

DYNAMIC RESONANCE ADAPTIVE TRACKING FILTER



Hi-Lo Dynamic Filtering User Manual

Table of Contents

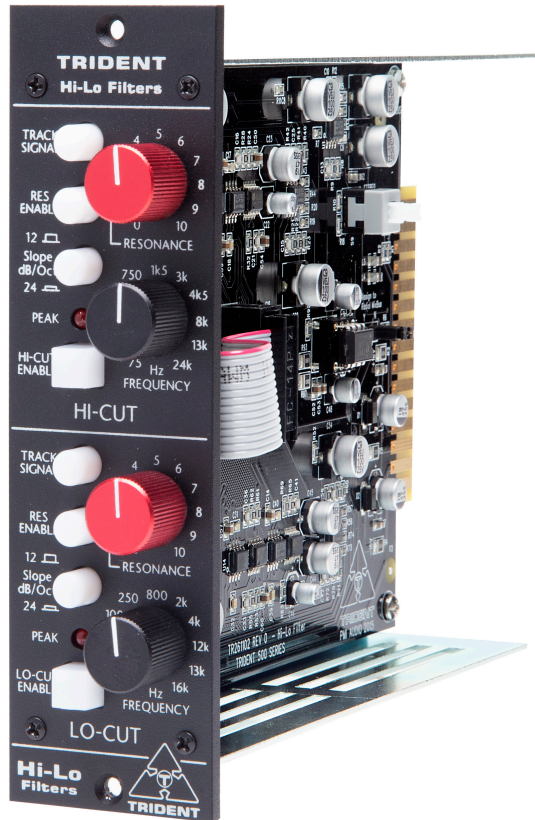
Overview.....	2
TheHi-CUT	3
Hi-CUT Dynamic Tracking.....	3
The Lo-CUT	4
Lo-CUT Dynamic Tracking.....	5
Hi-Lo Peak Indicators.....	6
Dynamic Linking Linked Stereo Tracking.....	6
Specifications.....	7
Warranty.....	8
Notes.....	10



**Trident
500 Series**

Hi-Lo Dynamic Filtering

No Ordinary
Filtering



The Trident Hi-Lo, an adaptive Hi-Cut/Lo-Cut frequency filtering module that responds dynamically to program material, providing a high degree of control and signal enhancement, unavailable in any modern day 500 series package.

— O V E R V I E W —

The Hi-Cut

This is a sweepable low pass filter with unity gain in the selected pass band and a selectable (12dB per octave or 24dB per octave) roll-off outside the pass band. Cutoff frequency can be set from 75Hz to 24kHz.

In addition, a RESONANCE control can be switched into circuit, to introduce a resonant peak at the selected cutoff frequency. The size of this peak, which is dependant on the elected frequency selected on the front panel, can be varied from zero to approximately +12dB. At maximum setting, RESONANCE stops just short of self-oscillation.

A HI-CUT ENABLE switch allows each individual frequency band or filter to be assessed, while a red PEAK warning indicator will illuminate at approximately +16dBu, approximately 12dBu below clipping. To allow adequate headroom, avoid boosting the signal by more than an amount which just causes this LED to flash on occasional peaks.

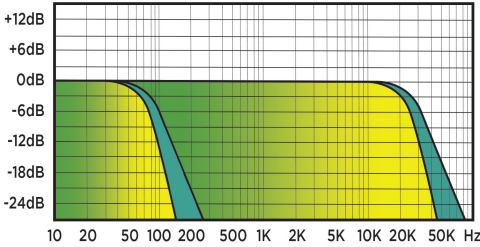


Hi-CUT Dynamic Tracking

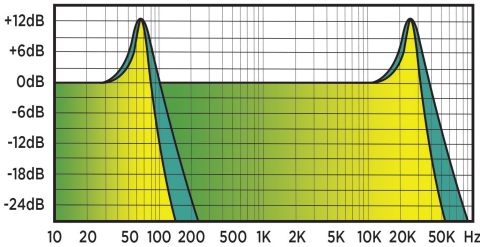
Using the TRACK SIGNAL function enables the Hi-Cut filter to be used for dynamic noise reduction. This is a technique which relies on the psychoacoustic effect of 'masking', in which a louder signal will cover up a quieter signal of the same frequency. In this mode, the cutoff frequency tracks dynamically the high frequency content of the music, with the FREQUENCY control setting the frequency to which the filter will close down in the absence of any high frequency content.

