PRL POWER AMPLIFIERS

AM160

AM320

AM320S

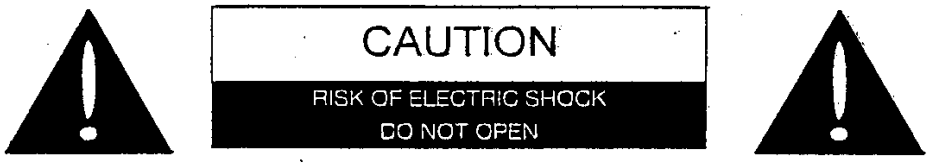
PROEL SOUND REINFORCEMENT

Technical Service Manual

Technical Service Manual

Introduction

This manual is prepared to assist service personnel with the repair and calibration of power amplifier, installed in the amplified version of TEMPLAR and SMART cabinets manifactured by PROEL.
The procedure described in this manual requires advanced technical experience and special audio test equipment.



CAUTION: To reduce the risk of electric shock, do not remove the amplifier from the cabinet and care should be taken so that objects do not fall into it. Refer servicing to qualified service personnel.

WARNING: To prevent fire or electric shock, do not expose the amplifier to water or moisture and do not cover the heatsink of the amplifier.

DOCUMENTATION: This manual contains schematics, topographics and part list of the AM160, AM320 and AM320S power amplifier.The information should be used in conjunction with the test and troubleshooting guide. The electrical and electronic components are identified on the schematics and part list.

EQUIVALENT PARTS: Most of the electronic components used in PROEL amplifier are easily available from electronic supplier and some other components are supplied by PROEL.
Repairs performed using non – PROEL spare parts may void the product warranty; when in doubt, you may contact the nearest PROEL Technical Service for assistance.
The part ordered to PROEL should include the schematic reference and the PROEL part code.

FACTORY REPAIR: If may be necessary to return a product to the factory for repair, call PROEL Technical Services for return instructions.

Test & Calibration

Required Test Equipment:

- 20 MHz Dual-channel Oscilloscope
- Function Generator
- V.E. Electronic Voltmeter (Volt and dB)
- Power Load Bank (350W in to 4 & 8 ohm)
- Digital Multimeter (Tester)
- Variac (0V – 230VAC, 15A)
- PROEL Test Cable included 0.22ohm with 5 or 10 watt

AM160 – AM320 – AM320S Test Procedure for Separate Amplifier Module

Connections:

- Connect the function generator output to the input amplifier CN1 or C18 + and select an output of 0.6 / 0.7VRMS, 0 / -2dB, 1kHz sine wave.
- Connect a dual-channel oscilloscope to the following test point; R14 (10E / 3W before relè) and S2 – ground faston.
- Connect the **test cable** included the power resistor from 0.22ohm - 5/10W in series with CN2 and the terminals connected to the power supply board (CSP081); the two terminals of the **test cable** are connected to the tester setting at 200mV range.
- Connect the power cord to the variac and make sure the knob is at 0Volt.

Calibration: Idle current, Power up & Relè Test:

- **Attention** - Before starting verify that the trimmer VR1- CSP082 is turned fully counter clockwise.

- Slowly raise the variac voltage and check at 30V that the current draw are 0 mV on the tester. If the value is different, stop the test immediately and verify the correct assembly of components or the presence of faulty solder. If the amplifier works correctly increase the voltage until you will hear the engage of the relè around 160V.

- Simultanuosly check that the sinusoidal signal is increasing gradually on the oscilloscope.

- Change the position of the test point from R14 to S1 + faston and verify the presence of the signal after the relè.

- **Disconnect the signal** from the input and increase the voltage at the nominal value of 230V. With a small screwer gently turn on the trimmer VR1 until you read 2mV on the digital multimeter.
  The 2mV value must be obtained with 230Volt supply and should remain the same for 5 minutes without load; if it does not happen, repeat the same procedure or verify the components and the solders on the amplifier module..

AM160 – AM320 – AM320S Final Test for Assembled Amplifier

Required Test Equipment:

- 20 MHz Dual-channel Oscilloscope
- Function Generator
- V.E. Electronic Voltmeter (Volt and dB)
- Power Load Bank (350W in to 4 & 8 ohm)
- Digital Multimeter (Tester)
- Variac (0V – 230VAC, 15A)
- PROEL Test Cable included 0.22ohm with 5 or 10 watt

Connections:

- Connect the function generator output at 1kHz , 0 / - 2dB, to the jack input amplifier.
- Connect one channel of the oscilloscope to the output S1 (+) and S2 (-) of the amplifier and the second channel to the amplifier input (on the jack).
- Connect the power cord to the variac and make sure that the knob is at 0Volt.

Calibration: Power output, dual feed & LED test:

- Change the position of the test point from R14 to S1 + faston and verify the presence of the signal after the relè.
- Connect the 8 ohm load and verify the stability of the idle current at 2 mV. Put the 1kHz sinewave signal to the amplifier input and verify that 20V output for AM160 and 28V for AM320 and AM320S can be seen on the VE; read the same value on R9 to check the green LED circuit.
- Connect the oscilloscope on the diode D8 and check that the wave shape is the same as shown in fig.2; repeat the procedure on the diode D15 and compare with fig.3.
- Remove the amplifier supply putting the variac knob at 0 Volt. Disconnect the amplifier module, and reassemble on the chassis for final check.

Calibration: Frequency Response & Limiter test:

- Assemble the amplifier, the preamplifier, the transformer & power supply on the chassis.
- Check the ground lift working with a digital multimeter (tester setting in Ohm) in the following way:
  a- Verify that the points are insulated (1 .ohm) when the switch is up
  b- Verify that the points are connected (00.5ohm) when the switch is down
- Connect the function generator output at 1kHz / 0.650/0.775VRMS / -2 / 0dB with a unbalanced Jack.

- Connect the oscilloscope on the faston S1 (+) and S2 (-) ground of the amplifier **without the resistive load.**

- Connect the power cord to the variac and make sure that the knob is at 0 Volt.

- Turn the trimmer VR2 (CSP083-1) fully clockwise, turn the volume up at maximun and a perfect sinewave signal at 1kHz can be seen on the oscilloscope.

- Switch on the amplifier and slowly raise the variac voltage at 230V.

- Increase the function generator output and put the amplifier in clipping, then with a small screwer turn the trimmer VR2 and check the signal that appears on the VE until:
  AM160 = 21.5V / 22V without resistive load
  AM320 / AM320S = 31V / 31.5V without resistive load

- Connect the 8 ohm load and verify the sinewave on the oscilloscope.

- Turning the volume knob, check that the LED colour is **green** for low level and **red** for high level.

- Check the frequency response of the amplifier at 100Hz, 1kHz & 10kHz without changing the output level.
  In order to check the subsonic filter, put the frequency at 30Hz and verify an attenuation on the VE or in to oscilloscope of the output level at – 12dB.

- Check the XLR input with the signal on pin 2 (+ hot) and connect pin 3 (- cold) with pin 1 (ground) unbalanced connection; compare the input with the output on the oscilloscope at 1kHz and check that the phase of the signal is the same (not-inverted).

- Switch off the amplifier, disconnect and store for the life (burning) test.

