OWNER'S MANUAL
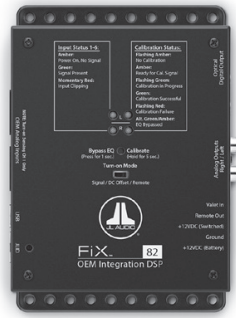

FiX™ 82
OEM Integration DSP

Thank you for purchasing a JL Audio FiX™ OEM interface / processor for your automotive sound system.

This product has been designed and manufactured to exacting standards in order to ensure years of musical enjoyment in your vehicle. For maximum performance, we highly recommend that you have your FiX™ 82 installed by an authorized JL Audio dealer. Your authorized dealer has the training, expertise and installation equipment to ensure optimum performance from this product without compromising your vehicle's functionality. Due to the complexity of modern vehicle systems, we do not recommend self-installation unless you have extensive experience in automotive electrical systems. Should you decide to install this product 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 the product'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.

Protect Your Hearing!
We value you as a long-term customer. For that reason, we urge you to practice restraint in the operation of this product so as to not damage your hearing and that of others in your vehicle. Studies have shown that continuous exposure to high sound pressure level can lead to permanent (irreparable) hearing loss. Automotive sound systems are capable of producing such high sound pressure levels. Please limit your continuous exposure at high volumes. While driving, operate your audio system in a manner that still allows you to hear necessary noises to operate your vehicle safely (horns, sirens, etc.).

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

Safety Considerations
• Install this product 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.).
• Securely mount this product so that it does not come loose in the event of a collision or sudden jolt to the vehicle.
• Check before drilling to make sure that you will not be drilling into a gas tank, brake line, wiring harness or other vital vehicle system.
• Do not run system wiring outside or underneath the vehicle. This is an extremely dangerous practice, which can result in severe damage/injury.
• Protect all system wires from sharp metal edges and wear by carefully routing them, tying them down and using grommets and loom where appropriate.

What's Included
(1) FiX™ 82 processor
(1) 5-pin Power Connector plug
(4) 4-pin OEM Analog Input plugs
(4) Mounting screws
(1) FIX™ Calibration CD

Product Overview
The FiX™ 82 is the ultimate tool for building a great sounding system using the OEM source. Equipped with a powerful 24-bit DSP processor, the FiX™ 82 delivers world-class sound and incredible functionality allowing the integration of complex factory source units with aftermarket audio equipment. It combines a level matching, summing preamp with delay and frequency response correction, all housed within a single chassis.

The FiX™ 82 may be used to perform the following functions:

1. Eight differential-balanced inputs accept virtually any OEM analog audio signal, from low-voltage, line-level to high power, amplified speaker-level, and converts them to digital audio with 24-bit effective resolution.
2. Compatible with full-range and band-limited OEM signals, outputs from factory 2-way, 3-way or 4-way stereo systems are automatically summed into a complete, full-range stereo signal.
3. Factory filtered or "tuned" signals are automatically restored back to a flat, full-range audio output. These digital-domain corrections can vary from subtle to dramatic, depending on the amount of equalization engineered into the factory audio system.
4. Time delayed OEM signals are automatically corrected into a synchronized output.
5. A simple calibration process performs signal summing, EQ restoration and time-delay correction tasks automatically.
6. Digitally corrected signals can then be sent to your aftermarket signal processors or amplifiers via two methods:
   • Analog audio through a stereo pair of low-distortion, 4-volt (RMS) line-level outputs
   • Digital audio through an optical (Toslink) output, supporting PCM audio (S/PDIF) 24bit/48kHz
7. Differential-balanced input architecture ensures noise immunity and compatibility with most analog output OEM source units or amplifiers.
8. Selectable turn-on options for activation include: conventional 12-volt trigger, automatic via Signal-Sensing or automatic via DC Offset-Sensing.
9. Provides a dedicated remote turn-on voltage output for activating aftermarket amplifiers or signal processors.
10. JLID Controller Port allows connection of the optional DRC-100 Digital Remote Controller (sold separately), adding Master Volume Control, Handsfree Optimization Mode and LED Status Reporting capabilities from the driver's seat.
11. USB port provides access to update firmware and advanced options.

The FiX™ 82 may be used as a standalone integration device, sending crystal-clear audio to your amplifiers or as a gateway to world-class sound by using it with our TwK™ System Tuning DSP (sold separately).

Planning Your Installation
It is important that you take the time to read this manual 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 performing signal testing with proper test equipment. If you are uncomfortable or unfamiliar with reading diagrams or testing signals, please enlist the services of your authorized JL Audio dealer to perform the installation.

Installation Procedure/Making Connections
The FiX™ 82 uses removable plugs for making power and signal input connections. Receptacles in each plug accept up to 16 AWG wire. To attach wires to the plug, use a small flathead screwdriver to back out the set screws. Strip 1/4 inch (6 mm) of insulation from the end of each wire and insert the bare wire into the receptacle, seating it firmly so that no wire is exposed. While holding each wire in place, tighten the set screw firmly, taking care not to strip the head of the screw.

