

Owners Manual



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EQ230

1/3 OCTAVE GRAPHIC EQUALIZER

Phoenix Gold EQ215 / EQ215x / EQ230 Owner's Manual

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Equalizer Specifications

Frequency Response.....	10Hz–30kHz ± 1dB
Signal to Noise Ratio (A weighted, referred to 8VRMS).....	105dB
Dynamic Range.....	113dB
Total Harmonic Distortion.....	<0.02%
Crossover (EQ215x only)	
Slope	24dB/octave
Frequency (adjustable, R-Net selected).....	90Hz
Input Gain control range –12dB to +20dB	
Output Level control range	–20dB to 0dB
Maximum Input or Output Signal Level	8VRMS
Input Impedance	
EQ215/EQ215x	5kΩ
EQ230	5kΩ RCA input/50kΩ balanced input
Output Impedance	510Ω
Battery Voltage	10.5–15VDC
Recommended Fuse	2A
Dimensions (LxWxH)	
EQ215/EQ215x	11.25" x 8.00" x 1.75"
EQ230	11.25" x 10.90" x 1.75"

NOTE: Due to continuous improvement, specifications and design are subject to change without notice. 7/95

Phoenix Gold makes many other types of signal processors in addition to those listed in this manual. You can depend on Phoenix Gold for all your car audio needs. Contact your local dealer for more information.

AX204A 2 Way Crossover

The AX204A is a state of the art 2 way asymmetrical 18dB per octave electronic crossover. It is able to take advantage of the LPL44 for low pass subwoofer level control.

AX406A 4 Way Crossover

The AX406A is a state of the art Stereo (3 way) or 4 channel (2 way) asymmetrical 18dB per octave electronic crossover. It can also take advantage of the LPL44 for low pass subwoofer level control.

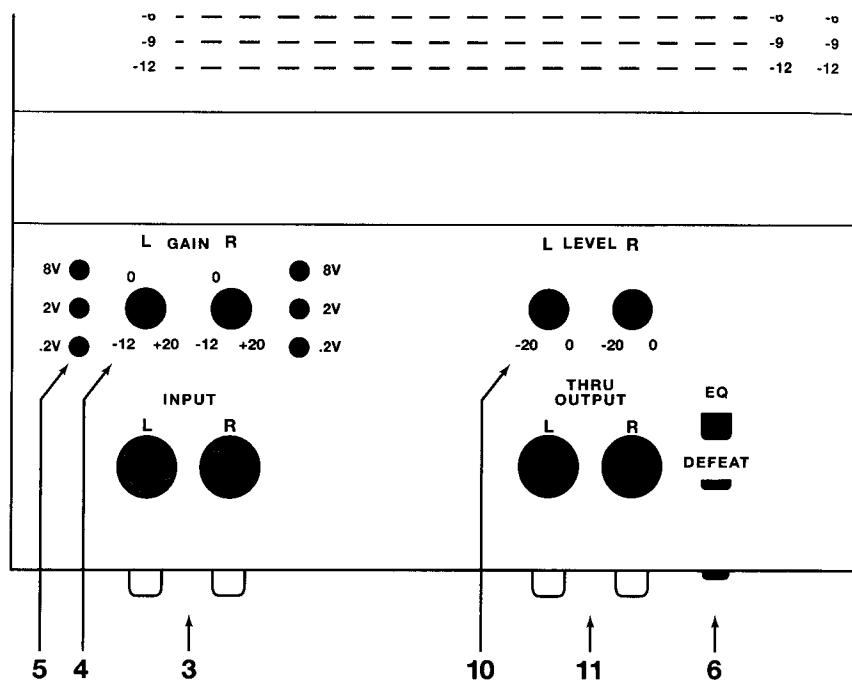
PLD1 Professional Line Driver

At Phoenix Gold, we set out to battle the noise problem and came up with the PLD1. This little gem takes the low level output of most decks, usually less than 2 volts, and increases it up to 8V AC. The PLD1 utilizes a very low 30Ω output impedance which makes the unit capable of effectively driving long lengths of cable without signal degradation. Car audio enthusiasts are raving worldwide!

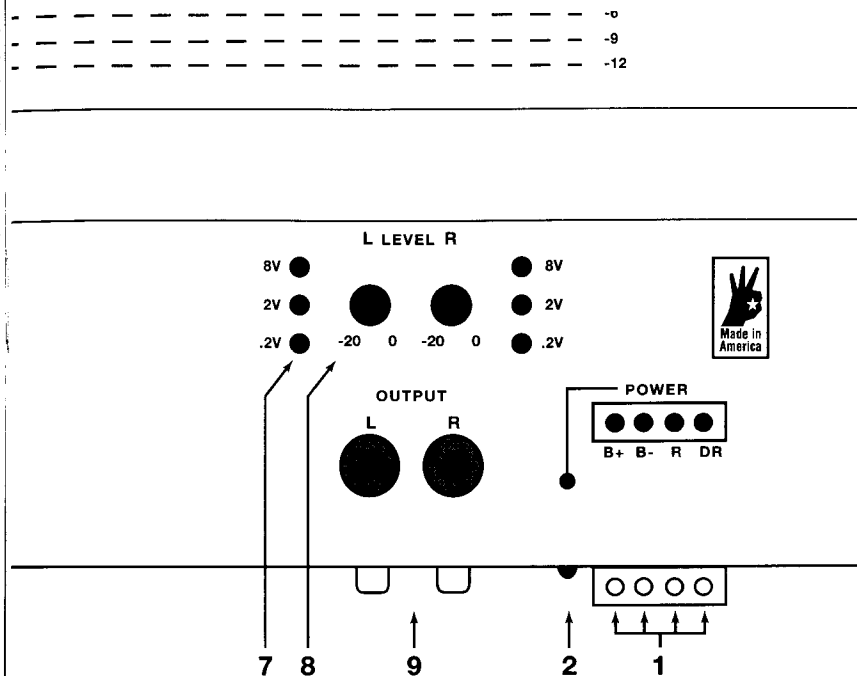
TBA1 Balanced Line Amplifier

Overcoming the harsh acoustic and electronic environment of the car audio world—road noise, vehicle noise, ground loops, radiated RF and electromagnetic noise and low signal to noise ratios—is typically a difficult challenge which is even more difficult when trying to send dynamic signals through multiple feet of RCA cable. To make this problem worse, head units with low output levels and high output impedance decrease the signal-to-noise ratio, making the signal cable even more susceptible to RFI and EMI induced noises. We designed TBA1 to overcome all these problems and help your system be the best it can be.

