



audio pro

B2-40 ACE-BASS SUBWOOFER

Manual

Audio Pro B2-40 is a unique product, based on new technology. It is very simple to install and operate and possesses excellent performance data and great flexibility.

In order to avoid risk of damage and insure optimum performance from your Audio Pro Subwoofer, you should take time to read this manual before you proceed to unpack and install it.

1. Unpacking

Remove the B2-40 from the carton carefully. Also included are cables and adaptors. If possible, please save the carton for later use. If the system is damaged in any way, contact your Audio Pro dealer immediately.

2. Mains operation

Since the B2-40 contains its own amplifier, it must be connected to a mains outlet. Two versions of B2-40 are manufactured, one for 110-120 V and one for 220-240 V operation. Check the manufacturer's label ③ to make sure that the correct model has been supplied.

3. Automatic on/off

Since the B2-40 is equipped with an automatic on/off facility, turning the system on each time it is to be used is avoided. When the system is connected to the mains, a green LED ① indicates STAND-BY status. In the presence of an audio signal the system is automatically switched on as shown by a red LED ②. If there is no signal for five minutes, the system shuts off.

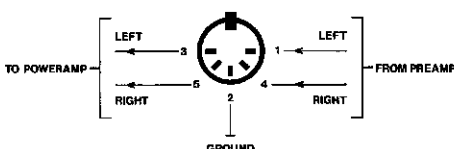
B2-40 is designed for continuous STAND-BY operation, and then draws negligible power (less than 3 VA). If the system is not to be used for a period of time, such as a vacation trip, disconnect the system by removing the mains plug to completely separate the speaker from the mains.

4. Connecting to main amplifier and satellite speakers

Subwoofer B2-40 can be connected to your stereo system in two different ways:

A. Subwoofer connected between Preamplifier and Power Amplifier

This is the preferential way of connecting your Subwoofer B2-40.



It should be used whenever you have a separate preamplifier, or an integrated amplifier or receiver where the preamplifier outputs can be separated from the power amplifier inputs.

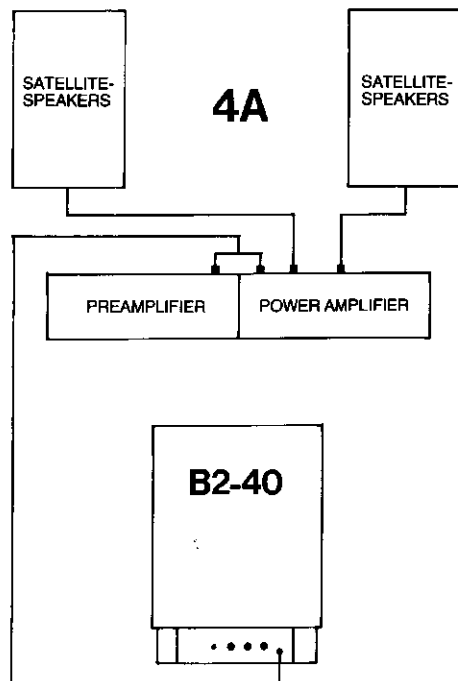
Connect preamplifier "out" and power amplifier "in" terminals for *Both channels* to the 5-pole DIN terminal ⑦ on the Subwoofer, as shown in the diagram below. (If you own an Audio Pro TA-150 receiver, just plug the enclosed cable A with DIN plugs into Subwoofer terminal and "Preamp out/Power amp in" terminal on the TA-150). If your amplifier has phono connectors use the enclosed adaptor cable B.

Leave the satellite stereo speakers connected to your power amplifier, as before, see diagram below for system connections.

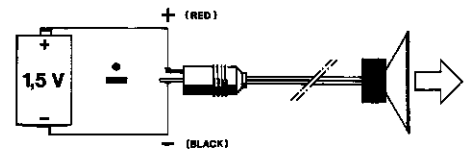
Subwoofer B2-40 will reproduce the sum of Left and Rights channel low bass signal, while the low bass is removed from the satellite speakers. (The crossover point is adjustable, see section 6).

Note: A few power amplifiers on the market are of inverting type, i.e., they introduce 180° phase shift between input and output. If your power amplifier is of this kind, you should interchange the wires in each of the satellite speakers connections to assure that the satellite speakers and the Subwoofer blend correctly at the crossover frequency.