+12VDC (Battery) Ground +12VDC (Switched) Remote Out Valet In

L+ | L− | R+ | R−
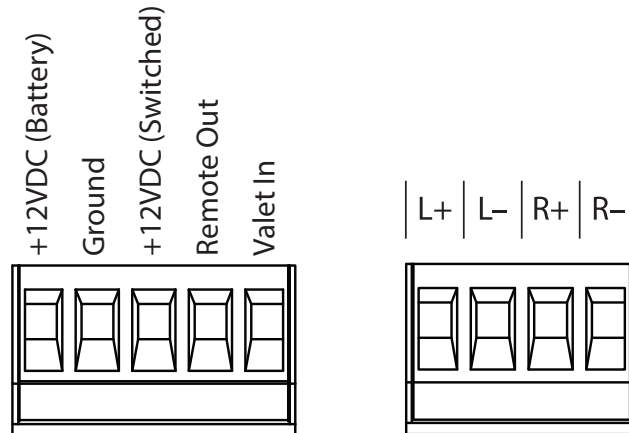
! IMPORTANT

Use caution to ensure correct polarity and wire placement of the Power and OEM Input connections.
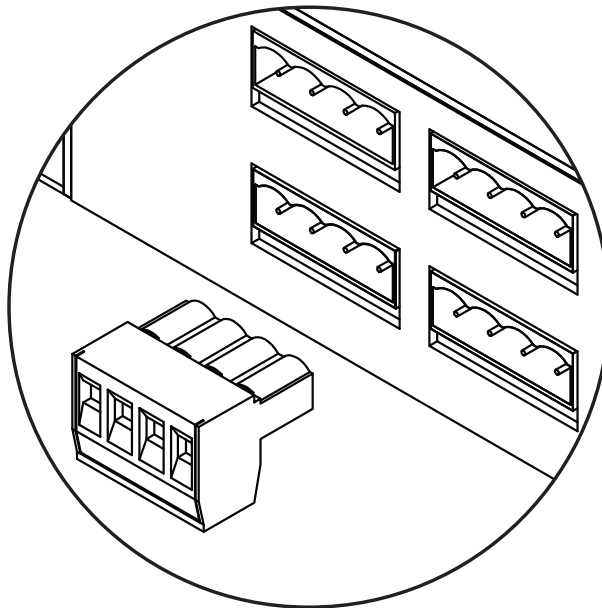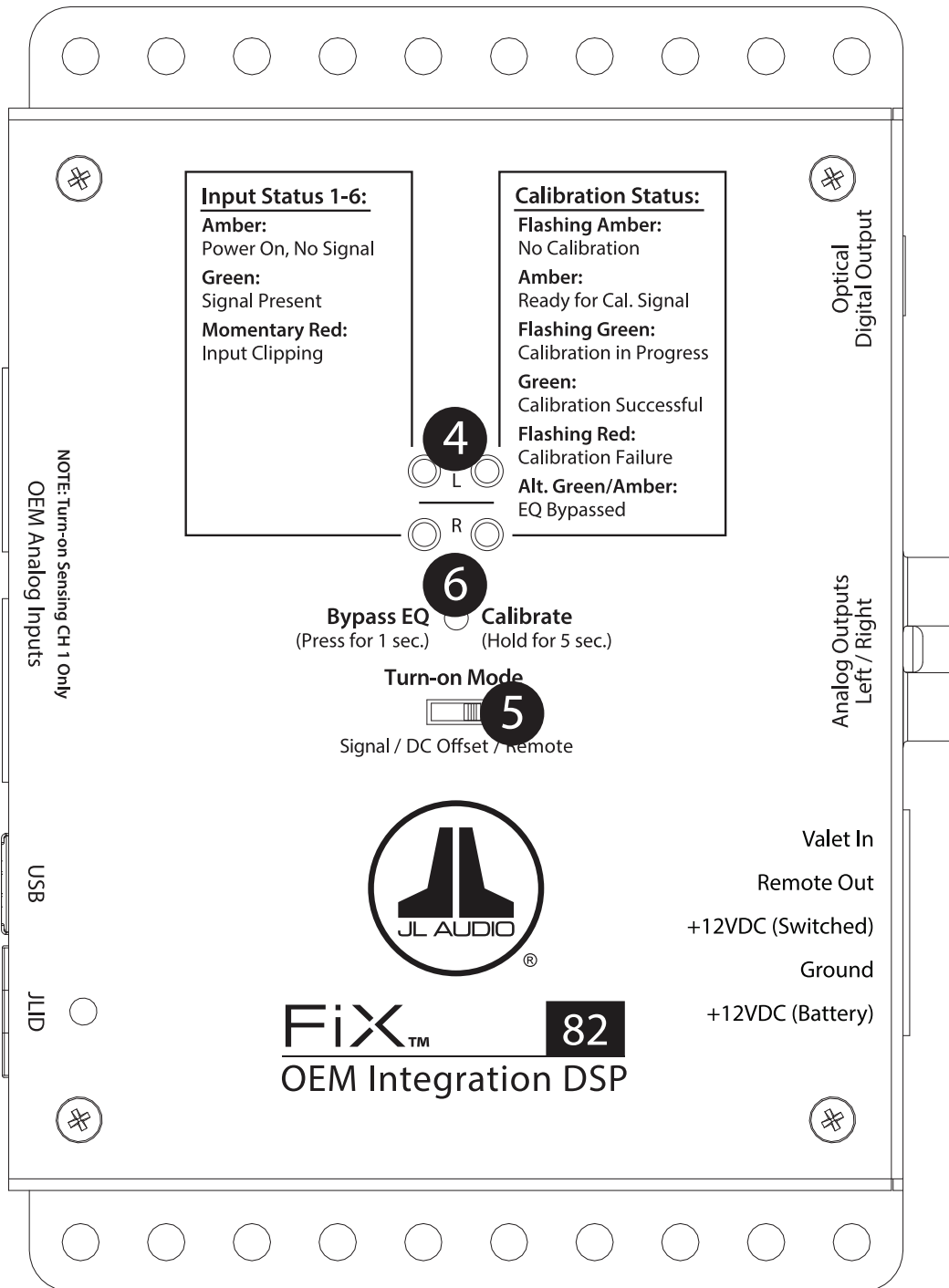
! IMPORTANT

Make sure to observe proper orientation when inserting each plug into the FiX™ 82. Each plug is keyed to fit in one direction only. When inserted correctly, the set screws should be facing down.
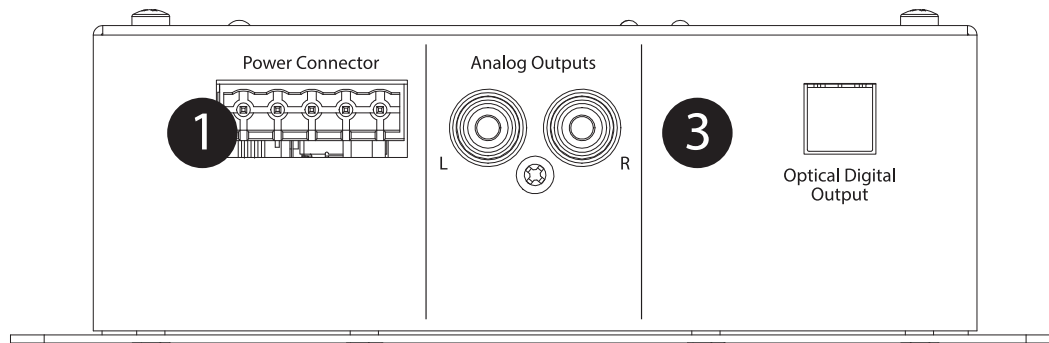
Use good quality crimp connectors (or solder with heat shrink tubing) when making connections to a vehicle's electrical system. Protect all wires from sharp edges (metal dash frame, firewall, etc.) by carefully routing and securing them, using grommets and loom where appropriate. Failure to do so may result in a dangerous short circuit.
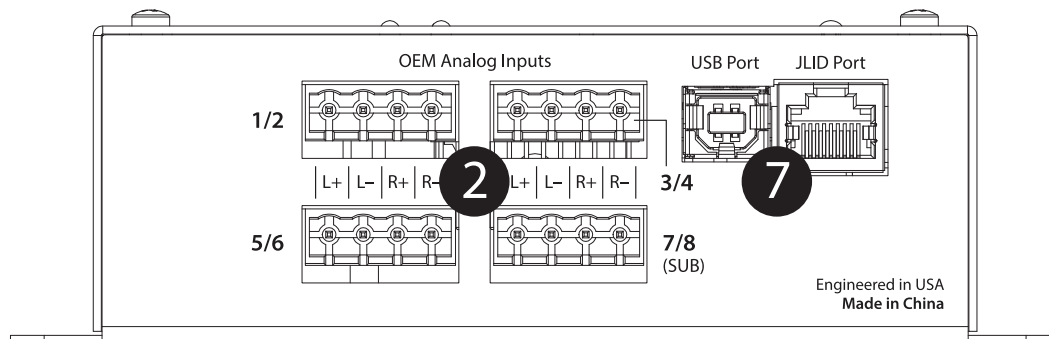
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FIX™ 82 Top View

Input Status 1-6:
Amber:
Power On, No Signal
Green:
Signal Present
Momentary Red:
Input Clipping

Calibration Status:
Flashing Amber:
No Calibration
Amber:
Ready for Cal. Signal
Flashing Green:
Calibration in Progress
Green:
Calibration Successful
Flashing Red:
Calibration Failure
Alt. Green/Amber:
EQ Bypassed

④

L

R

⑥

Bypass EQ
(Press for 1 sec.)

