Analog and Digital Systems
One Progress Way
Wilmington, MA 01887
USA

a/d/s

a/d/s

PQ20.2

four channel
400 watt amplifier

Owner's manual

Introduction

Thank you for purchasing the a/d/s/ PQ20. The PQ20's four channel design gives it unusual flexibility. It can be used as a four channel amplifier to drive four separate speaker systems (or two subwoofers and two satellite speakers), as a three channel amplifier to drive a single subwoofer and two satellite speakers, or as a high-power, bridge-mode two channel amplifier to drive two speaker systems.

This manual provides information on the connection and use of your PQ20. Please read it thoroughly. We suggest you save this manual and the PQ20 packing materials for future use.

Thank you,
Analog and Digital Systems, Inc.

About this manual

Because of the PQ20's high power output capability and the wide choice of system configurations the PQ20 allows, we strongly recommend that you seek professional installation services.

This manual contains information about the typical connection, use and maintenance of the PQ20. Diagrams show the connections for typical systems. These diagrams provide sufficient information to guide the skilled technician in installation. Basic information about installation, such as the importance of wiring polarity or techniques for solving grounding problems, is not provided here. Please consult your a/d/s/ dealer or a qualified technician for details not covered here.

Controls and features

About names: Signal sources and processors for the car have many names—radio, head unit, compact disc player, radio/CD player, equalizer, and so on. We call all signal sources *head units.*

DC power terminal block provides connections for the 12VDC power wires. The wires are clamped securely in the terminals by screws accessible through holes in the top of the chassis directly above the terminals between the heatsink fins.

Due to its unusually high power output capability, the PQ20 uses two separate sets of +12V and ground wires, with a fuse for each +12V line.

ground terminals connect the ground wires to the PQ20. The ground wires run between the PQ20 and a connection point on the chassis of the automobile.

+12V terminals connect the power supply wires which run between the PQ20 and the positive terminal of the battery.

remote terminal connects the control wire which provides remote power turn-on of the PQ20 by the head unit or a dash-mounted switch.

30A fuses protect both the PQ20 and the automobile's electrical system from fault conditions. The fuses are standard automotive plug-in type ATO.

ch 1, ch 2, bridge 1-2 speaker terminal block connects the wires of two speaker systems to the PQ20. The wires are clamped securely in the terminals by screws accessible through holes in the top of the chassis directly above the terminals between the heatsink fins.

ch 3, ch 4, bridge 3-4 speaker terminal block connects the wires of two more speaker systems to the PQ20 in the same way as the ch 1, ch 2 terminal block.

stereo 1-2/bridge 1-2 switch sets the PQ20 for proper operation with either one speaker system connected to each channel when in stereo mode, or a single speaker system driven from both channels when in bridge mode.

ch 1/br 1-2, ch 2 input jacks receive the output signals from two channels of the head unit or electronic crossover.

ch 3/br 3-4, ch 4 input jacks receive the output signals from two channels of the head unit or electronic crossover.

stereo 3-4/bridge 3-4 switch sets the PQ20 for proper operation with either one speaker system connected to each channel when in stereo mode, or a single speaker system driven from both channels when in bridge mode.

input 8-pin DIN jack provides all input signal and remote power switch connections in a single jack. This jack offers quick and accurate hook-up to a/d/s/ signal processing units, such as the 642CSi. The pin connections at this jack are in parallel with the 4 phono jack input connectors and the remote power terminal on the PQ20. Pin-out information is in the **Specifications** section of this manual.

ch 1/ch 2/bridge 1-2 and ch 3/ch 4/ bridge 3-4 Input level controls adjust the gains of pairs of channels for balancing and for matching the output level of the signal source. Each of the PQ20's level controls adjusts two channels simultaneously in stereo mode, and each adjusts the level of a bridged pair of channels in bridge mode. The controls (one adjustment for both channels 1 and 2, and one for both channels 3 and 4) are screwdriver adjustable. The controls are accessible through holes in the top of the chassis between the heatsink fins.

Cast aluminum chassis with integral heatsink makes the PQ20 mechanically strong and physically small. It provides excellent cooling for the power supply and amplifier circuitry.

