

## NL540 Alternative Gain Module

### Introduction

The NL540 ALTERNATIVE GAIN is a four channel NeuroLog System module that can be used with our NL820A ISOLATION AMPLIFIER to attenuate and or invert up to four input signals.

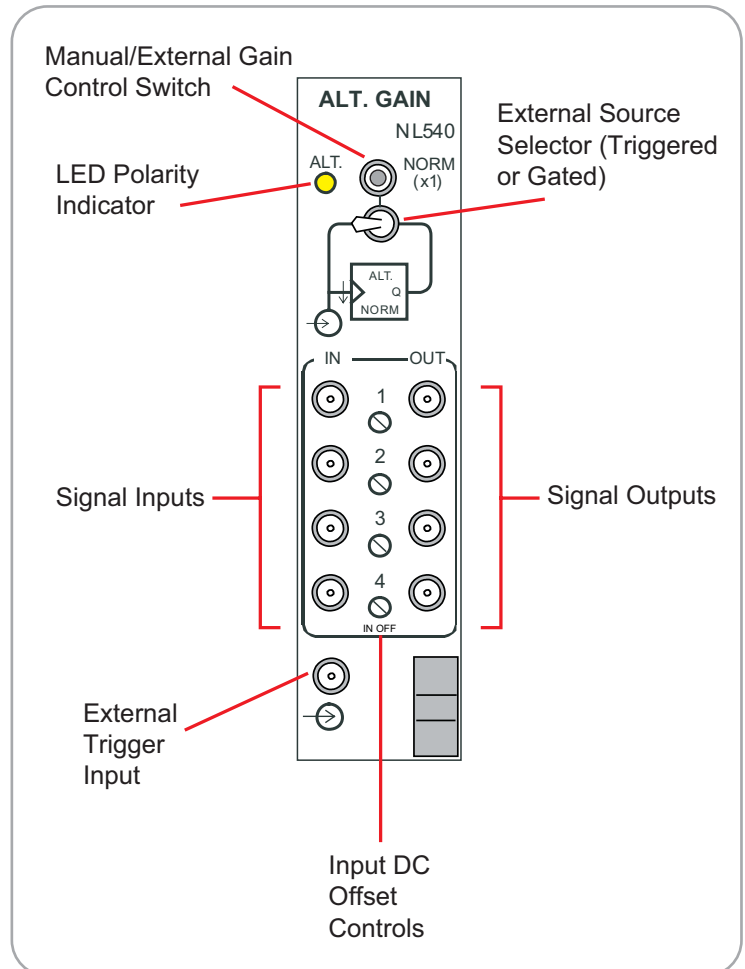
Inversion or attenuation can be:-

(i) Activated when the Manual/External Gain Control switch is moved from the NORM. to the ALT. position (MANUAL CONTROL).

(ii) Initiated and terminated (toggled) by successive TTL logic pulses at the External Trigger Input Socket (TTL PULSE CONTROL).

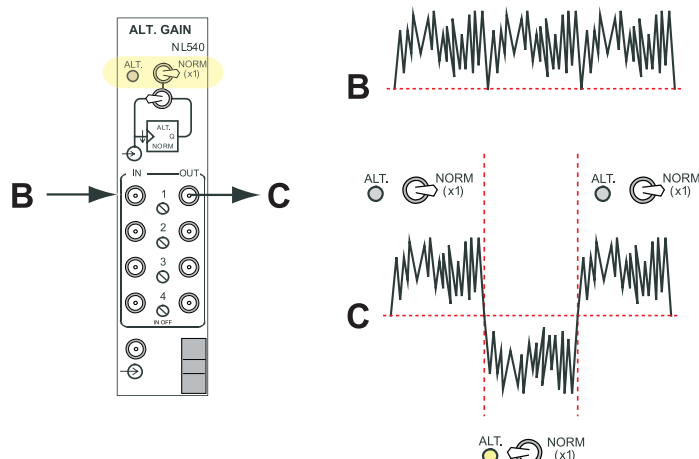
(iii) Activated for the duration of a TTL high input at the External Trigger Input Socket (TTL GATE CONTROL).

