iSP Technologies

HUM EXTRACTOR + DECIMATOR G

OWNERS MANUAL

INTRODUCTION

Congratulations on your purchase of the new patent pending HUM EXTRACTOR™ + DECIMATOR G™ pedal. The HUM EXTRACTOR +DECIMATOR G™ pedal was designed to provide the ultimate sonic performance possible for removing line frequency hum components from an instrument signal. Guitar and Bass instruments are susceptible to noise intrusion from AC line frequency electromagnetic fields. This kind of electromagnetic interference is typically picked up by the instrument pickups, although these hum frequency components can also be injected into audio signals by bad cables or other means of intrusion. The fundamental hum component is at the AC line frequency with many multiple harmonically related components above the fundamental frequency. The line frequency is selectable for 60 hertz or 50 hertz operation. Adjustments for HUM EXTRACTOR and DECIMATOR threshold settings plus the dynamic filter tracking are automatically stored and will be retained on power off. The HUM EXTRACTOR +DECIMATOR G can remove these hum components from the audio signal with amazing transparency reducing the requirement of the DECIMATOR single ended noise reduction to only have to work on gain noise and hiss. The DECIMATOR is controlled from the direct instrument input allowing the noise reduction to work perfectly when switching between high gain and clean settings. The DECIMATOR block incorporates ISP Technologies full DECIMATOR as included in the professional ProRack G which includes both a low level downward expander and a dynamic sliding low pass filter. This allows removal of high frequency hiss and noise while playing at full volume. The combination of both the HUM EXTRACTOR and DECIMATOR provides the most effective noise reduction system available for eliminating virtually all noise from the input signal with incredible transparency.

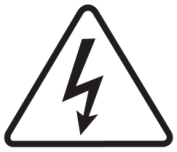
IMPORTANT SAFTEY INSTRUCTIONS

Please read the following very carefully before operating this unit

- Read ALL instructions carefully before using this unit. Keep these instructions for future reference. Heed all warnings and follow all instructions.
- Do not use this unit near water, in the rain, or where there is moisture. If this warning is ignored a serious electrical shock or death may occur.
- Do not attempt to service this unit. No user serviceable parts inside. Refer servicing to qualified, ISP approved personnel. Servicing is required when the unit is damaged in any way, such as power adaptor is damaged, liquid has been spilled into the unit, the unit has been exposed to rain or moisture, does not operate normally, or has been dropped.
- Care should be taken to avoid spilling any foreign objects or liquid into this unit. Avoid exposure of this equipment to dripping or splashing and ensure that no objects filled with liquid, such as vases, are placed on the equipment.
- Only use accessories or attachments that are specified by the manufacturer.
- Failure to follow these instructions may void the warranty.

NO USER SERVICABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED ISP TECHNOLOGIES SERVICE PERSONNEL.

The lightning bolt triangle is used to alert the user to the risk of electric shock.
The exclamation point triangle is used to alert the user to important operating or maintenance instructions.



POWER REQUIREMENTS

This unit requires the connection of the external AC Power Adaptor to a 120 volt AC outlet. Do not attempt to connect this unit to any power source other than the one supplied with the HUM EXTRACTOR +DECIMATOR G. The HUM EXTRACTOR +DECIMATOR G will typically draw on the order of 800 milliamps of current from the AC power adaptor when in use.

CONNECTIONS AND OPERATION

Refer to the Figures shown below which show the locations of the switches, knobs, and jacks when reading the following, or even better, just look at your unit.