Calibrate
(Hold for 5 sec.)

Turn-on Mode

⑤

Signal / DC Offset / Remote

NOTE: Turn-on Sensing CH 1 Only

OEM Analog Inputs

USB

JLID

Optical
Digital Output

Analog Outputs
Left / Right

Valet In

Remote Out

+12VDC (Switched)

Ground

+12VDC (Battery)

JL AUDIO

FiX™   **82**

OEM Integration DSP

FIX™ 82 Power Connection / Audio Output Panel

Power Connector

Analog Outputs

1

L   R

3

Optical Digital
Output

FIX™ 82 Input Panel

OEM Analog Inputs

USB Port   JLID Port

1/2

L+ | L− | R+ | R−

2

L+ | L− | R+ | R−

3/4

7

5/6

7/8
(SUB)

Engineered in USA
Made in China

1 **Power Connections**

5 **Turn-On Mode**

2 **OEM Input Connections**

6 **Bypass EQ / Calibrate Button**

3 **Output Connections**

7 **JLID Port and DRC-100 Function**

4 **Status LEDs**

① Power Connections

The FiX™ 82 has a 5-pin "Power Connector" jack located next to the "Analog Outputs". The Power Connector jack accepts the removable 5-pin plug and is used to make the connections below.

Plug	Connection	Description
Power Connector	+12VDC (Battery)	Positive (+12V) Power Connection
	Ground	Negative (GND) Ground Connection
	+12VDC (Switched)	Positive (+12V) Turn-On Input
	Remote Out	Positive (+12V) Turn-On Output
	Valet In	Negative (GND) Ground Input (used to activate Valet Mode)

! IMPORTANT

Never make power connections with a "live" wire. Always disconnect the vehicle's negative battery post before making any connections or adjustments to 12V power connections! Failure to make safe, tight, high-integrity connections can result in fire and extensive damage.

1. Disconnect the vehicle's NEGATIVE battery post connection and secure the disconnected cable to prevent accidental reconnection during installation. **This is an essential safety precaution during installation!**
2. **+12VDC (Battery):** Connect to a constant positive (+12V) source. The internal circuitry of this connection is equipped with a self-resetting fuse designed to protect the unit internally. To protect the vehicle and its electrical system from damage, always install an appropriate fuse within 18 inches (45 cm) of the +12V connection point. If this is the only device using the connection point, we recommend using a 1A fuse.
3. **Ground:** Connect to a clean, solid metal grounding point. Ideally, the +12VDC (Battery) and Ground connections should be run to the same distribution points that the amplifiers use for their power and ground connections. **This will minimize the possibility of noise in the system.**
4. **+12VDC (Switched):** This connection, along with the "Turn-on Mode" switch setting, determines the turn-on operation of the FiX™ 82. Connect this to the positive (+12V) remote turn-on output of your source unit, if equipped. If your source unit is not equipped with a dedicated remote turn-on output, refer to the "Turn-on Mode" section for more options.
5. **Remote Out:** This connection provides a positive (+12V) turn-on voltage (100 mA limit) to activate other aftermarket signal processors or amplifiers (similar to an aftermarket head unit's remote turn-on lead). If your equipment requires more than 100 mA total for activation, this connection can be used to trigger a relay to control the equipment in your system.
6. **Valet In:** Connect this to negative Ground to activate Valet Mode. When Valet Mode is active, the FiX™ 82's outputs are attenuated by 15 dB and its JLID status LED will flash slow green. Valet Mode can be used to prevent damage to the audio system from unwanted or unauthorized use when your vehicle is being serviced, valet parked, etc. Due to the covert nature of this function, we recommend concealing the location and/or method of its activation. This can be accomplished with a hidden toggle switch (not supplied) or other disguised mechanism to apply negative ground to this connection.

② OEM Input Connections

The FiX™ 82 accepts up to eight channels (four stereo pairs) of full-range or band-limited output from an OEM audio source (250 mV – 30 V RMS). Connections are made via four plugs located on the side of the unit labeled "OEM Analog Inputs". Each 4-pin plug accepts two channels of audio input, separated in pairs (Left and Right). Engineered to combat induced cable noise, the input architecture is set up in a differential-balanced configuration, making these inputs compatible with virtually any analog audio signal.

Depending on the specific architecture of your OEM system, you will need to locate suitable connection points to provide appropriate input signals to the FiX™ 82, while maintaining OEM functionality. It is recommended to obtain a service manual for the vehicle you are working on to locate and identify the correct OEM wires. Refer to the table below when making connections with your OEM audio source.

! IMPORTANT

It is vital to observe the correct electrical polarity of each channel's input signal. Failure to do so can result in improper calibration, loss of signal and poor performance.

Plug	Connection		Description	
1/2	L+	Ch. 1 input	(+) Positive Left Channel Signal	Ch. 1 is the monitored channel for the auto turn-on circuitry. (Make sure Ch. 1 & 2 inputs contain midrange signals.)
	L–		(–) Negative Left Channel Signal	
	R+	Ch. 2 input	(+) Positive Right Channel Signal	
	R–		(–) Negative Right Channel Signal	
3/4	L+	Ch. 3 input	(+) Positive Left Channel Signal	
	L–		(–) Negative Left Channel Signal	
	R+	Ch. 4 input	(+) Positive Right Channel Signal	
	R–		(–) Negative Right Channel Signal	
5/6	L+	Ch. 5 input	(+) Positive Left Channel Signal	
	L–		(–) Negative Left Channel Signal	
	R+	Ch. 6 input	(+) Positive Right Channel Signal	
	R–		(–) Negative Right Channel Signal	
7/8 (SUB)	L+	Ch. 7 input	(+) Positive Left Channel Signal	If the OEM subwoofer signal is mono (one ch. only), connect it to both the left and right channels, in parallel.
	L–		(–) Negative Left Channel Signal	
	R+	Ch. 8 input	(+) Positive Right Channel Signal	
	R–		(–) Negative Right Channel Signal	

! IMPORTANT

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 performing signal testing with safe test equipment. If you are uncomfortable with reading diagrams or testing signals, please enlist the services of your authorized JL Audio dealer to perform the installation.

2 **OEM Input Connections continued...**

Some factory audio amplifiers employ a load detection circuit that looks for a low-impedance load (expecting a speaker) in order to enable audio output. When a high-impedance load like the input section of the FiX™ 82 is connected to these factory amplifiers, the audio outputs will mute.

After installing the FiX™ 82 and turning on the audio system, if there is no output from the factory amplifier, a FiX-LSA-4 Load-Sensing Adaptor (sold separately) will need to be inserted inline with the FiX™ 82's inputs. The FiX-LSA-4 presents a safe and appropriate load to the factory amplifier and corrects the muting behavior. Refer to the FiX-LSA-4 manual for detailed instructions.

3 **Output Connections**

The FiX™ 82 offers two output types to feed audio signals to your aftermarket system. Choose the output type that is appropriate for the specific equipment of your audio system.

Analog Outputs: Two RCA-type, 4-volt (RMS) line-level output jacks are located next to the "Power Connector" and are labeled for each channel (Left and Right). Analog outputs are compatible with most types of aftermarket signal processors or amplifiers. The level of this output is proportionate to the FiX™ 82's input signal and may also be controlled by the optional DRC-100 Digital Remote Controller (sold separately).

