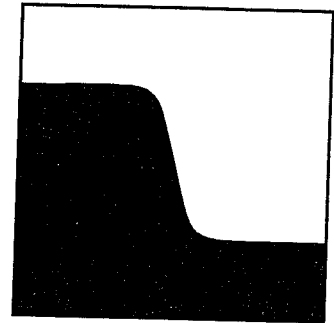


Operator's Manual

# PCA-200™

Low Frequency Synthesizer  
with patented *Fundamental Restoration*

**Audio Control Industrial**



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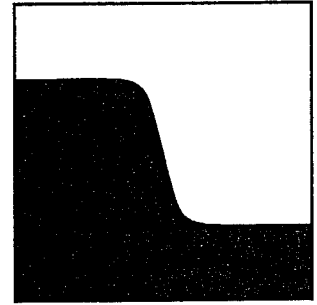
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# INTRODUCTION

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How to Use it Before Which is also known in some manuals as  
You Know What It Is

## QUICK START

*This is the part to read if you don't read anything else.*  
Follow the Fickle Fingers:

- ☞ Quick! Plug some source of sound into the PCA-200 inputs: a CD player, a tape, a mixer, a preamp.
- ☞ Plug the PCA-200 outputs into something else: an amplifier, another mixer, a recorder. Quick!
- ☞ Quick! All three pushbuttons **OUT**.
- ☞ **LOW CUT** control to 15 Hz, **HIGH CUT** control to 200 Hz, **DRIVE** to **CAL** and set the mix control halfway between **DRY** and **WET**.
- ☞ Run some music through it. Quick! And you've gotta have at least a little bass in the music.
- ☞ Twist the knobs till you like it. *Quick! Go! Go! Go!*

Now that the knob twisters are off frantically searching for patch cords, those of us left can take a relaxed stroll through the rest of the manual.

**For Those of Us With  
a Little More Time**

You must have an inkling what a PCA-200 is, or you wouldn't have bought one. Big bass, right? Okay, okay, it's possible; maybe you don't even have an inkling. You could have *found* a PCA-200, or maybe you work in a great big studio, your boss bought it and went to lunch and you don't have a clue what it does and he wants it up and running when he gets back.

Whatever, you're strolling through the *INTRODUCTION* here to see what *we* think a PCA-200 is. And what we think is: big bass.

**What It Is**

The PCA-200 is a *low frequency* or *subharmonic synthesizer*. It does not equalize or compress or delay the sound you put into it. It actually creates *new* sound, new low frequencies an octave below the sound you put in. These new bass frequencies are then added to your original sound with a mix control.

The new bass frequencies are musically related to the sounds you put into the PCA-200: the synthesized bass output is always exactly half the input frequency. If your input is a 102 Hz tone, the PCA-200 creates a 51 Hz tone. If the guitar is playing a low F-sharp, the PCA-200 generates a second F-sharp, perfectly in tune, but one octave lower.

The PCA-200 can work on both finished, mixed songs (a DJ can play CDs through it) and on separate tracks and instruments (while recording, overdubbing or mixing).

**Shake  
& Rumble**

Low frequency synthesis provides a much fuller, room-shaking bass on music incorporating kick drums, bass guitars and other low-frequency instruments. Sound effects like thunder or cannon command new respect. Songs mixed a little thin can be brought into balance.

Because the PCA-200 is not boosting the level of the *existing* low frequencies, it is often possible to increase the perception of bass in the room without driving the power amplifier closer to clipping

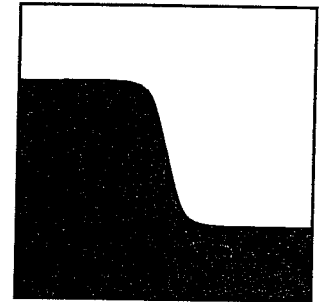
## INTRODUCTION

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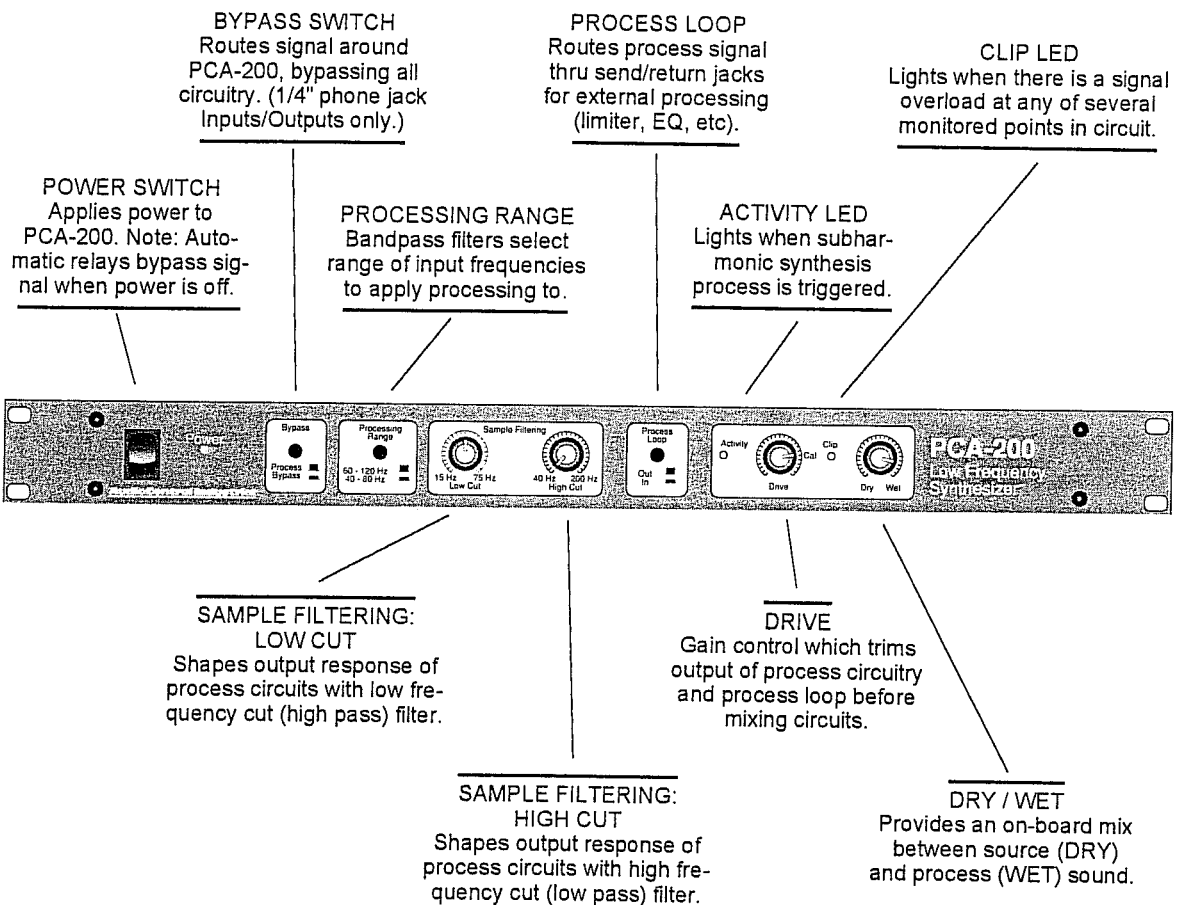
and distortion. In other words, more bass without a bigger amplifier.

