DATA SHEET and USER GUIDE

Audio Control Center Model 457

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... since 1957

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AUDIO CONTROL CENTER
TDL Technology, Inc., Las Cruces, NM USA
Model 457
REMOTE
SELECT INPUT
VOLUME
REMOTE
SELECT OUTPUT
#1 OUTPUT LEVEL
#2 OUTPUT LEVEL
#3 OUTPUT LEVEL
POWER ON

INTRODUCTION

Most of you know what a microphone preamp or a phono preamp is and what it is used for. But the name: Audio Control Center (ACC) does not convey the same understanding. So, we are departing from our usual format of a separate data sheet and user guide.

The ACC data sheet is also the user guide because you need more information than just the number of inputs and outputs, gain and noise level. As important as these are, you also need to know what the unit does and how YOU can use it.

We designed and built this item because WE needed several of its functions. It may be that you can benefit from one too when you find out what it can do for you.

DESCRIPTION

I have included a simplified block diagram on the next page to help explain the signal flow.

As you can see, there are six stereo inputs and three stereo outputs. Any input can be connected to any output using two front panel rotary switches; an Input Selector and an Output Selector. In addition, both switches have a REMOTE position. An optional remote control unit (also with two rotary switches) plugs into the ACC rear panel. Now you can sit in your favorite listening chair and, for example, compare the performance of two preamps by simply switching between them with the remote control input selector switch. Block diagrams showing how to connect the cables for this and other examples are in the Operation Section. For now, I just want to generally describe the features.

By using the Remote Control and the optional Speaker Control unit, which also plugs into the rear panel, you can compare two (or three) power amplifiers by switching between them with the remote (or front panel) output selector switch. The Speaker Control box switches your speakers from one power amplifier to another using DC operated relays with high current contacts. Built-in 8 ohm load resistors are placed on the inactive power amplifier outputs.

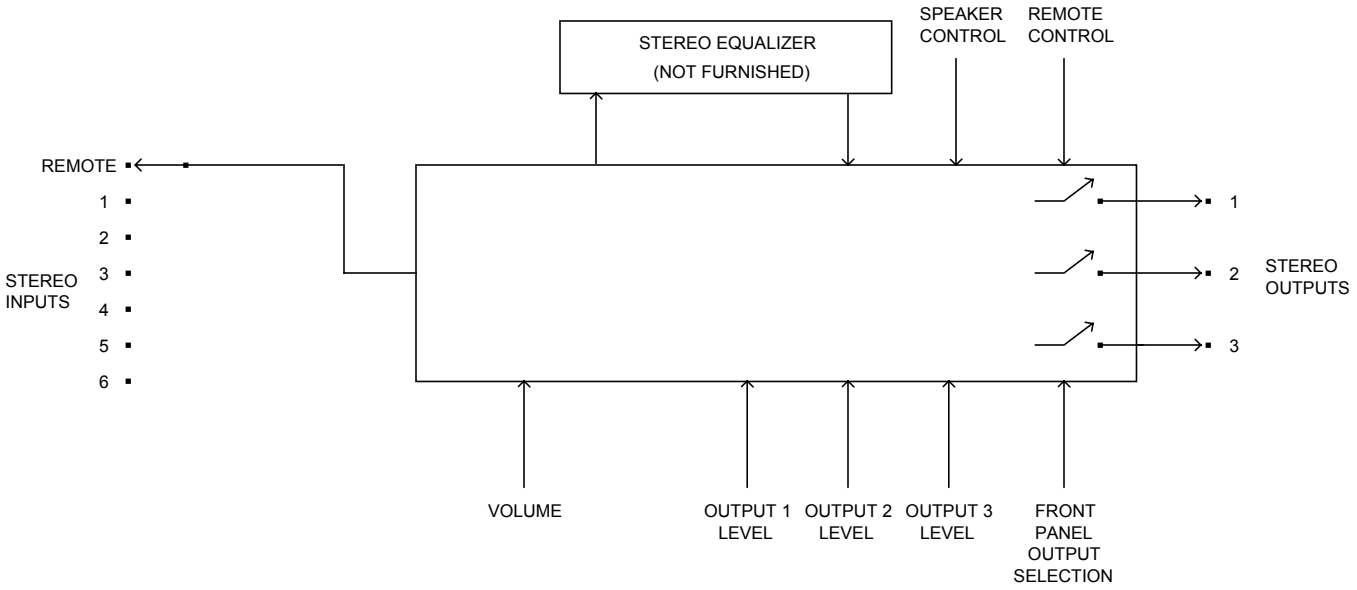
The ACC also serves as a master volume control for playback equipment without a volume control such as most CD players, DVD-A players and some cassette and reel-to-reel players. An external (not furnished) two-channel (stereo) multiband equalizer can be placed in the signal path by using the EQ IN and EQ OUT rear panel connectors. Simply remove the supplied jumpers and connect your equalizer. Although many equalizers can be set for additional gain (volume) it may be better to set your equalizer to unity gain (0 dB) as the equalizer's noise may not be as good as the ACC.

As a part of the ACC volume control we have included another front panel switch which can be set for 0, 3 ,6 or 9 dB of gain in both stereo channels. This can be useful if you have a phono preamp (or other playback unit) with marginal gain. Instead of turning the preamp's volume control all the way up, you can probably improve the signal-to-noise ratio (SNR) by turning the preamp volume down and then letting the ACC make up the difference.

The continuous (single-turn) volume control has both input and output buffer amplifiers. This means we can use almost any volume control on the market – from a simple dual audio pot to a professional step attenuator. We used an Alps 31-step stereo control in our first production ACC and it works very nicely! A step attenuator adds twenty to thirty dollars to the price of an ACC and it is available as an option. Or you can upgrade to one later if you are proficient with a soldering iron.

There is also an output level control for each of the three outputs. These may not be needed much in which case just set them all to maximum volume. But they will let you balance the volume if you are comparing power amplifiers with different gains when the power amps don't have volume controls (a fairly common occurrence). The ACC volume control and the three output level controls all have large, fluted knobs so you can easily make small adjustments.

For the technically inclined I have included a complete set of circuit diagrams and circuit board parts placement drawings, as Figures 1 through 7, and a complete Parts List. And, for completeness, I have included a Specifications Section.



