displayed and the readout select leds are sequentially lit. The processor waits until data is offered at the SAnet interface. After downloading the software, the amplifier resets (see also chapter 8).

Power turn with the channel 1 down button depressed

The installed software version number is displayed in the channel 1 display.
Return to normal use by turning the amplifier off and on again.

Power turn on with the channel 1 up button depressed

The identity code of the amplifier is shown in the channel 2 display.
Return to normal use by turning the amplifier off and on again.

******* The next actions are always during normal use ! *******

The SAnet ground button

Led 16 is on, both pins 1 of the SAnet connectors are disconnected from the amplifiers internal ground by relay 1 on the front board. Pushing the button again reverses this procedure.

The system ground button

Led 15 is on, the amplifiers internal ground is disconnected from the chassis and the mains ground by relay 1 on the regulated power supply board.
Pushing the button again reverses this procedure.

The lock button

By pushing the lock button, a lock code can be entered by means of the up/down buttons. After entering the desired code, system lock must be depressed again for definitely locking the amplifier and led 13 will then be lit.
Locking means the amplifier functions normally but no setting can be changed.
The processor ignores all buttons, except for two. Readout select can still be used to monitor a desired function and the lock button can be used to unlock the PPA 1200.
Unlocking is the reversed procedure, press lock, enter the right lock

code and press lock again. When the wrong code is entered, the amplifier remains locked and a new code can be entered.

The input ground buttons

Led 4 lights for channel 1, led 7 for channel 2. The amplifiers analog ground is disconnected from pin 1 of the channels input connector. Pushing the button again reverses this procedure.

The channel mode buttons

Led 5 lights for channel 1, led 12 for channel 2. IC13 (preamp board) mutes the input signal completely. Relay 1 and 2 are activated on the power supply board. After ± 3 seconds first relay 1 and 2 on the poweramp board are activated and shortly afterwards DDC relay 4 on the preamp board. IC13 (preamp board) restores the input signal slowly to its previous level.
Pushing channel mode when the power amp is on causes all relays to be released immedeately and IC13 (preamp board) mutes the input signal.

The readout select button

This buttons changes the information source for the displays of channel 1 and 2.
When led 17 (level) is lit, the displays read the input attenuation in dB. Off means the input attenuation is infinite. The input level can only be changed when this mode is selected, except for the immedeate mute function. Input attenuation is performed by IC13 on the preamp board.
When led 18 (temperature) is lit, the displays show the output devices temperature in degrees Celsius.
When led 19 (average power) is lit, the displays show the average power output delivered to the load. This power is the signal produced by the RMS output voltage converter multiplied with the signal of the RMS output current converter.
When led 20 (peak power) is lit, the displays show the peak power output delivered to the load. This power is a multiplication of peak ouput voltage and peak output current.
Led 21 (maximum power) indicates that the displays show the level at which the amplifier starts reducing its output power. The PPA 1200 measures the average output power and compares it with the selected level. When the measured level is higher than the selected level, the processor increases the input attenuation (IC13, preamp board) proportionally.
In case a preset for a Stage Accompany loudspeaker enclosure is chosen, the maximum power level is internally set. In this case the average output voltage is compared with the factory programmed level and reduced if necessary. This way, it is not necessary to select a new preset when more speaker enclosures are used parallel. Voltage conditions remain the same when using speakers parallel, only the current increases.
When led 22 (power amp on delay) is lit, the displays show the time after which the power amp turns on after the mains switch is turned on.

The up and down buttons

when level is selected at readout select:
down increases the input attenuation, up reduces it. The attenuation changes in steps of 1 dB from 0 dB to -59 dB and below -59 dB the last step is off which means complete attenuation. The input signal can be immedeately muted by pushing the up and down buttons simultaneously.

-when temperature, average or peak power is selected at readout select:
Depressing either the up or down button changes the readout select immedeately to level.

-when maximum power is selected at readout select:
Pushing the up button increases the maximum allowed average power to a maximum of 900 W, the down button reduces the power to a minimum of 30 W. The level can be set in steps of 10 W. When pushing the channel 1 down button at 30 W maximum power, the preset for Stage Accompany enclosures are selected. Relay 2 on the channel 2 preamp board and relay 3 on both the preamp boards are activated. This means that only the channel 1 input connector is active and used for both the channels and that a SA preset is always used for biamping an enclosure.
There is one exception, namely the PPA 1200's equiped with only the SA4549 low preset. Here relay 2 on the channel 2 preamp board is not activated and both the inputs have to be used.

-when power amp on delay is selected at readout select:
The down button reduces the time between power on and power amp on and the up button increases it. Minimum is 2.0 seconds, maximum is 99.9 seconds. The time can be set in steps 0.1 seconds.

-when the lock button is activated:
A lock code can be selected by means of the up/down buttons between 1 and 999.

The bridge mode button

The bridge mode button must be depressed for at least 1 second before any action takes place. The bridge mode button does not work in the preset mode.
After that, led 14 will be lit. Both amplifiers will be set stand by if they were on and all channel 2 controls and displays become inactive. The input attenuator is muted. Relay 2 is activated on the channel 2 preamp board and the channel 1 input is the bridge mode input. All control and display is done in the channel 1 section.
Pushing the channel mode button causes both amplifiers to turn on with a 1s interval.
The input level shown in the channel 1 display is the level for both the channels.
When temperature is chosen at display select the temperature of the hottest output devices is displayed.
All displayed powers (average and peak) are the total powers delivered by the amplifier, so the power output of each channel is summed by the microprocessor and shown in the channel 1 display.
The maximum power range is increased to 1800 W.

Clipping of the output signal

Clipping is detected by the processor by comparing the peak output

voltage with the supply level. After detection, the input is attenuated at the input attenuator (IC13, preampboard).
This protection can be disabled by pushing the channel 1 input ground and the readout select buttons simultaneously while turning the amplifier on. The protection is automatically re-enabled by turning the amplifier off and on again.

In case the output power exceeds the maximum power

Output power is measured by multiplying the average output voltage with the average output current. When this power exceeds the programmed maximum power, the input signal will be proportionally reduced by the input attenuator.
This protection can be disabled by pushing the channel 2 input ground and the readout select buttons simultaneously while turning the amplifier on. The protection is automatically re-enabled by turning the amplifier off and on again.

In case the temperature reaches 50°C

When the temperature of the output devices of a channel reaches 50°C or more, relay 2 on the regulated powersupply board will be activated and the fan starts running at high speed. Low fan speed is restored when both temperatures have dropped under 45°C.
For the studio version of the PPA 1200 these temperatures are raised to 70°C and 65°C to minimise noise.

In case the temperature reaches 85°C

At a temperature of 85°C, the input signal of the corresponding channel will be muted by the input attenuator. The display will read the text 'ht'. The power amplifier however remains on. Input level is restored when the temperature drops under 80°C.

In case the temperature reaches 90°C

At 90°C, the power amp is set to stand by. The input was already muted at 85°C. The power amp turns on again at 80°C and the input level is restored to its previous level.

DC detection at the amplifiers output

When DC has been detected, the output breakers RL1 and RL2 on the power amp board and the DDC relay 4 on the preamp board are released immedeately. The input level is muted and the poweramp is turned off after 3 seconds. The display reads the text 'dc'.
The amplifier can be activated again by pushing the channel mode button but this will result in 99% of the cases in another dc message. DC is nearly always caused by an internal fault.

Detection of a blown fuse

A blown fuse is detected through the power supply. When the situation 'power amp on' and supply voltage < 5 V occurs, the message 'Fb' is diplayed. Note that this warning can also implicate that the fuse is ok, but the power supply has broken down or a wire is interrupted.

8 Downloading of the software

Downloading of the software can be necessary in three cases:

- when the EEPROM or Flash EPROM has broken down and been replaced.
- when a new software version has been released.
- when you want to change the PPA 1200 into a different version.

When the EEPROM or Flash EPROM has broken down, Stage Accompany can supply you with a programmed or an empty replacement. In the first case, a software download is not necessary.
A new version can contain corrections or improvements of a previous version but also new features that were not possible before.
To change the PPA into a different version, the software as well the filter PCB has to be changed!

For a software download you need:

- An IBM or IBM compatible personal computer fitted with a SAnet interface card.
- Two files called PROGDEV.EXE and PPAx_x.DPF

PROGDEV.EXE is the program that contains the software for the communication between PC and EEPROM (or Flash) and PPAx_x.DPF contains the actual software for the PPA 1200. x_x tells you which software version this program contains. So PPA2_4.DPF contains software version 2.4.

The downloading contains the following procedure:

* Go to the directory in which the program PROGDEV.EXE is located.
* Make the connection between the PC and the PPA 1200's SAnet connector.
* Turn the amplifier off and turn it on again while pushing the SAnet and system ground lift buttons simultaneously. Now the display will read "BOOT P" and the readout select leds will start to flicker.
* Press "PROGDEV" followed by a "[carriage return]" ("[Enter]").
* Follow the instructions of the PROGDEV user manual.
* When the program is being loaded into the PPA 1200, the message "Boot P" changes into "Boot E" and the leds that normally indicate the readout selection will now flicker at a lower speed.
  When the downloading has finished, the amplifier's displays start flashing as an indication that the downloading has been succesfull. Turn the PPA off and on again and it is ready for use.

At the moment of this issue, four different software versions for the PPA 1200 are available:

- V 2.4 This is the standard version featuring the presets for the Champion, Leader en Master series enclosures, except the 4549 master studio monitor.
- V 10.4 This is the version for the low end of the master 4549 enclosure, featuring 100 Hz / 6 dB oct. filters. The

amplifier operates in the preset mode in stereo. Channel 1 is the low end amplifier for the left enclosure and channel 2 is the low end amplifier for the right enclosure.

- V 11.4 This is the version for the midrange and high end of the master 4549 enclosure featuring 1 kHz / 24dB oct. filters with special horn correction for the high pass amplifier.
- V 12.4 This version is for sublow application of the 4528 in combination with Blue Boxes. Crossover frequency is 100 Hz with 12dB / oct. slope. In preset mode, this PPA 1200 also works in stereo mode, so both channels have individual inputs.

9 Adjustments

After repair, all adjustable signals should be checked and re-adjusted if necessary.

1 AD converter reference voltage

input voltage:	0
output load:	open
adjustment location:	P1 on the front board
instrument:	DC volt meter
measure location + :	IC34 pin 15
measure location - :	IC34 pin 3
value:	-5.12 V ± 0.05 V

2 +86 V supply

input voltage:	0
output load:	open
adjustment location:	P1 on the regulated supply board
instrument:	DC volt meter
measure location + :	CN3 1 on a preamp board
measure location - :	CN3 7 on a preamp board
value:	86 V DC ± 1 V

3 -86 V supply

input voltage:	0
output load:	open
adjustment location:	P2 on the regulated supply board
instrument:	DC volt meter
measure location + :	R91 at the side of CN3 on a preamp board
measure location - :	CN3 7 on a preamp board
value:	-86 V DC ± 1 V

4 Bias current channel 1

input voltage:	0
output load:	open
adjustment location:	P1 on the power amp board
instrument:	DC volt meter
measure location + :	T9 pin 3
measure location - :	T15 pin 3
value:	0.03 V ± 0.005 V at 40 °C

5 Bias current channel 2

same as channel 1

6 Common mode rejection channel 1

input voltage:	1 Veff, 400 Hz on pin 2 and pin 3 in phase
output load:	8Ω
adjustment location:	P1 on the preamp board
instrument:	AC volt meter or scope
measure location + :	amplifier output +
measure location − :	amplifier output −
value:	≤ 0.015 Veff

7 Common mode rejection channel 2

same as channel 1

8 Output power calibration channel 1

output voltage:	40 Veff, 400 Hz, output device temperature 40 °C ± 1 °C
output load:	open
adjustment location:	P2 on the poweramp board
instrument:	scope
measure location + :	IC7-a (preamp board) pin 1
measure location − :	CN3 pin 8
value:	tune for minimum AC voltage until only a noise signal of ± 20 mV pk-pk is left.
output voltage:	40 Veff, 400 Hz, output device temperature 40 °C ± 1 °C
output load:	open
adjustment location:	P2 on the preamp board
instrument:	PPA 1200 display on peak power
measure location + :	PPA 1200 front
measure location − :	
value:	turn P2 fully clockwise and turn back slowly counter clockwise until the readout just changes from 3 or 4 W to 0. Do not turn further!

Connect a 8Ω dummy load and check the reading at peak power. It should read 200 ± 10%. Remove the dummy and the display should return to 0.

8 Output power calibration channel 2

same as channel 1

10 Final test after servicing

For a final test is needed a signal generator, 8 Ω / 500 W dummy loads, and a level meter/distortion analyser.

First check all buttons as described in chapter 7.

Next check the output power. Apply a 1 kHz sinewave and measure output power. The minimum output powers at 220 V mains voltage should be:

8 Ω :	350 W
4 Ω :	600 W
2 Ω :	900 W

at 1 kHz. Test if the clip leds work properly (disable limiter !).

Next check frequency response. This should be done at an output level of 10 V at 8 Ω. A typical frequency response is shown in figure 19. Final test norms are:

10 Hz -> 20 kHz ± 0.3 dB
10 Hz -> 80 kHz + 0.3 dB, - 1.5 dB

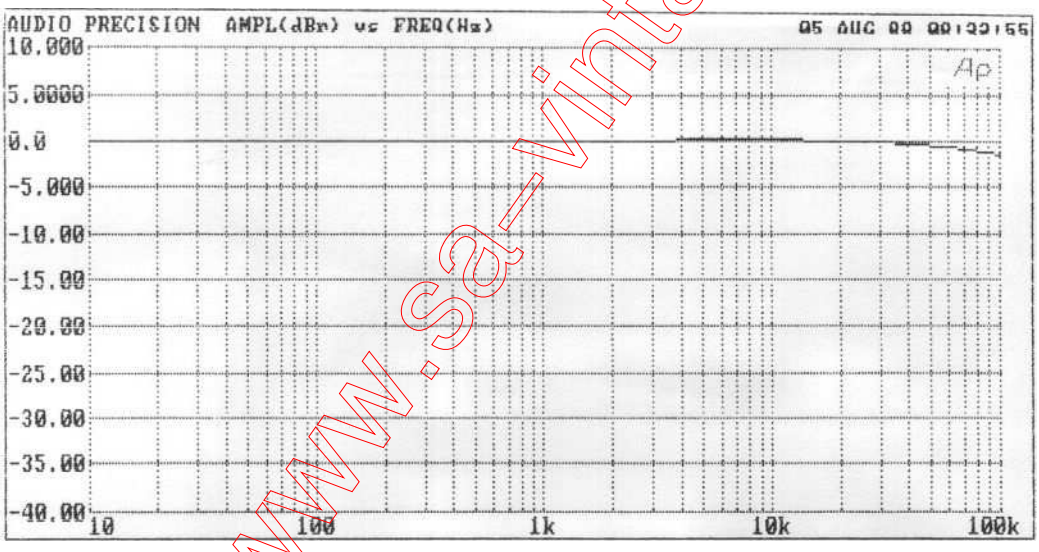


Fig 19 Typical frequency response

Next check harmonic distortion. Final test norms are:

P_{out} = 200 W into 8 Ω

THD + N	10 Hz -> 10 kHz	≤ 0.02 %
THD + N	10 Hz -> 30 kHz	≤ 0.05 %

P_{out} = 400 W into 4 Ω

THD + N	10 Hz -> 10 kHz	≤ 0.03 %
THD + N	10 Hz -> 30 kHz	≤ 0.08 %

Typical distortion graphs are shown in fig. 20 and fig. 21. An 80 kHz low pass filter is used to eliminate HF processor noise out of this test.

