

Audio by Van Alstine ABX Comparator Switch User Manual Rev 5/27/15



The ABX Comparator Switch allows seamless switching between two sources, two power amps, and three sets of speakers. Some of its features are:

- Precise volume level matching, in 0.1 dB increments.
- Infrared remote control.
- Blind test mode.
- Line level subwoofer support with built in selectable subwoofer filter.
- Programmable power up state and persistent volume settings
- Works with single ended or bridged amplifiers (ABX boxes displaying a date later than 06-05-14)

Note that any ABX box displaying a date of 06-05-14 or earlier at power up used a common ground throughout the switch. These cannot be used with bridged amplifier designs. Also, extreme care must be used with these older ABX Comparators to ensure correct speaker cable polarity, as a dual banana plug flipped around between the ABX switch and the amplifier output will connect ground to the positive amp output and could result in catastrophic amplifier damage.

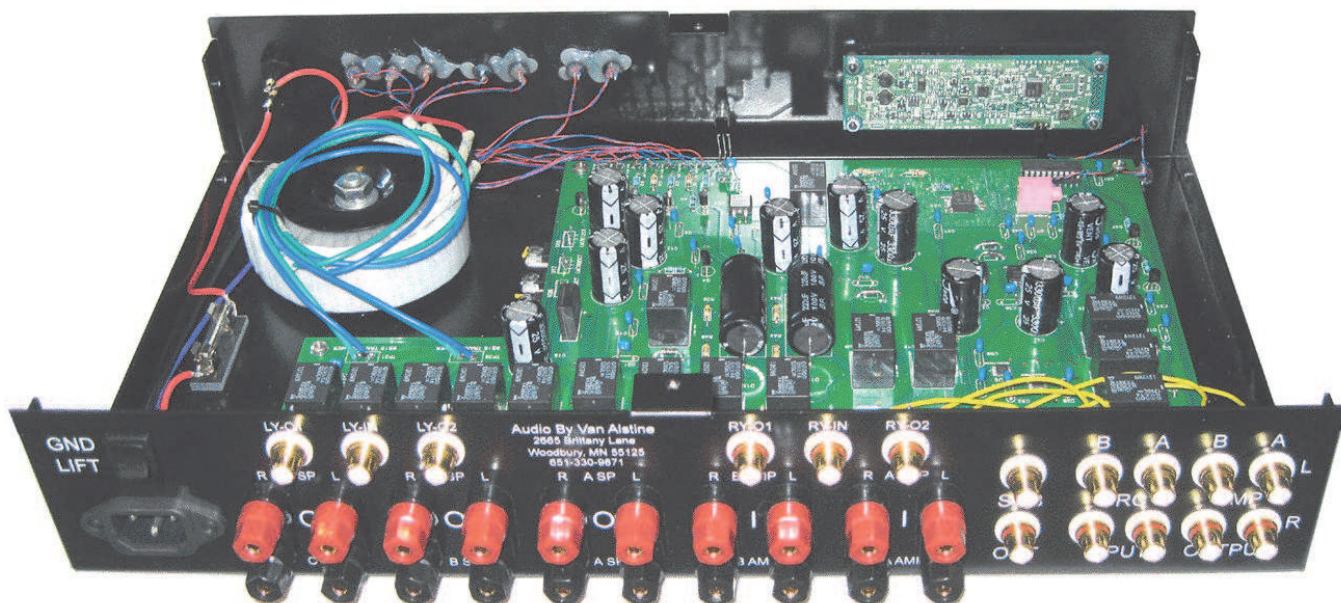
Current ABX boxes displaying a date later than 06-05-14 do not have common speaker grounds and have been designed to allow safe use of non-single ended amplifiers (bridged amplifiers). Output polarity reversal, while still important for phasing issues, will not short amplifier outputs.

Connections Setup

All line level signals connect with interconnect cables terminated with RCA plugs. **Speaker level signals** connect with speaker cables terminated with dual banana plugs for easiest use.

A line level signal is around 1 to 2 volts AC. It is the typical signal level that comes out of a high level source like a CD player, phono preamplifier, or tuner. It is also the typical signal level used to connect a pre-amp to a power amp.

The ABX Switch was designed to “drop in” to a system set at **normal** listening levels (or slightly louder) and then adjust those levels **slightly** to achieve equal volume settings for all components.



Source Line Level Connections to the ABX Comparator using the “Y” Jack Sets.