Life & Burning Test: Required Test Equipment:

- Noise Generator
- Power Load Bank with forced ventilation
- Use approprieted 230Volt supply

Step-one: One hour without signal and without load.
Switch on the amplifier and check the temperature, after one hour the heatsink is cold .
If the first step is good pass to the burning test.
Step-two: Eight hours with signal on the 4 or 8 ohm resistive load.
Switch on the amplifier, put a pink noise signal on the input and connect the output in to 4 or 8 resistive load and start with burning test.
Before switching off the amplifier check the temperature of the heatsink and the preamplifier working; turning the volume knob, check that the LED colours is green for low level and red for high level.
Step-three: Put the amplifier inside the cabinet and check its working with a musical program or a computerized measure.

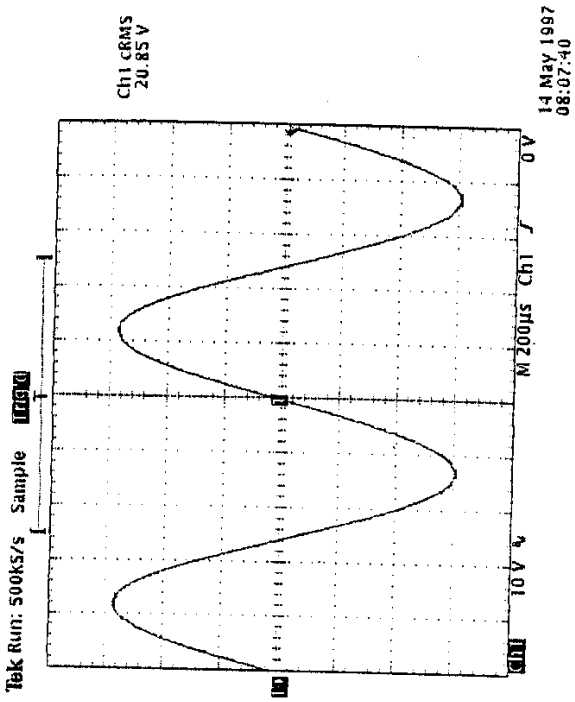


Fig. 1

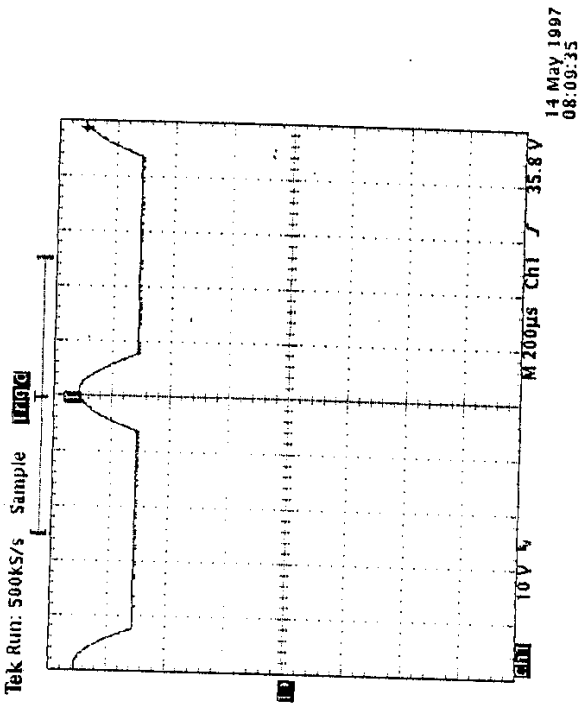


Fig. 2

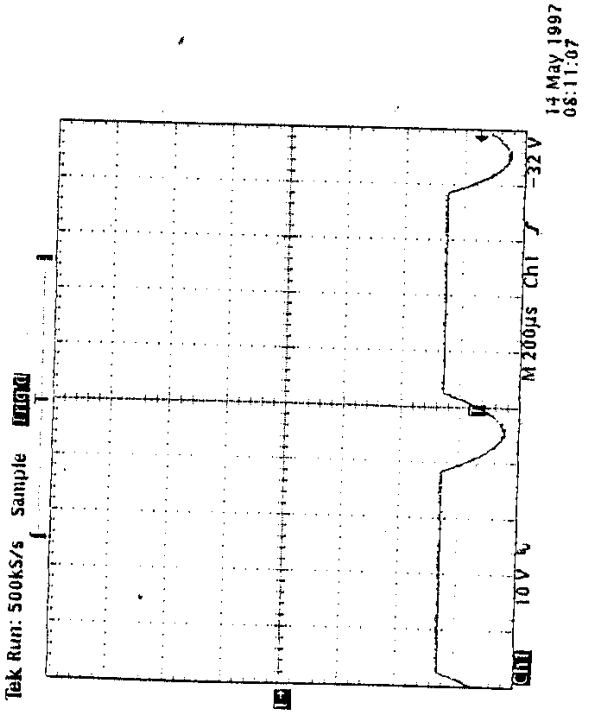
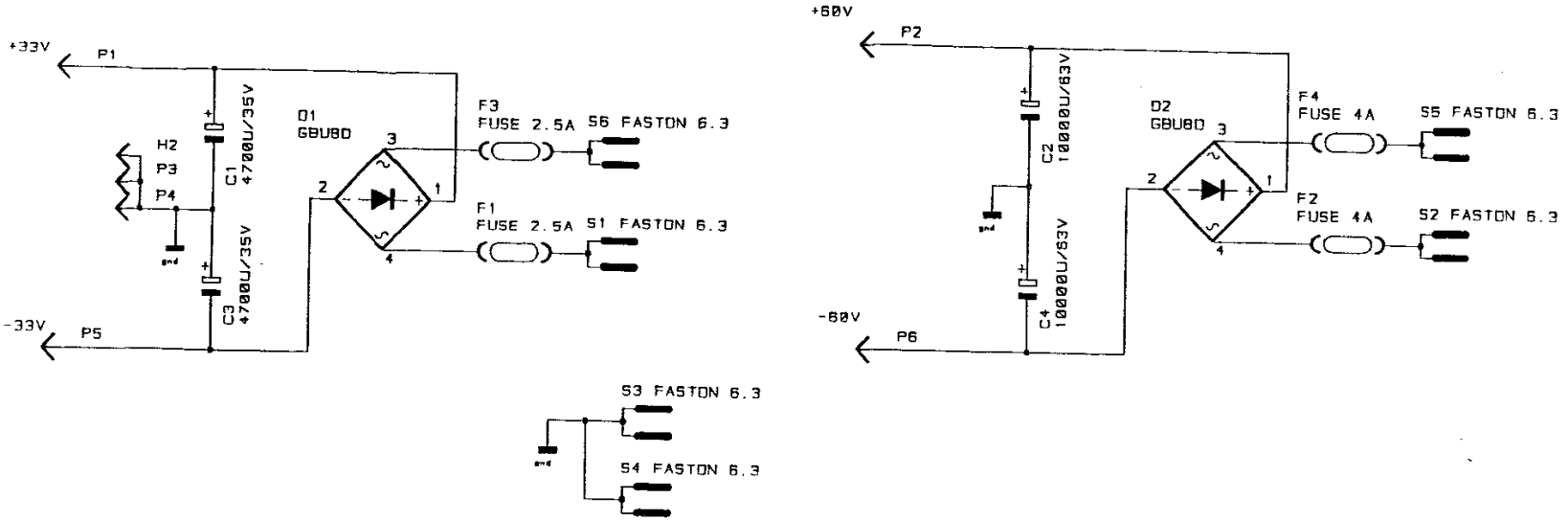
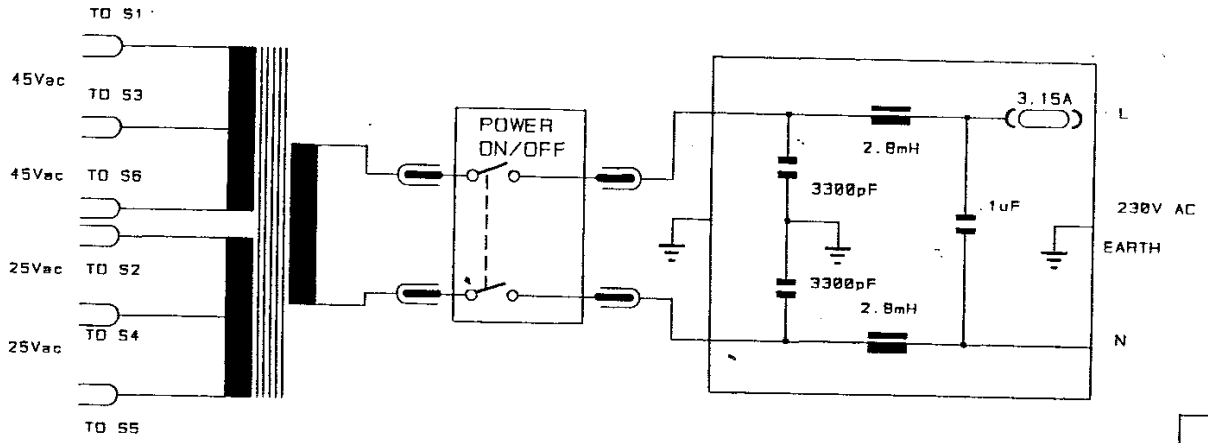