Hardware kit for the PQ20 contains:
4 ea. spacers to raise the PQ20 above the mounting surface.
4 ea. Phillips-head sheet metal screws to attach the PQ20 to the vehicle.
1 ea. screwdriver to tighten power and speaker wire terminal clamp screws and to adjust the input level controls.

Warnings

Be careful not to cut or drill into gas tanks, fuel lines, brake or hydraulic lines, vacuum lines or electrical wiring when working on your vehicle.

Do not use the PQ20 unmounted. Attach the PQ20 securely to the vehicle to prevent damage to either the PQ20 or the vehicle and its contents, particularly in the event of an accident.

Keep the PQ20 away from locations subject to leakage or immersion in water.

Do not mount the PQ20 so that the wire connections are unprotected or are subject to pinching or damage from nearby objects or people's feet.

Make sure the **stereo 1-2/bridge 1-2** and **stereo 3-4/bridge 3-4** switches are correctly set for your particular installation.

The +12V power supply wires *must* be individually fused at the battery positive terminal connection. Use fuses of the same current rating as the fuses in the PQ20. Disconnect the +12V wires at the battery end before making or breaking power connections at the PQ20's power terminals.

If you need to replace a PQ20 power fuse, replace it only with a fuse identical to that supplied with the PQ20. Use of a higher rating fuse may result in damage to the PQ20 which is not covered by the warranty.

Make sure your head unit and/or other equipment is turned off while connecting to the PQ20 input jacks and speaker terminals. Turn on the various components and slowly advance the volume control only after checking and double-checking all connections.

Associated equipment

The PQ20 will work well with many different types of signal sources and speakers, but the final result depends on your choice of equipment. Your a/d/s/ dealer can help you select components to complement the high performance of the PQ20. a/d/s/ automotive loudspeaker systems are particularly well suited for use with the PQ20, thanks to their broad frequency response, low distortion and wide dynamic range. Consult your a/d/s/ dealer for information.

Installation notes

The PQ20 generates heat in normal operation. Be sure that the cooling fins of the PQ20 are in free air and are not against a panel or other surface.

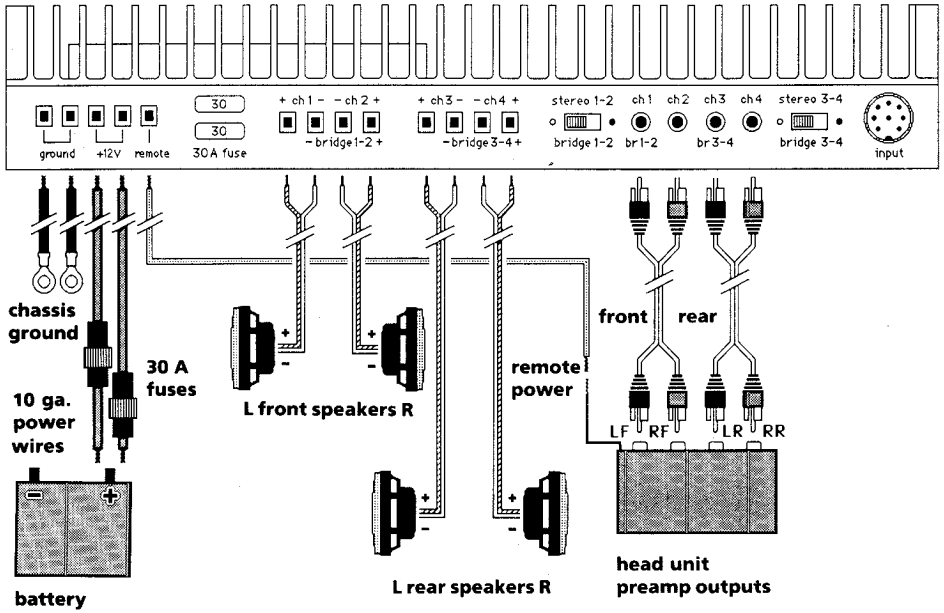
The **+12V** and **ground** wires **must** be 10 AWG stranded copper wire with heavy insulation. Smaller gauge wire will cause increased power losses and can lead to dangerous overheating conditions.