**Our Quest** AudioControl Industrial has been on a continuing quest for more bass since 1977. The PCA-200, designed for professional use, is the latest in a series of bass-enhancing products and uses patented *Fundamental Restoration*<sup>™</sup> circuitry in the synthesis and shaping of the subharmonics.

# TOUR DE PANELS



## PCA-200 Front Panel



## PCA-200 Rear Panel

## UNBALANCED OUTPUTS

1/4" TS phone jacks.  
+4 dBm line level,  
+16 dBm headroom. BY-  
PASS function only with  
BALANCED inputs.

## BALANCED INPUTS

1/4" TRS phone jacks.  
+4 dBm line level. Full  
BYPASS function.

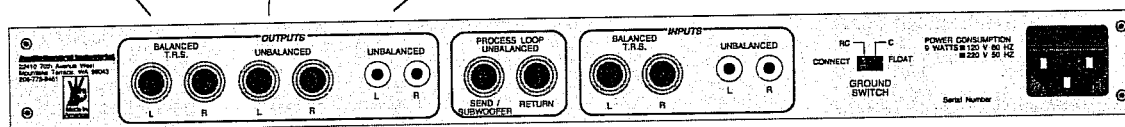
## BALANCED OUTPUTS

1/4" TRS phone jacks.  
+4 dBm line level,  
+22 dBm headroom.  
Full BYPASS function.

UNBALANCED OUTPUTS  
RCA phono jacks. -10 dBu  
line level, +4 dBu head-  
room. No BYPASS function.

## UNBALANCED INPUTS

RCA phono jacks.  
-10 dBu line level. No  
BYPASS function.

PROCESS LOOP SEND  
/ SUBWOOFER

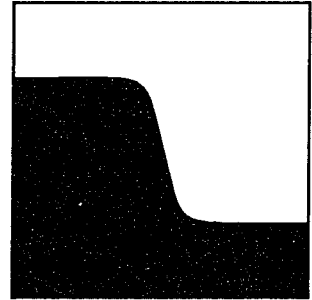
Unbalanced TS 1/4" phone jack output,  
+4 dBm level, +16 dBm headroom.  
Provides process direct out and send to  
external processing device.

**GROUND SWITCH**  
Disconnects PCA-200 chas-  
sis ground from connector  
shields, or connects grounds  
directly, thru a capacitor or  
thru a capacitor and resistor.

**PROCESS LOOP RETURN**  
Unbalanced TS 1/4" phone jack  
input, +4 dBm level. Provides  
return to process circuits from  
external processing device.

**POWER FUSE**  
250 mA 250 V GDB  
fuse located in com-  
partment at top of  
power cord connector.





# OPERATION

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## FIRST THINGS FIRST

**Power & Fuse** The PCA-200 is shipped wired for one of two different electrical power (mains) voltages: either 120 VAC 60 Hz or 220 VAC 50 Hz. North America and parts of South America use 120 VAC; Europe, parts of Southeast Asia and the other parts of South America use 220 VAC. If there is any doubt about the local electricity or the wiring of your PCA-200, check to be sure. Wrong voltages can cause smoke, fire and, of course, the dreaded personal injury. If you're not sure about the electricity, don't plug it in.

The main power fuse (250 milliamperere 250 volt type GMA) is hidden in a tiny compartment built into the AC power connector on the back of the PCA-200. Remove the power cord, then pop the compartment open with a screwdriver. Use only the same kind of fuse when you replace it.

**Ground Switch** In a perfect world, all systems would be wired properly and there would be no ground loops with all the buzz, hum and radio stations they bring. Since that's not yet the case, the thoughtful engineers at AudioControl Industrial have provided a **GROUND SWITCH** on the rear of the unit. The **GROUND SWITCH** determines how the shield grounds of the input and output jacks are connected to the PCA-200 chassis ground. The **CONNECT** position connects the shield grounds to the chassis, **C** connects them through a .1 microfarad capacitor, **RC** adds a 200 ohm resistor in parallel with the

capacitor, and **FLOAT** leaves the shields and chassis disconnected entirely. Don't worry about remembering any of this. Just leave the **GROUND SWITCH** in the **CONNECT** position unless you have a problem with noise. Then try each of the other positions of the switch to find the quietest configuration.

**Source & Sink** Something to think about: choose source material (music? sound effects?) which contains some bass frequencies for the PCA-200 to act upon. Flute solos and bird calls will not even tickle the inputs of the subharmonic synthesis circuits. Also, since the PCA-200 is in the business of generating very low bass, you will need speakers or headphones which can *reproduce* very low bass or you won't hear the full effect. Make sense?

## GETTING STARTED: Insert It

**Insert It In Your System** The simplest way to use the PCA-200 is as an *insert device*, that is, inserted in a line between a sound source and an amplifier. See Figure 3-1.

An alternate configuration, using the PCA-200 in a *send/return loop*, is shown in Figure 3-2 and discussed a little further on in this section.

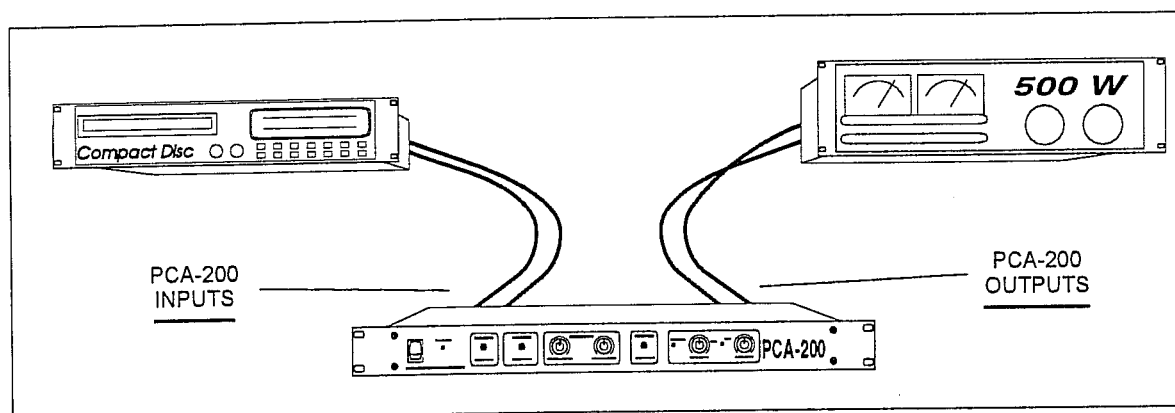


Figure 3-1: The PCA-200 Inserted in a System

☞ Connect the output of your source (tape, CD player, mixer, etc.) to the input of the PCA-200.