Fig. 3

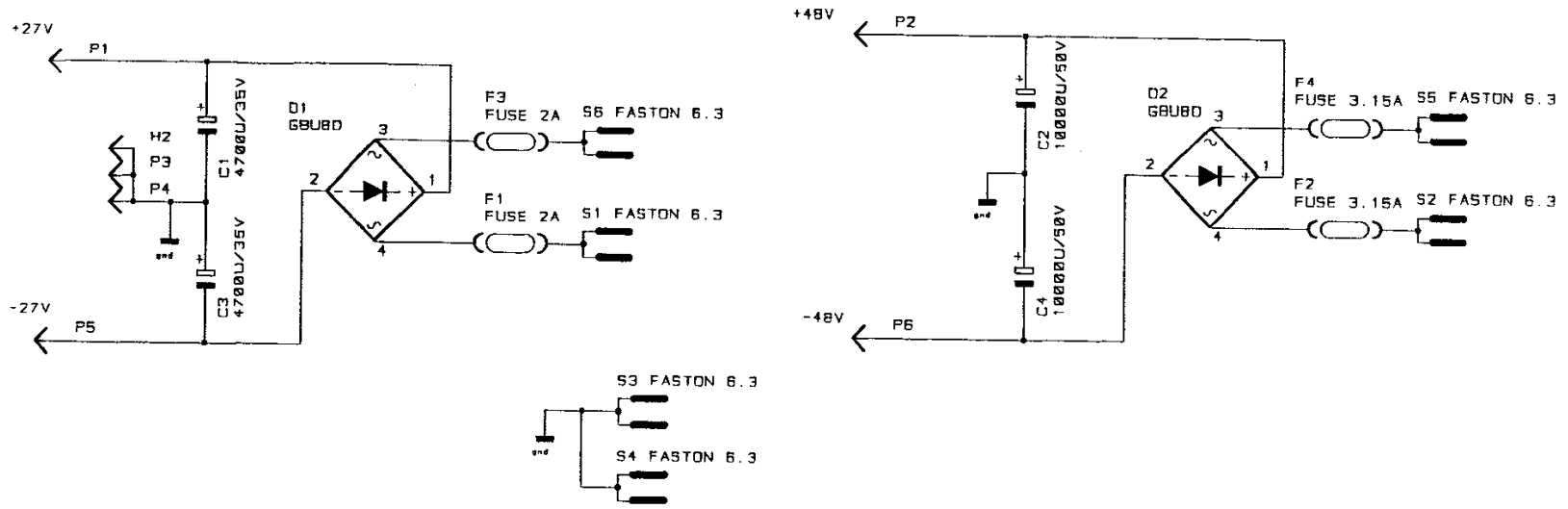
CSP081 power supply for AM320 - AM320S

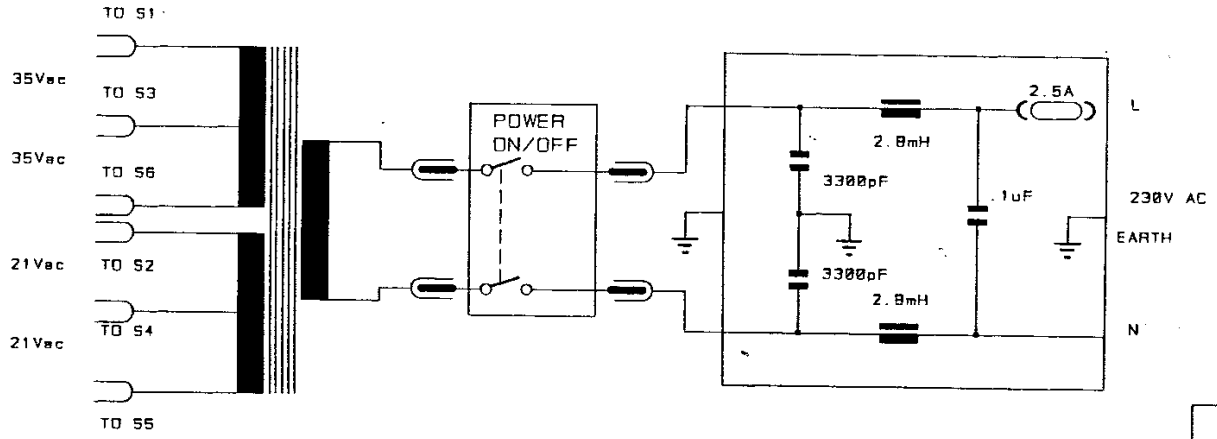




PROEL SpA	
DATE 30/12/96	REV 23/04/97
SCHEMATIC DIAGRAM	
ALIMENTATORE AM320-AM320S	

CSP081 power supply for AM160





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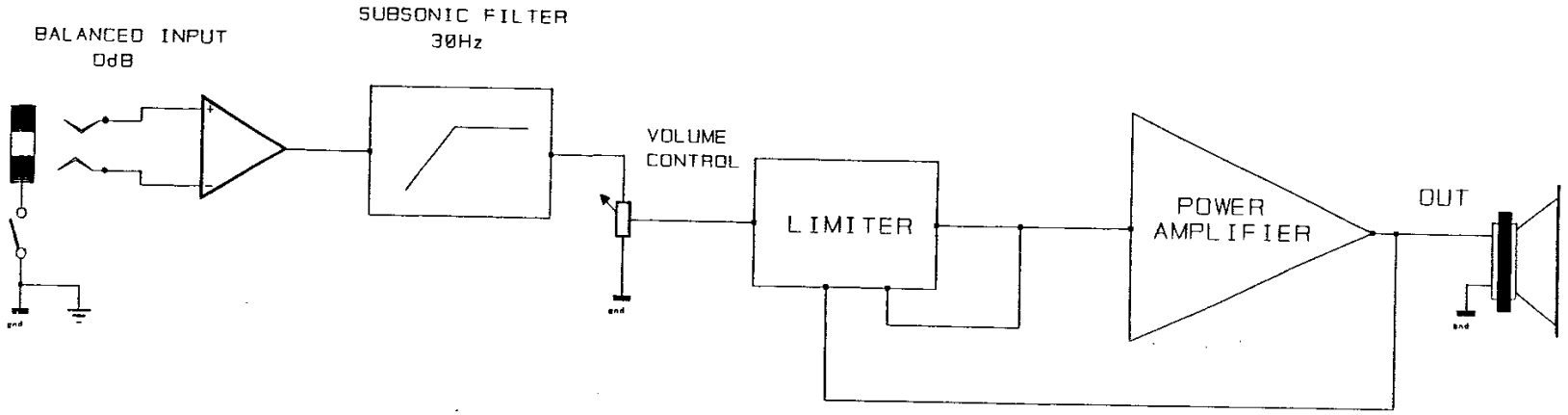
DATE 30/12/96	REV 23/04/97
SCHEMATIC DIAGRAM	
ALIMENTATORE AM160	