EQ215 CONTROLS & FUNCTIONS

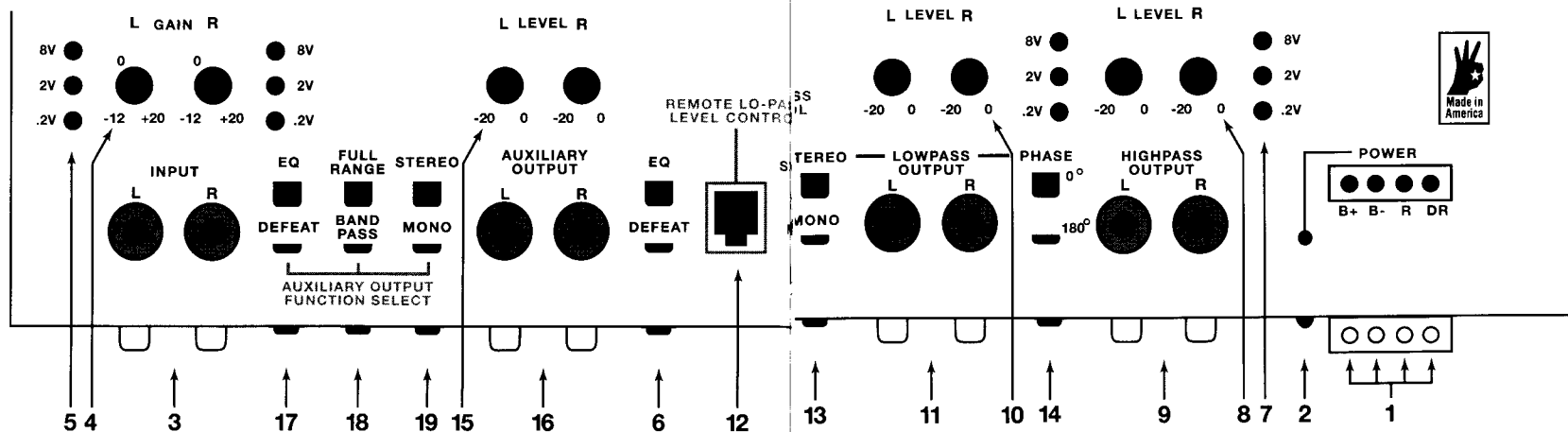


1. POWER Connector: Make connections using the supplied detachable plug. Connect the B+ terminal to battery positive and the B- terminal to chassis ground. Connect R (remote) terminal to a switched 12Vdc source to allow the EQ215 to be turned on/off by the head unit. Connect the DR (delayed remote) terminal to the amplifier remote input terminal to delay amplifier turn-on by 3 seconds.
2. POWER LED: This green LED lights when the unit is operational.
3. INPUT RCA Connectors: Connect to head unit or signal processor RCA line outputs.
4. Input GAIN Controls: These controls adjust left and right signal gain from -12dB to +20dB.
5. Input Level Indicators: These LEDs indicate left and right signal level **after** input gain controls.



6. EQ/DEFEAT Switch: This switch routes either equalized or non-equalized signals to the output.
7. Post-EQ Level Indicators: These LEDs indicate left and right signal level after equalization, **before** output level controls.
8. Output LEVEL Controls: These controls attenuate left and right output signal level from 0dB to -20dB.
9. OUTPUT RCA Connectors: Connect to amplifier or signal processor RCA line inputs.
10. Thru OUTPUT level Controls: These controls attenuate left and right thru output signal level from 0dB to -20dB.
11. THRU OUTPUT RCA Connectors: A non-equalized output for connection to amplifier or signal processor RCA line inputs.