When a regular, non-inverting power amplifier is used, each satellite speaker should be connected so that the woofer cone moves outward when a battery is connected between the speaker wires



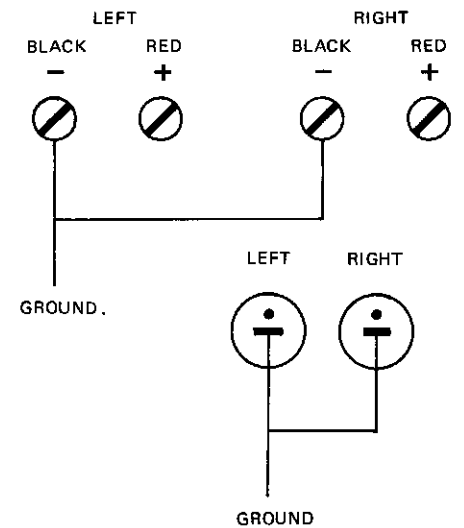
with the + wire normally being connected to the "hot" (or red) terminal of the power amplifier.



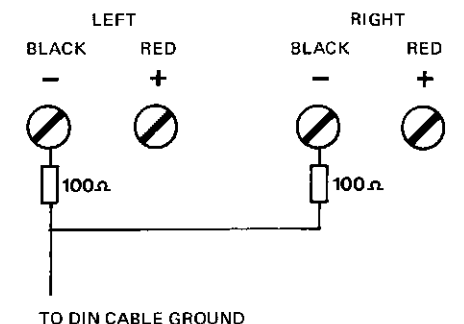
B. Subwoofer connected to the speaker outputs of the main power amplifier

The speaker cable adaptor C is intended for this alternative. Connect the adaptor wires to the power amp output in parallel to the satellite speaker wires. If your amplifier has DIN speaker terminals, use the DIN plugs D.

NOTE: Both "—" leads of adaptor C will be connected the 5 pole DIN cable ground. Be especially careful to ensure that each of the output grounds (and not any signal output) are connected to the DIN cable ground.



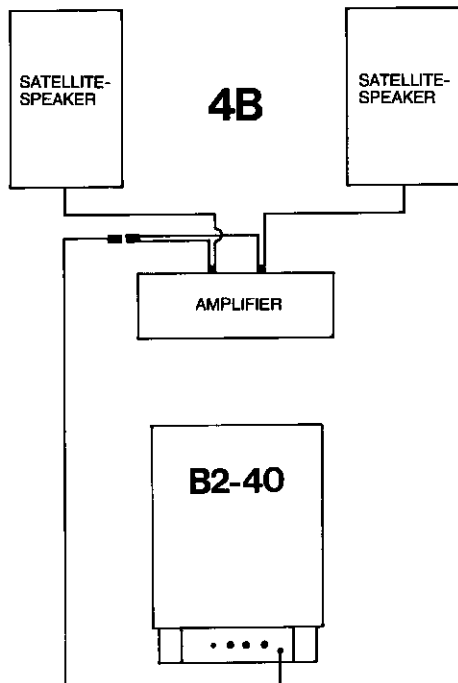
Some power amplifiers can not operate with interconnected grounds. This is solved with two 100 ohm resistors as shown below.



The speaker polarity should in this case always be normal, as described under connection alternative A above.

The low bass frequencies *cannot* be removed from the satellite speakers when the Subwoofer is connected according to alternative B.

If you want to use *two* Subwoofers B2-40, (one for left and one for right channel) both of them should have their *Left channel inputs* connected to their channel of the amplifier, because the automatic on/off function senses the left channel only.



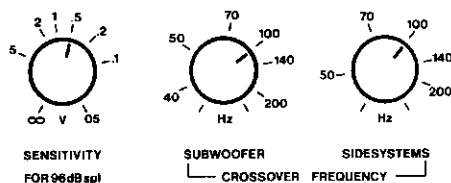
5. Position of the Subwoofer in the listening room

In theory, the best position for the Subwoofer is midway between the satellite speakers, with its front facing forward and in the same plane as the fronts of the satellite speakers.

Subwoofer B2-40 may, however, in practice be moved quite far from this position without any detrimental effect on the sound reproduction.

Different positions of the Subwoofer will affect its efficiency, and the room influence on the frequency response. This can be compensated most often by re-adjusting the filter setting (see section 6).

6. Setting of sensitivity and crossover filters



There are three control knobs on the rear of the Subwoofer.

These controls make it possible to match the low bass frequencies from the Subwoofer to the bass – midrange – treble sound of any good satellite stereo speakers for optimum sound, and at the same time to compensate for room-effects and different positions of the Subwoofer.

While adjusting B2-40 it is a good idea to turn it around for convenient access to the knobs. After the final setting is done B2-40 is placed with the frontside facing the room.

Your hearing is the final arbiter of correct settings.

The adjustments can be optimized without the aid of any tools except ear and good quality music records.

Before you make final adjustments, make sure your basic stereo system is in good working order.

Acoustic feedback

Since the B2-40 can produce a considerable output level at low frequencies, acoustic feedback via the turntable can occur. To ensure that this is not the case, perform the following test at installation of the B2-40.

