OPTIMUM SERIES

OPTIMUM-8
OPTIMUM-10
OPTIMUM-12

USER'S MANUAL

High Output Digital EQ Subwoofer

Velodyne®
ACOUSTICS

IMPORTANT SAFETY INSTRUCTIONS

Caution

To reduce the risk of electric shock, do not remove cover (or back). No user-serviceable parts inside. Refer servicing to qualified service personnel.

The lightning flash with arrowhead symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the subwoofer.

1. **Read Instructions** — All safety and operating instructions should be read before the product is operated.
2. **Retain Instructions** — The safety and operating instructions should be retained for future reference.
3. **Heed Warnings** — All warnings on the product and in the operating instructions should be adhered to.
4. **Follow Instructions** — All operating and use instructions should be followed.
5. **Water and Moisture** — The product should not be used near water — for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, near a swimming pool or the like.
6. **Carts and Stands** — The product should be used only with a cart or stand recommended by the manufacturer.
7. **Wall or Ceiling Mounting** — The product should be mounted to a wall or ceiling only as recommended by the manufacturer.
8. **Ventilation** — The product should be situated so that its location or position does not interfere with its proper ventilation. For example, the product should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or placed in a built-in installation such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
9. **Heat** — The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products that produce heat.
10. **Power Sources** — The product should be connected to a power supply only of the type described in the operating instructions or as marked on the product.
11. **Grounding or Polarization** — This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.
12. **Power-Cord Protection** — Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point at which they exit from the product.
13. **Cleaning** — The product should be cleaned only as recommended by the manufacturer.
14. **Nonuse Periods** — The power cord of the product should be unplugged from the outlet when left unused for a long period of time.
15. **Object and Liquid Entry** — Care should be taken so that objects do not fall and liquids are not spilled onto the enclosure.
16. **Damage Requiring Service** — The product should be serviced by qualified service personnel when:
    a. The power-supply cord or plug has been damaged.
    b. Objects have fallen or liquid has been spilled into the product.
    c. The product has been exposed to rain.
    d. The product does not appear to operate normally or exhibits a marked change in performance.
    e. The product has been dropped or damaged.
17. **Servicing** — The user should not attempt to service the product beyond what is described in the operating instructions. All other servicing should be referred to qualified service personnel.
18. **Lightning** — For added protection for the product during a lightning storm or when it is left unattended and unused for long periods of time, unplug it from the wall outlet.
19. **Overloading** — Do not overload wall outlets, extension cords or integral convenience receptacles as this can result in a risk of fire or electric shock.
20. **Attachments** — Only use attachments and accessories specified by the manufacturer.
21. **Voltage** — Insure that the subwoofer is only connected to the rated source voltage. Do not connect the 120-volt version to 230-volts or vice-versa. This will result in damage to the subwoofer and possible injury to the user.

CAUTION: To prevent electrical shock, match wide blade of plug to wide slot, fully inserted.

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Congratulations

Congratulations on your purchase of a Velodyne Optimum subwoofer. This system represents the state-of-the-art in low frequency reproduction. Please, read and follow the instructions below to insure safe and proper system operation.

Warning!

To prevent fire or shock hazard, do not expose this equipment to rain or moisture. To avoid electrical shock, do not open speaker enclosure or amp chassis cover. Please observe all warnings on the equipment itself. There are no user serviceable parts inside. Please refer all service questions to your authorized Velodyne dealer.

Prior to Installation

Please unpack the system carefully. Please save the carton and all packaging materials for future use. Record the serial number in the space provided on page 17 of this manual for future reference.

PRODUCT FEATURES

- DSP-Controlled
- 4 selectable preset modes for customized listening
- Automatic 7-band room equalizer with microphone included
- Night-mode setting
- Mute control
- Woofer
  - 8" (6.5" piston diameter) subwoofer with 2.5" high-temp voice coil and 107 ounce magnet/204 ounce motor structure (Optimum-8)
  - 10" (8" piston diameter) subwoofer with 3" voice coil and 162 ounce magnet/ 346 ounce motor structure (Optimum-10)
  - 12" (9.7" piston diameter) subwoofer with 3" voice coil and 162 ounce magnet/ 346 ounce motor structure (Optimum-12)
- Built-in 2400 watts Dynamic/1200 watts RMS high efficiency Class D amplifier
- Adjustable (40 to 135 Hz) low-pass crossover (defeatable)
- Line-level (RCA) inputs and outputs
- Speaker-level inputs with five way binding post connections
- Signal sensing auto turn on/off (defeatable)
- Variable volume control
- Selectable phase control (0, 90, 180 or 270 degrees)
- Overall frequency response of 16-240 Hz (Optimum-8), 13-240 Hz (Optimum-10), 13-240 Hz (Optimum-12),
- Magnetically shielded for video use (Optimum-10 and Optimum-12)
- Multiple staggered low-pass crossovers; 12 dB/octave initial, 48 dB/octave ultimate
- Driver Displacement Control circuit to prevent over excursion and amp clipping
- Blue level indicator LED
- High-excursion EPDM rubber surround
- Oversized spider for linearity at high excursion
- Hand-rubbed black lacquer or cherry veneer cabinet

