‘TURBO’

Upgrade for GSSL compressor/limiter

Assembly and Installation instructions

http://www.expataudio.com

Thank you for purchasing the Expat Audio 'Turbo' GSSL upgrade.

Please read through the instructions to familiarise yourself with the project before beginning, although this is a fairly simple project: -If you can build a GSSL, this should present no real difficulty at all.

You will need the following bill of materials to Assemble the Turbo:

Semiconductors		
Component	Quantity	Description
IC1	1	TL074
IC2	1	THAT2150
D1 – D6	6	1N4148
Resistors		
Component	Quantity	Description
R1	1	33k
R2 – R4	3	20k
R5, R17	2	10k
R6	1	1M
R7	1	68k
R8	1	270k
R9	1	510k
R10	1	620k
R11	1	3M9 (3.9M)
R12	1	1M8 (1.8M)
R13	1	1M2 (1.2M)
R14	1	15k
R15, R16	2	47Ω
R18	1	3K9 (3.9k)
R19	1	470Ω
Capacitors		
Component	Quantity	Description
C1, C5	2	100p
C2	1	22µF@25V
C3, C4	2	100nF
Connectors		
Component	Quantity	Description
X1, X3	2	3-pin, 0.1" header
X2	1	4-pin, 0.1" header

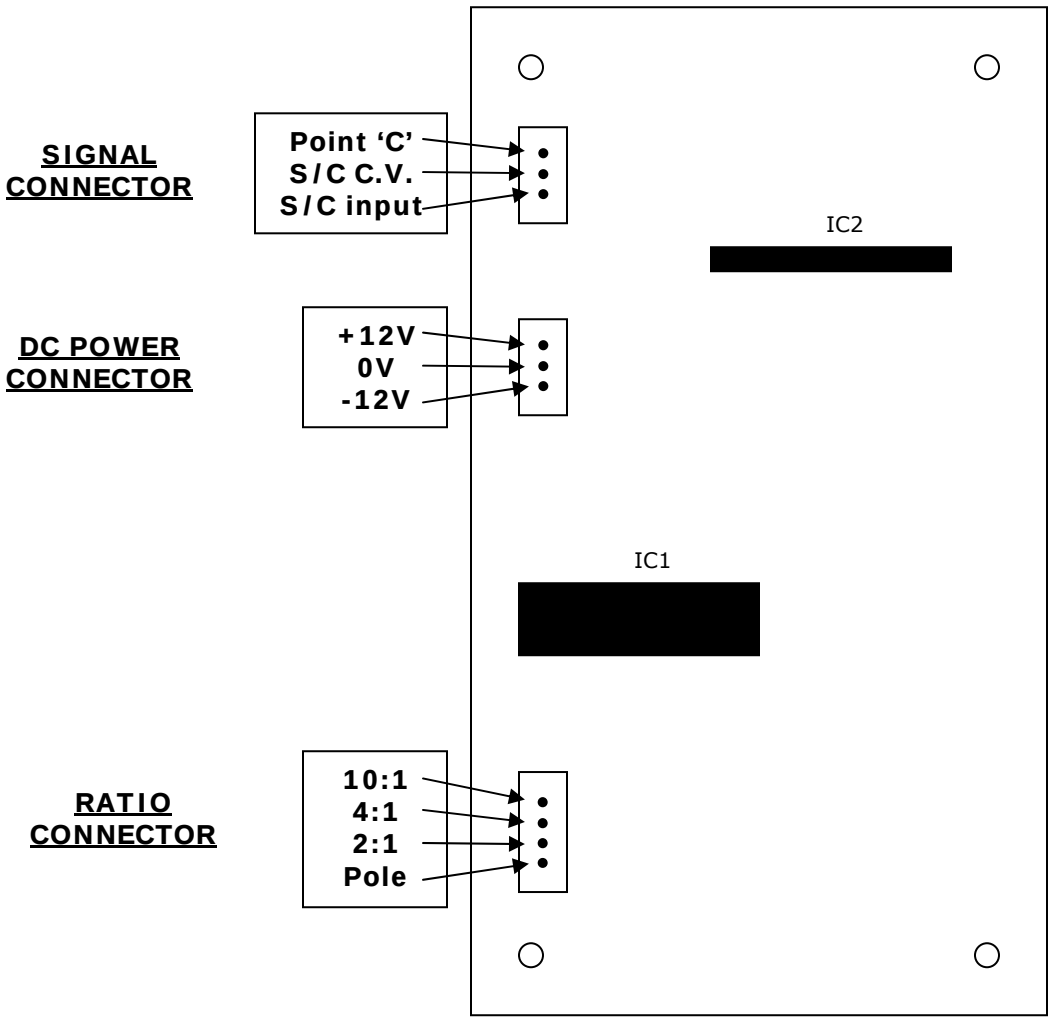
Once you have all the components, place and solder them in the board. The two ICs may be socketed if you prefer.