☞ Connect the output of the PCA-200 to the input of the next device in your system (mixer, preamplifier, amplifier, etc.).

See *CONNECTIONS*, at the end of this section, for details on which jacks to use and how to wire the connectors. Section 2, *TOUR DE PANELS*, may be helpful, too.

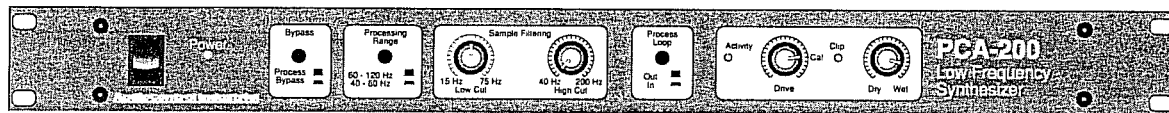
Let's set all the controls to normal positions for setup:

POWER SWITCH	OFF
BYPASS SWITCH	PROCESS
PROCESSING RANGE	60—120 Hz
LOW CUT	15 Hz
HIGH CUT	200 Hz
PROCESS LOOP	OUT
DRIVE	CAL
MIX	DRY
GROUND SWITCH (ON REAR)	CONNECT

*Note: If you are using the RCA phono jack UNBALANCED connectors on the PCA-200, skip the next paragraphs and go to the Power Up! heading below. The bypass relays do not pass signal through when using the RCA phono jack inputs and outputs.*

Before we fool around with the PCA-200, let's be sure everything's hooked up properly. Turn on your system and play some music through it. Everything should work just as it did before the PCA-200 was inserted, even though we haven't turned it on yet, because the bypass relays in the PCA-200 automatically pass the sound through when the unit is off (if you're using the 1/4" phone jack connectors).

If there is a new buzz or hum, try each of the four positions of the **GROUND SWITCH** on the back of the unit. Leave the switch in the



quietest position. If you still have noise, check the wiring of your connector cables.

**Power Up!** Turn the **POWER** switch on. The green **POWER** LED should light up. The PCA-200 protects your speakers from a power-on thump by muting the outputs momentarily. Then you should hear your source music passing through the system with no change, sounding wonderful. If you don't,

- check that the **DRY/WET** mix control is fully counter-clockwise, on **DRY**;
- check your signal path by testing the **BYPASS** switch;
- check the wiring and connection of your cables.

If there is a new buzz or hum in the signal, try each of the four positions of the **GROUND SWITCH** on the back of the unit, even if you switched it a few paragraphs ago. Leave the switch in the quietest position. If you still have noise, check the wiring of your connector cables.

**Let's Make Bass** Okay, it's on, it's passing signal, it's not buzzing. The **ACTIVITY** LED should be blinking. It lights when there is low frequency input with enough level to trigger the synthesis circuits. If signal is passing through the PCA-200 but the **ACTIVITY** light is *not* lighting, be sure there is at least some bass in your input signal, and that the volume level of the signal entering the PCA-200 is loud enough.

**Dry/Wet** Let's add some bass. Turn the **DRY/WET** mix control to the center of its range, straight up. This should give you an even mix of your original stereo source and the added (in the center) subharmonic bass. Spin the control across its range to hear the effect of different degrees of mix. Leave it at a pleasant setting and we'll check out the **PROCESSING RANGE** switch.

**Processing Range** The **PROCESSING RANGE** switch is *before* the subharmonic synthesis circuitry and selects the range of bass frequencies the synthesizer is allowed to act upon. Typically, the lower setting (40–80 Hz) restricts synthesis activity to the kick drum and the very lowest bass notes. 60–120 Hz lets the PCA-200 react to more of the input signal. You will usually want to check both settings whenever you are setting up a new effect. Different styles of music and types of source material, level settings, the effect you might like to hear, and probably the weather and how much sleep you had will affect your opinion of which **PROCESSING RANGE** setting is more effective.

That, by the way, is an essential PCA-200 concept: *please your ears*. Once the PCA-200 is basically running clean and the **CLIP LED** is not lighting, there are no rules. The front panel controls are there for art, for science, for joy. Turn them and twist them and push them until you like the sound or your teeth rattle, whichever comes first.

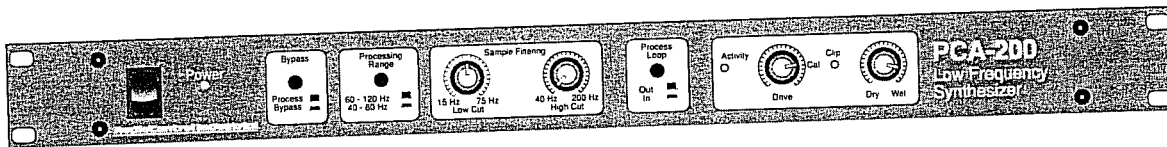
**Sample Filtering** The **SAMPLE FILTERING** controls are part of the patented circuitry of the PCA-200 and are a lot of why it sounds so good. The raw output of a frequency dividing circuit can sound rather nasty, a square wave with an attitude. The sample filters tame and sweeten that rude wave.

While the PCA-200 is working, first set the **DRY/WET** mix control to **DRY** to listen to the synthesis only. This will allow you to hear clearly the effects of the two filters. Set the **LOW CUT** to 15 Hz and the **HIGH CUT** straight up to its midrange.

**Low Cut** The **LOW CUT** filter is essentially out of the circuit when set at 15 Hz (fully counter-clockwise). As you slide the cut upward (clockwise) the synthesized bass becomes, well, less bassy, thinner. Take the control fully clockwise and the bass disappears almost completely. That's probably too far.

Normally, the **LOW CUT** would be set well to the counter-clockwise end of its travel. A little bit of low filtering might clean up a boomy bass in a big room, and add some definition to the sound. Too much low frequency cut will defeat the bass synthesis effect altogether.

## OPERATION



**High Cut** The **HIGH CUT** circuit is probably the more dramatic of the two controls, because it smoothes the square wave into a less edgy waveform. With the **HIGH CUT** fully open (200 Hz) the growling tone of the frequency divider is apparent. Some music will benefit from this more raw sound, which is similar to the tone of some bass guitars. Turn the knob counter-clockwise to close the filter down, and the tone will become smoother and less aggressive. Too far counter-clockwise and the bass becomes a mush.

Do your final setting of the sample filters while listening to a reasonable blend of source music and synthesized bass. Too much low end can be muddy, too little will be weak. Too much high end will grate but too little will cause the sound to lack edge and definition. Please your ears.