Prepare for Installation

Your new Velodyne subwoofer provides for a number of installation options. Read all of the installation information below in order to determine which installation option is best for your system. ***Remember to perform all installation procedures with system power turned off to prevent possible damage.***

Placement

The first step in installing your new Optimum sub is to determine where it will be placed in the room. Unpack the system carefully and use the following guidelines in order to find the best room placement option.

True subwoofers operate at extremely low frequencies which are primarily omni-directional. Keep in mind that frequency response and output level can be drastically influenced by placement, depending on the acoustic properties of the listening room. To obtain the best output from your subwoofer, try placing it within a foot of a corner. This location will offer the greatest output levels and maximize low frequency extension. If at all possible, your subwoofer should be placed along a wall. The worst location for a subwoofer is typically far away from any walls and close to the center of your room. Avoid these locations when possible. When using a pair of Velodyne subwoofers in stereo, it is preferable to feed each subwoofer with one channel and place each subwoofer near the satellite of the same channel.

Depending on the size and type of furnishings in the room, perfect placement may not be possible. Finding the best location within your environment will likely require some experimentation. We suggest you experiment with the location during setup to find what sounds best to you when seated in your typical listening position.

Regardless of where you install your Velodyne subwoofer, it must remain in an upright position (woofer facing forward). Using, shipping or storing the subwoofer in any other position for an extended period of time may result in damage to the unit not covered by warranty.

Caution!

This subwoofer has electronics built into the cabinet. Do not place the cabinet next to sources of heat such as furnace registers, radiators, etc. Do not place the unit near sources of excessive moisture such as evaporative coolers, humidifiers, etc. The power cord should be routed in such a way that it will not be walked on, pinched or compressed in any way that could result in damage to the insulation or wire.

Although the Velodyne Optimum-10 and the Optimum-12 are magnetically shielded, the Optimum-8 subwoofer is NOT magnetically shielded. Should you find it necessary to use it with an older CRT monitor or TV, keep it at least two feet from the monitor. Experiment for correct distance by minimizing distortion of the picture and colors.

Installation

Inputs

Your new subwoofer is equipped with speaker-level and line-level inputs. Use the LINE LEVEL jacks when connecting your subwoofer to a pre-amp, signal processor (such as LFE out), line-level crossover, or receiver with pre-amp level outputs. When using the line level jacks, some receivers may not provide enough signal to have the unit's auto-on feature operate properly. Additionally, this lack of signal may also cause the subwoofer to produce less output than it is capable of.

To alleviate this condition, we recommend the following steps:

1) If using line level jacks, BOTH THE LEFT AND RIGHT INPUT SHOULD ALWAYS BE USED – never use just the left or just the right input. If using line level connections from a preamp or signal processor, use both Left and Right inputs from your preprocessor or preamp and connect them to the Left and Right inputs on your subwoofer.

2) If using a receiver with LFE out, be sure the LFE channel is sending adequate signal to the subwoofer. The subwoofer's default volume setting is 30 on a 1-80 scale (roughly 1/3 volume). Adjust the LFE channel on your receiver or processor to achieve the desired bass output. See your receiver or processor's owner's manual for more information.

Volume Control

This control allows you to balance the output from the subwoofer to the main speakers in your system. This control should be set to achieve similar output levels from both the main speakers and subwoofer when listening to music. The default volume setting is 30 on a 1-80 scale.

Warning:

Some manufacturers preset their receivers with the Sub-Out channel signal at a minimum level. It is very important to verify that your receiver Sub-Out channel is set to the same output level as your front right and left channels. Refer to your receiver manual for the individual channel level adjustment procedure. If your receiver Sub-Out channel is set too low, the subwoofer may appear to have a weak output, it may sound noisy or distorted, and the Auto On/Off feature may not operate properly.