Notice that the two 0.1µF capacitor locations have 'alternate' hole spacings available; -the outermost hole is there as a convenience feature in case you have a capacitor style where the leads won't easily band to fit a 0.1" spacing. –If you do use the outermost (0.2" spaced) holes, please note that the outer most hole is not connected: You will need to bridge the alternate (outer) hole to the middle hole. The two 'active' holes are those indicated by the capacitor symbol in the component-side silk screening.

INSTALLATION

Once the board is populated and you've double-checked the component placement, please take a moment to double-check that you have the orientation of the six diodes, C2 and both IC's!

Take a look at the following illustration, which shows the location of the header connectors, together with a description of the function of each pin.



Location of Connector headers
And identification of pin Functions

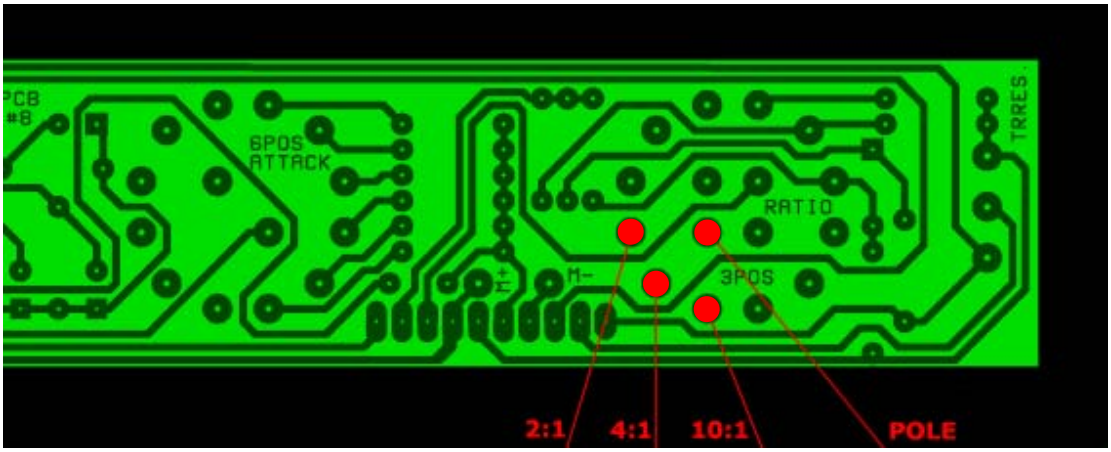
Each of the three connectors is dedicated to a particular function. One at a time, wire the connectors to their respective functions. Just as with the GSSL, you may either

use header connectors, or (-if you are the *really* confident type!) you can hard-wire directly to the board.

WIRING THE RATIO CONNECTOR:

- -Connect the "**Pole**" pin to the common ('pole', or 'wiper') terminal of an unused section of the ratio switch.
- -Connect the "**2:1**" pin to the switch terminal which connects with the common, when the switch is in the '2:1' position
- -Connect the "**4:1**" pin to the switch terminal which connects with the common, when the switch is in the '4:1' position.
- -Connect the "**10:1**" pin to the switch terminal which connects with the common, when the switch is in the '10:1' position.