Simplified Model 457 Block Diagram

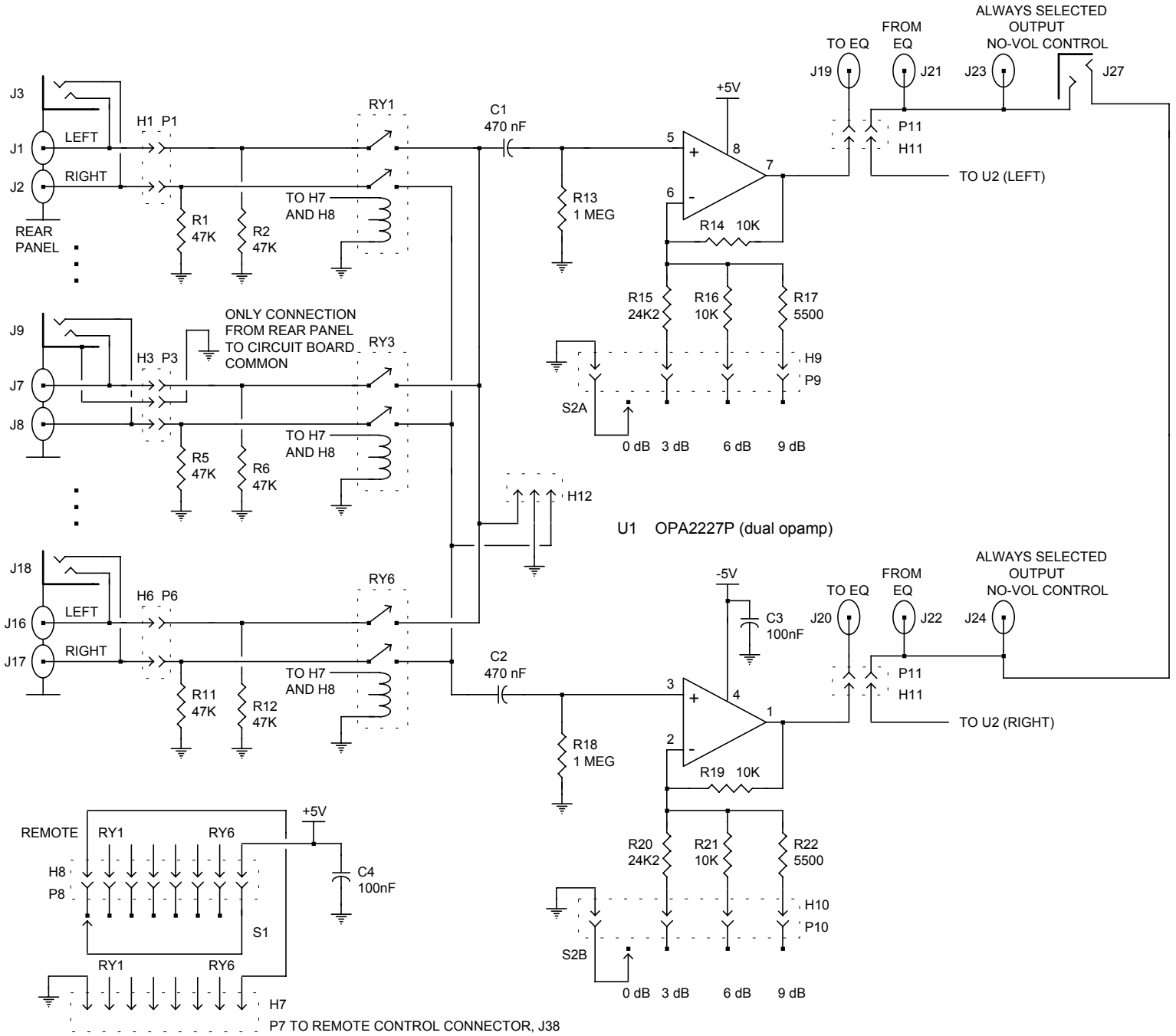


Fig. 1 -- Model 457 Input selection and step volume control

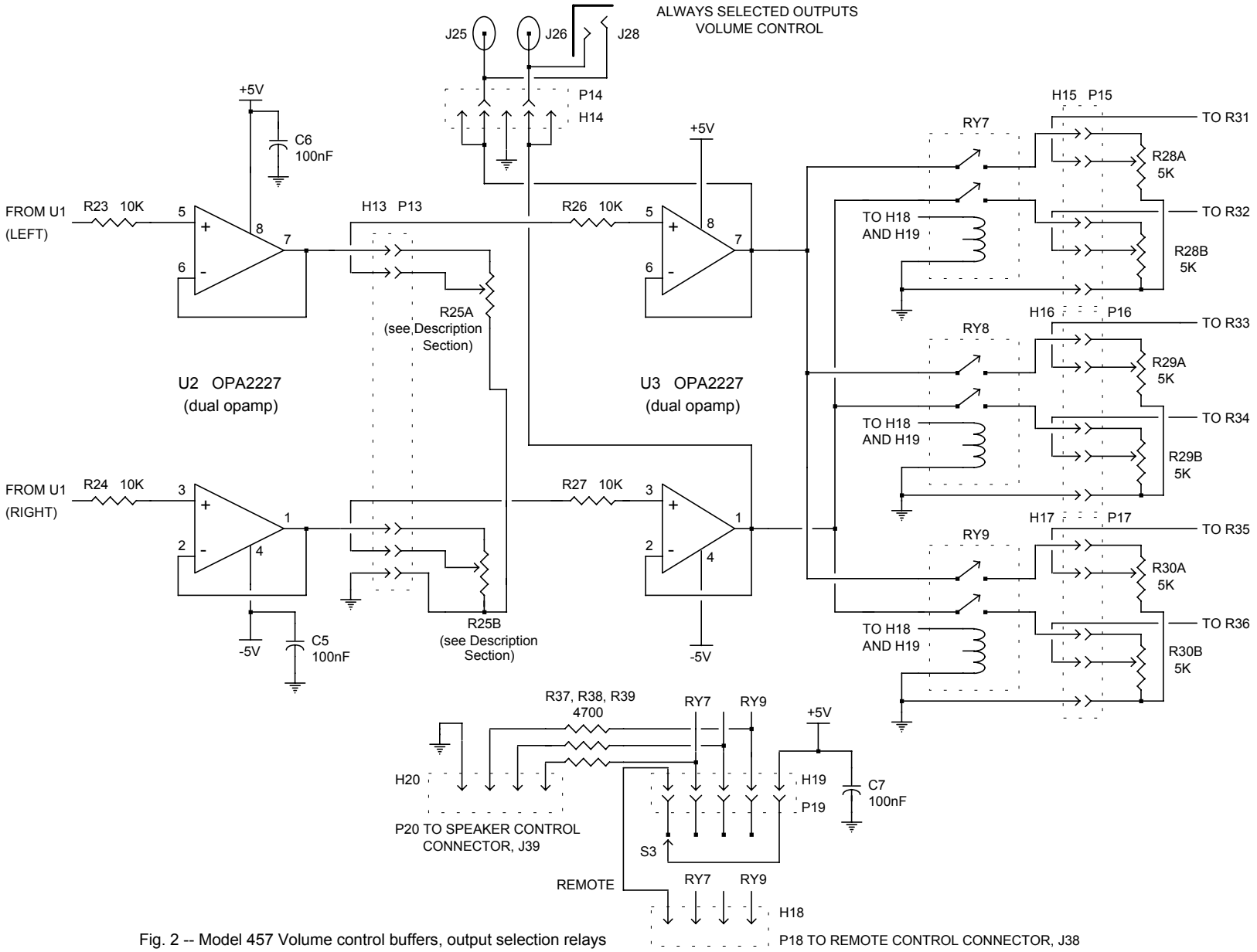