Optical Digital Output: Located next to the "Analog Outputs", this jack provides a digital audio output that is not susceptible to RF interference or noise-generating electrical conditions. This digital output is intended for use with a TwK™ System Tuning DSP (sold separately) or other signal processors or amplifiers that have an optical (Toslink) digital audio input (S/PDIF) jack. The level of this output is proportionate to the FiX™ 82's input signal and is not affected when used with the optional DRC-100 Digital Remote Controller (sold separately). For remote level control, you may use the DRC-200 Digital Remote Controller that is included with the TwK™ System Tuning DSP (sold separately).

4 **Status LEDs**

Located on top of the unit are two sets of LEDs used to report the status of the FiX™ 82. Arranged in left (L) and right (R) pairs, the LEDs are divided by category (Input Status and Calibration Status) and may be referenced during setup, calibration and normal use. Refer to the markings above the LEDs for specific behavior definitions.

5 **Turn-On Mode**

The FiX™ 82 is designed to perform as a turn-on and turn-off controller for the aftermarket components in your system. There are three options to control its method of turn-on, which can be selected via the "Turn-on Mode" switch located on the top of the FiX™ 82. Refer to the table below for detailed info and decide which option is best suited for your specific system.

Setting	Mode	Function	+12VDC (Switched) Connection	Note
Remote	Conventional (Preferred)	Controlled by your source unit for turn-on and turn-off control.	Connect to your source unit's +12V remote turn-on output.	If your source unit does not have a dedicated remote turn-on output, use the DC Offset or Signal setting below.
DC Offset	DC Offset Sensing (Auto)*	Automatically turns on and off by detecting the presence of small DC signal in OEM audio outputs.	Connect to a positive (+12V) source. This can be to the same connection point as the FiX™ 82's +12VDC (Battery) connection or to a positive (+12V) accessory circuit that is controlled by the vehicle's ignition switch.	If your source unit is controlled by a RAP (Retained Accessory Power) circuit, connect the +12VDC (Switched) connection to a positive (+12V) accessory circuit that is controlled by the vehicle's ignition switch. This will maintain the RAP functionality.
Signal	Signal Sensing (Auto)*	Automatically turns on by detecting full-range OEM audio signals and turns off after signal is removed (varies, depending on input signal levels).		
*When using DC Offset or Signal Sensing Modes, make sure Ch. 1 & 2 inputs of the OEM Analog Inputs contain midrange signals.				

6 **Bypass EQ / Calibrate Button**

The Bypass EQ/Calibrate button located on top of the unit is used to initiate the calibration procedure or to deactivate the FiX™ 82's equalization functions. Refer to the following info and table at right for specific instructions.

Bypass EQ: The Bypass EQ mode can be used to defeat the equalization effects of the FiX™ 82, allowing you to hear the raw response of the OEM audio source. Pressing the Bypass EQ button for 1 second will activate the Bypass EQ mode. As a visual confirmation, the Calibration Status LEDs will alternate green/amber. The Bypass EQ mode will remain engaged for 5 minutes or until you press the button again.

Calibrate: Use the calibration procedure to perform signal summing, EQ restoration and time delay correction tasks automatically.
Once all connections are made, follow the steps in the "Calibration Process Chart" to perform the calibration procedure.

! **IMPORTANT**

Ensure that any vehicle chimes or alerts that play through the audio system are not triggered during the calibration process.

Calibration Process Chart

Action	Input Status LEDs	Calibration Status LEDs	Note
1. Turn on source unit and confirm the FiX™ 82 and all aftermarket equipment have turned on.	When the FiX™ 82 is powered, its Input Status LEDs are active and their illumination will vary depending on the condition of the input signal.	Flashing amber (only if it has never been calibrated)	OEM source unit balance, fader and tone controls should be set to zero/flat or "centered". Turn off any source unit EQ or DSP modes.
2. With the OEM source unit volume set at 75%, insert the FiX™ Calibration CD and play Track 01. (Note: Track 01 begins with 20 seconds of silence.)			If your OEM source unit is not equipped with a CD player, you may transfer the calibration track to a portable media player or thumb drive and connect to your source unit's auxiliary input. Make to sure to disable any EQ/DSP modes on your portable media player during calibration.
3. Within 15 seconds of starting Track 01, press and hold the "Calibrate" button for 5 seconds until the "Calibration Status" LEDs turn to steady amber, then release.		Two green flashes	Once the "Calibrate" button is released, the "Calibration Status" LEDs may also light amber, depending on the progress of Track 01. This is normal.
4. After approximately 30 seconds, the "Calibration Status" LEDs will indicate whether a successful calibration was achieved or not.		Steady green	Successful calibration
		1 short red flash*	Error: Calibrated response not flat
		2 short red flashes*	Error: Incomplete audio spectrum
		3 short red flashes*	Error: Delay compensation failure
		4 short red flashes*	Error: No or low input signal level
		*Refer to the "Troubleshooting" section for more info.	

Calibration Reset

If desired, the calibration memory of your FiX™ 82 may be reset to an original "factory" state. This may be useful during troubleshooting or when transferring equipment from one vehicle to another. **To reset the calibration memory of your FiX™ 82:** Press and hold the "Calibrate" button for 15 seconds until the "Calibration Status" LEDs begin to alternate green, then release the button. The "Calibration Status" LEDs will cycle through amber-red-green colors x 3 times, then flash amber to confirm the reset status.

7 JLID Port and DRC-100 Function (optional)

The JLID port is designed to allow connection of the optional DRC-100 Digital Remote Controller (sold separately). Connecting a DRC-100 to the FiX™ 82 will add remote Master Volume Control, Handsfree Optimization and LED Status Reporting features to the FiX™ 82. Since these are driver-controlled functions, we recommend mounting the DRC-100 within easy reach of the driver, on the center console or dashboard of the vehicle. (Refer to the installation instructions included with the DRC-100 for detailed info.)

Master Volume Control: When used as a Master Volume Control, the DRC-100 maintains linear frequency response at all volume levels and delivers the best signal-to-noise performance for your audio system. To use, leave the volume control of your OEM source unit at the specific volume position that was used during calibration. From now on, you will use the DRC-100 to control your audio system volume, leaving the OEM volume control at the calibration level. You may continue to use the OEM source unit's tone, balance and fader controls, if desired.

Handsfree Optimization: The FiX™ 82 includes a Handsfree Mode designed to optimize the audio clarity of your vehicle's handsfree telephony system, if equipped. When Handsfree Mode is activated, the FiX™ 82's time correction function is disabled and a 100 Hz high-pass filter is applied to the audio outputs. Press the DRC-100 control knob once to activate Handsfree Mode. The DRC-100 status LED and the JLID LED on the FiX™ 82 will both illuminate amber to signify that Handsfree Mode is activated. When the call is finished, press the DRC-100 control knob again to deactivate Handsfree Mode, returning the color of the LEDs back to green.

LED Status Reporting: The DRC-100's multi-color LED will illuminate to report the FiX™ 82's overall condition to the driver. Refer to the table below for the color and meaning of the LED's behavior.

