AUDIOPHILE ACOUSTICS®

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# M12FR "The Swan"

## FULL RANGE 2 CH CLASS D AMPLIFIER

MODEL: M12FR

PRODUCT ID: M12FRD18

WWW.B2AUDIO.COM / WWW.FACEBOOK.COM/B2AUDIO

CE

## INTRODUCTION

There are times when you need to make a statement, such as raising the bar & going beyond what has become the standard. For nearly a decade this has become synomous with B2 audio. Whether it being product like subwoofers & amplifiers or even various competition formats in car audio, we have continously set our standards higher. At times it might not be the most financially wise decision, but we are more than product and profits, we are first and foremosts passionate about what we do, thus we want to implement our soul into each product.

M12FR - The Swan is yet another benchmark that is guaranteed to be the inspiration for others to follow, but doing it first requires thought, vision & finances. The uniqueness of this amplifier incorporates the best of both worlds combined with other M12 amplifiers, but with the capability of being the worlds' first high power 2 channel full range (full bridge) amplifier for car audio.
There's no challenge too big for the Swan, whether it being multiple subwoofers or a total of 80 midrange drivers onto both channels.
Comparable amplifiers are all mono, some are not even made for playing music, others are low frequency only. Our approach is fidely first, therefore the M12FR features a larger footprint, housing multiple times the components, leading to better stability, performance & sound quality. Power is nothing without control.

To obtain the full potential of the amplifier & to minimize failure it is necessary to upgrade the stock electrical system. Ensure the system is in accordance with the max performance of the amplifier. Don't make shorcuts, by not using all of 4 x 2/0 power terminals. They are there for a reason, so please read the entire manual!

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IS THE CORNERSTONE OF B2 AUDIO. IT'S THE PHILOSOPHY OF ADDING SOMETHING UNIQUE. KEEP IN MIND THAT CONTINIOUS EXPOSURE TO SPL ABOVE 100 DB CAN SERIOUSLY DAMAGE YOUR HEARING. TODAY'S HIGH POWER AUTO SOUND SYSTEMS CAN EASILY PRODUCE SPL OVER 140 DB. ENJOY YOUR MUSIC WITH SENSE.

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## DESIGN FEATURES

*M12FR The Swan*

| | |
|---|---|
| CIRCUIT CONFIGURATION: | HI-EF CLASS D DUAL MONO |
| FREQUENCY RESPONSE: | 10 HZ - 17.5 KHZ |
| SIGNAL TO NOISE RATIO: | > 85 DB |
| INPUT SENSITIVITY: | 6 V - 0.2 V |
| CROSSOVER CIRCUIT: | 24 DB / OCTAVE |
| LOW PASS CROSSOVER: | 35 HZ - 17 KHZ |
| SUBSONIC / HIGH PASS CROSSOVER: | 10 HZ -500 HZ |
| DAMPING FACTOR: | > 300 |
| BASS BOOST FREQUENCY: | 30 HZ - 80 HZ |
| BASS BOOST: | 0 - 9 DB |
| PHASE: | 0 - 180° |
| REMOTE CONTROL W/ CLIP INDICATOR: | INCLUDED |
| POWER TERMINAL GAUGE: | 2/0 GA X 4 |
| FUSE RATING: | 1000A |
| DIMENSIONS: | 32.67" X 12.6" X 2.71" / 830 MM X 320 MM X 69 MM |

## SPECIFICATIONS

All features are subject to change in the continuing effort to improve the products without notice.

CONTINIOUS OUTPUT POWER (RMS) DONE WITH AUDIO PRECISION TEST EQUIPMENT AND CEA STANDARDS.

| | (12 V < 1% THD) | (14.4 V < 1% THD) | (16 V < 2% THD) |
|---|---|---|---|
| POWER @ 4 Ω: | 1150 W X 2 | 1700 W X 2 | |
| POWER @ 2 Ω: | 2200 W X 2 | 3200 W X 2 | |
| POWER @ 1 Ω: | 4200 W X 2 | 6200 W X 2 | 7000 W X 2 |

CONTINIOUS OUTPUT POWER (RMS) MEASURED TO COMPETITORS FULL BRIDGE STANDARD TESTING (1 KHZ ≤ 10% THD).

| | (12 V ) | (14.4 V ) | (16 V) |
|---|---|---|---|
| POWER @ 4 Ω: | 1400 W X 2 | 2200 W X 2 | |
| POWER @ 2 Ω: | 2700 W X 2 | 4000 W X 2 | |
| POWER @ 1 Ω: | 5000 W X 2 | 7500 W X 2 | 8200 W X 2 |

### DESCRIPTION OF SPECIFICATIONS

Stable impedance load of the M12FR is 1 Ohm per channel. THE CHANNELS CAN'T BE BRIDGED, SO DON'T TRY IT!
Operation below minimum impedance will stress the amplifier & void the warranty.
Excessive heat will also appear at a faster rate and the and the amplifier will go into thermal protection.