Low-pass Crossover - 40 to 135 Hz

All inputs sum the left and right channels together, with the resulting signal passing through an adjustable low-pass crossover before being amplified. The crossover control allows you to adjust the upper limit of the subwoofer's frequency response from 40 to 135 Hz. The subwoofer's response will begin rolling off above the frequency you set this control to. You should set the crossover frequency to obtain a smooth and seamless transition from the subwoofer to the main speakers in your system. If your main speakers are smaller with limited low frequency output, you may wish to choose a higher frequency (such as 100 - 120 Hz) than you would with larger speakers which have greater low frequency output. The default crossover setting is 80 Hz. With larger speakers, you may want to set this even lower, for example 70 Hz.

Phase Adjustment - 0°/90°/180°/270°

This control allows you to change the phase of the subwoofer's output signal to correct for any possible mismatch and resulting cancellation between the subwoofer and your main speakers/amplifier. To adjust, simply listen to the system with music playing, then depress the various phase switches on the remote control and listen for a change in mid-bass frequency output. The correct position will have a greater amount of apparent mid-bass frequency output. If the settings sound similar, we recommend the "0" position. See the remote control section for more information.

Auto Turn on Function

The subwoofer will turn itself on automatically when an audio signal is present. If no signal is present for approximately eight minutes, the unit will switch to standby mode (blank LED). While in standby mode, your subwoofer will draw very minimal power. Your sub is shipped in the "INACTIVE" (always on) position. In order to activate the circuit, change the switch to "ACTIVE".

Warning:

If the Sub-Out channel signal level from your receiver is too weak, this feature will not operate properly and shut the subwoofer off while you are listening to it. To correct this, see the VOLUME CONTROL section on previous page.

