

Owner's Manual

AX-406A

4-Channel 2-Way / 2-Channel 3-Way

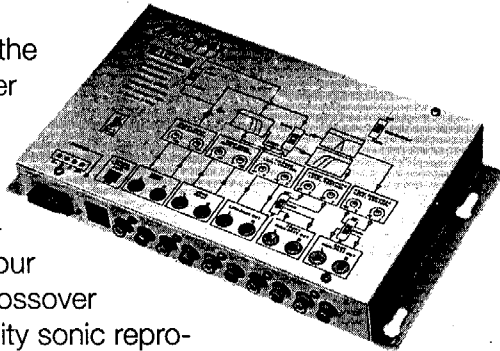
ASYMMETRICAL CROSSOVER

Phoenix Gold

AX-406A ELECTRONIC CROSSOVER

4 Channel 2 Way 18dB Per Octave Asymmetrical Crossover
2 Channel 3 Way 18dB Per Octave Asymmetrical Crossover

Thank you for purchasing the AX-406A Electronic Crossover by Phoenix Gold. In doing so you've demonstrated a desire to own the finest in audio reproduction equipment. Properly installed, your Phoenix Gold electronic crossover will provide years of high quality sonic reproduction. The AX-406A is sophisticated signal processor that offers many features and has the flexibility to expand with your car audio system.



To achieve maximum performance from the AX-406A we recommend that you read this manual thoroughly before installing this crossover in your vehicle. It contains detailed system diagrams as well as valuable information relating to your installation.

TECHNICAL SPECIFICATIONS

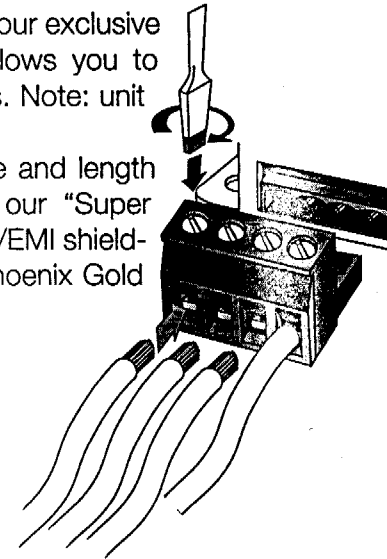
Distortion:.....0.02% THD at 1 KHz 0.02% I.M. at 1 KHz
Frequency response:10 Hz—30 kHz +1/-3 dB
S/N ratio (A weighted):100 dB
Crossover frequencies:.....Plug-in resistor module-any frequency
Crossover slope rate:18 dB per Octave (3rd Order Mrs. Butterworth)
Input impedance:10K Ohms
Output impedance:510 Ohms
Output gain:20dB
Output voltage level:.....9 volts max.
Power source13.8 volts DC negative ground
Input current:.....0.5 amp max.
Dimensions: Chassis: 8-11/16" x 5-3/4" x 1-1/8", Overall: 9-9/16" x 6-3-16" x 1-1/8"
Mounting screw pattern: 9-3/16" x 4-1/2"

NOTE: Due to continuous improvements, specifications and designs are subject to change without notice.

ELECTRICAL INSTALLATION

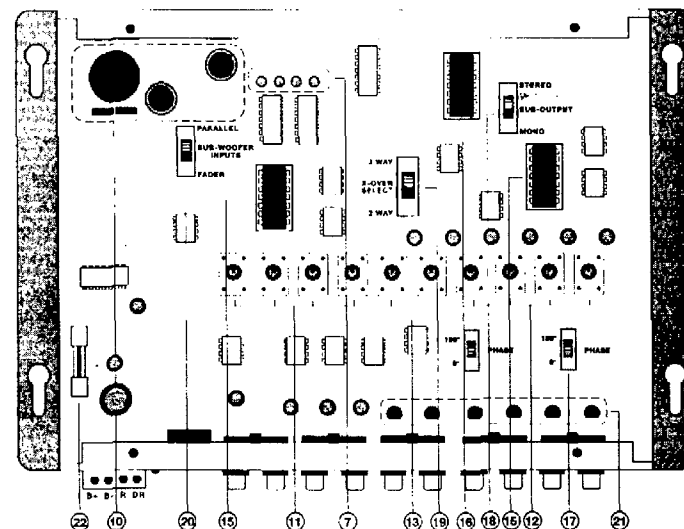
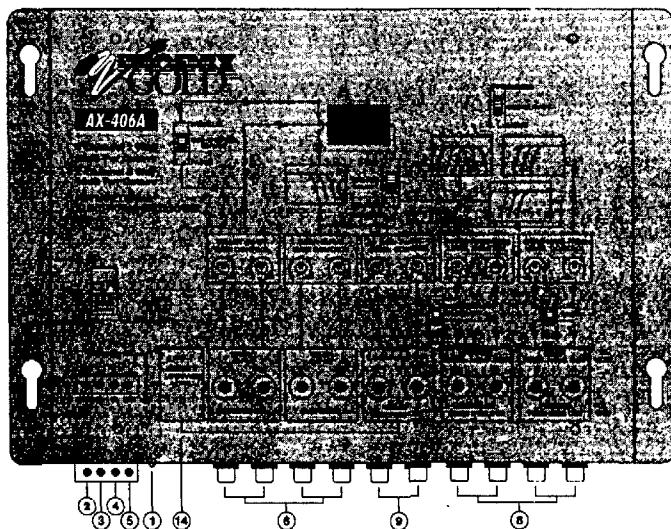
The Phoenix Gold AX-406A is equipped with our exclusive removable termination connector which allows you to build your own custom length wiring harness. Note: unit must be fused externally with 1A fuse.