Protection can also be caused by the following
* Speaker overload
* Short circuit
* Input Voltage - RCA & Power Supply

The PCB is a Full Bridge Class D design which optimizes power output, maintains lower thd & voltage, without increasing the footprint of the amplifier.

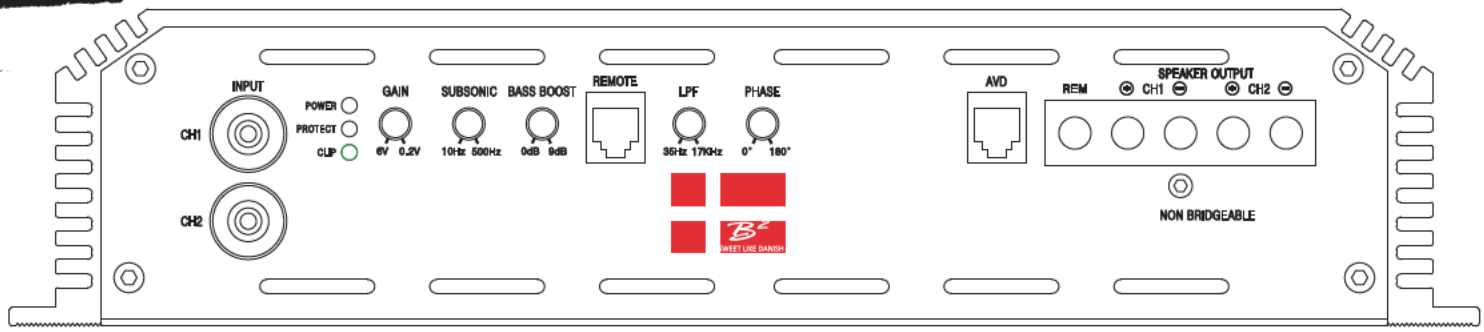
Operational voltage 8.5V~16 V

Operational voltage will also be affected by the load of the amplifier.

*In order to get the full power output of the amplifier, it is crucial that your electical system is correctly (over)dimensioned.

## PANEL LAYOUT

M12FR




### INPUT
RCA signal input for Left & Right channel.
A minimum of 0.2 v input signal is required for correct operation.

### POWER & PROTECTION INDICATOR
Power LED, blue light shows correct operation,
Protect LED, red light shows general malfunction, faulty connection or thermal protection.

### GAIN (6V-0.2V)
Adjusts signal input voltage from the source to match the amplifiers input stage.
0.2 V ~ 6 V is the operational voltage.
Daisy chain is strictly (prohibited) of 2 amplifiers.
Voltages beyond may cause damage.

### SUBSONIC
Variable Subsonic/High Pass setting from 10 Hz to 500 Hz. It is highly recommended to set it according to the tuning of your subwoofers to avoid unnecessary strain to your sound system. If used for speakers, you can use the fs as a guideline

### BASS BOOST
Variable signal boost of the BASS BOOST with 0 dB ~ 9 dB.

### REMOTE LEVEL CONTROL PORT
Connection of external signal level control.
CAUTION, the amplifier needs to be gained in accordance with the remote to avoid excessive signal boost.

### LPF (LOW PASS FILTER 35 HZ -17 KHZ, 24 DB/OCT)
Adjusts the cut off point for the low pass crossover at the frequency chosen. The LPF will also work as a bandpass alsong with the subsonic from 10 Hz ~ 500 Hz

### PHASE
Stepless adjustment of the phase from 0 to 180 degrees.

### CLIP SENSOR
Enables you to monitor clipping to avoid damage to your speakers. Distortion above 1% will cause it to light up. Avoid the sensor to be continiously lit.

