

**AVALON**  **DESIGN**

**PURE CLASS A MUSIC RECORDING SYSTEMS**

# **VT-747SP**



**Pure Class A Stereo Spectral Opto-Compressor Equalizer**



# **Operation Manual**



# VT-747SP

## Operation Manual

# AVALON DESIGN

PURE CLASS A MUSIC RECORDING SYSTEMS

## Table of Contents

<b>1.0 Introduction</b> . . . . .	<b>4</b>	<b>5.2.0 Application Settings</b> . . . . .	<b>21</b>
1.1 Overview . . . . .	4	5.2.1 Stereo Buss for Mixdown . . . . .	21
1.2 Features . . . . .	5	5.2.2 Stereo Buss with De-ess . . . . .	22
1.3 Unpacking and Inspection . . . . .	6	5.2.3 De-ess on Vocals . . . . .	22
<b>2.0 Quick Start-up</b> . . . . .	<b>7</b>	5.2.4 Stereo Keyboards . . . . .	23
2.1 Quick Set-up Guide . . . . .	8	5.2.5 Extreme Compression Effect . . . . .	23
2.2 Tips . . . . .	9	5.2.6 Acoustic Piano . . . . .	24
2.3 Tutorial-Using it all . . . . .	9	5.2.7 Acoustic Guitar . . . . .	24
<b>3.0 Safety and Grounding</b> . . . . .	<b>10</b>	5.2.8 Drum Overheads . . . . .	25
3.1 Safety Instructions . . . . .	10	<b>6.0 Compression Primer</b> . . . . .	<b>25</b>
3.2 Grounding Instructions . . . . .	10	<b>6.1 Equalization Primer</b> . . . . .	<b>27</b>
3.3 AC Voltage Selection . . . . .	11	<b>7.0 FAQs</b> . . . . .	<b>27</b>
3.4 Fuse Replacement . . . . .	12	<b>8.0 Trouble Shooting</b> . . . . .	<b>30</b>
3.4 Rack Mounting and Cooling . . . . .	12	<b>9.0 Service and Contact Information</b> . . . . .	<b>32</b>
3.5 Turn-on Procedure . . . . .	13	<b>10.0 Technical Information</b> . . . . .	<b>33</b>
<b>4.0 Operation and Controls</b> . . . . .	<b>14</b>	10.1 Recall Sheet . . . . .	34
4.1 Rear Panel Description . . . . .	17	10.2 Block Diagram . . . . .	35
4.2 Connections . . . . .	17	<b>11.0 Warranty</b> . . . . .	<b>36</b>
4.3 Unbalanced Operation . . . . .	17	11.1 Returns . . . . .	36
4.4 Using the Vt-747sp . . . . .	18	<b>12.0 Safety Standards</b> . . . . .	<b>36</b>
4.5 Six Band Passive Equalizer . . . . .	18	<b>Appendix A - Glossary</b> . . . . .	<b>37</b>
4.6 Using the Equalizer . . . . .	18		
4.7 Using the Side-chain . . . . .	19		
<b>5.0 Applications</b> . . . . .	<b>19</b>		
5.1.0 Typical Set-ups . . . . .	19		
5.1.1 Recording . . . . .	20		
5.1.2 Stereo Mixdown (Buss) . . . . .	20		
5.1.3 Mixdown/Mastering - DAW . . . . .	20		
5.1.4 Mastering . . . . .	21		



## 1.0 Introduction

Welcome to Avalon and the world of high performance Pure Class A music recording systems. The *Vt-747sp* is an extremely versatile, pure Class A, vacuum tube/discrete TSP (Tube Signal Path) stereo opto-compressor and program equalizer.

The *Vt-747sp* is the most creative and flexible stereo compressor available. With TSP (Tube Signal Path), the *Vt-747sp* uses three hand selected vacuum tubes in the signal path for warm tube tone or bypasses the tubes for classic Class A discrete transistor sound. Also featured on the *Vt-747sp* is a passive six-band graphic equalizer for gentle tone-shaping plus a two-band parametric EQ for complete spectral side-chain or musical control.

The *Vt-747sp* is hand built in the USA using only the finest active and passive electronic components available. Many of these parts have been custom-manufactured exclusively for Avalon. A "no compromise" approach in every stage of design and production ensures that the *Vt-747sp* will give many years of dependable high-quality service.

Please take a moment to read this manual and enjoy your Avalon experience!

## 1.1 Overview

The *Vt-747sp* combines a stereo tube/discrete Class A opto-compressor with a musical six-band program equalizer, as well as Left/Right output level, gain reduction metering and an internal regulated power supply in a 2U space. Ideal for high performance DAW (digital audio workstation) input signal conditioning, stereo buss compression/EQ, stereo keyboards and mastering applications.

The *Vt-747sp* features a minimum signal path design utilizing sealed silver relays for all signal routing and bypass functions.

Compression with the *Vt-747sp* is achieved with twin optical attenuators that act as passive level controllers together with a Class A variable gain make-up amplifier. Full dynamic control from soft compression to hard-knee limiting can be achieved with master threshold, compression ratio, attack and release controls. Gain reduction indication is a large analog VU meter. Low and High Frequency (LF and HF) contour parametric spectral controls can be routed into the on-board side-chain path for enhanced frequency dependent compression with variable frequency and threshold levels. An SC LISTEN switch provides side chain listen mode for easy monitoring.

The *Vt-747sp* equalizer utilizes 100% discrete, Class A high voltage transistors for optimum sonic performance. The six-band stereo program EQ incorporates the smooth characteristics of an all passive design. The frequency turnover, Q and amplitude ranges have been carefully chosen for each band to provide the most natural harmonic balance with lowest phase change while offering simple and effective tone control. The EQ can be placed pre or post compressor for enhanced effects.

The *Vt-747sp* features TSP (Tube Signal Path) which gives you the choice of either tube tone (utilizing three high-voltage dual triode tubes), or the classic, Class A discrete transistor sound (utilizing discrete transistor amplifiers) in the primary opto buffers and output stages.

Fully balanced DC coupled, Class A discrete amplifiers are utilized for the input and output drive interface with +36dB input headroom. A high quality analog VU meter indicates accurate gain reduction. Twin LED meters provide a 60dB range with fast L-R output status of all levels.

*Inside view of Vt-747SP*



## 1.2 Features

- Class A optical compression
- 100% discrete Pure Class A operation
- Built-in side chain for spectral control
- Six-band discrete graphic passive EQ
- TSP (Tube Signal Path) with bypass
- EQ pre/post compression selection
- Twenty-two silver relays for signal routing
- True hard-wire bypass
- Low noise, better than -92dB
- High operating headroom +36dB
- Fully balanced operation, input and output
- 3 military-grade dual triode vacuum tubes
- High voltage, high current signal path
- Rugged stainless steel metric hardware
- 2U nineteen inch welded steel chassis
- Switchable AC power supply 100-240v
- 150W toroidal shielded power transformer
- Discrete soft-start DC power regulators

### 1.3 Unpacking and Inspection

Your *Vt-747sp* was packed carefully at the factory. Check to make sure that the shipping carton contains the following items:

1. *Vt-747sp*
2. Power cable
3. Warranty card
4. Operation Manual

Keep the packing materials in case you need to ship your unit for any reason.

Note: You must fill out and send in your warranty card in order to receive warranty and technical support. If you have not already filled out your warranty card please take the time to do so now.



*Vt-747sp contents and packaging*

## 2.0 Quick Start-up

The following chapter is designed to help you get started using your *Vt-747sp* right away without having to read the entire manual. Make sure however to take time to read the manual at a later date as there are many safety aspects and features of the *Vt-747sp* that will not be discussed here.

If you are familiar with this type of equipment you can also familiarize yourself with your *Vt-747sp* and the functions with the Quick Set-up Guide on page 8.

Note: The *Vt-747sp* is an extremely high performance piece of musical equipment. Every setting has great potential for musicality. **Do not be afraid of turning the knobs or faders to their full extreme positions.**

### Hook it up, turn it on and play:

1. Check on the rear of your unit that the power supply is set for your local AC voltage. (120V in U.S.) Refer to Chapter 3 page 11 for details.

2. Plug in the AC power cable and connect your *Vt-747sp* to your stereo source. (XLR type connectors pin 2 is hot.) You can use the *Vt-747sp* in mono, however, the Left and Right will always work together as one dedicated stereo pair.

3. Turn on the power and allow 60 seconds while the soft-start procedure commences. You may hear a relay click at about 45 seconds. During the soft-start procedure, the *Vt-747sp* is in hard-wire bypass mode and will pass signal, but the controls will not work. **For optimum performance, allow 30 minutes for the *Vt-747sp* to fully warm up.**

4. With all switches in the disengaged or non-illuminated position, run a signal through the *Vt-747sp*. Use the output control on the right hand side of the unit to check basic operation.(see figure 2.0 below)

5. Now you are ready to start pressing switches, turning knobs and pushing EQ faders!

The Quick Set-Up Guide on the following page gives a brief description of the switches and controls on the *Vt-747sp*.