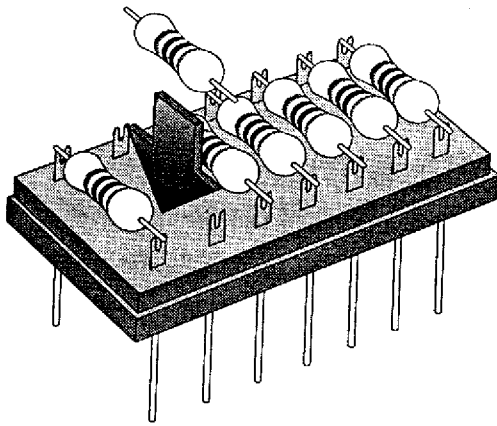
Audio cables are not included as the type and length used often varies. We highly recommend our "Super Triple Shielded" audio cables. These fully RFI/EMI shielded RCA cables are available at your local Phoenix Gold Dealer.



CONTROLS, FUNCTIONS AND FEATURES OF THE AX-406A ELECTRONIC CROSSOVER

1. **Power ON LED Indicator:** This indicator lights up when the unit is operational via power on/off of source unit.
2. **Power Input Terminal (Positive 12 Volts):** Connect this terminal to the vehicle's positive 12 volts supply.
3. **Ground Input Terminal:** Connect this terminal to the vehicle's chassis ground.
4. **Remote Turn-On Input Terminal:** This allows the AX-406A to be controlled via power on/off of your source unit. Connect the remote B+ and/or power antenna lead from source unit to this terminal.
5. **Delayed Remote Turn-On Output Terminal:** Connect to all other signal processors remote turn-on input terminal. This connection delays the turn-on/off of connected components. This delay helps eliminate on/off thump caused by brand incompatibility.
6. **Front/Rear Stereo Signal Input Jacks:** Accepts up to 9 volts AC. Connect to pre-amp outputs of source unit.
7. **Peak Overload LEDs:** LEDs are used to accurately adjust input sensitivity. See Input Level Adjustment Section...
8. **Front/Rear High Pass Outputs:** Connects to the High Pass (mid and tweeter) amplifier. Frequency is selectable via internal plug-in IC module.
9. **Low Pass Output:** Connects to the Low Pass (subwoofer) amplifier. Frequency is selectable via internal plug-in IC module.
10. **Pulse Width Modulated Power Supply:** Reduces AC ripple and other impurities that would interfere with circuitry.
11. **Front/Rear Input Gain Controls:** Allows variable adjustment of the left and right input Gains from 0 - 20dB. These controls are Mono.
12. **Front/Rear High Pass Output Level Controls:** Provides correct level matching with the High Pass (mid and tweeter) amplifier. See level Adjustment Section for more information.
13. **Low Pass Output Level Controls:** Provides correct level matching with the Low Pass (Subwoofer) amplifier. See Level Adjustment Section.
14. **Low Pass Level Controller Input:** (Optional) This dash mount potentiometer enables the user to control the Bass gain from the front of the vehicle.
15. **High Pass Crossover Plug-In Module Sockets:** These are IC sockets that the Front/Rear High Pass crossover resistor modules plug into.
16. **Low Pass Crossover Plug-In Module Socket:** This is the IC socket that the Low Pass crossover resistor modules plug into.
17. **Phase Inverter Switch:** Engaging this switch shifts subwoofer output signal 180 degrees "out of phase" relative to the High Pass output.
18. **Subwoofer Stereo/Mono Switch:** Engaging this switch changes the subwoofer output from stereo to mono mode operation.
19. **Crossover 2/3 Way Switch:** Controls operation mode. 2 way mode: Front/Rear outputs are High Pass only. 3 Way mode: Front outputs become Bandpass (Midrange) and rear outputs become Tweeter.
20. **Parallel Fader Switch:** Used for fadable operation. Parallel mode: AX-406A will accept Front inputs only while still driving all outputs. Fader mode: Allows unit to fade between Front/Rear outputs (2 way only).
21. **Fully Muted Output Circuitry:** Attenuates the AX-406A inputs and outputs 25dB during turn on/off.
22. **Reverse Polarity Protection:** A 1 AMP internal fuse protects the unit against improper power wire connections.