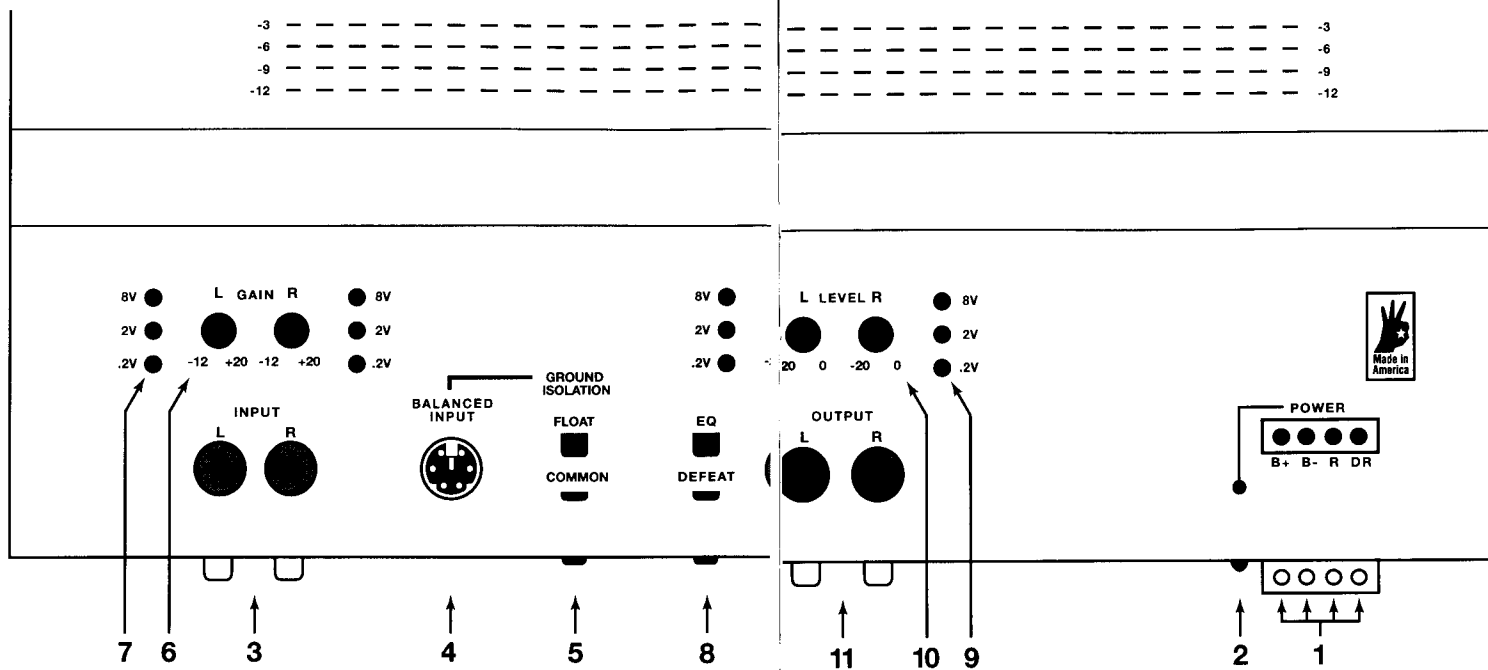
EQ215x CONTROLS & FUNCTIONS



1. Power Connector: Make connections using the supplied detachable plug. Connect the B+ terminal to battery positive and the B- terminal to chassis ground. Connect R (remote) terminal to a switched 12VDC source to allow the EQ215x to be turned on/off by the head unit. Connect the DR (delayed remote) terminal to the amplifier remote input terminal to delay amplifier turn-on by 3 seconds.
2. Power LED: This green LED lights when the unit is operational.
3. input RCA Connectors: Connect to head unit or signal processor RCA line outputs.
4. Input gain Controls: These controls adjust left and right signal gain from -12dB to +20dB.
5. Input Level Indicators: These LEDs indicate left and right signal level **after** input gain controls.
6. EQ/DEFEAT Switch: This switch routes either equalized or non-equalized signals to the highpass and lowpass outputs.
7. Post-EQ Level Indicators: These LEDs indicate left and right signal level after equalization, **before** crossover section or output level controls.
8. Highpass Output LEVEL Controls: These controls attenuate left and right highpass output signal level from 0dB to -20dB.
9. HIGHPASS OUTPUT RCA Connectors: Connect to midrange/tweeter amplifier or signal processor RCA line inputs.

10. Lowpass Output LEVEL Controls: These controls attenuate left and right lowpass output signal level from 0dB to -20dB.
11. LOWPASS OUTPUT RCA Connectors: Connect to lowpass amplifier or signal processor RCA line inputs.
12. LPL Jack: Connect the optional LPL44 Lowpass Level Control to this jack.
13. STEREO/MONO Switch: This switch selects either stereo or summed mono operation of the lowpass outputs.
14. PHASE Switch: This switch selects either 0° (in-phase) or 180° (out-of-phase) operation of the lowpass outputs.
15. Auxiliary Output LEVEL Controls: These controls attenuate left and right auxiliary output signal level from 0dB to -20dB.
16. AUXILIARY OUTPUT RCA Connectors: Connect to center/rear channel amplifier or signal processor RCA line inputs.
17. EQ/DEFEAT Switch: This switch routes either equalized or non-equalized signals to the auxiliary outputs.
18. FULLRANGE/BANDPASS Switch: This switch selects either full range or 200 to 6000Hz bandpassed operation of the auxiliary outputs.
19. STEREO/MONO Switch: This switch selects either stereo or summed mono operation of the auxiliary outputs.

EQ230 CONTROLS & FUNCTIONS



1. Power Connector: Make connections using the supplied detachable plug. Connect the B+ terminal to battery positive and the B- terminal to chassis ground. Connect R (remote) terminal to a switched 12Vdc source to allow the EQ230 to be turned on/off by the head unit. Connect the DR (delayed remote) terminal to the amplifier remote input terminal to delay amplifier turn-on by 3 seconds.
2. POWER LED: This green LED lights when the unit is operational.
3. INPUT RCA Connectors: Connect to head unit or signal processor RCA line outputs.
4. BALANCED INPUT Connector: Connect to balanced line output of TBA1 (or other compatible balanced source).
5. GROUND ISOLATION Switch: This switch selects either floating or common signal ground when using balanced input. Use the setting which yields lowest system noise.

6. Input GAIN Controls: These controls adjust left and right signal gain from -12dB to +20dB.
7. Input Level Indicators: These LEDs indicate left and right signal level **after** input gain controls.
8. EQ/DEFEAT Switch: This switch routes either equalized or non-equalized signals to the outputs.
9. Post-EQ Level Indicators: These LEDs indicate left and right signal level after equalization, **before** output level controls.
10. Output LEVEL Controls: These controls attenuate left and right output signal level from 0dB to -20dB.
11. OUTPUT RCA Connectors: Connect to amplifier or signal processor RCA line inputs.