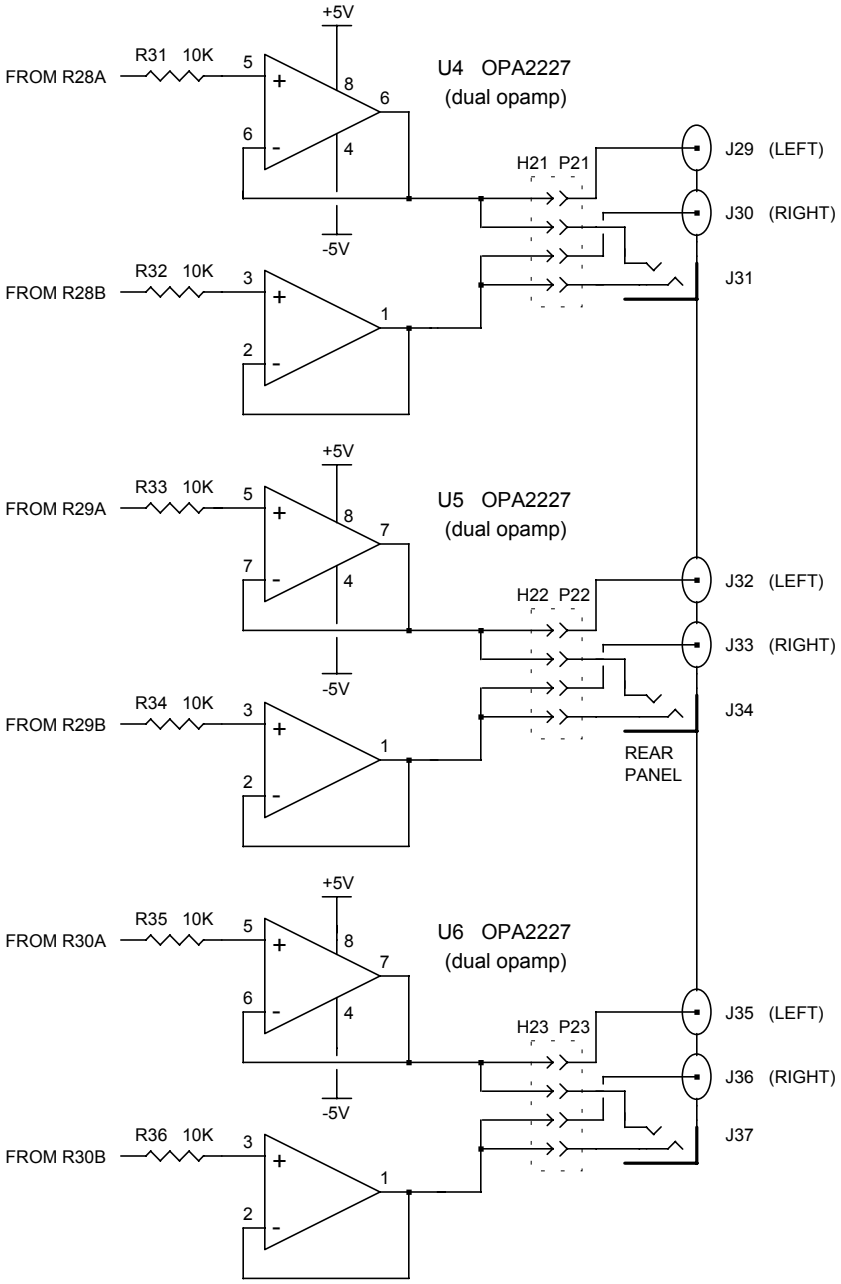


Fig. 2 -- Model 457 Volume control buffers, output selection relays and output volume balance controls.