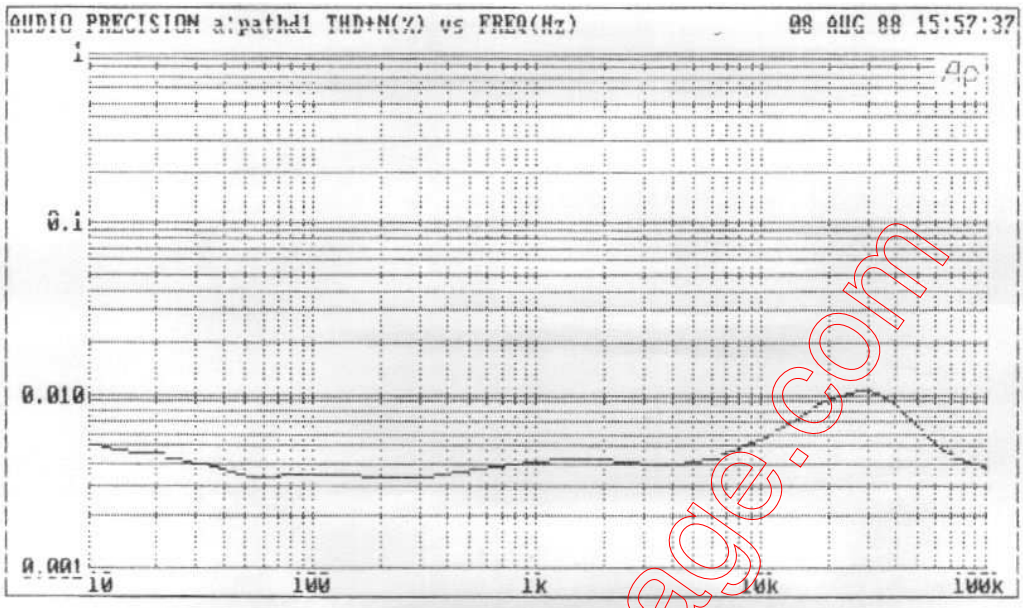


Fig 20 Typical harmonic distortion at 200 W / 8 Ω

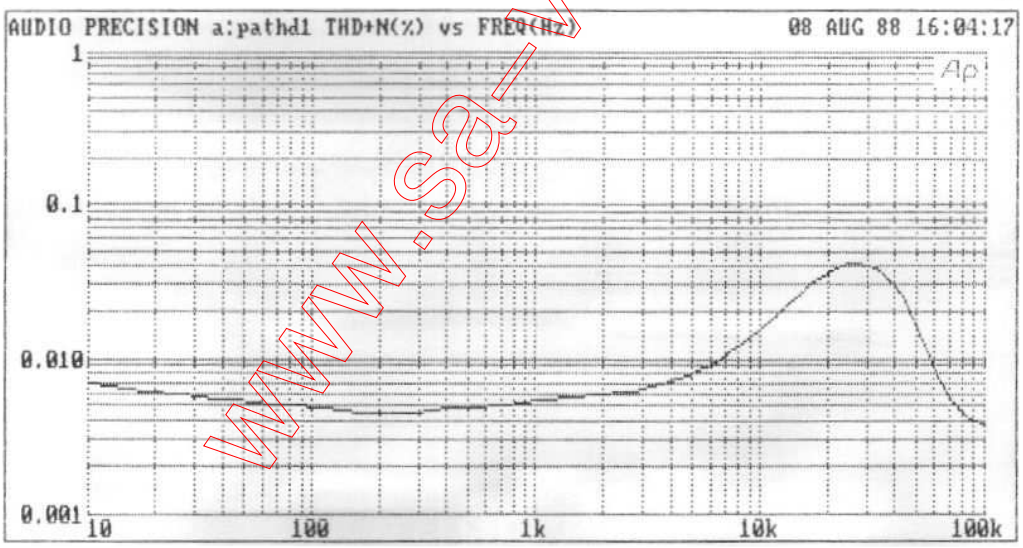


Fig 21 Typical harmonic distortion at 400W / 4 Ω

The total noise level of the PPA 1200 should be less than 110 dB under 50V output level. For this test, a 600 Ω resistor should be placed between pin 2 and pin 3 of the XLR input connector. The best way to test output noise is to measure frequency response without an input signal. A typical graph is shown in fig. 22.

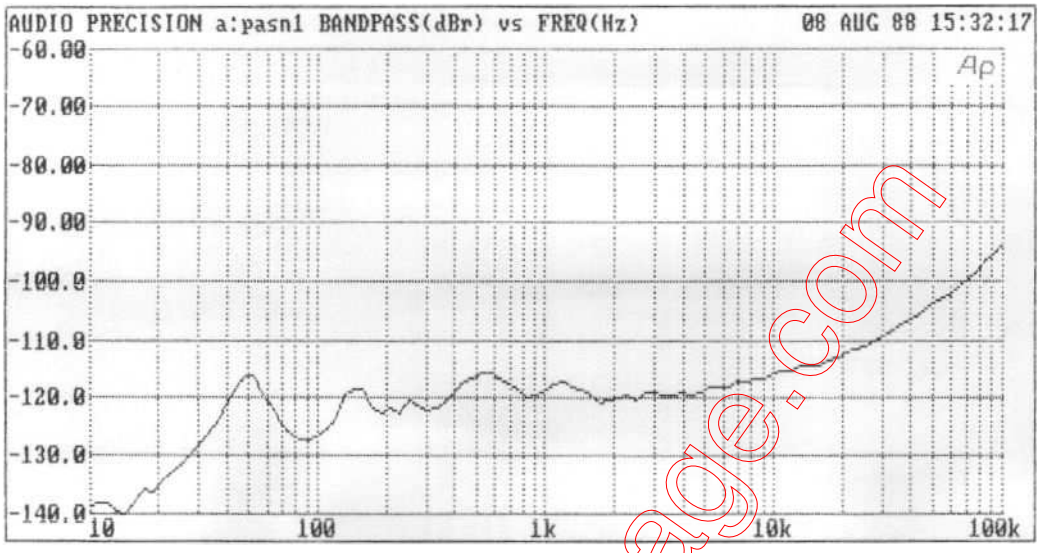


Fig 22 Output noise versus frequency, @ 50 V

Next test common mode rejection. A typical performance graph is shown in fig. 23. The norms are:

CMRR	≥ 60 dB at 1 kHz
	≥ 35 dB at 20 kHz

The PPA 1200's crossover should be tested on frequency accuracy. Put the PPA in the preset mode on the SA 4529 preset. Be sure both input levels are 0 dB.
The best way to check the crossover frequencies is to make a frequency graph of both the channels. If this is not possible, check a few frequencies.
Take 100 Hz, 10 V output into 8 Ω as reference level. The following levels should be checked:

channel 2 level:	0 dB ± 0.5 dB at 10 kHz
channel 1 high pass filter:	f_{-3dB} = 15 Hz ± 10 %
channel 1 low pass filter:	f_{-6dB} = 1 kHz ± 5 %
channel 2 high pass filter:	f_{-6dB} = 1 kHz ± 5 %

A typical graph is shown in fig. 24.

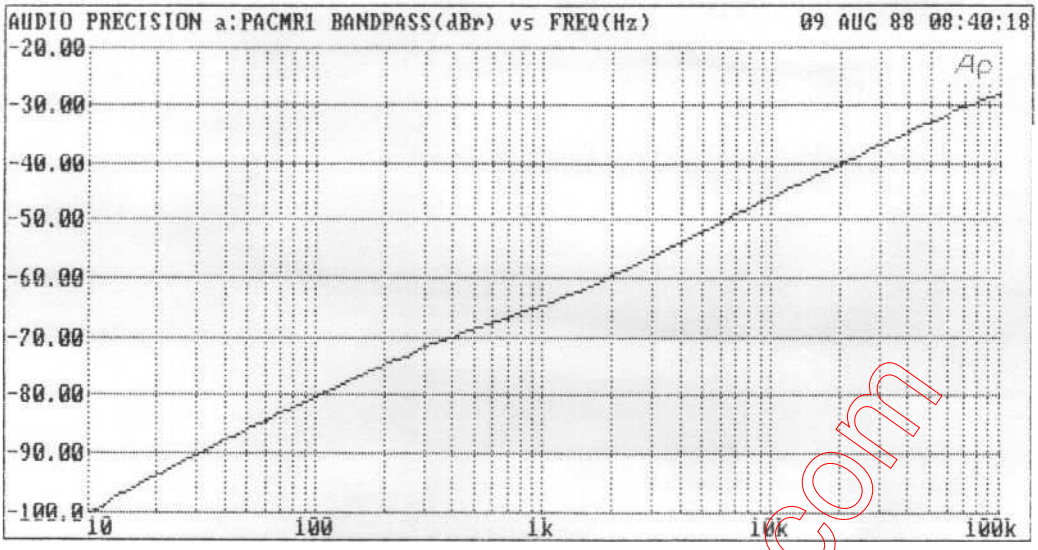


Fig 23 Typical CMR versus frequency

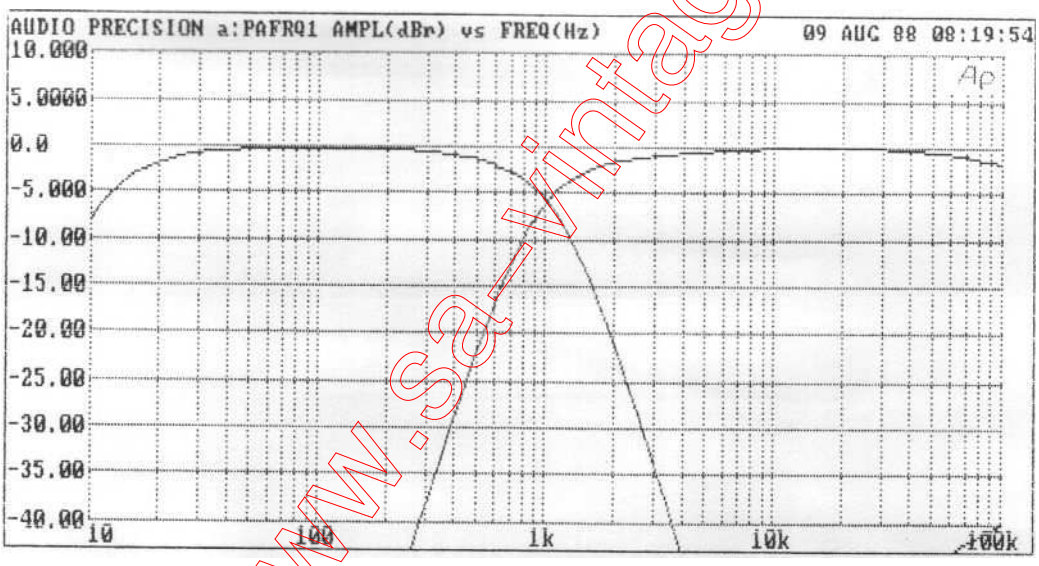


Fig 24 Typical frequency response in the preset mode

11 Specifications

Frequency response: 10 V into 8Ω.	20 Hz to 20 kHz 5 Hz to 80 kHz	± 0.3 dB - 3 dB
Power output:	180 W into 16Ω 350 W into 8Ω 600 W into 4Ω 900 W into 2Ω	Both channels driven, 20 Hz to 20 kHz, full 220 V mains.
Bridge mode power:	700 W into 16Ω 1200 W into 8Ω 1800 W into 4Ω	20 Hz to 20 kHz, full 220 V mains.
Harmonic distortion:	≤ 0.08% THD	20 Hz to 20 kHz, impedance >2 Ω at all powers 10% below clip value.
typical	≤ 0.008% THD ≤ 0.015% THD ≤ 0.008% THD	1 kHz, 200 W into 8Ω. 20 kHz, 200 W into 8Ω. 1 kHz, 1 W into 8 Ω.
Intermodulation distortion:	≤ 0.01%	200 Hz to 20 kHz with f1 = 70 Hz 4:1, 200 W into 8 Ω.
Channel separation:	≥ 80 dB ≥ 60 dB	1 kHz, 300 W into 8 Ω. 20 kHz, 300 W into 8 Ω.
S/N ratio:	≥ 110 dB	20 Hz to 20 kHz below full output power.
Slew rate	≥ 40 V/uS	
Damping factor:	≥ 10000	1 kHz, 10V into 8Ω
CMRR:	≥ 70 dB ≥ 60 dB	1 kHz 20 kHz
Display readout: Temperature accuracy	± 1 °C	between 0 °C and 100 °C
Power accuracy	± 10 W ± 10%	below 100W above 100W

12.1 Output board

The connections of the components on the output board are shown in fig. 25.
The four resistors provide for feedback in case one of the DDC terminals is not connected to a loudspeaker terminal.
The two capacitors provide for high frequency stability.