LED Color	Status/Condition
Constant green	Normal operation
Slow green flash	Valet mode is active
Constant amber	Handsfree mode is active
Flashing or constant red	Clipped input signal detected*
	*Reduce output level of the source unit

Troubleshooting

Problem	Possible Cause	Possible Solution
FiX doesn't turn on	Faulty fuse	Remove fuse and check with continuity meter. Replace if necessary.
	Poor connection integrity	Check "Ground" and both "+12VDC" connections for pinched wires; ensure tight connections.
	Insufficient "+12VDC (Switched)" input	Make sure there is a sufficient +12V supply at the "+12VDC (Switched)" connection; if not, a relay may be required.
	Incorrect auto turn-on mode settings	Verify "+12VDC (Switched)" and input signal connections; refer to "Turn-On Mode" section.
Amps or processors not turning on	Poor connection integrity	Check "Remote Out" connections for pinched wires; ensure tight connections.
Little or no bass response	Handsfree mode is engaged	Deactivate Handsfree mode using DRC-100, if equipped.
	Reversed polarity at one or more inputs	Double-check wiring of "OEM Analog Inputs".
Low or no volume	OEM source unit/master volume set too low	Increase OEM source unit volume; increase DRC-100 master volume control, if equipped.
Calibration Error	**Possible Cause**	**Possible Solution Before Recalibration Attempt**
1 short red flash: Calibrated response not flat	OEM source unit tone/EQ controls not set flat	Verify OEM source unit tone controls are set to zero/flat or "centered" and turn off any source unit EQ or DSP modes.
	Reversed polarity at one or more inputs	Double-check wiring of "OEM Analog Inputs".
2 short red flashes: Incomplete audio spectrum	Disconnected or incorrect input connections in multi-way system	Connect input plugs, 1 pair at a time, and check for green "Input Status" LEDs when playing Calibration Track 01.
		Use RTA to view output spectrum to identify response gap for correction. Attempt to "Fill the gap" by substituting a different L/R channel pair and recalibrate.
3 short red flashes: Delay compensation failure	Poor connection integrity	Double-check "OEM Analog Input" plugs for open or loose connections.
	Elevated OEM system noise floor	Disconnect any redundant input plugs already carrying audio content available via other input plugs and recalibrate.
		Recalibrate at a lower (or higher) OEM source unit volume setting.
4 short red flashes: No/low input signal level	OEM source unit volume set too low	Increase OEM source unit volume and recalibrate.
	Valet mode is engaged	Ensure Valet mode is not active.
	Too low or missing signal from OEM outputs	Make sure "Input Status" LEDs are green during audio playback. With multiple inputs, insert input connectors one plug at a time (input channels 1/2, 3/4, 5/6, 7/8) while playing a calibration test signal and confirm both L & R "Status LEDs" are green during playback.
	Verify the OEM outputs are "on". The OEM source unit may need to "see" a speaker load to turn the amp "on".	May need to install a FiX-LSA-4 (sold separately) to activate OEM amp outputs.

Specifications

Electrical Specifications	
Power Supply Type	Regulated DC-DC SMPS
Operating Voltage	10 – 16V DC
Standby Mode Current Draw	< 1.5 mA
Operating Current Draw	0.7 A at 13.8V
Recommended Fuse Value	1 A
Recommended Fuse Type	Fast-Acting, ATO/ATC or similar
OEM Input Section	
Number of Input Channels	Eight
Input Type	Differential-Balanced
Input Range	250 mV – 30V RMS
Input Level Setting	Fully Automatic
Input "Signal Present" Threshold	10 mV RMS
Digital Specifications	
Processor	Intersil® D2Audio DAE-6
Bit Depth / Sample Rate	24 bit / 48 kHz
Number of EQ Bands	30 x 2 channels
EQ Resolution	1/3 octave (25Hz – 20kHz)
Output Section	
Number of Output Channels	Two
Output Type	Unbalanced, via RCA Jacks
	Optical digital (S/PDIF)
Maximum Output Voltage	4V RMS
Output Impedance	450 ohms
Signal to Noise Ratio	96dB (A-Weighted, referred to 4V RMS output)
THD + Noise	0.02% at rated output (20Hz – 20kHz)
Dimensions	
L x W x H	5.19 in. x 4.29 in. x 1.85 in. (132 mm x 109 mm x 47 mm)

Limited Warranty – Electronics (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 Electronics 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.

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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.

</div>

DRC-200: Installation Instructions

Digital Remote Controller For JL Audio Products
with JLid™ Compatibility

Connect to any JLid™-compatible device with JLid™ Port

JLiD Port

CONTROL
KNOB

INDICATOR
LED

HARNESS
JACK
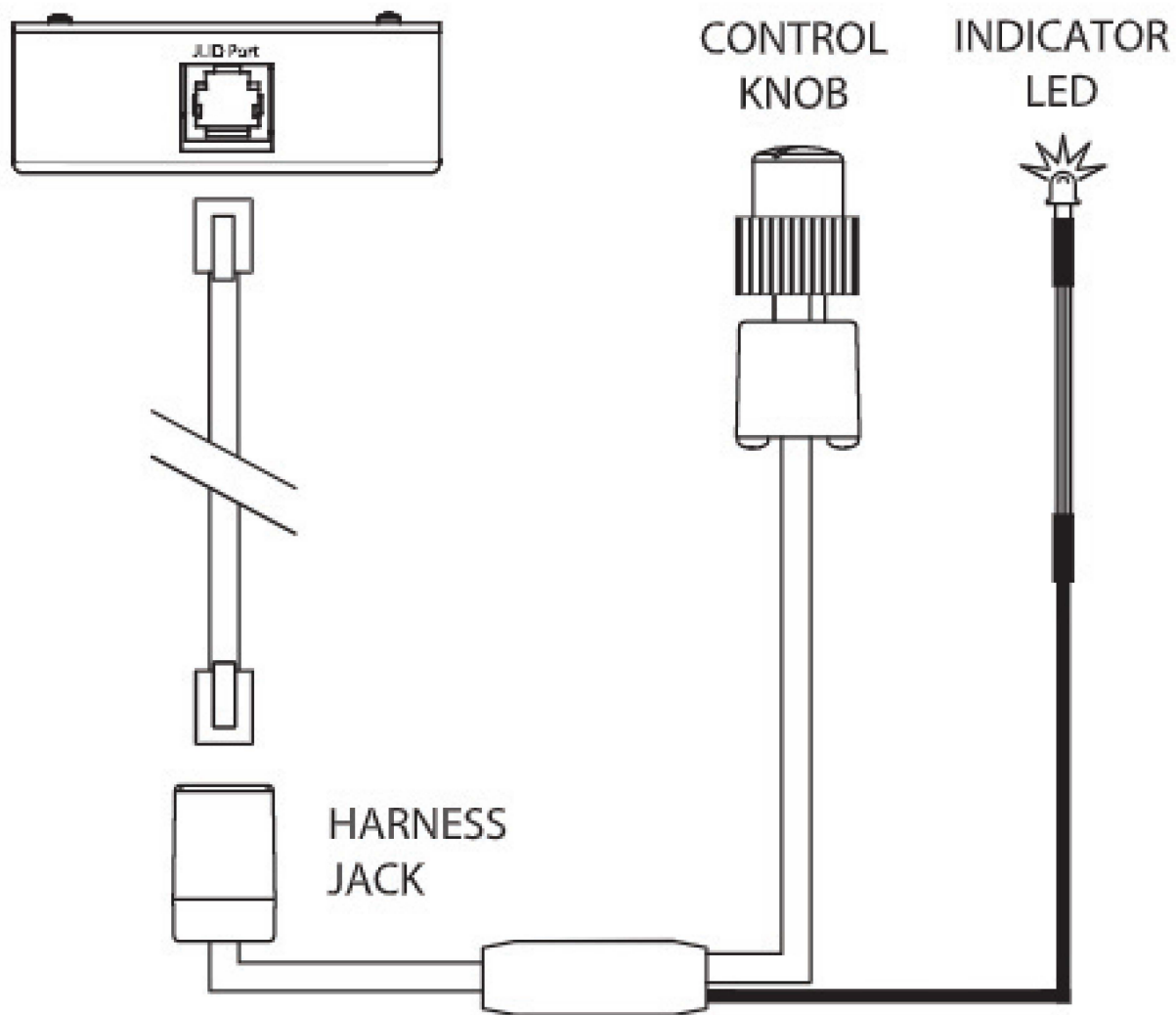
This product will not work with JL Audio amplifiers with "Remote Level Control" or "Remote Bass Control Ports".