Front Panel Features

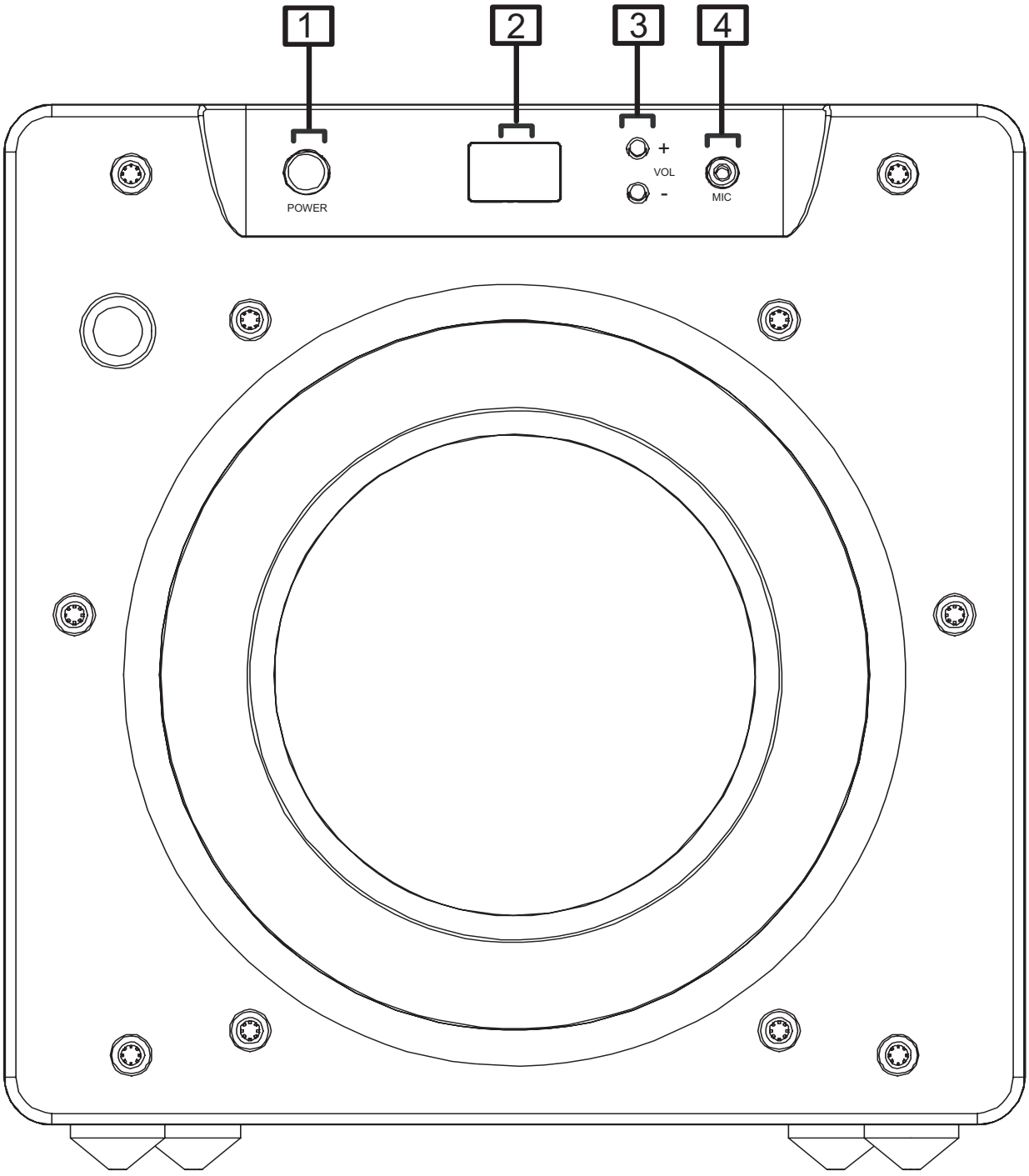

Figure 1. Optimum Front Panel Features

Figure 1 shows the features on the front panel of the Optimum.

(1) Power Switch
This button forces your Optimum subwoofer into standby mode. The numeric LED shuts off and the sub puts out no power. The sub will remain in this mode until the POWER button is pressed again. To fully deactivate (i.e. power button) the sub, use the main power switch on the back panel.

(2) LED Numeric Display
This LED supplies information on volume, crossover, presets, and other information. The "Light" button on the remote deactivates this display.

(3) Volume Control
These buttons allow you to balance the output from the subwoofer to the main speakers in your system. The volume should be set to achieve similar volume level of both the main speakers and subwoofer. The default volume is 30. The upper button increases the subwoofer level and the lower button decreases it.

Note: Volume can also be controllable by using the supplied remote.

WARNING: *Some manufacturers preset their receivers with the Sub-Out (A.K.A. LFE) channel signal at a minimum level. It is very important to verify that your receiver Sub-Out channel is set to the same output level as your front right and left channels. Refer to your receiver manual for the individual channel level adjustment procedure. If your receiver Sub-Out channel is set too low, the subwoofer may appear to have a weak output, it may sound noisy or distorted, and the Auto On/Off feature may not operate properly.*

(4) Mic Input
Connect the supplied microphone for the Auto-EQ feature to this mini-jack input.