Four front panel DC offset controls allow small baseline offsets to be trimmed out at the input stage so they are not attenuated or inverted at the output stage.



### Manual Inversion/Attenuation

Moving the Manual/External Gain Control switch from NORM through the centre position to ALT. results in inversion/attenuation of all four signal inputs, according to the individual settings on the printed circuit board (see Internal Switches and Jumpers). If this toggle switch is moved back to the centre, the output signals will remain altered and the LED will remain lit until it is returned to the NORM. position. In this way, manual control allows the user to reset/preset the status of the outputs, so as to determine the effect of an incoming logic pulse in TTL Pulse Control Mode (overleaf).

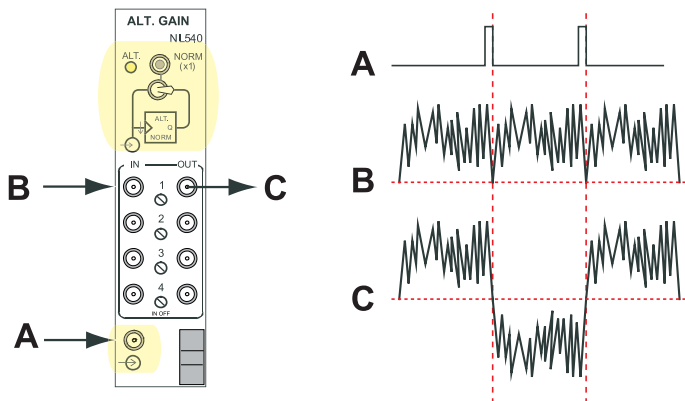


The size/polarity of the four input signals can be manually changed by moving the upper toggle switch from NORM (x1) (output same as input) to ALT. (altered). The lower toggle switch has no effect in either of these positions. When the signal is altered, this is indicated by illumination of the front panel LED.

If the upper toggle switch is placed into the central position, the external control options are enabled (see overleaf), with the four outputs remaining in the state they were immediately prior to this change.

## External Control of Inversion/Attenuation with External TTL Pulse Control

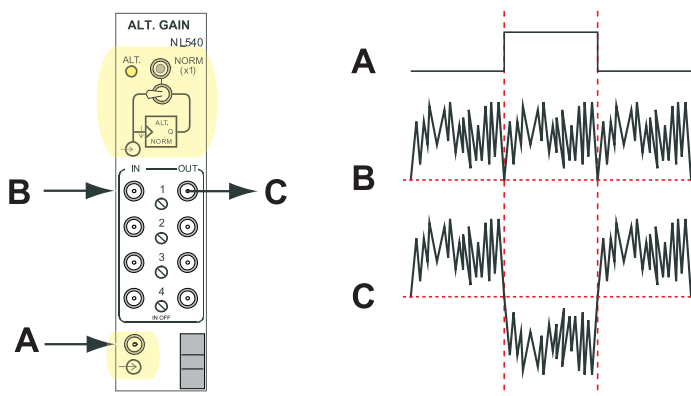
When the Manual/External Gain Control switch (upper toggle switch) is moved from the NORM. position to the centre position, the External Source Selector (lower toggle switch) and the External Trigger Input Socket become active.



With the External Source Selector switch placed to the right, signals will be inverted/attenuated in response to TTL pulses at the trigger input. Inversion/attenuation is triggered by the falling (negative) edge of an incoming TTL pulse with normal polarity/gain returning following a second TTL pulse. As with manual control, the LED will illuminate when the output signals are inverted/attenuated.