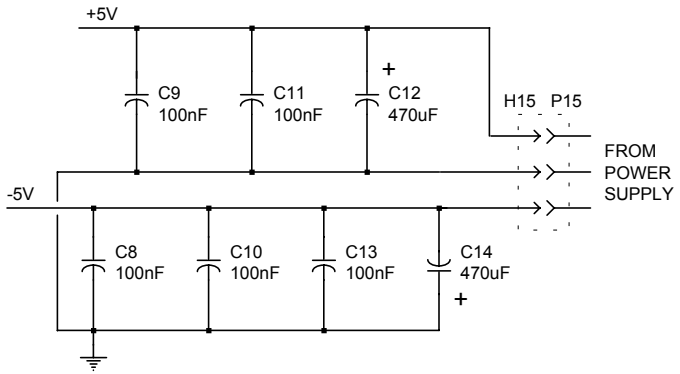


Fig. 3 -- Model 457 Output buffers and power supply filters

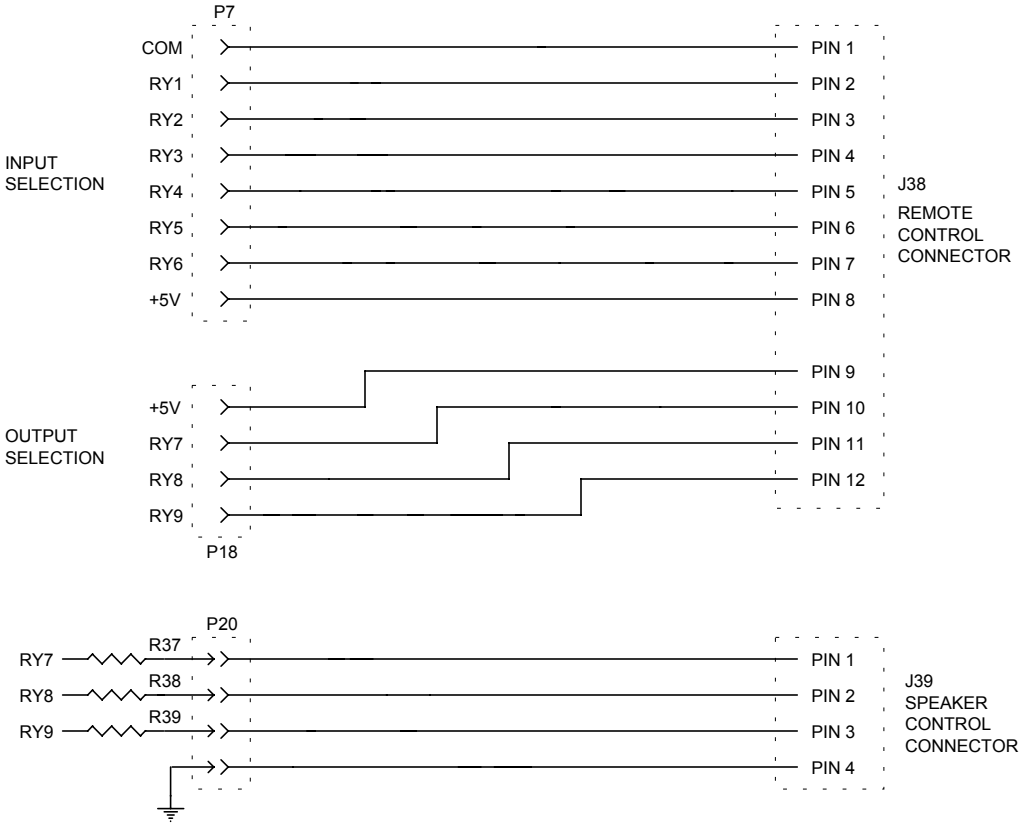


Fig. 4 -- Model 457 Wiring to the Remote Control and Speaker Control connectors.