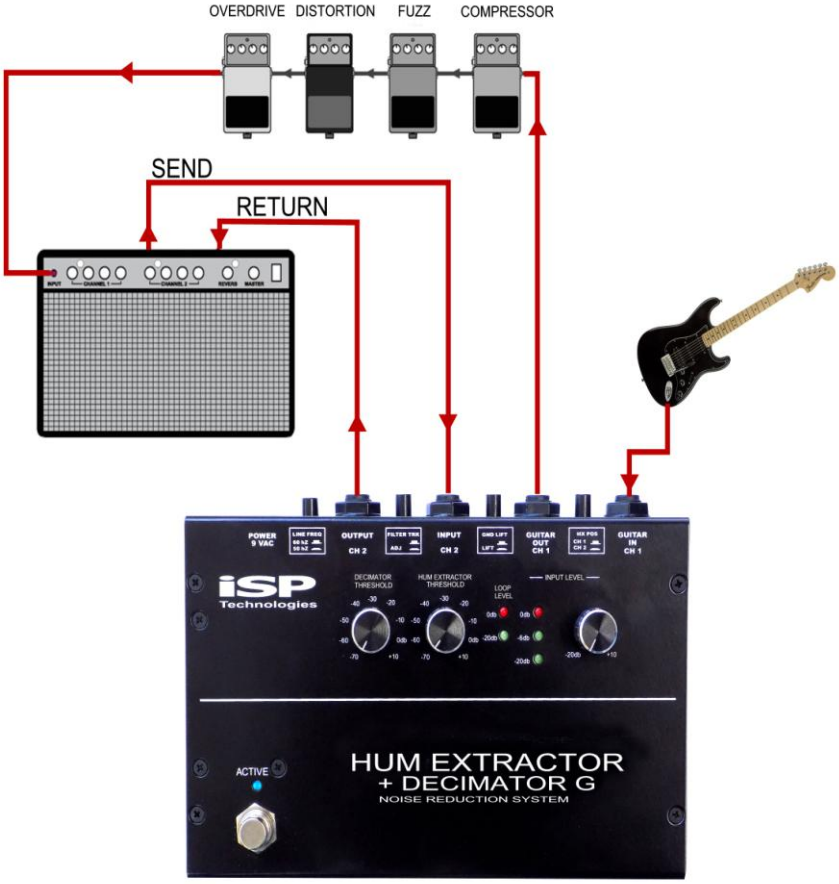
Connect the supplied 9V AC power adaptor to wall power, then to the POWER input on the HUM EXTRACTOR +DECIMATOR G. The unit will power up and automatically recall the last used settings.

The unit has two channels with INPUT and OUTPUT connections. Plug the guitar directly into the input of Channel 1 and connect the output of Channel 1 to the input of your rig. You can select the position for the HUM EXTRACTOR function to be inserted into channel 1 or channel 2 via the HX POS switch. For most setups selecting channel 1 may provide better transparency however, this allows you to select the HUM EXTRACTOR function to be before or after the distortion block of your setup. Select this position for the best operation of your particular system. In order for the HUM EXTRACTOR +DECIMATOR G to function properly the direct guitar input signal needs to be inserted into channel 1, this allows the direct guitar signal to be used to control the level detection for both the HUM EXTRACTOR and the DECIMATOR functions.

A GROUND LIFT switch is provided to avoid ground loops from redundant grounds in your setup. When switched to LIFT this lifts the ground connections for both INPUT and OUTPUT of channel 2.

Channel 2 should be connected after all preamplifier, equalization and compression which allows the DECIMATOR to remove all gain noise present in the signal post gain functions. This also allows the user to set the threshold to remove noise from the audio signal without the need to change threshold settings when switching from high gain to a clean tone.

The diagram below shows the typical connections when using guitar pedals and a guitar amplifier with a series effects loop. The guitar output is connected directly to the Guitar IN on the HUM EXTRACTOR +DECIMATOR G, the Guitar OUT is connected to the input of all pedals which can cause noise in the signal path, compression, overdrive, distortion etc. The output of the pedal chain is connected to the input of a guitar amplifier and the series loop is connected to the second channel of the HUM EXTRACTOR +DECIMATOR G. In this configuration the HUM is eliminated in the signal between the guitar and the input of the pedal chain and the DECIMATOR is in the signal path after the preamplifier of the guitar amplifier. This allows the DECIMATOR to remove all noise introduced at any point in the signal path and will not require any threshold change when switching from high gain to clean tones. NOTE: when using longer time based effects like echo, delay and reverb it is best to insert these effects after the output of channel 2 to avoid cutting off reverb tails or echo spillover.