How to Use Your Equalizer

Both the EQ215 and EQ215x are stereo 15 band 2/3 octave equalizers, while the EQ230 is a 30 band 1/3 octave equalizer. Basically an equalizer is used to correct frequency deviations. If you are not using a Real Time Analyzer (RTA) to tell you where the dips and peaks in response are (these are called deviations), it will be rather difficult to know where and how much to adjust the equalizer. We highly recommend the use of an RTA to adjust our equalizer or any equalizer. Obviously, you can adjust the equalizer to taste without an RTA, but to make life easier, follow the Basic Rules Of Equalization:

RULE 1: Never equalize more than +/- 3dB at any time. If you have to equalize more than 6dB at any frequency, something is seriously wrong! Most likely a driver is out of phase at or near the frequency.

RULE 2: Since our equalizers are typically mounted in the trunk it is very important to adjust only one or two bands at any one time. Look at the RTA curve then listen to the changes in response.

RULE 3: Remember that an increase of 6dB doubles the voltage. This means you can easily clip the signal when you use excessive boosting.

Level Setting After Equalizing

After equalization is completed using a Real Time Analyzer and your ears, check the post-EQ level indicator LEDs to make sure the signal is not being clipped. While playing a dynamic track, the green LEDs (2V indicators) should be lit almost continuously while the red LEDs (8V indicators) should only flash during musical peaks. Reduce input gain if the red LEDs light too frequently or distortion is audible.

Planning Your EQ Installation

Preplanning the installation will reduce short and long term headaches. The first point to consider is how an equalizer can be incorporated into the current system design.

Typically an equalizer will be installed in the rear of the vehicle, so care should be taken to avoid running signal cables close to power wires and/or factory wiring harnesses that could radiate noise into the signal path. Never mount the equalizer to the chassis of the vehicle (steel parts of the vehicle's body). If your equalizer is installed in the trunk, make sure there is adequate ventilation to minimize condensation and heat buildup.

Installation Instructions

1. For safety, disconnect the battery ground cable during installation.
2. Do not mount the equalizer directly to metal. The case of the equalizer is referenced to audio ground to provide shielding for the circuitry inside. If the case touches the vehicle's chassis it could create a ground loop.
3. Use the processor case as a template to mark mounting hole locations.
4. Drill 1/8" pilot holes for the mounting screws.
5. Mount equalizer using #8x1/2" philips pan head sheet metal screws.
6. Connect equalizer power and signal wiring.

Note for EQ230 with TBA: Make sure that the balanced cable does not short to the chassis of the vehicle. Avoid sharp bends and pinching of the balanced cable. These conditions could cause increased noise in the signal path.

Do not route audio cables and power cables together! This can cause engine noise in your system.

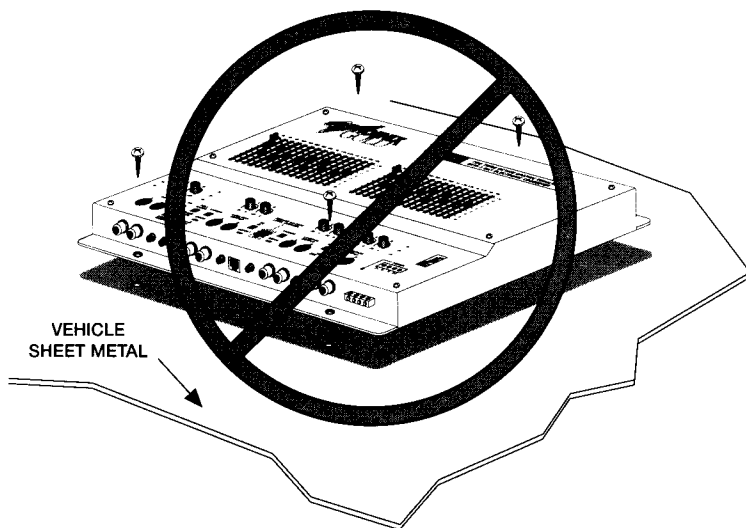
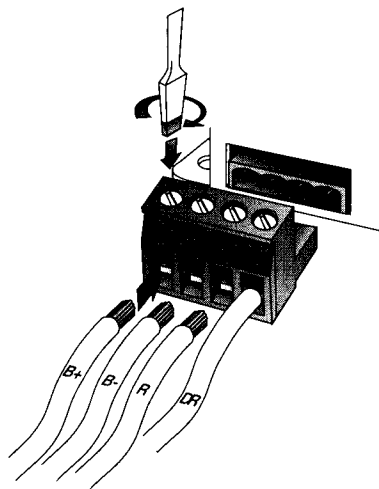
Power Connections

Always remember to disconnect the battery ground before working on a vehicle's electrical system.

Power connections are made to Phoenix Gold equalizers using a 4 position detachable plug which mates to a jack on the front panel of the unit.

Viewed at the back of the plug from left to right, the connections are as follows:

- B+** 12V supply (We suggest using a 2A fuse to protect the B+ wiring.)
- B-** chassis ground
- R** remote input (switched 12V from source unit)
- DR** delayed remote output

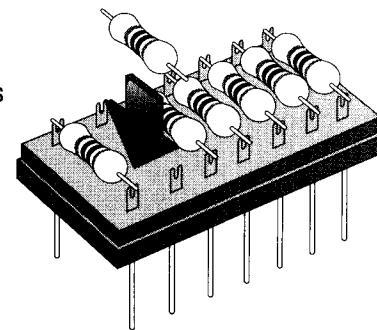


Determining Crossover Frequencies

The EQ215x is supplied from the factory with a 90 Hz 14 pin IC resistor module (commonly known as an R-NET). We recommend that if you choose to change the desired crossover frequency, do this with great care, taking into consideration the size of the speaker as well as the power handling characteristics, location and manufacturer's intent. Passive crossovers are typically utilized in this situation depending on the sound quality desired.