**Process Loop** The **PROCESS LOOP** switch allows you to route the synthesized bass (*not* your source music) through external processing equipment connected to the **PROCESS LOOP** jacks on the back of the unit as shown in Figure 3-2. The **OUT** position bypasses the **PROCESS LOOP** jacks and passes the bass signal to the PCA-200 **DRIVE** circuit.

**IN** interrupts the circuit and assumes you will plug something into the jack in the back to complete it again. If you don't, the bass signal is disconnected and the bass synthesis circuits are effectively defeated. (This is a handy way to do A-B checks on your effects, if you're not using the **PROCESS LOOP** for external processing. Pushing the **PROCESS LOOP** switch **OUT** and **IN** will add or remove the bass synthesis from the **DRY/WET** mix.)

What kind of processing would one want to connect to the **PROCESS LOOP** jacks, anyway, if one wanted to? A fair question, that.

How about a compressor or limiter, to grab and tighten the bass effect before it's remixed with the original sound? How about an equalizer, to tweak and shape the bass even more than the **SAMPLE FILTER** circuits? Or a quick delay, to give a double whack to all

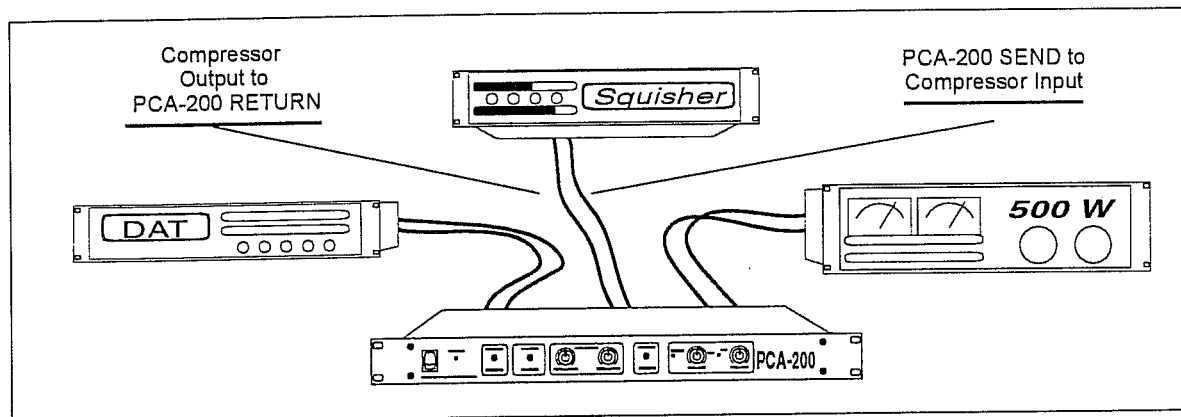


Figure 3-2: Using External Processing in PROCESS LOOP

the bass effect without affecting the original music? Lots of potential. Please your ears.

*Note: The external processing unit, whatever it is, should be adjusted to provide unity gain; that is, the volume level it returns should be close to the volume level you send it. Otherwise, you run the risk of adding noise (if the level is too low) or distortion (if it's too high) to the signal. It'll probably be annoying, at the very least.*

If your external processing unit is reasonably compatible with the rest of the world, it will be close to unity gain. It may have input or output level controls to help in the matching.

**Subwoofer / Direct Out** The **PROCESS LOOP SEND/SUBWOOFER** output can also be used as a bass synthesis direct out, as shown in Figure 3-3. Synthesized bass is available at the **PROCESS LOOP SEND** jack regardless of the position of the **PROCESS LOOP** switch. The **SUBWOOFER** jack can be used as an output when the PCA-200 is in the send/return loop of a mixer or preamp. Using the PCA-200 in a send/return loop is discussed a few paragraphs below.

The PCA-200 **DIRECT OUT** is also an easy way to feed a subwoofer without need of a crossover. Just patch the **DIRECT OUT** into your subwoofer amplifier input and set the level on the amp.

**Drive** The **DRIVE** knob is simply a volume control, set in the bass synthesis circuits after the **PROCESS LOOP** return but before the

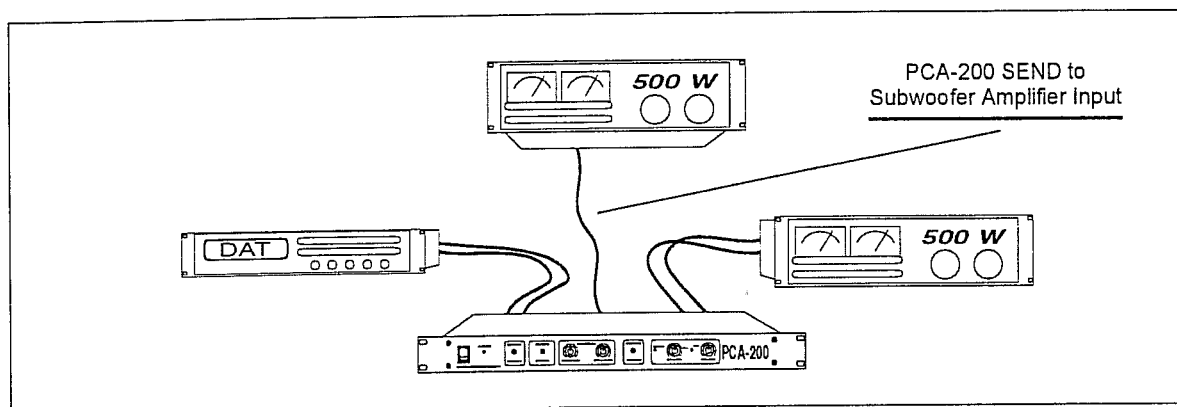


Figure 3-3: Using the PROCESS LOOP SEND to a Subwoofer

**DRY/WET** mix knob. Leave it at **CAL** (the factory **CAL**ibrated level setting) unless you really need to adjust the level of the bass effect, perhaps to correct for a low or high level coming back through the **PROCESS LOOP RETURN** jack.