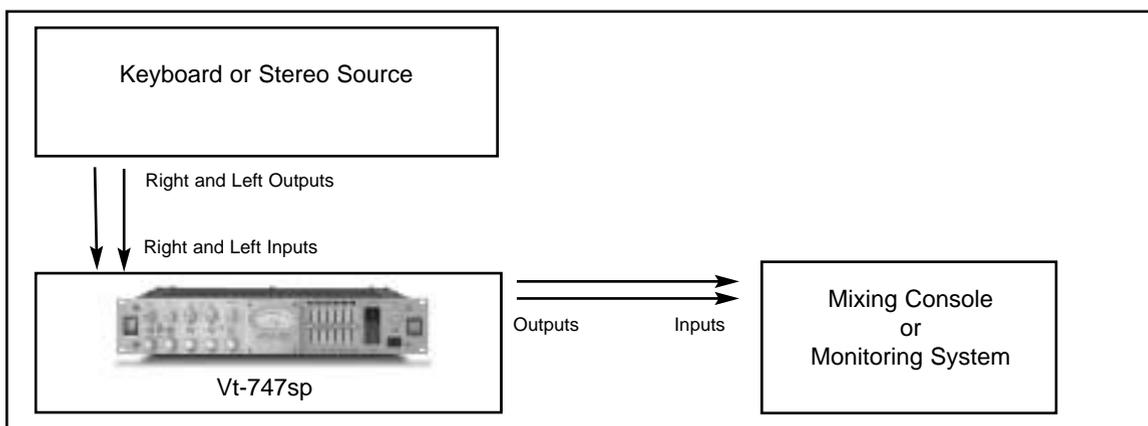


figure 2.0 Quick Start up

Figure 2.1 Quick Set-up Guide

### VT-747SP QUICK SET-UP OPERATING GUIDE

**LF and HF THRESHOLD**  
Range -15dB to +15dB, detent at 0dB, clockwise rotation raises the threshold (less compression) and counter clockwise rotation lowers the threshold (more compression) at the frequencies set by the LF (low frequency) and HF (high-frequency) spectral frequency controls located directly below

**INPUT GAIN**  
Trims input level -20dB to +8dB detent at 0dB (+18dB with +10dB IN)

**+10dB switch**  
Boosts input amplifier by +10dB for extra tube over-drive

**THRESHOLD**  
Sets compressor input threshold from -30dB to +20dB

**EQ to COMP**  
Inserts the six (6) band EQ pre the compressor

**Blue LED**  
Indicates compressor for Spectral EQ speed and activation

**SC LISTEN**  
Switch (in) into audio path to monitor SC

**COMPRESSION**  
Sets ratio of compressor from 1:1 to 20:1

**COMPRESSOR**  
Switch (in) engages shelf compressor into signal path (hard-wire bypass)

**COMPRESSION RATIO**  
Sets ratio of compressor from 1:1 to 20:1

**MAKE-UP**  
0dB to +10dB variable gain on opto-compressor

**METER**  
High quality VU meter indicates spectral content and output level gain reduction 0dB to -20dB

**POWER LED**  
Indicates ac power is on

**METER**  
Fast LED meter indicates both L-R spectral content and output level -30dB to +30dB

**OUTPUT LEVEL**  
Stereo output level control -20dB to +6dB detent at 0dB

**EQ**  
Switch (in) activates 6 band passive EQ into audio path (hard-wire bypass)

**AC POWER**  
Note: Check rear power input connector for correct local ac voltage. Allow forty seconds for the soft-start procedure to activate the audio signal path.

**Note: Knob settings shown represent starting positions only.**

# AVALON

## Class A Vacuum Tube

# VT-747SP

STEREO SPECTRAL OPTO-COMPRESSOR WITH TSP

Avalon Design is a division of Avalon Industries, Inc. © 2001

**Note: For the best sonic performance, allow thirty minutes for warm-up.**

When not in use, turn the ac off. This will extend the life of the electronics . . . Enjoy!

All units in dBu.

## 2.2 Tips

**Unity Level** - The *Vt-747sp* is calibrated so that unity level is +4dBu.

**INPUT** - Use the input control as a gain control, not a level control. This will drive the tubes and/or transistors harder for different tone.

**OUTPUT** - Use the output control as the overall level control.

**TSP** (Tube Signal Path) - Pressed in (illuminated) is tube mode. Pressed out (non-illuminated) discrete Class A mode.

**EQ > COMP** - Inserts the six-band graphic EQ before (pre) the compressor in the signal path.

**SIDE-CHAIN** - Engages the built-in side-chain. Use the SIDE CHAIN THRESHOLD and the corresponding frequency bands to compress specific frequencies.

**SC LISTEN** - To monitor the signal through the side chain.

**GR** (Blue LED) - Fast-acting LED illuminates when peak gain reduction begins to occur.

**EQ** - Six-band graphic EQ parameters:

Low to high (left to right)

+/-24dB 15Hz shelf

+/-8dB 125Hz selected Q

+/-4dB 500Hz selected Q

+/-4dB 2kHz selected Q

+/-10dB 5kHz shelf

+/-20dB 32kHz shelf

## 2.3 Tutorial - Using it all

The following is a tutorial that will quickly get you familiar with all of the functions of the *Vt-747sp*.

Start by plugging a stereo source (CD player, stereo keyboard, Submix output, etc.) into your *Vt-747sp*. If possible, run directly out of the *Vt-747sp* to powered monitors bypassing the console or mixing board. Choose a musical selection, loop, patch, sample or instrument with wide dynamic range so you can experiment with the compressor.

Set push button switches to their off or non-illuminated position.

1. **INPUT** - Set to 5. (Adjust **OUTPUT** so that overall signal level is at a comfortable monitoring level.

2. **GAIN +10dB** - Press in and out to get a feel for the sound of the high gain switch. Leave it non-illuminated.

3. **EQUALIZER** - (Located on right side of panel) press in equalizer switch and familiarize yourself with the six band equalizer. Adjust the two outside bands half way between unity and maximum, and the four mid-bands to half way between unity and minimum. Toggle the **EQUALIZER** switch in and out.

4. **COMPRESSOR** - Press in **COMPRESSOR** switch and turn the main compression controls to the following:

**COMPRESSION** - fully clockwise

**THRESHOLD** - fully counter clockwise

**ATTACK** - fully counter clockwise (Fast)

**RELEASE** - fully clockwise (Slow)

5. EQ->COMP - Press in to insert the EQ before (pre) the compressor in the signal path.

6. Press in TSP. This will engage the tubes so that you are now in tube mode.

7. Press in SIDE CHAIN and SC LISTEN. You are now monitoring the signal going through the side chain. You can use the side chain listen function as a parametric EQ on the primary audio path.

8. Adjust the side chain parameters to the following settings:

Both LF and HF side chain threshold fully counter clockwise.

LF frequency set to 300 Hz.

HF frequency set to 1k6 Hz.

9. Press out the SC LISTEN switch (disengaged).

Now you have full compression, with fast attack and slow release, and two different frequencies going into the side chain that are being compressed more than the overall stereo signal.

Make yourself familiar with all of the functions in the *Vt-747sp*. The combinations, colors, and tones are endless. For more details on each specific control or switch, please refer to Chapter 4 - Operations and Controls.

## 3.0 Safety and Grounding

The following chapter describes how to safely install your *Vt-747sp* for optimal sonic performance.

### 3.1 Safety Instructions

**This unit contains voltages that can cause serious injury or death. Do not operate with the covers removed.**



*Improper connection of the equipment-grounding cable can result in a risk of electric shock.*

Check with a qualified electrician or serviceman if you are in doubt about your electrical power or ground connection. The *Vt-747sp* is for use with an AC supply as selected by the AC voltage selector (located within the AC inlet on the rear of the chassis). Voltages are 100-120-220-240 VAC +/-5%, 50-60Hz, at 60 watts.

### 3.2 Grounding Instructions

**Always connect the *Vt-747sp* to a grounded AC power circuit.**

If the unit should malfunction or become "live", the chassis ground will provide the path of least resistance for electric current to reduce the risk of fatal shock.

**This product is equipped with an AC power inlet and must be connected to a three-wire grounded plug.**

The AC power cable must be plugged into an appropriate outlet that is correctly installed and grounded in accordance with all local electrical safety codes and ordinances.

If hum or ground-buzz is induced into the system, remove the rear-mounted GROUND LINK. This ground-link isolates the AC chassis ground from the audio ground. When the LINK is removed, the AC ground remains connected to the chassis via the AC inlet connector and provides a direct path for any electrical fault or dangerous condition.



**Warning! No ground adapter should ever be used with this unit.**

### 3.3 AC Voltage Selection

Before connecting the *Vt-747sp* to the AC supply, check the OPERATING VOLTAGE located on the rear of the chassis in the AC inlet connector.



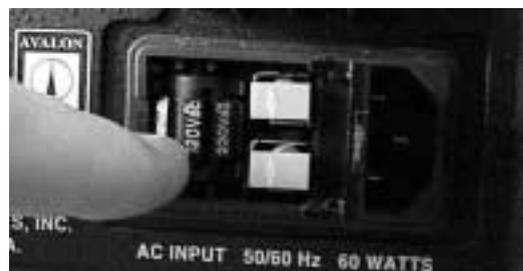
Voltages available are 100-120-220-240VAC +/-5%, 50-60Hz at 60 watts. (USA uses 120V)

To change the AC voltage for your location:

1. Make sure there is no AC power cable connected to the AC inlet.
2. Insert a small flat-head screwdriver tip into the voltage selector cavity. Carefully lift-open the hinged cover from left to right.



3. Rotate the selector wheel to show the correct voltage for your location, then push the wheel firmly into the mounting tabs.
4. Press the voltage selector cover snap-shut, check correct AC voltage in window.



5. Connect grounded AC power cable.

### 3.4 Fuse Replacement

The fuse on the *Vt-747sp* is located within the AC plug assembly on the back of the unit. A fuse can blow if the AC selection is not selected properly or if there is a sudden surge of AC to your *Vt-747sp*.

Your *Vt-747sp* uses a **250V, 1 amp** slow blow fuse.

To change the fuse:

1. Make sure there is no AC cable connected to the AC inlet.
2. Insert a small flat-head screwdriver tip into the voltage selector cavity. Carefully lift-open the hinged cover from left to right.



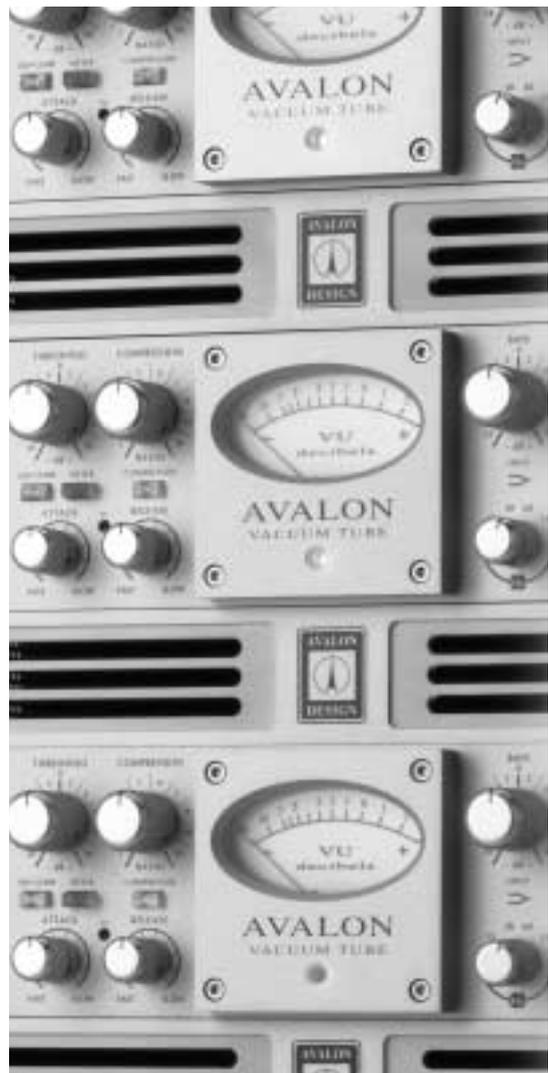
3. Pull fuse casing (labeled with an arrow) straight out.