### AVD PORT
Amplifier voltage display port. Connection of external voltmeter display to monitor the amplifiers voltage.

### SPEAKER OUTPUT
Rem in, 12 v switched remote to turn on the amplifier.
Speaker outputs per CH are individual & not connected internally. Due to the design of the amplifier, it is NON BRIDGEABLE.
Each channel can only be used individually.

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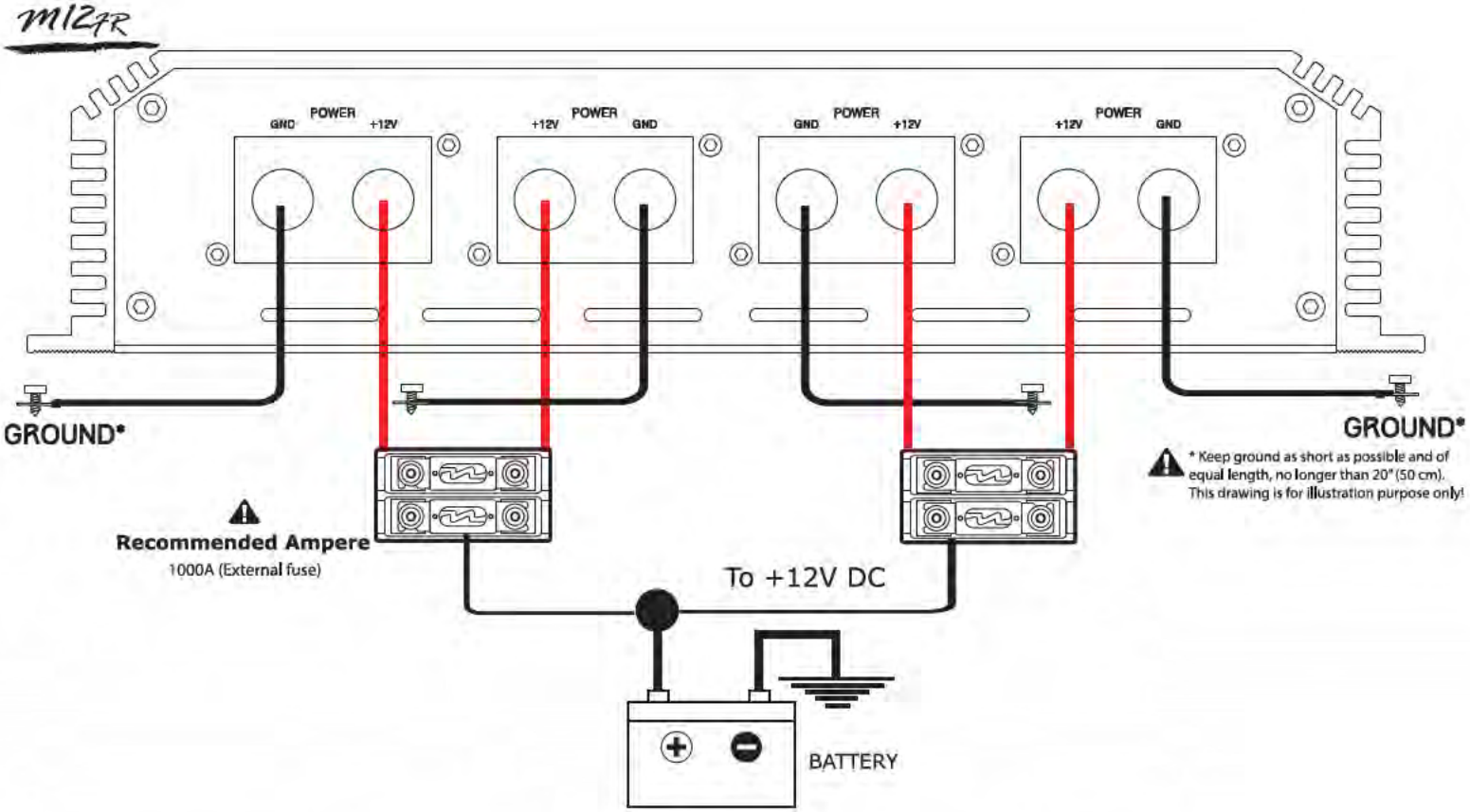
## PANEL LAYOUT




**GND (GROUND CONNECTION)**
Connects to the vehicle's chassis.
Keep as short as possible (< 20" / 50 cm)
Use minimum 0 Ga cable for optimal conditions.