You may also use the newer 16-pin R-Nets, by utilizing only 14 of the 16 pins. The crossover frequencies will be roughly the same, although it is recommended to measure the resistance to find the exact crossover frequency.

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:

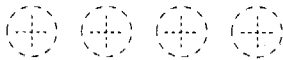
$$\frac{18800}{200\text{Hz}} = 94\text{k}\Omega$$

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.

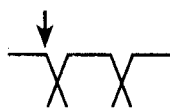
AX204, AX204a, AX406a, EQ215x

AX 406A Adjustment Template



Clip LED's

Low-Pass Crossover Module



2-way and 3-way corner frequency

U25

STEREO



Sub Output

MONO

PARALLEL

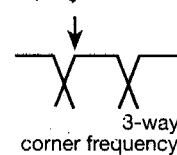
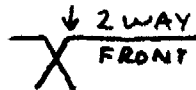
In "Parallel" mode the low-pass crossover receives signals from front and rear inputs.

USE PARALLEL IN 3-WAY MODE

Sub Inputs

FADER

In "Fader" mode the low-pass crossover receives signals from the rear inputs only.



U23

Front High-Pass Crossover Module

X-Over Select

3-WAY

In "3-Way" mode only the front main inputs can be used, and lowpass, bandpass and highpass outputs are active.

In "2-Way" mode front and rear inputs can be used and front highpass, rear highpass and rear lowpass outputs are active.

2-WAY

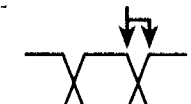
Note: The rear highpass crossover receives signals from the rear inputs when this switch is in 2-way mode.

U24

Rear High-Pass Crossover Module

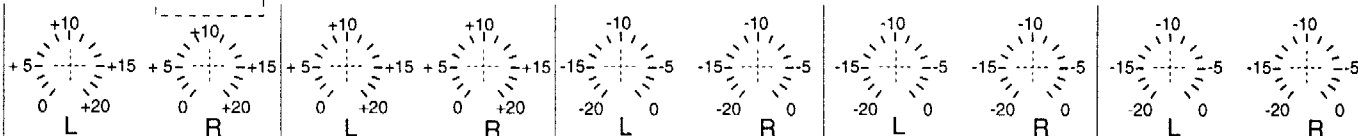


2-way corner frequency



3-way corner frequencies

Controls



2-Way Mode Function

Front Input Gain Control

Rear Input Gain Control

Low-Pass Level Control

Rear High-Pass Level Control

Front High-Pass Level Control

3-Way Mode Function

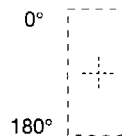
Main Input

Not Used

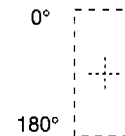
Low Pass

Midrange Band Pass

High Pass



Phase



Phase

Hint: When adjusting gain and level controls, always adjust **input** gains as low as possible and **output** levels as high as necessary to drive the amplifier to full power, **but not to a hard clip.**