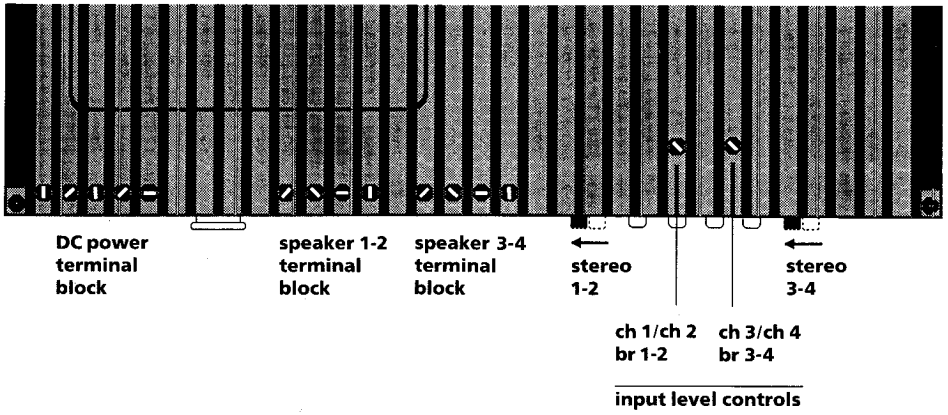
The **remote** wire can be relatively light wire; 18 AWG is recommended. Keep the length of all wires as short as possible.

Make all speaker connections with 16 AWG or larger wire.

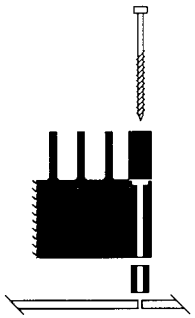
The PQ20 can receive input signals either from low level sources (the pre-amp outputs on the head unit or the outputs from an electronic crossover used in a subwoofer/satellite system—or from high level sources such as the speaker outputs of a head unit. The PQ20's **ch 1/br 1-2, ch 2** and **ch 3/br 3-4, ch 4** input jacks are used for either type of source. The adjustment range of the PQ20's input level controls lets it work with either type of source. See **Operation**, following, for information on setting levels.