The two groups of three RCA jacks above the row of speaker terminals form simple “Y” connectors to allow identical input signals to feed two attached preamplifiers allowing preamp testing.

Connect left and right line level analog input signals from a DAC, Phono preamp, or computer to the LY-IN and RY-IN center jacks. Then connect LY-O1 and RY-O1 to a line level input set on preamplifier A and LY-O2 and RY-O2 to preamplifier B.

There is a built in 10k ohm resistor between center jack and left / right jacks so isolation exists between the duplicate signals.

The Y connections are not needed when testing speakers or power amplifiers using only a single common preamplifier. In this case the preamplifier audio outputs connect directly to SRC INPUT A left and right RCA jacks. These are the third vertical pair from the right end shown in the photo above. In this case, make sure Source A is selected with the remote (Button 1).

Preamplifier and power amplifier line level connections to the ABX Comparator.

Connect the left and right audio outputs from preamplifier A to SRC INPUT A left and right RCA jacks.

Connect the left and right audio outputs from preamplifier B to SRC INPUT B left and right RCA jacks.

Connect the left and right audio outputs from ABX Comparator AMP OUTPUT A left and right RCA jacks to the left and right audio input jacks on power amplifier A.

Connect the left and right audio outputs from ABX Comparator AMP OUTPUT B left and right RCA jacks to the left and right audio input jacks on power amplifier B.

If a subwoofer(s) with built in plate amplifier(s) is/are used, it/they is connected to the Sub Out left and right RCA jacks. *Subwoofer volume and a high pass filter for the main speakers can be controlled from the remote control as described later in this manual.*

Power Amplifier speaker cable connections to the ABX Comparator.

For easiest and most reliable speaker level connections we strongly recommend using Pomona Double Banana Plugs or similar for the speaker wire terminations at the ABX Comparator. Due to the necessary space limitations, reliable bare wire or spade lug connections will be difficult. The double banana plugs are available at Mouser.com. Use Red ones for the right channels (Mouser part number 565-1330-2) and black ones for the left channels (Mouser part number 565-1330-0). These are also available from many other electrical supply vendors.

Up to two power amplifiers connect to the four right most dual banana jacks using speaker wires terminated in dual banana plugs.

Power Amplifier A speaker output jacks connect to A AMP left and right speaker dual banana jack sets.

Power Amplifier B speaker output jacks connect to B AMP left and right speaker dual banana jack sets.

Care should be used to ensure correct cable polarity, as proper phasing is important. Also, on any ABX box displaying a date of 06-05-14 or earlier at power up, a dual banana plug flipped around between the ABX switch and the amplifier output will connect ground to the positive amp output which could result in catastrophic amplifier damage.

Loudspeaker speaker cable connections to the ABX Comparator.

Up to three sets of speakers connect to the left most 6 dual binding post sets.

The first set of speakers connects to left and right A SP dual binding posts.

The second set of speakers connects to left and right B SP dual binding posts.

A third set of speakers connects to left and right C SP dual binding posts.

Note that the Black binding posts are common ground only on units dated before 6/5/14.

Subwoofer Support

Subwoofer support is available in the form of left and right line level outputs to a subwoofer “plate” amp through 2 RCA connectors marked SUB OUT L and R. Usually, the subwoofer volume tracks the regular volume setting, but this can be set differently if desired.

To set the subwoofer outputs at a different volume than the main speakers, press the **FF** button on the remote control. This changes the display to read SUBV. Now you can adjust the output level of an attached subwoofer to match the level of the speaker under test. Pressing the **FF** button again changes the volume control back to the main system. Once adjusted, the subwoofer volume tracks the main volume settings.

A different subwoofer volume setting can be used with each set of main speakers connected. The ABX Comparator “remembers” the subwoofer settings when the box is powered off.

The ABX Comparator can also insert a speaker level 6 dB per octave high pass filter (pole point about 100Hz) into the output to selected speakers if desired when using subwoofers. Pressing the **PLAY** button on the remote control turns the filter on or off. When the filter is engaged, the display will read SUB.

This is useful when comparing a full range speaker pair to a pair benefiting from a subwoofer. The filter prevents the low frequencies being reproduced by the subwoofer from also being reproduced by the main speakers. This providing a more balanced operation for this setup.

Front Panel Displays

Left and right volume is shown on the display located on the left side of the front of the unit. The display shows the current volume settings and many special function options.