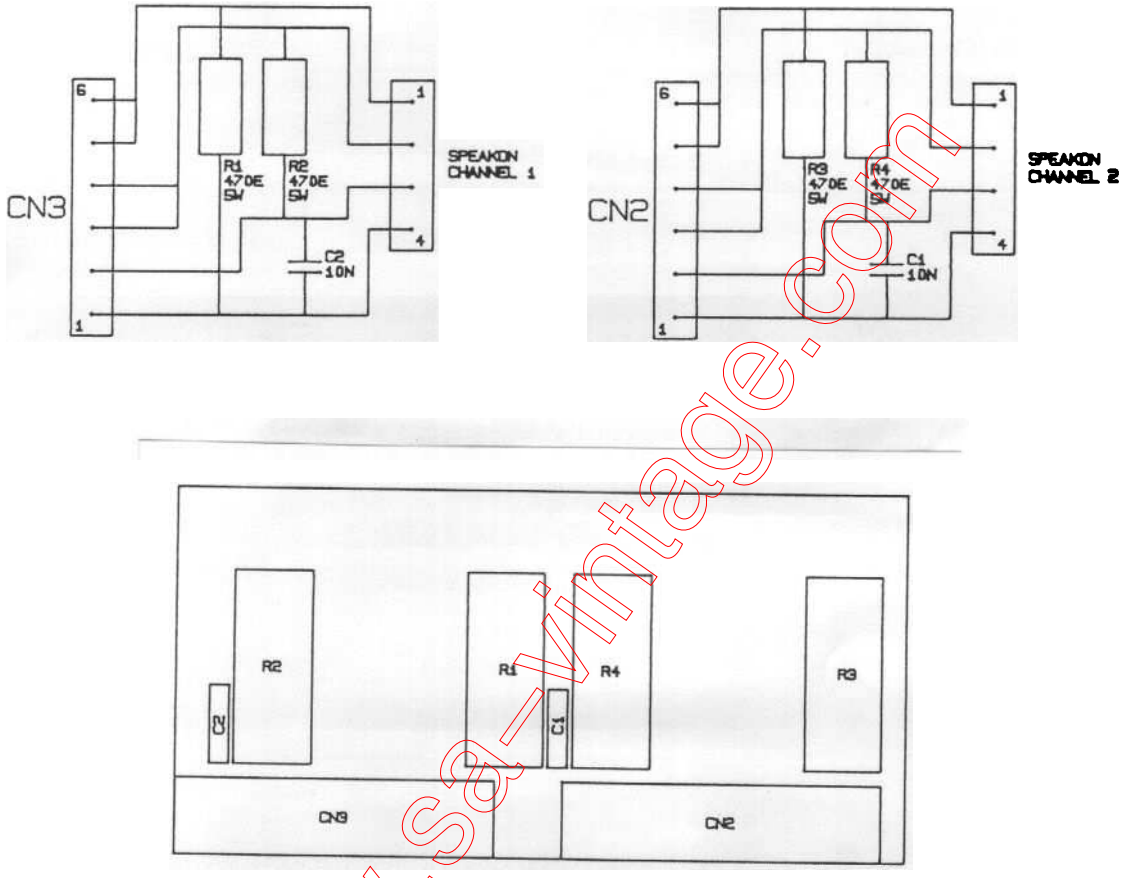


Fig. 25 output board

12.2 Triggering problems

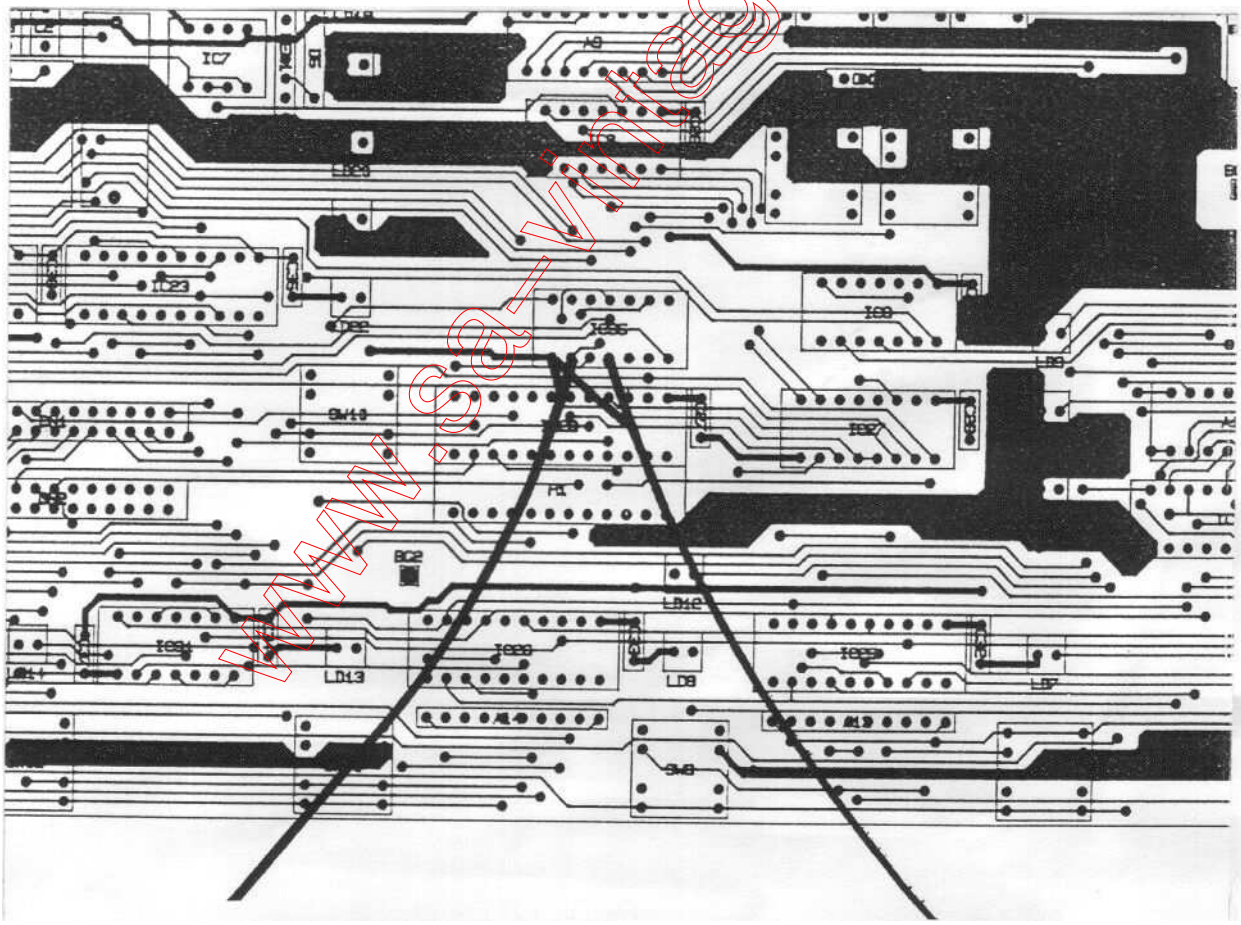
With some PPA 1200's, the following problem may occur:
While switching a power amplifier from standby to the power amp on mode, some other controls of that channel or the opposite channel change as well, temporary or steady state. The intensity of the problem is dependent of the way the power cord is plugged into mains receptacle.
The problem is caused by large potential changes that occur when the power transformers are being switched on and off. These changes have influence on the triggering of the latches IC12 on the preamp boards.

Solution:

The problem can be solved by connecting the clock signal with screened cable and changing the 74HC273 for a 74HC373. Upgrading sets can be supplied by Stage Accompany (part no. 2220.9990).

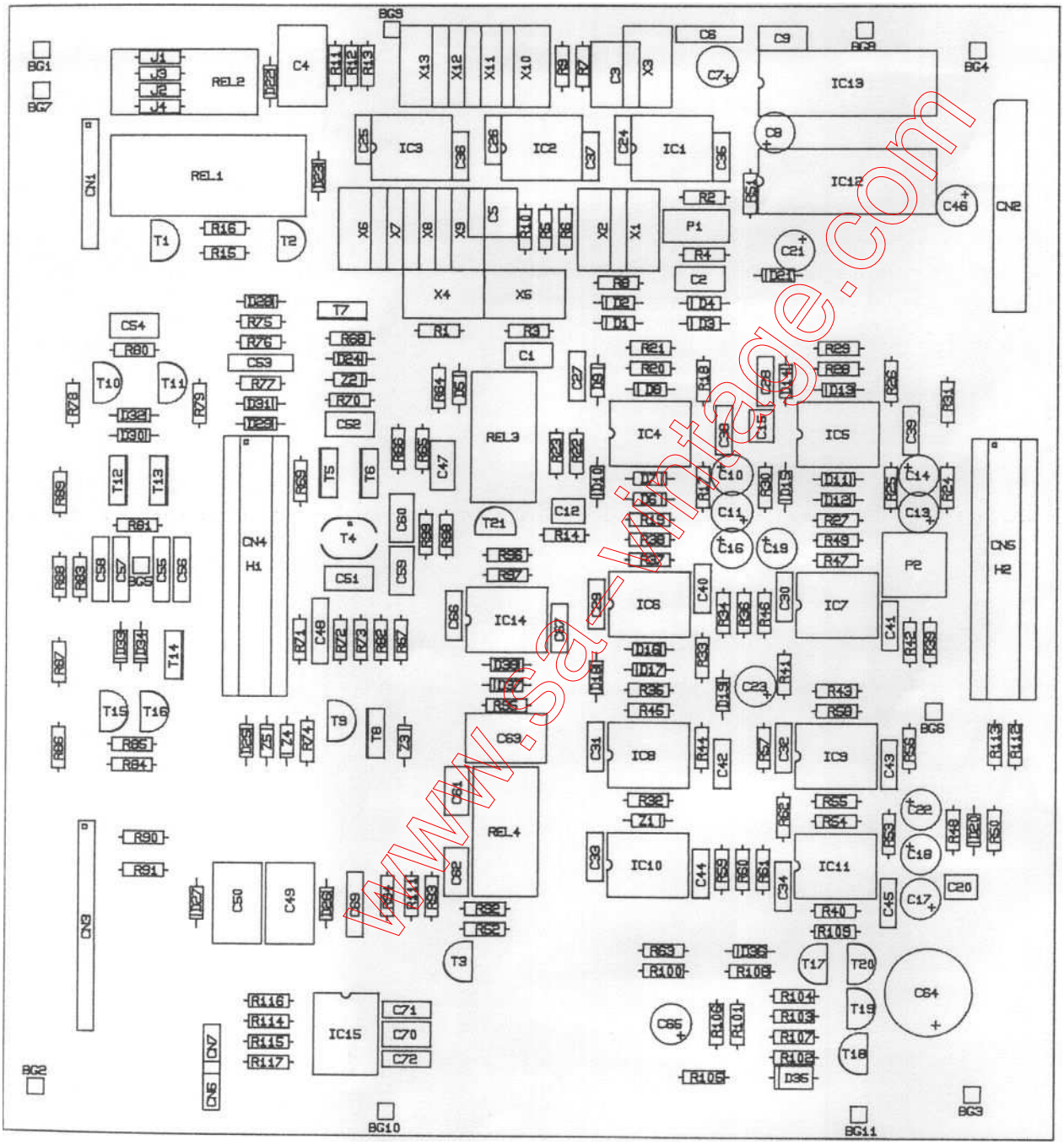
12.2.1 Modification of a PPA 1200 with identity number < 121

- Order for an upgrading set at Stage Accompany.
  Remove the PPA 1200's amplifier modules and front as described in

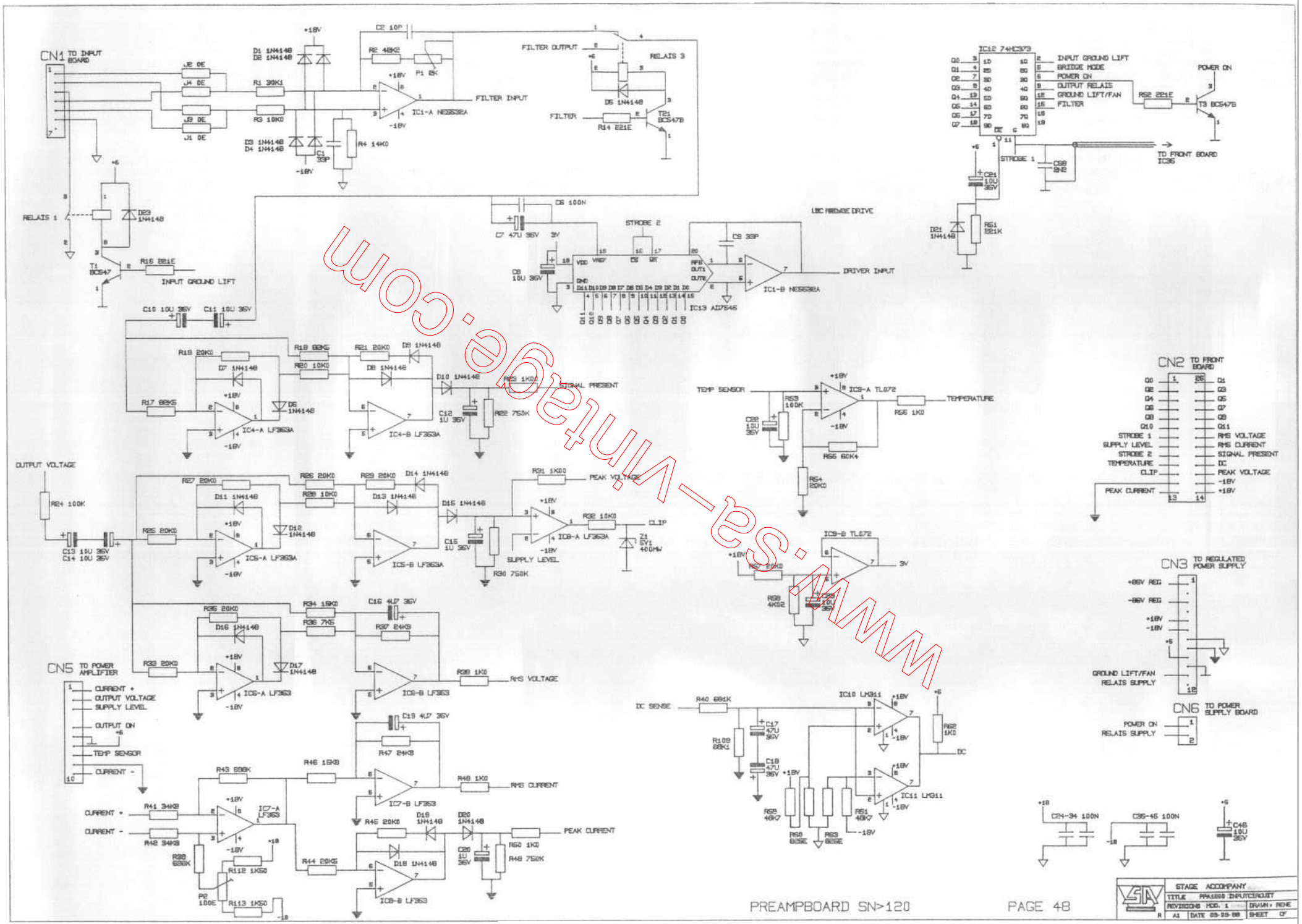


channel 2 hannel 1

Fig.26 connection of the screened wires



PAGE 47 PREAMP BOARD



13.1 Various new PCB layouts

From serial (identity) number 271 and higher, most of the PPA 1200 PCB's have been modified:

Preamp board	-	The crossover is on a separate PCB now to increase ease of installing special versions.
	-	Dual operational amplifiers have been replaced by quad types.
	-	The output voltage measurement has been simplified.
	-	A steel screen has been added to improve hum performance for studio applications.
	-	Zener diodes have been added for better performance of the current measurement circuit.
	-	HF common mode rejection is improved by adding a capacitive trimmer.
High power supply board	-	Build in soft start to reduce initial peak currents.
Regulated power supply board	-	The PCB has been placed on the bottom panel for better access to the fuses.
	-	The resistors for the low speed operation of the fan are on the PCB now.
	-	The regulated power supplies do not longer need to be trimmmed
Front board	-	New memory circuit for Flash Eprom
	-	The screened wire modification (see chapter 12.2) has been added on the PCB.
Input connector board	-	Two male XLR3 connectors have been added to make an input link possible.

13.2 Adjustments

Important: Notice in figure 19 that for adjustment purposes of the new PPA, the amplifier modules are lifted to the right, in stead of to the left.