**REM (REMOTE)**
Connects to switched +12V from the headunit.

**+ 12V (POWER CONNECTION)**
Connects to the positive terminal of the battery.
For specified performance 0 Ga cable is required.
Fuses shall be placed within 8" / 20 cm of the battery.
The HI-EF class D design allows for higher output power, even at low voltage applications.
This sets high requirements to the battery system.
Choose batteries with high CCA ratio.

**⚠ CAUTION**

**INSTALLATION OF THE AMPLIFIER SHALL BE DONE IN THE FOLLOWING STEPS:**

1. Connect the +12V wire, keep in mind this wire has to be fused at the battery as well. 2. Ensure the ground is appropriate, then connect it to the amplifier. 3. Connect the switched remote. 4. Reattach negative wire (ground) to the battery. 5. Operation over 16V will cause the amplifier to go into protect & can void the warranty!

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## INSTALLATION

### INSTALLATION CONSIDERATIONS

If you choose to install the amplifier by yourself, please read the entire owner's manual carefully.
Before you start your installation, please take all steps into consideration.
If in doubt, please go to www.b2audio.com for authorized distributors / dealers that will be able to configure your set up & ensure the warranty of your amplifier.

### PREPARATION

Disconnect the negative (-) battery cable before mounting or making any connection.
Check the battery & alternator ground (-) connection. Make sure they are properly connected/dimensioned & free of corrosion. Before selecting a mounting location for the amplifier, please take cooling & safety into consideration. Avoid areas with excessive vibration & up side down installation!

In order to avoid excessive heat from the amplifier, it is recommended to find a mounting location that allows for vertical positioning of the heatsink fins. For safety purposes, install the amplifier in a dry and well ventilated location and make sure no cables or other harness of the car is interfaced with the mounting location or will present a hazard to the car's cable, control cables, fuel lines/tanks, hydraulic lines or other components of the vechicle. Route the RCA cables away from high current wires, if possible run RCA, Power and Speaker cables individually and with a good distance from each other.

### POWER CONNECTORS

#### 12V (POWER CONNECTION)

Before mounting the amplifier, disconnect the negative (-) wire from the battery to protect any accidental damage to the amplifier or the audio system. The amplifier is equipped with quad 0 AWG power & ground terminals. It is crucial that all terminals are used with the adequate cable to ensure correct operation.
Connect the power cables to the power terminal labeled as +12V.
The amplifier is not equipped with fuses, so external fuses are required at both the battery and the amplifer.
Connect one end of the fuse holder to the power cable and the other end of the fuse holder to the positive battery terminal within 8" /20 cm of the same cable. The same shall be done at the other end of the cable that connects to the amplifier. The fuses will protect the system and the vehicle against the possibility of a short circuit in the power cable. Make sure that the fuses and the fuse holder is according to the system requirements.

#### GND (GROUND CONNECTION)

Locate a secure grounding connection as close as possible to the amplifier.
Make sure the location is clean and provides a direct electrical connection to the chassis of the vehicle.
Connect one end of an equal sized cable as the positive cable to the location of ground.
It is important that the ground cable is as short as possible, but no longer than 20" / 50 cm at maximum.
Run one end of the cable to the grounding point. Run the other end of the cable to the mounting location.
Connect the ground cable to the terminals labeled as GND.

#### REM ( REMOTE CONNECTION )

Run a remote turn on cable from the switched +12V source.
This may be a toggle switch, a relay, the source unit's remote ouput cable or power antenna trigger cable.
Connect the remote turn on cable to the power terminal labeled as REM.

#### INPUT (RCA CABLE)

Run the RCA cables away from the high current cables / speaker cables and connect to the amplifier.
Use high qualtity cables with a secure grounding point to avoid amplifier malfunction and / or alternator whine.