Rear Panel Connections

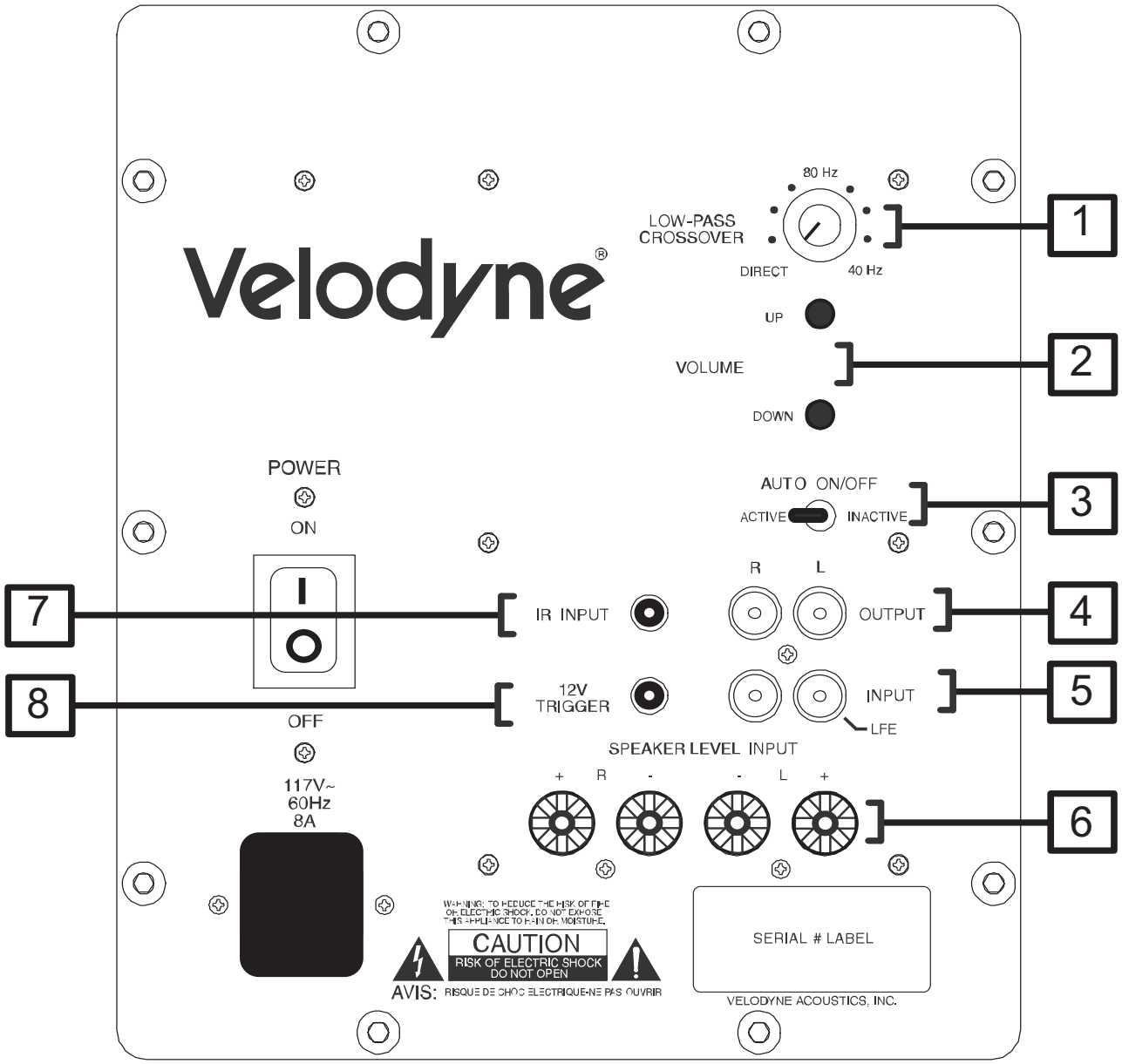

Figure 2. Optimum Rear Panel Connections

Figure 2 shows the connections on the rear panel of the Optimum.

Following are brief descriptions of the connections described in Figure 2. More detail on these connections can be found in the next section.

(1) LOW-PASS CROSSOVER

Use this knob to select the frequency above which you wish to roll off the signal to the subwoofer. When the knob is turned all the way to the left, the Subwoofer Direct feature is invoked and the subwoofer plays all frequencies up to 200 Hz.

(2) VOLUME Control

This control allows you to balance the output from the subwoofer to the main speakers in your system. This control should be set to achieve similar volume level from between both the main speakers and subwoofer. When pressing volume up or down, set the level while watching the LED display for reference. The upper button increases the subwoofer level and the lower button decreases it.

Note: Volume is also controllable by using the supplied remote. When defaults are restored, the default volume setting is 30 out of 80.

(3) AUTO ON/OFF Switch

Use this switch to select between auto-on (active) and constant on (auto-on inactive) operation.

(4) LINE OUTPUT

Connect these jacks to the LINE IN amp input to use the Optimum subwoofer's internal high pass crossover. See below for a more detailed explanation of this crossover.

(5) LINE INPUT/LFE Input

Connect these jacks to the LINE OUT preamp output, LFE output or subwoofer output jacks of your receiver/processor. If using the LFE output from your receiver or processor, plug the single cable into the "L" - LFE input or for more signal, use a "Y" connector (not included) and feed the signal into both "R" and "L" inputs.

(6) SPEAKER LEVEL INPUT Terminals

Connect these input terminals to the speaker output terminals of your amplifier or receiver. If you use this method of connection, when you go to the receiver speaker set up menu, make sure you select the large speaker option.

(7) IR Input

This is a connection that allows the utlization of a third party infrared remote sensor, such as Elan or Xantech, or an extended cable for placement closer to your other remote controlled equipment. This keeps you from awkward control angles using the infrared remote control.

(8) 12v Trigger

When this 2-conductor mini jack is connected, the amplifier remains in power-off mode until the trigger is applied. The correct trigger is +12V on the tip of the connector relative to the grounded sleeve.

Rear Panel Connections - Detailed Explanation

Your new subwoofer is equipped with both speaker-level and line-level inputs. Use the RCA/Phono type "INPUT" jacks when connecting your subwoofer to a pre-amp, signal processor, or line-level crossover. The "SPEAKER LEVEL INPUT" jacks connect directly to the speaker outputs of an integrated amplifier or receiver. Your amplifier section will notice no additional loading effects when you use these inputs because of their high impedance.