With a noisy signal applied (e.g. from analogue tape or other material with a high background noise content), start with the FREQUENCY control at maximum (fully clockwise) and back off the control until the noise just disappears.

Hi-Cut Dynamic Tracking *continued*



HI-CUT FILTER ~ SWEEP RANGE & 12/24dB/OCTAVE



HI-CUT FILTER ~ EFFECT OF RESONANCE CONTROL

Use of higher resonant settings will result in the movement of the filter becoming audible and indeed, combined with the lower settings of the FREQUENCY control, this can be the basis of some unique special effects.

Further possibilities —

The sweep range of the Hi-Cut filter is extremely wide, from effectively subsonic, right up to full audible bandwidth. This suggests the possibility of fading tracks in and out, not in the amplitude domain as is usual, but in the frequency domain.

The Lo-Cut

This is a sweepable high pass filter with unity gain in the selected pass band and selectable (12dB per octave or 24dB per octave) roll-off outside of the pass band. Cutoff frequency can be set manually, anywhere from 15Hz to 16kHz.

In addition, a RESONANCE control can be switched into the circuit, to introduce a resonant peak at the selected cutoff frequency. The size of this peak, which is dependant on the elected frequency selected on the front panel, can be varied from zero to approximately +12dB. At maximum setting, RESONANCE stops just short of self-oscillation.



A LOW-CUT ENABLE switch allows each individual frequency band or filter to be assessed, while a red PEAK warning indicator will illuminate at approximately +16dBu, approximately 12dBu below clip-ping. To allow adequate headroom, avoid boosting the signal by more than an amount which just causes this LED to flash on occasional peaks.

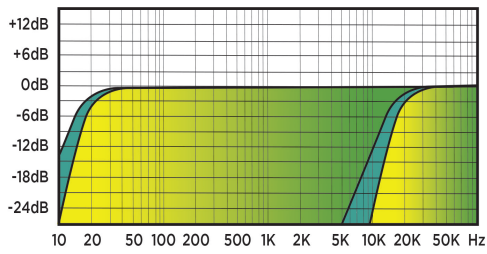
Lo-Cut Dynamic Tracking

Using the TRACK SIGNAL function, enables the Lo-Cut filter to be used for dynamic hum or rumble reduction. This is a technique which relies on the psychoacoustic effect of ‘masking’, in which a louder signal will cover up a quieter signal of the same frequency. In this mode, the cut-off frequency tracks dynamically the low frequency content of the music, with the FREQUENCY control setting the frequency to which the filter will open up in the absence of any low frequency content.

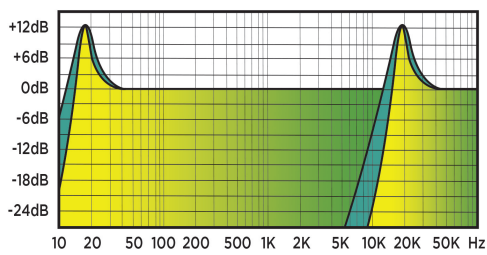
With a noisy signal applied (e.g. from a record deck or other material with a high background noise content), start with the FREQUENCY control at minimum (fully anticlockwise) and advance the control until the hum or rumble just disappears.