4. Replace fuse in casing. Insert casing into casing slot. Close AC voltage selector cover.

### 3.5 Rack Mounting and Cooling

The *Vt-747sp* is designed to be mounted in a standard 19" equipment rack. As vacuum tubes and Class A circuitry can generate heat, it is highly recommended that an additional rack space above and below the unit be kept empty to allow for adequate cooling. Avalon Design has developed 1U ventilation panels (VP-1) specifically to keep your rack-mounted gear cool.



*Avalon units with VP-1 vent panels*

Be sure that the ventilation slots (located on the top and bottom of the unit) are not obstructed and air is allowed to flow easily through the chassis. If the unit is not rack-mounted, be sure to place supports under the unit to allow air to pass underneath. Never leave any obstruction on top of the unit (such as papers or books) blocking ventilation slots. Also, be sure that the heat sink mounted on the rear panel of the chassis has adequate clearance from the equipment enclosure and any adjacent equipment. **In electronic equipment, excessive heat is the cause of most component failures.** A little extra precaution to ensure proper ventilation can help avoid many premature equipment breakdowns.

Always use all four front panel-mounting holes when mounting the *Vt-747sp* in a rack enclosure. If not shipped in its original packing, the *Vt-747sp* should be transported in a floating-type shock-mounted flight case.

Although the *Vt-747sp* is well shielded against moderate electrical and magnetic fields, care should be taken to avoid areas that are in proximity to large motor or power transformers. Locations near sources of high RFI (radio frequency interference) such as computers or digital effects devices should also be avoided.

Because of the microphonic nature of vacuum tubes, areas of extreme vibration or sound levels should also be avoided.

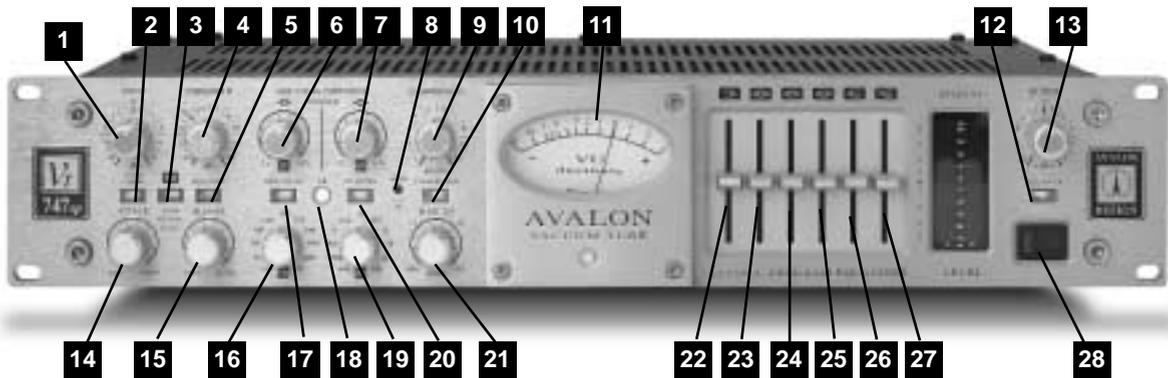
### 3.6 Turn-on Procedure

The *Vt-747sp* is designed with a "soft-start" feature that slowly brings the unit to life when the unit is powered on. This feature ensures that there is no strain on the electronic components when it is activated. It takes approximately 60 seconds for the unit to run through the "soft-start" turn-on procedure.

When the *Vt-747sp* is switched off or during the "soft-start" turn-on procedure, it is in hard wire bypass mode and the unit will pass signal utilizing a hard wire relay but none of the controls will operate.

Allow the unit to warm up for at least thirty minutes prior to use. This allows the components time to come up to temperature and stabilize before recording begins.

**It is recommended that the unit be turned off during periods of "non-use" greater than 4 hours.**



## 4.0 Operation and Controls

The following chapter describes the details of your *Vt-747sp* and how to operate each function.

### 1 INPUT

Continuously variable control trims input level of signal source. This control will drive the tubes harder while in tube mode to get more tube tone into the compressor. In discrete mode (TSP disengaged) the transistors are driven harder to achieve more classic discrete transistor sound. The input has +36dB of headroom before overload. You can use this control at minimum and maximum levels for different sounds and colors.

### 2 GAIN +10dB

Boosts the signal by +10dB. This switch enables more flexibility for another set of sounds and colors, and for matching low level sources. (e.g. keyboards, synthesizers, etc.)

### 3 TSP (Tube Signal Path)

Illuminated switch IN swaps three (3) tubes into the audio path from discrete Class A transistor-based amplifiers.

### 4 THRESHOLD

This control sets compressor threshold level. Continuously variable from -30dB to +20dB.

### 5 EQ > COMP

Switches six-band passive equalizer before (pre) the compressor. This gives flexibility to achieve different sounds. Putting the EQ before the compressor will give the signal a more squashed and narrow sound than if the EQ follows the compressor.

### 6 LF SIDE-CHAIN THRESHOLD

Controls the increase of compression for the LF specified frequency range. As the Threshold is turned counter clockwise (made more negative), the frequency set with the LF Side-Chain Threshold Hz will be compressed harder than the compression of the overall program. (Operates in the reverse of a standard EQ +/- control.)

### 7 HF SIDE-CHAIN THRESHOLD

Controls the increase of compression for the HF specified frequency range. As the Threshold is turned counter clockwise (made more negative), the frequency set with the HF Side-Chain Threshold Hz will be compressed harder than the compression of the overall program.

### **8 VU METER (0dB calibration screw)**

Recessed screwdriver adjustment for setting 0dB on the VU meter. The VU meter indicates the amount of gain reduction in dB.

To calibrate the VU meter: Power unit on and allow 30 minutes before making this adjustment so that components can warm up to operating temperature. While there is no signal present, adjust the trim pot so the needle on the VU meter lines up with zero ("0").

### **9 COMPRESSION RATIO**

Sets the compression ratio. Continuously variable from 1:1 to 20:1.

**Note:** With opto-compressors, the Threshold and Compression Ratio are interactive and are effected by one another.

### **10 COMPRESSOR**

Switches the compressor in the signal path with a sealed silver relay. (Hard-wire bypass)

### **11 VU METER**

Analog VU meter indicates gain reduction. The VU meter's needle is speed sensitive for measuring attack and release of the signal.

### **12 EQUALIZER**

Switches the six-band passive graphic equalizer in the signal path with a sealed silver relay. This EQ is designed for subtle sweetening and shaping. It is very simple and easy to use. The frequency turnover, Q and amplitude ranges have been carefully chosen for each band to provide extremely smooth musicality. Pushing the faders up from center detent will boost and pushing the faders down will cut.

### **13 OUTPUT**

Continuously variable output control. This controls the overall program level of the *Vt-747sp*. The *Vt-747sp* is calibrated so that 0 on the LED output meters accurately shows +4dBu.

### **14 ATTACK**

Varies attack time of compressor from 2ms (FAST) to 200ms (SLOW).

### **15 RELEASE**

Varies release time of compressor from 100ms (FAST) to 5 seconds (SLOW).

### **16 LF SIDE-CHAIN THRESHOLD Hz**

Sweep variable peak/dip frequency setting for Side-Chain parameter. (60Hz to 1kHz)

### **17 SIDE-CHAIN**

Activates the two-band parametric spectral Side-Chain controls.

### **18 GR (Blue LED)**

Fast-acting blue light indicates peak gain reduction.

### **19 HF SIDE-CHAIN THRESHOLD Hz**

Peak/dip variable sweep frequency side chain parameter. (600Hz to 10kHz)

### **20 SC LISTEN**

To monitor the signal going into through the Side Chain before it is effected by the compressor.

### **21 MAKE-UP GAIN**

Variable 0dB to +10dB control to add gain after compressed signal. (Only acts when the compressor switch is in.)

**22 LOW-BASS EQUALIZER BAND**

Controls low-bass frequency range:  
+/-24dB 15Hz shelf

**23 MID-BASS EQUALIZER BAND**

Controls mid-bass frequency range:  
+/-8dB 125Hz peak/dip

**24 LOW-MID EQUALIZER BAND**

Controls low-mid frequencies  
+/-4dB 500Hz peak/dip

**25 MID-RANGE EQUALIZER BAND**

Controls mid frequency range:  
+/-4dB 2kHz peak/dip

**26 HIGH-MID EQUALIZER BAND**

Controls high-mid frequency range:  
+/-10dB 5kHz shelf

**27 HIGH-RANGE EQUALIZER BAND**

Controls high frequency range:  
+/-20dB 32kHz shelf

**28 AC Power Switch**

Turns the power on and off. You must allow approximately 60 seconds from the time you turn on the power switch for the *Vt-747sp* to complete the entire soft start turn-on procedure. For more details on the soft start procedure please refer to Chapter 3.5 Turn-on Procedure.

*Vt-747sp production at Avalon*





### 4.1 Rear Panel Description

**1 LINE INPUT (Left and Right)**  
Female XLR-3 connectors. Balanced input for line level signals to +36dB maximum. (pin +2 hot)

**2 LINE OUTPUT (Left and Right)**  
Male XLR-3 connectors. Balanced DC coupled, capable of +30dB into 600 ohms. (pin +2 hot)

**3 GROUND LINK**  
2-terminal barrier strip. Provided to isolate chassis ground from audio ground. To lift ground, simply unscrew both phillips-head screws and remove the metal strip held by the screws.

**4 AC INPUT & FUSE**  
Combination IEC socket, voltage selector and fuse location. AC voltage is factory set as ordered. To change the factory voltage setting, refer to the AC Voltage Selection section of this manual in Chapter 3 (page 11), or contact your authorized Avalon dealer.

For instructions on changing the fuse, see Chapter 3.4 Fuse Replacement (page 12).

### 4.2 Connections

The **LINE INPUTS** are an electronically balanced Class A circuit with a nominal 20k ohm input impedance. (Can be used unbalanced by shorting pin 3 to ground on the cable connector.) The connectors are female XLR-3.

The **OUTPUTS** are a low impedance electronically balanced circuit which terminates to a male XLR-3 connector. (Can be used unbalanced by shorting pin 3 to ground on the cable connector.)