Note: Do not use both the RCA/Phono "INPUT" connections and "SPEAKER LEVEL INPUT" connections simultaneously.

Low-Pass Crossover

Both sets of inputs sum the left and right channels together and the resulting signal is passed through an adjustable low-pass crossover before being amplified. The crossover control allows you to adjust the upper limit of the subwoofer's frequency response from 40 to 135 Hz. The subwoofer's response will begin rolling off above the frequency you set this control to. (See note above about frequency limits.)

You should set the crossover frequency to obtain a smooth and seamless transition from the subwoofer to the main speakers in your system. Do this by listening to the blend between your satellites and subwoofer using familiar material. If your main speakers are smaller units with limited low frequency output, you may wish to choose a higher frequency (such as 100-120 Hz) than you would with larger speakers which have greater low frequency output. With larger speakers, you might start with this control set lower, such as 70 Hz.

Subwoofer Direct

Subwoofer Direct is the leftmost setting on the low-pass crossover knob and will allow frequencies up to 200 Hz into the subwoofer. If you are not using an external crossover, we recommend that you use the one provided within the subwoofer for optimum performance.

Caution!!!

To avoid damage to your main amplifier, be sure to maintain correct polarity when making all connections. Red (positive) to red, and black (negative) to black. Be sure that all connections are tight, and that there are no loose strands or frayed wires.

Power Switch

The master power switch is located on the middle left half of the unit. This rocker style switch is the main on/off for the unit. This switch should be set to position 1 for on (up), 0 for off (down).

A Word About Your Receiver's Crossover and the Velodyne Optimum Subwoofer Crossover

Your Velodyne Optimum subwoofer is designed to operate using the full range audio signal for input when using the built-in crossover (controlled by the dial on the back panel). Many home theater processors/receivers (Dolby Digital®, DTS®, THX®) have a "subwoofer out" jack that performs this same function and are designed to be used with a powered subwoofer.

In these installations, you may want to bypass the crossover in either the processor or the Velodyne subwoofer. In some cases, you may want to use BOTH crossovers. To do this, you can use both your processor's crossover and the one internal to the Velodyne sub. You should stagger the frequencies, (i.e., 120 Hz subwoofer, 80 Hz processor) for best results.

To bypass the subwoofer's internal crossover when the unit is being fed a low pass signal from another crossover, simply rotate the knob marked "LOW-PASS CROSSOVER" on the rear panel of the subwoofer, turning it counterclockwise to the leftmost position. This will eliminate the internal crossover from the signal path.

Note: If you are not using an external crossover, you should use the built-in crossover for the best performance. When using a single RCA sub out from the processor, connect to the "L" - LFE input on the subwoofer, or for more signal, use a "Y" connector and feed the signal into both "R" and "L" inputs.

Interconnect Cables

When installing your new Velodyne subwoofer using the line-level connections, you should always use shielded phono cables. There are many decent cables available today, most any of which will work perfectly well. We do recommend that you keep the length of cable as short as possible to avoid any potential noise problems.

When using speaker level connections, use a quality speaker cable that mates well with the connectors (at least 18-gauge). Be very careful to avoid any loose or frayed strands that could result in a short, causing a dangerous condition and possible damage to your unit. Cables of extremely large size are typically not required. Extremely large gauge wire may not properly fit in the binding posts, resulting in a poor connection and possible short circuits.

Usage

This section addresses day-to-day usage of your Optimum subwoofer.

Remote Control

Figure 3 shows the remote control, enabling you to easily choose whatever listening mode you desire.

NOTE: The Optimum remote can be attached magnetically to the back of the subwoofer in the upper left hand corner.

Figure 3. Remote Control

POWER

This button forces your Optimum unit into standby mode. The woofer will not play and the LED will turn off. The unit will remain in this mode until the POWER button is pressed again. To fully deactivate (i.e. power down) the unit, turn off the power switch on the back panel.

MUTE

This button mutes the subwoofer. The display will show "OO" when the unit is muted. To unmute the subwoofer, press the MUTE button again.

