VX600/1i

600W Monoblock Class D Subwoofer Amplifier with Integrated DSP

with NexD 2

CONNECTION GUIDE

Thank you for purchasing a JL Audio amplifier for your sound system.

Your amplifier has been designed and manufactured to exacting standards in order to ensure years of musical enjoyment. For maximum performance, we highly recommend that you have your new amplifier installed by an authorized JL Audio dealer. Your authorized dealer has the training, expertise and installation equipment to ensure optimum performance from this product. Should you decide to install the amplifier yourself, please take the time to read this manual thoroughly to familiarize yourself with its installation requirements and setup procedures.

If you have any questions regarding the instructions in this manual or any aspect of your amplifier's operation, please contact your authorized JL Audio dealer for assistance. If you need further assistance, please contact the JL Audio Technical Support Department at technical@jlaudio.com or call (954) 443–1100 during business hours.

Installation Applications
This amplifier is designed for operation with 12 volt, negative-ground electrical systems. Using this product in systems with positive ground and/or voltages other than 12V may result in damage to the product and will void the warranty. This product is not certified or approved for use in aircraft.

Product Description
This is a monoblock, Class D subwoofer amplifier equipped with the second generation of JL Audio's NexD™ high-speed switching technology. It is engineered to deliver reference-grade audio amplification with outstanding efficiency and unprecedented, built-in processing power. Instead of traditional analog processing controlled by knobs and switches, VXi amplifiers feature an integrated DSP (Digital Signal Processor). The amplifier and its integrated DSP are configured using an external device (PC, Tablet or Phone), with the appropriate JL Audio TüN™ application installed. (See **What is TüN?** section for more info.)

Planning Your Installation
It is important that you take the time to read this manual thoroughly and that you plan your installation carefully. It is very easy to damage expensive vehicle systems in modern automobiles. Never assume that you have found appropriate wires without consulting a reliable wiring diagram or without analyzing with proper test equipment. If you are uncomfortable or unfamiliar with reading diagrams or testing methods, please enlist the services of your authorized JL Audio dealer to perform the installation. Your authorized dealer has the training, expertise and installation equipment to ensure optimum performance from this product. The following are some considerations that you must take into account when planning your installation.

Safety Considerations
- Install your amplifier in a dry, well-ventilated location that does not interfere with your vehicle's safety equipment (air bags, seat belt systems, ABS brake systems, etc.).
- Do not mount the amplifier in the engine compartment or in any areas of extreme heat.
- Securely mount the amplifier so that it does not come loose in the event of a collision/sudden jolt or as a result of repeated vibrations during normal operation.
- Check before drilling to make sure that you will not be drilling into a fuel tank, gas/brake line, wiring harness, or other vital system.
- Do not run system wiring outside or underneath the vehicle/vessel. This is an extremely dangerous practice, which can result in severe damage/injury.
- Take the necessary precautions when making connections to the vehicle's battery.
- Protect all system wires from sharp edges by carefully routing them, tying them down and using grommets and loom where appropriate.
- Secure all wiring as needed, using cable ties or wire clamps to protect them from moving parts and sharp edges.

Cooling Efficiency Considerations
The outer shell of your JL Audio amplifier is designed to remove heat from the amplifier circuitry. For optimum cooling performance, this outer shell should be exposed to as large a volume of air as possible. Enclosing the amplifier in a small, poorly ventilated chamber can lead to excessive heat build-up and degraded performance. If an installation calls for an enclosure around the amplifier, we recommend that this enclosure be ventilated with the aid of a fan. In normal applications, fan-cooling is not necessary. If mounting the amplifier under a seat, make sure there is at least 1 inch (2.5 cm) of space above the amplifier's outer shell to permit proper cooling.

What is Included
(1) Amplifier
(1) Analog Input Harness
(1) JL Audio Badge
(1) USB A/B Cable (6 ft./1.8 m)
(2) Black Hex Cap Machine Screws
(2) Silver Thumbscrews
(1) Connection Guide
(1) Power Connector
(1) Subwoofer Output Connector
(4) Corner Caps
(1) Corner Cap Tool
(1) 2.5 mm Hex Wrench
(1) 3 mm Hex Wrench

JL Audio Badge
To complement the amplifier's mounting orientation, the logo badge includes a recessed key feature allowing it to be affixed at 90 degree increments on the amplifier's top. To install, remove the adhesive backing and press the badge at the desired orientation.

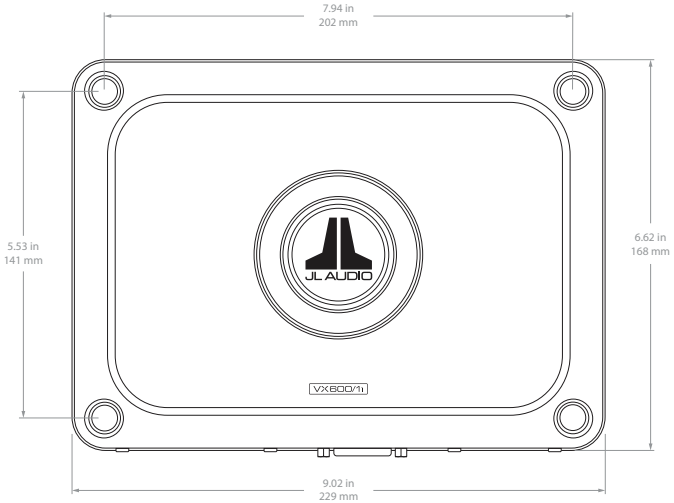
Corner Cap Installation and Removal
The corner caps are designed to conceal the amplifier's mounting holes and hardware. To install, simply press a corner cap into each mounting hole. To avoid scratching the amplifier's chassis during removal, use the included, plastic corner cap tool and lift below each cap.

Making Connections
VXi amplifiers utilize removable plugs and harnesses to make the following connections:

- **Power Connector and Subwoofer Output Connector**
  To connect the power, ground, remote turn-on and subwoofer output wires to the amplifier, back out the set screws on each connector using the supplied hex wrenches. Strip back 3/8 inch (10 mm) of insulation from the end of each wire and insert the bare wire into the receptacle on the power connector plug, seating it firmly so that no bare wire is exposed. While holding each wire in place, tighten each set screw firmly, taking care not to strip the head of the screw. Install each connector by plugging it into the amplifier's corresponding receptacle, pushing firmly.
- **Analog Input Harness**
  This harness includes connections for Signal Input (RCA plugs), Preamp Outputs (RCA plugs), Remote Turn-On Output (wire lead) and Valet Input (wire lead). Select either the included black hex cap machine screws or the silver thumbscrews to secure the Analog Input Harness connector to the amplifier.

Turn-On Mode
VXi amplifiers can be switched on and off using one of three methods, configured by the "Turn On Mode" setting in the TüN™ Software Interface. Refer to the table below for detailed info and decide which option is best suited for your specific system.

Setting	Mode	Function	Connection
Remote	Conventional (Preferred)	Turn-on/off controlled by your source unit.	Connect your source unit's +12V remote turn-on output to the Power Connector's Remote Turn-On Input connection.
DC Offset	DC Offset Sensing (Auto)	Automatically turns on/off by detecting the presence of small DC signal in OEM audio outputs.	This circuit senses the Analog Input 1 only. Note: The sensitivity of this circuit is designed for high-level (speaker level) signals, not for low-level (preamp level) signals. Make sure the OEM audio outputs contain midrange signals.
Signal	Signal Sensing (Auto)	Automatically turns on by detecting full-range OEM audio signals and turns off after the signal is removed (varies, depending on input signal levels).	



1 Power Connector

A. Run 4 AWG power wire from the positive (+12V) battery post to the amplifier mounting location. If additional amplifiers are being installed, run the appropriate gauge power wire for the combined, maximum current draw, and install a fused distribution block near the amplifiers.

B. An appropriate fuse (sold separately) at the main power wire(s) is vital for vehicle safety. This fuse must be installed within 18 inches (45 cm) of the battery post connection. If this is the only device connected to this main wire, use a 50 A fuse. Do not install the fuse until the power wire has been securely connected to the amplifier.

C. The ground connection should be made to a clean, solid metal grounding point using 4 AWG wire, and kept as short as possible. The metal surface of the grounding point should be sanded to create a clean, metal-to-metal connection. For optimal grounding, we recommend using a JL Audio ECS master ground lug (XB-MGLU). **All ground connections (source unit and amplifiers) should be made at the same location.**

D. The remote connection should be made to the source unit's positive (+12V) remote turn-on output. If your source unit does not have a dedicated remote turn-on output, consider one of the alternative turn-on options. (See **Turn-On Mode** section for more info.)

2 Analog Input Harness

The Analog Input Harness accepts the following connections:

Line-Level Analog Inputs: Two female RCA jacks feed a differential-balanced input section, providing a high degree of input flexibility, and retaining superior noise rejection. This type of input architecture also allows the VX600/1i to cleanly accept any analog audio signal up to 16 VRMS, without using a line-output converter.

Preamp Outputs: Two female, RCA jacks deliver line-level, analog audio outputs (Max 4 V RMS) that are compatible with most types of aftermarket equipment. These are configured with the TüN™ Software Interface.

Remote: This connection provides a positive (+12V) turn-on voltage (475 mA limit) to activate other aftermarket equipment (similar to an aftermarket head unit's remote turn-on lead).