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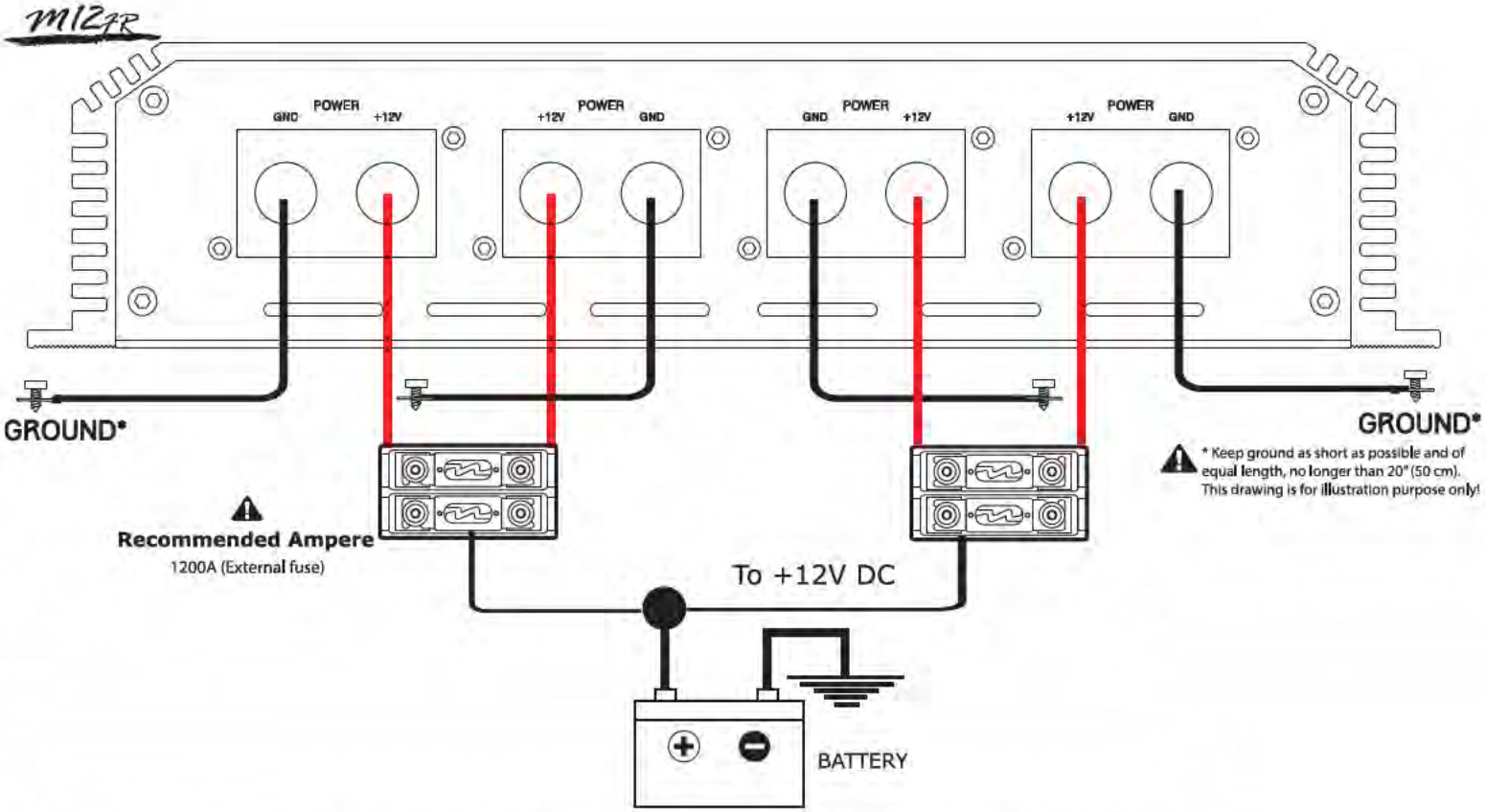
## PANEL LAYOUT




We recommend to use minumum10 Ga speaker cables to acquire the intended performance.
Run the speaker cables from your speakers to the amplifier's mounting location.
Ensure these are ran separately and away from high current cables and if possible the RCA cables as well.
In all cases where cables are penetrating the vechile's chassis use grommets to protect the cable.

Connect the speaker wires according to the terminals on the speaker(s). Strip 3/8" / 1 cm of insulation of the end of each cable and twist the cable strands together tightly. Make sure there are no stray strands that could touch other cables or terminals as it can cause a short circut.
Crimp spade plugs over the end of the cable or tin the ends with solder to provide a solid terminal.
Connect the cable ends to the amplifier as shown in the diagram. Note, the amplifier's speaker terminals are internally bridged.

### ⚠ CAUTION

**INSTALLATION OF THE AMPLIFIER SHALL BE DONE IN THE FOLLOWING STEPS:**

1. Connect the +12V wire, keep in mind this wire has to be fused at the battery as well. 2. Ensure the ground is appropriate, then connect it to the amplifier. 3. Connect the switched remote. 4. Reattach negative wire (ground) to the battery. 5. Operation over 16V will cause the amplifier to go into protect & can void the warranty!