block diagram for AM160 - AM320



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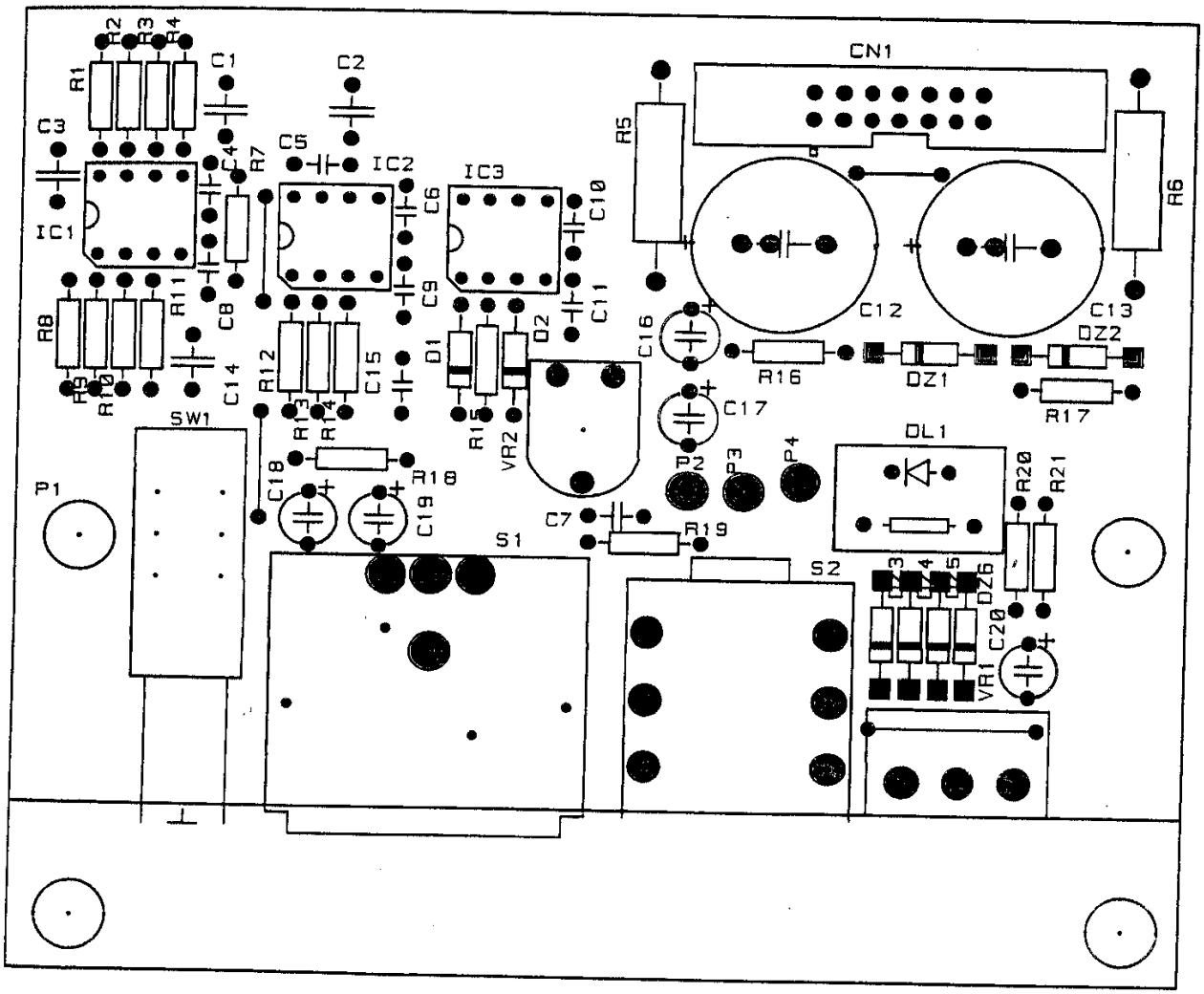
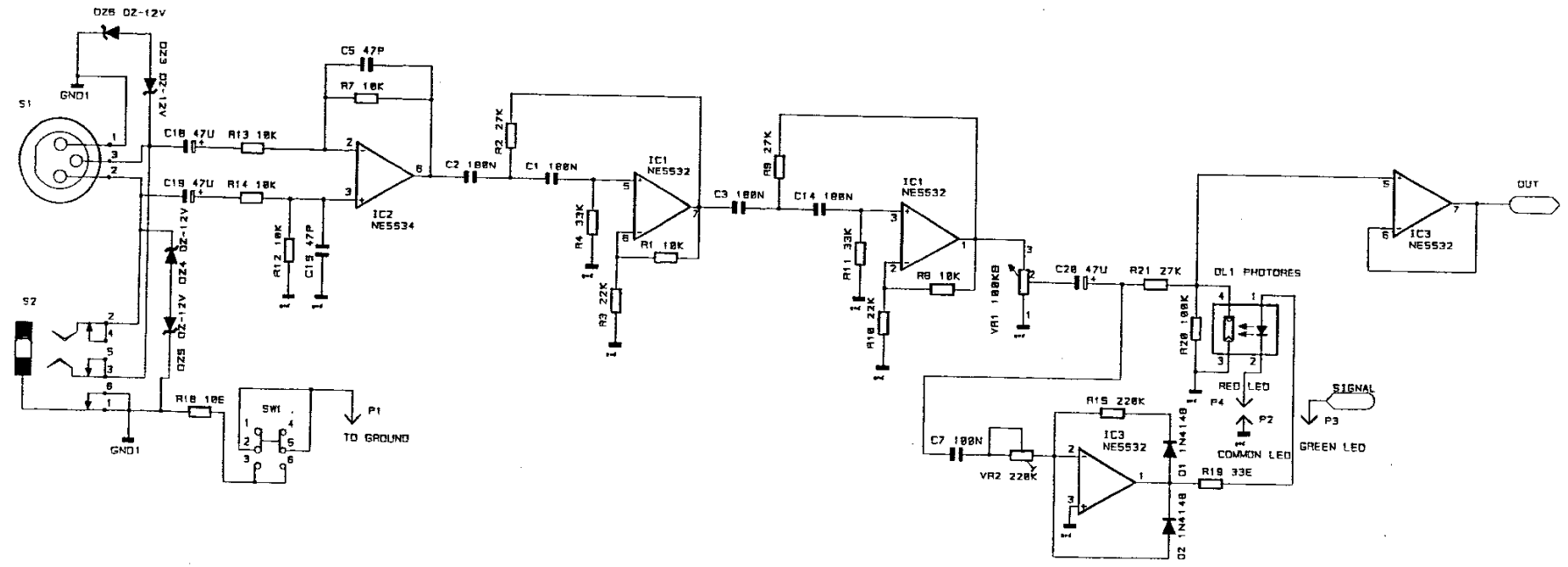
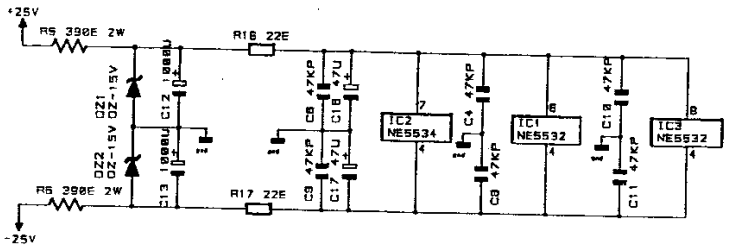
DATE 06/06/97	REV
SCHEMATIC DIAGRAM	
AM160 - AM320	