Valet: When connected to negative ground, this connection activates the Valet Mode Preset and will remain active until the ground connection is removed. This preset is configured using the TüN™ Software Interface and will override any DRC controlled preset.

3 Subwoofer Output Connector

Connect the subwoofer wires to the corresponding terminals.

4 JLid-COMM

Connect optional accessories (VXi-BTC, VXi-HUB, etc.) to this port.

5 JLid-CTRL

Connect optional DRC (Digital Remote Controller) wired controllers to this port.

6 SD + Reset

Lift the dust cover to access the following utility functions:

Reset Buttons: Use a small pin to perform the following:
Reboot Amp - Press and release the right button.
Factory Reset (wipe memory, reboot amp) - Press and hold the left button for 7 seconds.
DFU (Device Firmware Update) Mode: Press and release both buttons simultaneously.

Micro SD Slot: For service/future expansion.

7 USB

This USB A/B port permits connection to a computer for configuration and tuning, using the TüN™ Software.

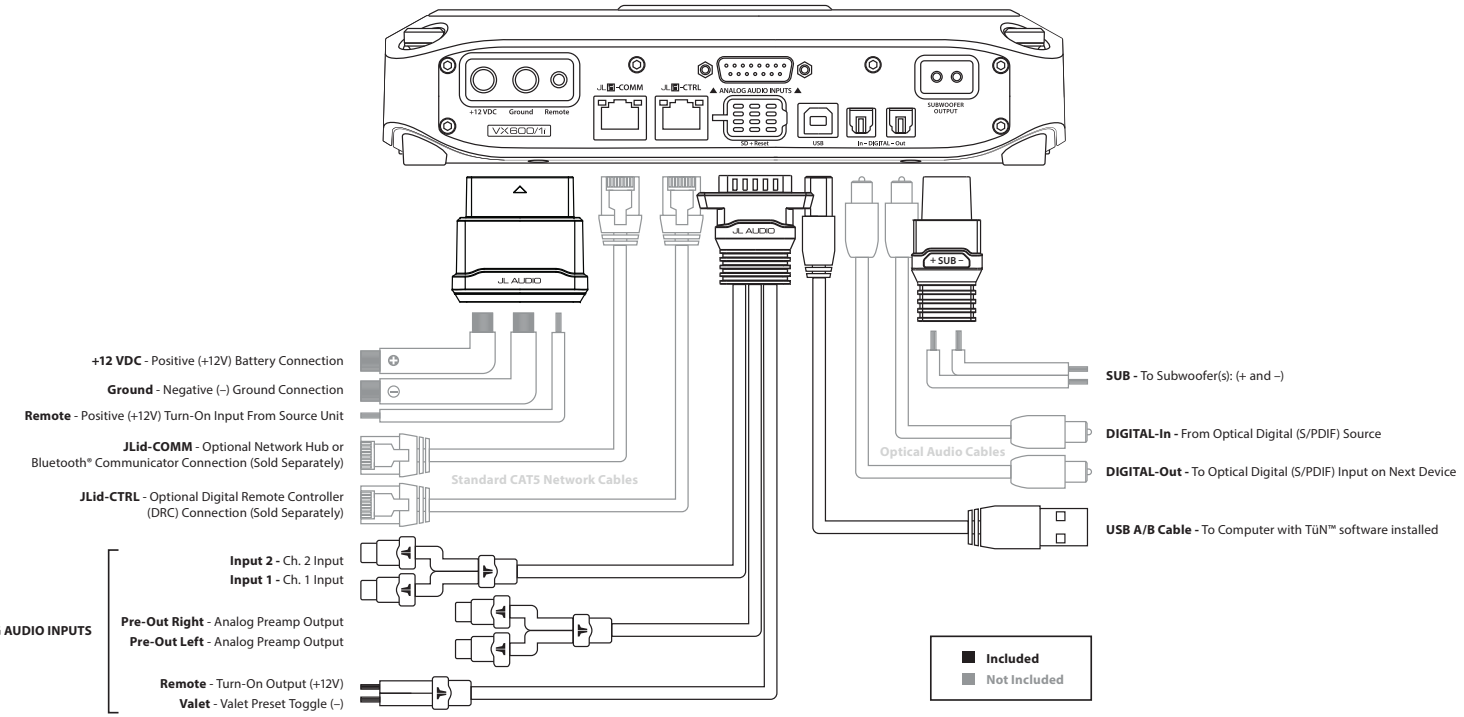
8 DIGITAL-In

Toslink port accepts 2-channel digital audio signal from any optical (S/PDIF) digital output, with a sample rate up to 192 kHz.

9 DIGITAL-Out

Provides a digital audio output (24 bit/96 kHz) that is not susceptible to RF interference or noise-generating electrical conditions. By default, this is a pass-through audio output, with no signal processing applied, and intended for use with other equipment that have an optical (Toslink) digital audio input (S/PDIF) port. Using the TüN™ Software Interface, you may configure this output's routing, equalization, output level and DRC control functionality.

Wiring Diagram - VX600/1i



Connections

Power Connector		
Connection	**Wire Capacity**	**Description**
+12 VDC (+)	4 AWG	Positive (+12V) Power Connection to Battery
Ground (–)	4 AWG	Negative (GND) Chassis Ground Connection
Remote	18 to 10 AWG	Positive (+12V) Remote Turn-On Input from Source Unit
Analog Input Harness		
Label	**Plug/Wire Color**	**Description**
Input 1	White RCA	Channel 1 Signal Input
Input 2	Red RCA	Channel 2 Signal Input
Pre-Out Left	White RCA	Preamp Signal Output 1
Pre-Out Right	Red RCA	Preamp Signal Output 2
Remote	Blue	Positive (+12V) Turn-On Output (475 mA limit)
Valet	Green	Negative (GND) Ground Input (activates the Valet Mode Preset)
Subwoofer Output Connector		
Connection	**Wire Capacity**	**Description**
SUB +	14 to 10 AWG	(+) Positive Subwoofer Output
SUB –	14 to 10 AWG	(–) Negative Subwoofer Output
Data Connections		
Label	**Type**	**Description/Use**
JLid-COMM	RJ45 Jack	Optional accessory connections (VXi-BTC, VXi-HUB, etc)
JLid-CTRL	RJ45 Jack	Optional DRC (Digital Remote Controller) connection
USB	USB A/B Port	Computer connection to configure TüN™ Software Interface
DIGITAL-In	S/PDIF Port	2-channel, optical (Toslink) digital input
DIGITAL-Out	S/PDIF Port	2-channel, optical (Toslink) digital output
SD + Reset	Reset Buttons	Multifunction use (Reboot/Reset/Device Firmware Update mode)
	Micro SD Slot	Used for future expansion

Specifications

Amplifier Specifications				
Amplifier Topology		2nd-Gen NexD™ High Speed Class D		
Power Supply		Unregulated MOSFET switching type		
Recommended Power/GND Wire		4 AWG		
Recommended Fuse		50 A		
Standby Current Draw		3.6 mA		
Input Voltage Range		200 mV - 16 V RMS		
Rated RMS Power @ 14.4V, <1% THD+N		400W x 1 @ 4 Ω	500W x 1 @ 3 Ω	600W x 1 @ 2 Ω
Rated RMS Power @ 12.5V, <1% THD+N		300W x 1 @ 4 Ω	400W x 1 @ 3 Ω	500W x 1 @ 2 Ω
Frequency Response		12 Hz - 500 Hz (+0, -1dB)		
Analog Inputs	S/N Ratio, (A-weighted, 20 kHz noise bandwidth)	90 dB (Referred to rated power), 64 dB (Referred to 1 W)		
Digital Input	S/N Ratio, (A-weighted, 20 kHz noise bandwidth)	90 dB (Referred to rated power), 64 dB (Referred to 1 W)		
Damping Factor		>125 / 50 Hz @ 4 Ω, >125 / 50 Hz @ 2 Ω		
DSP Specifications				
Processor		AKM AK7738, processing at 24 bit/96 kHz		
Analog Inputs	Type	Line-Level, Differential-Balanced		
	Number of Channels	2, via harness-mounted female RCA jacks		
Digital Input	Type	S/PDIF Optical via chassis-mounted Toslink port		
	Bit Depth/Sample Rate	Up to 24 bit/192 kHz		
Analog Outputs	Type	2 Line-Level, via harness-mounted female RCA jacks		
	Max Output Level	4 V RMS		
Digital Output	Type	S/PDIF Optical via chassis-mounted Toslink port		
	Bit Depth/Sample Rate	24 bit/96 kHz		
Dimensions				
L x W x H		9.02 in x 6.62 in x 2.12 in / 229 mm x 168 mm x 54 mm		

TüN™ SOFTWARE

What is TüN?
TüN™ is software that you use to configure, tune and control your VXi amplifier, and other JL Audio DSP products. TüN™ automatically recognizes what it is connected to, and allows you to make adjustements with a clear interface specifically set up for that product. TüN™ is available for download for free in a variety of applications, for computers and most handheld devices. For more information, visit: jlaudio.com/tun

TüN™

For Windows® PC or Mac® computers, TüN™ connects via USB and offers complete control and command of the entire VXi feature set from the comfort of your desk or driver's seat. Software also runs in demo mode, without connected amplifiers, for offline setup or demo purposes. Test drive it for free!

