



## **What is the Kicker F.I.T. Input Circuit?**

### **F.I.T. input:**

Kicker uses a special circuit for the audio input to our amplifiers called Failsafe Integration Technology or **(F.I.T.)** for short. This highly specialized input circuitry is designed to make the installation of KICKER amplifiers very simple and noise-free. F.I.T. is optimized to work with almost any audio source, including an aftermarket head unit, factory head unit or even a headphone output jack from a portable device.

### **Disadvantages of Traditional Line Output Converters:**

Line Output Converters (or “LOC’s”), were originally designed over 30 years ago. They were created for several reasons - the first being isolation. Most amplifiers have a single-ended input. This means that all the RCA shields are connected together and then connected to the amplifier’s ground path. With single-ended inputs, you have now connected your audio signal to the vehicle’s chassis ground which can be a possible source of engine noise. This noise can be very difficult to find and eliminate.

Most LOC’s share a common flaw. They are designed to reduce speaker output voltage to an acceptable RCA level for most aftermarket amplifiers. A lower input signal voltage requires the amplifier to apply more amplification to this signal and any noise or distortion accompanying the input signal. Simultaneously, it will amplify noise as well as distortion. This creates an unnecessarily lower overall sound quality.

Transformer-based LOC’s step the voltage down to an acceptable level for most amplifiers. As power from the source increases, the frequency response narrows – causing significant loss in audio quality.

Resistor-based LOC’s dissipate source power as heat. The down side to this type of inexpensive LOC is an excess of heat. In extreme cases, it can melt the plastic housing they are often enclosed in – which can lead to potential vehicle damage.

### **F.I.T. to the Rescue!**

F.I.T. was developed to solve the issues that LOCs would create. Found in almost every KICKER amplifier, F.I.T. inputs will accept up to a 10-Volt signal without clipping. This eliminates

the need to attenuate the high-level signals from your source unit's speaker outputs, making traditional LOC's unnecessary. With a higher input voltage, the amplifier does not need to work as hard to achieve the desired output levels. This will increase overall sound quality. F.I.T. inputs also eliminate the need for a LOC to isolate the speaker outputs of your source unit from ground. This will allow you to connect your speaker outputs directly to the RCA inputs of the KICKER amplifier.

## **But Wait - There's More!**

The last issue F.I.T. inputs resolves is how to turn an amplifier on when using it with a factory source unit. The most popular way to trigger an amplifier to turn on is with a switched 12-volt signal. This becomes a problem when you are installing an amplifier into a newer vehicles (such as CAN bus-controlled vehicles), since many of them do not offer a traditional switched 12-volt source.

All KICKER amplifiers equipped with F.I.T./F.I.T.2/F.I.T.+ inputs have a circuit that will sense DC voltage on the RCA inputs of the amplifier. The vast majority of source units have a constant DC voltage that is unaffected by changes in volume on the speaker wires known as DC offset. By using the speaker outputs of your source unit as input signal, the circuit detects this DC offset, turning the amplifier on with the source unit. This eliminates the need for you run a remote turn on wire to your amplifier, from your source unit. This makes searching through diagrams or on the internet for a switch 12-volt source unnecessary - nor will you need to install a CAN bus adapter to provide a switched 12-volt signal.

Some KICKER amplifiers allow you to select what type of turn-on signal you prefer, via a switch located on the amplifier's end panel (12V/DC/AUDIO). 12V is for traditional remote input, DC is for DC offset, and AUDIO is for audio sensing. If there is no switch, the amplifier will automatically attempt to use DC offset first. If there is no DC offset present, then you must supply a 12-volt switched source to turn on the amplifier. When using the DC offset or audio sensing methods (F.I.T./F.I.T.2 only), the remote input terminal of the amplifier that would normally receive a 12-volt signal to turn the amplifier on, now sends a switched 12-volt signal out to turn on other electronics that do not have DC offset sensing. This can be very handy if you have other audio gear that does not have DC offset sensing.