Set up the equipment for record-playing. Place the pick-up on a non-rotating record (disconnect the turntable power cord if necessary). Tap the turntable while gradually increasing the volume control. If there is a shift in the sound character from the loudspeakers (towards sustained sound) before the volume control has been advanced to a setting that represent loud listening, acoustic feedback is a problem.

Moving the turntable or speakers may remedy this problem. Or try placing a vibration pad under the turntable.

A. Sensitivity setting

With the knob ④ "sensitivity" the volume of the Subwoofer is set to properly match the satellite speakers. If you know the efficiency or sensitivity of your satellite systems, you can calculate a guide value for the setting. If not, start with a setting of .2 V.

The table below compares the different ways of expressing loudspeaker efficiency.

When the Subwoofer is connected between the preamp and power amp, the guide value of the sensitivity setting can be calculated using:

$$\text{Guide value} = \frac{\sqrt{\text{DIN sensitivity of satellite speakers} \times \text{Impedance of satellite speakers}}}{\text{Gain of main power amp}}$$

Speaker impedance is normally 4 or 8 ohms and power amplifier gain between 20 and 40 times. If the sensitivity per IHF-A-202 is given for the power amplifier instead of the gain, the gain can be calculated using:

$$\text{Gain of power amp} = \frac{2.8}{\text{IHF-sensitivity}}$$

If, for example, you have an Audio Pro TA 150-receiver which has a power amp gain of 32 and a pair of 8 ohms satellite speakers with .6 % efficiency (= 4 W DIN sensitivity, from the table), the guide value will be

$$\frac{\sqrt{4 \times 8}}{32} \approx .18 \text{ volt.}$$

If the Subwoofer is connected to the speaker outputs of the main power amp, the guide value is calculated using:

$$\text{Guide value} = \frac{\sqrt{\text{DIN sensitivity of satellite speakers} \times \text{Impedance of satellite speakers}}}{20}$$

(The signal from the power amp is attenuated 20 times in the speaker cable adaptor C).

The guide value is good when the Subwoofer is placed on the floor against one wall in a normal living-room.

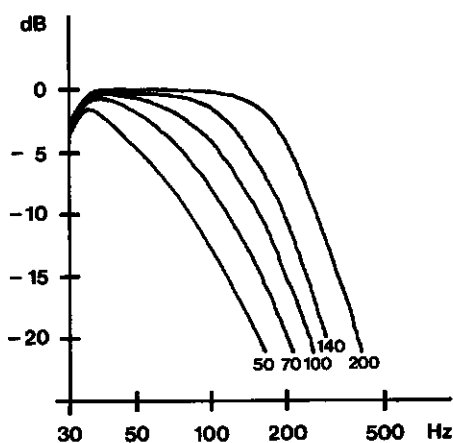
If the Subwoofer is free-standing on the floor, the sensitivity could be increased by 3 dB, i.e. the guide value multiplied by .7. If it, on the other hand, is placed in a corner, the sensitivity could be decreased by the same value. If the walls of your room are very inflexible it might be necessary to reduce the sensitivity somewhat.

B. Setting of upper frequency limit for Subwoofer

The lower frequency limit of Subwoofer B2-40 is always 30 Hz. Whit knob ⑤ "crossover frequency subwoofer" an adjustable, second order (12 dB/octave) lowpass filter gives an upper limit between 40 and 200 Hz as shown in the figure below.

If the Subwoofer is connected to the speaker outputs of the main amplifier (as in 4 B), and consequently the low bass of the satellite speakers cannot be cut off, the knob should be set to the frequency where the response of the satellites is down 3 dB.

When the Subwoofer is connected

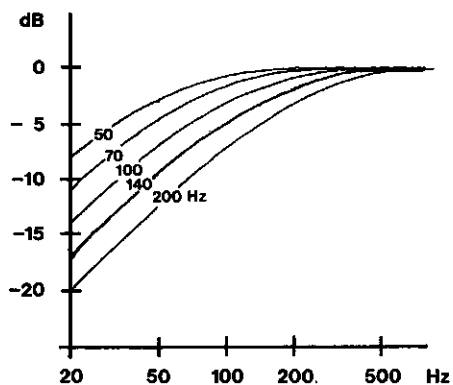


between the preamp and power amp as in 4 A – which is recommended – the knob should be set to 100 Hz if your satellites have decent bass. However, if they have a resonance frequency above 70 Hz, the subwoofer should work higher up.

C. Setting of lower frequency limit for satellite speakers

Knob ⑥ "crossover frequency side-systems" is only active when the subwoofer is connected between the preamp and power amp. The purpose of this control is to match the satellite cut off frequency to the upper frequency limit of the Subwoofer, which was set in 6 B.

