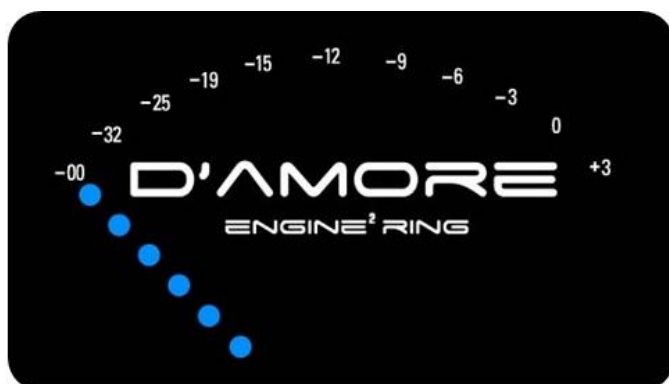


# SMD

## Crossover Calibrator

### CC-1

## Owner's Manual



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## **The purpose and benefit of the D'Amore Engineering / SMD Crossover Calibrator.**

The purpose of this tool is to enable the installer to set the crossover frequency of an electronic crossover to the desired frequency, accurately and quickly. It can also be useful for matching gains on multiple amplifier competition type systems.

## **What is included?**

- The Crossover Calibrator (CC-1)
- Protective silicon rubber boot
- 2 Calibrated Test tone CDs
- Harness
- This manual
- Pride of ownership

## About the design

When you pick up the CC-1, know that you are holding a precision piece of equipment. If treated as such it should provide you with many years of reliable service. We have chosen a 9V battery as a power source for a few reasons:

- They are readily available
- Isolating the CC-1 from the vehicle's electrical system for power, guarantees that it will only measure what it is supposed to measure; the audio signal, not noise in the charging system

We also chose an RCA input connector for a few reasons:

- It makes it pretty easy to measure the output of a headunit directly, if you choose to do so
- Should the harness become damaged it is easily replaceable or repairable in the field

## Specifications

Everyone hides these in the back of the book. We are proud of our specs, they aren't lies, so we are putting them up front.

- The Crossover Calibrator's circuitry is computer controlled
- Crossover point accuracy +/- 0.10dB
- Gain matching accuracy +/- 0.05dB
- Low Battery LED = battery voltage < 6.5Vdc
- Auto-shut off timer 8 - 10 minutes after ON button is pressed

## **Power requirements**

Pull the silicon rubber boot off of the unit by starting at one end and pulling off towards the other end. On the back side you will see the battery compartment. Slide battery compartment cover off towards bottom end of unit to reveal the 9V battery compartment. Insert a fresh 9V battery, make sure the wires are routed around the battery. (If they are under or on top of the battery the door may not close properly) You are ready to go. When the low battery LED is illuminated, the tool will become inaccurate. Replace with a fresh battery as soon as possible.

**Do not run this unit off of any power source other than a 9V battery. Wall adapters are electrically noisy, as are vehicle electrical systems.**

## Setting a Low Pass Crossover

1. This procedure will set the Low Pass Crossover frequency to a desired set point. This is accomplished by setting the bass, treble, etc. to zero; and any EQs and crossovers in the headunit to flat. When finished, you can reset the bass, treble, EQ, etc. as desired.
2. Connect the CC-1 to an electronic crossover's outputs by plugging an RCA from the crossover's outputs to CC-1's input or use the included harness to connect the CC-1 to the amplifier's speaker outputs; Red to speaker (+) and Black to battery ground. Note: On some amplifiers the right channel's output may actually be on the speaker (-) terminal. In this case, connect Red to speaker (-) and Black to battery ground.
3. If the unit is already on, switch the CC-1 off by holding the OFF button for 1 second. **(This must be done to initialize the program mode)** Now switch CC-1 power on by pressing the ON button.
4. Set the source unit's volume to zero.
5. Select the track on the CD that corresponds to the desired crossover frequency. Play track on repeat. (Track list on page 16)
6. Set the crossover switch to off (all pass, full pass, full range etc.) Skip to step 8.
7. If the crossover cannot be turned off (full range) turn the crossover frequency to its **highest** setting.

8. Turn up the source unit volume until you see the Signal LED illuminate green. If the LED turns Red, this indicates the volume is too high. Turn volume down until the LED remains green.
9. When the Signal LED remains Green, press the READ button.
10. Set crossover switch to Low Pass if it has one.
11. Using the LEDs at the top of the CC-1, slowly turn the crossover frequency adjustment pot until the CALIBRATED LED illuminates.
12. Congratulations, you have just set the crossover frequency perfectly!