The adjustments to these boards are the same as to the previous ones, except for (see page 37):

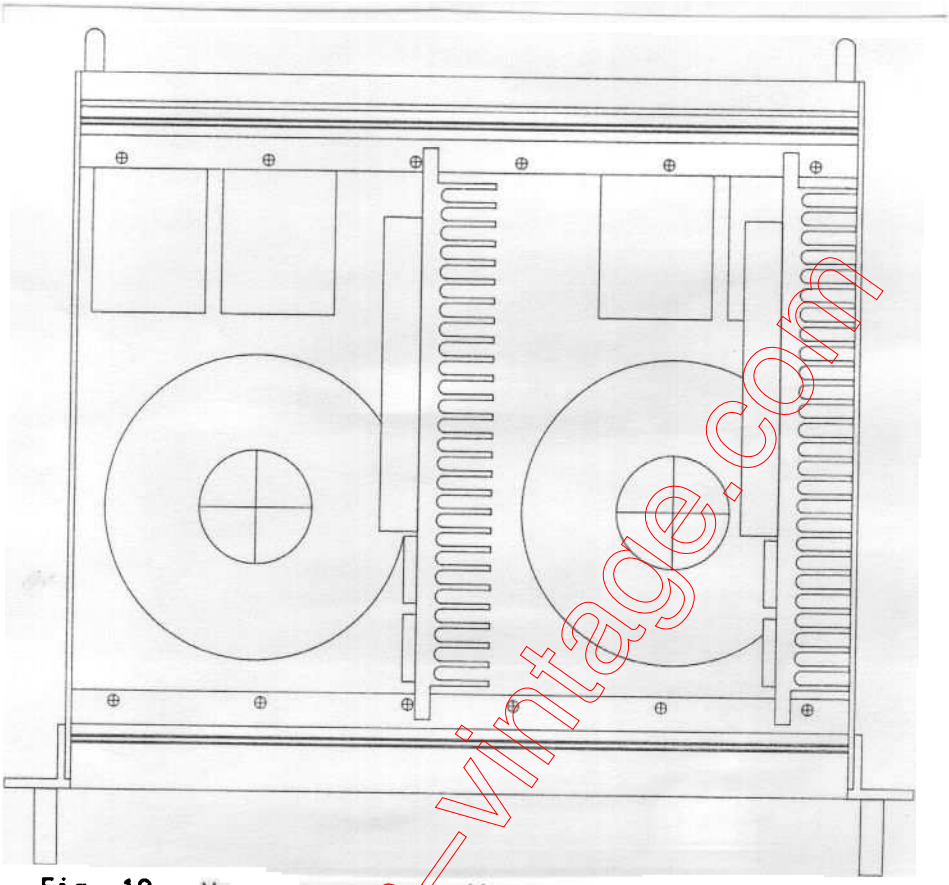


Fig. 19 New set up for adjustments

Procedure 2 and 3 are omitted, the 86 volt supplies do not need to be trimmed any more.

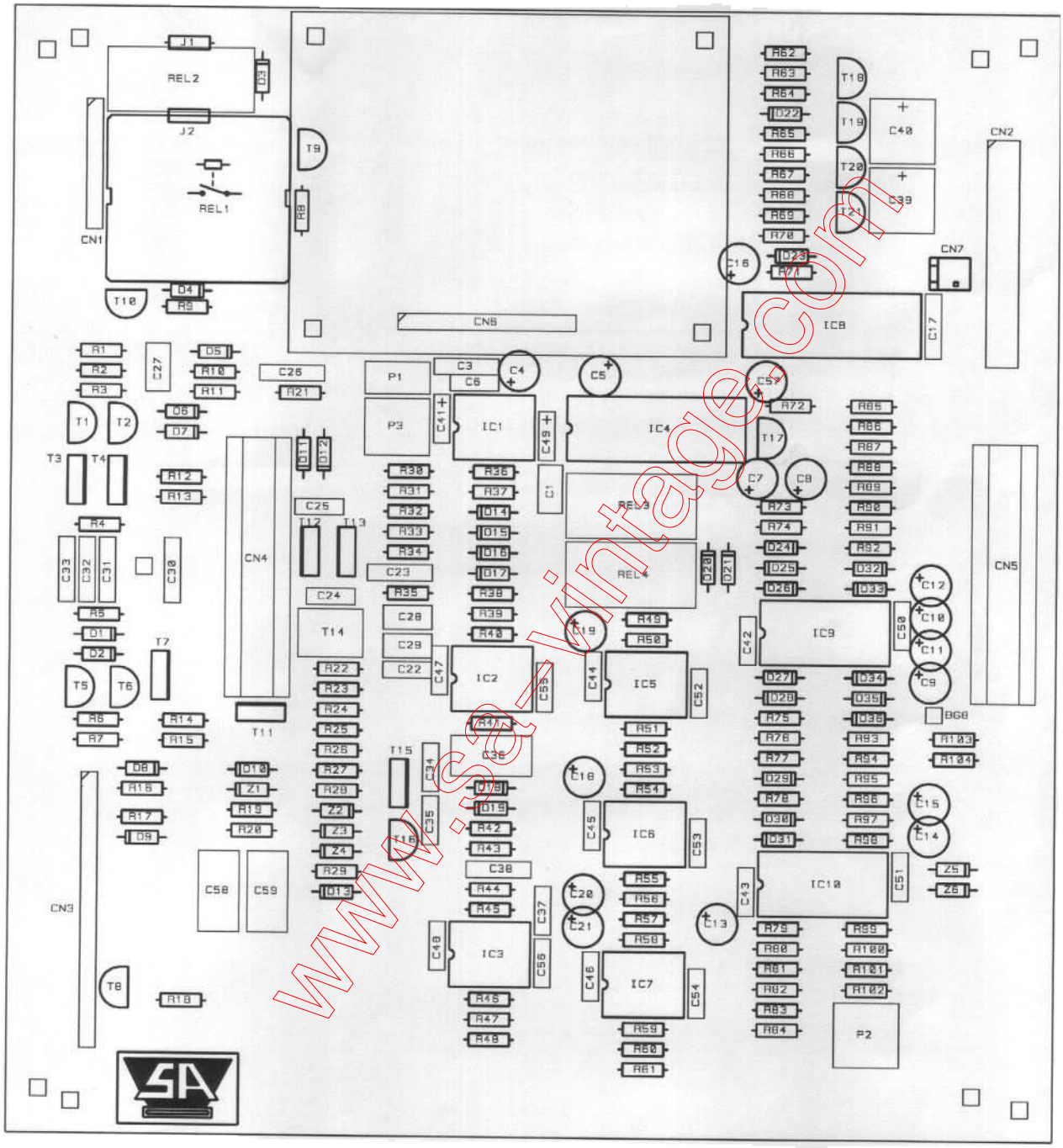
Procedure 6 and 7 remain the same but are extended with procedure 6a and 7a.

6a High frequency common mode rejection channel 1

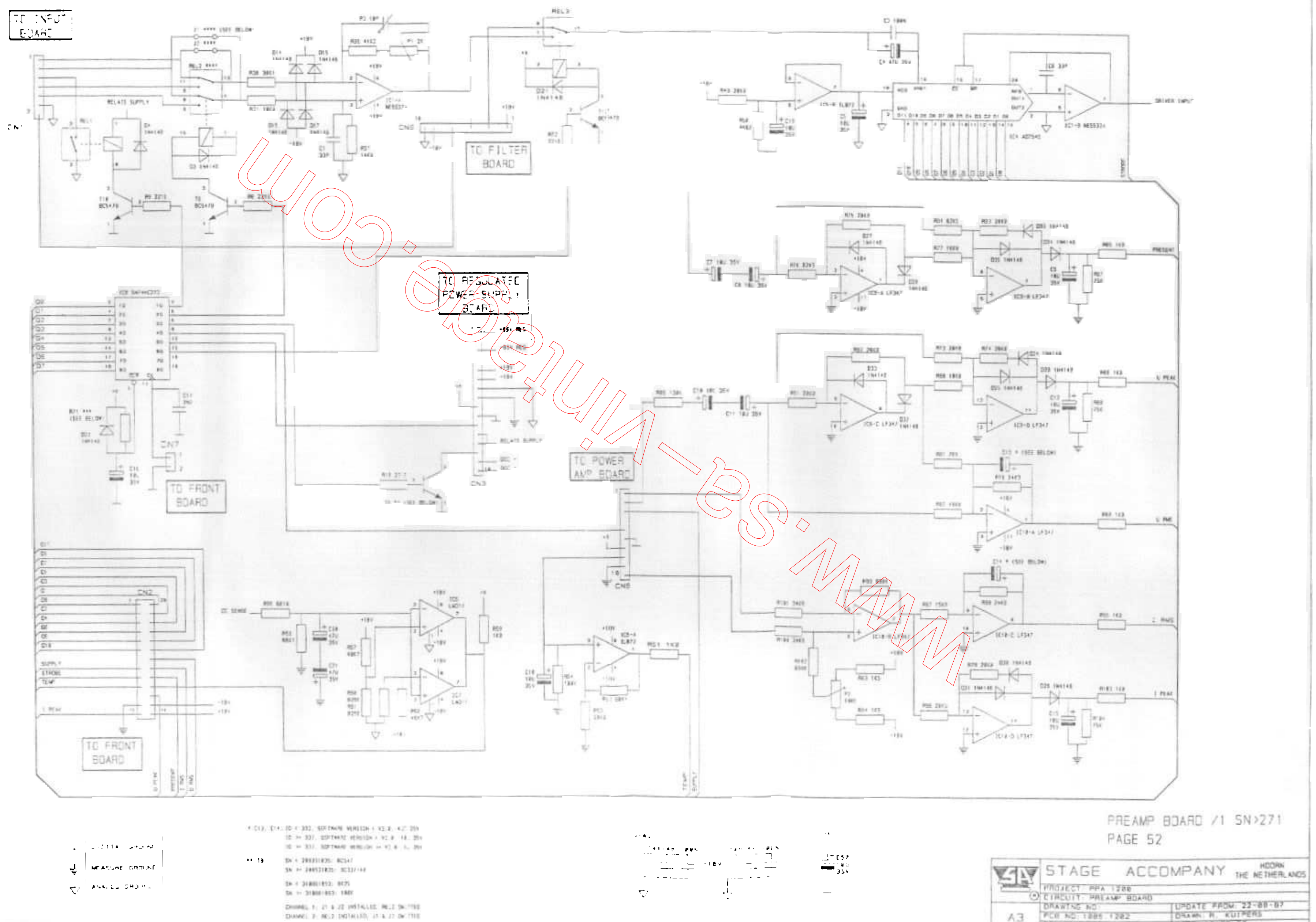
input voltage:	1 Veff, 20 kHz on pin 2 and pin 3 in phase
output load:	8 Ω
adjustment location:	P3 on the preamp board
instrument:	AC voltmeter or scope
measure location +:	amplifier output +
measure location −:	amplifier output −
value:	≤ 0.02 Veff

7a High frequency common mode rejection channel 2

same as channel 1

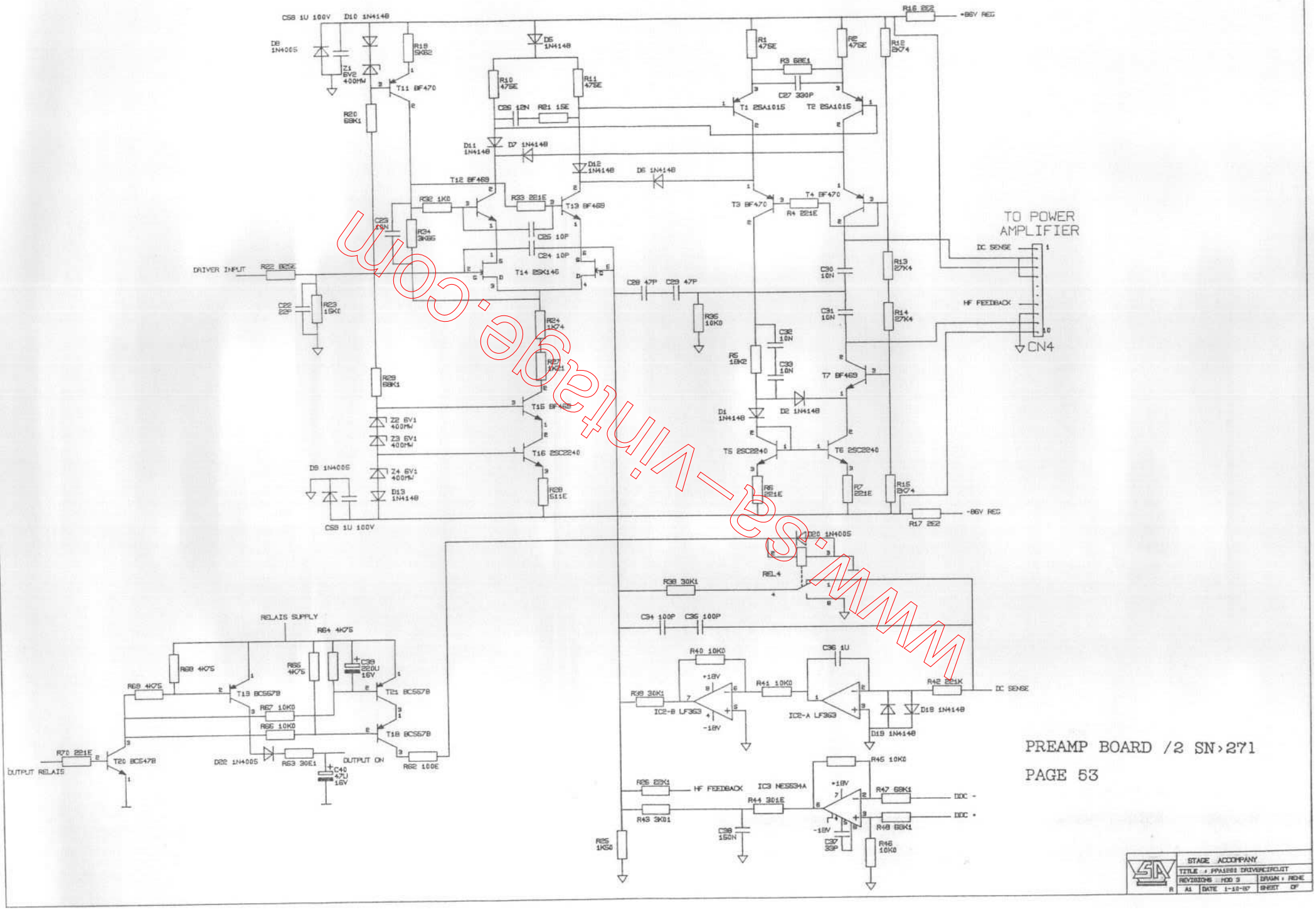


PREAMP BOARD SN>271
PAGE 51



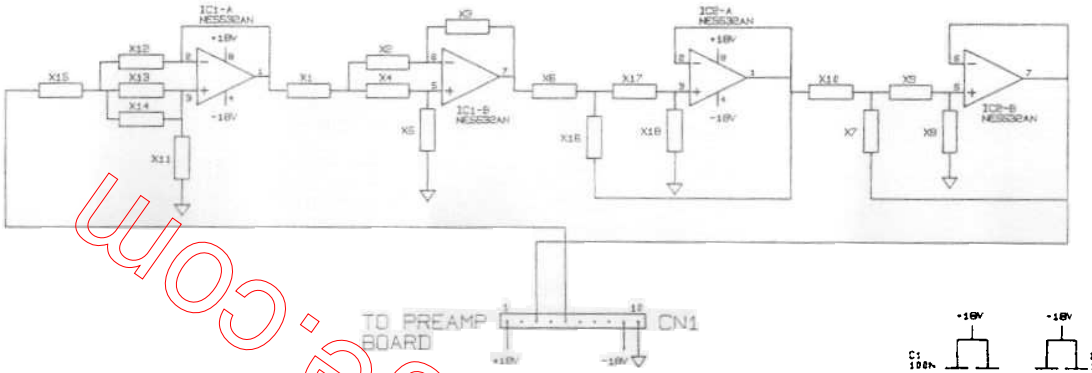
PREAMP BOARD /1 SN>271
PAGE 52

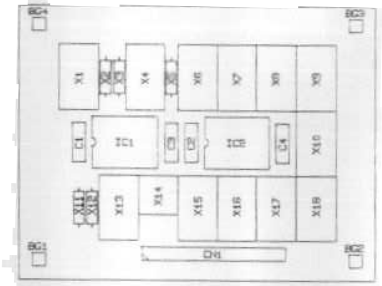
STAGE ACCOMPANY	HOORN THE NETHERLANDS	
PROJECT: PPA 1200		
CIRCUIT: PREAMP BOARD		
A3	DRAWING NO:	UPDATE FROM: 22-08-87
	PCB NO: 1085.1202	DRAWN: R. KUIPERS
	REMARKS: C13, C14 & R71 UPDATES	DATE: 12-03-93