All XLR connectors are wired:

- Pin 1 ground
- Pin 2 high (+)
- Pin 3 low (-)

Input Impedance: 20k Ohm  
Output Impedance: 600Ohm

### 4.3 Unbalanced Operation

The *Vt-747sp* can also be used in unbalanced mode by grounding pin 3 on the cable input and output pins.

#### 4.4 Using the *Vt-747sp*

The opto-compressor of the *Vt-747sp* has the standard features of a typical outboard compressor plus a few other unique features like no other compressor. Basic operation is as follows:

1. Engage the COMPRESSOR push-button. This will insert the compressor into the signal chain.
2. Set ATTACK to FAST.
3. Set RELEASE to FAST.
4. Set COMPRESSION to 20:1 (fully clockwise)
5. Set THRESHOLD to  $-30\text{dB}$  (fully counter clockwise)
6. Test compression by introducing signal. Needle should move rapidly for any substantial input signal. Turn up the INPUT GAIN if needle is not moving.
8. Fine tune controls for desired effect.

#### 4.5 Six Band Passive Equalizer

The six band graphic equalizer is extremely smooth and musical. The six frequency bands and corresponding Q settings have been carefully chosen to provide the most natural harmonic balance and lowest phase change while offering simple and effective tone control.

The following is a description of the six frequency bands.

From Low to High (left to right)

1. +/- 24dB 15Hz shelf response
2. +/- 8dB 125Hz selected Q response
3. +/- 4dB 500Hz selected Q response
4. +/- 4dB 2kHz selected Q response
5. +/- 10dB 5kHz shelf response
6. +/- 20dB 32kHz shelf response

#### 4.6 Using the Equalizer



The equalizer section of the *Vt-747sp* has been designed to be easy to use.

Engage EQ push-button (illuminates "IN") to insert the EQ in the signal path.

All six faders have a center detent. When all faders are set to center detent the EQ is completely flat.

Pushing a fader up from the center detent boosts the corresponding frequency band and pushing a fader down from the center detent cuts the corresponding frequency band.

Because of the passive design, the equalizer on the *Vt-747sp* is smooth and musical. It can be used to subtly shape and color while still keeping the signal musically balanced (program equalizer.)

## 4.7 Using the Side-chain



Inserting an equalizer into a compressor's gain reduction control path is commonly known as **side-chaining**. This effect allows for spectral control of the compression at the specified frequencies. The most frequent application of this technique is known as de-essing. De-essing is the removal of excessively pronounced "S" sounds from vocal recordings. You can de-ess with the *Vt-747sp* and any other frequencies where you need a little more compression than the overall program.

To insert the two-band spectral EQ into the Side Chain:

1. Set the compressor to full compression to begin. (described in previous section)
2. Engage the SIDE-CHAIN switch
3. Set the HF and LF Threshold controls to -15dB (fully counterclockwise)
4. Press in the SC LISTEN to monitor
5. Sweep the LF and HF frequency controls to find the desired signals to send into the Side-Chain.
6. Depress the SC LISTEN switch (non-illuminated) so that the signal you were emphasizing with the SC LISTEN is now routed into the gain control section of the compressor.

## 5.0 Applications

The first thing to remember is that **there are no specific rules**. The *Vt-747sp* was designed to be extremely flexible and filled with endless colors, textures and tones. **TRUST YOUR EARS!**

### 5.1.0 Typical Set-ups

The following setup diagrams are a few typical ways (not the only ways) to insert the *Vt-747sp* in the audio chain during a recording project. Much of the power in the *Vt-747sp* lies within its flexibility. You can use the *Vt-747sp* in every stage of the recording or mixdown process:

**Figure 5.1.1 - Recording** to direct to Digital Audio Workstation (DAW) or tape machine.

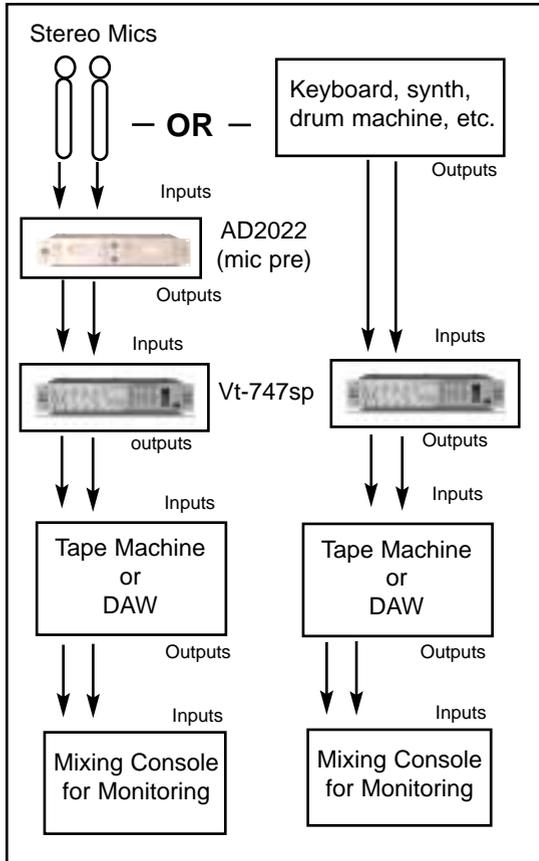
Note that the *Vt-747sp* is a line level unit only. It does not have microphone preamplifiers (mic pre's). You must use mic pre's Such as the two-channel Avalon AD2022, before inserting the *Vt-747sp* during recording. The *Vt-747sp* works wonderfully with keyboards, drum machines, synthesizers and other line level inputs enabling you to completely bypass the mixing console and go directly to your DAW or tape machine.

**Figure 5.1.2 - Mixdown Stereo Buss** - Main right/left Insert or across the entire stereo mix.

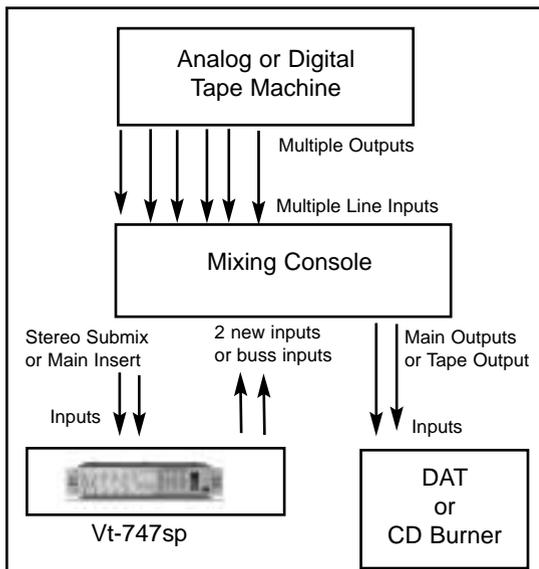
**Figure 5.1.3 - Mixdown and/or Mastering on DAW** - Across a stereo submix or the entire mixed stereo signal

**Figure 5.1.4 - Mastering Tape Based** - Main Right and Left Outputs

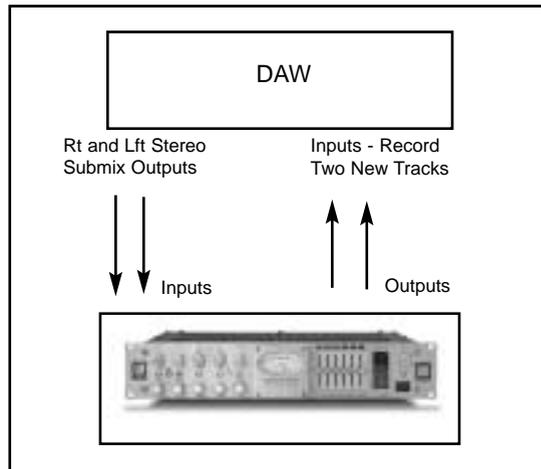
**Figure 5.1.1 - Recording**



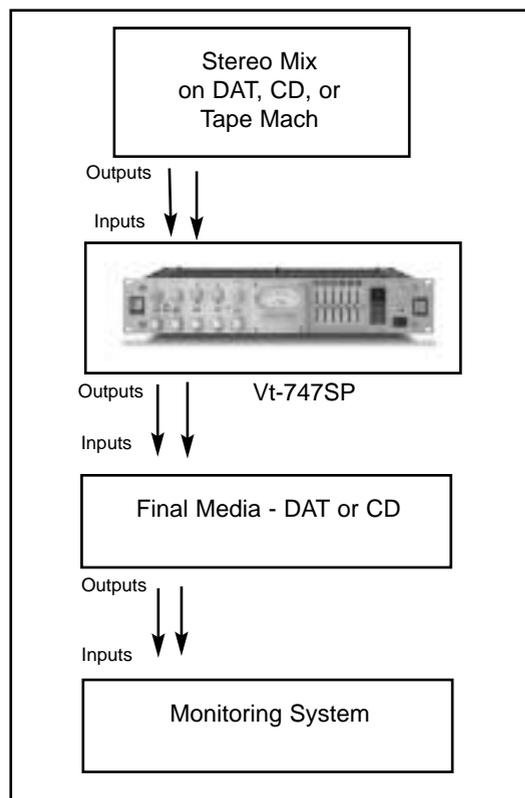
**Figure 5.1.2 - Stereo Mixdown (Buss)**



**Figure 5.1.3 - Mixdown or Mastering Using DAW**



**Figure 5.1.4 - Mastering Tape Based**

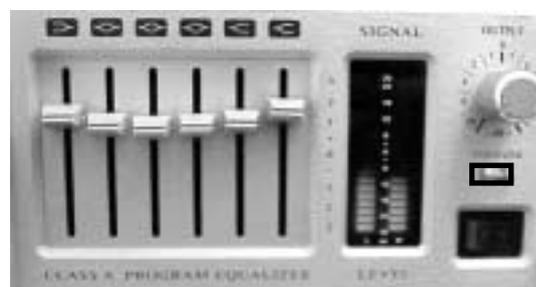


## 5.2.0 Application Settings

The following are a few example settings for the *Vt-747sp* to be used as starting points for specific applications. You will most likely need to adjust the settings given here for your recordings because of the many variables which depend on a recorded sound. Variables such as microphone choice, microphone placement, recording room, recording media, mixing console, the musician, etc., can greatly alter and change the sound of a recording. Simply stated, trust your ears.