Channel 2 can be inserted after the pedal chain if a series loop is not available in the setup.

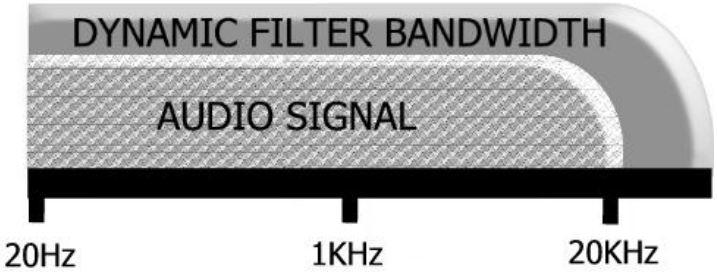
Principles of the HUM EXTRACTOR adjustment and operation:
When set properly the HUM EXTRACTOR will remove line frequency HUM components and the associated higher frequency harmonic hum components in the audio signal. Set the **LINE FREQUENCY** switch for the required line frequency in use either 50 hertz or 60 hertz based

on your countries AC line frequency. The HUM EXTRACTOR +DECIMATOR G is a digital processor and requires optimizing the input signal level for proper headroom in the digital signal path. Start by turning the guitar all the way up play a HOT signal adjusting the INPUT LEVEL control so that the 0db LED just flashes with maximum playing levels. Avoid excessive peaking of the INPUT LEVEL meter with playing at maximum signal level. Next adjust the HUM EXTRACTOR Threshold until any background HUM is removed. Start with the Threshold of the DECMATOR at minimum setting. For maximum transparency it is best to adjust this threshold setting up and down slightly for the optimum transparency and removal of the hum components. The HUM EXTRACTOR is a dynamic operation similar to the DECIMATOR noise reduction. The HUM EXTRACTOR operates in multiple frequency bands to selectively remove the HUM components which appear in the signal within each frequency band. The operation is dynamic using precision level detection in each frequency band to detect the presence of the HUM and audio signal and dynamically filter these components within each frequency band of operation. Adjusting the HUM EXTRACTOR threshold adjusts the dynamic operation of the HUM filtering in each band based on the level of the audio signal. As noted above, it is best to adjust the HUM EXTRACTOR threshold first to remove the HUM in the signal and then adjust the DECIMATOR to remove the remaining gain noise. The DECIMATOR level detection is done after the HUM EXTRACTOR which allows the DECIMATOR to operate with more precision after any HUM is removed.

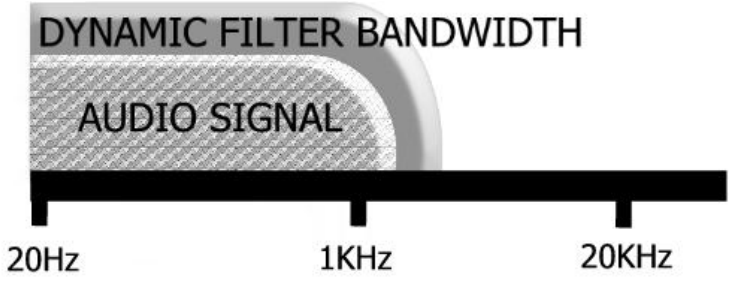
When properly used, the DECIMATOR should be completely transparent; it should have no effect on the audio signal other than to remove the background noise. To maximize the performance of the DECIMATOR, it is necessary to understand both the operation of the controls and the principles of how the system operates. After this understanding, it will be easier to set up the DECIMATOR to suit any application.

The DECIMATOR achieves noise reduction by employing two individual noise reduction processes, which work cohesively together to attain superior results. These two processes are: Dynamic Low Pass Filtering and Low Level Downward Expansion.

