

HOWTO RFTECH: AUDIO SIGNAL INTEGRATION

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When installing a Rockford Fosgate amplified system in your vehicle, on your motorcycle, boat, ATV (All Terrain Vehicle), or UTV (Utility Task Vehicle), integration is usually the first task to handle. Whether using a factory or aftermarket radio, you may encounter a wide range of signal types used to derive the source audio. Learning how to implement these various configurations will make the difference between a good sounding system and a FANATIC sounding system.

In order to optimize integrity of the audio signal, you will need to determine the best method to acquire it. In a typical audio system, you may encounter a Low Level, an Internally Amplified High Level, or an Externally Amplified High Level signal.

NOTE: The topics discussed in this article require advanced installation knowledge and is intended to explain how Rockford Fosgate products “manage” these conditions through various feature implementations. Therefore, we suggest having a local Authorized Rockford Fosgate Dealer perform your installation.

LOW LEVEL (RCA)

Low-level audio is typically classified as an “un-amplified” signal – usually 4 Volts and lower – transmitted through RCA cables (Fig. 1). There are premium source units on the market capable of higher output voltages on its RCA output jacks than specified above, but these are a special class of radio.

A good quality RCA audio source should have a voltage rating around 1-2 Volts and a low impedance. The voltage is the “strength” of the signal and the “impedance” relates to signal integrity once the RCA is plugged into the amplifier. Low source impedance allows more than one amplifier to be connected to the source unit. SPL systems having a large amplifier array should use a line driver or choose a source unit with the lowest impedance possible.

If the source unit has a low quality RCA audio source (less than 100mV and/or higher than 500-Ohms impedance), it may be beneficial to use a line driver like the RF-BLD to boost the signal.

Many radios having RCA outputs utilize a remote turn-on (switched +12V) wire used to trigger an amplifier. This wire should be extended to your Rockford Fosgate amp to turn it on/off.



Fig. 1 - Radios with RCA jacks provide a low level signal for amplifiers.

HIGH LEVEL (SPEAKER LINE)

High-level audio is typically classified as an “amplified” signal – usually 4 Volts and higher – transmitted through a factory harness or speaker line outputs (Fig. 2). This type of signal uses a “built-in” amplifier housed within the source unit and is usually boosted up to 12 Volts.

The most common implementation uses a high-to-low converter that transforms the High Level (speaker line) outputs into RCA jacks. Current Prime, Punch and Punch “Class-BR” (boosted rail) amplifiers have this type of converter built-in and can directly handle high-level inputs.

If adding only a subwoofer amplifier to the system, your installer will “tap” into the front speakers, enabling constant bass regardless of rear fader position. If adding a multi-channel amp, both

front and speaker lines should be tapped to retain full fader control.

If no switched +12V wire can be found to turn the amplifier on/off, installers can probe the speaker line output for a “DC Offset” signal. This can be verified by using a Digital Voltmeter set to “DC” (clamp the red lead to the “+” output and the black lead to the “-” output) and monitor for +6 Volts. If using a newer Punch amplifier (with C.L.E.A.N. technology) or Punch “Class-BR” amplifier, it can be turned on/off automatically using this DC Offset trigger using high level inputs. The RF-BLD and 3SIXTY.3 are also good candidates because they can accept high-level inputs and turn-on/off by sensing a DC Offset signal. In this mode, the RF-BLD and 3SIXTY.3 have a special “remote out” function allowing additional amplifiers to be automatically turned on/off.

HIGH LEVEL (OEM AMPLIFIED)

OEM Amplified High-level audio is typically classified as an “externally amplified” signal – usually 8 Volts to 20 Volts – transmitted through a factory harness. This type of signal uses an “external” amplifier housed behind the dash, kick panel, door panel, rear deck, or under a seat (Fig. 3).

Sometimes this type of system is configured using discrete channels, where each channel has a dedicated frequency bandwidth sent from the radio to the amplifier/speaker. For example, a radio could pass only 4kHz-20kHz down the line to the tweeter/amp, another could pass 400Hz-4kHz to the midrange/amp, and a third could pass 20Hz-400Hz to the subwoofer/amp.

Systems having a discrete configuration require multiple “tap-in” sources in order to regenerate a full bandwidth spectrum. This can be a cumbersome task while trying to maintain front/rear fader control. However, using a summing device - like the Rockford Fosgate 3SIXTY.3 - is perfect for collecting multiple sources and summing them to create a full-range output with fader control. Keep in mind, you must be able to “assemble” a full-range signal for both front and rear channels independently to maintain fader control.