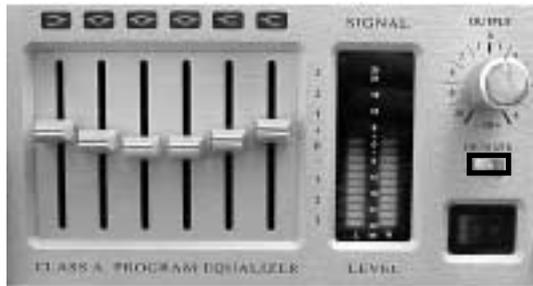
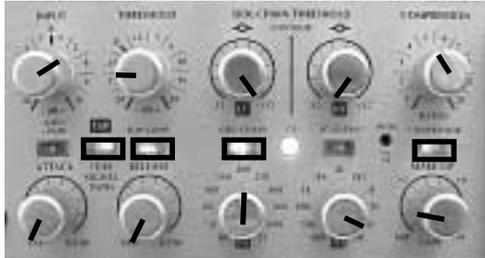
**Note:** The output controls the signal level to the next piece of equipment in the audio chain. The output control is designed to be sonically invisible. This means that you can set the output level based on what signal level you want coming out of the *Vt-747sp* and you will not color the signal by turning this control up or down. **Therefore, the output level is not included in the example settings.**

## 5.2.1 Stereo Buss for Mixdown



- Input:** +3
- Gain:** Out
- TSP:** Out
- Compressor:** In
- EQ->Comp:** Out
- Compression Ratio:** 5:1
- Compression Threshold:** -15
- Attack:** 11 o'clock
- Release:** Fast
- Make-up:** +1 (10 o'clock)
- Side-Chain:** Out
- Side-Chain LF Threshold:** bypassed
- Side-Chain LF Frequency:** bypassed
- Side-Chain HF Threshold:** bypassed
- Side-Chain HF Frequency:** bypassed
- Equalizer:** In
- EQ Faders** from left (1) to right (6):
  1. +2
  2. +1
  3. +1
  4. +1
  5. +1
  6. +2

## 5.2.2 Stereo Buss &amp; Vocal De-ess



**Input:** +3  
**Gain:** Out  
**TSP:** In  
**Compressor:** In  
**EQ->Comp:** In  
**Compression Ratio:** 5:1  
**Compression Threshold:** -12  
**Attack:** Fast  
**Release:** Fast  
**Make-up:** +1 (10 o'clock)  
**Side-Chain:** In  
**Side-Chain LF Threshold:** +15  
**Side-Chain LF Frequency:** 200Hz  
**Side-Chain HF Threshold:** -15  
**Side-Chain HF Frequency:** 7kHz  
**Equalizer:** In  
**EQ Faders** from left (1) to right (6):  
 1. +1  
 2. +1  
 3. +0.5  
 4. +0.5  
 5. +1  
 6. +1

## 5.2.3 De-ess on Vocals



**Input:** +2  
**High Gain:** Out  
**TSP:** In  
**Compressor:** In  
**EQ->Comp:** In  
**Compression Ratio:** 20:1  
**Compression Threshold:** -20  
**Attack:** Fast  
**Release:** Fast  
**Make-up:** +2  
**Side-Chain:** In  
**Side-Chain LF Threshold:** +15  
**Side-Chain LF Frequency:** 200Hz  
**Side-Chain HF Threshold:** -15  
**Side-Chain HF Frequency:** 7kHz  
**Equalizer:** In  
**EQ Faders** from left (1) to right (6):  
 1. +1  
 2. 0  
 3. 0  
 4. +0.5  
 5. +0.5  
 6. +0.5

### 5.2.4 Stereo Keyboards



**Input:** +3  
**High Gain:** Out  
**TSP:** In  
**Compressor:** In  
**EQ->Comp:** Out  
**Compression Ratio:** 6:1  
**Compression Threshold:** -17  
**Attack:** 11 O'clock  
**Release:** Fast  
**Make-up:** +2  
**Side-Chain:** Out  
**Side-Chain LF Threshold:** bypassed  
**Side-Chain LF Frequency:** bypassed  
**Side-Chain HF Threshold:** bypassed  
**Side-Chain HF Frequency:** bypassed  
**Equalizer:** In  
**EQ Faders** from left (1) to right (6):  
 1. 0  
 2. +1  
 3. +1  
 4. +2  
 5. +2  
 6. +1

### 5.2.5 Extreme Compression



**Input:** 0 - Unity  
**Gain:** Out  
**TSP:** In  
**Compressor:** In  
**EQ->Comp:** In  
**Compression Ratio:** 20:1  
**Compression Threshold:** -20  
**Attack:** Fast  
**Release:** 12 O'clock  
**Make-up:** +10  
**Side-Chain:** Out  
**Side-Chain LF Threshold:** bypassed  
**Side-Chain LF Frequency:** bypassed  
**Side-Chain HF Threshold:** bypassed  
**Side-Chain HF Frequency:** bypassed  
**Equalizer:** In  
**EQ Faders** from left (1) to right (6):  
 1. +3  
 2. +2  
 3. +1  
 4. +1  
 5. +2  
 6. +2

### 5.2.6 Acoustic Piano



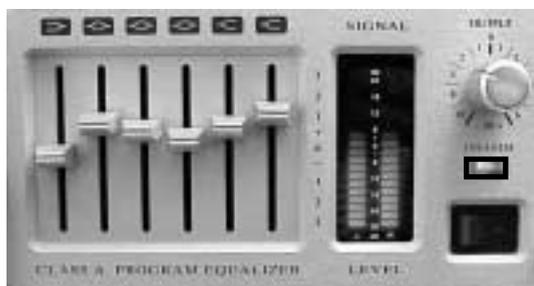
**Input:** +2  
**Gain:** Out  
**TSP:** In  
**Compressor:** In  
**EQ->Comp:** Out  
**Compression Ratio:** 6:1  
**Compression Threshold:** -12  
**Attack:** Fast  
**Release:** Fast  
**Make-up:** 0  
**Side-Chain:** In  
**Side-Chain LF Threshold:** +15  
**Side-Chain LF Frequency:** 70 Hz  
**Side-Chain HF Threshold:** -15  
**Side-Chain HF Frequency:** 3kHz  
**Equalizer:** In  
**EQ Faders** from left (1) to right (6):  
 1. +1  
 2. +2  
 3. +1  
 4. +2  
 5. +1  
 6. +1.5

### 5.2.7 Acoustic Guitar



**Input:** +3  
**Gain:** Out  
**TSP:** Out  
**Compressor:** In  
**EQ->Comp:** Out  
**Compression Ratio:** 9:1  
**Compression Threshold:** -15  
**Attack:** 10 O'clock  
**Release:** Fast  
**Make-up:** 0  
**Side-Chain:** In  
**Side-Chain LF Threshold:** 10 O'clock  
**Side-Chain LF Frequency:** 250 Hz  
**Side-Chain HF Threshold:** 3 O'clock  
**Side-Chain HF Frequency:** 7 kHz  
**Equalizer:** In  
**EQ Faders** from left (1) to right (6):  
 1. 0  
 2. -0.5  
 3. -1  
 4. 0  
 5. +0.5  
 6. +0.5

### 5.2.8 Drum Overheads



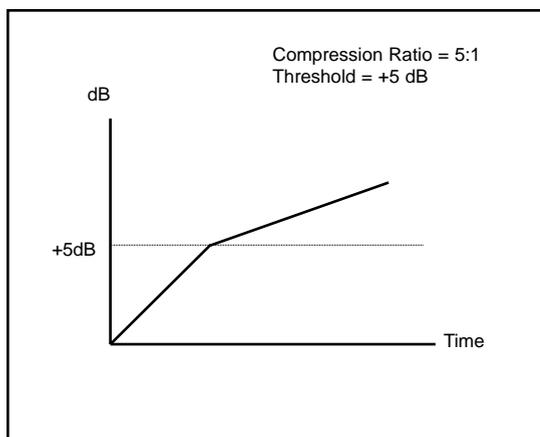
- Input:** +4
- Gain:** Out
- TSP:** In
- Compressor:** In
- EQ->Comp:** Out
- Compression Ratio:** 4:1
- Compression Threshold:** -17
- Attack:** Fast
- Release:** Fast
- Make-up:** +5
- Side-Chain:** Out
- Side-Chain LF Threshold:** bypassed
- Side-Chain LF Frequency:** bypassed
- Side-Chain HF Threshold:** bypassed
- Side-Chain HF Frequency:** bypassed
- Equalizer:** In
- EQ Faders** from left (1) to right (6):
  1. 0
  2. +2
  3. +1
  4. +0.5
  5. +1
  6. +2

### 6.0 Compression Primer

A compressor is one of the most widely used signal processors in the recording studio. Compressors are used during the recording process as well as during mixdown and mastering. During the recording process compressors are used to control the dynamic range or volume of a signal. For example, a singer may vary his volume level from a whisper to a scream during a particular song. A compressor will control the volume of the vocal so that the volume is consistent whether the singer is whispering or screaming. During mixdown compressors are used to "tighten up" the tracks so that nothing pops out of the mix uncontrollably. During the mastering process compressors are used very slightly to tighten up the entire mix and can give the mix a bigger sound.

The way a compressor works is like an automatic fader. When the input signal exceeds a predetermined level called the **threshold**, the gain is reduced by the compressor and the signal is attenuated. By attenuating the louder signal levels, you are in fact, reducing the program's overall dynamic range. Because the range between the loudest and softest signal is "compressed" by increasing the signal's overall gain, the average level will be greater. Thus the signal will be perceived as being louder than it otherwise would be.

*Compression is measured by the ratio of the change in output level (in dB) to the change in input level, called the **compression ratio**. If a compressor is set to 8:1 compression then an 8 dB increase in the input level will result in a 1dB increase in the output level.*



*Graphic description of compression*

### Compression Variables Defined

Compressors are controlled by four main functions: **Threshold**, **Ratio**, **Attack** and **Release**.

**Threshold:** Defines the level where compression begins. If the sound level coming into the input is below the threshold, the compressor passes the signal with no change. When a louder signal rises above the threshold, the compressor starts working, automatically reducing the output gain by the amount set with the ratio control.

**Ratio:** The ratio control is the amount of volume reduction relative to the original signal level. A 1:1 (one to one) ratio is the lowest compression ratio. This means that the volume that goes into the compressor is exactly the same as the volume that comes out. A 2:1 ratio means that the compressor will only allow the output level to rise 1dB for every 2dB that the input is over the threshold. This way the compressor allows the signal to be louder than the threshold, but only by half as much. This is typical moderate compression. A 4:1 ratio

means that if the input signal is 4dB over the threshold, the compressor only allows an output 1dB over the threshold.