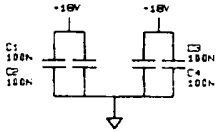


PREAMP BOARD /2 SN>271

PAGE 53







STANDARD VERSION
LOW PASS
4549 LO MID

COMPONENT	TYPE	VALUE
X15	C MKH	470N
X12	R	2BK7
X13	C MKH	47BN
X14	/	/
X11	R	31K6
X1	C MKH	470N
X2	R	21K5
X4	C MKH	470N
X5	R	54K9
X3	R	0E
X6	R	15K4
X16	C FOIL	10N
X17	R	13K0
X18	C FOIL	10N
X10	R	21K5
X7	C FOIL	10N
X9	R	21K5
X8	C FOIL	3N9

STANDARD VERSION
HIGH PASS

COMPONENT	TYPE	VALUE
X15	R	0E
X12	/	/
X13	R	0E
X14	/	/
X11	/	/
X1	R	0E
X2	R	10K0
X4	/	/
X5	/	0E
X3	R	10K0
X6	C FOIL	10N
X16	R	10K0
X17	C FOIL	10N
X18	R	17K8
X10	C FOIL	10N
X7	R	10K1
X9	C FOIL	10N
X8	R	30K1

4549 SUB LOW

COMPONENT	TYPE	VALUE
X15	C MKH	470N
X12	R	2BK7
X13	C MKH	47BN
X14	/	/
X11	R	31K6
X1	C MKH	470N
X2	R	21K5
X4	C MKH	470N
X5	R	54K9
X3	R	0E
X6	R	0E
X16		
X17	R	0E
X18		
X10	R	0E
X7		
X9	R	16K0
X8	C MKH	15EN

4549 HIGH PASS

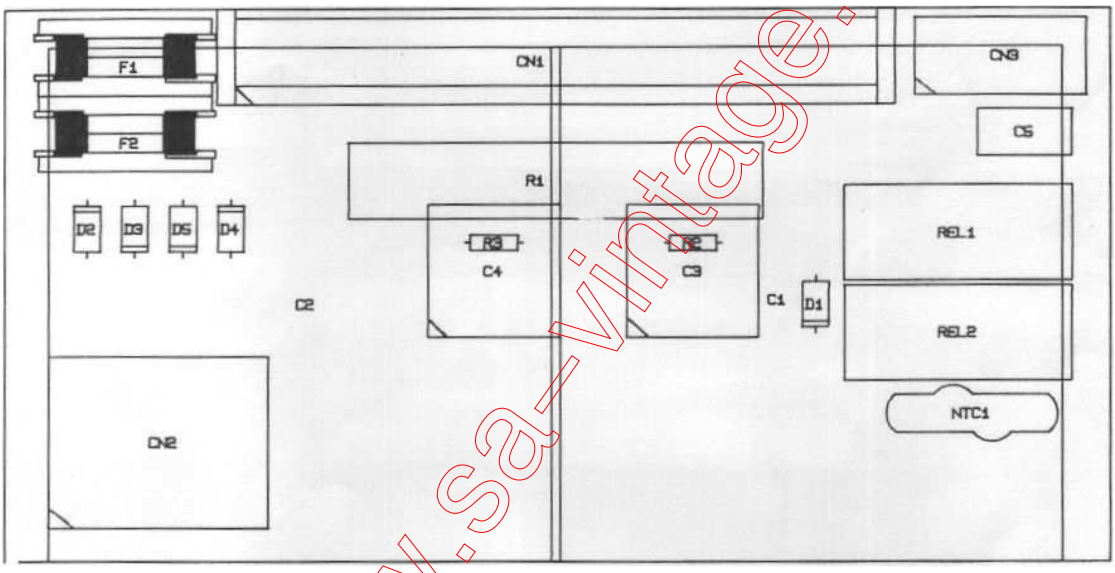
COMPONENT	TYPE	VALUE
X15	R	0E
X12	/	/
X13	R	10K0
X14	C FOIL	4N7
X11	R	10K0
X1	R	0E
X2	R	10K0
X4	/	/
X5	/	0E
X3	R	10K0
X6	C FOIL	10N
X16	R	10K0
X17	C FOIL	10N
X18	R	17K8
X10	C FOIL	10N
X7	R	10K1
X9	C FOIL	10N
X8	R	30K1

4528 SUB LOW

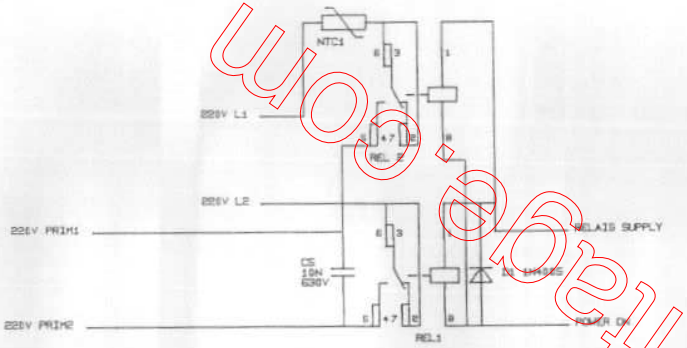
COMPONENT	TYPE	VALUE
X15	C MKH	470N
X12	R	2BK7
X13	C MKH	47BN
X14	/	/
X11	R	31K6
X1	C MKH	470N
X2	R	21K5
X4	C MKH	470N
X5	R	54K9
X3	R	0E
X6	R	10K
X16	C MKH	144N
X17	R	10K
X18	C MKH	100N
X10	R	0E
X7		
X9	R	0E
X8		OPEN

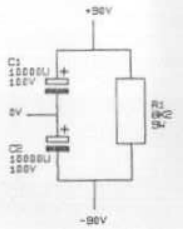
FILTER BOARD SN›271

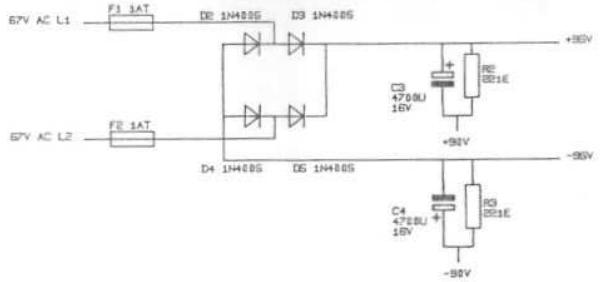
STAGE ACCOMPANY
TITLE: PP4528B FILTERCIRCUIT
REVISIONS: MOD 3 | DRAWN: REHE
R | A3 | DATE 02-20-07 | SHEET OF