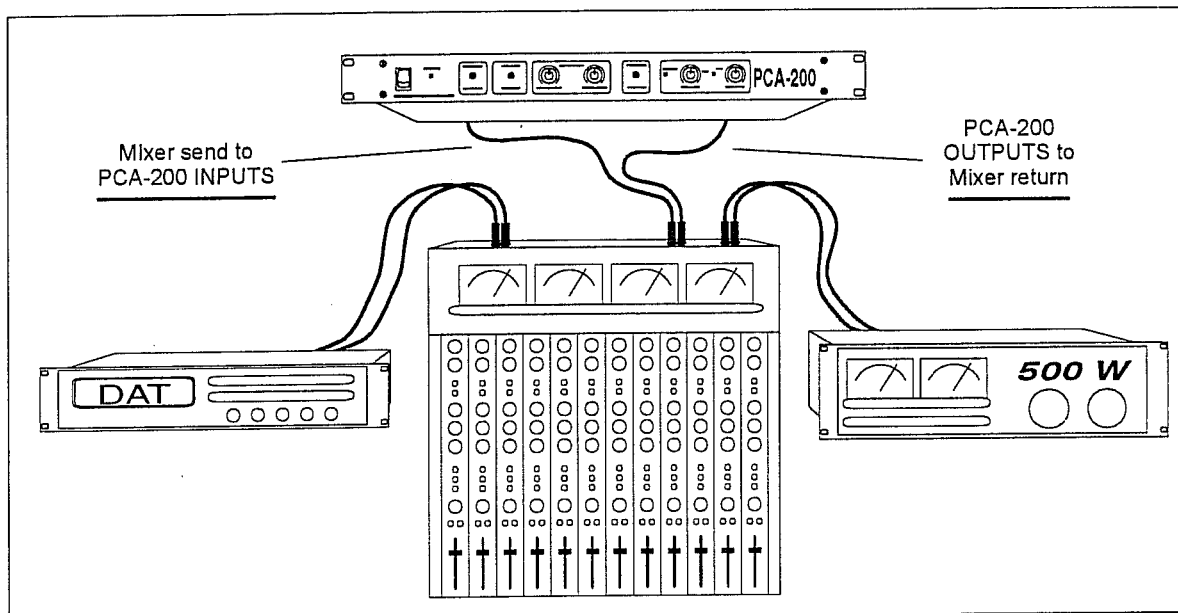
**Clip** The **CLIP** LED is connected to several different points in the PCA-200 circuits. It will light if there is clipping (too high a level) at any of the important circuit areas, including wet, dry and return signals. It means something is too loud. First try lowering the **DRIVE** control. If the light is still blinking regularly, the input levels to the PCA-200 are too high and must be reduced at the source.

## GETTING STARTED: Loop It

Now that you know how the PCA-200 works, you might want to consider using it in a send/return loop with a mixing console. Used this way, a separate *send* or *bus* from your mixer is assigned to the PCA-200, and only the sounds you select have low frequency synthesis applied to them. The (**WET** only) output of the PCA-200 comes back through a mixer return input (or a dedicated line input) and is remixed with the rest of the music or other program material. Figure 3-4, submitted by our crack drawing staff, shows the hookup.

This would be the normal setup of the PCA-200 in a recording studio, in a sound reinforcement system, or whenever a large





**Figure 3-4: The PCA-200 as a Send/Return Device**

mixing console is used. There are a number of advantages to this configuration:

- Routing of specific sounds to be affected to a send bus
- Special mixing, EQing, compression etc. of send bus
- More control of returned effect; specifically, panning, EQ, compression, gating, reverb, automation of level, etc.

**Send/Return Tips** Be sure the level from your mixer send output is a pretty solid line level. The PCA-200 circuitry may not trigger with too low an input level.

Use the PCA-200 **SUBWOOFER** output or set the mix control to **WET**. You will want only the synthesized component from the PCA-200 to bring into your return. You can adjust the blend in the mixer. (If this sounds like a recipe for a Tropical Fruit Blaster, you're probably not far off. Shake with ice.)

Remember, when you solo the PCA-200 return on your mixer, you may be inadvertently muting the sends. If the bass disappears when you solo, check your mixer manual. The PCA-200 should be routed (and soloed) the same as an echo send/return.

## CONNECTIONS

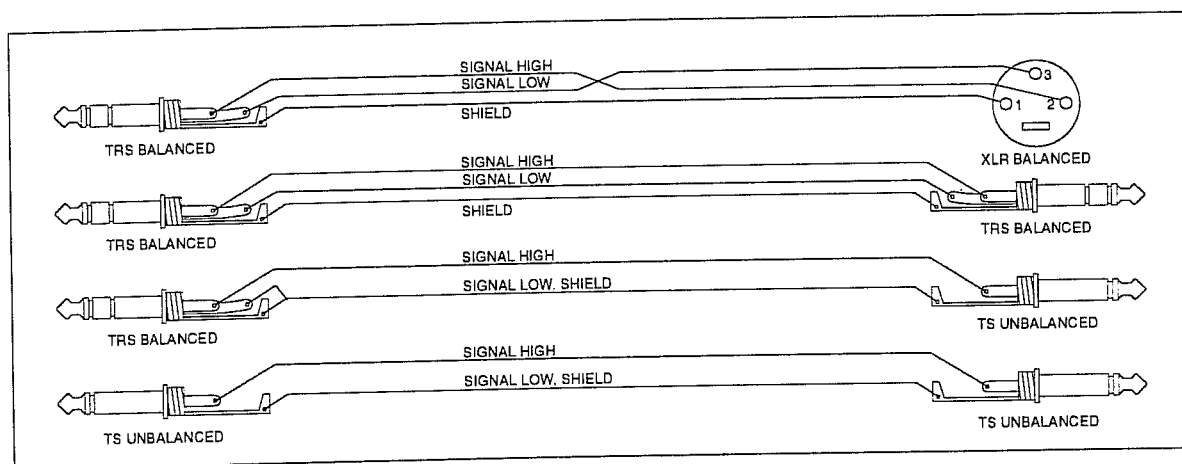
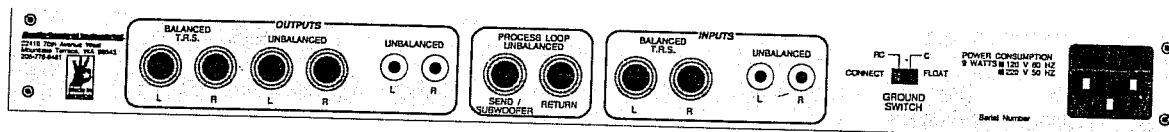


Figure 3-5: PCA-200 Connections

**Balanced** The traditional reasons for balanced wiring and inputs involve long  
**Vs.** cable runs, common-mode noise rejection and separation of signal  
**Unbalanced** and shield grounds. These are valid concerns, but the short runs at  
line level within a system often do not require the insurance of  
balanced circuits. However, many pieces of electronic equipment  
treat balanced and unbalanced circuits differently. In addition to  
the traditional advantages, using the balanced inputs and outputs  
of the PCA-200 will give you greater nominal line level, consider-  
ably more headroom and the full function of the bypass circuits.

If your other equipment and your cables allow it, use balanced wiring and the PCA-200 balanced inputs and outputs.

**Inputs:** The 1/4" phone jack inputs are balanced with a nominal line level  
**Balanced** of +4 dBm. A Tip-Ring-Sleeve (TRS) or stereo 1/4" phone plug  
should be used in these inputs. Signal high should be connected to



the Tip, signal low to the Ring and the shield or ground wire (if used) to the Sleeve.