**Attack:** The very beginning of a sound is usually the loudest and most difficult to record smoothly (for example, vocals, slap bass, guitar, etc.). In many cases you want to let these initial transients pass through before pulling down the gain, other times you want the compression to start right away. To help make adjustments to this specific event, the attack control adjusts the length of time it takes for the compression to begin.

**Release:** Once the signal falls below the threshold, the Release control determines how quickly the compressor "lets go" of the volume control and lets the level rise back to unity gain. Just as the Attack control sets the volume of the start of a sound, the Release control sets the volume of the end of a sound. The release can be used creatively to make sounds cut-off sharply or sustain longer.

Compressors usually have built-in metering to allow monitoring of the amount of gain reduction taking place. The meter usually sits at 0 VU when the input signal is below the threshold and falls to the left to indicate the number of decibels of gain reduction. Also the actual speed of the moving needle indicates the attack and release speeds.

## 6.1 Equalization Primer

An equalizer is a group of tone controls that allow adjustment to the frequency range of an incoming signal using a number of separate frequency bands. A graphic equalizer consists of a number of pre-selected frequency bands, boost/cut control, and a pre-set bandwidth or “Q” control for each frequency band. Each fader on a graphic equalizer corresponds to a specific frequency range to either cut or boost. The bandwidth of the frequency range is preselected. The mid bands are typically peak/dip while the end bands are typically shelving filters.

A six-band graphic (program) equalizer as found in the *Vt-747sp* consists of six frequency selection controls: Low-bass, Mid-bass, Low-mid, Mid, High-mid, and High. Each frequency band has carefully selected cut/boost, frequency range, and Q parameters that are useful and effective to shape and sweeten the signal. The Low Bass, High Mid and High bands are shelving filters while the Mid-bass, Low-Mid, and Mid bands are peak/dip filters. For details on the *Vt-747sp* graphic EQ parameters see Chapter 3, Operation and Controls.

## 7.0 FAQs

The following are answers to **Frequently Asked Questions** about the *Vt-747sp*:

**Q: Can I use the *Vt-747sp* as an insert for compression and EQ?**

*A: Yes. the *Vt-747sp* is perfect as an insert for a recorded stereo signal such as keyboards, acoustic piano, drum overheads, acoustic guitar, etc.*

**Q: What’s the main difference between the *Vt-747sp*’s compressor and Avalon’s *AD2044* compressor?**

*A: The *Vt-747sp* is a dedicated stereo compressor that is loaded with many different tones and color. The *Vt-747sp* has vacuum tubes, six-band program equalizer and built in spectral control. The *AD2044* is an ultra-high performance pure Class A 100% discrete traditional compressor. It features extreme dynamic range, ultimate low noise and completely transparent compression, great for mastering, tracking and mixing.*

**Q: How often will I need to change the tubes?**

*A: The vacuum tubes on the *Vt-747sp* are military spec tubes rated for over 5,000 hours. Avalon recommends changing the tubes approximately every 2 years or so on a unit that is used regularly. Avalon recommends that you replace tubes with exact make and model of the tubes that Avalon specifies. You may purchase a spare set of tubes for your *Vt-747sp* directly from Avalon.*

**Q: Can I damage the *Vt-747sp* by turning the preamp gain up too high?**

*A: No. The *Vt-747sp* has enormous headroom. Crank it up and check it out.*

**Q: Why does Avalon use opto cells?**

A: Avalon uses opto-cell compression because they are the most musical of all control elements.

**Q: Can I do mastering with a Vt-747sp?**

A: Yes. Since the Vt-747sp is a dedicated stereo unit it is a great tool for mastering. The noise floor is low enough for mastering and the built-in EQ and side chain are perfect for gentle shaping and sweetening.

**Q: Is the Vt-747sp durable enough for the road?**

A: Yes. the Vt-747sp as well as all Avalon equipment is literally built like a tank. Steel chassis, metal faceplate, metal knobs, all circuit boards are fixed with stainless steel hardware and more.

**Q: Should I power down the Vt-747sp ?**

A: The Vt-747sp is equipped with a "soft-start" procedure that slowly brings the unit to life without damaging the tubes. Avalon recommends that you turn the unit off if not being used for more than 4 hours. This procedure will also save on your electric bills.

**Q: Will the Vt-747sp continue to work when I travel to different countries?**

A: Yes. The power supply on the Vt-747sp has selectable voltages: 100V, 120V, 220V, and 240V. It is very easy to change the voltage. See chapter 3.

**Q: Why is the High-Mid Band on the Vt-747sp shelving and not peak/dip like the other Mid Bands?**

A: Having two shelving bands on the high end of the equalizer gives more flexibility and musicality. If you want to utilize the High-Mid Band as a peak/dip then simply cut (turn

down) the High Frequency band to bring down the ultra high end, giving you more creative possibilities.

**Q: Why does the needle in the VU meter sometimes drift to the left of 0dB after the Vt-747sp warms up?**

A: As the unit warms up, after approximately 30 minutes, the resistance of the meter coil is increased with heat and the needle then settles into its operating 0dB position. If inadequate cooling is provided, the operating temperature will be too high. (just like the old LA2A's). To calibrate the VU meter to 0dB see page 32.

**Q: Will the Vt-747sp work with unbalanced inputs on my recording device?**

A: Yes. You need to make sure that the cables you are using are wired the same (pin 2 hot). You can get a cable that has XLR on one side and RCA or 1/4" on the other. This will work fine for unbalanced systems. Keep the cables 20 ft in length or less for best sonic performance.

**Q: Can I use the Vt-747sp with a recording device that is designed for -10dB operation?**

A: Yes. The Vt-747sp will work however the output signal from the Vt-747sp may be too hot. Adjust the output control on the Vt-747sp to match the input to the -10dB device. If you have a choice, always run at +4dB.

**Q: Can I use different types of tubes in the Vt-747sp to get different or better sounds?**

A: Avalon has selected the tubes in your Vt-747sp for optimal sonic performance. Avalon does not recommend experimenting with different types of tubes because they may cause extreme damage to the Vt-747sp.

**Q: Why does the Vt-747sp have a six-band graphic EQ?**

A: The Vt-747sp's graphic EQ is designed to be very simple to operate and musical. It is intended to enhance the program material for sonic retouching and eliminates the need to patch and additional EQ if only minor adjustments are required.

**Q: What are the advantages of using the Vt-747sp with my digital recording system?**

A: The Vt-747sp breaths life into digital recordings. It will add air to the top, enhance the space in the lower mid range and solidify the bottom end. This process is very effective if used with high quality A-D and D-A converters. Even if your converters are not of the highest quality it will still enhance your recordings.

**Q: Will the Vt-747sp help to warm up the signal going to a digital recorder?**

A: Yes. The Vt-747sp will give the signal a richer warmer sound. The bottom end will open up and your recorded music will sound bigger. It works wonderfully for synths, drum machines, and keyboards that would otherwise sound thin and lifeless.

**Q: Can I use the SIDE CHAIN LISTEN function as a parametric EQ?**

A: Yes. Press in the SIDE CHAIN LISTEN button and use the Threshold controls as cut/boost and the two frequency selectors to select the frequencies of interest. Note that the Threshold controls will act in the opposite direction. (ie. clockwise will cut and counter clockwise will boost selected frequency.)

**Q: What is the difference between the Vt-737sp and the Vt-747sp?**

A: The Vt-737sp is a mono Mic, Line, and Instrument level preamplifier with compressor and parametric equalizer. It is great for recording one channel at a time and for mixdown on the most important channel.

The Vt-747sp is a dedicated stereo line level compressor and graphic equalizer. **It has no microphone preamplifier.** The Vt-747sp is great for stereo keyboards, synthesizers, drum machines, stereo submix or mix buss applications and mastering.

### 8.0 Trouble Shooting

If you experience any problems with your *Vt-747sp*, please make sure to first isolate the problem to your *Vt-747sp*. In many cases the problem can be a bad cable or another piece of equipment in the signal path.

It is easiest to isolate the problem by removing as many pieces of extraneous gear in the signal path as possible. If you believe that your *Vt-747sp* has a problem, please set up the following test system:

1. Plug your input source (keyboard, synthesizer or line input) into *Vt-747sp*; make sure to check your cables.

2. Connect the output of *Vt-747sp* directly to your powered speakers or monitor system. Use the OUTPUT control on the *Vt-747sp* to adjust the volume.

Once you have isolated the problem to the *Vt-747sp* please check the following list for suggested solutions.

**Vt-747sp Trouble Shooting Table**

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
No Power	Power cable on back of chassis not securely plugged in	Plug in power cable
No Power	Fuse blown due to power surge or improper AC voltage setting	Replace fuse (page 12) and check AC voltage setting (page 11)
Lights dim / no sound	Improper AC voltage setting	Check AC voltage setting (page 11)
No sound	Bad cable	Check cables
Hum or buzzing noise	ground loop	Check cable wiring and grounding, lift ground on <i>Vt-747sp</i> (page 10)
Distorted sound	<i>Vt-747sp</i> is overheating	Make sure <i>Vt-747sp</i> has adequate cooling and ventilation (page 12)
Distorted sound	Input source overloading	Try a different input source, reduce input level control

**Tube Related Symptoms**

The following list are symptoms of a failing vacuum tube. If you are experiencing these symptoms please call your local dealer or the Avalon factory at 949-492-2000.

1. Background noise (a crackling or sizzling sound)
2. Ringing noise
3. Low output volume
4. Distorted sound

**Other problems**

Please call your nearest dealer or the Avalon factory at 949-492-2000 if you have any technical questions or are experiencing problems not listed in our Trouble Shooting Table.

## 9.0 Service and Contact Information

### Maintenance and Tube Life

Because of the exceptional build quality of the *Vt-747sp*, the unit will perform for many years to come. Like any musical instrument, it needs care and maintenance to keep it in top shape.

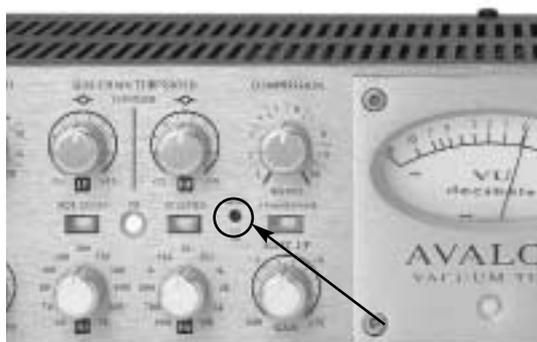
### Vacuum Tube Replacement

For peak performance, Avalon Design recommends changing these tubes every 5000 hours of run time. Changing the tubes every two years is recommended assuming use of 8 hours per day, 7 days per week. A matched set of replacement tubes can be purchased directly from your local dealer or Avalon. Avalon only recommends Sovtek 6922 vacuum tubes for your *Vt-747sp*. Replacement of tubes should be performed by an authorized Avalon technician.