PQ20 connections

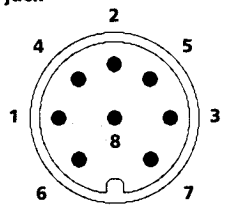




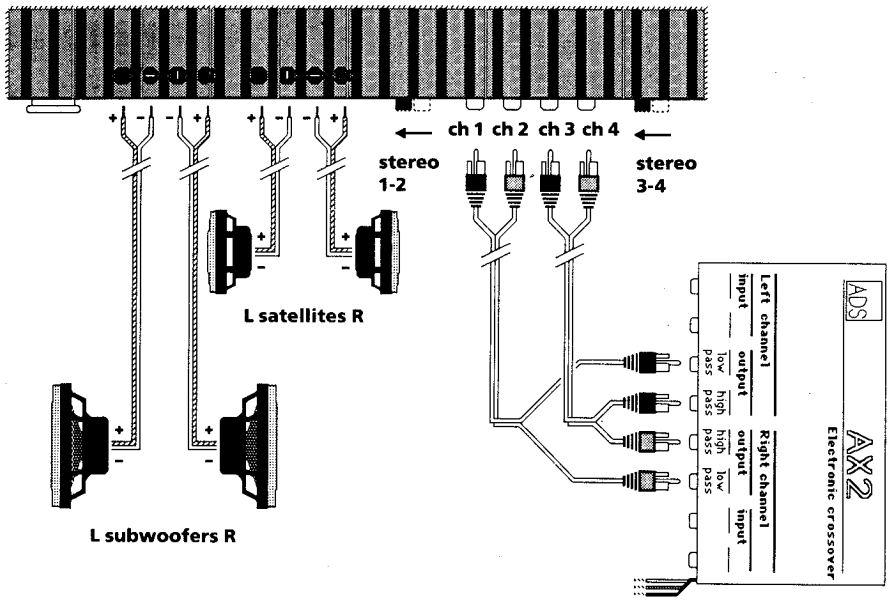
PQ20 mounting



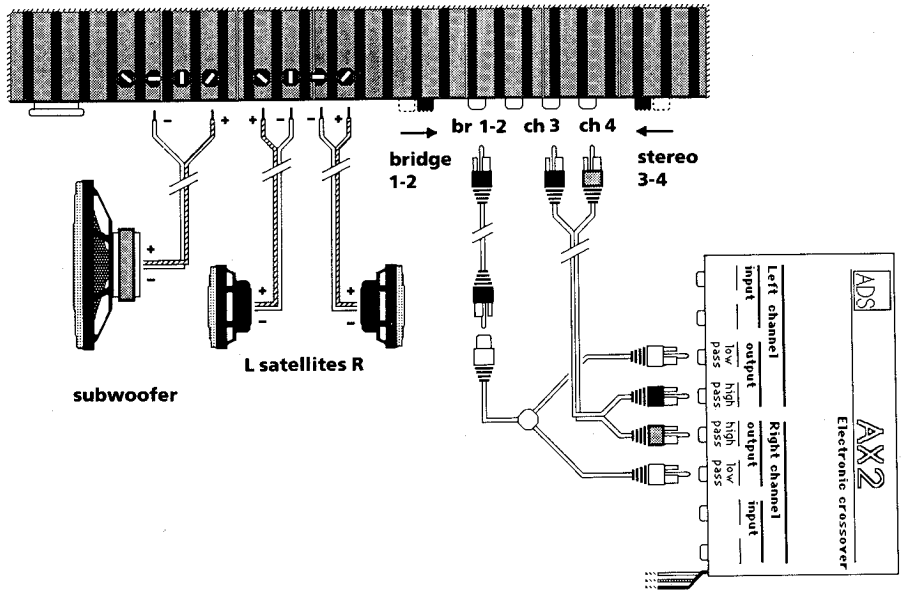
8-pin DIN input jack pin locations viewed from the front of the jack



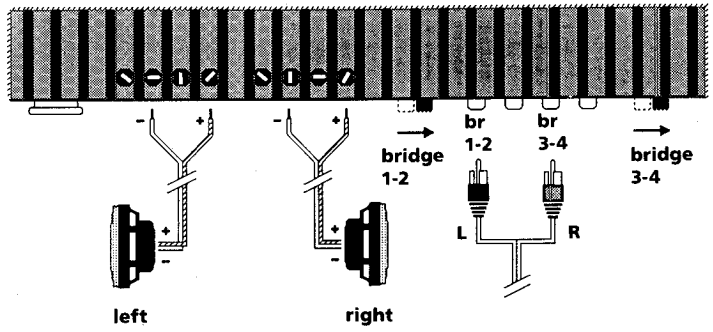
Four channel, subwoofer/satellite wiring



Three channel, subwoofer/satellite wiring



Two channel, two speaker bridge mode wiring



Your system will probably be, or be like, one of the following typical configurations:

A
Four channel, four speaker stereo with four full-range speakers.

B
Four channel, four speaker stereo with two subwoofer and two satellite speakers.

C
Three channel, single subwoofer/two satellite speaker stereo.

D
Two channel, two speaker stereo.

Diagrams of these typical systems are found inside the covers of the manual.

Typical configurations

A
Four channel, four full-range speaker stereo Usually, the four channels of the PQ20 are driven from four outputs on the head unit. These outputs typically are Left Front, Right Front, Left Rear and Right Rear. The speakers connected to the PQ20 are located in the corresponding positions in the vehicle. Set all channels of the PQ20 to stereo mode.

When the head unit has only two stereo outputs (Left and Right), these outputs are split with "Y" adapters to provide two Left outputs and two Right outputs.

B
Four channel, two subwoofer/two satellite speaker stereo In the case of the subwoofer/satellite system, the head unit's outputs are fed through the electronic crossover to the PQ20, so that the Front outputs drive the satellite speakers in the front and the Rear outputs drive the subwoofers in the rear. This wiring lets you use the head unit's Front/Rear fader to adjust the relative balance of the subwoofers and satellites. Set all channels of the PQ20 to stereo mode.

When the head unit has only two outputs (Left and Right), the electronic crossover takes two inputs and provides four outputs as a normal part of its function.