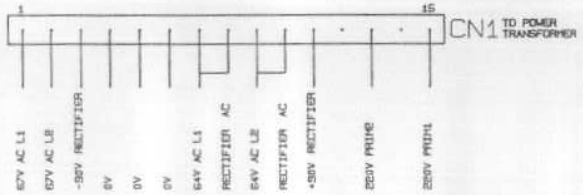


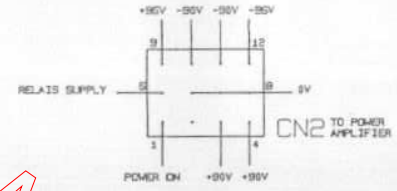
POWER SUPPLY BOARD SN›271

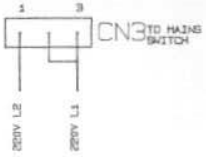






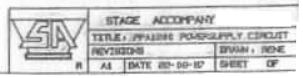


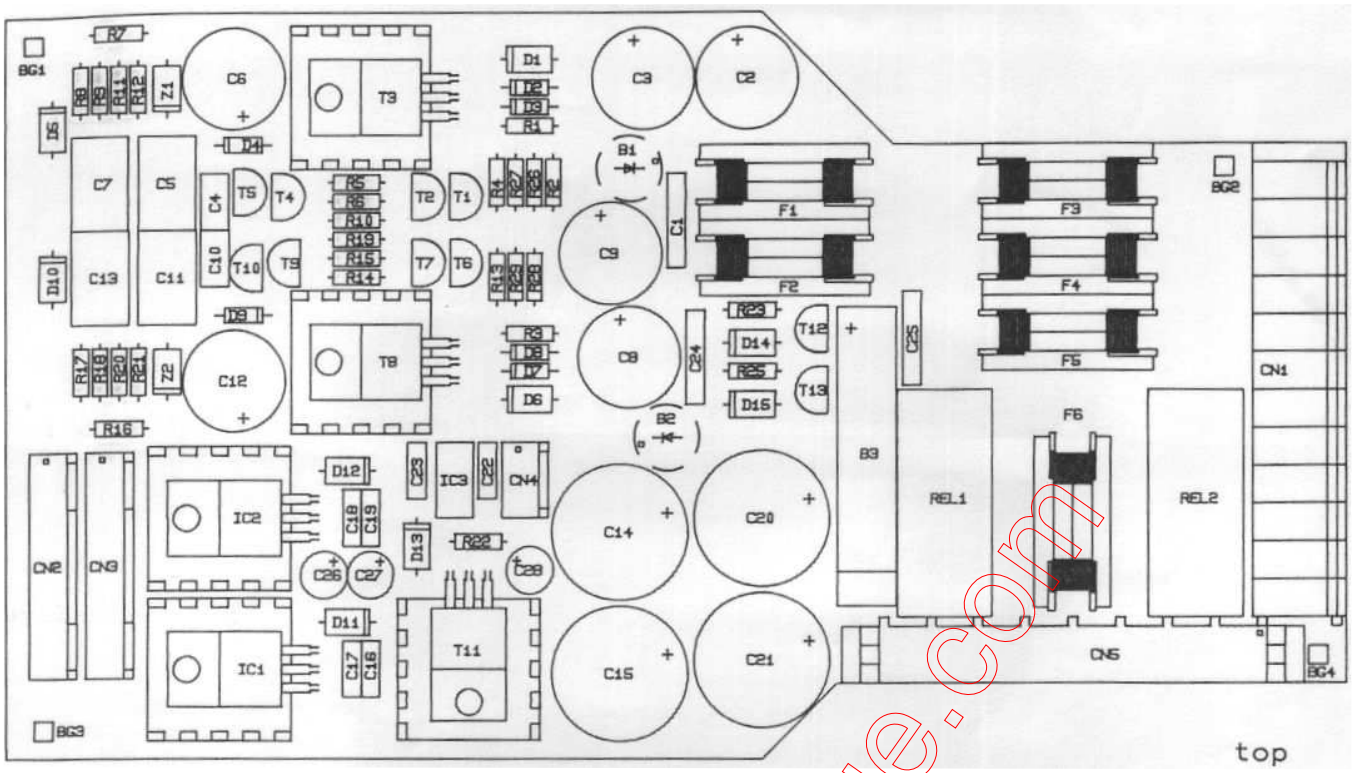


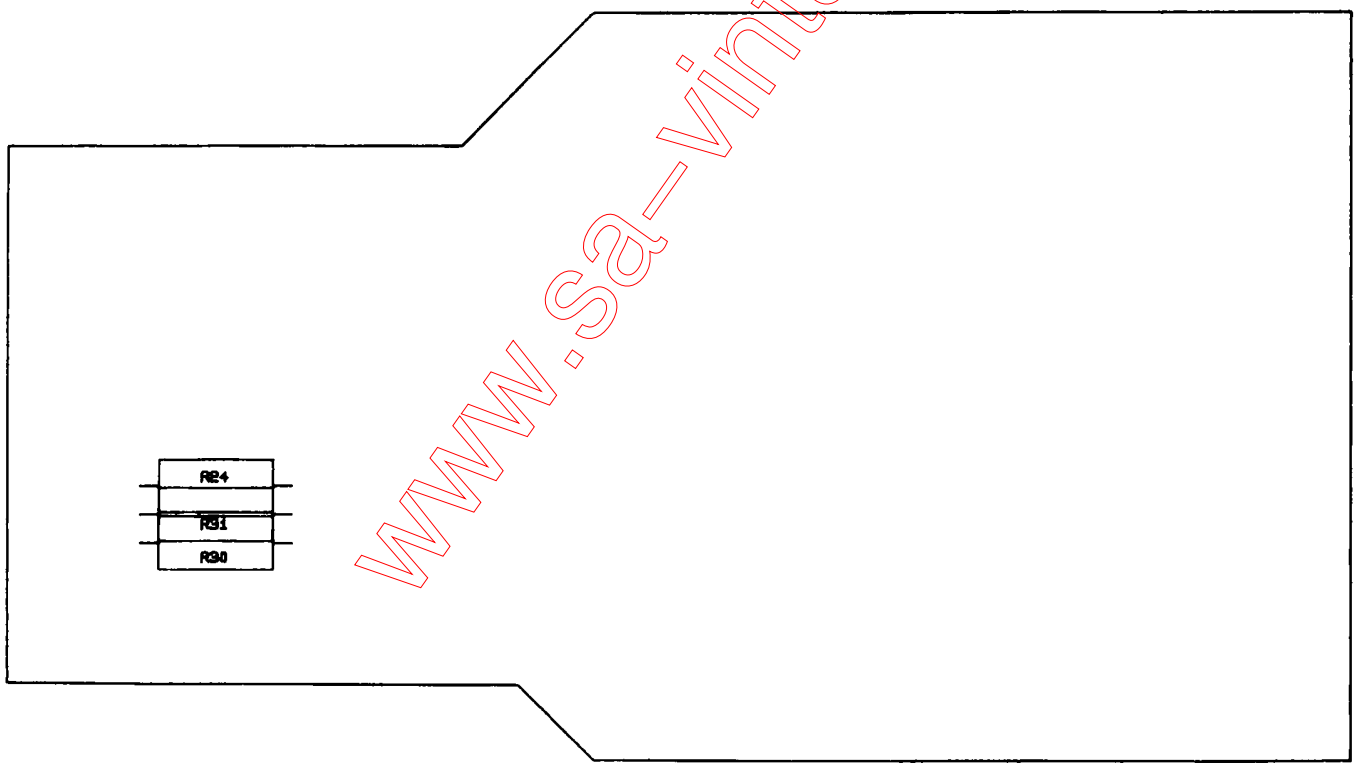


POWER SUPPLY BOARD SN>271

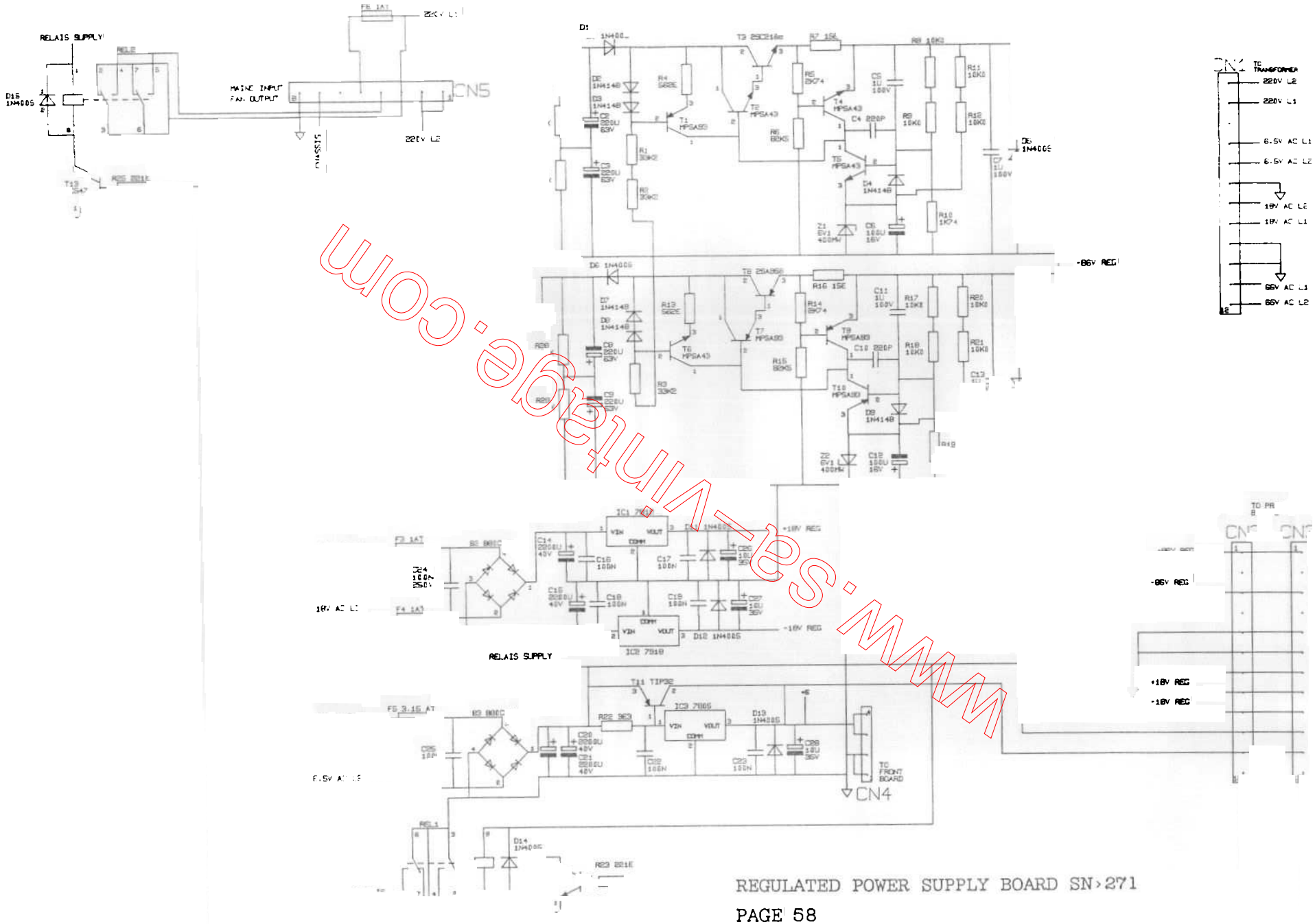
PAGE 56





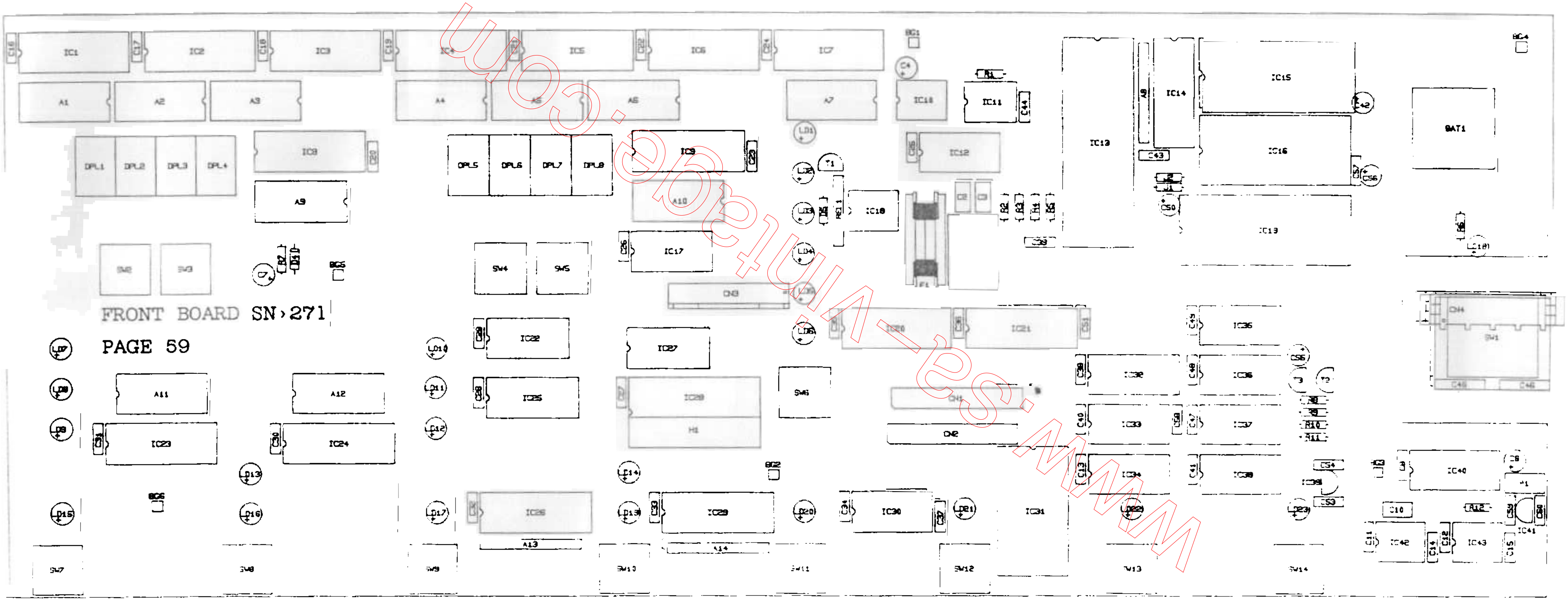


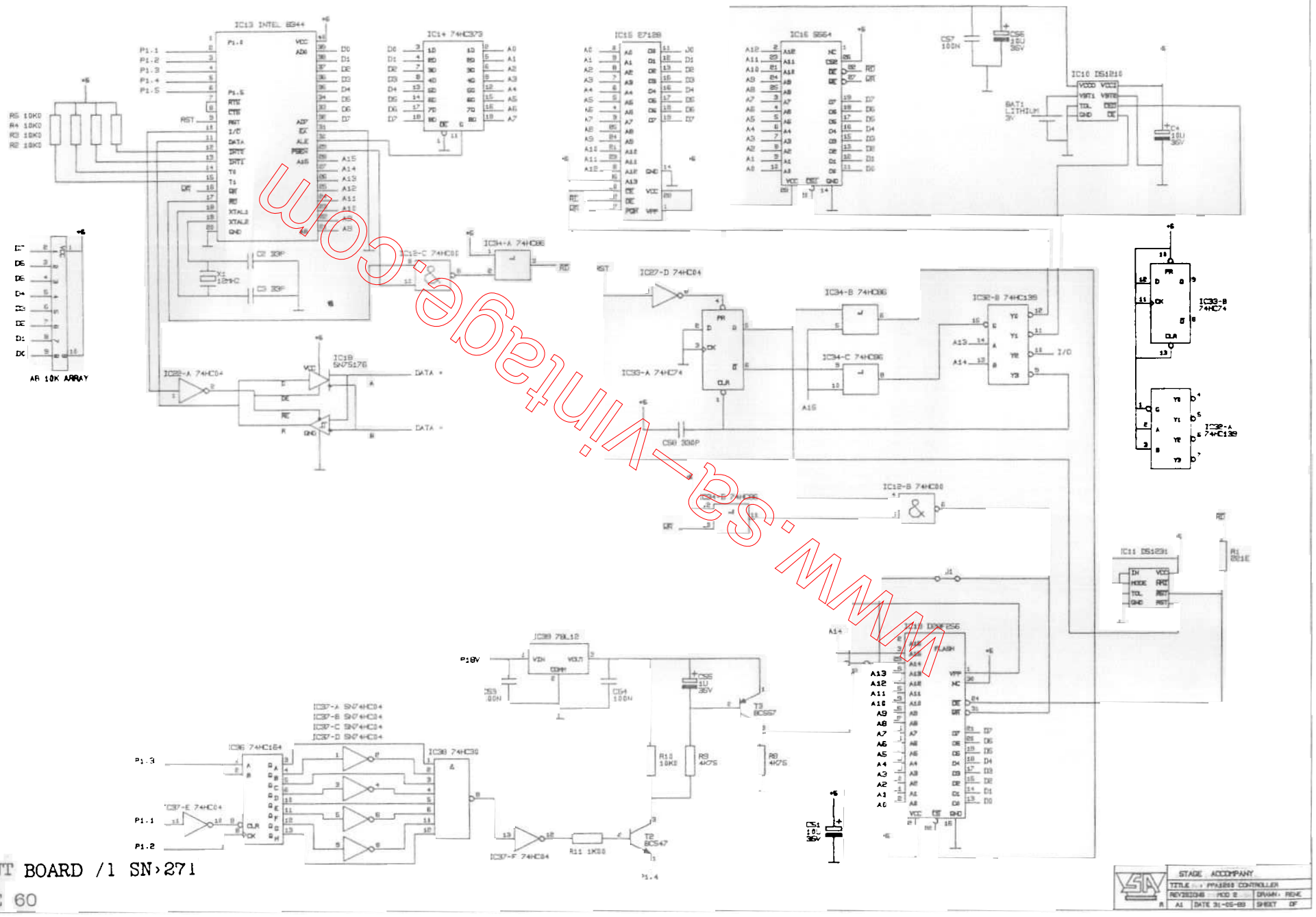
REGULATED POWER SUPPLY BOARD SN›271



REGULATED POWER SUPPLY BOARD SN>271

STAGE ACCOMPANY





FRONT BOARD /1 SN>271

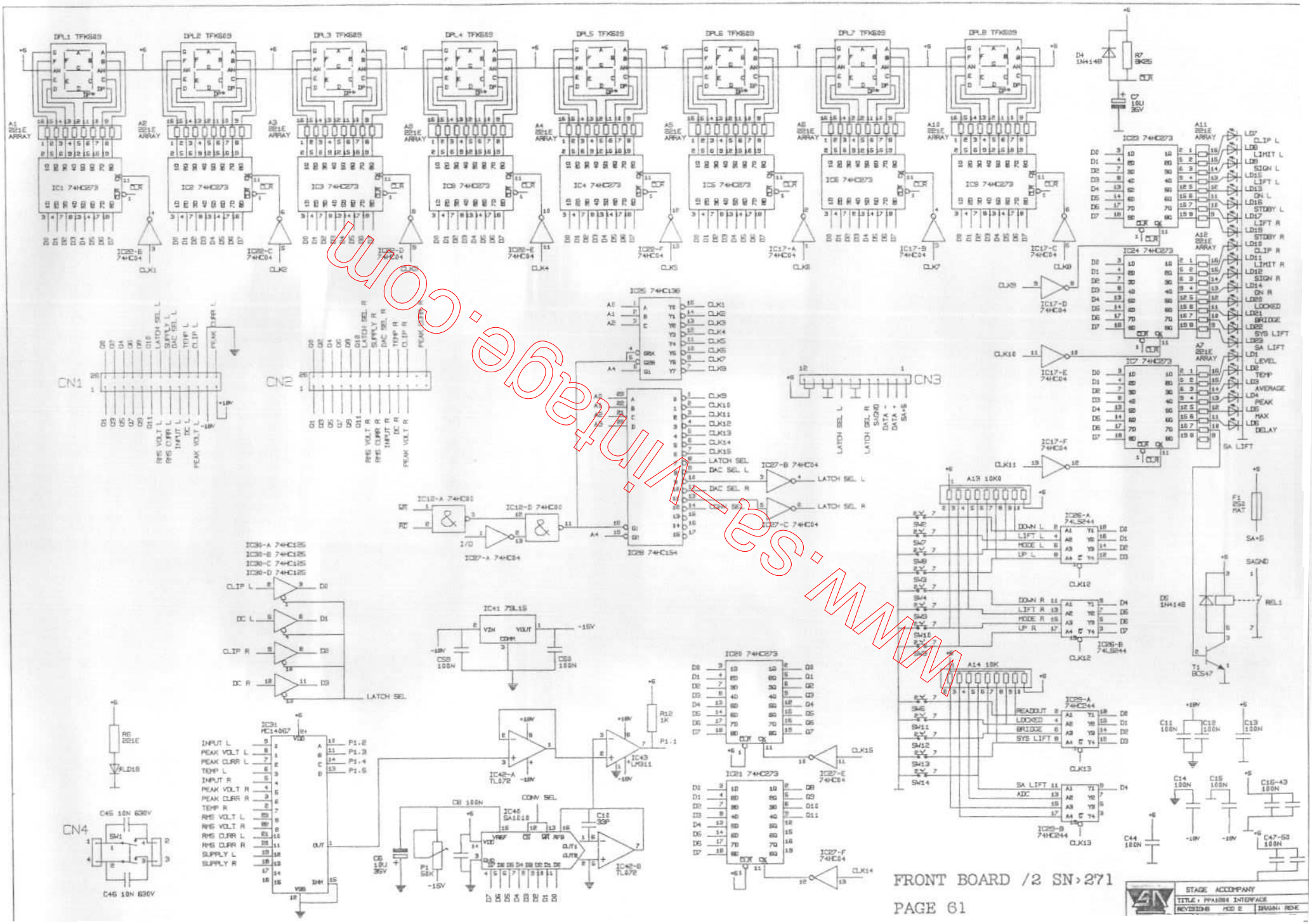
PAGE 60

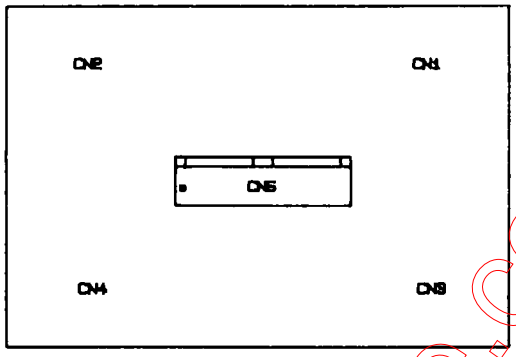
STAGE ACCOMPANY

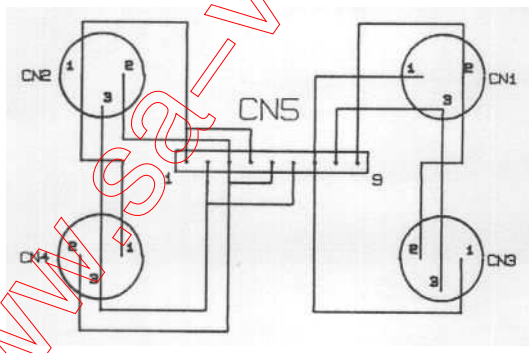
TITLE : PPA2000 CONTROLLER

REVISION : MOD 0 DRAWN : RENE

A1 DATE 31-05-00 SHEET OF







INPUT CONNECTOR BOARD

14 Supplement 4

14.1 Filter board

With the introduction of the Performer series PA systems, four new filter configurations have been designed.