### Meter Calibration and Alignment

The VU meter can be easily adjusted to 0 VU when no signal is present. To adjust the VU meter to zero:

1. Turn the unit on
2. Let unit warm up for at least 30 minutes
3. Unplug all inputs
4. From the front of the unit use a small flat head screwdriver to turn the recessed trim pot so that the needle reads zero.



### External Cleaning

The *Vt-747sp* can be cleaned using an ordinary mild house cleaner such as 409 or Windex. Do not use abrasive cleaners or petroleum-based solvents. Doing so could cause damage to the finish.

### Contact Information

Avalon Design  
PO Box 5976  
San Clemente, CA 92673

Tel: 949-492-2000  
Fax: 949-492-4284

Email: [avalon@avalondesign.com](mailto:avalon@avalondesign.com)  
Website: [www.avalondesign.com](http://www.avalondesign.com)

## 10.0 Technical Information

Your *Vt-747sp* is built to withstand many years of high performance music making. If you experience any malfunctions or problems, please contact the dealer where your unit was purchased. If your *Vt-747sp* has outlasted your dealer, please contact Avalon directly.

### Specifications

**Circuit Topology:** Three dual triode vacuum tubes, plus high-voltage discrete Class A

**Input Gain Range:** Balanced, Class A, 20k ohms, +6dB with high gain switch in

**Maximum input level:** +36 dB balanced XLR

**Maximum output level:** +30dB balanced XLR 600 ohms, DC coupled, Pin 2 hot

**Output gain range:** Output trim gain -45dB to +10dB

**Noise 20-20kHz unweighted:** -92dBu

**Distortion (THD, IMD) @ 1kHz** 0.5%

**Bandwidth (-3dB):** 1 to 200kHz

**Frequency Response:** 10 to 40kHz +/-0.2dB

**VU meter and gain reduction:** 0VU=+4dBu and gain reduction to -20dB.

**Output meter:** Twin 20 segment LED VU meters with -27dB to +30dB range

**Compressor type:** optical passive attenuator

**Make-up gain:** Variable 0dB to +10dB stereo tracking

**Compression ratio:** Variable 1:1 to 20:1

**Threshold:** Variable -30dB to +20dB

**Attack:** Variable 2mS to 200mS

**Release:** Variable 100mS to 5 seconds

**Side-chain spectral contour:** Variable threshold -15dB to +15dB, frequency 70Hz to 9kHz

**Equalizer type:** Discrete Class A, passive design optimized for full-range program material

#### **Frequency bands (6):**

1. LF +/-24dB 15Hz shelf response
2. MF1 +/-8dB 125Hz selected Q response
3. MF2 +/-4dB 500Hz selected Q response
4. MF3 +/-4dB 2kHz selected Q response
5. MF4 +/-10dB 5kHz selected shelf
6. MF5 +/-20dB 32kHz shelf response

**AC power:** Internal toroidal 100v to 240v, 50-60Hz selectable, 60 watts maximum, enclosed in separate steel chassis

**Dimensions:** 19 x 12 x 3.5 inches  
482 x 305 x 89 mm

**Weight:** 22 lbs. (10 kg)

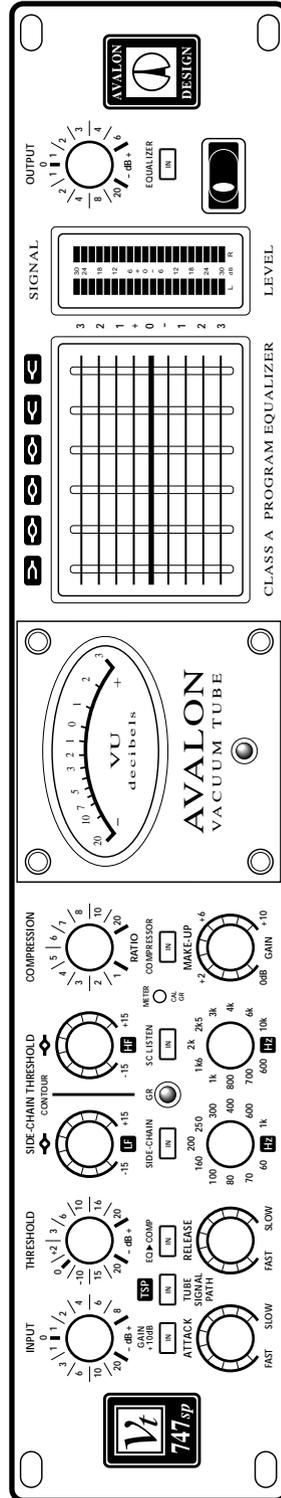
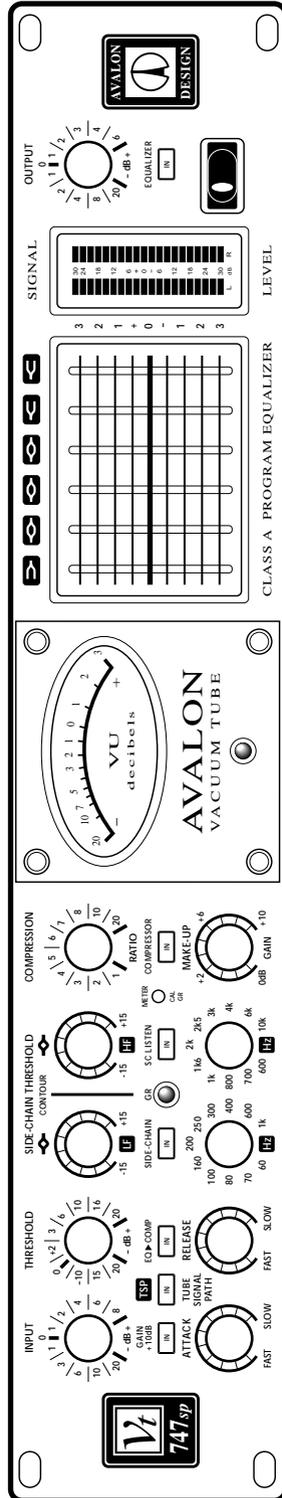
#### **Dimensions - shipping carton:**

21 x 18 x 8 inches  
533 x 457 x 203 mm

**Weight packed:** 26 lbs. ( 11.8 kg)

10.1 Vt-747sp Recall Sheet

**VT-747SP RECALL SETTINGS**




---

---

---

---

---

---

---

---

Class A Vacuum Tube  
STEREO SPECTRAL OPTO-COMPRESSOR

**VT-747SP**

Avalon Design is a division of Avalon Industries, Inc. © 2001




---

---

---

---

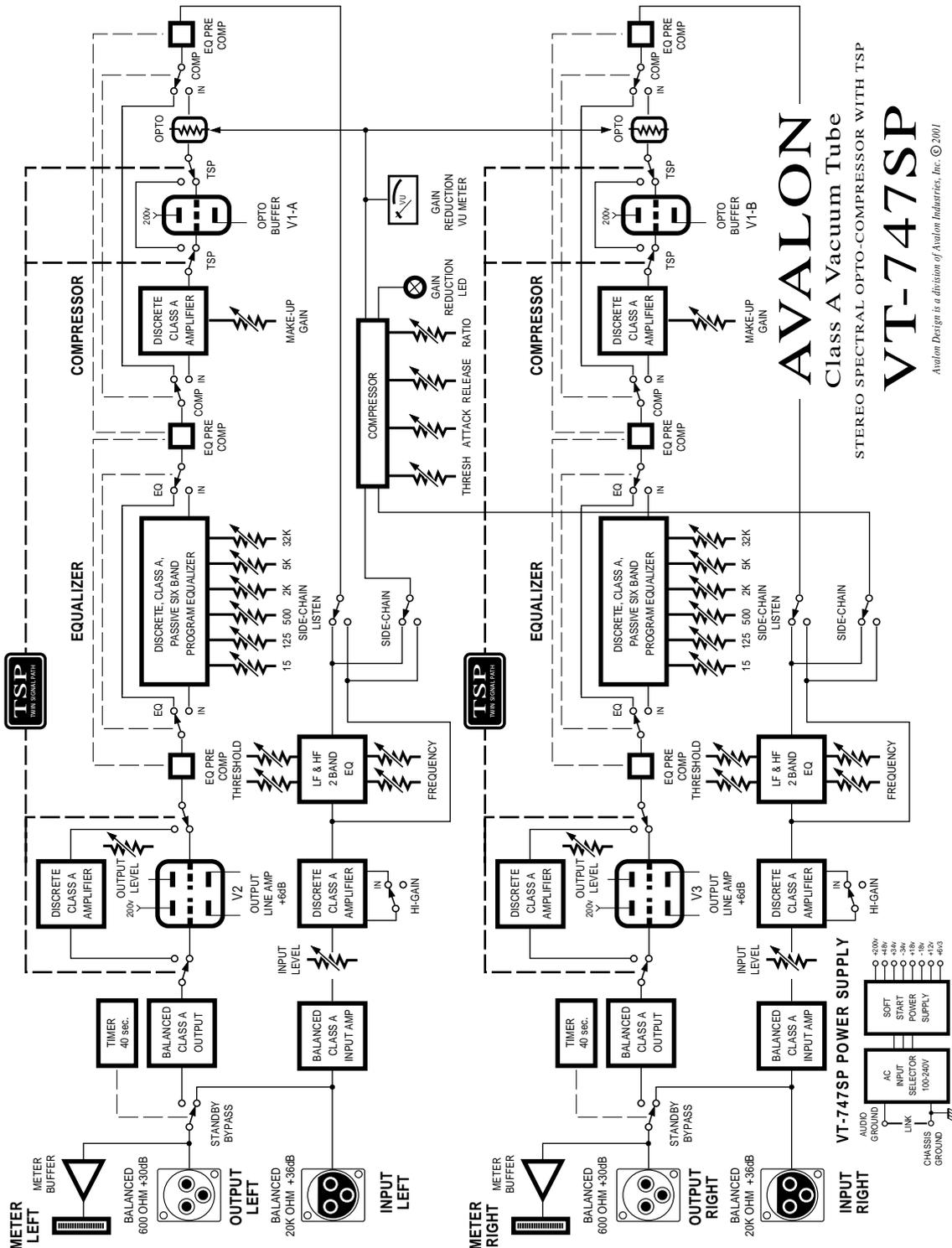
---

---

---

---

10.2 Vt-747sp Block Diagram



**AVALON**  
 Class A Vacuum Tube  
 STEREO SPECTRAL OPTO-COMPRESSOR WITH TSP  
**VT-747SP**

*Avalon Design is a division of Avalon Industries, Inc. © 2001*

## 11.0 Warranty

Avalon Industries, Inc. warrants this product against defects in material or workmanship as follows:

1. For a period of one (1) year from the date of purchase Avalon will pay the labor charges to repair the defective product. After this one (1) year period, all labor charges will be paid by the customer.
2. Avalon will supply at no charge, new or rebuilt replacements for any defective mechanical switches, potentiometers or moving parts for a period of one (1) year from original date of purchase.
3. Avalon will supply at no charge, new replacement for any defective vacuum tubes for a period of ninety days (90) from the original date of purchase.
4. This warranty is void if the product has been found to be subjected to misuse, abuse or unauthorized service.
5. This warranty does not cover cosmetic damage, and damage due to acts of God, accident or transit damage.
6. Proof of purchase in the form of a bill of sale or invoice to provide evidence that the unit is within the warranty period must be presented to obtain warranty service.
7. This warranty is only valid if the serial number appears on the product.