C
Three channel, single subwoofer/two satellite speaker stereo In this system, two channels of the PQ20 are in bridge mode to drive the subwoofer while the other two channels are used in stereo mode to drive the satellite speakers. The two subwoofer (low-pass) outputs of the electronic crossover are "Y"ed together to provide a single output to the bridged channels of the PQ20. The head unit's connections to the electronic crossover are the same as in the four channel systems.

D
Two channel, high-power stereo In this system, both pairs of amplifiers in the PQ20 are in bridge mode to provide two high-power channels of amplification, driving two speaker systems. The speakers can be full-range systems or subwoofers or satellites—but only two can be used.

There are many other configurations possible—for example, two PQ20's can be used to make a powerful six channel system with two subwoofers and two biamplified satellites. However, all will be variations of the basic configurations shown here.

Operation of the PQ20 consists of correctly setting the **stereo/bridge** switches, adjusting the input level controls, and avoiding use conditions which result in distortion and poor sound quality.

Setting the stereo/bridge switches

When you are using the PQ20 as a four channel amplifier with four speaker systems connected, set the **stereo/bridge** switches to the left-hand, **stereo** positions. When you are using the PQ20 as a high-power, two channel bridged amplifier driving two speaker systems, set the switches to the right-hand, **bridge** positions. When you are using the PQ20 as a three channel amplifier, set the switch of the two amplifiers you are bridging to the **bridge** position, and set the other switch to the **stereo** position.

Trying the system Once you have checked that all connections to the PQ20 are secure and correct, you may try the system. Initially set the PQ20's input level controls to full counter-clockwise rotation (fully down). Turn on the power to your head unit, and then, if the PQ20 is separately switched, turn on the

remote switch for the PQ20. Leave the volume control on the head unit turned down for a moment to allow the PQ20 to power up. You may hear a mild 'pip' through the speakers when the PQ20 turns on.

Turn up the PQ20's input level controls to mid-rotation. Select a program source on the head unit and slowly turn up the volume control. If no sound or distorted sound is heard, immediately turn off the system, check fuses and check all power and signal wiring for correct and secure connections. If the problem persists, consult with your dealer or service technician.

Input level adjustment Before following the procedure for adjusting input levels, **be sure** your speakers are rated for the maximum power output capability of the PQ20.

Be certain that the PQ20's input level controls are fully counter-clockwise (fully down) and set the tone and balance controls of the head unit to mid-rotation. Set the head unit's volume control to full clockwise rotation (fully on).

Each of the PQ20's level controls adjusts two channels simultaneously in stereo mode, and each adjusts the level of a bridged pair in bridge mode. Be sure that the **stereo/bridge** switches are in the correct positions before adjusting the PQ20's input level controls.

Note: In some head units, the output levels from the radio and from cassette tapes or compact discs may be substantially different. Check all sources when setting the PQ20's input level controls to be sure that all provide maximum undistorted output.

Adjust the PQ20's level controls clockwise until the sound is at a comfortable level for you and the pairs of channels are balanced. Now listen for clarity and freedom from distortion in the sound. If you hear distortion, slowly turn the head unit's volume control down until the sound is clear. If you don't initially hear distortion, leave the head unit's volume control at full rotation. In either case the resulting volume control setting is the maximum for undistorted output from the unit.

Now turn the PQ20's input level controls up until the sound is distorted (limited by either the amplifier or the speakers). The sound level will likely be very loud, so when the levels are reached where distortion occurs, quickly turn down the head unit's volume control. The above procedure maximizes the system signal-to-noise ratio and its overall reliability. These settings of the input level controls should result in a satisfactory range of sound levels from very soft to full output.

Maintenance

The PQ20 requires little routine maintenance. Keep the chassis free from dust and dirt, and check the quality of the various connections every few months, with the power off.

Do not use solvents or liquid cleaners of any kind on the PQ20's chassis. Dust and dirt can be removed with a dry cloth or soft brush.

In case of difficulty

The most common difficulties are noise and/or distortion, and thermal cycling. A blown PQ20 fuse is an unusual occurance. If you want to talk to us about any problems, call:

Customer service department
617-729-1140, between 9am and 5pm, Eastern time.