EQ

This button automatically EQs the subwoofer using a 7-band internal parametric equalizer. To use this feature, first plug the supplied microphone into the Mic Input jack on the front panel of the subwoofer and place the mic on its stand and in your preferred listening position. Then, by pressing EQ on the remote, the subwoofer emits 12 "sweep tones" that cover the frequencies between 20 and 150 Hz. After the sweeps are complete, the unit calculates and saves its EQ settings, then returns to normal operation. In order to avoid accidentally activating the EQ feature, you will need to hold down the EQ button for 1 to 2 seconds before the EQ sweep tones activate.

NOTE: Each time the EQ feature is utilized, the EQ settings for the Optimum subwoofer are reset. If the microphone is not plugged in, the Optimum subwoofer will emit two sweep tones then cease the EQ operation. In this case, the previous EQ settings will be preserved.

PHASE

These buttons allow you to optimize the subwoofer performance for the location and your listening position. Select the switch position at which you hear the most bass. The setting will be shown in the front panel display by "PH" followed by the phase setting selected — 0, 90, 180 or 270 degrees.

LIGHT

If you wish, you can deactivate the blue front panel display on your Optimum unit. To do this, press the LIGHT button on your remote. The display will turn off. It will turn on briefly to reflect any other setting changes while deactivated. To reactivate the display, press the LIGHT button again.

NIGHT

Night mode limits the maximum dynamic output of the subwoofer for later night listening or to be more considerate of close neighbors. Press the night button to turn the night mode feature on or off. Activation of night mode causes "n" to appear briefly on the display. When night mode is deactivated, the display shows "n off" and then returns to normal function.

VOLUME CONTROL

This control allows you to balance the output from the subwoofer to the main speakers in your system. This control should be set to achieve similar volume level from both the main speakers and subwoofer. When pressing the volume up or down, the setting is shown in the front-mounted LED display as a number between 00 and 80.

NOTE: The volume can also be adjusted via the buttons on the back panel of the subwoofer. These buttons have the same effect as pressing the up and down volume buttons on your remote. The unit comes preset from the factory with the volume set at 30 out of a maximum setting of 80.

PRESETS

There are four presets, consisting of Movies, R&B - Rock, Jazz - Classical, and Games. As a preset is chosen, the LED display shows the selected preset: P1, P2, P3 or P4. The presets provide the following characteristics for bass reproduction:

Movies: (P1) Maximum output and impact for explosions and other action adventure movie content.

R&B - Rock: (P2) Provides the driving bass found in today's rock music.

Jazz - Classical: (P3) The tightest, cleanest, lowest distortion bass.

Games: (P4) Maximum loudness available for the impact of video games.

The following table indicates musical style and which preset is recommended for it.

MUSICAL STYLE	SUGGESTED PRESET
Action Adventure Movies	Movies
Country - Rock	R&B - Rock
Country - Soft	Jazz - Classical
Folk	Jazz - Classical
Indie Music	R&B - Rock
Pop	R&B - Rock
Rock	R&B - Rock
Alternative Rock	Jazz - Classical
Blues	Jazz - Classical
Broadway and Vocalists	Jazz - Classical
Children's Music	Jazz - Classical
Christian and Gospel	Jazz - Classical
Classic Rock	R&B - Rock
Classical	Jazz - Classical
Dance and DJ	R&B - Rock
Hard Rock and Metal	R&B - Rock
Latin Music	R&B - Rock
Miscellaneous	Jazz - Classical
Movies - Non-Action Adventure	Jazz - Classical
New Age	Jazz - Classical
Opera and Vocal	Jazz - Classical
R&B	R&B - Rock
Rap and Hip-Hop	R&B - Rock
Soundtracks	R&B - Rock, Jazz - Classical
Video Games	Games

Each preset has its own characteristics with respect to subsonic filter, volume differential and a single equalizer (EQ) in order to optimize the listening mode for the preset.

The following table shows the settings for the various presets:

Preset	Subsonic Filter Frequency	EQ Frequency	EQ Level	Volume Differential
Movies	25 Hz	35 Hz	+4 dB	+5 dB
R&B - Rock	28 Hz	50 Hz	+4 dB	+1 dB
Jazz - Classical (Reference)	15 Hz	N/A	N/A	N/A
Games	34 Hz	62 Hz	+4 dB	+4 dB

Restore Defaults

There is a feature that allows you to restore default settings for your Optimum subwoofer. By pressing presets in EXACTLY the following order on the remote, the unit's LED display will blink and then show "P3" briefly, indicating that you have restored defaults.