*Note: An unbalanced connection can also be made with these inputs. A TRS plug wired unbalanced (Ring shorted to Sleeve) or a standard mono (TS) 1/4" phone plug will unbalance the input but will work.*

**Inputs:** The RCA phono jack inputs are unbalanced with a nominal line level of -10 dBu. These connectors are *not* routed through the bypass relays.

**Outputs:** The 1/4" balanced phone jack outputs have a nominal line level of +4 dBm. Clipping occurs at +22 dBm. A Tip-Ring-Sleeve (TRS) or stereo 1/4" phone plug should be used in these outputs. Signal high should be connected to the Tip, signal low to the Ring and the shield or ground wire (if used) to the Sleeve.

**Outputs:** The 1/4" unbalanced phone jack outputs have a nominal line level of +4 dBm. Clipping occurs at +16 dBm. Use a TRS plug wired unbalanced (Ring shorted to Sleeve) or a standard mono (TS) 1/4" phone plug. Plugging a balanced TRS plug into the output will automatically unbalance the feed on the next piece of equipment. It will work, but, hey! if you've got a balanced input on the next piece of gear, why not plug it into the balanced output on the PCA-200? You'd get 6 dB more of headroom.

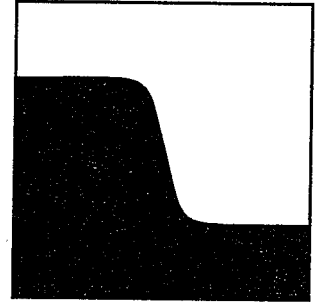
**Outputs:** The RCA phono jack outputs are unbalanced, nominal line level -10 dBu. Clipping occurs at +4 dBu. These connectors are not routed through the BYPASS relays.

**Process Loop Send / Subwoofer** The **PROCESS LOOP SEND / SUBWOOFER** is a 1/4" unbalanced phone jack output with a nominal line level of +4 dBm. Clipping occurs at +16 dBm. Use a TRS plug wired unbalanced (Ring shorted to Sleeve) or a standard mono (TS) 1/4" phone plug. If the input to the external processing equipment is balanced, plugging a

balanced TRS plug into the **PROCESS LOOP SEND** will automatically unbalance the input, but it will work.

**Process Loop Return** The **PROCESS LOOP RETURN** is a 1/4" unbalanced phone jack input with a nominal line level of +4 dBm. Use a TRS plug wired unbalanced (Ring shorted to Sleeve) or a standard mono (TS) 1/4" phone plug. If the output from the external processing device is balanced, plugging a balanced TRS plug into the **PROCESS LOOP RETURN** will automatically unbalance the output, but it will work.

*Note: When the **PROCESS LOOP** switch is IN and the **BYPASS** switch is in **BYPASS**, the signal presented to the **PROCESS LOOP RETURN** input will be grounded through a 1000 ohm resistor.*



## APPLICATIONS

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We thought it would be nice to share some tips with you. We have actually had a number of beta PCA-200s in the field for some time, and we've gotten some real-world ideas on how you might rattle some windows of your own.

### MUSIC STUDIO USE

**TRACKING** Whether you record or mix in a commercial music studio, a MIDI room or your own project studio you've probably had times you were not satisfied with the sound of the kick drum. The right combination of attack and punch is hard to get, and sometimes you may be looking for a little more than reality, *mondo* kick. The PCA-200 is a great tool to give a kick drum a bit of authority.

You can add a subharmonic to the kick as you record your basic tracks, if you like, but you'll be committed to the result. If you have spare tracks, you might print the subharmonic (triggered by the kick drum) on its own track. Not only does this allow you much more flexibility during mixing, but it frees up the PCA-200 for other duties.

**MIXING** However, most engineers (including you, I'm sure) prefer to blend in all the effects during mixing. Set the PCA-200 up in a send/return loop during mixing, much the same as a reverb or delay. Patch a send into the PCA-200 and bring the output back into a return or a channel line input. Even the Auratones will sound big. Figure 3-4 in the previous section gives a typical hookup.

## SOUND EFFECTS

**FILM AND VIDEO POST-PRODUCTION** The PCA-200 can work wonders putting really serious low end on some sound effects. A 747 landing on your head, Thor's own thunderclap, an explosion which actually *does* shake the glassware, a door slam that says: "I'm *CLOSED* now!"

Patch the PCA-200 into your system for tracking or for mixing as above. Or, make a new samples of your effects which includes the low-frequency synthesis and put them in your library.

**THEATER** No matter what you do, somebody will eventually steal your thunder, but until they get their own PCA-200 it'll be *your* plaster alone sifting down onto the audience during Act I Scene 1 of *The Tempest*.

You'll probably want to connect the PCA-200 to your mixer in a send/return loop for the most control. But if you have subwoofers

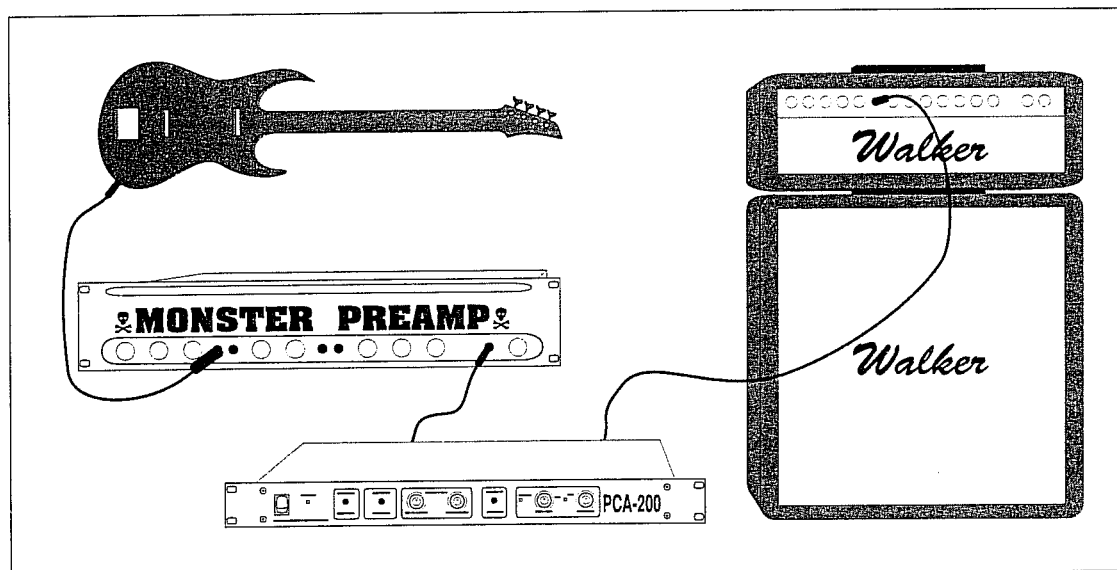


Figure 4-1: PCA-200 Live on Bass Guitar

or surround speakers, you might try inserting the PCA-200 into the feed for a more spacious effect.