In practice, this technique demands a trade-off between noise reduction and loss

of some low frequency content of the program material. However, using the steepest (24dB per octave) slope, maximises the amount of low frequency content retained. In addition, discreet use of the RESONANCE control to introduce a small peak of a few dB at the cutoff frequency, can psycho acoustically enhance the apparent bandwidth of the filtered signal. Use of higher resonant settings will result in the movement of the filter becoming audible and indeed, combined with higher settings of the FREQUENCY control, this can be the basis of some unique effects.



LO-CUT FILTER - SWEEP RANGE & 12/24dB/OCTAVE



LO-CUT FILTER - EFFECT OF RESONANCE CONTROL

Lo-Cut Dynamic Tracking *continued*

Further possibilities — The sweep range of the Lo-Cut filter is extremely wide, from effectively ultrasonic to right down to full audio bandwidth. This suggests the possibility of fading tracks in and out, not in the amplitude domain as usual, but in the frequency domain.

Hi-Lo Peak Indicators

The Trident Hi-Lo includes LED peak indicators on the outputs of both the Hi-Cut filter section and the Lo-Cut filter section. Since the filters are in series (the Hi-Cut circuitry before the Lo-Cut), the Hi-Cut Peak LED monitors the Hi-Cut filter stage only, and the Lo-Cut Peak LED monitors signal thru both stages, and as such, the output of the unit. This gives the most flexibility for clip monitoring in the unit. The Output of the Hi-Lo can drive approximately 27.5 dB into a 600 Ohm load. The clip levels are approximately 12 dB below actual signal Clip (so we have this occur at +16dBu) and allows for tweaks in resonance which may exceed that but allow for headroom after the clip indicator has just reached active.

It should also be noted, that if neither the Hi-Cut or Lo-Cut switches are enabled, the peak LED indicators are actively monitoring the incoming signal level.

Dynamic Linking Linked Stereo Tracking

The Trident Hi-Lo module also offers the option of linked stereo tracking when paired with a second Trident Hi-Lo module. Ordinarily, most 500 Series racks offer paired slots by default. The Trident Hi-Lo provides an on-board stereo link switch (S9) for use in this instance. With both modules stereo link switches selected to on, and the modules fitted in the pre paired slots, the modules are now paired together.

By enabling both Hi-Lo modules TRACK SIGNAL switches, and setting the FREQUENCY controls to identical positions, the left and right signals are now summed together, and the automatic tracking follows both the left and right signal sources.

When using a 500 Series rack with selectable stereo pairing on the rear of the rack, such as with the Trident Deca-Dent, by releasing the on-board stereo link switches, both modules can be used as separate mono units without the need to access the rear of the rack.

API Radial Workhorse

An on-board jumper is available for use when the Trident Hi-Lo is used in conjunction with the API Radial Workhorse. When selected, this allows the Hi-Lo to send its output to the Workhorse mix bus (pin 11), which is fed to the Workhorse mixer section. This can be used in conjunction with the on-board stereo link switch, thus enabling stereo use on the Workhorse.

Up to 48dB Per Octave Slope (Wired In Series)

When two Hi-Lo modules are connected in series, slopes of 12, 24, 36 and 48dB can be achieved, in any combination, by selecting the appropriate SLOPE buttons on the front of each Hi-Lo module. For example, by engaging both of the Hi-Lo modules Hi-Cut filters, and setting both modules to 24dB slope, the program material will be subject to a 48dB slope. By adjusting one of the Hi-Cut filters to 12dB, the program material will be subject to a 36dB slope.

The introduction of a third Hi-Lo in series with the first two Hi-Lo modules, would provide for yet steeper slopes, again in increments of 12dB. In fact, because they can be connected in series, you're only limited by the number of Hi-Lo's that you have to hand.