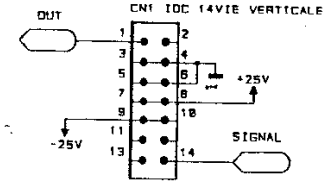
CSP083 preamplifier for AM160 - AM320



CSP083 preamplifier for AM160 - AM320

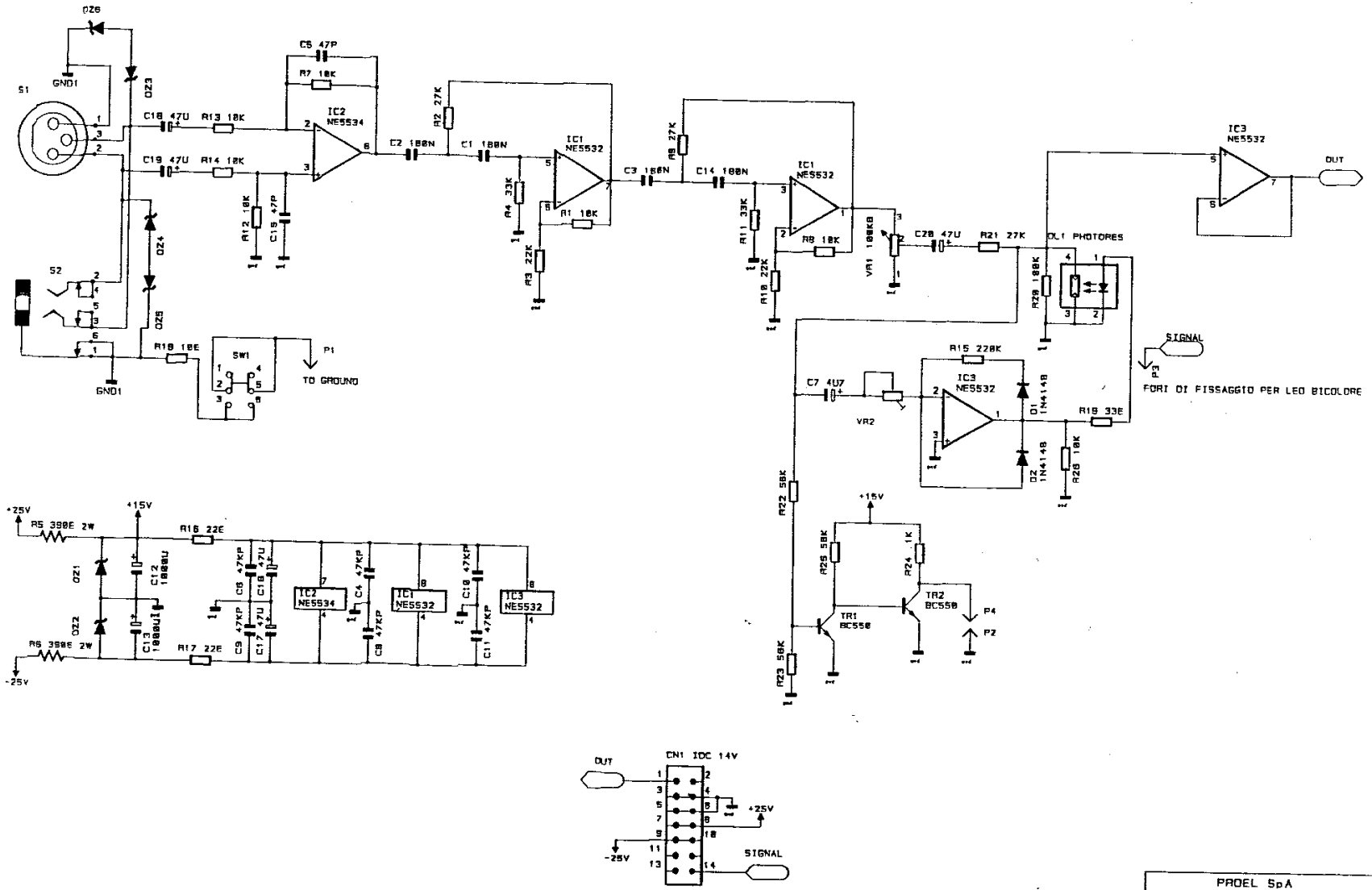






PROEL SpA	
DATE 30/12/96	REV 22/04/97
SCHEMATIC DIAGRAM	
PREAMPLIFICATORE VU88-V228	