## LIVE PERFORMANCE

Drummers, bassists, keyboarders: if you're already making your public grin by virtue of your low, low tones, consider even lower tones and bigger grins. You can use the PCA-200 on stage right now, if at some point the signal from your ax is at *line level*, which usually means an amplifier with a line-level loop or a mixer/amp or preamp/amp combination. A line-level output from a synth (including drum pads) will work directly. Drummers beating real skins will have to mic the drums and plug the PCA-200 into the PA mix.

With the **PROCESSING RANGE** switch *in*, any pitch between 40 Hz and 80 Hz will trigger the bass synthesis. Musically, this range corresponds to about E<sub>1</sub> to E<sub>2</sub>, or the first octave of a bass. With **PROCESSING RANGE** *out*, the range is 60 Hz to 120 Hz, or about B<sub>1</sub> to B<sub>2</sub>. For drummers this translates to kick, a low tom or two, and possibly some other drums, depending on the tuning. For bass guitar the first octave and a half will generate the subharmonic, with guitar the PCA-200 responds to low E to B, and on keyboards any note below about B<sub>2</sub> or so will gain automatic pedal tones.

Insert the PCA-200 somewhere in your signal path or loop it into your amp or mixer, as shown in Figure 4.1.

The bypass switch can be used to kill the effect (if you're not using the RCA jacks; check Section 3, *OPERATION*). The PCA-200 is not provided with a footswitch, but you can have one wired into the bypass circuit if you're really determined. Call us if you need help.

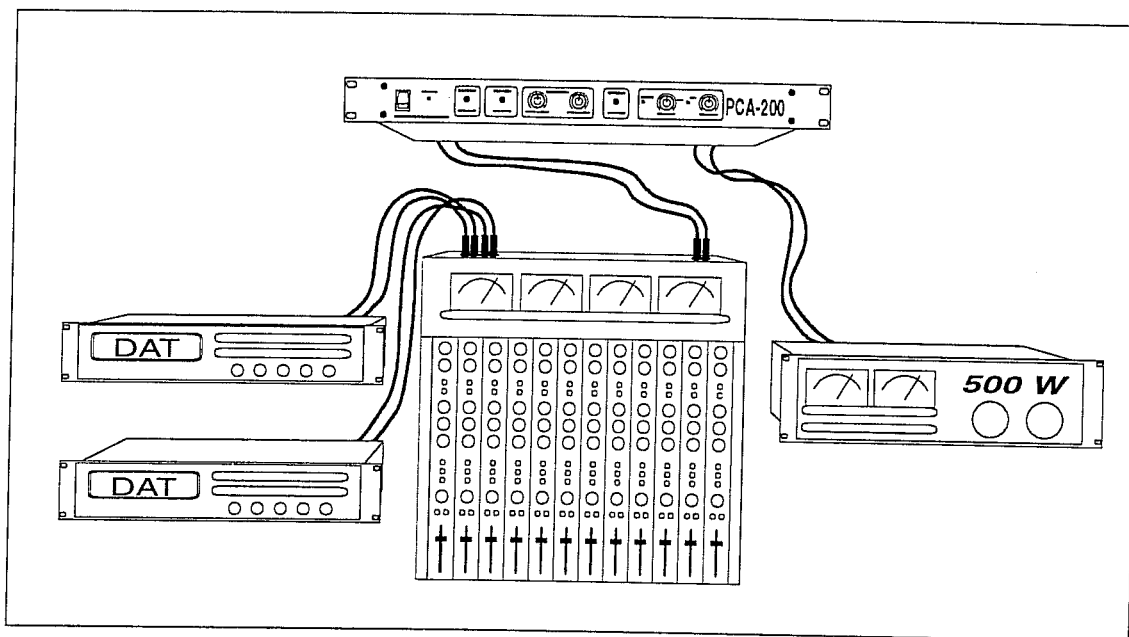


Figure 4-2: DJ Playback System with Inserted PCA-200

## DJs

The typical DJ/disco setup involves two or more music sources (CDs, DATs, cassettes, turntables), a microphone, a mixing board, possibly an equalizer, a power amplifier and some big speakers.

The easiest way to hook up the PCA-200 is to insert it in the signal chain between after the mixer and before the equalizer or power amp, as Figure 4-2 suggests. All the sources will be processed. An interesting side effect is that the DJ's *voice* might be processed, too. If he (or she, I guess; just how low *is* your voice?) has enough in the low register to trigger the subharmonic synthesis, the PCA-200 will act like a time-release testosterone capsule.

If you choose *not* to have the PCA-200 act on the DJ's voice and you'd also like to tweak the amount of processing *independently* on your various inputs, connect the PCA-200 to a send output from the mixer, then route it back into a return or extra fader as shown in Figure 3-4 in the previous section. Now you can adjust the



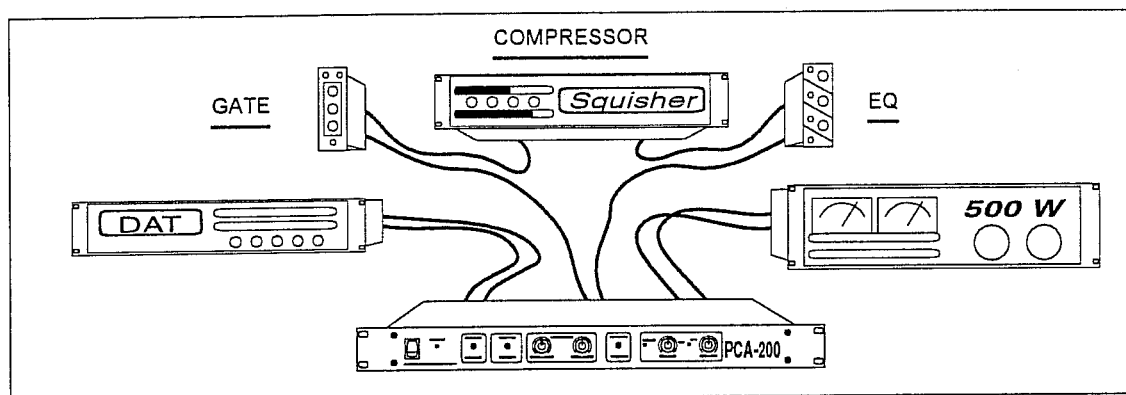


Figure 4-3: Use and Overuse of the PROCESS LOOP

amount of processing on each source from zero to maximum, using the send control on that mixer input.