On page 65, all existing filter configurations can be found.

Each software version is matched to a set of filter boards, being:

Standard PPA 1200

Ch.1	Standard version low pass
Ch.2	Standard version high pass
Software	V 2.9

4549 Sub Low PPA 1200

Ch.1	4549 Sub low
Ch.2	4549 Sub low
Software	V 10.8

4549 Mid High PPA 1200

Ch.1	Standard version low pass
Ch.2	4549 / Performer high pass
Software	V 11.8

4528 Sub Low PPA 1200

Ch.1	4528 Sub low version
Ch.2	4528 Sub low version
Software	V 14.8

Performer 4816 Sub low PPA 1200

Ch.1	Performer 4816 version
Ch.2	Performer 4816 version
Software	V 16.0

Performer 4817 Sub low PPA 1200

Ch.1	Performer 4817 version
Ch.2	Performer 4817 version
Software	V 17.0

Performer X-24 & X-26 Mid high PPA 1200

Ch.1	Performer 24/26 low mid version
Ch.2	4549 / Performer high pass
Software	V 18.0

Performer X-27 & X-29 Mid high PPA 1200

Ch.1	Performer 27/29 low mid version
Ch.2	4549 / Performer high pass
Software	V 19.0

14.2 Regulated power supply board

Due to the fact that the PPA 1200 is controlled by a micro processor, the amplifier as a whole is more sensitive to mains voltage variations than a regular amplifier.
As published in our newsletters, Stage Accompany offered an upgrade set for the PPA 1200's 5 volt supply to increase the minimum mains voltage from 180 Volts to 140 Volts.

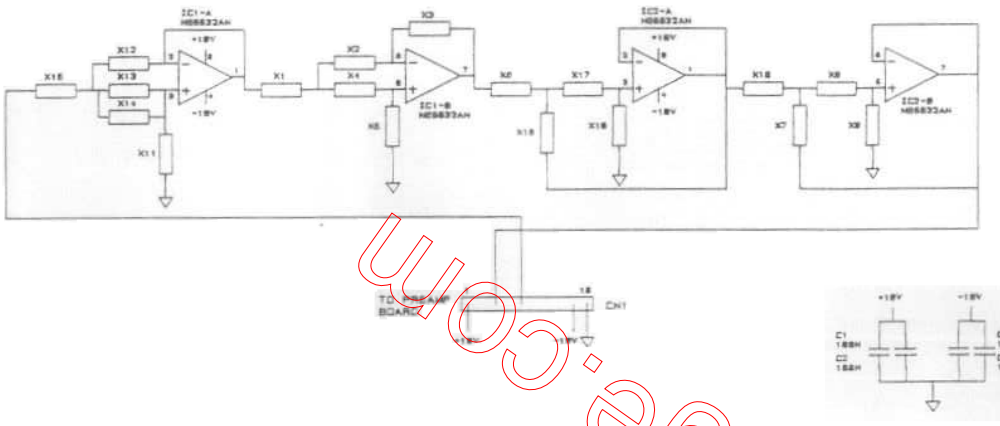
Because of the fact that the upgrade set caused some production problems, the circuit has been removed.

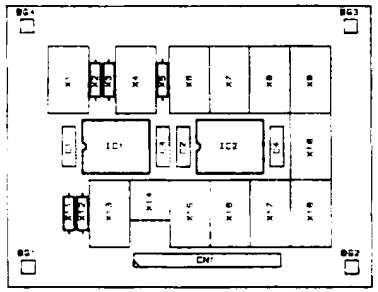
The mains problem has now been solved by a different approach. The transformer voltage has been slightly increased and all relays in the PPA 1200 have been replaced by 12 Volts types (previously 6 Volts). Because of this, the current consumption of the relais supply rail has dropped resulting in more headroom in the 5 volts power supply.

> All PPA 1200's with serial number 9011120503 or higher are equiped with 12 V relays

Because the board was allready redesigned for an integrated upgrade set, you might find either PCB 1531.1201/2 or 1531.1201/3 in PPA 1200's. The component layout of board 1531.1201/2 can be found on pages 66 and 67, those of 1531.1201/3 on page 68 and 69.
Both boards contain identical electronics, of which the schematics can be found on page 70.

Note that pins 2 and 3 of transistor T11 had to be swapped on board 1531.1201/2.





STANDARD VERSION
LOW PASS
4549 LOW MID

COMPONENT	TYPE	VALUE
X16	C MKH	47NH
X12	R	39K7
X13	C MKH	47NH
X14	/	/
X11	R	31K6
X1	C MKH	47NH
X2	R	31K6
X4	C MKH	47NH
X5	R	64K9
X3	R	8R
X8	R	18K4
X15	C FOIL	18N
X17	R	13K8
X18	C FOIL	18N
X18	R	31K6
X7	C FOIL	18N
X9	R	31K6
X9	C FOIL	3N9

STANDARD VERSION
HIGH PASS

COMPONENT	TYPE	VALUE
X16	R	8R
X12	/	/
X13	R	8R
X14	/	/
X11	/	/
X1	R	8R
X2	R	18K8
X4	/	/
X5	/	8R
X3	R	18K8
X8	C FOIL	18N
X15	R	18K8
X17	C FOIL	18N
X18	R	17K8
X18	C FOIL	18N
X7	R	13K1
X9	C FOIL	18N
X9	R	39K1

4549 SUB LOW

COMPONENT	TYPE	VALUE
X16	C MKH	47NH
X12	R	39K7
X13	C MKH	47NH
X14	/	/
X11	/	31K6
X1	C MKH	47NH
X2	R	31K6
X4	C MKH	47NH
X5	/	64K9
X3	R	8R
X8	R	18K4
X15	C FOIL	18N
X17	R	13K8
X18	C FOIL	18N
X18	R	31K6
X7	C FOIL	18N
X9	R	31K6
X9	C MKH	39N

4549 HIGH PASS
PERFORMER HIGH PASS

COMPONENT	TYPE	VALUE
X16	R	8R
X12	/	/
X13	R	18K8
X14	C FOIL	4N7
X11	R	18K8
X1	R	8R
X2	R	18K8
X4	/	/
X5	/	8R
X3	R	18K8
X8	C FOIL	18N
X15	R	18K8
X17	C FOIL	18N
X18	R	17K8
X18	C FOIL	18N
X7	R	13K1
X9	C FOIL	18N
X9	R	39K1

4528 SUB LOW

COMPONENT	TYPE	VALUE
X16	C MKH	47NH
X12	R	39K7
X13	C MKH	47NH
X14	/	/
X11	R	31K6
X1	C MKH	47NH
X2	R	31K6
X4	C MKH	47NH
X5	R	64K9
X3	R	8R
X8	R	18K
X15	C MKH	144N
X17	R	18K
X18	C MKH	180N
X18	R	8R
X7		
X9	R	8R
X9		OPEN

PERFORMER
4816

COMPONENT	TYPE	VALUE
X16	C MKH	47NH
X12	R	8K87
X13	C MKH	47NH
X14	/	
X11	R	18K8
X1	C MKH	47NH
X2	R	3K74
X4	C MKH	47NH
X5	R	24K9
X3	R	8R
X8	R	18K4
X15	C MKH	180H
X17	R	13K8
X18	C MKH	180H
X18	R	31K6
X7	C MKH	180H
X9	R	31K6
X9	C MKH	39N

PERFORMER
4817

COMPONENT	TYPE	VALUE
X16	C MKH	47NH
X12	R	8K87
X13	C MKH	47NH
X14	/	
X11	R	18K8
X1	C MKH	47NH
X2	R	3K74
X4	C MKH	47NH
X5	R	24K9
X3	R	8R
X8	R	22K1
X15	C MKH	180H
X17	R	18K7
X18	C MKH	180H
X18	R	39K9
X7	C MKH	180H
X9	R	39K9
X9	C MKH	39N

PERFORMER 24/26
LOW MID

COMPONENT	TYPE	VALUE
X16	C MKH	180H
X12	R	18K8
X13	C MKH	180H
X14	/	/
X11	R	17K8
X1	C MKH	180H
X2	R	13K1
X4	C MKH	180H
X5	R	39K1
X3	R	8R
X8	R	18K4
X15	C FOIL	18N
X17	R	13K8
X18	C FOIL	18N
X18	R	31K6
X7	C FOIL	18N
X9	R	31K6
X9	C FOIL	3N9

PERFORMER 27/28
LOW MID

COMPONENT	TYPE	VALUE
X16	C MKH	180H
X12	R	22K7
X13	C MKH	180H
X14	/	/
X11	R	26K6
X1	C MKH	180H
X2	R	17K4
X4	C MKH	180H
X5	R	43K2
X3	R	8R
X8	R	18K4
X15	C FOIL	18N
X17	R	13K8
X18	C FOIL	18N
X18	R	31K6
X7	C FOIL	18N
X9	R	31K6
X9	C FOIL	3N9