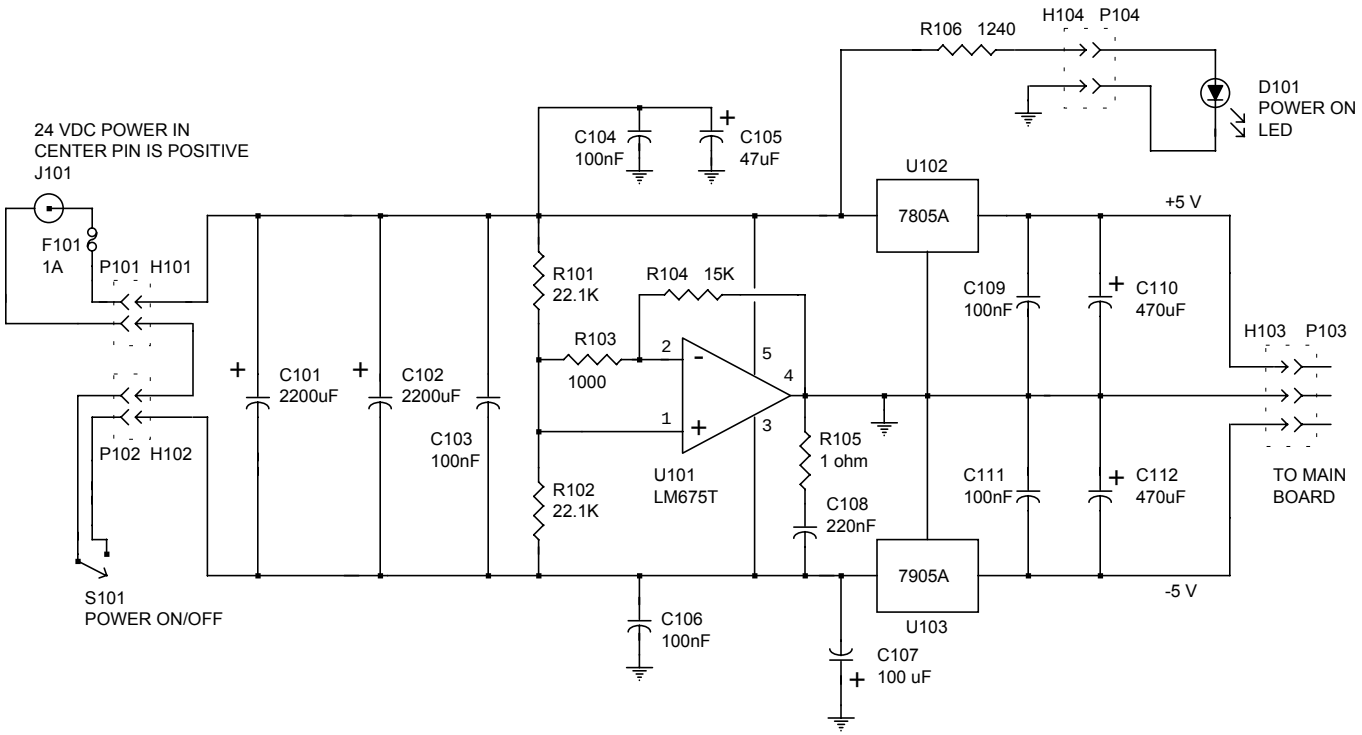


Fig. 5 -- Model 457 Power supply

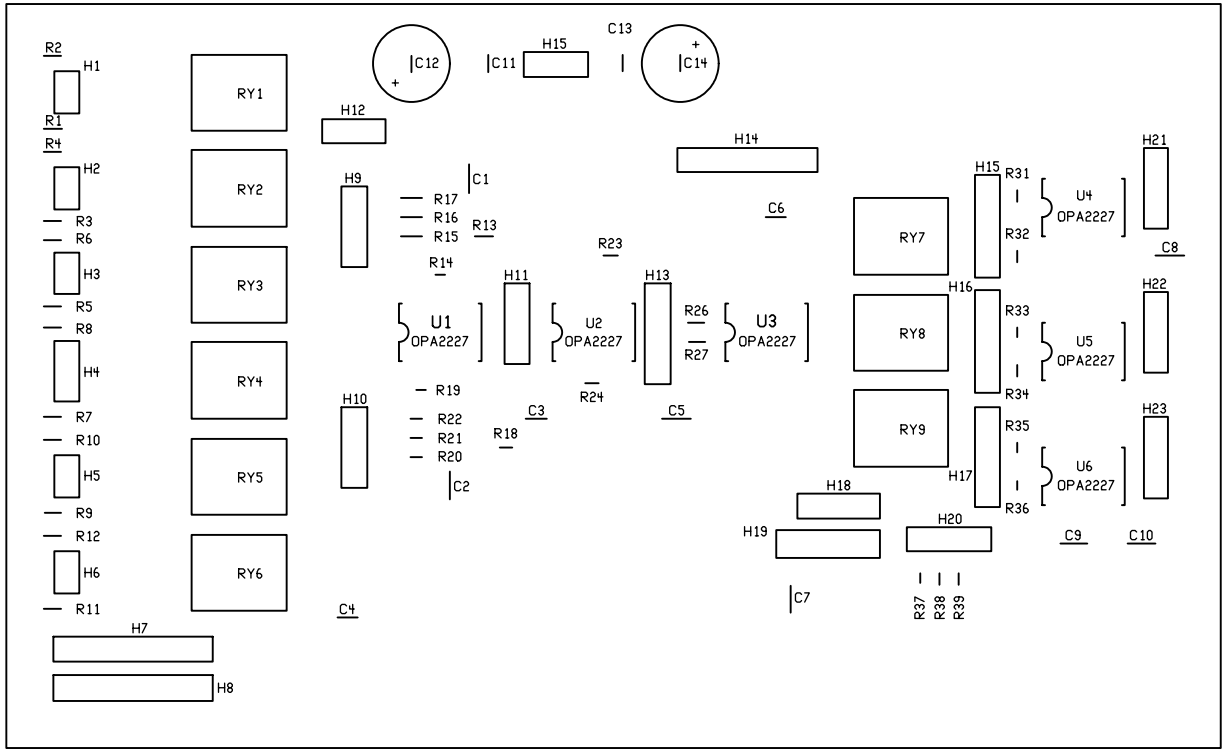


Fig. 6 -- ACENTER2 Parts Placement

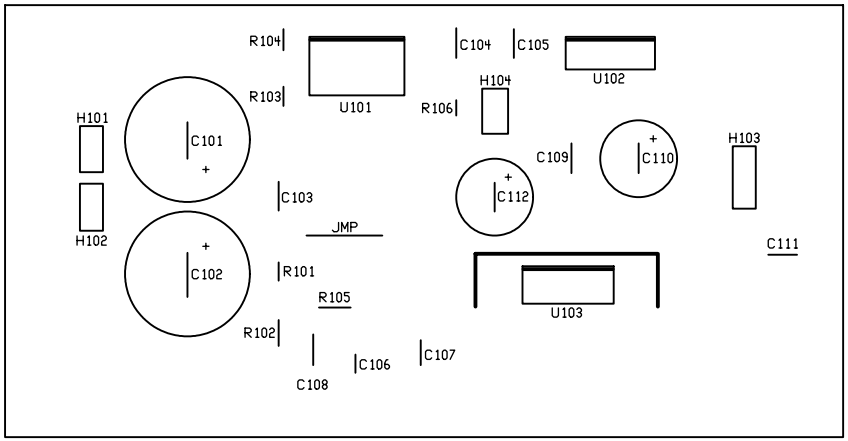


Fig. 7 -- PWRACEN2 Parts Placement

AUDIO CONTROL CENTER

Parts List
Model 457

REFERENCE	VALUE	DESCRIPTION	MANUFACTURER
R1, R2 , R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	47K	1%, ¼ w, metal film	
R13, R18	1 Meg	1%, ¼ w, metal film	
R14, R16, R19, R21, R23, R24, R26, R27, R31, R32, R33, R34, R35, R36	10K	1%, ¼ w, metal film	
R15, R20	24K2	1%, ¼ w, metal film	
R17, R22	5500	1%, ¼ w, metal film	
R25	5K to 250K	See Description Section	
R28, R29, R30	5K	Dual audio taper potentiometer	Mouser 313-2420-5K
R37, R38, R39	4700	1%, ¼ w, metal film	
R101, R102	22K1	1%, ¼ w, metal film	
R103	1000	1%, ¼ w, metal film	
R104	15K	1%, ¼ w, metal film	
R105	1 ohm	5%, 1 w, carbon film	
R106	1240	1%, 1/2 w, metal film	
C1, C2	470 nF	50 V, 5%, polyester film	
C3, C4, C5, C6, C7, C8, C9, C10, C11, C13, C103, C104, C106, C109, C111	100 nF	50 V, 5%, polyester film	
C101, C103	2200 uF	35 V, radial electrolytic	
C105	47 uF	25 V, radial electrolytic	
C107	100 uF	50 V, radial electrolytic	
C110, C112	470 uF	25 V, radial electrolytic	
U1, U2, U3, U4, U5, U6	OPA2227P	Dual op amp, 8-pin DIP	
U101	LM675T	Power op amp, TO-220	
U102	7805A	+5 V regulator, TO-220	
U103	7905A	-5 V regulator, TO-220	