1. Movies
2. R&B - Rock
3. Jazz - Classical
4. Games
5. Games
6. Jazz - Classical
7. R&B - Rock
8. Movies

When you press the presets in the above order, the power light will blink and then show "P3" indicating that you have restored defaults and the subwoofer is now set to preset 3. The unit's volume is reset to level 30 out of 80. Be sure to check the status of the Auto On/Off function after restoring defaults.

Care of Your Subwoofer

Do not use any harsh detergents or chemicals to clean the cabinet. Abrasives, detergents, or cleaning solutions will damage the finish on the cabinet. We recommend using a damp cloth to clean the front, back and sides.

During normal conditions, the subwoofer may be left on continuously without any problems. If you plan to leave the unit unused for an extended period of time, we recommend that you turn off the subwoofer by the master power switch on the rear panel.

Troubleshooting and Service

Before seeking service for your amplifier or subwoofer, please re-check all systems. Following is a simple troubleshooting guide to assist you.

1. Verify that the unit is plugged in and power outlet used is active.
2. Is the power switch on?
3. Is the unit receiving an input signal from your source?
4. Have all controls on the amplifier (volume, crossover, phase, etc.) been properly set?
5. If the unit has been running at high levels, one of the protection circuits may be engaged. Has the amplifier overheated?
6. Has the power button been depressed on the remote?
7. Make sure binding posts are tightened.

If the protection circuitry is active, the unit may cycle on and off until operating parameters return to normal. Under more serious conditions, the unit may shut off completely. Normal operation should return upon cooling, but you may be required to turn the power off and then on again to reset the unit.

The following conditions require service by a qualified technician:

1. The power cord has become damaged
2. The unit does not appear to operate normally or exhibits a marked change in performance
3. The unit has been exposed to water
4. Some part of the chassis or circuitry is physically damaged

Thank You for Purchasing a Velodyne Optimum Subwoofer!

SPECIFICATIONS

Specifications	Optimum-8	Optimum-10	Optimum-12
Woofer:	8" forward firing (6.5" piston diameter)	10" forward firing (8" piston diameter)	12" forward firing (9.7" piston diameter)
Amplifier: (Class D)	2400 watts Dynamic 1200 watts RMS Power	2400 watts Dynamic 1200 watts RMS Power	2400 watts Dynamic 1200 watts RMS Power
High Pass Crossover:	80Hz (6 dB/octave)	80Hz (6 dB/octave)	80Hz (6 dB/octave)
Low Pass Crossover*:	40-135 Hz	40-135 Hz	40-135 Hz
	*12 dB octave initial, 24 dB octave ultimate		
Frequency Response: Overall (+/-3 dB)	 16-240 Hz 26-135 Hz	 13-240 Hz 23-135 Hz	 13-240 Hz 21-135 Hz
Harmonic Distortion:	<5% (typical)	<5% (typical)	<5% (typical)
Magnet Structure:	204 oz. (12.7 lbs)	346 oz. (21.6 lbs.)	346 oz. (21.6 lbs.)
Voice Coil:	2.5" Dual Layer inner/outer wind	3" Dual Layer inner/outer wind	3" Dual Layer inner/outer wind
Inputs:	Line and Speaker Level	Line and Speaker Level	Line and Speaker Level
Outputs:	Line-level, 80Hz up	Line-level, 80Hz up	Line-level, 80Hz up
Phase:	0°, 90°, 180°, 270° degrees	0°, 90°, 180°, 270° degrees	0°, 90°, 180°, 270° degrees
Video Shielded:	No	Yes	Yes
Dimensions (H/W/D): (inc. feet, grill and knobs)	11.2" x 10.7" x 14" (28.4 x 27.2 x 35.6 cm)	13.5" x 13" x 15.4" (34.3 x 33 x 39 cm)	15.5" x 15" x 18.5" (39.4 x 38 x 47 cm)
Cabinet:	Sealed enclosure	Sealed enclosure	Sealed enclosure
Finish:	Hand-rubbed black lacquer or cherry veneer	Hand-rubbed black lacquer or cherry veneer	Hand-rubbed black lacquer or cherry veneer
Accessories:	Mic, mic stand, and remote control	Mic, mic stand, and remote control	Mic, mic stand, and remote control
Shipping Weight (approx.):	33 lbs. (15 Kg)	43 lbs. (20 Kg)	49 lbs. (22 Kg)

NOTE: Specifications are subject to change

FOR YOUR RECORDS. . .

Date Purchased_____

Dealer_____

Serial #_____

**NOTE: Please complete and return your warranty card within ten (10) days or*

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