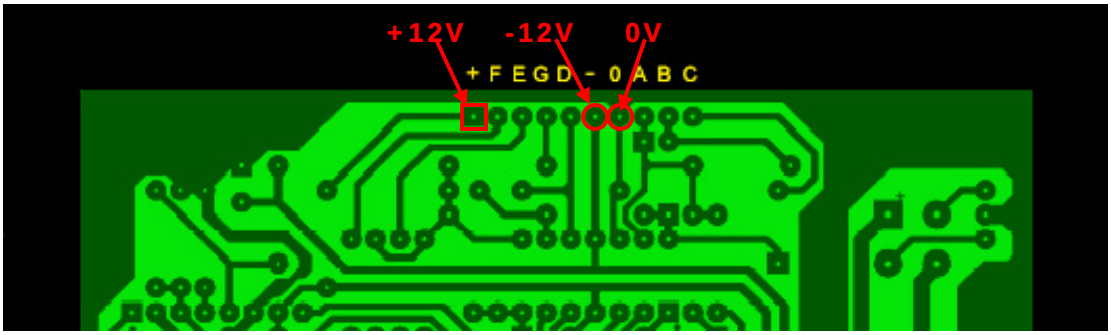
If you're using PCB mounted 'Lorlin' type switches, mounted onto the Gyraf front panel PCB, connect the wires by soldering onto the unused switch terminals according to the illustration below:



(Viewed from **solder** side of circuit board)

WIRING THE DC POWER CONNECTOR:

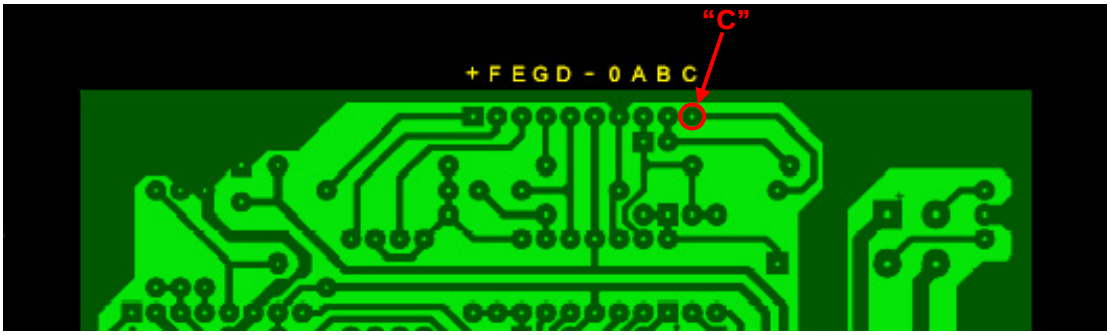
- -Connect the "**+12V**" pin to pin #1 of the 10-pin connector which links the main GSSL circuit board with the front panel control board. It is identified "+" below. (and it is the only SQUARE solder pad.)
- -Connect the "**0V**" pin to pin # 7 of the same connector. –It is identified "0" below.
- -Connect the "**-12V**" pin to pin #6 of the same board. –It is identified "-" below.



(Viewed from **solder** side of circuit board)