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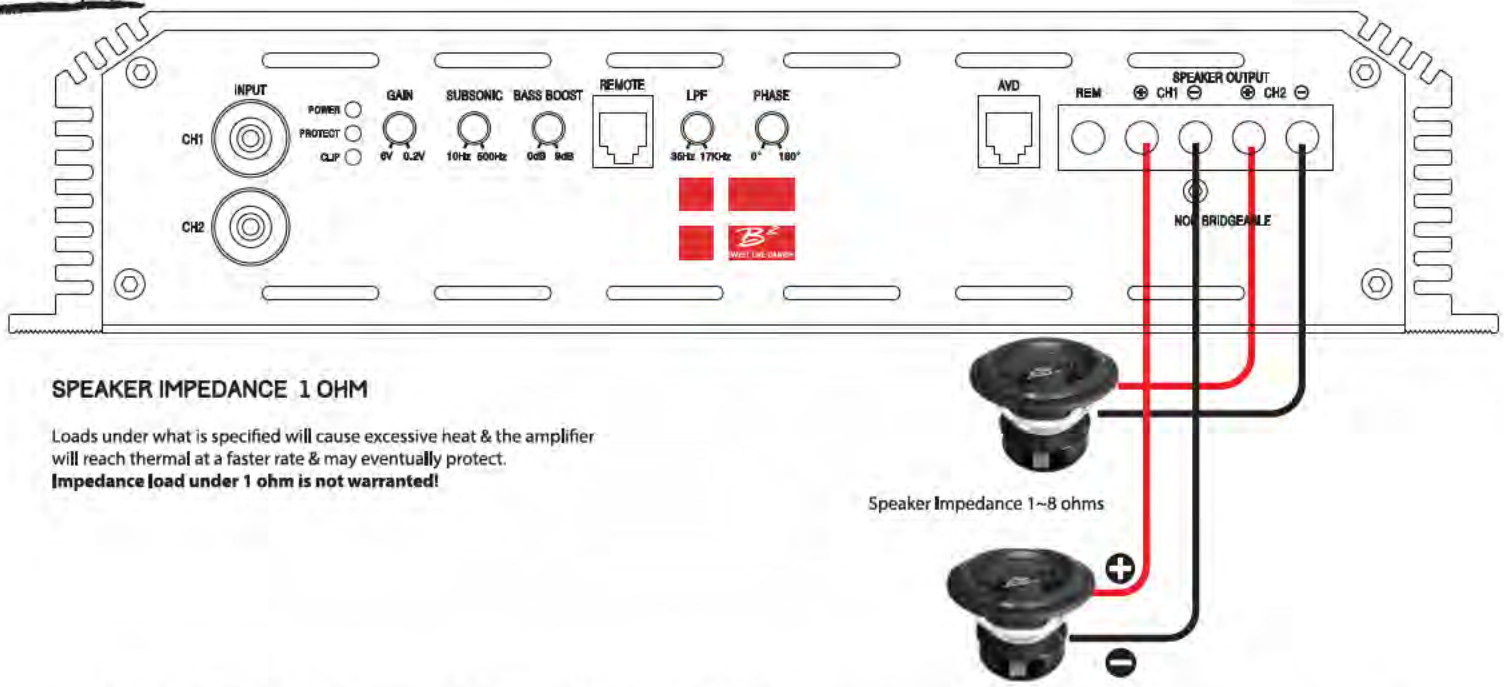
## SPEAKER WIRING DIAGRAM