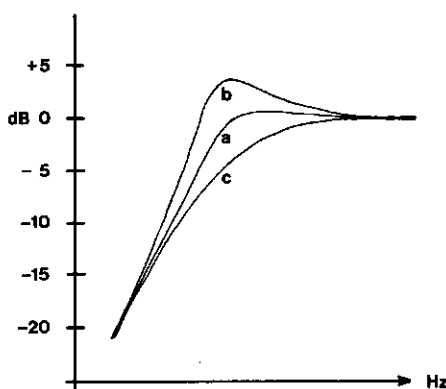
With this knob, two separate first order (6 dB/octave) high pass filters – one for each channel – are adjustable between 50 and 200 Hz. The filtering – as shown below – is inserted between the main preamp and main power amp.



If your satellites are properly damped at the bass resonance – as shown in curve "a" below – the knob should be selected to the same frequency as was set for the Subwoofer upper frequency limit in 6 B. If your satellite speakers are underdamped ("boomy"), the knob should be set to a higher frequency and if they are overdamped ("dry") a lower setting is best.

It is the sum of the satellites' response (exemplified below) and the filter response (shown above) that should be down 3 dB at the same frequency as was set for the Subwoofer in 6 B.

Write down the final settings, so they can be re-set accidentally changed.



Some speakers are designed to give flat frequency response when placed freely, at least three feet from the nearest wall, floor or ceiling. When such speakers are placed against a wall (which is very common) there will be a strong raise in the frequency response in the upper bass up to 200 Hz. In these cases you must cut the bass of the sidesystems high up, while the Subwoofer must stop working at a much lower frequency. A setting of 200 Hz for the "sidesystems crossover frequency" and 120 Hz for the "subwoofer crossover frequency" is not unusual.

7. Service

Audio Pro Subwoofer B2-40 is designed and built for long term stability and reliability. It does not require any periodic maintenance or adjustments, and we

trust it will serve you well for many years.

If, however, some problems should arise, we advise against repair or replacement of components except by authorized service centers who have the knowledge and the precision equipment required to properly tune your Subwoofer B2-40:

Contact your Audio Pro Dealer, for the address of your nearest service center.

Data

Frequency response: 30–200 Hz within ± 2 dB from curve shown below, 6th order Butterworth response with -3 dB at 30 Hz, upper limit adjustable 40–200 Hz.

Sound pressure level: At least 100 dBspl at 1 meter in half space (2π steradian solid angle).

Sensitivity for 96 dBspl

On preamp terminal: 50 mV -2.5 V (adjustable) 10 kohm input impedance.

With speaker cable adaptor C: 1 V -50 V (adjustable) 5 kohm input impedance.

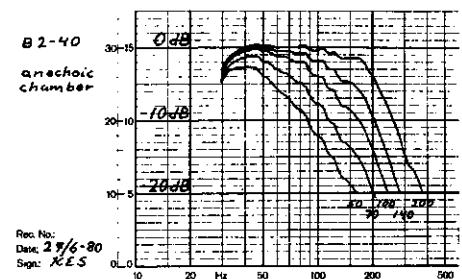
Crossover filter for satellite speakers:

Variable 50–200 Hz, 6 dB/octave upper frequency limit > 500 kHz, gain .95 output impedance < 200 ohm, max signal out > 5 V, slew rate 10 V/ μ s, distortion $< .02$ %, hum and noise < -100 dBA rel 0.5 V. (Active only when preamp terminals used).

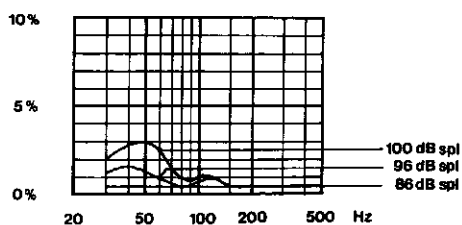
Power consumption: Max 120 W, less than 3 VA in STAND BY.

Dimensions: width 375 mm (14 $\frac{3}{4}$ in) \times depth 375 mm (14 $\frac{3}{4}$ in) \times height 520 mm (20 $\frac{1}{4}$ in).

Weight: 18 kilograms (39 lbs).



Frequency response at different settings of upper frequency limit.



Typical distortion at different output levels. 2nd + 3rd harmonics.

Sensitivity W for 96 dBspl (DIN standard)	Sensitivity Sound pressure level at 1 m for 1 W input	Efficiency after SHFI Swedish standard	Efficiency in halv space (2π)
0.5 W	99 dBspl	2.4 %	5.0 %
1 W	96 dBspl	1.2 %	2.5 %
2 W	93 dBspl	0.60 %	1.2 %
5 W	89 dBspl	0.24 %	0.50 %
10 W	86 dBspl	0.12 %	0.25 %
20 W	83 dBspl	0.06 %	0.12 %