Listen to the bass quality. If it sounds boomy, a lower sub woofer crossover frequency may solve the problem. Sub-woofer crossover frequency settings of 70 Hz or below are common.

Determine the performance of the mid bass speakers. If there is audible popping or bottoming of these speakers, the driver's crossover frequency may be set too low.



Designing Crossover Modules (R-NETs)

Your local authorized Phoenix Gold Dealer will stock the majority of these R-NET modules. If you deem it necessary to build your own modules, use the following formula:

$$\frac{18800}{\text{Desired Frequency}} = \text{Resistor value (K}\Omega\text{s)}$$

If desired frequency = 200Hz, then the equation is as follows:

$$\frac{18800}{200\text{Hz}} = 94\text{k}\Omega$$

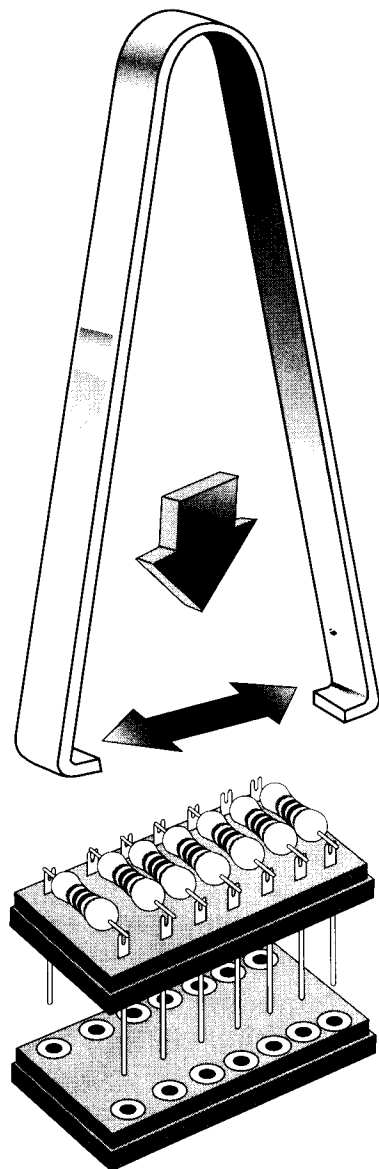
So, for a 200Hz crossover, use seven 94k Ω 2% resistors and a 14 dip header.

Note: For best performance, use new resistors with 5% or lower tolerance.

Installing the R-NET

To change the R-Net, you must first remove the top cover of the EQ215x. This is a simple operation.

1. Remove the 8 gold plated Phillips head screws from the cover and lift the cover off.
2. Locate the R-Net frequency chip on the lower circuit board. Carefully remove the R-Net, using an IC puller if possible since the R-Nets tend to be fragile.
3. Plug in the new R-Net, then inspect it to ensure all the pins are properly inserted.
4. Replace the cover and screws.



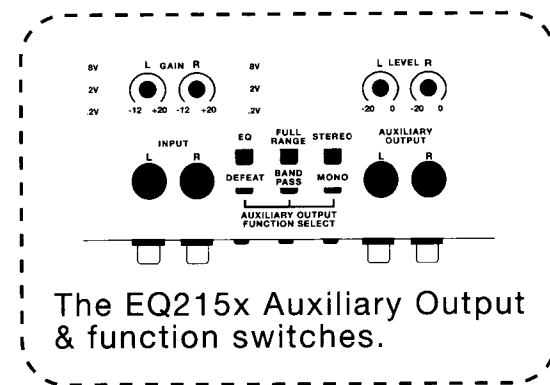
Auxiliary Output

We incorporated a rather interesting feature into the EQ215x that isn't available from any other manufacturer. Our exclusive Auxiliary Output—yeah, we know what you're thinking. Big deal, right? Everybody has an Auxiliary Output!

Actually, it is a big deal, because our Auxiliary Output is a little different from the rest. Now you can easily build a full blown competition vehicle! You can make your vehicle stage, image, and have adjustable rear fill by simply pushing the appropriate switches.

How do you do that, you ask? Just set the STEREO/MONO switch to "MONO" and the FULLRANGE/BANDPASS switch to "BANDPASS" (the EQ/DEFEAT switch can be in either position). Now the Auxiliary Output drives two bandpassed mono channels with independent output level controls. You're there!

Connect the auxiliary output channels to a stereo amplifier where one channel drives the front center speaker and the other drives the rear fill speakers. You now have a stereo system with bandpassed mono center channel and rear fill.



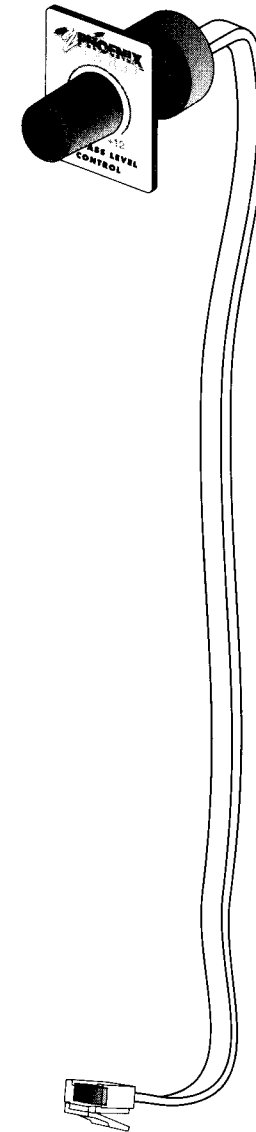
Input Gain And Output Level Adjustment Using Level Indicator LEDs