AUDIO CONTROL CENTER

D101	Red LED	Power-on indicator	Lumax SSI-LXR1612ID (DigiKey 67-1147)
J1, J4, J7, J10, J13, J16, J19, J21, J23, J25, J29, J32, J35	Female, panel mount RCA, black		DGS (Mouser 161-1052)
J2, J5, J8, J11, J14, J17, J20, J22, J24, J26, J30, J33, J36	Female, panel mount RCA, red		DGS (Mouser 161-1053)
J3, J6, J9, J12. J15, J18, J27, J28, J31, J34, J37	Stereo phone jack, ¼ inch		Switchcraft (Mouser 502-12B)
J38	12-pin, female, panel mount connector		Molex (Mouser 538-38330-0512)
J39	5-pin, female, panel mount DIN socket		Deltron (Mouser 16HR635)
J101	2.5 mm male, insulated, panel mount, power input connector		DGS (Mouser 163-4303)
P1, P2, P4, P5, P6, P101, P102, P104	2-pin shell with terminal pins		Molex WM2011
P3, P103	3-pin shell with terminal pins		Molex WM2012
P9, P10, P11, P18, P20, P21, P22, P23	4-pin shell with terminal pins		Molex WM2013
P13, P14, P15, P16, P17, P19	5-pin shell with terminal pins		Molex WM2014
P7, P8	8-pin shell with terminal pins		Molex WM2017
	Terminal pins for the Molex shells		Molex WM2200
H1, H2, H4, H5, H6, H101, H102, H104	2-pin male header		Molex WM4000
H3, H12, H103	3-pin male header		Molex WM4001
H9, H10, H11, H18, H20, H21, H22, H23	4-pin male header		Molex WM4002
H13, H14, H15, H16, H17, H19	5-pin male header		Molex WM4003
H7, H8	8-pin male header (H12 is primarily a test point so P12 may not be used.)		Molex WM4006
F101	5 mm fuse, 1A, in panel mount holder		

AUDIO CONTROL CENTER

S101	SPDT miniature toggle switch	
S1	Rotary switch, 1-pole, 7-position, break-before-make	Mouser 105-14571
S2	Rotary switch, 1-pole, 4-position, make-before-break	Mouser 105-13571
S3	Rotary switch, 1-pole, 4-position, break-before-make	Mouser 105-14571
RY1, RY2, RY3, RY4, RY6, RY6, RY7, RY8, RY9	DPDT relay, 5 V coil, 312 ohms, 10-pin DIP	Aromat TF2E-5V or equal
	Rack mount enclosure, 3.5 x 7 x 19 inches	Sescom 2RU7
	Front panel	Metalphoto of Cincinnati, PN50162
	Rear panel	Metalphoto of Cincinnati, PN50475
	Knobs (3) for rotary switches	Eagle (Mouser 45KN017)
	Knobs (4) for Volume controls	Jameco 138510CA
	Heat sink for 7905A	Jameco 228005CA
	Heat sink for U101 and U102	3.5 inch length of ¾ x ½ inch aluminum channel
	Circuit board ACENTER2	
	Circuit board PWR457	
	Misc. hardware, teflon insulated wire, and shrink tubing	
	Ribbon cable: P7 and P18 to J38 and P20 to J39	
	Wall DC power supply, 24 VDC @ 400 mA	Mouser 412-124044

TECHNICAL SPECIFICATIONS
Audio Control Center, Model 457

INPUT RESISTANCE: All inputs: 47,000 ohms.

INPUT to OUTPUT GAIN: 0, 3, 6 or 9 dB maximum as set by a front panel rotary switch. Volume control and Output Level controls decrease the gain from the maximum. No phase inversion from any input to any output.

OUTPUT IMPEDANCE: Each output has a unity gain buffer amplifier for a low output impedance.

OUTPUT NOISE: Any selected input to any selected output (input open).
Maximum gain (9 dB) with Volume control fully clockwise: 680 uV (microvolts) RMS
0 dB gain with Volume control at "12 O'Clock" (ordinary listening level): 430 uV RMS
Connecting an equalizer raises the output noise level by 8 to 10 times (4.5 mV RMS) but the noise and hum are still inaudible. The model 457 is very, very quiet!

CONNECTORS:
Inputs (6): one black female RCA (left), one red female RCA (right) and a 1/4 inch stereo phone jack.
EQ IN and EQ out: one black female RCA (left) and one red female RCA (right).
Always Selected Output: two black female RCA (left), two red female RCA (right) and two 1/4 inch stereo phone jacks.
Selected Output (3): one black female RCA (left), one red female RCA (right) and a 1/4 inch stereo phone jack.
Remote Control: one 12-pin female, panel mount Molex socket.
Speaker Control: one 5-pin female, panel mount DIN socket.

POWER: 24 VDC wall power supply (furnished) plugs into any standard US 115 VAC, 60 Hz outlet. Power supplies for other mains voltages and outlets available on special order, or you can furnish your own supply.

PHYSICAL: 3.5 x 7 x 19 inch rack mount enclosure. Clear anodized front and rear panels with black lettering. Weight: 4.6 pounds (2.08 kgm).

OPTIONS: Step attenuator Volume control, Option 01

ACCESSORIES:

Remote Control unit, Model 458
Speaker Control unit, Model 459
Turntable Signal Splitter, Model 460

PRICE: See Price List

OPERATION

Plug the wall power supply into any convenient outlet and attach the power cord to the ACC power input connector.

What you do next depends upon how you want to use the ACC. Let's look at some examples – I will start with simple ones. To use the ACC as a volume control between your CD player and a power amplifier, connect the CD player output to one of the ACC inputs (it doesn't matter which one). Connect any of the three ACC outputs to your power amp input. Set the ACC input and output selector switches (or the remote control) according to the input and output connectors you used. (The input and output connector numbers on the rear panel correspond to the selector numbers.) If you have an equalizer, remove the ACC jumper cables from the EQ IN and EQ OUT connectors and connect your equalizer. Set the output level controls to maximum, and the volume controls to 0 dB and mid range (12 o'clock). Turn on the equipment. Put in a CD, press play and adjust the volume as needed.

Your CD player probably has a pair of RCA connectors as its output. The left channel is black (or white) and the right channel connector is red. The ACC also has black (left) and red (right) RCA in and out connectors as well as stereo phone jacks. So the most convenient connection is a stereo cable with RCA plugs on both ends. Power amps frequently have RCA input connectors too. If you find phone jacks or XLR connectors instead, adapters are readily available. For example, see the Parts Express* printed or online catalog.

Before going on to the next example, I want to say a few words about cables. Buy the best ones you can afford. "Cheap" cables can degrade the performance of the finest audio equipment and make you wonder what's wrong. Radio Shack *Goldline* cables are pretty good and are the minimum quality you should consider. Dayton Audio cables from Parts Express* are the next step up and are the cables we mostly use here at TDL. Acoustic Research cables, also available from Parts Express, cost about double the Dayton Audio cables and in my opinion are only marginally better.