For installers, deciding whether to “tap” into the factory harness before or after the amplifier is challenging. Fig. 4 illustrates the possible locations of external amplifiers in various autos (location varies by year/make/model). Obtaining a signal prior to the OEM amplifier is typically easier, but often there is no +6V DC Offset signal needed to turn on/off an external amplifier with auto turn-on functionality. Obtaining the signal after an OEM amplifier usually provides best results, but a consequence is excessively high signal voltage that can clip the input circuit of an amp. The solution is using an RF-BLD, the direct high-level input of a newer Punch amplifier (with C.L.E.A.N.), or a Punch Class-BR amplifier.

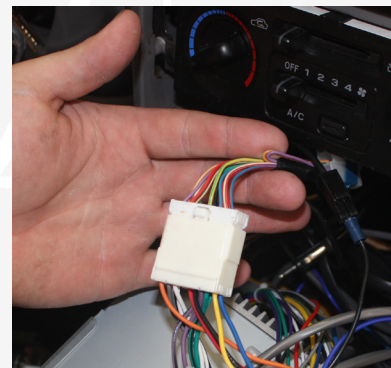


Fig. 2 - Radios with high-level outputs have speaker wires or run through a factory wiring harness.



Fig. 3 - Premium factory installed systems use small external amplifiers.

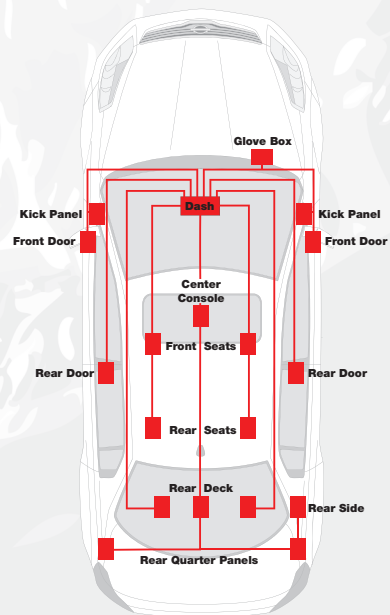


Fig. 4 - Possible locations of factory amplifiers.

ROCKFORD FOSGATE SOLUTIONS

There are a variety of Rockford Fosgate solutions designed to specifically address installation conditions. These products may share features, and can be used to address multiple applications.



The RF-HLC2 is a 2-channel high-to-low converter that transforms speaker line outputs into RCA jacks.



The RF-HLC4 is a 4-channel high-to-low converter that transforms speaker line outputs into RCA jacks and can retain fader control.



The RFI2SW (male) and RFIF2SW (female) are 2-channel interfaces that can directly feed speaker line outputs into amplifiers that can accept a high-level input signal on their RCA jacks. The RF-BLD, newer Punch (with C.L.E.A.N.) and Punch Class-BR amplifiers support this function.



The RF-BLD is a balanced line driver that can boost low audio signals, drive a large array of amplifiers, and convert single ended into balanced signals to eliminate noise. If you want to run an entire system using just a portable MP3 player (no source unit), the BLD is a great solution that can boost low signals (many MP3 players produce less than 1.5V on the 1/8" headphone jack) enough to properly drive any amplifier.



The 3SIXTY.3 interactive signal processor is a line-driver, 248 band parametric equalizer, crossover and source selector built into one unit. This unit is great when summing multiple sources to create a full-range signal while retaining fader control as shown in Fig. 5. The 3SIXTY.3 also has an AUX input to connect an iPod®, iPhone® or other media player directly to the audio system.

PUTTING IT ALL TOGETHER

As you can see, there are several options for obtaining an audio signal for proper integration of your premium Rockford Fosgate system. However, it isn't always straight forward, and an installer may incorporate any one of the additional Rockford Fosgate products shown above to optimize signal integrity.

As vehicle electrical systems increase in complexity, you'll be certain Rockford Fosgate's engineering team continues

its research and development to keep up with the pace of technology. Whether your goal is building an SPL monster, or simply adding an amp and subwoofer to an OEM system, a solid signal will make it sound good enough for any Car Audio Fanatic to be proud!



Fig. 5 - 3SIXTY.3 can sum multiple sources to create a full bandwidth output complete with fader control.