Control Knob Installation:

1. Find an appropriate location to mount the Control Knob assembly on the dash or console of the vehicle. You will need access to the rear of the mounting panel for installation.

   The area will require the following minimum and maximum dimensions:
   Area Behind Panel: 1-1/8" square x 3/4" deep
   (28mm x 28mm x 19mm)
   Mounting Panel Thickness: 1/8 inch (3.2mm) maximum

2. Drill a 3/8" (9.5mm) hole in the center of the mounting area.

3. Remove the knobs (inner, then outer) from the controller's shaft. Do NOT remove the preinstalled nut and washer.

4. From behind, insert the controller's shaft through the drilled hole and push forward.

5. Place a supplied washer, then nut on the front of the shaft and tighten using an 11 mm wrench or deep-well socket. Take care not to over-tighten this nut, especially when mounting to a plastic panel.

6. Turn each control fully counter-clockwise and place the knobs on the shaft (outer, then inner) with their markers pointing at 7:00. The knobs should sit close to the panel, but still permit the button to be pushed.

7. Route the control cable to the JLid™-equipped device and connect one end to the jack labeled "JLid™ Port". Connect the other end to the harness jack on the DRC-200 controller.

Status LED Installation:

1. Drill an 8mm hole in the center of the mounting area.

2. From behind, insert the status LED (without its mounting grommet) through the drilled hole.

3. Snap the mounting grommet over the LED body and then insert it into the hole. Press until flush with the surface.

4. Refer to the JLid™ product's Owner's Manual for the specifics of control operation.

Note: Should a replacement cable be needed, you may use any standard, 8-conductor network cable with RJ45 connectors. The arrangement of the conductors at each connector end must be a "straight through" configuration (pin 1 to pin 1, pin 2 to pin 2, etc.).

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

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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.
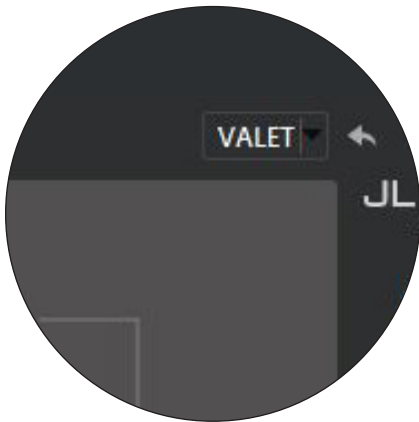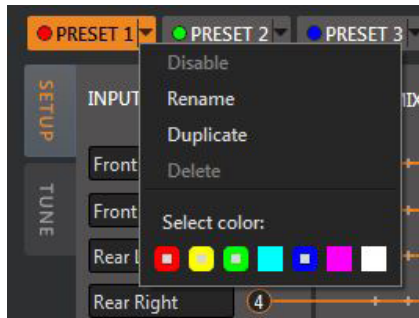
NEW PROJECT CONFIGURATION

JL AUDIO | TUN.

SETUP TAB CONFIGURATION

SETUP

TUNE

SETUP

PRESET 1 ● PRESET 2 ● PRESET 3 ● PRESET 4 ●   +   VALET

INPUTS ≡   5

Front Left ①
Front Right ②
Rear Left ③
Rear Right ④
⑤ ⑥ ⑦ ⑧

INPUT MIXER   6
TO EQUALIZER 2   TO EQUALIZER 1

0 dB
0 dB
0 dB
0 dB
0 dB
0 dB
0 dB
0 dB
0.0 dB   0.0 dB

PRE-EQ LEVEL TRIM   0 dB
PRE-EQ LEVEL TRIM   0 dB

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TüN
ADVANCED
Simulation
None
4

EQUALIZERS   7   6 5 4 3 2 1

4

ROUTER   8   CROSSOVERS   DRC SET   9   OUTPUTS ≡   10

Ⓐ Front Left Tweeter
Ⓑ Front Right Tweeter
Ⓒ Front Left Midrange
Ⓓ Front Right Midrange
Ⓔ Rear Left Channel
Ⓕ Rear Right Channel
Ⓖ Center Channel
Ⓗ Subwoofer

A B C D E F G H

TUNE TAB CONFIGURATION

SETUP

TUNE

TUNE

PRESET 1 ● PRESET 2 ● PRESET 3 ● PRESET 4 ●   +   VALET

EQUALIZERS   EQ 1/2   11

ALL RESET   ALL OFF
GAIN:
31.3Hz   0 dB
62.5Hz   -3.7 dB
125Hz   -4.3 dB
250Hz   0 dB
500Hz   -2 dB
1kHz   -5 dB
2kHz   -1.7 dB
4kHz   0 dB
8kHz   0 dB
16kHz   0 dB

+6 +3 0 -3 -6 -9 -12
31.25 62.5 125 250 500 1k 2k 4k 8k 16k

EQ 3/4

+6 +3 0 -3 -6 -9 -12
31.25 62.5 125 250 500 1k 2k 4k 8k 16k

6 5 4 3 2 1

JL AUDIO
TüN
ADVANCED
Simulation
None

CROSSOVERS ≡   12   DELAY / POLARITY   13   OUTPUTS   14

	High-Pass Filter			Low-Pass Filter		
	5,000 Hz	24 dB L-R		20,000 Hz	Off	
	5,000 Hz	24 dB L-R		20,000 Hz	Off	
	80 Hz	24 dB L-R		5,000 Hz	24 dB L-R	
	80 Hz	24 dB L-R		5,000 Hz	24 dB L-R	
	100 Hz	24 dB L-R		20,000 Hz	Off	
	100 Hz	24 dB L-R		20,000 Hz	Off	
	100 Hz	24 dB L-R		5,000 Hz	24 dB L-R	
	20 Hz	Off		80 Hz	24 dB L-R	

DELAY / POLARITY
	Speaker Distance	Additional Delay	Total Delay	Polarity
	23.91 in	0 ms	3.04 ms	
	48.09 in	0 ms	1.25 ms	
	23.91 in	0 ms	3.04 ms	
	48.09 in	0 ms	1.25 ms	
	52.03 in	1.04 ms	2.00 ms	
	61.88 in	1.04 ms	1.27 ms	
	30.09 in	0 ms	2.58 ms	
	64.97 in	0 ms	0.00 ms	