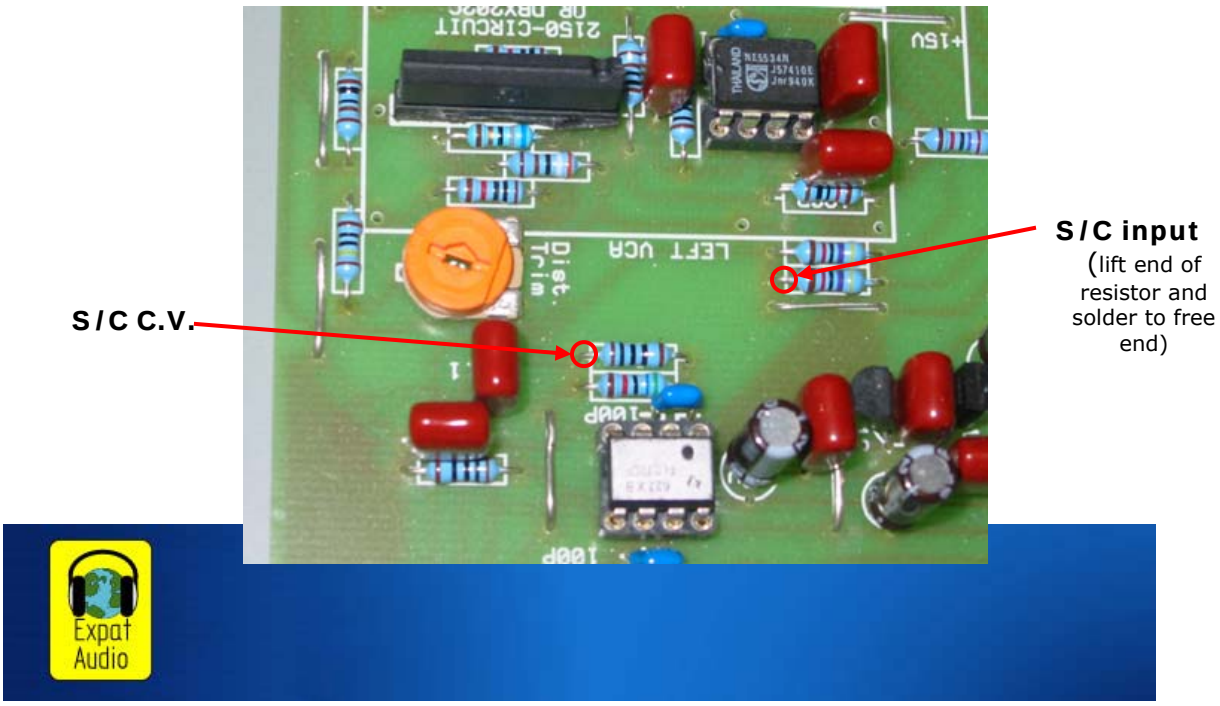
WIRING THE SIGNAL CONNECTOR:

- -Connect the "**Point 'C'**" pin to pin #10 of the 10-pin connector which links the main GSSL circuit board with the front panel control board. It is identified "C" below.



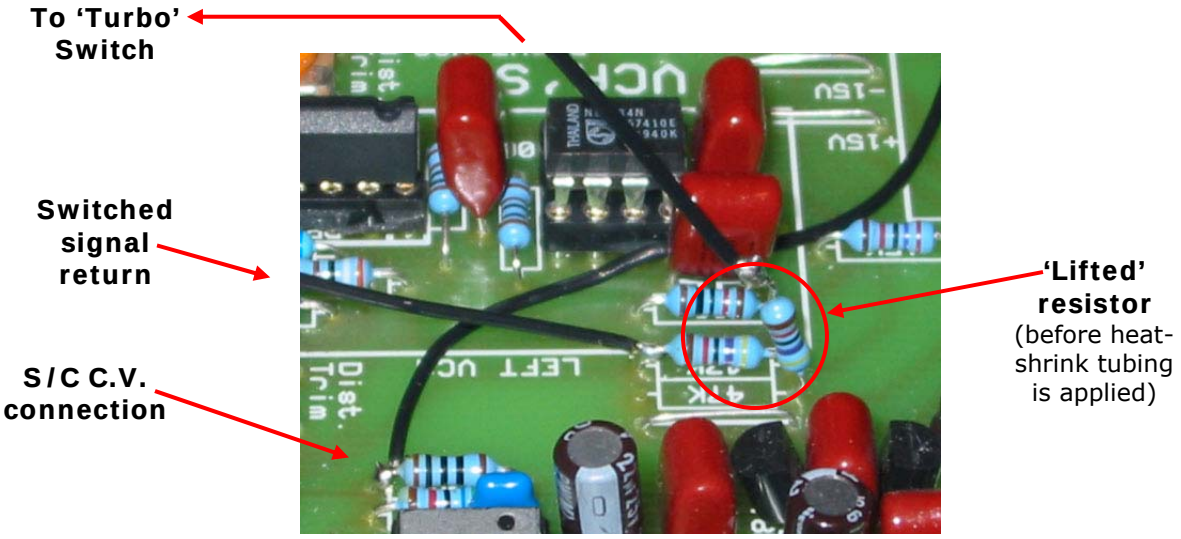
- -Connect the "**S/C C.V.**" pin to the end of a 100Ω resistor which is located on the main GSSL circuit board, near to the TL072. There are two resistors between the 072 and the left VCA; the resistor which needs to be connected is the one ***further*** away from the 072: in other words, the one which is slightly closer to the VCA –The particular end you need to connect to is the end nearest the 'Dist. trim' adjustment.