TüN™ | Mobile

For iPad or Android tablets. Enjoy the full-featured TüN™ software experience on your tablet, with the freedom of a wireless connection via Bluetooth®. Requires VXi-BTC Bluetooth® Communicator.

TüN™ | Express

Wireless connection and streamlined options, for fast and simple amplifier setup. Download *TüN™ Express* for iPhone, iPad and Android phones & tablets. Requires VXi-BTC Bluetooth® Communicator.

Limited Warranty – Amplifiers (USA)
JL Audio warrants this product to be free of defects in materials and workmanship for a period of two (2) years from the original date of purchase. This warranty is not transferrable and applies only to the original purchaser from an authorized JL Audio dealer. Should service be necessary under this warranty for any reason due to manufacturing defect or malfunction, JL Audio will (at its discretion), repair or replace the defective product with new or remanufactured product at no charge. Damage caused by the following is not covered under warranty: accident, misuse, abuse, product modification or neglect, failure to follow installation instructions, unauthorized repair attempts, misrepresentations by the seller. This warranty does not cover incidental or consequential damages and does not cover the cost of removing or reinstalling the unit(s). Cosmetic damage due to accident or normal wear and tear is not covered under warranty.

Warranty is void if the product's serial number has been removed or defaced.
Any applicable implied warranties are limited in duration to the period of the express warranty as provided herein beginning with the date of the original purchase at retail, and no warranties, whether express or implied, shall apply to this product thereafter. Some states do not allow limitations on implied warranties, therefore these exclusions may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

If you need service on your JL AUDIO product:
All warranty returns should be sent to JL Audio 's Amplifier Service Facility freight-prepaid through an authorized JL Audio dealer and must be accompanied by proof of purchase (a copy of the original sales receipt). Direct returns from consumers or non-authorized dealers will be refused unless specifically authorized by JL Audio with a valid return authorization number. Warranty expiration on products returned without proof of purchase will be determined from the manufacturing date code. Coverage may be invalidated as this date is previous to purchase date. Non-defective items received will be returned freight-collect. Customer is responsible for shipping charges and insurance in sending the product to JL Audio. Freight damage on returns is not covered under warranty.

For Service Information in the U.S.A. please call
JL Audio Customer Service:
(954) 443-1100 9:00 AM – 5:30 PM (Eastern Time Zone)
JL Audio, Inc.
10369 North Commerce Pkwy. Miramar, FL 33025
(Do not send product for repair to this address)

International Warranties:
Products purchased outside the United States of America are covered only by that country's distributor and not by JL Audio, Inc.

JL AUDIO®

VXi

Thank you for choosing a JL Audio VXi Amplifier for your automotive sound system. This amplifier is carefully engineered and precision-built to deliver the highest level of audio performance in your vehicle.

Register your VXi Amplifier online.

http://register.jlaudio.com

JL AUDIO® | How we play.®

TüN™
SOFTWARE

Software Overview

for use with TwK™ Processors
(ver. 2.0)

JL AUDIO®
Ahead of the Curve®

SYSTEM REQUIREMENTS

To configure the TwK™ System Tuning DSP, you will need to connect a PC to the TwK™ processor using the included USB cable, and launch the JL Audio TüN™ software. When finished, unplug the USB cable from the TwK™ processor.

If you do not have the TüN™ software, you can **download it for free** by visiting:

jlaudio.com/tun

Use of the software implies you agree to the accompanying License Agreement.

Once installed on your PC, the TüN™ software can be operated in "Simulation Mode", allowing you to familiarize yourself with the interface and create configurations, while not connected to a TwK™.

Minimum PC Requirements:
OS: Windows 7 SP1/Win 8.1/Win 10; 32 bit or 64 bit
Screen Resolution: 1280 x 768
CPU: 1GHz
RAM: 1GB for 32 bit, 2GB for 64 bit
Disk: 256MB free space

Recommended PC Requirements:
OS: Windows 7 SP1/Win 8.1/ Win 10; 32 bit or 64 bit
Screen Resolution: 1400 x 1050
CPU: Dual core 2.5GHz
RAM: 1GB for 32 bit, 2GB for 64 bit
Disk: 256MB free space

WARNING: DO NOT ATTEMPT TO ADJUST OR OTHERWISE USE THIS SOFTWARE WHILE OPERATING A MOTOR VEHICLE OR VESSEL.

TwK™ - TüN™ SOFTWARE OVERVIEW

TüN™ is JL Audio's DSP tuning software for the PC platform. It has been developed to control and manage JL Audio DSP products. TüN™ is designed to automatically recognize which product(s) it is connected to, allowing you to select one at a time, configuring its interface appropriately for that product.

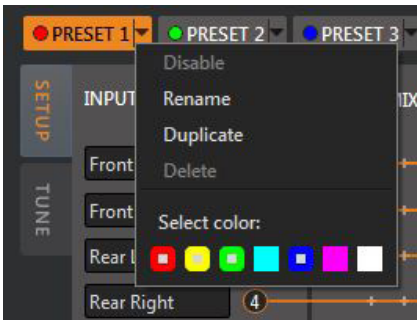
While the TüN software is designed to work with multiple JL Audio DSP platforms, this particular document is focused on TüN™ connected to one of JL Audio's TwK™ System Tuning DSPs. This overview was written for release version 2.56.145 of the TüN™ software. Some details may vary in future updates and releases. Please consult the online help or the support section of the JL Audio website for the most up-to-date information, and for in-depth explanations of the TüN™ software.

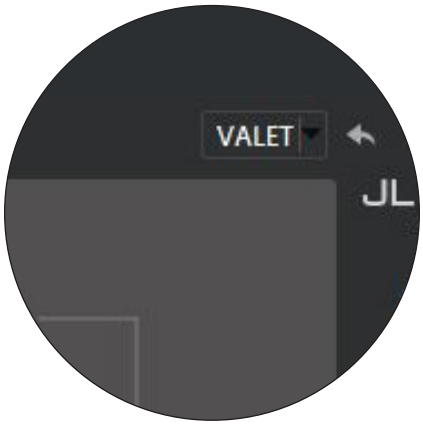
If you have any questions about the installation or setup of the software not covered in this overview, please contact your dealer or technical support.

The answers to most questions can also be found in the JL Audio Help Center which is available anytime online. Visit: **jlaudio.com/support**

JL Audio Technical Support:
(954) 443-1100
9:00 AM – 5:30 PM
(Eastern Time Zone)
Monday - Friday

WARNING





A FEW DEFINITIONS

PROJECT: The entire configuration file that you are working on, encompassing all your created PRESETs and the PROJECT level information. A PROJECT can contain from one to eleven PRESETs, including one VALET PRESET.

The PROJECT is the file that will be saved in your computer, and the file that is uploaded to, and stored in the TwK™ DSP. TwK™ PROJECT files have the extension "*.twkproj" when viewed in your computer's file browser.

PRESET: A specific configuration of DSP settings that is saved within a PROJECT.

PRESETs are designated as "Disabled" or "Enabled". When Enabled, they are available to be activated via the TüN™ software when the PC is connected, or via the TwK's connected DRC controller when no PC is connected. PRESETs may also be activated by pressing the Preset Toggle button located on the top of the TwK™. When "Disabled", a PRESET is dormant and not able to be activated. It must first be Enabled via the TüN™ software. A maximum of six PRESETs may be Enabled at one time, plus a special preset called "VALET". A total of 10 PRESETs, plus the VALET preset may be stored in a PROJECT file. Only one Enabled PRESET may be Active at any time.

Each PRESET is shown in the TüN™ interface as a rectangular button along the top edge of the dark gray frame. A new, blank PRESET can be created by clicking the + symbol to the right of the PRESET button(s).

Each PRESET button also has a pull-down menu, which allows a PRESET to be enabled/disabled, renamed, duplicated or deleted. The "Duplicate" function allows you to create an exact copy of an existing PRESET, which you can then modify without disturbing your previous PRESET.