OUTPUTS
	Level Trim		
	0 dB	Ⓐ	Front Left Tweeter
	0 dB	Ⓑ	Front Right Tweeter
	0 dB	Ⓒ	Front Left Midrange
	0 dB	Ⓓ	Front Right Midrange
	-3 dB	Ⓔ	Rear Left Channel
	-3 dB	Ⓕ	Rear Right Channel
	-1.5 dB	Ⓖ	Center Channel
	0 dB	Ⓗ	Subwoofer

A B C D E F G H

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.
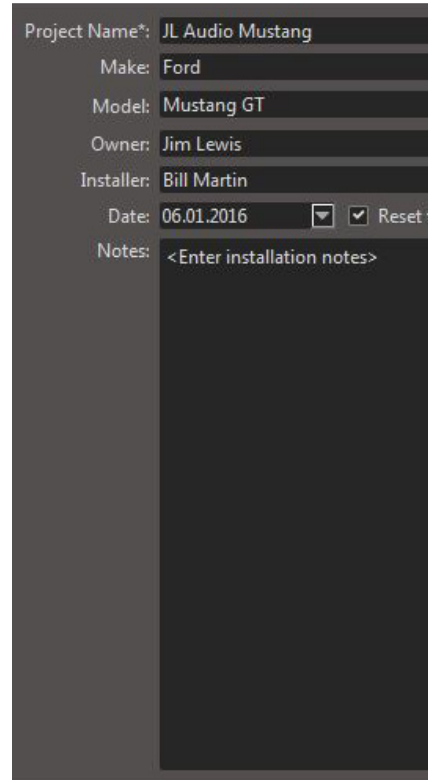
Advanced: offers a full feature set with restrained safeguards to prevent accidental damage to the audio system. This is ideal for experienced DSP users looking to get full advantage of the TwK's power, while avoiding certain pitfalls that can result in poor performance or speaker damage. You will be 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.

|	
Project Name*:	JL Audio Mustang
Make:	Ford
Model:	Mustang GT
Owner:	Jim Lewis
Installer:	Bill Martin
Date:	06.01.2016 ▼ ✓ Reset
Notes:	\<Enter installation notes\>

⚠ IMPORTANT

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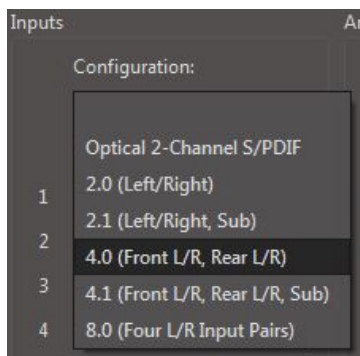
2 **Input Configuration**: Select from a list of common input signal configurations. The TüN™ software will automatically name the Inputs and configure the Input Mixer. These can be edited later, if needed.

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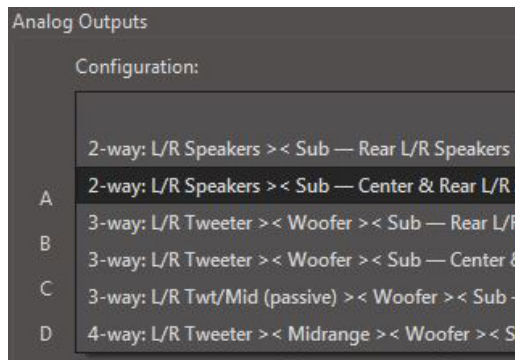
If you don't see a configuration that matches your system design, you can choose a similar one and then edit it in the SETUP tab. In the Expert Project Level you can also select a "Blank" setup to enter everything manually in the SETUP tab.

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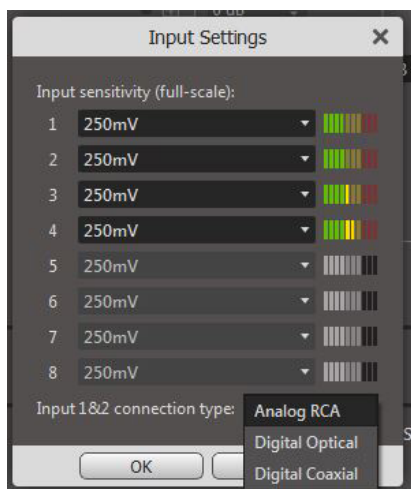
> **Input Settings**: click on the "Menu" ☰ to access the Input Settings Menu (TwK™ 88 only)

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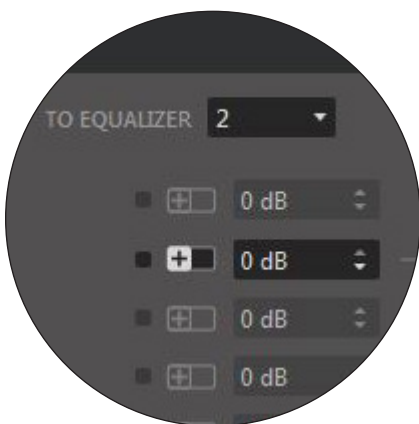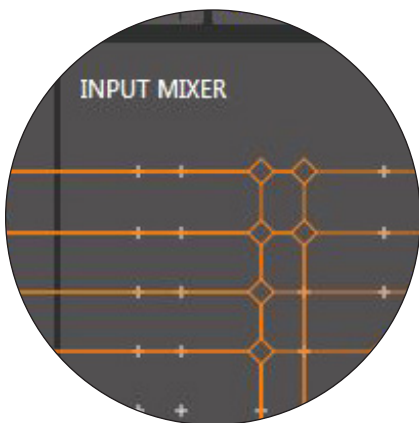
the rear speakers. With only two EQ Banks, you can tune the entire eight-channel system.