Dynamic Low Pass Filtering is done by use of a high quality voltage controlled sliding low pass filter. A frequency sensitive audio level detection circuit incorporating ISP Technologies patent pending Time Vector Processing circuit controls the dynamic filter. When the audio input signal contains high frequency information the dynamic filter increases in bandwidth to allow the audio signal to pass unaltered and shown in the simplified graph below.



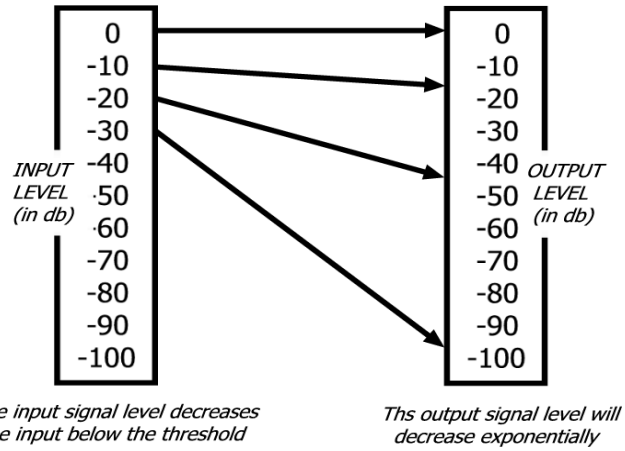
When the high frequency information in the input signal decreases the dynamic filter bandwidth will track the decrease in high frequency and eliminate high frequency noise that remains in the input signal. The simplified graph below shows the dynamic filter response when there is no high frequency audio above 1KHz.



The release time of the dynamic filter is controlled by the Time Vector Processing circuit and our new patent pending DECIMATOR X technology, which determines the release characteristics of the input signal and automatically varies the release response of the dynamic filter.

Low Level Downward Expansion is performed by use of a voltage controlled amplifier controlled by a log based audio level detection circuit. A second Time Vector Processing combined with our new patent pending DECIMATOR X technology circuit, that adaptively varies the release response over a 1000 to 1 ratio, controls the release response of the Downward Expander. The release response will be extremely fast, on the order of 2 milliseconds, if the input signal has a fast decaying envelope and upwards of 2 seconds if the input signal has a slow decaying signal. Downward Expansion takes place when the input signal level drops below the preset threshold. For example: if the threshold is set for 0db and input signal of 0db with produce no expansion. As the input signal drops below 0db downward expansion starts and increases exponentially the farther the input signal drops below the threshold point. The graph below shows the response of the Expander with a 0db threshold.

TYPICAL EXPANSION RATIO
with a threshold setting of 0db.



To set up the DECIMATOR for proper operation first determine the reference level of the system that the DECIMATOR will be connected to. Most professional products operate at a +4dbu reference level. Music equipment typically operates at –10dbu. Once the proper reference level is determined set the reference level switch on both channels accordingly. (Note: Both Channel One and Two must be engaged.)

SETTING THE DECIMATOR THRESHOLD

THE DECIMATOR control adjusts both the expander and dynamic filter sensitivity. Start by setting both the Threshold and Filter Tracking for minimum, full counterclockwise. Push the FILTER TRACKING switch in and turn the DECIMATOR threshold to the maximum and then minimum setting. This will set the FILTER TRACKING to a minimum setting while adjusting the downward expander threshold. Switch the FILTER TRACKING switch to the “OUT” position and turn the Threshold control clockwise until the desired setting of the downward expander is achieved. This allows adjustment of just the expander operation without the dynamic filter functioning. The expander should start to operate when there are gaps in the audio or as the input signal gets close to the noise floor. **NOTE:** Setting this control to high will cause the expander to start to cut off the instrument signal to soon.