System noise and distortion The background noise level of the system will vary widely with different equipment and the choices of individual component grounding points. This noise usually consists of "alternator whine," a buzzing sound which changes in pitch as the engine RPM changes.

Do not confuse this noise with the normal background "hiss" which occurs when playing tapes at high levels, or the various "static" noises which normally occur with AM and FM radio reception. The tape hiss and static noises are either normal or the result of problems with the head unit and have nothing to do with the PQ20. Most noise problems resulting from grounding problems are audible even when the volume control of the head unit is turned fully down.

Noise in the system may be normal, depending on its source. Tape "hiss" and radio "static" are common and sometimes unavoidable noises in the system; review

Input level adjustment, preceding, to minimize these noises. Engine speed related noises, especially those heard at low volumes, usually are solvable.

Distortion, especially when it occurs at high volume, may simply be the result of overdriving the amplifier or the speakers or both. Overcoming the noise resulting from driving at highway speeds with the windows down, for example, will tax the abilities of any automotive sound system. The obvious cure is to reduce the volume level of the system.

A defective loudspeaker can also cause distortion. Fuzzy or raspy sound, especially at loud levels, is a sign of loudspeaker failure. Listen to each driver of each loudspeaker system in turn to determine which speaker is defective, and replace it.

Thermal cycling The PQ20 is protected from excessive temperatures by a thermal cutout which turns off the power converters when the heatsink temperature exceeds approximately 80°C. Normal operation of the PQ20 resumes automatically when the heatsink cools down.

The PQ20 may run excessively hot when:

- cooling air to the heatsink is blocked
- the ambient temperature of the air around the PQ20 is very high
- more than one speaker system is used with a pair of PQ20 amplifier channels in bridge mode (the load is less than 4 Ohms)

Check the setting of the stereo/bridge switches, and remove anything which blocks the flow of air over the PQ20.

Loss of sound A blown PQ20 fuse is unusual and may result from problems within the PQ20. Use only a replacement fuse of the exact type and rating specified for the PQ20. The power fuses plug into fuse blocks in the PQ20's connector panel. If a replacement fuse blows immediately, take the PQ20 to your a/d/s/ dealer or authorized service agency for assistance.

Occasionally, the protection circuits of the PQ20 which detect power output beyond the safe capabilities of the amplifier may turn the PQ20 off momentarily. When this occurs, reduce the volume level of the system and check the position of the stereo/bridge switches. A defective loudspeaker also may trigger this condition. Listen for distortion from the speakers at medium volume levels; if you hear distortion, try to determine which speaker is defective and replace it.

Specifications

Output power (Watts), all channels driven, continuous	
FTC rated, 20Hz to 20kHz, ≤0.05% THD:	
4 Ohm, 4 channel	4 x 70
4 Ohm, 3 channel	1 x 150 + 2 x 70
4 Ohm, 2 channel	2 x 150
2 Ohm, 4 channel (0.5% THD)	4 x 75
Typical midband, 1kHz, <1% THD	
4 Ohm, 4 channel	4 x 80
4 Ohm, 3 channel	1 x 160 + 2 x 80
4 Ohm, 2 channel	2 x 160
2 Ohm, 4 channel	4 x 80
Dynamic headroom	1.1 dB IHF, 90 Watts
Frequency response	10Hz to 40kHz, ± 1dB
Signal to noise ratio	>105dBA re full power, 20kHz bandwidth
Damping factor	>100 into 4 Ohms
Input sensitivity	45mV–1.2V for 1 Watt output
Input impedance	50kOhms
Input DC power supply current over 10 to 16VDC operating range:	
No signal	2 A
Average	15 A
Maximum output	60 A
Remote	0.01 A

Power fuses	2, Type ATO, 30 Amp
8-pin DIN input jack connections	
pin 1	**ch 4** input
pin 2	Audio signal ground
pin 3	**ch 2** input
pin 4	**ch 3/br 3–4** input
pin 5	**ch 1/br 1–2** input
pin 6	No connection
pin 7	No connection
pin 8	**remote** power control
Dimensions	360mm/14⅛" w by 60mm/2⅜" h by 210mm/8¼" d
Weight	5 kg/11 lbs