*M12FR*



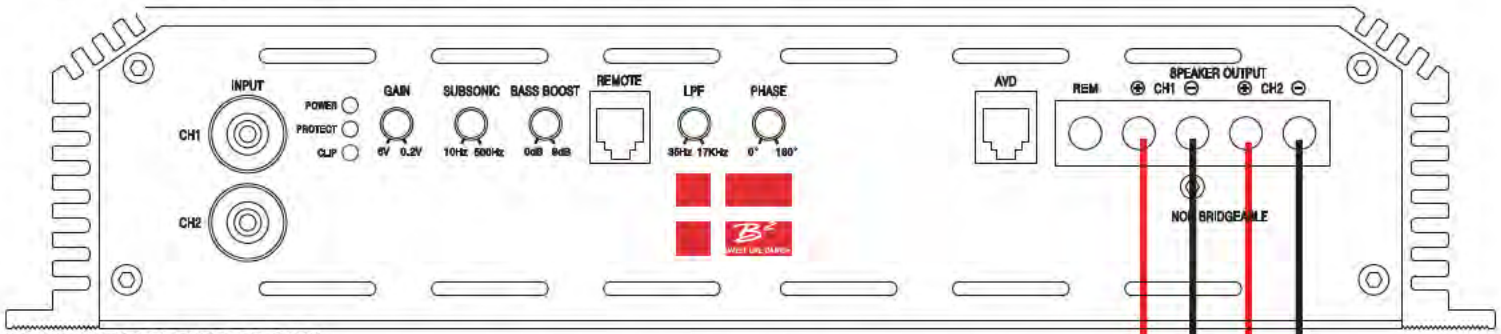

### SPEAKER IMPEDANCE 1 OHM

Loads under what is specified will cause excessive heat & the amplifier will reach thermal at a faster rate & may eventually protect.
**Impedance load under 1 ohm is not warranted!**



Speaker Impedance 1~8 ohms

The M12FR can be used in a subwoofer or a full range speaker configuration.
In a loudspeaker configuration, the subsonic crossover, doubles as a high pass crossover. Unwanted frequencies will be attenuated by 24 dB/Oct from the chosen setting between 10 Hz ~500 Hz. Using the amplifier for tweeters with the internal crossover is not advised due to the 500 Hz setting. A better option is external crossovers, headunit or the use of a dsp. Using both the subsonic and the lowpass crossover will create a bandpass crossover within the frequencies chosen.




### SPEAKER IMPEDANCE 8 OHM

### PARALLEL WIRING

Speaker Impedance 8 ohms

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## CROSSOVER - BOOST SETTINGS

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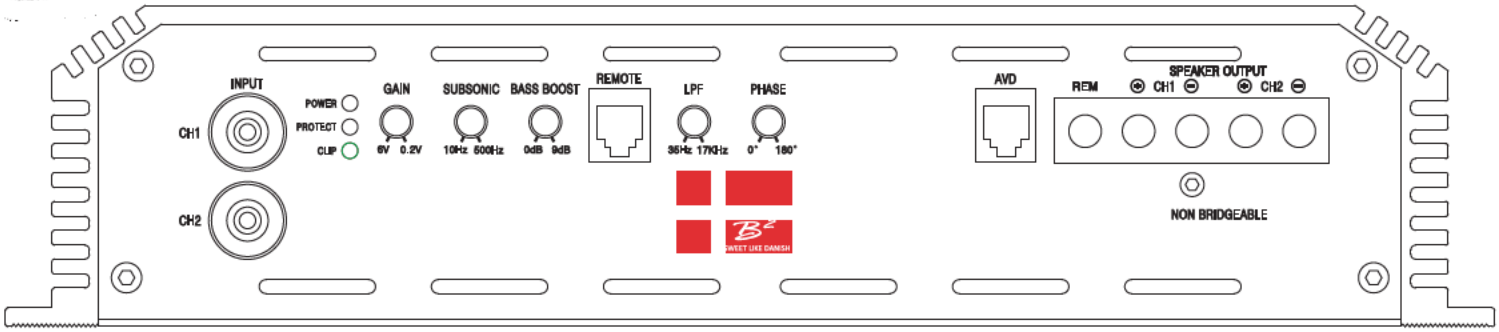


### LOW PASS CROSSOVER

The low pass crossover is 24 dB / oct. Setting it at 80 Hz will then have the signal cut off with 24 dB at 40 Hz (1 octave). To ensure accuracy for the individual crossover frequency the pot feature 41 clicks, each with a corresponding frequency.

### CLICK SETTINGS FOR LPF

1. 38.07 Hz
2. 38.07 Hz
3. 38.08 Hz
4. 38.09 Hz
5. 38.10 Hz
6. 39.20 Hz
7. 42.10 Hz
8. 44.81 Hz
9. 48.53 Hz
10. 52.09 Hz
11. 56.58 Hz
12. 61.68 Hz
13. 67.77 Hz
14. 75.84 Hz
15. 86.21 Hz
16. 99.30 Hz
17. 116.48 Hz
18. 142.10 Hz
19. 188.01 Hz
20. 223.76 Hz
21. 243.54 Hz
22. 263.10 Hz
23. 287.79 Hz
24. 322.74 Hz
25. 357.46 Hz
26. 400.87 Hz
27. 460.90 Hz
28. 547.36 Hz
29. 669.78 Hz
30. 851.20 Hz
31. 1192.18 Hz
32. 1747.20 Hz
33. 1963.30 Hz
34. 2227.67 Hz
35. 2644.90 Hz
36. 3079.85 Hz
37. 3613.67 Hz
38. 4818.77 Hz
39. 5722.74 Hz
40. 13704.70 Hz
41. 15660.90 Hz