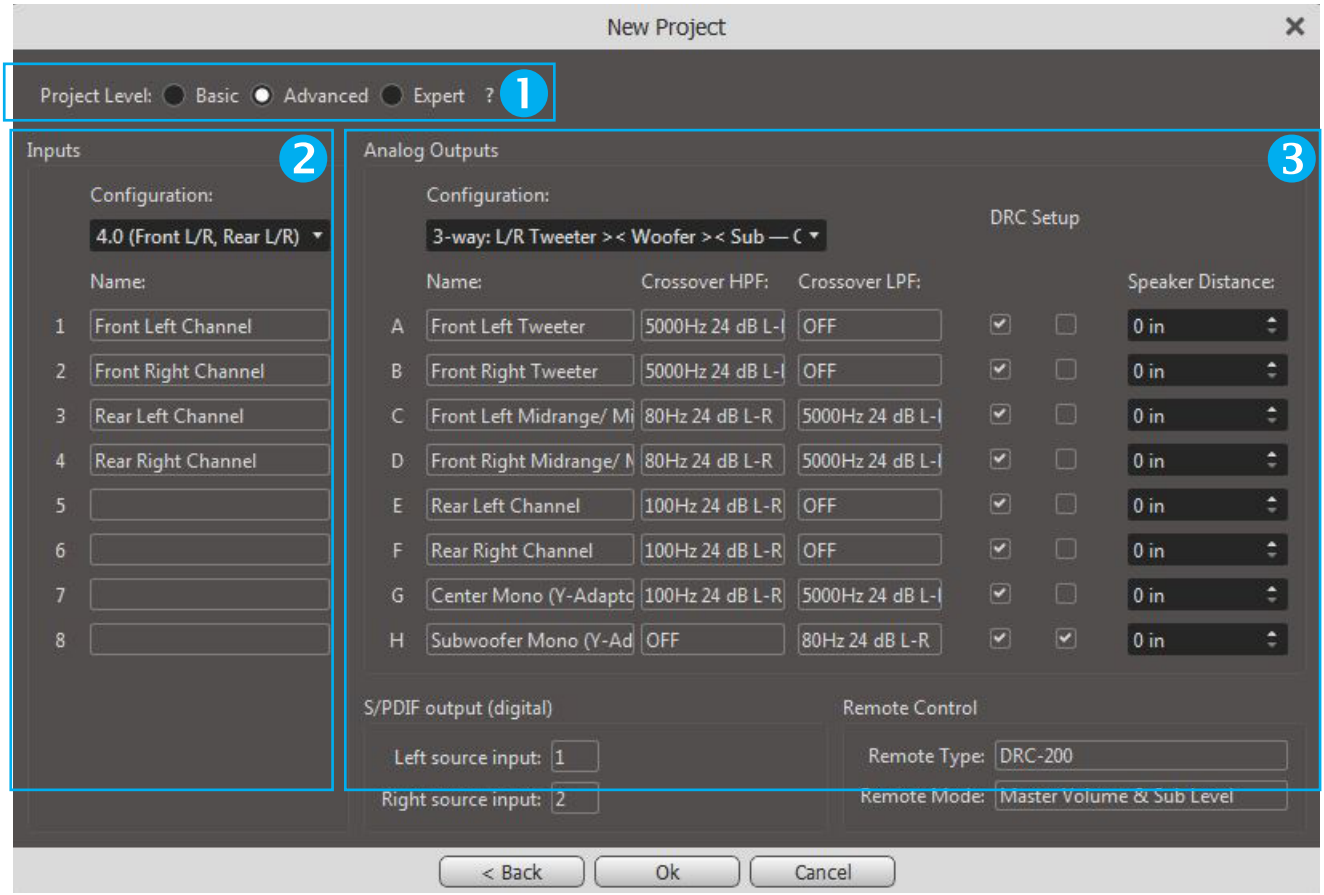
You will also assign a color to each Enabled PRESET. This color will be displayed on the DRC's LED when you activate that PRESET. This permits the user to easily identify the PRESET being activated.

The order of the PRESETs can be rearranged at any time by selecting, dragging and dropping the PRESET's button into the desired position.

VALET: a special PRESET that is called up by grounding the "Valet In" connection located on the TwK's power connector. This allows you to install a switch or an automatic relay trigger to activate this special PRESET, overriding all other PRESETs while that connection remains grounded. This is useful for creating a limited "VALET" mode with restrained output levels, for example. Another example would be a special tuning that is automatically activated when opening the roof on a convertible. You decide what you want this special PRESET to do, and how it is activated.

DRC: An abbreviation for "Digital Remote Controller". Refers to a JL Audio accessory which connects to the TwK™ (or other JL Audio products) via the "JLid™ Port" on the JL Audio hardware. The TwK™ 88 and TwK™ D8 each include a DRC-200 controller with indicator LED. This controller has an outer knob and an inner knob, with push-button functionality. It can be discreetly mounted within reach of the vehicle's driver. The LED can be located separately, so that it is visible for PRESET identification.

NEW PROJECT CONFIGURATION



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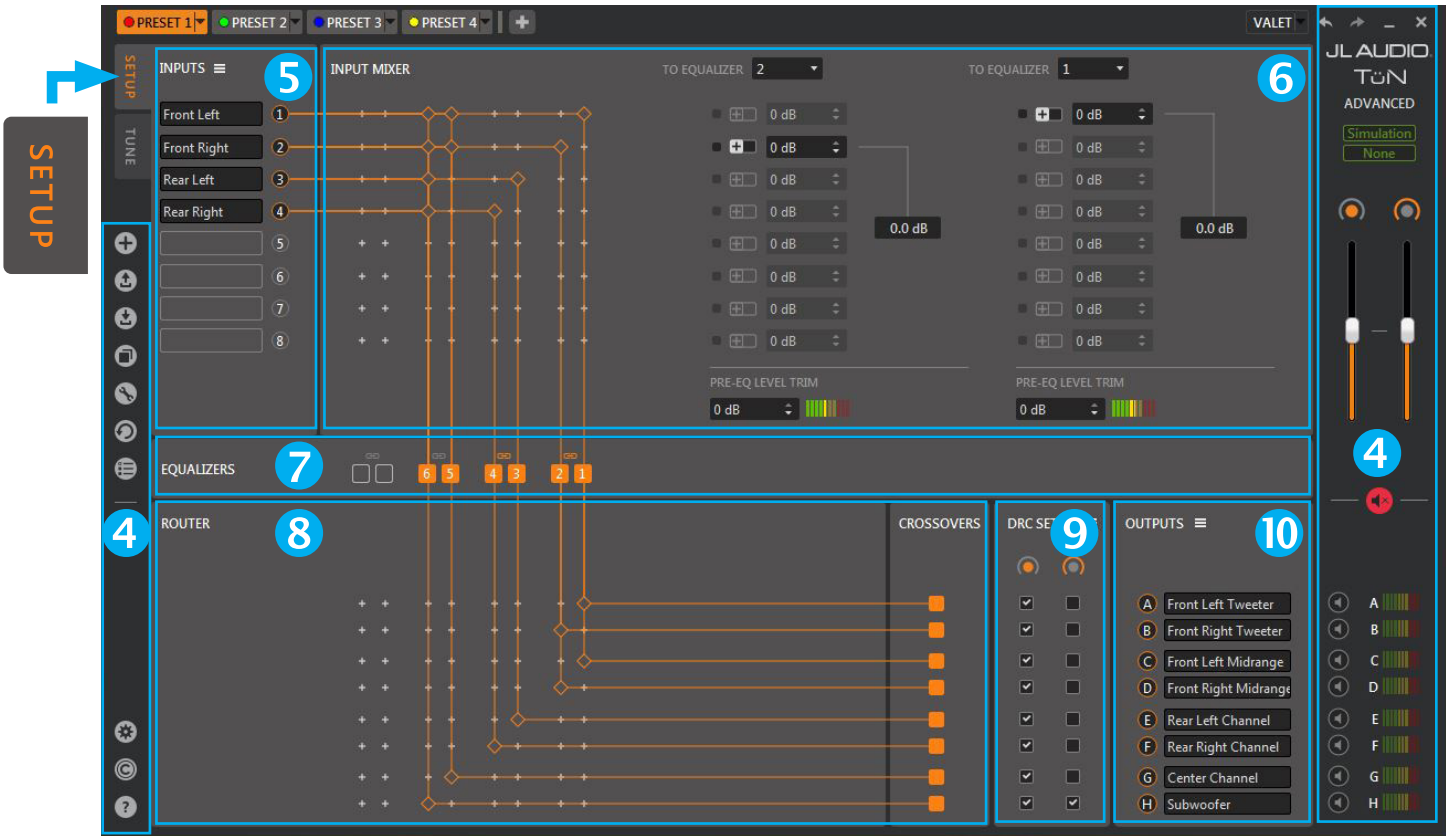
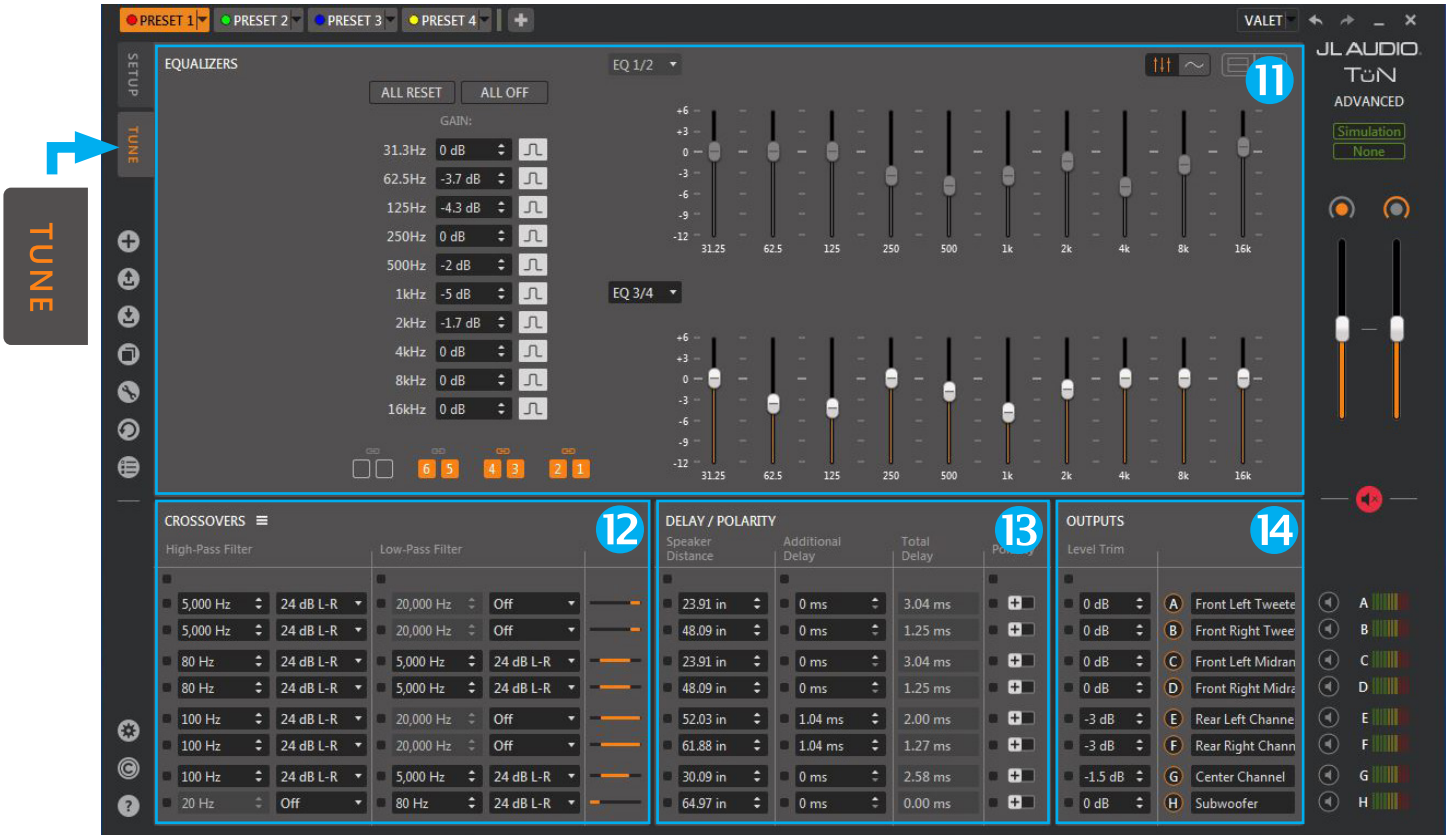
SETUP TAB CONFIGURATION