## External Control of Inversion/Attenuation with External TTL Gate Control

When the Manual/External Gain Control switch (upper toggle switch) is moved from either the ALT. or NORM positions to the centre, the lower toggle switch and the External Trigger Input Socket become active. When the External Source Selector (lower toggle switch) is in the left position the signals passing through the module will remain unaltered while the External Trigger Input Socket has a TTL low input. When the External Trigger Input Socket input goes TTL high, the signal outputs will be attenuated/inverted according to the PCB switch settings.



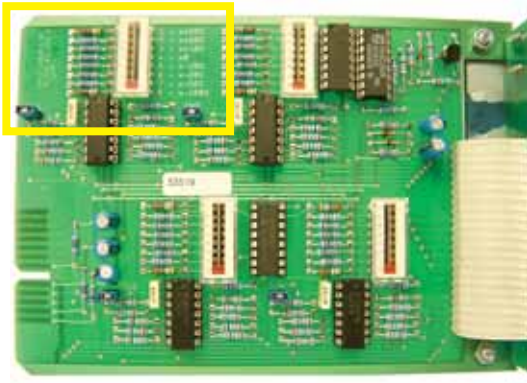
Signal inversion/attenuation can be gated on and off in response to a logic signal at the external trigger input. With the External Source Selector set to the left, the signals will remain Normal (x1 gain, input polarity) while the External Trigger Input is TTL low. When this inputs goes TTL high, the signals will be attenuated/inverted. As above, the LED will illuminate when the output signals are in the altered state.

## Internal Switches & Jumpers

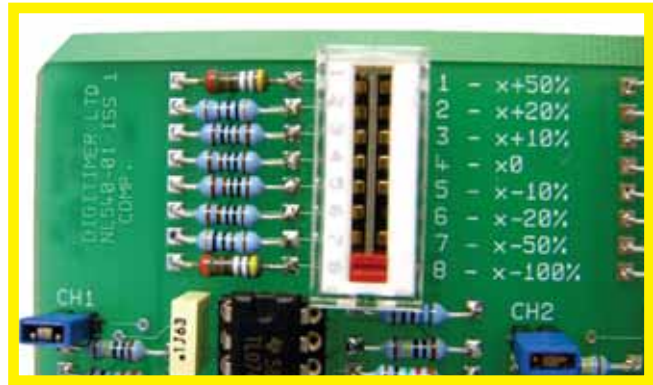
Each channel has a sliding selector switch which is used to set the alternative gain for that output channel. The slider switch has 8 numbered positions, with the switch positions and respective gains indicated on the PCB.

<b>1</b> - x +50%	<b>5</b> - x -10%
<b>2</b> - x +20%	<b>6</b> - x -20%
<b>3</b> - x +10%	<b>7</b> - x -50%
<b>4</b> - x 0	<b>8</b> - x -100%

Each channel also includes a blue jumper which is used to allow input signals to pass from module immediately to the left through the rear connections on the PCB rather than the front panel sockets. As with our other modules, the rear connection is enabled by linking the two jumper pins (as shown in the photographs below). If front panel cable connections are to be used as the signal inputs, then the blue jumper should be removed and re-positioned on only one pin for safe storage.



NL540 PCB View



Zoomed view of Channel 1 Switches and Jumper

## Specification Summary

### INPUTS:

Signal Input Voltage Range:  $\pm 15V$

External Trigger Input Requirements: TTL (triggered on -ve edge of  $>500ns$  pulse)

Input DC Offset Control:  $\pm 0.6V$  (independent for each channel)

### OUTPUTS:

Gain: Internally selectable for each channel:  $x +50%$ ,  $x +20%$ ,  $x +10%$ ,  $x 0$ ,  $x -10%$ ,  $x -20%$ ,  
 $x -50%$ ,  $x -100%$ .

Signal Output Range:  $\pm 15V$  (front panel sockets or rear connections)

Rear PCB connections to the motherboard allow input (jumper selectable) and output (permanent) interconnection between this and other modules without the need for front panel cables.