CSP083-1 preamplifier for AM160 - AM320



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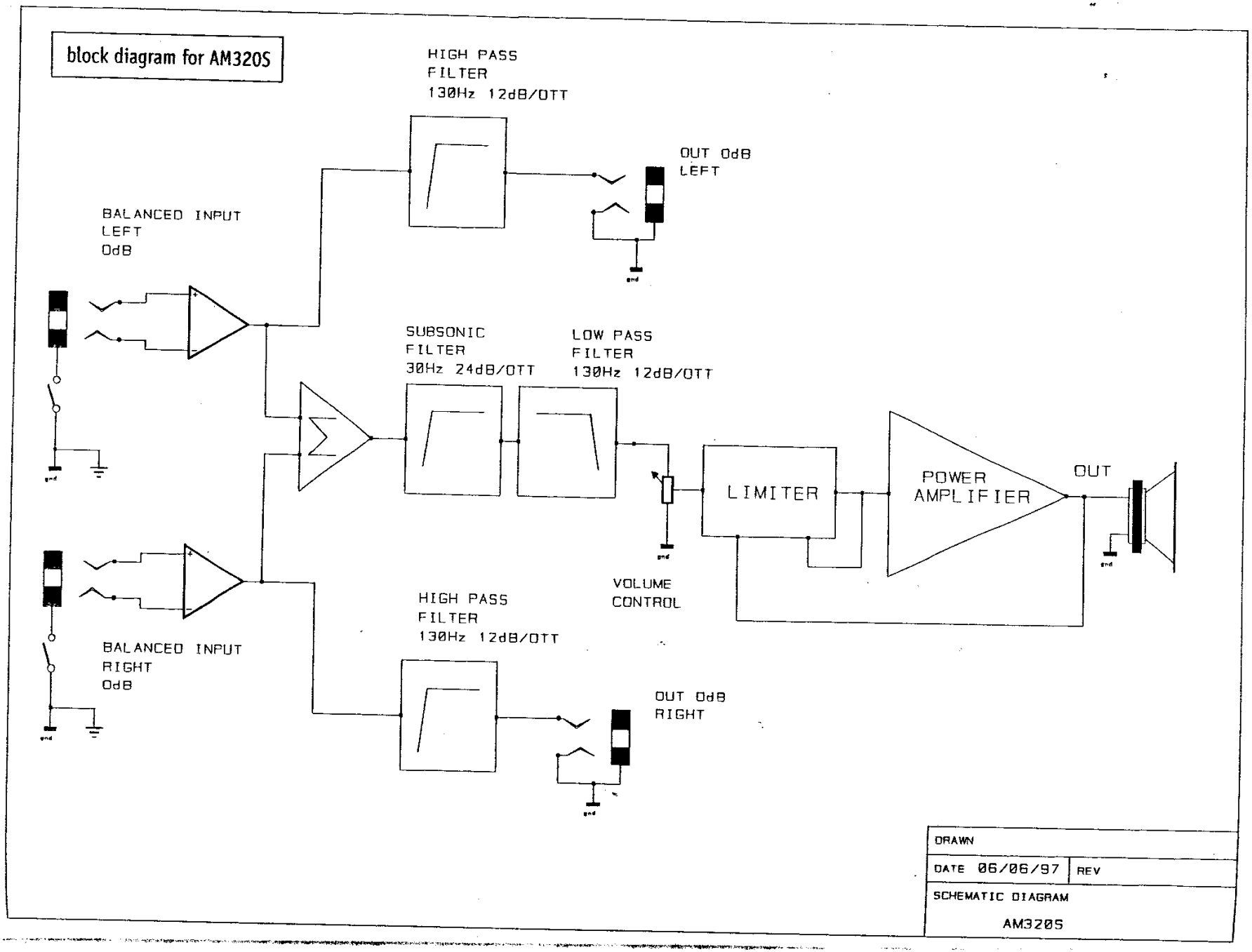
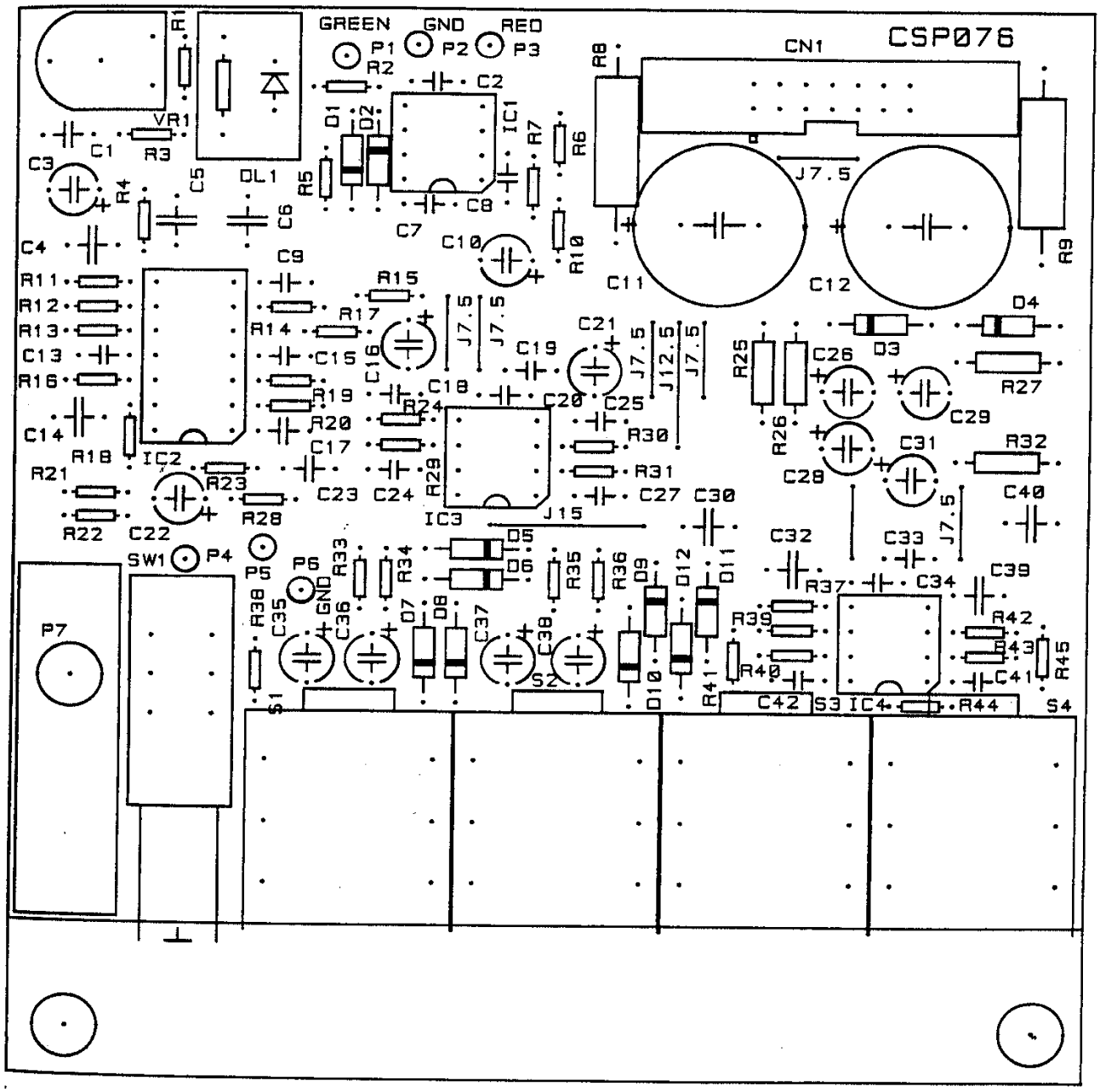
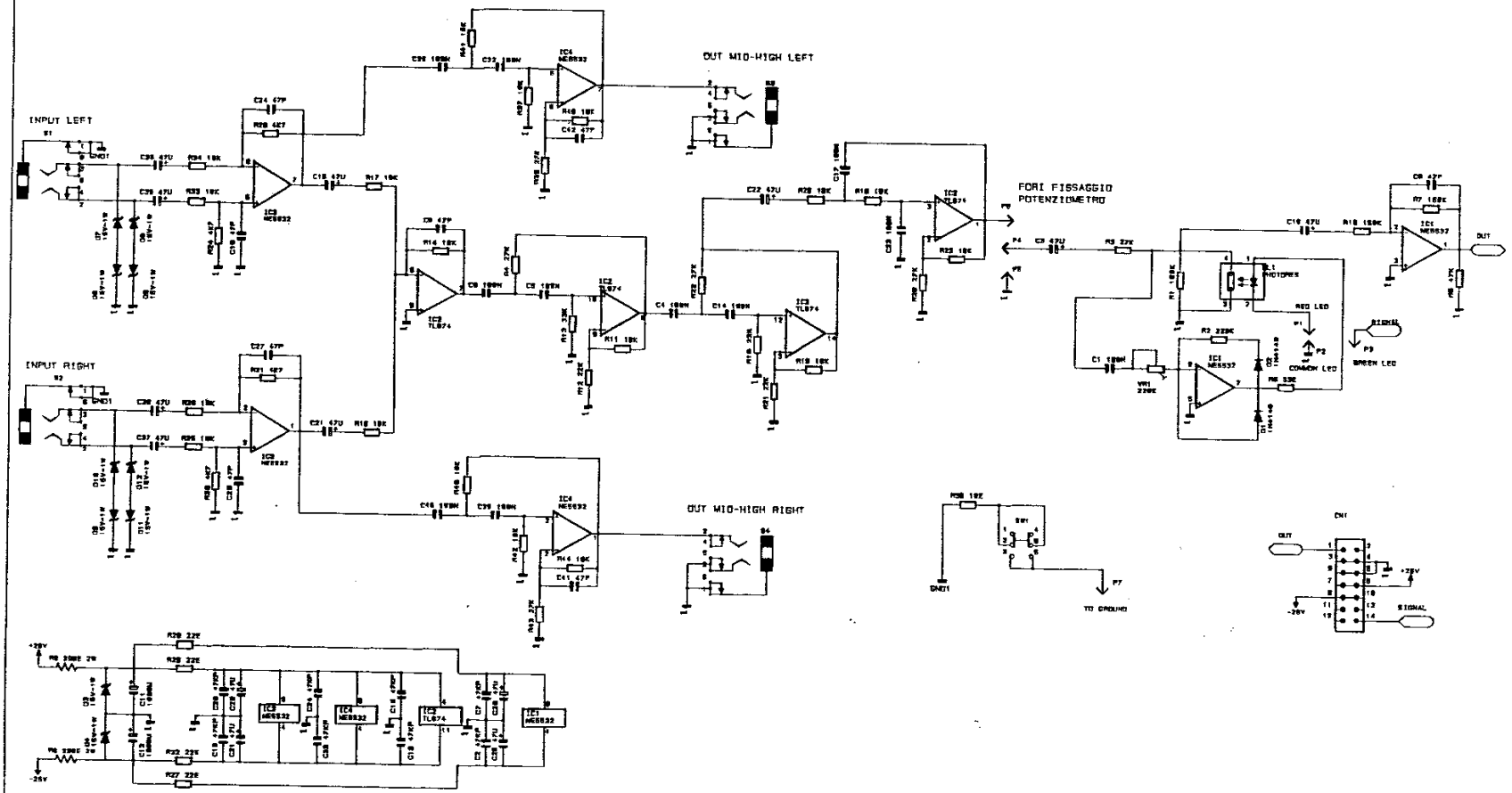
SCHEMATIC DIAGRAM PREAMPLIFICATORE M160-M320	