**Caution! Overdriving the system
could damage your audio components.**

1. Set the equalizer input gain controls to ~11 o'clock (unity gain), the output level controls to 0dB (unity gain), and the EQ/DEFEAT switch to EQ (push-button out).
2. Perform a rough system equalization by ear. It is sufficient to just get close to final equalization at this point, not be perfect.
3. Reset the equalizer input GAIN controls to -12dB and the EQ/DEFEAT switch to DEFEAT (pushbutton in).
4. Select a dynamic track and set head unit volume control just a bit below full volume.
5. Adjust gain controls on any line drivers (PLD1, TBA1, etc.) for maximum unclipped signal level into the equalizer. Listen for the onset of distortion. This maximizes the signal level being transmitted to the back of the vehicle to ensure low system noise.
6. Use the input level indicator LEDs to check signal level. Slowly turn up equalizer input gain controls until the green LEDs (2V indicators) are lit almost continuously and the red LEDs (8V indicators) flash only during musical peaks.
7. Set the EQ/DEFEAT switch to EQ (pushbutton out). Check the post-EQ level indicators to see whether the signal level on either channel is too high: as before, the green LEDs (2V indicators) should be lit almost continuously while the red LEDs (8V indicators) should only flash during musical peaks. If the signal level has been increased significantly by equalization, it may cause distortion. Adjust the input gain controls on the equalizer to reduce signal level if necessary.
8. Adjust equalizer OUTPUT level controls to match output signal level to the input of the following signal processor or amplifier.
9. Perform final system equalization and fine tune equalizer signal levels.

LPL44 Remote Low Pass Level Control

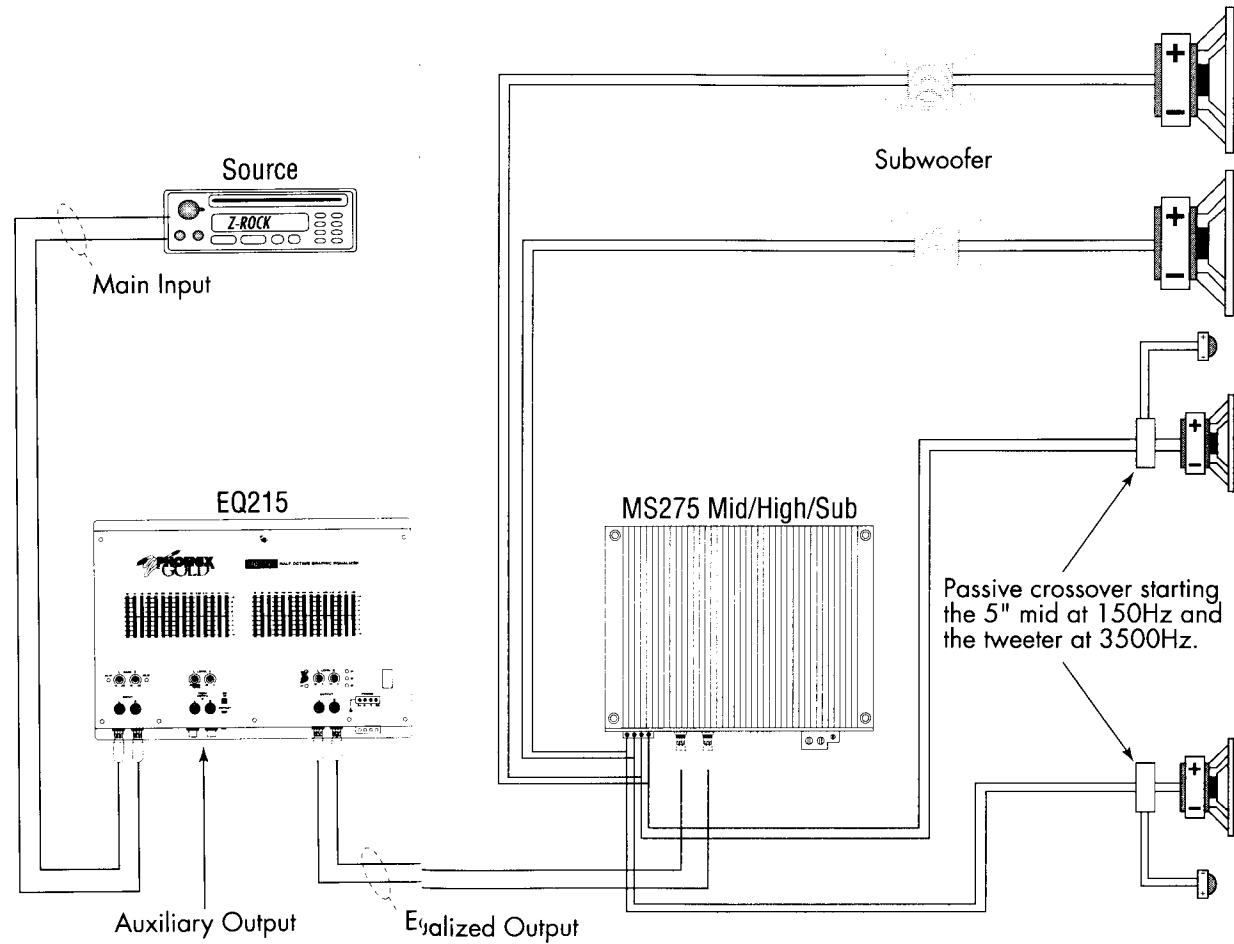
The optional LPL44 Remote Low Pass Level Control provides convenient subwoofer level control from the comfort of your front seat. The LPL44 kit consists of a 50kW potentiometer with cable and mounting hardware.