TUNE TAB CONFIGURATION



GETTING STARTED

To start a New Project, select "Create a New Project" from the Startup Dialog Box or "**New Project**" ⊕ from the toolbar on the left side of the interface. Whenever a new PROJECT is created, a New Project Setup Tool window pops up in front of the TüN™ interface. This tool is designed to quickly and efficiently establish the starting parameters for your PROJECT. Here, you will name the PROJECT, enter the vehicle information, add a few notes if you want, and then click "Next" .

In the second page, you will be asked to make a few selections. The answers you provide will allow the TüN™ software to create a safe, baseline starting configuration for tuning your system, saving you a lot of data entry time. The selections you will make are as follows:

1. **Project Level**: Sometimes you need maximum flexibility and complexity, and sometimes you don't. To address your particular Project with appropriate complexity, the TüN™ software offers three Project Level choices: Basic, Advanced or Expert.

   Basic: offers a streamlined feature set with common sense safeguards designed for efficient system tuning. It is ideal for first time DSP users and time-sensitive projects. You will have access to the Input Mixer and Router, DRC Setup, Output Polarity, 10-band Graphic Equalizers, High-Pass and Low Pass Filters (12, 24 or 48 dB/octave, Linkwitz-Riley) and Level Trim controls.

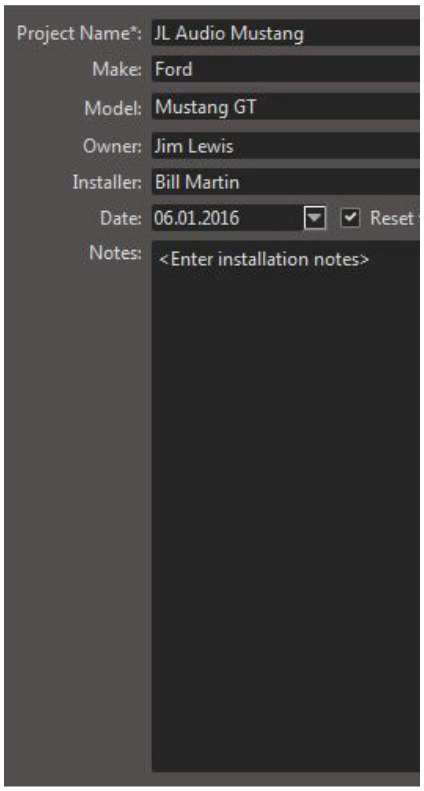
   Advanced: offers a full feature set with restrained safeguards to prevent accidental damage to the audio system. This is ideal for experienced DSP users looking to get full advantage of the TwK's power, while avoiding certain pitfalls that can result in poor performance or speaker damage. You will be able to access all the Basic Level features listed above, plus summing polarity, fully parametric 10-band EQ's and channel delays.

   Expert: offers the complete feature set with no safeguards. This level is only for expert users who have no need for technical support. Additional crossover filter slopes and alignments are added with the following safeguards and constraints disabled: crossover frequency safety mute, parametric EQ boost limits and automatic summing level. You can easily get very bad sound and/or speaker damage if you are not careful.

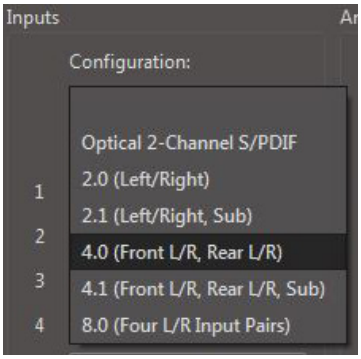
   When in doubt, choose "Advanced".

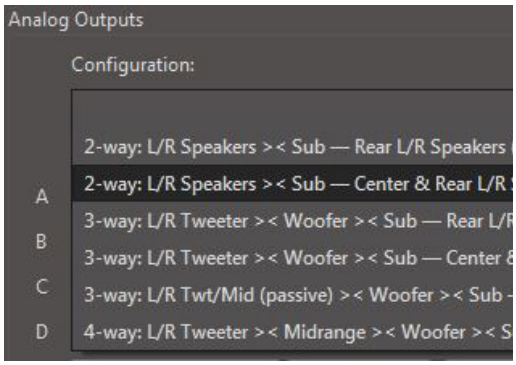
   Changing Project Levels of an existing Project: If you begin a Project at one Project Level and wish to change to a higher Project Level, this can be accomplished with "**Project Settings**" 🔧 .

IMPORTANT: ONCE YOU MOVE A PROJECT INTO A HIGHER PROJECT LEVEL, IT CANNOT BE RETURNED TO A LOWER PROJECT LEVEL. IF YOU THINK YOU MIGHT NEED TO GO BACK, CREATE A COPY OF THE PROJECT AND STORE IT IN YOUR PC, BEFORE CHANGING THE PROJECT LEVEL.



IMPORTANT





2 **Input Configuration**: Select from a list of common input signal configurations. The TüN™ software will automatically name the Inputs and configure the Input Mixer. These can be edited later, if needed.

3 **Output Configuration**: Select from a list of output signal configurations. The TüN™ software automatically configures the Router, assigns the EQ banks, sets the DRC Mode, enters Crossover frequencies and names all of the output channels of the TwK™.

Output Configuration choices are presented as follows:
The front of the system, or main zone, is described as 2-way, 3-way or 4-way, including the subwoofer, with the front/main outputs separated by a >< symbol, indicating a crossover. A dash (–) separates the front/main outputs from additional channels, such as Rear and Center channel outputs.

If you don't see a configuration that matches your system design, you can choose a similar one and then edit it in the SETUP tab. In the Expert Project Level you can also select a "Blank" setup to enter everything manually in the SETUP tab.

Speaker Distance Entry (Advanced and Expert Project Levels only): Enter the speaker distance to the primary listener for each output channel, in inches. (Metric units can be selected in the Preferences menu, if preferred.) The TüN™ software will automatically convert these distance numbers to delay parameters. If you do not wish to apply speaker distance compensation in your starting configuration, simply skip this step.

PLEASE NOTE: ALL PARAMETERS SET WITH THE SETUP TOOL CAN BE EDITED LATER IN THE SETUP AND TUNE TABS OF THE TÜN SOFTWARE.

4 PROJECT MANAGEMENT

Settings and controls placed in dark gray areas along the sides of the main TüN™ interface window contain management tools that apply to the entire project.

The left vertical edge of the TüN™ software's dark gray frame displays icons for several management tools which apply to the entire Project:

- "**New Project**": creates a new Project
- "**Open Project**": opens an existing, saved Project stored in your PC
- "**Save Project**": saves the project to a file in your PC
- "**Transfer Project to TwK**": transfers the active Project into the TwK™ DSP's memory.
- "**Project Settings**": allows editing of Project Level and Vehicle Notes
- "**Restore Project**": reinstates a stored backup project file (see ⚙ for settings)
- "**Search and Select Device**": searches for connected, compatible devices
- "**Preferences**": TüN™ preferences can be edited here. Also displays software version, and firmware version of connected device.
- "**Copyrights**": explanation of software license and copyright notices
- "**Help**": accesses the online Help Center (an internet connection is required)

At the top right of the TüN™ interface's dark gray frame you will find **UNDO/REDO**: a left facing (UNDO) arrow and a right facing (REDO) arrow. As you have probably figured out, these allow you to retrace your tuning steps and come back, one-by-one.