The PCA-200 will generate thundering bass on a large system with subwoofers (check out *Subwoofer/Direct Out* in the middle of Section 3). It can also make a smaller system sound much bigger, often with less chance of amplifier clipping for an equivalent perceived loudness. That's a mouthful which means you made a good investment.

## EXTERNAL PROCESSING TIPS

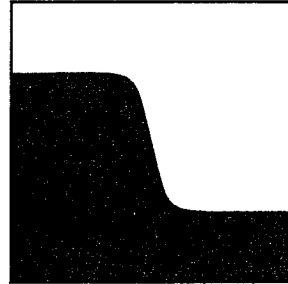
All the processing discussed here can be done within a loop using the **PROCESS LOOP SEND** and **PROCESS LOOP RETURN** jacks. See Figure 4-3.

**Gating** If you've spent any time listening to the **WET** synthesis-only output of the PCA-200, you've noticed that under certain conditions it can be pretty dirty, with low frequency rumblings and grumblings in addition to the sub-bass and sub-kick you're looking for. Some of this noise is dependent on the nature of the input, and some can be cleaned up by tweaking the input level and the PCA-200 filters. In practice, these unwanted sounds are masked by the rest of the music.

But if you'd like to take cleanliness a step further, put a noise gate in the **PROCESS LOOP** and gate the bass synthesis. Properly set up, a gate will reduce or eliminate any low-level noise in your signal.

**Compression** Once that's done, try some compression on the output of the gate to add some more punch to the signal. A compressor can make the bass synthesis very solid and consistent in level.

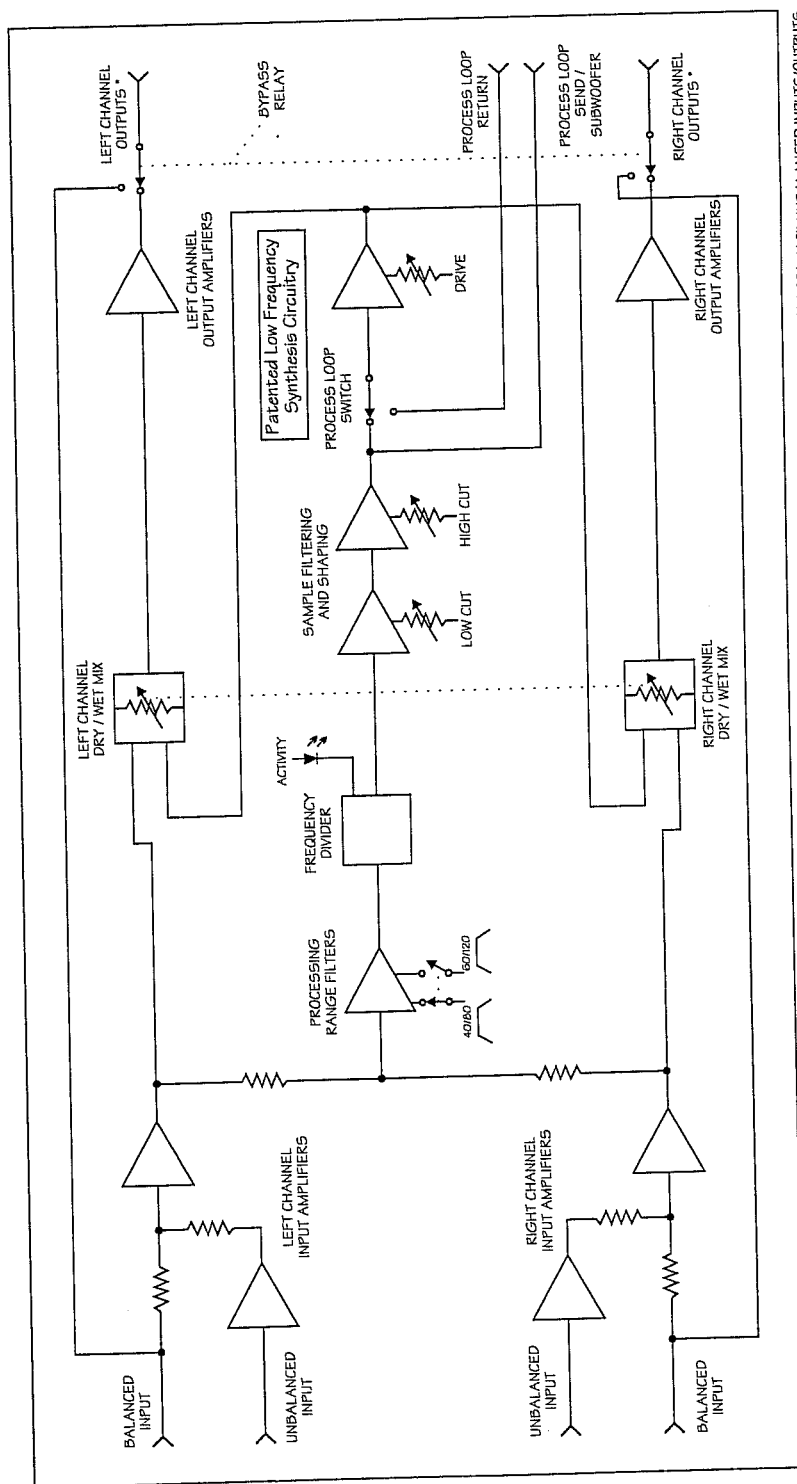
**EQ** And now you've got so many patch cords connected already you might as well equalize the synthesis, too, and see where that gets you. With the added control of an EQ in the loop, you might leave the **HIGH CUT** filter on the PCA-200 a little more open and give the synthesis more bite. An open **HIGH CUT** filter can sound great on some bass guitars, and the EQ will allow you to touch it up.



## SPECIFICATIONS & DIAGRAMS

### PCA-200 SPECS

Signal Level	+4 dBu balanced TRS -10 dBu unbalanced RCA
Output noise	-90 dBu(A) TRS, -105 dBu(A) RCA
Input CMRR	> 40 dB @ 60 Hz
Input Z	20 kohms balanced, 10 kohms unbalanced TRS 25 kohms unbalanced RCA
Output source Z	< 200 ohms, balanced and unbalanced
Output circuit	floating balanced output
Maximum output	+22 dBm balanced, +4 dBu unbalanced
High cut	12 dB/octave, 40–200 Hz
Low cut	12 dB/octave, 15–75 Hz
Frequency response	+0, -1 dB, 20–20 kHz
THD	< 0.01% @ 1 kHz @ +4 dBm balanced
Power requirements	9 watts
Connectors	1/4" phone balanced, RCA unbalanced
Size	19" W. x 4.6" D. x 1.7" H.
Weight	5 pounds
U.S. patent number	4,698,842
Country of origin	U.S.A.



\* NOTE: BYPASS RELAY DOES NOT SWITCH RCA JACK UNBALANCED INPUTS/OUTPUTS

## PCA-200 BLOCK DIAGRAM