COMPARING AT THE INPUT

You can compare two (or more) CD players, FM tuners, phono preamps or any other program sources by connecting their outputs to the ACC inputs and switching between them with the remote control or front panel input selector.

To compare two CD players you need two copies of the CD but making copies is easy these days and is legal as long as it's for your own use. After making the comparison, try reversing the CD's in the players and listen again. A digital copy is usually identical to the original but it doesn't hurt to make sure.

Comparing FM tuners can be a little tricky. When tuned to the same station, they may interfer with each other so physically separate them as far as is practical. If you have to connect them to the same antenna, use a signal splitter with as much loss as possible or add extra attenuation in each tuner input cable.

Figure 8 is a block diagram of how to compare two phono preamps. The optional model 460 signal

splitter lets the turntable pickup cartridge "see" the correct load resistance for driving two or three preamps. Without the 460 (or similar unit), the cartridge load would be incorrect and the music probably wouldn't sound very good either!

COMPARING AT THE OUTPUT

Figure 9 shows how you can compare power amplifiers while keeping the rest of the system the same, including the speakers. The optional model 459 Speaker Control switches the speakers to the power amp selected by the remote control or front panel output selector. Even though no input signal is applied to the unselected amps, the Speaker Control places load resistors on their outputs to insure safety and stability. The ACC output level controls let you balance the listening volume if the amps have different gains. (If the power amp has it own volume control you can also use it for balancing the listening level.)

Figure 10 shows how to compare two or three speaker systems. The model 459 uses relays to do the switching so it is bidirectional. That is, inputs can be used as outputs and *vice versa*. By connecting the power amp output to the speaker connectors and the speakers to the 459 inputs, the speaker "in use" will be the one selected by the remote control or front panel output selector.

IMPORTANT CAUTION!!

When comparing only two speaker systems **DO NOT** select the third output with the remote control or front panel output selector. This would leave the power amp with no load and would probably result in its failure! It is impractical to protect against this in the model 459 so you must take responsibility for your use of the ACC in this way.

VERSATILITY

The ACC is a very versatile system and can be used in ways not already mentioned. For example, you can compare at both the input and output at the same time – say, two preamps and two power amps for four different combinations.

One final comment which may not be obvious. There are two different "Always Selected" outputs. One is before the master volume control and the other output is volume controlled; the connectors are so labeled on the rear panel. Which one to use? If your subwoofer has its own volume control then the "No-Vol Control" would probably be better. For speaker comparison, you would probably want to drive the power amp from the "Volume Control" output unless the power amp has its own control in which case it doesn't matter which ACC output is used.

* Parts Express, 725 Pleasant Valley Drive, Springboro, OH 45066. Phone: 937-743-3000, email: sales@partsexpress.com. www.partsexpress.com

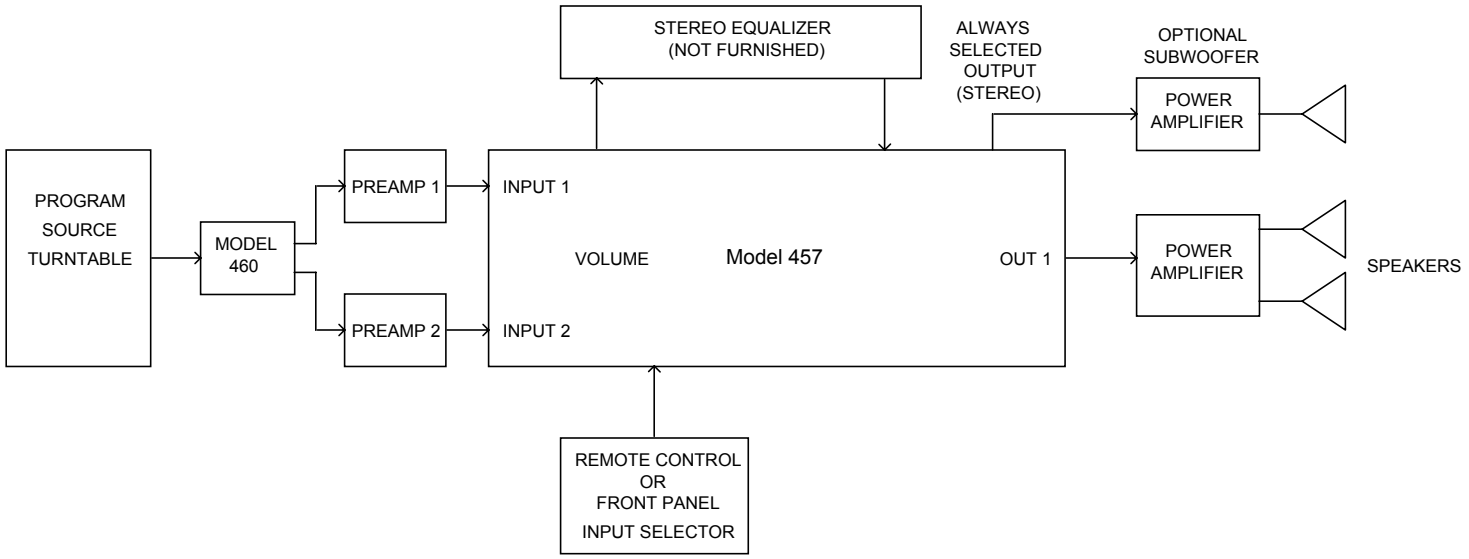


Fig. 8 -- Block diagram of how to compare two preamps.
All inputs and outputs are stereo but are shown simplified.