Phoenix Gold AX406A

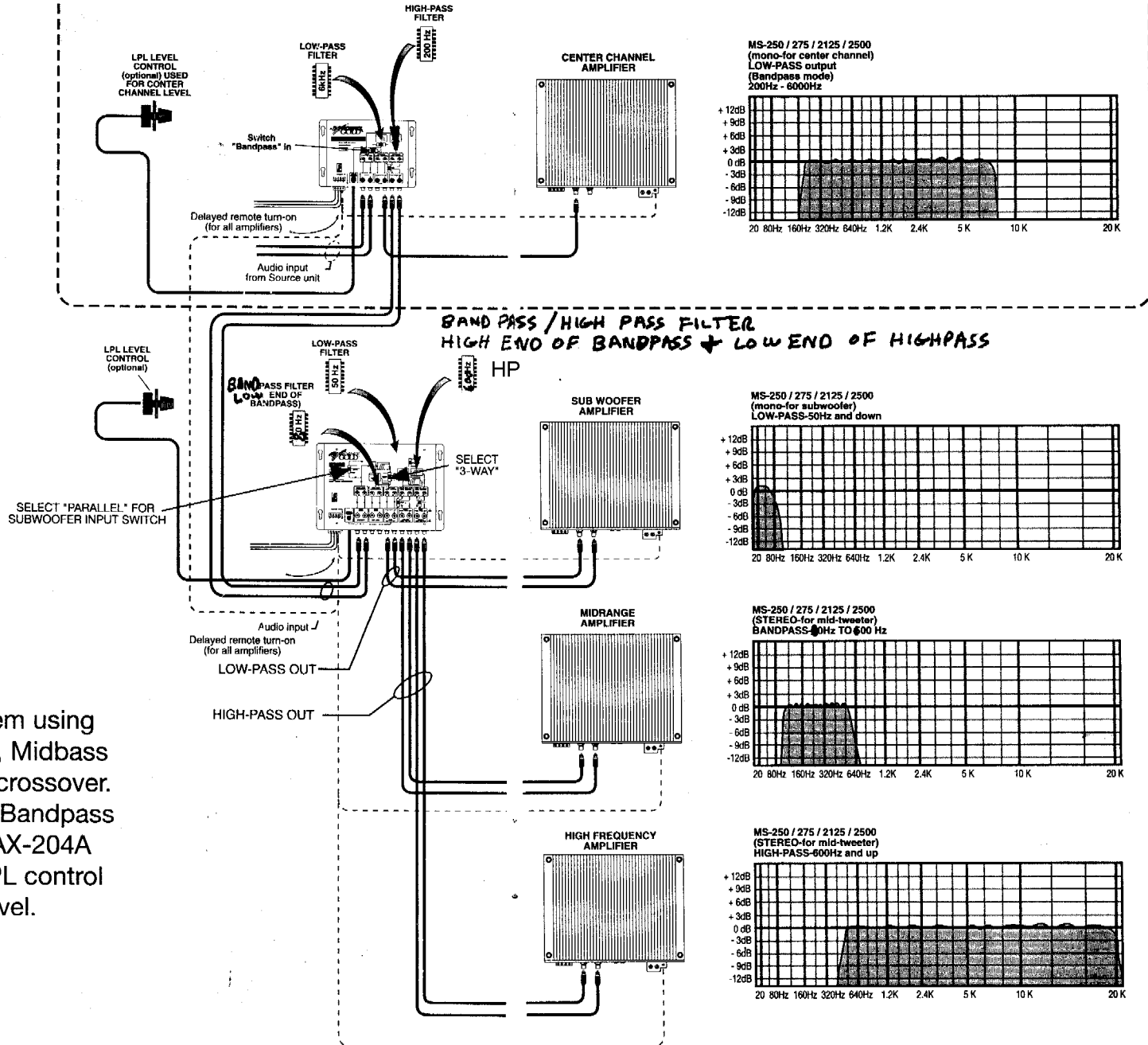
Three-Way Configuration

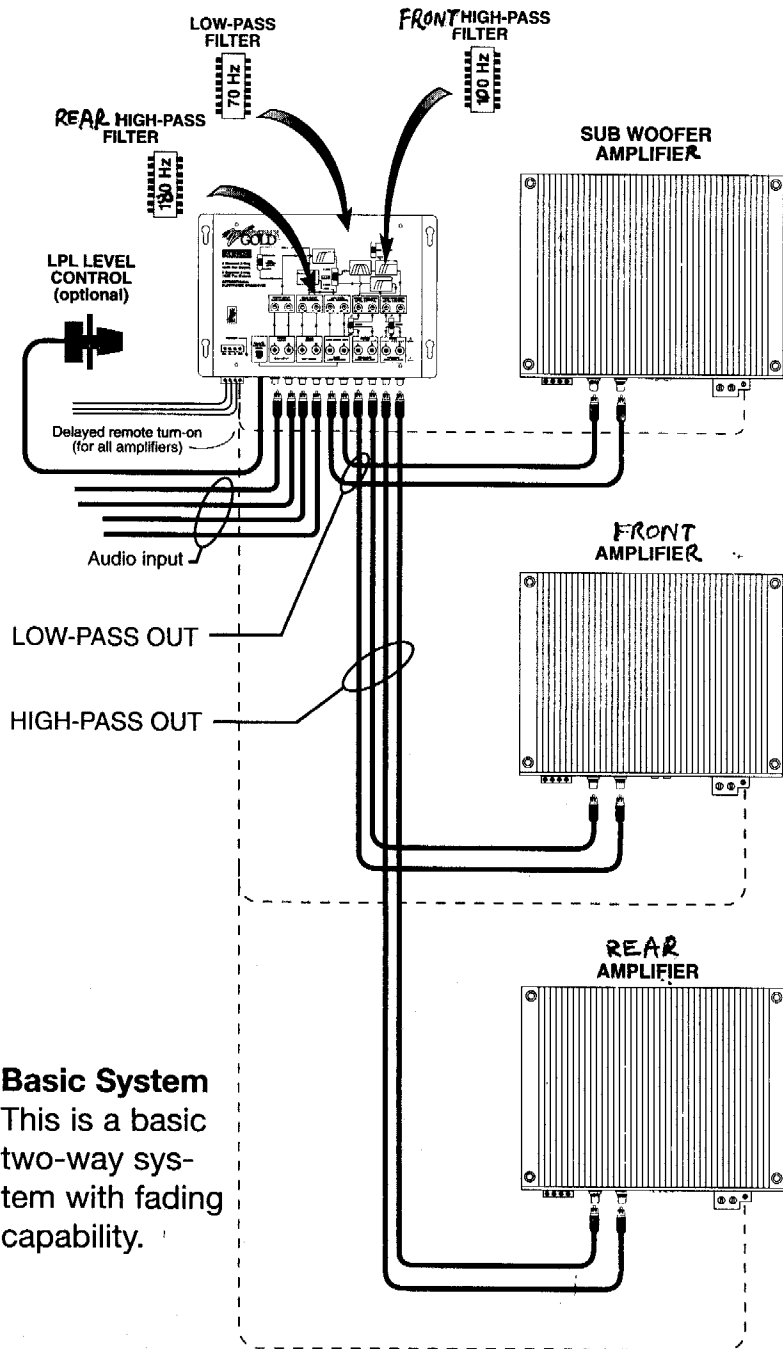
1. Set X-Over Select switch to "3-WAY" and Subwoofer Input switch to "PARALLEL".
2. Connect input signal to "Main Input/Front Input" jacks.
3. Bass low pass output is from "Bass Low Pass Out/Front Low Pass Output" jacks. Low pass output corner frequency is set by R-Net plugged in socket U25.
4. Midrange output is from "Midrange Band Pass Out/Front High Pass Out" jacks. Band pass lower corner frequency is set by R-Net plugged in socket U23; upper corner frequency is set by R-Net plugged in socket U24. (see #5)
5. High Pass output is from "Tweeter High Pass Out/Rear High Pass Out" jacks. High pass output corner frequency is set by R-Net plugged in socket U24. (see #4)
6. Use the following formula to determine the R-Net resistor value you need:
Resistor Value (kOhms)=18800 divided by the desired frequency (Hz)

Example: For 200Hz corner frequency, $R=18800/200\text{Hz}=94\text{kOhms}$.