SETTING THE FILTER TRACKING CONTROL

The **FILTER TRACKING** control adjusts the relationship between the sensitivity of the Dynamic Filter and the Downward Expander. Once the THRESHOLD control is set for proper operation of the downward expander the FILTER TRACKING is adjusted in relation to the setting of the downward expander. Push the FILTER TRACKING button in, this keeps the setting of the DECIMATOR EXPANDER and now allows setting the operation of the Dynamic Filter. Increase the DECIMATOR THRESHOLD control (with the FILTER TRACKING button IN) until the desired dynamic filter operation is achieved. Setting this control to high will cause the filter to not fully open when high frequency signals are present cutting the amount of highs in the signal. Setting this control to low will not provide any high frequency noise reduction. Once the FILTER TRACKING is set, switch the FILTER TRACKING button to the out position. This now allows simultaneous adjustment of the threshold of both the expander and the dynamic filter and will maintain the tracking relationship for these two noise reduction operations.

SAVING YOUR SETTINGS

The HUM EXTRACTOR +DECIAMATOR G will automatically save the settings every time any adjustment is made. This allows the unit to recall your HUM EXTRACTOR threshold settings DECIMATOR threshold settings and the **FILTER TRACKING** settings. This allows instant recall on power up and the settings will be retained until the next adjustment is made. NOTE: switch position settings and INPUT LEVEL are not stored which means switch settings and INPUT LEVEL will be based on the current position of the switches and the INPUT LEVEL control.

Adjustments can be easily made if playing in a new venue with higher or lower levels of HUM and or noise. Once the filter tracking is set to your preference simply adjusting the DECIMATOR threshold will adjust both the dynamic filter threshold and the low level downward expander threshold. The offset between the dynamic filter threshold and downward expander threshold will be maintained until the FILTER TRACKING button is switched in and the DECIMATOR threshold control is adjusted to change the saved FILTER TRACKING setting.

HUM EXTRACTOR +DECIMATOR G™ SPECIFICATIONS

INPUT IMPEDANCE	470K OHM
INPUT LEVEL TRIM	21.5db / input level -8dbu to +13.5dbu
MAXIMUM INPUT SIGNAL	+13.5dbu
NOISE FLOOR	- 104dbu A WTD
DYNAMIC RANGE	117db A WTD
DECIMATOR / MAX NOISE RED	80db
FREQUENCY RESPONSE	20Hz – 20KHz = +0 / -.5db
OUTPUTS	Max Level +13.5dbu
DIMENSIONS	7.15” W x 1.85” H x 4.5” D
WEIGHT	1.2 lbs
POWER	9VAC RMS / 1.5 AMPS

NOTE:0dbu = .775 VRMS

HUM EXTRACTOR +DECIMATOR G™ are covered under US Patents 6,944,305 and 7,532,730, HUM EXTRACTOR is covered under other Patents Pending

HUM EXTRACTOR +DECIMATOR G™ are trademarks of ISP Technologies

WARRANTY AND SERVICE

The Internal Circuitry is fully guaranteed to be free of defects under normal use and service for a period of three years from the date of purchase.

Any damage resulting from the misuse or the failure to follow the precautions and instructions will void the warranty.

In the event that the unit needs to be repaired, please return the unit to ISP Technologies directly. Simply repack the unit, send a copy of the original receipt, a note stating the problem, your contact information and send it to:

ISP Technologies, LLC
5479 Perry Drive Unit B
Waterford, MI 48329
Attn: Repair Dept.

All shipping charges must be fully prepaid.

ISP will not be responsible for any damages incurred in shipping of any unit. Any claim will need to be settled with the shipping company.

The warranty will be voided if the serial number has been tampered with in any way. The warranty card must also be filled out and returned in order to activate the warranty.

Should you have any questions for the repair department prior to returning the product please call 248-673-7790

ISP TECHNOLOGIES, LLC
5479 PERRY DRIVE UNIT B
WATERFORD, MI. 48329
Phone: 248-673-7790
www.isptechnologies.com

WARNING:

This product can potentially expose you to chemicals including lead, nickel and chromium which are known to the State of California to cause cancer and birth defects or other reproduction harm. For more information go to www.P65Warnings.ca.gov