## Setting a High Pass Crossover

1. This procedure will set the High Pass Crossover frequency to a desired set point. This is accomplished by setting the bass, treble, etc. to zero; and any EQs and crossovers in the headunit to flat. When finished, you can reset the bass, treble, EQ, etc. as desired.
2. Connect the CC-1 to an electronic crossover's outputs by plugging an RCA from the crossover's outputs to CC-1's input or use the included harness to connect the CC-1 to the amplifier's speaker outputs; Red to speaker (+) and Black to battery ground. Note: On some amplifiers the right channel's output may actually be on the speaker (-) terminal. In this case, connect Red to speaker (-) and Black to battery ground.
3. If the unit is already on, switch the CC-1 off by holding the OFF button for 1 second. **(This must be done to initialize the program mode)**
4. Now switch CC-1 power on by pressing the ON button.
5. Set source unit's volume to zero. Select the track on the CD that corresponds to the desired crossover frequency. Play track on repeat.
6. Set the crossover switch to off (all pass, full pass, full range etc.) Skip to step 8.
7. If the crossover cannot be turned off (full range) turn the crossover frequency adjustment to its **lowest** setting.



8. Turn up the source unit volume until you see the Signal LED illuminate green. If the LED turns Red, this indicates the volume is too high. Turn volume down until the LED remains green.
9. When the Signal LED remains Green, press the READ button.
10. Set crossover switch to High Pass if it has one.
11. Using the LEDs at the top of the CC-1, slowly turn the crossover frequency adjustment pot until the CALIBRATED LED illuminates.
12. Congratulations, you have just set the crossover frequency perfectly!

## Setting a Subsonic (Infrasonic) Filter

1. This procedure will set the Subsonic.... rant mode on.... (Infrasonic is the correct term – which literally means a sound that has a frequency that is lower than a human can hear. *Subsonic: A speed or velocity which is slower than the speed of sound.*) ....rant mode off....Ok this procedure will set the Infrasonic Filter frequency to a desired set point. This is accomplished by setting the bass, treble, etc, to zero; and any EQs and crossovers in the headunit to flat. When finished, you can reset the bass, treble, EQ, etc. as desired.

2. Connect the CC-1 to an electronic crossover's outputs by plugging an RCA from the crossover's outputs to CC-1's input or use the included harness to connect the CC-1 to the amplifier's speaker outputs; Red to speaker (+) and Black to battery ground. Note: On some amplifiers the right channel's output may actually be on the speaker (-) terminal. In this case, connect Red to speaker (-) and Black to battery ground.
3. If the unit is already on, switch the CC-1 off by holding the OFF button for 1 second. **(This must be done to initialize the program mode)** Now switch CC-1 power on by pressing the ON button.
4. Set the source unit's volume to zero.
5. Select the track on the CD that corresponds to the desired crossover frequency. Play track on repeat. (Track list on pages 16, 17)
6. Set the Infrasonic Filter to off or defeat. Skip to step 8.
7. If the Infrasonic Filter cannot be turned off, turn the Infrasonic Filter frequency to its **lowest** setting.
8. Turn up the source unit volume until you see the Signal LED illuminate green. If the LED turns Red, this indicates the volume is too high. Turn volume down until the LED remains green.
9. When the Signal LED remains Green, press the READ button.
10. Set the Infrasonic Filter switch to on if it has one.

11. Using the LEDs at the top of the CC-1, slowly turn the Infrasonic Filter frequency adjustment pot until the CALIBRATED LED illuminates.
12. Congratulations, you have just set the Infrasonic Filter frequency perfectly!

## **Matching the gains of multiple amplifiers.**

This procedure requires the CC-1 to be placed in a special mode reserved for SPL competitors and audiophiles.

1. Switch the CC-1 off by holding the OFF button for 1 second. **(This must be done to initialize the program mode)** Now switch CC-1 power on by pressing the ON button.
2. Disconnect the harness to make sure there is no signal being applied to the CC-1 and that the Signal LED is **NOT** illuminated.
3. Press and hold the READ button for 3-5 seconds or until the Set LEDs start flashing. Release Set button. **CC-1 is now in competition mode!!**
4. Next you need to connect the CC-1 to the "Master" amplifier's outputs. Use the included harness to connect to amplifier's outputs; Red to speaker (+) and Black to battery ground.

5. Set the source unit's volume to zero. Select the track on the CD that corresponds to the desired frequency you wish to match gains at. If you don't know which frequency to use try 40 Hz (track 10 Disc A) if it is a subwoofer amplifier, or 1 kHz (track 8 Disc B) if it is a full range amplifier. Play track on repeat.
6. Continue by turning up the source unit volume until you see the Signal LED illuminate green. If the LED turns red, this indicates the volume is too high. Turn volume down until LED remains green.
7. When Signal LED remains Green, press the READ button. The Blue Calibrated LED should illuminate.
8. Now without touching any adjustments on anything, connect the CC-1 to the output of the next amplifier that you wish to match it's gain to the first amplifier.
9. The LEDs will indicate if the gain is too high or too low compared to the "Master" amplifier.
10. Adjust gain on the amplifier that the CC-1 is now connected to until the Calibrated LED illuminates. The amplifier's gain is now matched to the Master amplifier's gain within  $\pm 0.05\text{dB}$  !!
11. Repeat steps 9 – 11 for any other amplifiers in the system.

## Troubleshooting:

**Problem:** The CC-1 is not reading any signal, i.e. the signal LED won't illuminate.

**Solution:** Some amplifiers have the left output on the Left (+) speaker terminal and the Right output on the Right (-) terminal. Use left channel, or connect Red probe to Right (-) and Black to battery ground.