block diagram for AM320S
HIGH PASS
FILTER
130Hz 12dB/OTT
OUT 0dB
LEFT
BALANCED INPUT
LEFT
0dB
SUBSONIC
FILTER
30Hz 24dB/OTT
LOW PASS
FILTER
130Hz 12dB/OTT
LIMITER
POWER
AMPLIFIER
OUT
VOLUME
CONTROL
HIGH PASS
FILTER
130Hz 12dB/OTT
BALANCED INPUT
RIGHT
0dB
OUT 0dB
RIGHT
DRAWN
DATE 06/06/97
REV
SCHEMATIC DIAGRAM
AM320S

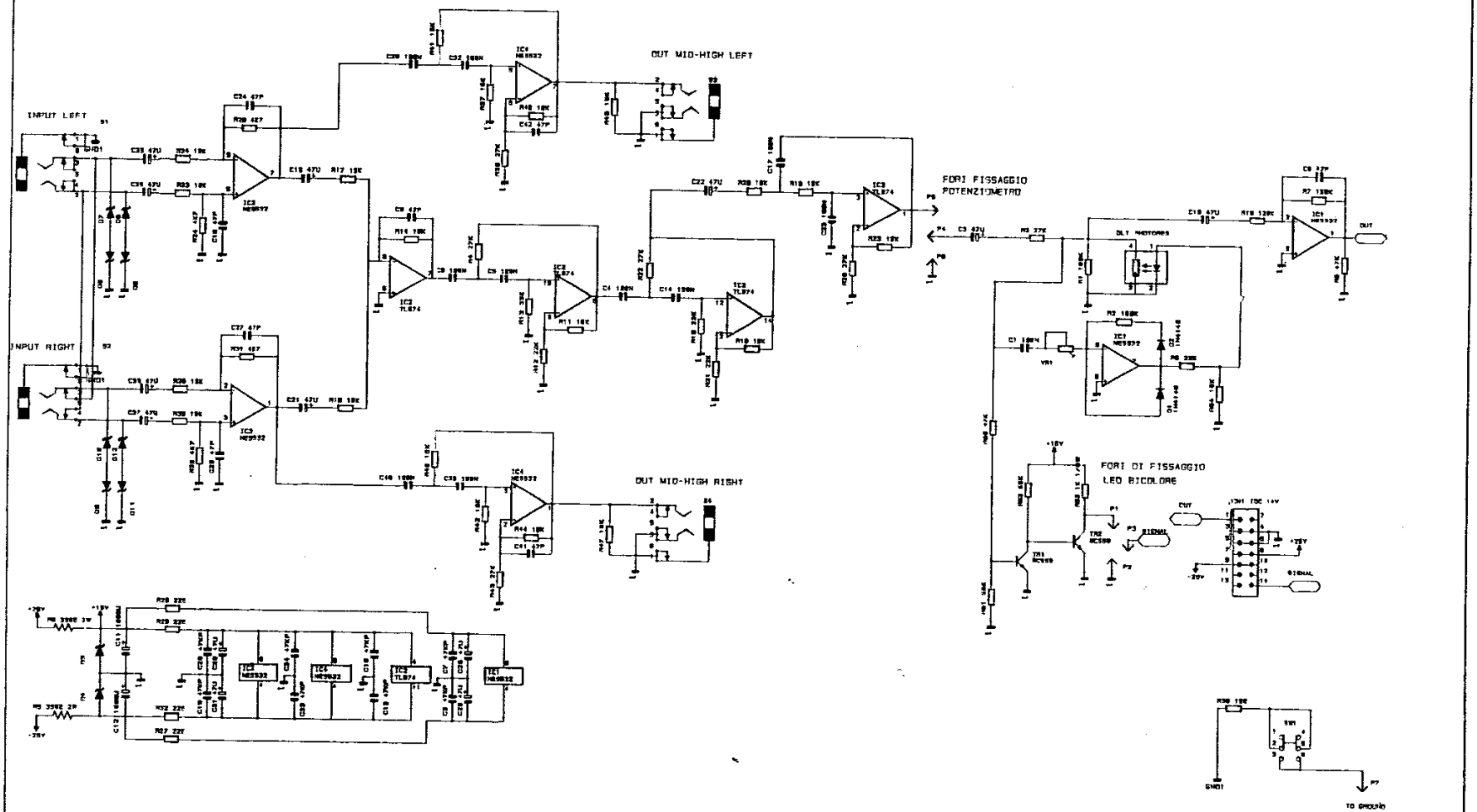
CSP076 preamplifier with electronic crossover for AM320S