— S P E C I F I C A T I O N S —

Input Impedance	10 kilohms
Max Input	+27dBu
Max Output	+27dbu (Into 600ohms)
Distortion (+10dBu Out)	0.0031% (20Hz to 20kHz) (Hi Enabled Max Freq) (Lo Enabled Min Freq)

Distortion (+20dBu Out)	0.0069% (20Hz to 20kHz)
Frequency Response	15Hz to 60kHz (-3dB)

Noise (20Hz to 20kHz bandwidth limited)

No Filters in circuit (Residual Noise)	-95dBu
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High Cut Enabled

Freq Max	-83.5dBu
Freq Min	-90dBu
Freq Max - 24dB/Oct Slope Enabled	-80dBu
Freq Min - 24dB/Oct Slope Enabled	-90dBu
Freq Max - Res Enabled, Resonance Min	-83.5dBu
Freq Max - Res Enabled, Resonance Max	-72dBu
Freq Max - 24dB, Res Enabled, Res Max	-71dBu
Freq Min - Res Enabled, Resonance Min	-90dBu
Freq Min - Res Enabled, Resonance Max	-90dBu
Freq Min - 24dB, Res Enabled, Res Max	-90dBu

Low Cut Enabled

Freq Max	-83dBu
Freq Min	-86dBu
Freq Max - 24dB/Oct Slope Enabled	-83dBu
Freq Min - 24dB/Oct Slope Enabled	-90dBu
Freq Max - Res Enabled, Resonance Min	-84dBu
Freq Max - Res Enabled, Resonance Max	-72dBu
Freq Max - 24dB, Res Enabled, Res Max	-73dBu
Freq Min - Res Enabled, Resonance Min	-86dBu
Freq Min - Res Enabled, Resonance Max	-87dBu
Freq Min - 24dB, Res Enabled, Res Max	-84dBu

Warranty

Trident Audio Developments Limited Warranty Statement

The following outlines the warranty periods for all Trident Analogue electronics. All warranty service requires Proof of Purchase. Proof of purchase is the original Bill of Sale, or Sales Invoice from an authorized dealer.

Trident Audio Developments electronics are covered by a limited warranty against defects in materials and workmanship (parts and labor) for a period of One (1) Year from the date the unit is sold to the Dealer or original purchaser only.

Acceptable registration is met by registering online

<http://www.tridentaudiodevelopments.com/product-registration/>

The terms and conditions of this limited warranty are:

1. The warranty applies to Trident Audio Developments Electronics purchased from Trident Audio or authorized Trident Audio dealers.
2. The warranty covers any defects in materials and workmanship and is limited to the repair or replacement of the original registered product. In its sole discretion, Trident may either repair or replace the product with a product of the same model or replace the product with a new model of a similar specification when the same model is no longer available.
3. The warranty does not cover any of the following: damage caused by the user: spillages or moisture damage; neglect, abuse or misuse, including but not limited to the failure to use the product(s) for its normal purpose in accordance with the manufacturer's instructions for use. Failure to properly maintain the product in accordance with the manufacturer's instructions, and/or the failure to use the products in accordance with the manufacturer's specifications; normal wear and tear; use of products with incompatible or faulty equipment; unauthorized modifications; repairs conducted by unauthorized persons or service center's; the model and/or serial number being altered, removed or made illegible; accidents; acts of God or any cause beyond the control of Trident Audio Developments. It does not cover damage caused by connecting to an improper power voltage supply, cosmetic defects, such as paint finish, and general wear and tear, as well as certain consumables not covered under warranty such as fuses, faders, pots, switches and meter bulbs. Mechanical components including but not limited to a consumable item; potentiometers, faders and switches are covered by a 90-day warranty. Failure to maintain, damage; neglect, abuse or misuse of any mechanical components in this time will result in a void warranty. Trident recommends regular service of the product and in particular; regular service of the mechanical components such as potentiometers and faders.
4. The warranty is applicable to the original purchaser throughout the warranty period as stated above or until original owner resells product. If a unit is received for warranty repair, and after complete examination and testing, no problem is found with the unit, customer will be charged for time labor plus return shipping costs, presuming initial user error falsely caused the unit to be determined faulty.
5. The warranty does not affect any statutory rights the original purchaser may have in accordance with the law applicable in the jurisdiction where the product was purchased, or any rights the original purchaser may have against the authorized dealer pursuant to their original purchase agreement. This warranty gives you specific legal rights and you may also have other rights, which vary from state to state, and or country to country.