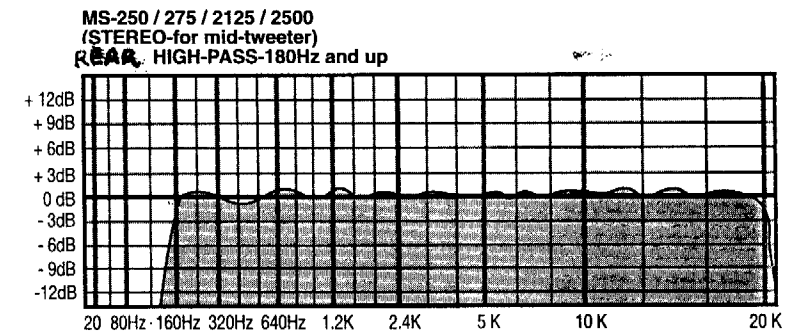
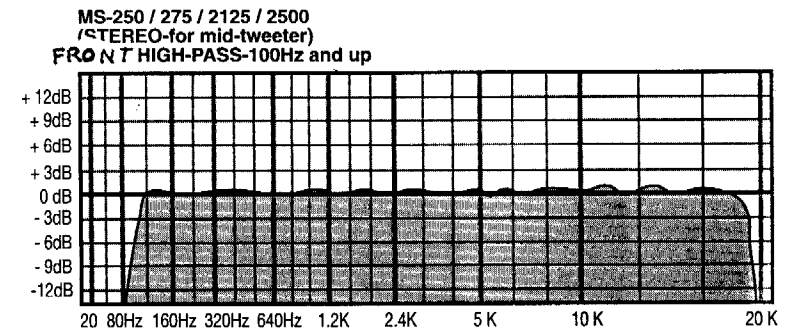
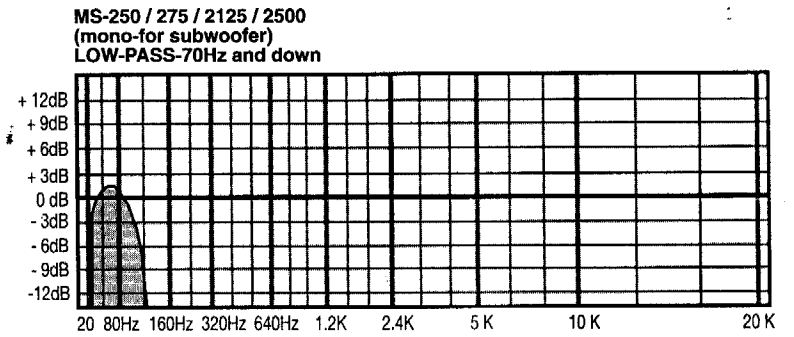
Use 1/8 watt, 5% (or better) tolerance resistors for good performance.

OPTIONAL CENTER CHANNEL CONFIGURATION





Basic System
 This is a basic two-way system with fading capability.



AX406A Adjustments

1. Turn all amplifier input gains to minimum.
2. Set all tone controls, balance and fader of your headunit to the center (flat) positions.
3. Remove the cover of the AX406A.
4. Set all output level controls of the AX406A to -20 dB (full counterclockwise).
5. Select either mono or stereo for the low pass output. Select mono if the lowpass output is used for subwoofers. Select stereo for all other applications.
6. Use a very dynamic recording for adjustments. Set the volume control of the headunit to maximum undistorted output (on most headunits this will be approximately 7/8 of maximum volume). Make sure the output of the deck is not clipping.
7. Adjust the input gains and output levels of all signal processors between the headunit and the AX406A as per the manufacturer's instructions. Start with the first processor after the headunit and work your way down the signal path to AX406A. Make sure the output of these processors is not clipping.
8. Turn up the input gain control for each channel of the AX406A until the peak LED for that channel blinks steadily with the music (clockwise).
9. If using the optional LPL44 level control, disconnect it or turn it to maximum.
10. A. For outputs of the AX406A that are connected directly to an amplifier:
Turn up each output level control on the AX406A until the speakers connected to that channel begin to distort. Then turn the level down just enough to remove the distortion. If this adjustment cannot drive the speakers to distortion, then and only then should the amplifier gain control be turned up.
NOTE: If the lowpass output is too loud, it can be turned down with the optional LPL44 level control.
B. For outputs of the AX406A that are connected to another signal processor:
These output levels will be determined by the input level needs of the next processor (check with the manufacturer's instructions).
11. Adjust the input gains and output levels of any additional processors between the AX406A and the amplifiers. Start with the next processor after the AX406A and work your way down the signal path to the amplifiers.
NOTE: Use the last signal level adjustment before the amplifier to reach maximum undistorted output from the speakers. If this final adjustment cannot drive the speakers to distortion, then and only then should the amplifier gain control be turned up.
12. Listen to various musical tracks and determine if the overall balance between the amplifiers is correct. If any of the amplifiers is too loud compared to the others, turn the signal going into that amplifier down until the level is correct. Try switching the phase of the highpass outputs back and forth from 0 to 180 degrees and listen to the effect. There will likely be a change in the sound level around the crossover points of that channel. The correct setting is the one that sounds the best.
13. With the levels set correctly, maximum output of the system is reached at the same point on the volume control of the headunit that was set during step 6.