The rest of the right vertical edge of the dark gray frame is dedicated to status indicators and for TwK™ user controls needed while connected to the PC.

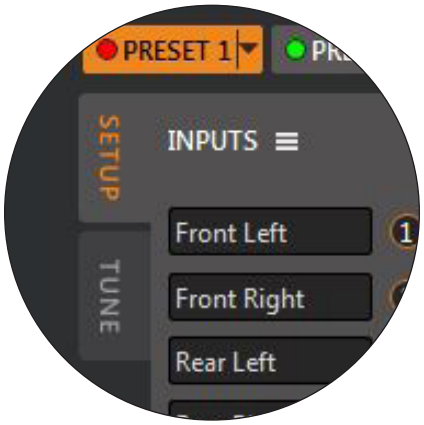
Below the JL AUDIO TüN™ logo, you will see a display of the current Project Level (Basic, Advanced or Expert). Below that, you will find connection status indicators.

TwK™ CONTROLS: These controls talk to the TwK™ hardware directly, without any permanent effect on the current Preset or Project. Since the **DRC** is disabled when the PC is connected via USB, the two **VERTICAL SLIDER** controls become your volume (inner DRC knob) and secondary level control (outer DRC knob), while tuning with your PC. When you disconnect the PC, the TwK™ will immediately revert to being controlled by the DRC connected to it.

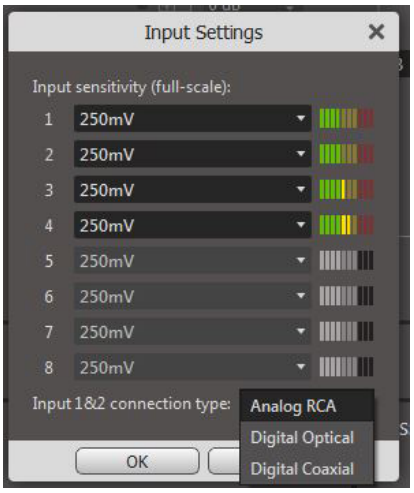
Below the sliders is the **MASTER MUTE** button to mute/unmute all TwK™ outputs. Below the Master Mute, you will find individual **CHANNEL MUTE** buttons. The mute buttons display red when muted. These are useful for isolating channels while tuning or for troubleshooting purposes. **SIGNAL LEVEL METERS** for each output channel are located next to the Channel Mute buttons.

PRESET CONTROL AREAS

Now that we've covered the features in the TüN™ software's dark gray frame, we will focus on the light gray areas that house all of the data related to a currently selected PRESET. All parameters displayed in the light gray areas are stored within the selected PRESET. This means that you can create multiple PRESETs with variations of all these features, including the use of different inputs, different outputs, more or fewer EQ banks, different signal routing, different crossovers, etc. The configuration for each PRESET is organized in two Tabs, located at the upper left of the TüN™ interface. These are labeled "SETUP" and "TUNE".



SETUP TAB



5 "INPUTS" Panel

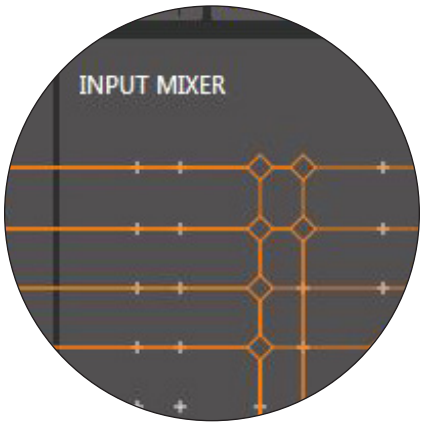
TwK™ 88: Inputs are numbered from 1-8, corresponding to the connection labels on the TwK™ 88 hardware. The adjacent Input Labels can be edited via the PC's keyboard.

Input Settings: click on the "Menu" ☰ to access the Input Settings Menu (TwK™ 88 only)

Input Sensitivity: Adjustable from 250 mV (default) to 7.1 V, in 3 dB steps. Designed to match the output level of your source unit's analog outputs to the TwK's analog-to-digital converter. (Refer to Appendix A on page 15 for more info.) Input Sensitivity is not adjustable with digital inputs.

Input 1 & 2 Connection Type (TwK™ 88 Only): Inputs 1 and 2 can receive Analog signals via RCA connections. They can also be set to receive Digital Optical or Digital Coaxial signals in 2-channel S/PDIF format from the appropriate connectors on the TwK™ hardware. Please note that this particular selection applies to all presets. If you wish to switch between digital and analog inputs via PRESET selection, do not connect analog inputs to Inputs 1 & 2. Use other inputs.

TwK™ D8: The TwK™ D8 has only one input: Digital Optical. There are no Input Settings to adjust.



6 "INPUT MIXER" Panel

The INPUT MIXER directs input signals to the EQ Banks and has the ability to combine input channels. It uses an intuitive clickable interface that provides visual feedback of input signal routing. In Advanced and Expert modes, additional mixing flexibility is enabled by permitting input polarity and relative level to be adjusted to create spatial effects.

Pre-EQ Level Trim:
Allows the output levels of the mixer to be reduced as much as –12 dB, prior to being routed to the EQ Banks. These controls should be left at 0 dB (highest setting) in most use cases.

7 "EQUALIZERS" Panel:

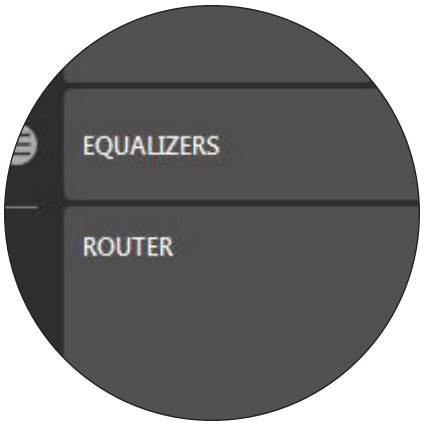
A unique aspect of the TwK™ signal flow design is the ability to assign as many (or as few) EQUALIZERs as you need for your system design. The TwK™ DSP has a total of eight EQ banks, each with 10-bands of equalization. With eight EQ Banks available, you have the option to assign one to each Output Channel. Alternatively, you can assign as few as one pair of EQ Banks to all eight Output channels… or any number in between.

One particular advantage of this approach is that you can configure your TwK™ to equalize by system zone. Let's consider just one example: you have a 3-way system in the main zone: tweeters, woofers and subwoofers, and the second zone only contains rear "fill" speakers. With the flexibility of the TwK™ EQ Banks, you can assign one pair of EQ's to tune the entire front zone (tweeters, woofers and subs), and another pair of EQ Banks to tune

the rear speakers. With only two EQ Banks, you can tune the entire eight-channel system.

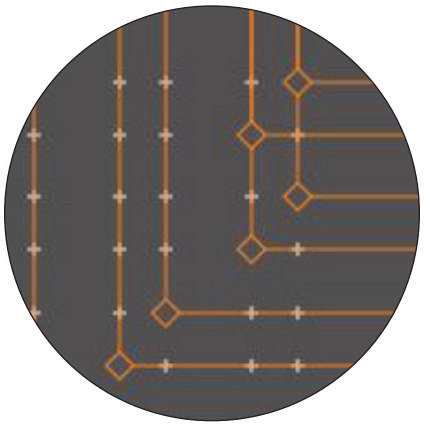
In the Basic PROJECT Level, the EQ Banks are fixed in a full-octave, graphic EQ format that should be familiar to all audio enthusiasts. This provides a fast, simple method for improving system frequency response.

In the Advanced and Expert PROJECT Levels, the EQ Banks can be used in the aforementioned 10-band graphic EQ mode, or in fully Parametric mode. 10 bands of Parametric EQ are even more powerful than a thirty band graphic EQ. With full control over each EQ band's center frequency, "Q" and boost/cut, you can correct response with incredible finesse and accuracy, and thanks to the processing power of the TwK™, you can hear the immediate effect of your adjustments, without any lag or muting.



8 "ROUTER" Panel:

The router establishes the connections and signal flow between the outputs of the EQ Banks and the Output Channels. Like the Input Mixer, the Router uses an intuitive, clickable interface that provides visual feedback of output signal routing.



9 "DRC SETUP" Panel:

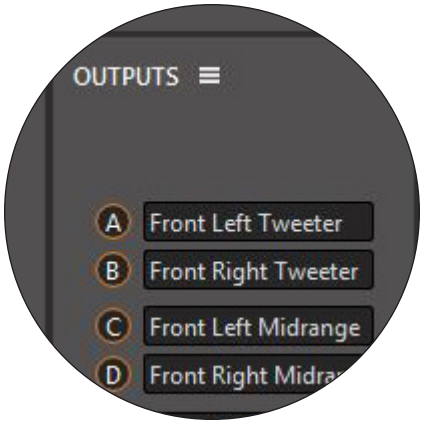
This panel allows you to configure the behavior of the DRC-200 that is included with the TwK™. Check boxes allow you to determine which channels will be controlled by the inner and outer knobs of the DRC-200.