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.
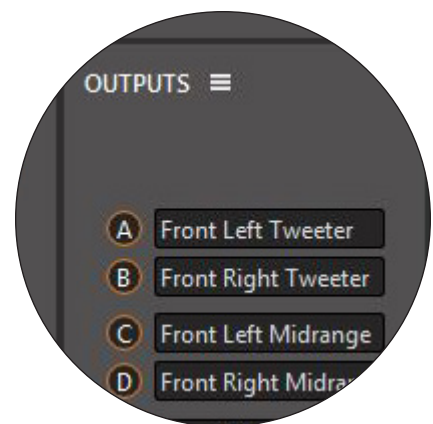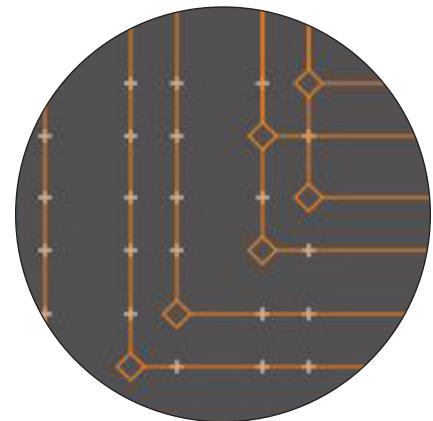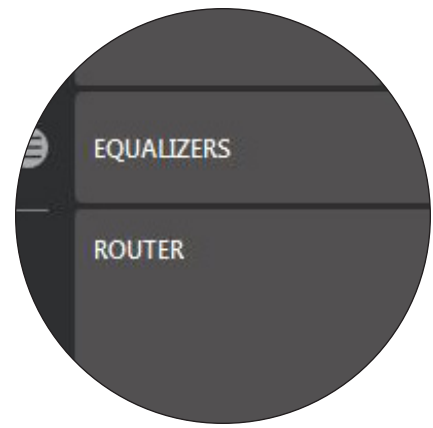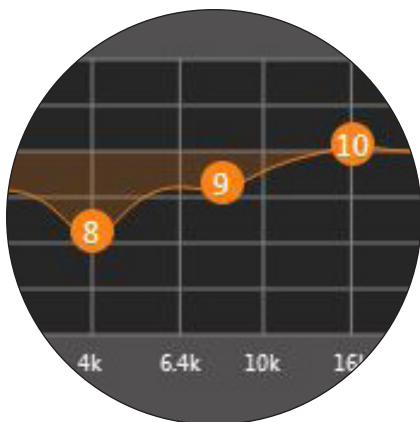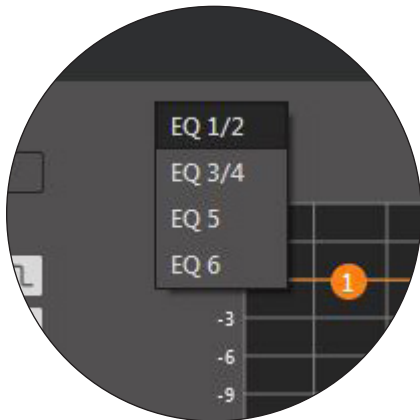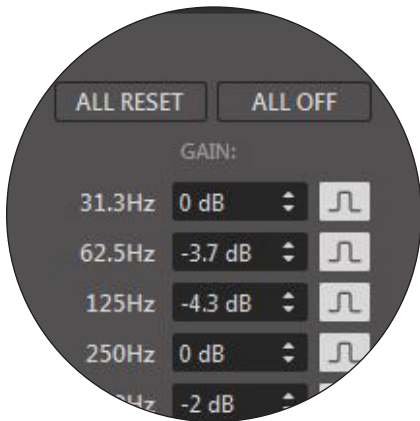
TUNE TAB

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.

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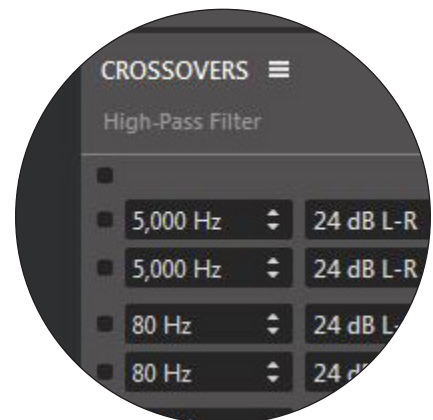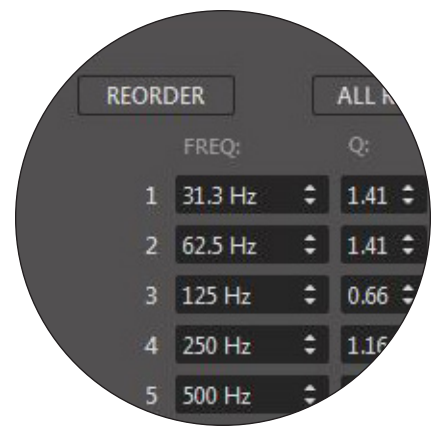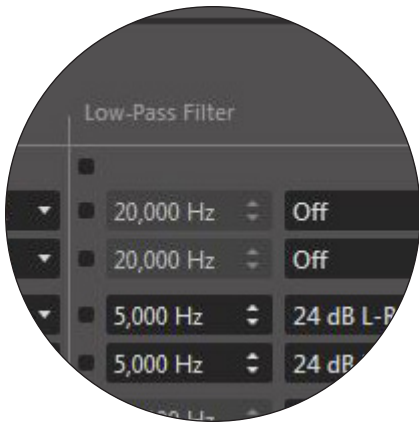
Passband: the range of frequencies uniformly passed by a filter. Defined by two frequencies.

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
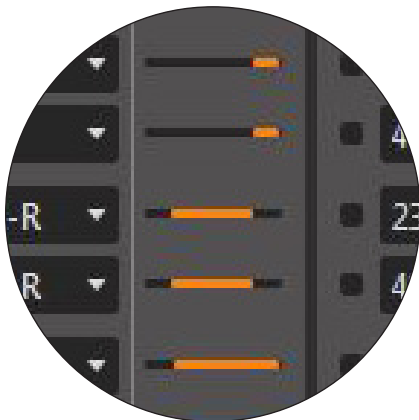
Passband Bar display: shows, at a glance, the approximate passband (bandwidth) of the signal on each channel, based on the crossover frequencies that have been selected. Clicking on the Passband Bar Display will open a window with a large, detailed view of the crossover filter's response. Once this window 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.
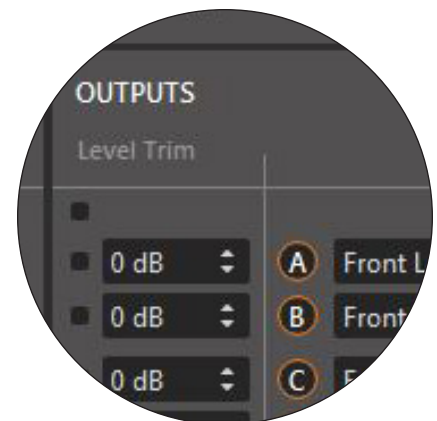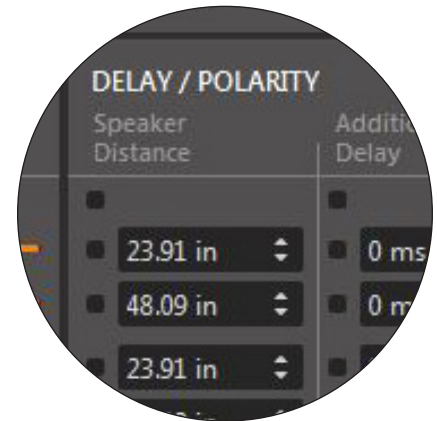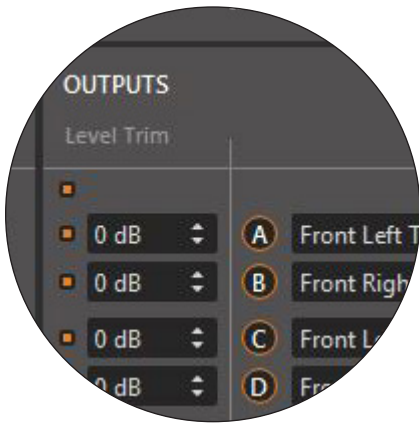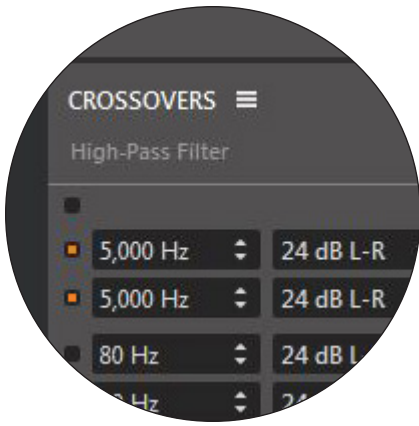
Control Linking:
The small selection boxes ▪ that correspond to each channel in various control panels allow you to temporarily link ▪ the controls for multiple channels, for simultaneous adjustment. The selection box at the top of the panel selects all channels with one click.

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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