LPL Installation

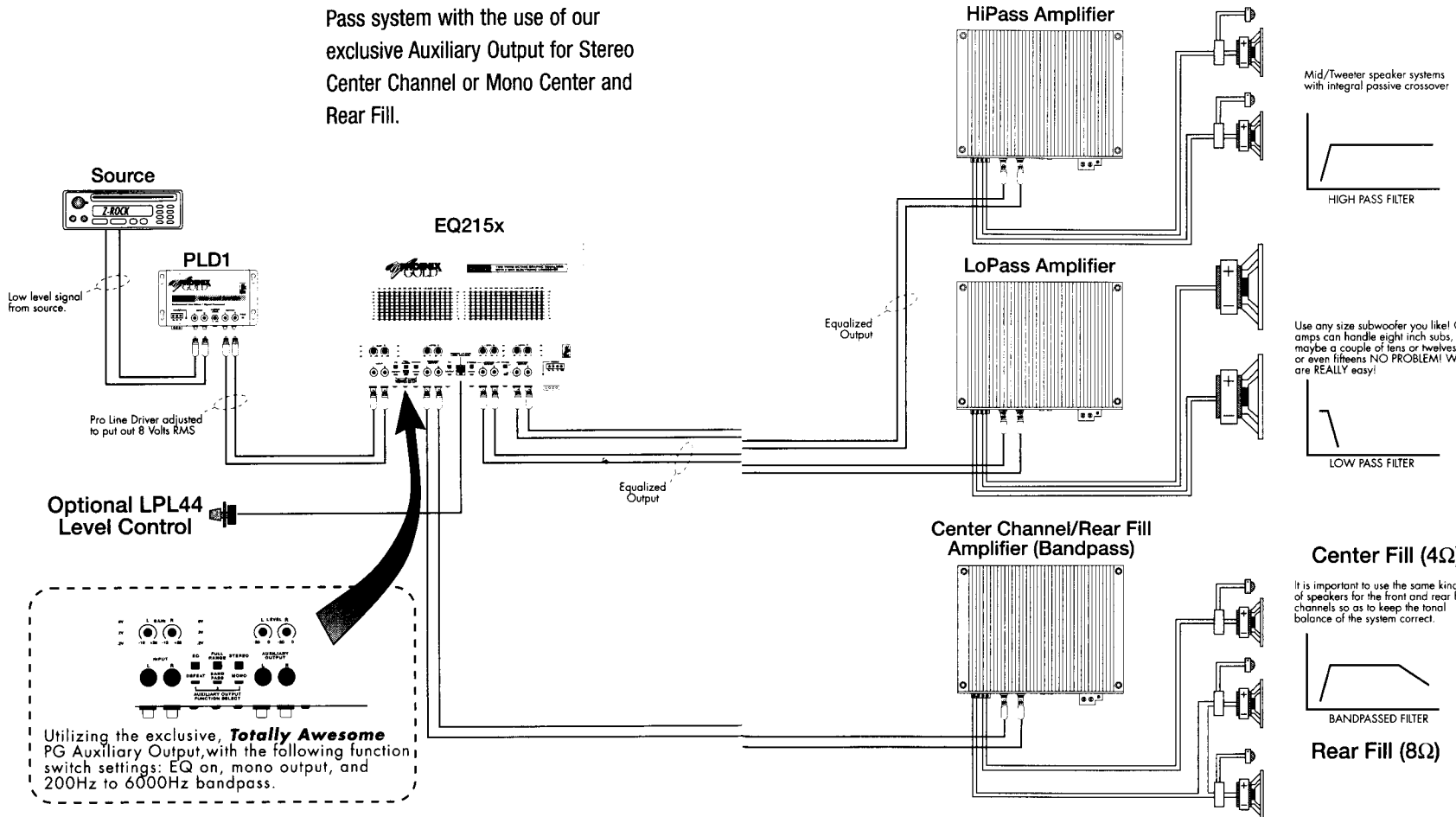
1. Mount the potentiometer as desired. Hardware is supplied in the kit for either through-dash (up to 1/2" thickness) or under-dash control mounting.
2. Route the cable back to the EQ215x and plug it into the modular jack labeled "REMOTE LOW-PASS LEVEL CONTROL".
3. Turn the system on and set the LPL control to maximum.
4. Adjust processor and amplifier gains to bring subwoofer level up to maximum undistorted output. The LPL44 control now allows you to cut subwoofer level from maximum. Normal subwoofer level will likely be lower than maximum.

This neat little system with the MS275 powering everything is one of the most popular around. With the addition of the EQ215 it is sure to increase its sonic quality.