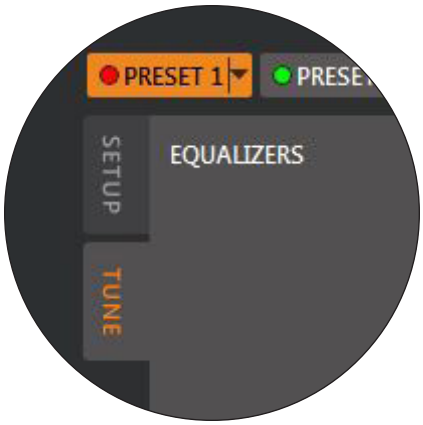
By clicking on the "Menu" ☰, you may choose between subwoofer level control, fader and zone control functions for the outer knob of the DRC-200. Appropriate setup check boxes will appear for each mode.

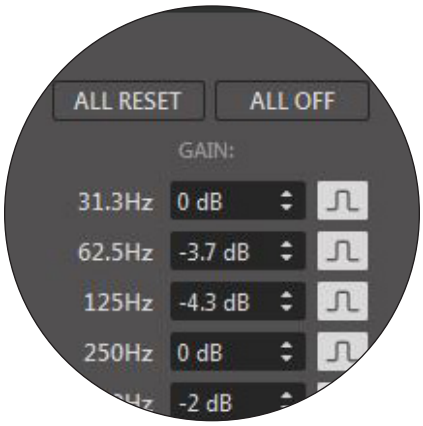
10 "OUTPUTS" Panel:

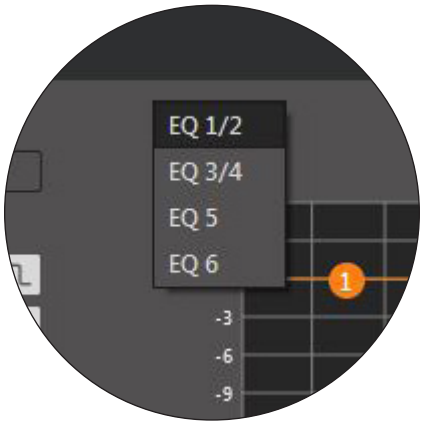
Output Channel labels can be edited and renamed by clicking and highlighting the label. Use your PC's keyboard to create a new name.

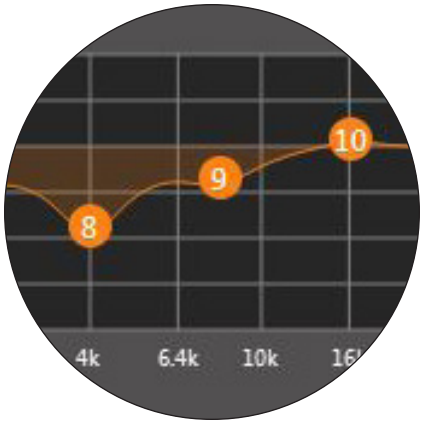
Digital Output Source:
By selecting the "Menu" ☰ in the OUTPUTS panel, you can access the input selector for the TwK's digital outputs. Using the pull-down menus, select the TwK™ inputs that will feed the Optical Digital Output. Please note that these signals pass directly from the inputs to the outputs with no signal processing applied.











TUNE TAB

11 "EQUALIZERS" Panel:

Reorder: Re-establishes numerical order (1-10) of parametric EQ band labels in order of center frequency, from low to high. (Parametric EQ only)

All Reset: Resets all EQ bands to their default values

All Off/On: Temporarily defeats/turns on all EQ bands

EQ Select: Select an EQ to adjust from the pull-down menu (Linked EQ's are shown as pairs).

EQ Link: Allows Left and Right EQ Banks to be linked and adjusted together, with identical settings.

Numerical Entry of EQ values: You can directly enter numerical values for EQ adjustment into the following entry fields. Use the up/down arrow icons in each field for incremental adjustment. Holding the Shift-Key down while clicking the arrows results in finer resolution. The following entry fields are available:

FREQ: The center frequency of the EQ band. Default values are in accordance with ISO full octave EQ band specifications: 31, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hz. These values are fixed in Graphic EQ mode and variable in Parametric EQ mode.

"Q": The shape of the EQ filter response. Lower "Q" values result in wider bandwidth EQ filter response. Higher "Q" values result in narrower bandwidth EQ filter response. This value is fixed in Graphic EQ mode and variable in Parametric EQ mode from 0.26 to 10. Default value is 1.41.

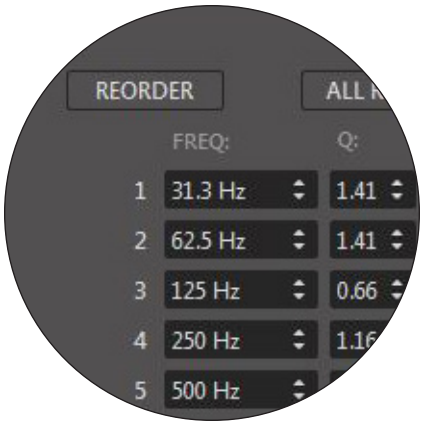
Gain: The amount of amplitude boost or cut applied through the selected filter, expressed in decibels and adjustable from +6 dB to –12 dB. Default value is 0 dB. This control is available in Graphic and Parametric EQ modes.

Manual EQ adjustment on the display graph: The Graphic EQ uses familiar "slider" control graphics. In Parametric EQ mode, the numbered, round EQ Band labels on the display graph can be directly selected and moved using the mouse/touchpad. The graph will display the resulting effect on frequency response in real time. The resulting value changes will also be reflected in the EQ numerical entry fields.

Manual commands:
Left Click and Hold, then Drag Up/Down for Boost/Cut
Left Click and Hold, then Drag Left/Right to change Center Frequency (Parametric EQ only)
Right Click and Hold, then Drag Up/Down or Left/Right to change "Q" (Parametric EQ only)
Control+Left Click to select multiple EQ bands. These can then be adjusted together.

EQ adjustment with Arrow Keys: You can also select EQ Band Label(s) with your mouse/trackpad, and then make adjustments using the arrow keys on your keyboard. Finer adjustment steps can be achieved by using the SHIFT key, in conjunction with the arrow keys.

Keyboard commands:
Up/Down Arrows: Boost/Cut
Left/Right Arrows: Center Frequency down/up (Parametric EQ only)
CONTROL + Up/Down Arrows: "Q" Up/Down (Parametric EQ only)
Control+Left Click to select and adjust multiple EQ bands.



Individual Band Defeat:
Individual EQ bands can be defeated (turned off)  , by clicking the icon  located to the right of the numerical entry fields. To re-engage them, click the icon again.

Dual or Single EQ Views:
These icons allow you to choose whether to display one or two EQ display graphs on the screen. This way you can work on two EQ banks at once, or just focus on one with better resolution. Linked EQs are always displayed together, on one display graph.

Graphic or Parametric EQ Modes:
These icons allow you to switch between Graphic and Parametric EQ modes when in the Advanced or Expert Project Levels.

IMPORTANT: YOU MAY SWITCH FROM GRAPHIC TO PARAMETRIC MODE WITHOUT LOSING ANY SETTINGS, BUT SWITCHING FROM PARAMETRIC TO GRAPHIC MODE RESETS THE PRESET'S EQ BANKS TO DEFAULT SETTINGS.

12 "CROSSOVERS" Panel:

The following controls are available for each Output Channel

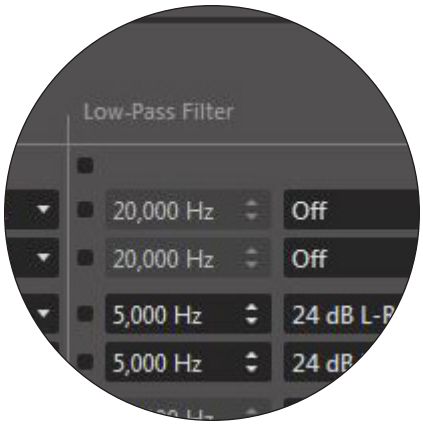
A few definitions of crossover terms:

High-Pass Filter: uniformly allows signals to pass above a certain frequency. Below that frequency, signal levels are attenuated at a gradual rate, defined by the Filter Slope.

Low-Pass Filter: uniformly allows signals to pass below a certain frequency. Above that frequency, signal levels are attenuated at a gradual rate, defined by the Filter Slope.

Bandpass Filter: uniformly passes signal above a certain frequency and below another frequency. A bandpass filter is created by combining, in series, a high pass filter and a low pass filter on the same signal.

Filter Alignment: determines the theoretical behavior of the crossover (combination of signals) created between a low-pass filtered signal and a high-pass filtered signal, assuming that both filters are of the same slope and alignment. For most tuning purposes, Linkwitz-Riley is the best choice.



Passband: the range of frequencies uniformly passed by a filter. Defined by two frequencies.

Stopband: the range, or ranges of frequencies outside the passband.

The TüN™ software provides separate controls for adjusting a High-Pass Filter and a Low-Pass Filter on each Output Channel. These can be combined to create a Bandpass Filter. Each filter section contains the following controls:

Frequency: allows adjustment of the filter frequency (in Hz) via direct numerical entry with the keyboard, or incrementally via the arrows located next to the displayed value. Holding "Shift" down when clicking results in finer resolution steps.