### **Outside of the USA**

Please check [www.avalondesign.com](http://www.avalondesign.com) for your nearest authorized service center.

## 11.1 Returns

If your *Vt-747sp* has become defective within the one (1) year period as specified above, please contact the place of purchase to arrange for warranty repair. If you would rather work directly with Avalon, please call the factory at (949) 492-2000.

To return a unit to Avalon for repair or exchange, you will need to obtain a Return Authorization Number (RA) from Avalon. **Do not send your unit to Avalon without an RA number.**

## 12.0 Safety Standards



Avalon Industries, Inc. declares that the *Vt-747sp* conforms to standards EN55013 (Emissions), EN55020 (Immunity), and EN60065 (Product Safety).

## Appendix A - Glossary

**amplification** – The process by which a signal level is increased.

**amplitude** – The distance above or below the centerline of a signal's waveform. The greater the distance from the centerline, the larger the pressure variation or electrical signal.

**attack** – The initial transient or first part of the envelope of a signal. The beginning of a note.

**attenuate** – To reduce the signal level

**balanced** – In a classic balanced audio circuit, the two legs of the circuit (+ and -) are isolated from the circuit ground by exactly the same impedance. Additionally, each leg carries the signal at exactly the same level but with opposite polarity. Balanced input circuits can offer excellent rejection of noise and grounding loops.

**balanced line** – A cable having two conductors and a ground connection and often surrounded by a shield. With respect to ground, the conductors are at equal potential but opposite polarity. These lines are often used in professional setting to reduce or eliminate induced noise and interference from external electromagnetic sources.

**bandwidth** – The band of frequencies that pass through a device with a loss of less than 3dB, expressed in hertz or in musical octaves.

**channel** – A single functional path in an audio circuit.

**clipping** – A cause of audio distortion that is the result of excessive gain requiring the peaks of the audio signal to rise above the capabilities of the circuit.

**compressor** – In effect, an automatic fader. When the input signal exceeds a predetermined level, called the threshold, the gain is reduced by the compressor and the signal is attenuated.

**compression ratio** – The ratio of signal dynamic range between the compressor input and the output above the device's set threshold point (such as 2:1, 4:1, 20:1).

**console** – A term for a sound mixer, usually a large desk-type mixing board used to mix together multiple track musical material.

**crosstalk** – The unwanted leakage of a signal from one channel or track onto another.

**decibel (dB)** – A unit of audio measurement of sound pressure level (SPL), signal level, and changes of difference in signal level. The decibel is a logarithmic (log) mathematical function that reduces large numeric values into smaller, more manageable numbers. Decibel is calculated as 10 times the log of the ratio of two powers, and 20 times the log of the ratio of two voltages.

**dBm**: Decibels referenced to 1 milliwatt.

**dBu or dBv**: Decibels referenced to 0.775 volt.

**dBV**: Decibels referenced to 1 volt.

**de-ess** – Using a frequency-dependent function in a compressor to reduce excessive sibilance ("sss", "sh," and "ch") sounds.

**detent** – A point of slight physical resistance (a click stop) in the travel of a knob or slide control.

**dynamic range** – The range between the maximum and minimum sound levels of an audio system. It is usually expressed in decibels as the difference between the level at peak clipping and the level of the noise floor.

**equalizer** – A frequency-dependent amplifier that controls the relative amplitude of various frequencies in the audible bandwidth. The equalizer lets you exercise tonal control over the harmonic content or timbre of a sound.

**EQ curve** – A graph of the response of an equalizer, with frequency on the x (horizontal) axis and amplitude (level) on the y (vertical) axis. Equalizer types and effects are often named after the shape of the graphed response curve, such as peak, dip, shelf, notch, knee and so on.

**fade** – A slow change in volume.

**fader** – A linear attenuation device or linear volume control.

**feedback** – The returning of a loudspeaker signal back into a microphone feeding the loudspeaker. Excessive feedback results in unpleasant, screaming sounds usually at particular, high frequencies.

**filter** – A simple equalizer designed to remove certain ranges of frequencies. A high-pass filter (also called a low-cut filter) reduces or eliminates frequencies below the cutoff frequency. There are also high-cut (low-pass) filters, bandpass filters, which cut both high and low frequencies but leave a band of frequencies in the middle untouched, and notch filters, which remove a narrow band but leave the high and low frequencies alone.

**flanging** – A process whereby a delayed signal is combined with itself undelayed. The delay is varied to create continual changes in sound.

**frequency** – The rate at which a sound wave repeats a cycle. The number of cycles that occurs over the period of one second is called hertz (Hz). Often, the perceived range of hearing is from 20Hz to 18,000Hz.

**gain** – The measure of how much a circuit amplifies a signal. Gain may be stated as a ratio of input to output values, such as decibels from line amplifier.

**gain stage** – An amplification point in a signal path, either within a system or a single device. Overall system gain is distributed between the various gain stages.

**graphic EQ** – A type of equalizer where the frequency bands for cut/boost and bandwidths are fixed. Graphic EQs are usually controlled by faders instead of knobs.

**ground** – The point of zero voltage in a circuit or electrical system.

**ground loop** – A condition that exists in an improper grounding situation, whereby a DC current differential exists between one signal path and another, resulting in a 50Hz or 60Hz hum.

**headroom** – The difference between nominal operating level and peak clipping in an audio system.

**hertz** – The unit of measure for frequency of oscillation, equal to 1 cycle per second. Abbreviated Hz. kHz is an abbreviation for kilohertz, or 1000 Hertz.

**impedance** – The opposition of current flow in a circuit.

**knee** – A sharp bend in an EQ response curve. Also used in describing dynamic processors.

**line level** – A signal level that is referenced to either +4dB (professional) or -10dB (semi-pro/consumer).

**mastering** – The processing and transfer of a final, sequenced or mixed audio tape to a medium for duplication.

**mixdown** – The process in which the separate audio tracks of a multiple track recording are combined, balanced, and routed through the recording console. During mixdown, volume, tone, special effects and spatial positioning can be artistically set by the engineer to create a stereo or surround sound mix that is then recorded to a master recording device, such as a DAT recorder.

**monaural** – Confined to a signal channel. One microphone is a mono pickup; many microphones mixed to one channel is a mono

mix. Several mono sources, however, can be panned into a stereo (or at least two-channel) mix.

**mono** – short for monaural.

**noise** – Unwanted sounds. Hum, buzz or hiss; could be crosstalk or digital hiss.

**noise floor** – The residual level of noise in any system. The lower the noise floor and the higher the headroom, the more usable dynamic range a system has.

**overload** – The distortion that occurs when an applied signal exceeds a system's maximum input level.

**parametric EQ** – A parametric EQ allows continuous control of each of the three primary EQ parameters (frequency, gain and bandwidth) independently.

**passive EQ** - A filter topology similar to early equalizer designs (such as pultec) where passive components (capacitors) are only used to filter the signal. In a passive EQ, amplifiers are only used as make-up gain devices. The capacitors used to filter the signal are not incorporated in the active feedback stage of the circuit. Passive EQ's have a distinctively smooth and musical sound.

**peak amplitude** – The maximum instantaneous amplitude of a signal.

**phase** – The degree of progression in the cycle of a wave, where one complete cycle is 360 degrees. Phase is measured in degrees of a cycle and will result in audible variations of a combined signal's amplitude and overall frequency response.

**phase shift** – The difference in degrees of phase angle between corresponding points on two waves.

**potentiometer (pot)** – A rotary gain, pan, or other type of continuously variable signal control.

**preamplifier** - A piece of equipment that boosts the signal level so that the signal operates at a higher and more desired level enabling greater frequency and dynamic range.

**release time** – Once compression has begun, the time taken for the attenuated signal to return to 63% of its original (unprocessed) level.

**resistance** – The opposition to the flow of DC current in a wire or circuit.

**ribbon microphone** – A microphone that uses a diaphragm of extremely thin, aluminum ribbon suspended in a strong field of magnetic flux. As sound-pressure variations displace the metal diaphragm in accordance with air-particle velocity, the ribbon cuts across the magnetic lines of flux. This induces a current in the ribbon of proportional amplitude and frequency to the acoustic waveform.

**side chain** - A function on a compressor where a specified frequency range is compressed more than the overall musical program. Many compressors have a jack for

an equalizer to be inserted into the compressor drive electronics.

**shelving filter** – A rise or drop in frequency response at a selected frequency that tapers off to a preset level and continues at the level to the end of the audio spectrum.

**spectral control** - The use of a side chain in a compressor to compress selected frequencies of a musical program. One example of spectral control is removing the "sss" sounds of a vocal (de-essing).

**sweep EQ** – An equalizer that allows you to "sweep" or continuously vary the frequency of one or more sections.

**unbalanced** – An electrical circuit in which the two legs of the circuit are not balanced with respect to ground. Unbalanced circuit connections require only two conductors (signal "hot" and ground). Unbalanced audio circuitry is less expensive to build, but under certain circumstances is more susceptible to noise. An unbalanced audio cable has only one conductor plus a surrounding shield, in which the shield is at ground potential. The conductor and the shield carry the signal.

**volume** – Electrical or sound level in an audio system.

**waveform** – A graph of a signal's sound pressure or voltage level versus time.