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## TROUBLESHOOTING

The protection circuits of the amplifier prevents severe damages from faulty conditions & improper use.
The protection indicatior will switch on due to short circuit connection & speaker overload, thus the amplifier will be turned off. Prior to inspecting the occurred problem, turn all levels down & all power off, then carefully check the installation for wiring mistakes, shorts or faulty ground (GND). If the amplifier shuts down due to excessive heat, the protection indicator will light up; please allow time for the unit to be cooled off. Before removing your amplifier, refer to the list below and follow the suggested procedures step by step. If not at ease, contact an authorized installer which can assist you.

### AMPLIFIER DOESN'T TURN ON

- Measure voltage on the +12V terminal.
- Ensure that the remote terminal has min. 13.8 V DC remote connection.
- Recheck the ground (GND) connection. Inspect the in-line fuses.
- Check the protection LED is not on.

### PROTECTION LED IS LIT ONCE THE AMPLIFIER IS TURNED ON

- Check shorts on speaker wires & the connected load / impedance. Check power cables & GND.
- Disconnect the speaker cables and reset the amplifier.
- High / Low voltage, operation voltage is 8.5 V ~ 16 V+. Voltages below / beyond this will cause the amplifier to go into protect.

### FUSE BLOWING

- Measure the speaker impedance & that it is in accordance with the configuration.
- Inspect the power cable for shorts along with vehicle chassis.

### OVERHEATING

- Measure the speaker impedance & that it is in accordance with the configuration.
- Check speaker shorts.
- Ensure airflow around the amplifier is sufficient & that the amplifier is not installed in areas of excessive vibration & upside down!

### AUDIO OUTPUT INSUFFICIENT - DISTORTED SOUND

- Ensure that the gain settings on the amplifier is matched with the output level of the head unit.
- Adjust the head unit volume.
- Check speaker shorts.
- Adjust the crossover frequencies in accordance with the setup.
- If no output at all, check the RCA connections & the cable itself.

### TURN ON THUMP

- Disconnect the signal input to the amplifier, then turn it on and off.
  a) If the noise is cancelled, then connect a delay turn on module on the REM wire running from the source unit to the amplifier.
  b) Use another 12V source for REM lead to the amplifier. If the noise is cancelled, use a relay to isolate the amplifier from the turn on thump.

### HIGH HISS-ENGINE NOISE IN SPEAKERS

- Ensure that all signal transferring wires (RCA, speaker cables etc) are kept seperately / away from the power and the ground wires.
- Bypass all electrical components between the Head unit and the amplifier. Connect the Head unit directly to the amplifier's input. If the noise is eliminated, the unit bypassed is the one causing the noise.
- Remove the existing ground wires for all electrical components installed. Ensure that the point of ground is 100% metal which has been grinded free of rust, paint etc.
- Replace the ground cable from the OEM battery / alternator and ensure it is grounded accordingly.
- Test the battery and alternator load (can be carried out by a professional). Ensure that the vehichle's electrical system is in a good condition, this includes distributor, alternator, spark plugs / wires, voltage regulators etc.

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**LIMITED WARRANTY INFORMATION**

B2 audio offers a limited warranty under the following terms:
The product is to be free of defects in material & workmanship under normal use for a period of 1 year from the date of the original purchase, when installed by an authorized dealer. Items not installed by authorized dealers will be warrantied for 30 days from the original purchase. Original sales receips must be accompanied with all returns.The warranty applies to the original purchaser of the product & it being sold by authorized B2 audio dealers.

The warranty does not cover: 1. Damage caused by accident, abuse, misuse, improper operation, water / solvents & shipping.
2. Product modification, neglect, failure to follow installation instructions & misrepresentation by the seller.
3. Products used for competition purposes or are of such a charachter 4. Any product that has been opened.
5. Products that has had the serial number defaced, altered or removed.
6. The cost of shipping the product back for repair to an authorized repair centre & cost of return of non-defective items.