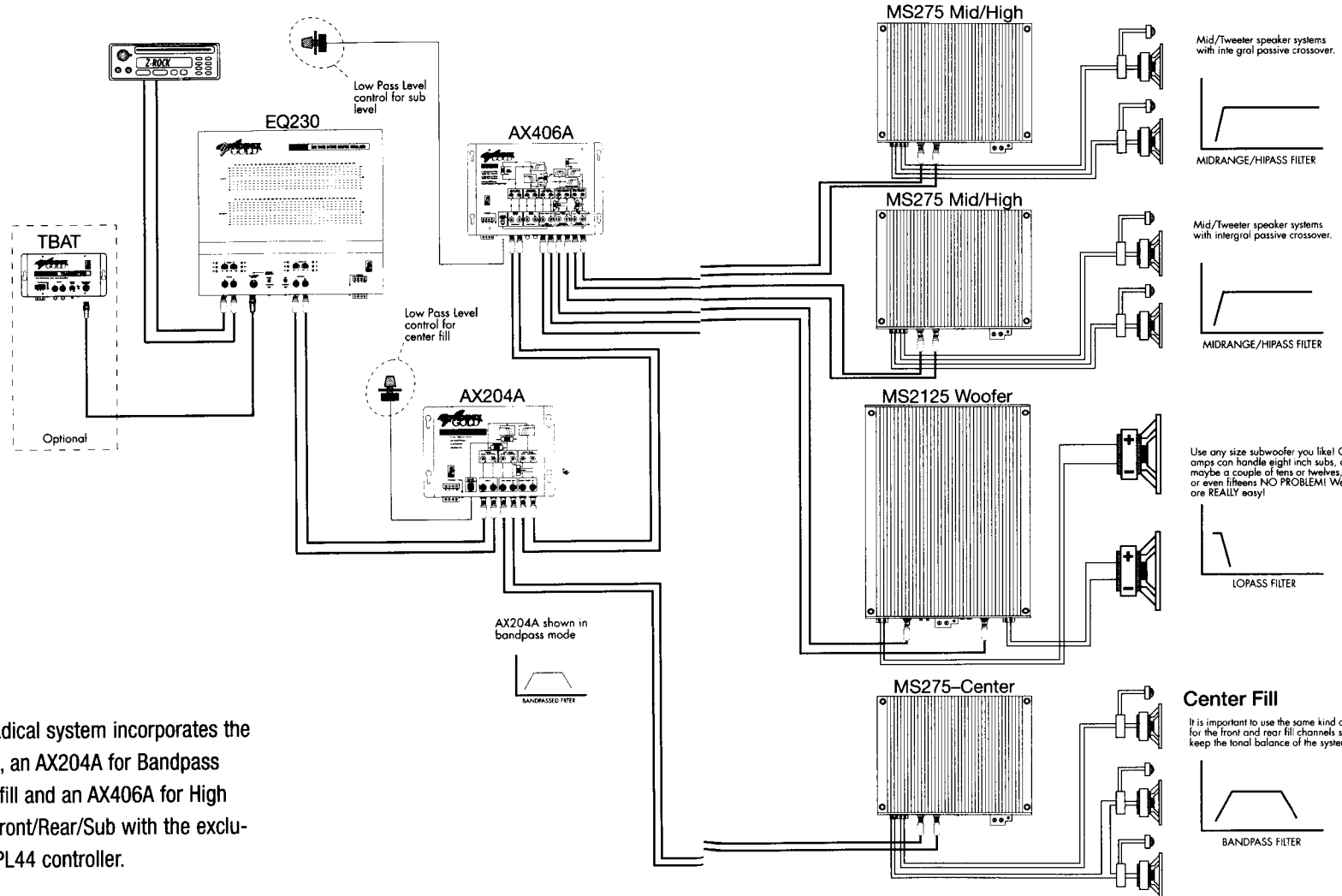


EQ215x SYSTEM EXAMPLE

We designed the EQ215x in order to build this flagship system. As shown below and described previously, it incorporates a High Pass and Low Pass system with the use of our exclusive Auxiliary Output for Stereo Center Channel or Mono Center and Rear Fill.



EQ230 SYSTEM EXAMPLE



This radical system incorporates the EQ230, an AX204A for Bandpass Centerfill and an AX406A for High Pass Front/Rear/Sub with the exclusive LPL44 controller.

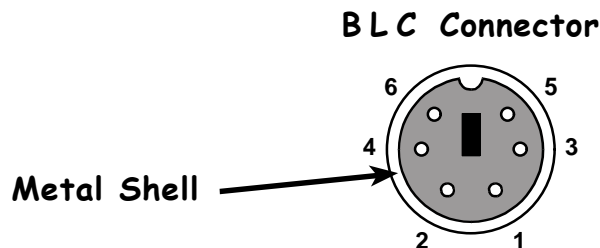
-- Phoenix Gold Tech Tips --

BLC Cable Pin Assignments

Phoenix Gold BLC cable assemblies use six conductor shielded cable with two groups of three conductors twisted together. Each group has two insulated and one bare wire conductor. The ends are terminated with shielded 6-pin, mini DIN plugs (commercially available).

Phoenix Gold BLC cable assemblies are used to connect a TBA+ Balanced transmitter to an EQ230 Equalizer. They are also used to connect a the balanced transmitter and receiver together in a TBA1 set.

Pin 1, Pin 6 and the metal shell are common with respect to signal ground inside the TBA+. They are not common inside the EQ230 or inside a TBA receiver unless the the FLOAT/COMMON switch is in the COMMON position.



View looking at the end of the male connector. Both ends of the cable are identical.

BLC Pin configuration

- Pin 1 - Left bare wire shield
- Pin 2 - Left inverted phase
- Pin 3 - Left normal phase
- Pin 4 - Right inverted phase
- Pin 5 - Right normal phase
- Pin 6 - Right bare wire shield
- Shell - Signal ground



-- Phoenix Gold Tech Tips --

How to interface signal processors that use XBC balanced cables with processors that use BLC cables.

Examples: TBAt (BLC) to EQ232 (XBC) or TBAt2 (XBC) to EQ230 (BLC)

Either scenario requires the use of an XBC cable with one connector removed and replaced with a BLC style connector.

You will need a shielded 6-pin, mini DIN plug (commercially available).

Note: BLC style cables will not accept XBC style connectors.

Attaching a 6 pin mini DIN connector to an existing XBC cable

XBC Cable Conductors	Mini DIN Pin Assignment
Blue (left inverted phase).....	Pin 2
Red twisted with Blue (left normal phase).....	Pin 3
Yellow (right inverted phase).....	Pin 4
Red twisted with Yellow (right normal phase).....	Pin 5
Two bare wires.....	Shell



Views looking at the end of the male connector

XBC Pin Configuration

Pin 1 - Left inverted phase
Pin 2 - Left normal phase
Pin 3 - open
Pin 4 - open
Pin 5 - open
Pin 6 - open
Pin 7 - Right inverted phase
Pin 8 - Right normal phase
Shell - Signal ground

BLC Pin Configuration

Pin 1 - open
Pin 2 - Left inverted phase
Pin 3 - Left normal phase
Pin 4 - Right inverted phase
Pin 5 - Right normal phase
Pin 6 - open
Shell - Signal ground