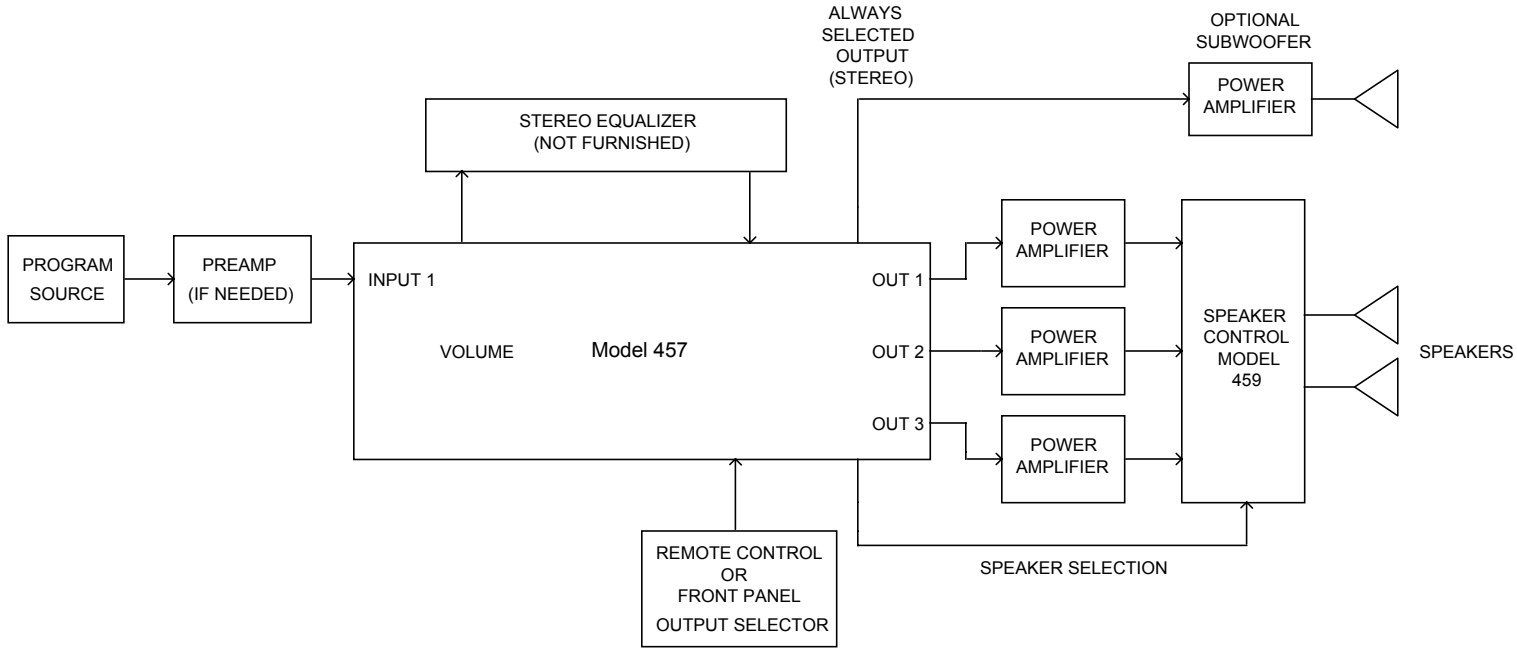


Fig. 9 -- Block diagram of how to compare two or three power amps using the same speaker system.

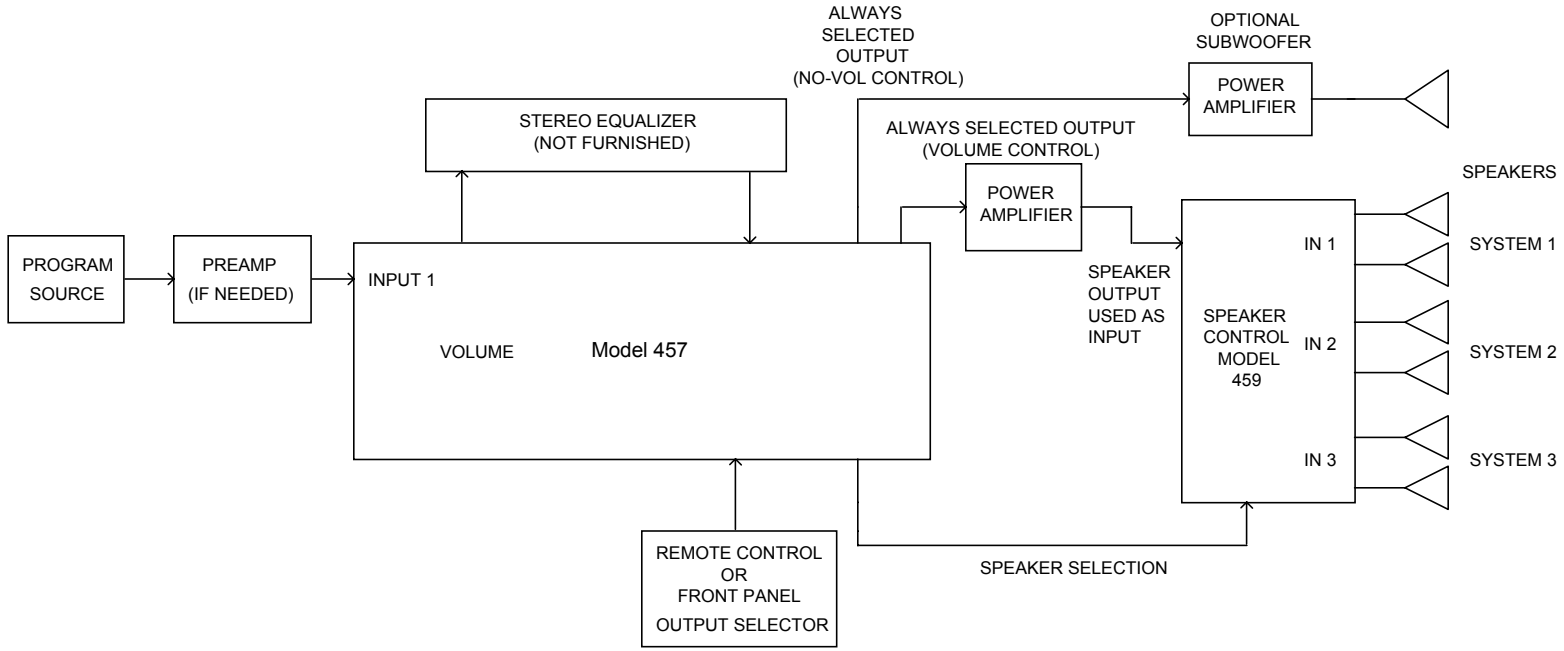


Fig. 10 -- Block diagram of how to compare two or three speaker systems.
IMPORTANT! Please read the CAUTION in the Operation Section.