- -Connect the "**S/C input**" pin to the 'lifted' end of the 47K resistor on the main circuit board, directly next to the letter 'L' of the words "LEFT VCA". –The best way to do this is to unsolder and 'lift' the end of the resistor closest to the letter 'L' of the word "LEFT". –It is this 'lifted' end of the resistor which should connect to the wire going to the Turbo board.



MAKING 'TURBO' MODE SWITCHABLE:

- -For the last step above, lift the 47kΩ resistor leg as described in the above step, but instead of wiring it directly to the "**S/C input**" pin, instead wire it to the pole (middle pin) of a single-pole, double-throw (SPDT) switch. Then wire one of the two outside terminals to the "**S/C input**" pin, and the other outside terminal back to the hole from which the resistor leg was unsoldered. –In this manner the switch either sends the signal from the 47k resistor to the turbo board, OR right back where it was originally going, in the original Gyraf GSSL design.



Installation with 'High-pass' Sidechain boards: (optional)

There have been a couple of lof-frequency rolloff boards designed for the GSSL as attempts to 'fix' the GSSL's tendency to over-compress loud, centre-panned instruments. These can still be used with the Turbo, however you'll need TWO channels of high-pass filter board. Also, a dual-gang switch should be used, so that the rolloff selector switch now controls BOTH channels simultaneously.

–It's worth considering however, that the need to use a low-rolloff may be quite considerably reduced once the turbo board is fitted, since the original design's dual-sidechain circuit (which was omitted from the GSSL version) is considerably less sensitive to being influenced by the typical centre-image 'problem' sources, such as kick drum, bass, and loud solo instruments. –However, if your front panel has already been drilled and printed or engraved to accommodate a sidechain rolloff switch, there's no problem in keeping the additional functionality, although you may find that it may not be required anywhere near as much. (The original console buss compressor circuit had no provision whatsoever for modifying the sidechain

response, and it was never asked for until the GSSL clone was built, when it was designed in an attempt to make the unit less sensitive to large-amplitude (think bass etc.) centre-panned instruments.

If you have a sidechain rolloff board in your unit, you'll probably notice that it 'replaces' the two 47k resistors where the turbo sidechain takes connect its input and output signals.

If your unit has a sidechain filter and you'd like to retain it, You should first build a second sidechain filter for the other channel, then wire ONE input to the left input of each sidechain board (instead of two inputs to one board), then wire the output of one sidechain board back to the GSSL main board as normal, and wire the output of the second sidechain board EITHER:

1) To the sidechain input of the Turbo board, if you're making the unit permanently 'turbo'.
2) To the pole of the changeover switch, if you're making the unit 'turbo-switchable'.

Another helpful way to consider the sidechain boards: they 'replace' the 47K resistors… In the normal installation, the signal goes through the two 47K resistors, one passes signal to the GSSL sidechain circuit, the second one (the one which you 'lift') passes signal to the turbo board. –If you use the sidechain boards, each sidechain board will be used to directly replace ONE of the 47k resistors in function.

That's it! –As one final safety check, it's usually best to make sure that the DC power is wired correctly before you fire it up. –If the 074 and VCA are socketed, leave them out of the sockets the first time that you power up the unit with the turbo wired-in. –Measure DC volts at pins 4 and 11 of the 074: -You should measure POSITIVE 12 volts at pin 4 and NEGATIVE 12 volts at pin 11. –If it's the *other* way round, you'll be glad that you left the chips out! –Correct it before plugging in the chips. –One final double-check (and the check to carry out BEFORE powering up if the 074 and VCA are soldered directly to the board instead of being socketed) is to measure continuity between pin 4 of the TL074 on the Turbo board and pin 4 of the 074 on the main GSSL board. Likewise pin 11 of the 074 on the Turbo board should read full continuity to pin 11 of the 074 on the GSSL main board.

Make sure that the VCA is the right way round (pin 1 nearest the connector headers) and you should be safe to power it on.

Enjoy your limiter's new personality.

Or, -if you've made it switchable- Enjoy its new "dual-personalities"!

-The Expat Audio team.