

KEY200.4 Smart 4-Ch. Amplifier (auto-EQ/processor)

WHITE PAPER

Features:

- 50 watts x 4 at 4Ω.
- Compatible with start/stop vehicles.
- Two-stage power supply for extremely efficient and cool operation.
- Fully automatic DSP setup for EQ, level, and time alignment.
- User-selectable, high-pass crossovers for amp 1 and amp 2 independently.
- User-selectable, bi-amp mode for component sets.
- User-selectable KICKER EQ circuit.
- User-selectable compression circuit.
- 12 volt or auto turn-on with DC offset sensing.
- Included set-up microphone and button.

The KEY200.4 amplifier is a very unique DSP amplifier. It is capable of measuring the audio output of a 4-speaker, full-range system or a component set consisting of two tweeters and two midranges to determine if any tone settings, level settings, and time-delay settings could be improved upon for better tonal balance and enhanced imaging. This process is accomplished by analyzing the audio output of the existing audio system with the included microphone while playing uncompressed pink noise from the source unit. It takes the analog signal it has measured and converts it to the digital domain where can be fine-tuned (patent pending) before it is converted back to analog and amplified.

To run the setup procedure, the amplifier must be completely connected, DIP switches should be in the proper configuration for that particular set up, and all of the KEY's output channels tested for output at low levels. All speakers not connected to the KEY amplifier must be disconnected or turned off before test begins. The microphone should be temporarily mounted on top of the driver's head rest with the microphone pointing straight up toward the headliner of the vehicle. Turn on the existing stereo system and make sure the KEY200.4 is also powered on. The source unit in the vehicle should be playing an uncompressed pink noise recording at a moderate volume from CD, SD card, or auxiliary input source. In this mode, it will automatically compensate for any factory-programmed equalization. One click of the setup switch will start the tuning process. Once the button is pushed you will have 10 seconds to exit vehicle. For best results, the vehicle should be in a quiet environment to prevent outside noises from degrading the tuning. The KEY200.4 will follow the following set up processes:

4-channel full-range speaker system set up:

For proper automatic setup, make sure all windows and doors are shut and make sure you are in a quiet environment so outside noises will not adversely affect tuning and set up. This will be especially important with cars with a convertible top. Make sure all speakers are unobstructed and all of the tone settings, loudness, balance, fader, crossovers, listing position are in the "off" position on the source unit.

To initialize setup process, depress the momentary switch on the microphone cable. You will have 10 seconds to exit vehicle and shut door. When setup mode is initialized, the amplifier will go through the following process for a 4-speaker full-range system.

1. The DSP will send electrical pulses to the speakers independently to measure the time it takes for the acoustic pulse to return to the microphone. This will set the proper time alignment for the front speakers improving the staging of the sound in the vehicle in increments of .00002 seconds or 20 μ seconds.
2. With pink noise playing from the audio source in the vehicle, the DSP will adjust each of the speakers with a 10-band equalizer to smooth out any irregular frequency response bands by cutting or boosting each frequency band. It has the capability of boosting up to 8.5 dB and cutting up to 12 dB at 1/100 dB increments. It will do this independently for all four speakers.
3. Next it will measure the level of the front vs. the rear for overall output. It will adjust the rear speaker's output level to compliment the front speaker's output level.
4. The higher frequencies of the rear speakers will be reduced to bring sound stage more to the front.
5. When you hear the happy tones, the 4-speaker setup is now complete and the setup switch/microphone may be unplugged and stored for later use.
6. If you hear the sad tones, count the number of beeps to correspond to error chart in owner's manual. Check all connections, DIP switch settings, pink-noise level from the source, and make sure vehicle is in a quiet environment and repeat set up process.
7. Repeat tuning process until happy tones are heard.
8. Once the signal is optimized, you can then choose to defeat the KICKER EQ curve for a flatter response. You can also engage the compressor circuit to eliminate distortion caused by clipping (overdriving) the amplifier. This will prevent damaging the speakers by ensuring the output is not clipped by limiting the overall output. You may also select a high-pass crossover at your choice of 60 Hz, 80 Hz, or 120 Hz at 24 dB/octave.

When in bi-amp mode:

The KICKER KEY200.4 can also be used to set up and optimize a bi-amp system if you are powering the midranges and tweeters of a component speaker system separately. It will also do the same for wider bandwidth dash speakers (such as 3 1/2", 4", 4 x 6", 5 1/4" ect...) if there are larger or full-range speakers in the dash along with speakers in the doors. The KEY will automatically determine if you have a tweeter or larger speaker and tune accordingly.

1. The DSP will send electrical pulses to each of the four speakers independently to measure the time it takes for the acoustic pulse to return to the microphone. This will set the proper time alignment and improve the staging of the sound in the vehicle in increments of .00002 milliseconds or 20 μ seconds.
2. Next it will send a signal to determine if you have only tweeters or a smaller full-range speaker connected to amp 1. If it is a dedicated tweeter, it will apply a 24 dB/octave high pass crossover at 3200 Hz to amp 1 and a 24 dB/octave low pass filter also at 3200 Hz to amp 2.
3. If the DSP circuit detects a speaker other than a tweeter only connected to amp 1, it will apply a 24 dB/octave high-pass crossover at 320 Hz to amp 1 and a 24 dB/octave low-pass crossover at 640 Hz to amp 2.

4. It will then match the high-pass output of amp 1 to the sensitivity of the low-pass output of amp 2.
5. With pink noise playing from the audio source in the vehicle, the DSP will adjust the left and right channels with a 10-band equalizer to smooth out any irregular frequency-response bands by cutting or boosting each frequency band. It has the capability of boosting up to 8.5 dB and cutting up to 12 dB at 1/100 dB increments.
6. Next it will match the levels of the left and right channels.
7. Once the signal is optimized, you can then choose to defeat the KICKER EQ curve for a flatter response. You can also engage the compressor circuit to eliminate distortion caused by clipping (overdriving) the amplifier. This will prevent damaging the speakers by ensuring the output is not clipped by limiting the overall output. You may also select a high-pass crossover at your choice of 60 Hz, 80 Hz, or 120 Hz at 24 dB/octave.

If you change speakers, move the amplifier to another vehicle, or for any other reason you wish to reset the amplifier, press and hold the setup switch for at least 10 seconds until you hear a low tone. This will clear any DSP settings and you ready to start the setup process again.