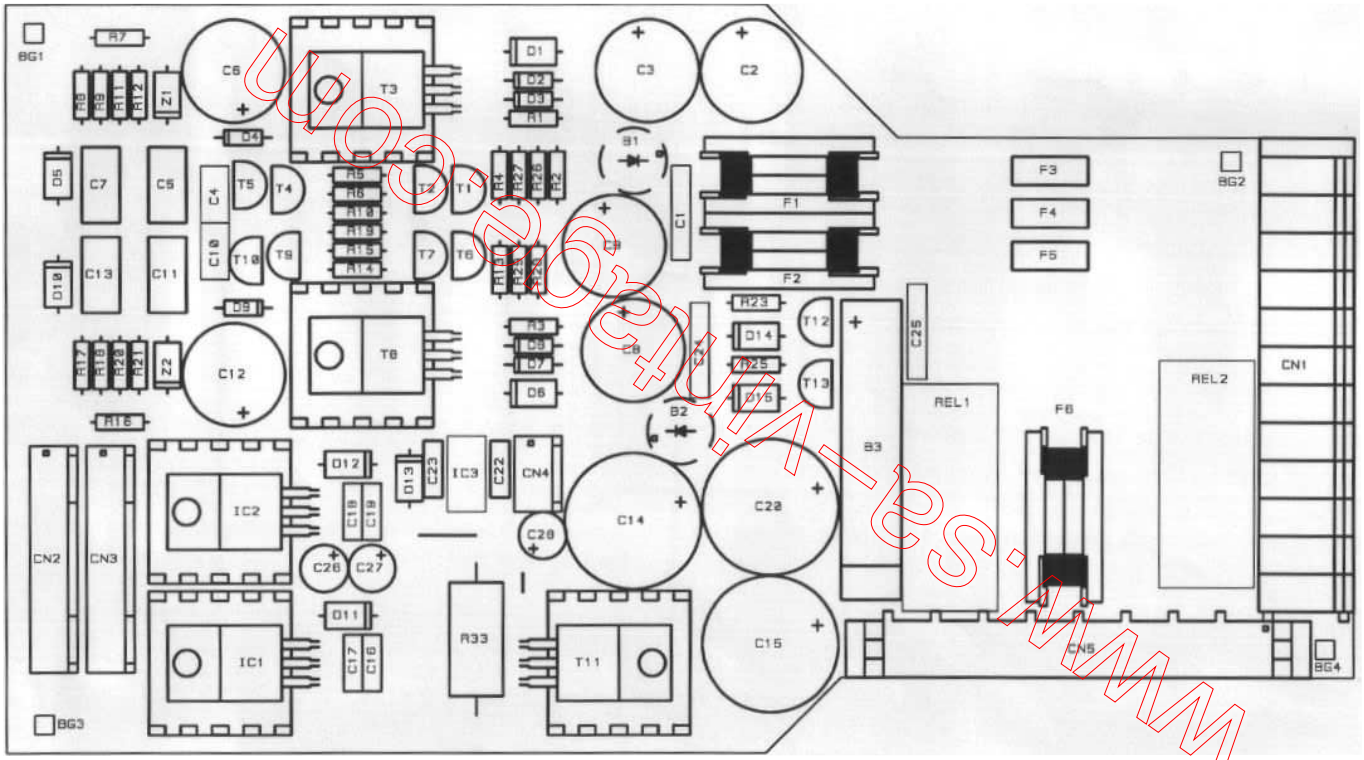
FILTER BOARD

PAGE 65

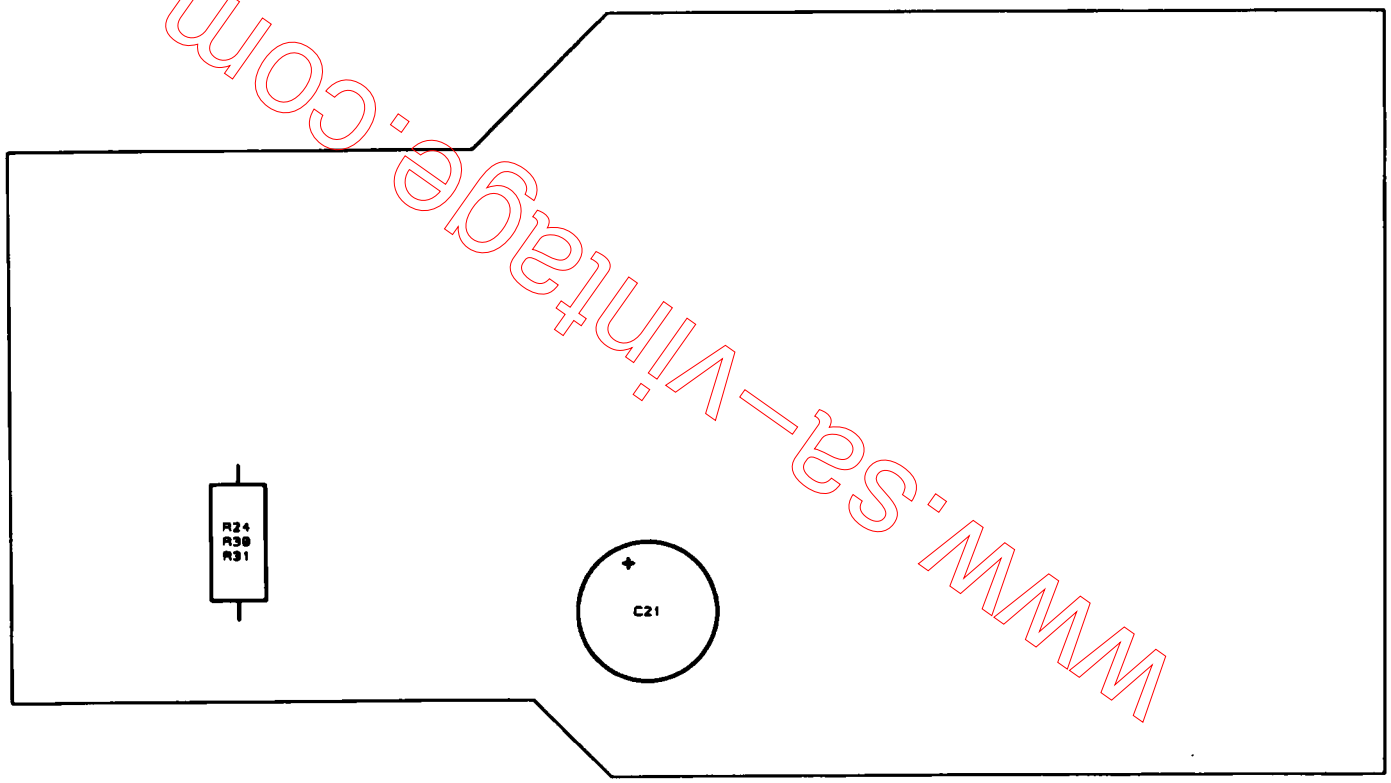
STAGE ACCOMPANY HOORN THE NETHERLANDS

PROJECT: PPA 1200
CIRCUIT: FILTER CIRCUIT
DRAWING NO:
PCB NO: 1651.1205
REMARKS:
UPDATE FROM:
DRAWN: R. KUIPERS
DATE: 88-12-02

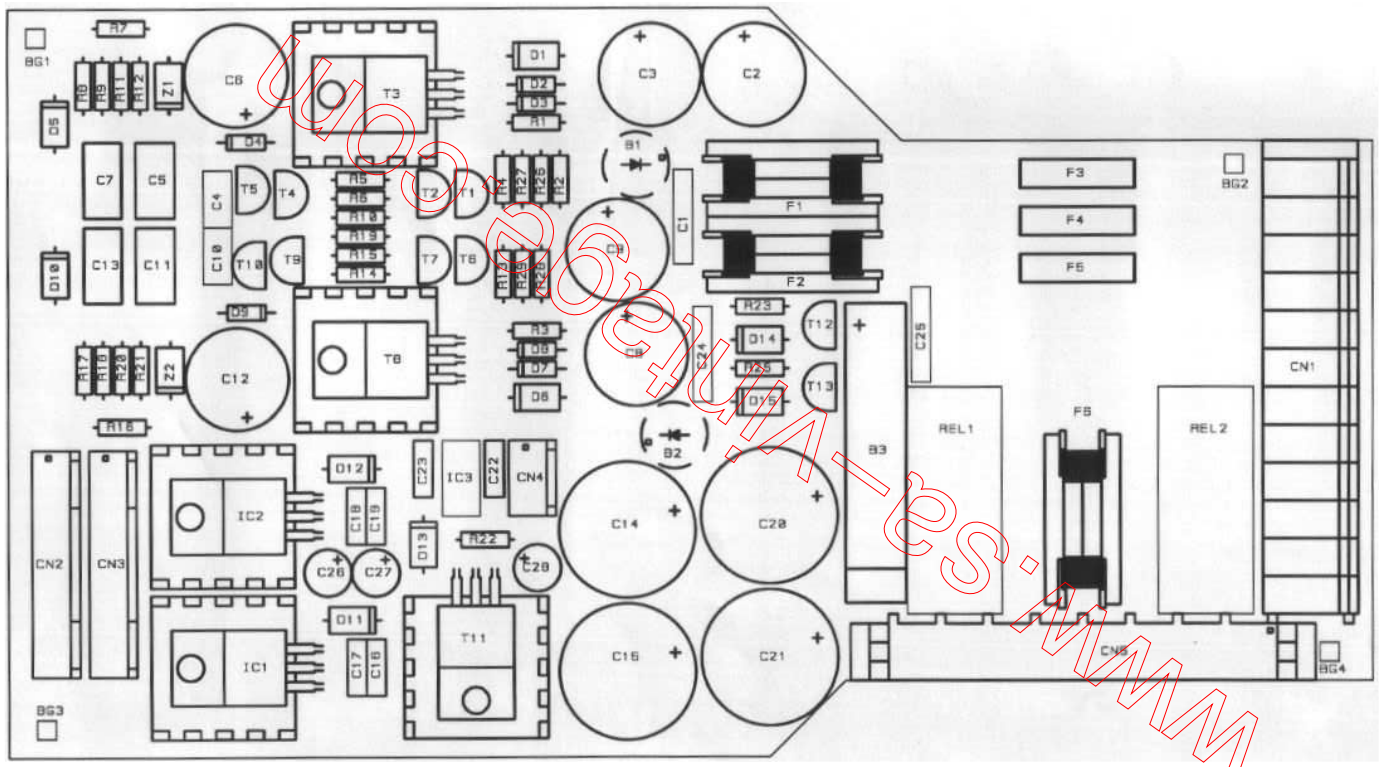
A3



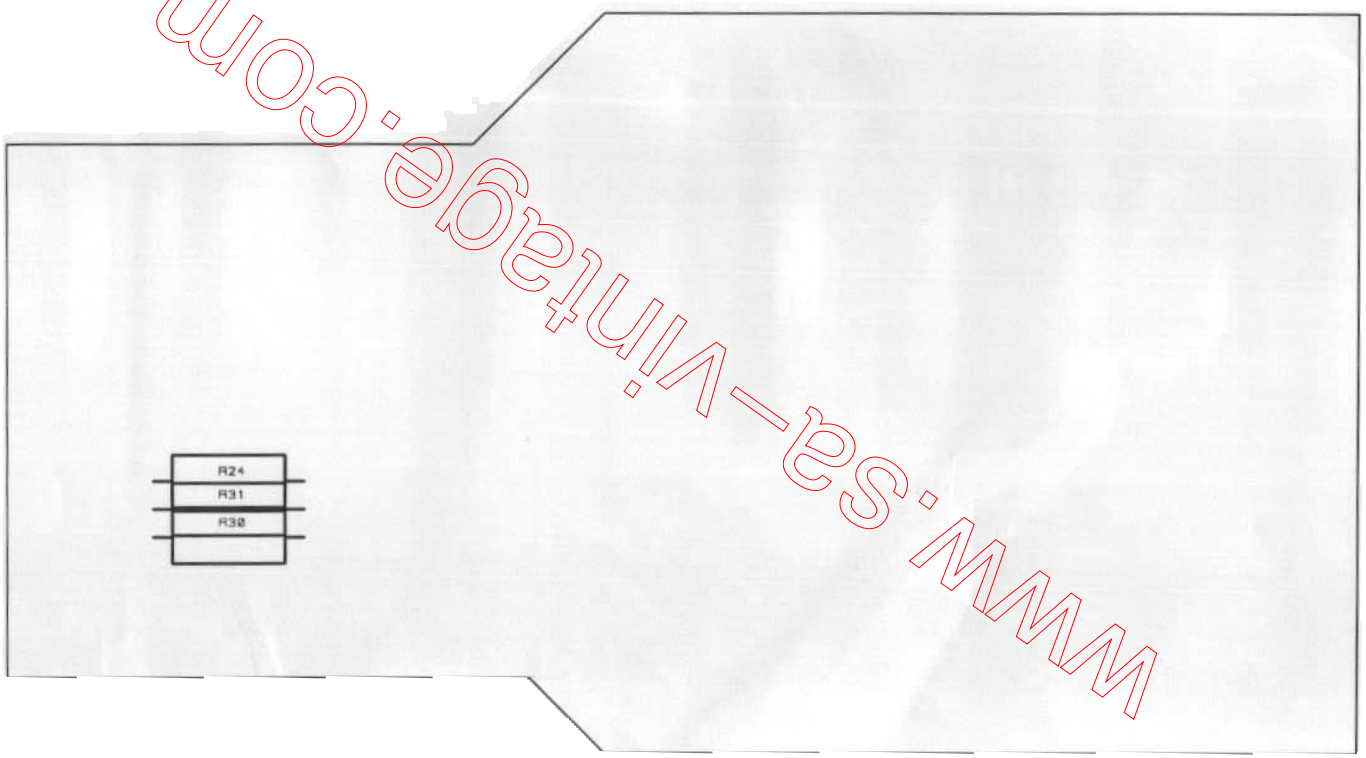
REGULATED POWER
SUPPLY BOARD 1201/2
PAGE 66



REGULATED POWER
SUPPLY BOARD 1201/2
PAGE 67

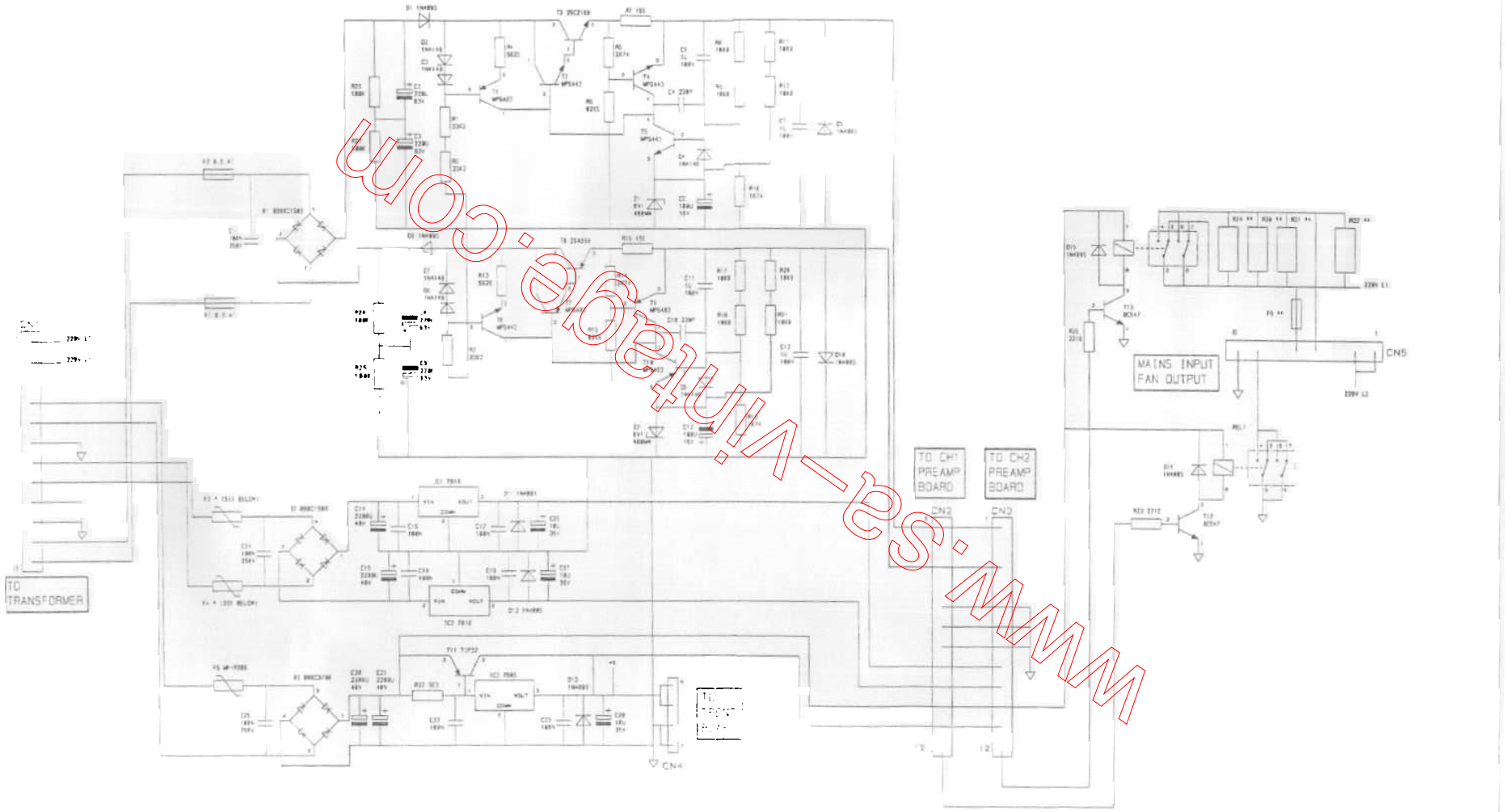


REGULATED POWER
SUPPLY BOARD 1201/3
PAGE 68



REGULATED POWER

SUPPLY BOARD 1201/3



REGULATED POWER SUPPLY BOARD
PAGE 70

STAGE ACCOMPANY HOORN THE NETHERLANDS
PROJECT: PPA 1200
CIRCUIT: REGULATED POWER SUPPLY
A3
DRAWING NO:
PCB NO: 1531.1281/2.73
REMARKS:
UPDATE FROM: 18-05-91
DRAWN: R. KUIPERS
DATE: 18-03-93

14.3 Fuses

All fuses in this manual are specified for 220/240V. For 100/110 Volts operation, all fuses at the primary side should be doubled in value.
This means the two fuses on the back of the PPA 1200 and fuse F6 on the regulated power supply board!

Fuse	220/240	100/110	
F6	1AT	2AT	(regulated power supply board)
Channel 1/2	8AT	16AT	(back of amplifier)

Fuses at the secondary side of the transformers remain unchanged.
Note that all fuses are of the slow type, fast types will survive only a few on/off cycles.