Slope: A pull-down menu allows selection of crossover slopes and filter alignment from a list of available choices:

Basic and Advanced Mode:
12, 24 or 48 dB per octave, Linkwitz-Riley alignment (L-R).

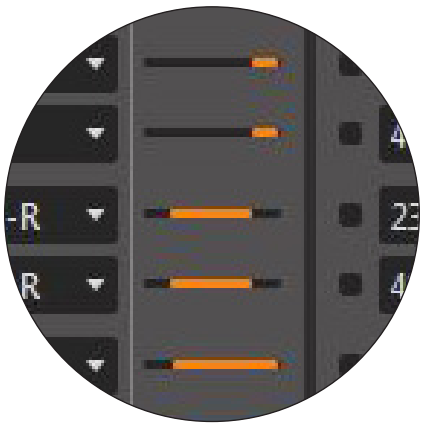
Expert Mode:
All of the above, plus 6 dB per octave and
12, 18, 24, 36, 48 dB per octave, Butterworth alignment (BW)

Some basic guidelines for setting filter frequencies and good starting frequencies for tuning a system (use 24 dB/octave L-R slope):

2-way System:
Coaxial/Component System with passive crossover between woofer and tweeter: 80 Hz High-Pass
Subwoofer: 80 Hz Low-Pass

3-way System:
Tweeter: 5000 Hz High-Pass
Component woofer: 80 Hz – 5000 Hz Bandpass
Subwoofer: 80 Hz Low-Pass

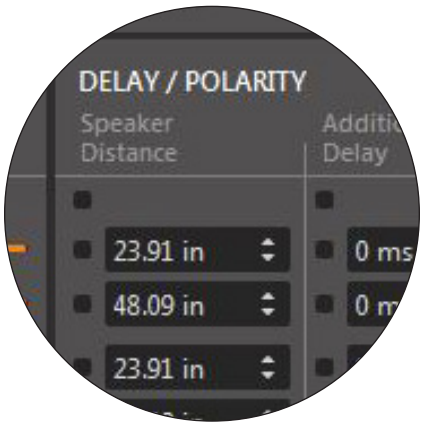
4-way System:
Tweeter: 5000 Hz High-Pass
Midrange: 500 Hz – 5000 Hz Bandpass
Midbass: 80 Hz – 500 Hz Bandpass
Subwoofer: 80 Hz Low-Pass



Passband Bar display: shows, at a glance, the approximate passband (bandwidth) of the signal on each channel, based on the crossover frequencies that have been selected. Clicking on the Passband Bar Display will open a window with a large, detailed view of the crossover filter's response. Once this window is open, you can show and hide channels to evaluate the crossover settings. The detailed crossover response view can also be called up by clicking on the Crossover menu ☰.

13 "DELAY/POLARITY" Panel:

The TwK™ has a powerful digital delay feature with separate entries for Speaker Distance and Additional Delay, which can apply over 24 feet of speaker distance compensation (21.3 milliseconds of delay) to each of its output channels. Among other things, this delay capability allows you to compensate for the unequal distances between the primary listener and the various speakers installed in the vehicle. This is very useful if you are using delay to optimize the sound for one listening position. Once you have the measurements set corresponding to the speaker distances in the vehicle, you can adjust the Additional Delay control for additional effect.



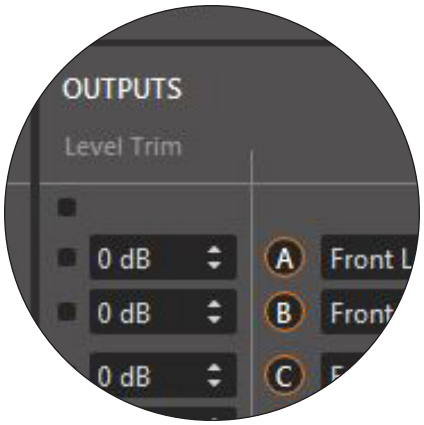
Speaker Distance: Use this tool to establish the baseline delay correction. Simply enter the distance from the speaker(s) connected to a given output channel and the primary listener's head. This can be done in inches or centimeters, switchable in the Preferences panel. The maximum Speaker Distance that can be entered is 290.4 inches (737.7 cm). The TüN™ software will automatically convert the Speaker Distances entered into Time Delay values, expressed in milliseconds (ms), and displayed in the TUNE tab's "Total Delay" displays. You can also establish different Speaker Distance setups for different listening positions in the vehicle, by creating a PRESET for each one and entering the appropriate values.

Additional Delay: Here, you can add delay to the baseline delay correction. Clicking the arrows moves the value approximately 0.2 ms. Holding the "Shift" key, while clicking the arrows, results in a step value of 0.02 ms, which is the minimum delay step value. Any entered values will be rounded up to the nearest available delay step.

Total Delay: Displays the total delay that is applied to the signal (the sum results of the Speaker Distance and the Additional Delay entries). This is a display-only field.

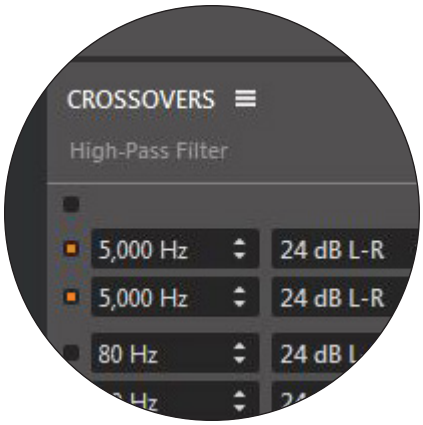
Polarity: Inverts the POLARITY of each output channel's audio signal when the  position is selected. This is equivalent to reversing the positive and negative connections on the loudspeaker(s) connected to a given output signal. Adjusting POLARITY relative to other channels can be useful for improving the acoustical performance of crossovers in the vehicle, and can also be used to create spatial effects.

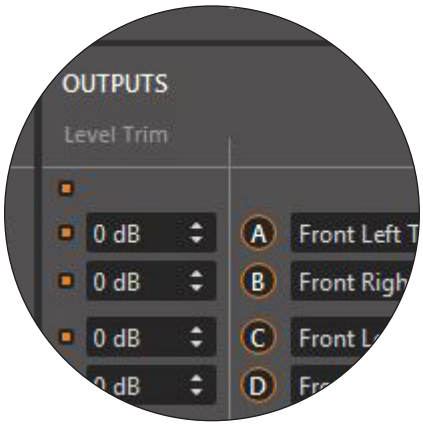
14 "OUTPUTS" Panel:



Level Trim: Each Output Channel has a level trim control with a range of –12.0 to +12.0 dB. The default setting is 0 db. These are the primary tuning controls used to adjust the relative level of the TwK™ Output Channels to achieve the desired balance in the audio system.

Output Labels Display: Displays the Output Channel Letter ID and the Channel Labels. The Channel Labels are created by the Setup Tool, or by the user in the SETUP tab. They can be edited within the SETUP tab, if desired.





Control Linking:
The small selection boxes ■ that correspond to each channel in various control panels allow you to temporarily link ■ the controls for multiple channels, for simultaneous adjustment. The selection box at the top of the panel selects all channels with one click.

Control Linking is incredibly useful, permitting you to execute changes in multiple channels, while listening to the effect of these changes in real time. For example, you could select both the left and right tweeter channels and adjust delay on them, together, while retaining any offset that exists between them. You can flip the polarity of multiple channels and listen to the result in real time, or adjust the levels of multiple channels together.

Control Linking is available for the following controls:
Speaker Distance
Polarity
Pre-Crossover Level Trim
High-Pass Filter (Slope changes trigger auto-mute, except in Expert Mode)
Low-Pass Filter (Slope changes trigger auto-mute, except in Expert Mode)
Additional Delay
Output Level Trim

PLEASE NOTE: CONTROL LINKING IS A TEMPORARY ADJUSTMENT STATE AND IS NOT SAVED IN THE PROJECT FILE.

Appendix A:
Twk™ Input Sensitivity Level Setting
Selecting the appropriate Input Sensitivity setting is critical to achieving maximum, low distortion output. To properly set the TwK's Input Sensitivity settings, perform the steps below prior to making any amplifier adjustments.

Necessary Equipment
• CD or file with a pink noise test track.

1. After all wiring is complete, connect your TwK™ to a PC and launch the TüN™ software. Configure your project, then press the "Master Mute" button to mute all TwK™ outputs.
2. Turn off all processing (bass/treble, loudness, EQ, etc.) on the source unit and processors (if used). Set the source unit's fader and balance controls to center.
3. Set the source unit volume to ¾ of maximum. This will allow for reasonable gain overlap with moderate clipping at full volume.
4. Select the Input "Menu" from the SETUP tab and begin playing the pink noise track (at ¾ source unit volume).
5. Click the dropdown arrow for the first input channel and, using the "Signal Level Meter" as a guide, select the setting that does not exceed the yellow bars. Repeat for the remaining input channels.

Note: When using JL Audio amplifiers, set the amplifier's Input Sensitivity control to twelve o'clock (noon) and Input Voltage switch (if equipped) to "Low".

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