## **F.I.T. 2**

Some factory source units have lowered their DC offset level from 5-7 volts to much lower levels. KICKER designed the F.I.T. 2 to work with a lowered DC offset turn on threshold - from 4.5 volts to 2.5 volts - ensuring the DC offset in newer vehicles reliably turns the amplifier on.

Some of the new "smart" radios are now incorporating protection circuitry that will either throw a fault code to the vehicle's onboard computer or may even shut off output from one or more channels. They need some form of load or speaker on the outputs to work properly. The F.I.T.2 inputs have a "radio detect switch" that will present the factory, smart head units a

resistive load to simulate a speaker being connected. This allows the head unit to operate normally. **This switch should only be used on factory head units if no output is heard from the amplifier or if the amplifier seems to cut out at moderate or high volumes.**

Until very recently, all powered outputs were driven off either the positive speaker lead or both the positive and negative leads. In some newer cars, manufacturers have changed how they send signal to the speakers. Some of the newer “smart” factory radios now only power the speaker from the negative speaker lead; leaving the positive lead to complete the circuit and carry DC offset voltage. F.I.T.2 now incorporates a half wave rectifier to compensate for this new type of output. It will maintain an acceptable level of DC offset to keep the amplifier turned on.

### **F.I.T. + (2019)**

F.I.T.+ has a few changes to handle some new challenges that installers are facing today. Many newer OEM systems have an output voltage exceeding the 10-volt limit of F.I.T. and F.I.T.2. F.I.T.+ accepts up to 40 volts of input without clipping to ensure the user is not overdriving the input stage of the amplifier and introducing distortion.

The only drawback is the increased input capability has made it impractical to also include the load resistors associated with the radio detect switch (see F.I.T.2 description above). The high input voltage would require larger high-power resistors that would add substantial heat buildup inside the amplifier. Should you have a source unit that requires a load at this higher voltage, you will also need to add a **KISLOAD** to the output of the OEM source unit before it sends signal to the F.I.T.+ -equipped KICKER amplifier.

F.I.T.+ equipped amplifiers with RCA outputs will pass the same signal and DC offset voltage out of the RCA as they receive. Since the DC offset voltage eliminates the need to run a separate 12-volt switched wire to any additional amplifiers in the system, no additional 12-volt turn-on source is needed (if those amplifiers can use DC offset as a turn-on method). **NOTE:** When using a F.I.T.+ amplifier with DC offset selected as the turn-on method, the 12v switched output from the amplifier’s remote connection will be disabled.

### **F.I.T. vs. Differential Inputs:**

Some car audio amps have a differential inputs as opposed to a single ended input. This means that there is a buffer on the shield of the RCA inputs to isolate it from chassis ground. This gives you increased noise rejection over a single ended input, but it is still not the best option. F.I.T., F.I.T.2, and F.I.T.+ all have an additional buffer circuit on the positive connection of the center pin of the RCA input, giving the F.I.T. input twice the noise isolation! It is by far the best for noise suppression and currently the most noise-free amplifier you can get.

## Differences between the F.I.T. inputs at a glance:

### F.I.T.

- 10-Volt input signal capability
- Signal isolation from chassis ground
- 4.5-Volt DC offset threshold
- Switched 12-volt, DC offset, and audio sense turn on options (if equipped)
- Switched 12-volt output from remote input when using DC offset or signal sense auto turn-on



### F.I.T.2

- 10-Volt input signal capability
- Signal isolation from chassis ground
- 2.5-Volt DC offset threshold
- Switched 12-volt, DC offset, and audio sense turn on options (if equipped)
- Radio detect switch with 68Ω load resistors
- Half wave rectifier for radios driving negative speaker lead with signal
- Switched 12-volt output from remote input when using DC offset or signal sense auto turn-on



### F.I.T +

- 40-Volt signal input capability
- Signal isolation from chassis ground
- 2.5-Volt DC offset threshold
- Switched 12 volt and DC offset turn on options
- Half wave rectifier for radios driving negative speaker lead with signal
- No load resistors
- No switched 12-volt output from remote connection on amplifier