Warranty

6. Any claim pursuant to this warranty from the date of purchase of any Trident Audio Developments product must be returned, together with the original proof of purchase, to the authorized Trident Audio dealer that sold the product, or to the Trident Audio service center in the USA or our UK service center. All returns to Trident Audio, or any Trident Audio Service Center must be in the original packing, accompanied by the issued Repair Authorization, and must be shipped to the address specified on the Return Authorization via insured freight at the customer's own expense. Factory original packaging can be ordered from Trident Audio, Inc. Customer will be charged for new factory original packaging if customer fails to ship product to Trident Audio in the original factory packaging. Trident Audio will not pay for express or overnight delivery.

7. Once the product has been received, the authorized Trident Audio service center will assess the warranty claim and arrange to either repair or replace in accordance with the warranty procedure prescribed by Trident Audio for their authorized service center network. The warranty replacement will be conducted by the authorized Trident Audio service center as promptly as possible and within a reasonable time from the date of submission of the warranty claim. In all circumstances, a claimant under this warranty will be liable for all costs in delivering their Trident Audio brand product to the authorized service center for warranty replacement and for all costs in collecting the repaired/replacement Trident Audio product from that authorized Trident Audio service center. Trident Audio service center may waive the cost of return shipping after full inspection to determine cause of warranty.

8. Trident Audio will not accept any warranty replacement without the original proof or purchase of the Trident Audio product, and without the registration of the Trident Audio product within 30 days of purchase by mail, or online. It is the original purchaser's responsibility to keep the original proof of purchase or copy safe at all times, as Trident Audio is not obliged to provide a replacement of the original proof of purchase.

9. The warrantor assumes no liability for property damage or any other incidental or consequential damage whatsoever which may result from failure of this product.

10. A Trident Audio product that was not purchased through an authorized and legitimate sales channel is considered "Grey Market". Warranties for Trident Audio Products purchased outside the USA will be covered by its Trident Audio UK Service Center. Trident Audio product originally sold to the USA market and consequently resold overseas forfeits its warranty. "Grey Market" purchases are not covered by any warranty. In the case that a Trident Audio Product must be returned, it should be returned to the original place of purchase, or the Trident Audio factory, with proper return authorization. Returns from outside the USA, customer shall adhere to specific shipping, customs, and commercial invoicing instructions given with the Return Authorization. Trident Audio will not be responsible for transportation costs or customs fees related to any importation or reexportation charges whatsoever.

11. Trident Audio shall not be liable for damages in excess of the purchase price of the Trident Audio product arising out of the use or inability to use the Trident Audio product.

12. Governing Laws

Any dispute, controversy or claim arising out of or relating to this Agreement shall be decided by arbitration in Los Angeles, California, in accordance with the rules of the American Arbitration Association (the "Association") then in effect. Any award rendered by the Association shall be final, binding and not subject to appeal, and may be enforced by any court of competent jurisdiction.

For Tech Support and Repair Authorization, please contact: US Service & Sales

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or sales@tridentaudiodevelopments.com

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Notes

[illegible]

Safety - This product is intended for professional use only and it is assumed that the user is familiar with the 500 Series Modular Rack system. Always switch off the rack power before inserting or removing this (or any other) module or damage may occur. Do not expose this product to direct heat, moisture or mechanical shock.



Environmental - This product complies with the RoHS directive and contains no lead or other banned hazardous materials. In accordance with the WEEE directive, this product must be disposed of responsibly at its end of life, by means of local authority approved recycling systems.



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