**Problem:** It just doesn't seem to be working correctly

**Solution:** Did you make sure to turn the power off and then back on if it was previously used and still on? This is required to reset all of the data the tool gathered during its last use.

**Problem:** The signal LED is Red and it won't do anything when the READ button is pressed.

**Solution:** The incoming signal level is too high, reduce the system volume until the LED turns Green.

**Problem:** No CD player available

**Solution:** Tracks can be ripped to MP3, use 192kbps or higher.

**Problem:** The CC-1 keeps turning off

**Solution:** The CC-1 has an auto turn off timer, it will operate for 8-10 minutes after the "ON" button is pressed. This is to prevent it from eating your battery when you forget to turn it off.

**Problem:** Low battery LED is on... You know what to do

## Where do I set my crossover frequency?

This could be debated for days, and it really comes down to user preference. Here are some guidelines for the novice as a good place to start. If you hear the full range speakers “popping” or “bottoming out” when you play it at high volumes after using value in the chart below, turn the crossover frequency up until it stops.

Speaker Size	12dB/oct High Pass	24dB/oct High Pass	12dB/oct Low Pass	24dB/oct Low Pass
3 – 4 inches	250Hz	200Hz		
5.25	160Hz	125Hz		
6.5	125Hz	100Hz		
6x9	100Hz	80Hz		
8, 10			100Hz	125Hz
12			80Hz	100Hz
15,18			63Hz	80Hz

## Where do I set my infrasonic (subsonic) filter?

Again this is up for debate, here are some starting points for the less experienced.

Speaker Size	Sealed or 4 <sup>th</sup> order bandpass with 12dB/oct filter	Sealed or 4 <sup>th</sup> order bandpass with 24dB/oct filter	Ported or 6 <sup>th</sup> order bandpass with 12dB/oct filter	Ported or 6 <sup>th</sup> order bandpass with 24dB/oct filter
8	35Hz	31Hz	Just below tuning frequency of port	½ octave below tuning frequency of port
10	31Hz	25Hz		
12	25Hz	20Hz		
15,18	Not needed	Not needed		

## Track list on CC-1 Disc A:

*These Frequencies are based on ISO Standard 1/6 Octave Centers.*

Track	Frequency	Duration
1	14Hz	2:20
2	16Hz	2:20
3	18Hz	2:20
4	20Hz	2:20
5	22Hz	2:20
6	25Hz	2:20
7	28Hz	2:20
8	31Hz	2:20
9	35Hz	2:20
10	40Hz	2:20
11	45Hz	2:20
12	50Hz	2:20
13	56Hz	2:20
14	63Hz	2:20
15	71Hz	2:20
16	80Hz	2:20
17	90Hz	2:20
18	100Hz	2:20
19	112Hz	2:20
20	125Hz	2:20
21	140Hz	2:20
22	160Hz	2:20
23	180Hz	2:20
24	200Hz	2:20
25	225Hz	2:20
26	250Hz	2:20
27	280Hz	2:20
28	315Hz	2:20
29	355Hz	2:20
30	400Hz	2:20



## Track list on CC-1 Disc B:

*These Frequencies are based on ISO Standard 1/6 Octave Centers.*

Track	Frequency	Duration
1	450Hz	2:20
2	500Hz	2:20
3	560Hz	2:20
4	630Hz	2:20
5	710Hz	2:20
6	800Hz	2:20
7	900Hz	2:20
8	1kHz	2:20
9	1.12kHz	2:20
10	1.25kHz	2:20
11	1.4kHz	2:20
12	1.6kHz	2:20
13	1.8kHz	2:20
14	2kHz	2:20
15	2.25kHz	2:20
16	2.5kHz	2:20
17	2.8kHz	2:20
18	3.1kHz	2:20
19	3.55kHz	2:20
20	4kHz	2:20
21	4.5kHz	2:20
22	5kHz	2:20
23	5.6kHz	2:20
24	6.3kHz	2:20
25	7.1kHz	2:20
26	8kHz	2:20
27	9kHz	2:20
28	10kHz	2:20
29	11.2kHz	2:20
30	12.5kHz	2:20

## **Limited Warranty**

D'Amore Engineering warrants this product to be free of defects in materials and workmanship for a period of one year.

This warranty is not transferrable and applies only to the original purchaser from an authorized D'Amore Engineering dealer. Should service be necessary under this warranty for any reason due to manufacturing defect or malfunction, D'Amore Engineering 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, unauthorized repair attempts, misrepresentations by the seller. This warranty does not cover incidental or consequential damages. 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 one year beginning with the date of the original purchase. No warranties 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 D'Amore Engineering product:**

All warranty returns should be sent to D'Amore Engineering accompanied by proof of purchase (a copy of the original sales receipt). Warranty expiration on products returned without proof of purchase will be determined from the manufacturing date code. Non-defective items received will be returned COD. Customer is responsible for shipping charges and insurance in sending the product to D'Amore Engineering. Shipping damage on returns is not covered under warranty.

**To obtain service worldwide please e-mail  
D'Amore Engineering at  
Warranty@DAmoreEngineering.com**

Notes:

**D'Amore Engineering**

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