CSP076 preamplifier with electronic crossover for AM320S



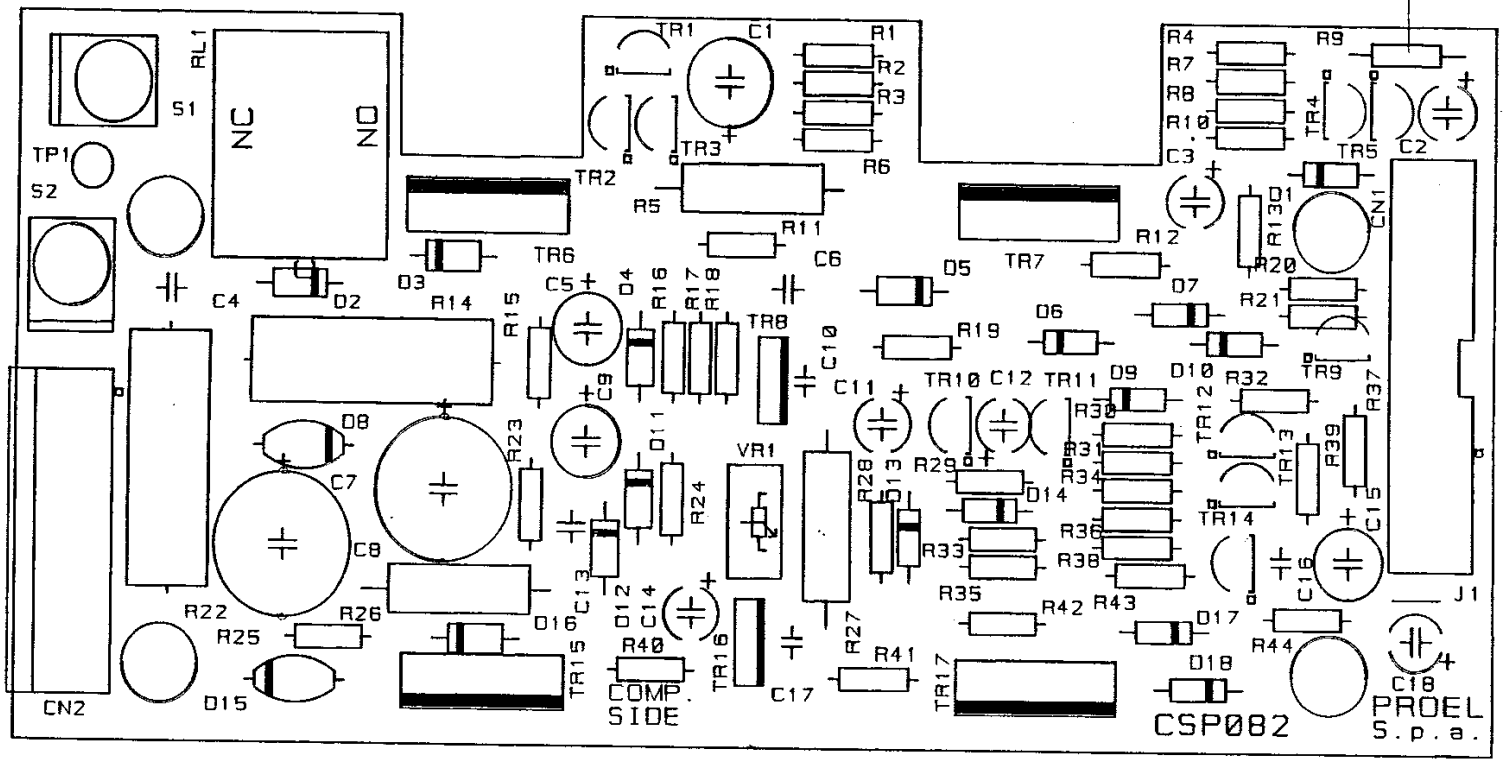
CSP076-1 preamplifier with electronic crossover for AM320S

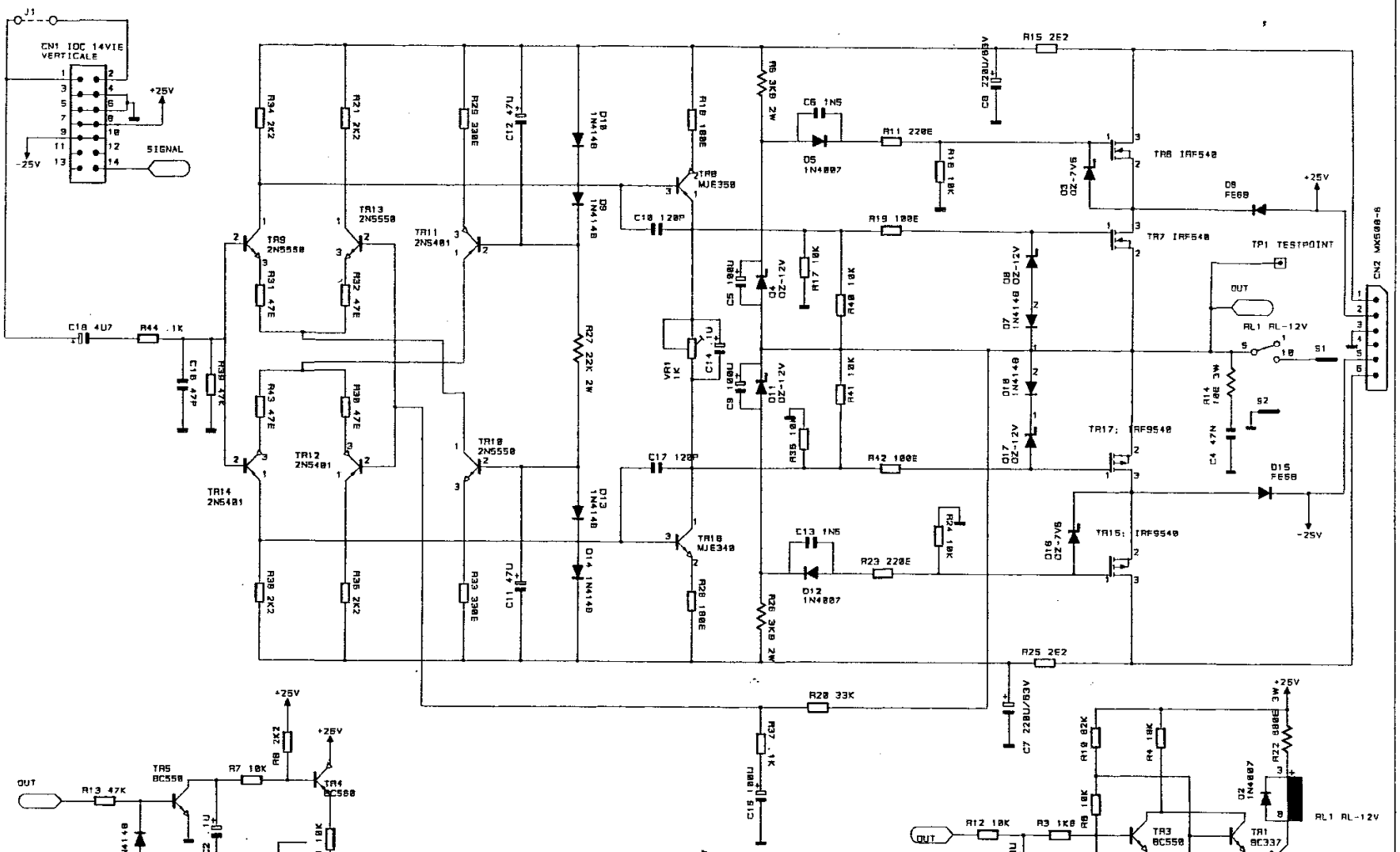


CSP082 power amplifier for AM160 - AM 320 - AM320S

	AM160	AM320 -AM320S
TR6	IRF 540	IRF 540
TR7	IRF 540	IRF P140
TR15	IRF 9540	IRF 9540
TR17	IRF 9540	IRF P9140

R9 = 10KΩ
R9 = 33kΩ





	AM160	AM320 -AM320S
TR6	IRF 540	IRF 540
TR7	IRF 540	IRF P140
TR15	IRF 9540	IRF 9540
TR17	IRF 9540	IRF P9140

CSP082 power amplifier for AM160 - AM 320 - AM320S

PROEL SpA

DATE 23/12/98 | REV 22/04/97

SCHEMATIC DIAGRAM

POWER AMPLIFIER M160/M320/M320S