Green LED's are illuminated for A source, A amp, and A speaker pair. Blue LED's are used for B source, B amp, and B speaker pair. A red LED is used for C speaker pair.

All displays and settings are turned off in either the quick test or formal ABX test modes.

The supplied Universal Remote Control

The remote control must be set in the VCR-DVD mode to run the ABX Comparator. If using the remote is producing unanticipated results, check to make sure the VCR-DVD button is pushed.

The infrared receiver used with the remote is located in the ABX Comparator between the display and the A source LED. There needs to be a clear line of sight from the remote control unit to this infrared receiver.

The ABX Comparator uses a universal remote set to "Sony" codes. An RCA RCU-403R or RCU-404R remote comes pre-programmed with each ABX Switch. This remote is readily available on-line and at stores should it become lost or damaged. A new remote must be programmed for Sony codes. Both the "TV" and the "VCR" portion of the remote must be set, and the remote must function as if controlling a VCR. Program the RCA model RCU-403 / RCU-403R to work with the ABX Switch by doing the following:

- 1) Press and hold "CODE SEARCH" until remote's LED lights. Release "code search"
- 2) Press and release "TV". LED will blink
- 3) Press and release the four digits "0001". The LED will flash after each digit and then go out..
- 4) Press and hold "code search" until remote's LED lights. Release "code search"
- 5) Press and release "VCR-DVD" ("VCR"). LED will blink
- 6) Press and release the four digits "0032". The LED will flash after each digit and then go out.
- 7) *Ensure remote is in VCR mode by pressing "VCR-DVD" ("VCR"). If remote is in TV mode, play, stop, FF, pause, rew, and record won't work. If TV MODE is not programmed, volume changes won't work.*

Low Batteries. When any button on the remote is pressed and held, the remote should transmit the code for that button as fast as possible. The red LED in the upper left corner of the remote should reflect this by being on continuously while the button is depressed. If a button is pressed continuously and only one flash of the red LED in the upper left corner of the remote occurs (and only one code is transmitted to the ABX Switch) the remote's batteries are low and should be replaced.

When changing batteries the remote should retain the program codes but will revert to "TV" mode when powered back up. Press "VCR-DVD" ("VCR") to ensure proper operation.

Use of ABX Comparator volume control (adjusted by remote control).

The remote control must be set in the VCR-DVD mode to run the ABX Comparator. If using the remote is producing unanticipated results, check to make sure the VCR-DVD button is pushed.

Volume can be set from “99” (maximum volume) down to “00” (minimum volume). For the most part, the display increments are 0.1 db. So a volume of “92” would be .1 dB less than “93”. This small difference is inaudible to humans but can easily be measured on test equipment.

Note that the ABX switch has no gain and can only attenuate the line level input signal from the source.

It is important to keep the ABX switch volume set to a high number (80 would be a good starting point). Internally there is a limit to allowable signal swing. This limit can be exceeded if the ABX volume setting is set low and the source is “cranked up” to get reasonable listening levels out of the ABX switch. When this permissible signal swing is exceeded, the signal is clipped and a large amount of distortion is generated. The insertion loss of the switch, set to maximum volume, is about 1 db. Therefore from volume “99” down to volume “10” represents an attenuation of about 1 dB to 9.9 dB in 89 steps. From volume setting “09” down to “00” the full range of the attenuation circuit is used which translates into about 3 to 4 dB per step. Volume “09” is about 13 dB down; volume 08 is about 16 dB down. This continues down to volume “01” which is 42 dB down, and finally “00” is 63 dB down. Volume settings of “09” to “00” should never be used unless necessary to get equal volumes on the A and B sides when the “quiet” side has the volume set to maximum. The only reason to need a volume setting of “09” to “00” is if testing an extremely “hot” source against an extremely “quiet” source, or an extremely efficient speaker against an extremely inefficient speaker.

Remote Control ABX Comparator Functions

VOL UP/DOWN buttons adjust Left and Right Volume up or down simultaneously. Holding button down causes adjustment speed to increase. Adjustments to each separate Source, Amplifier, or Speaker pair can be done independently to match levels for comparison tests.

CHANNEL UP/DOWN buttons adjust selected channel volume only. Holding button down causes adjustment speed to increase.

PREV CH button selects either L or R channel for independent volume adjustment. Channel selected is indicated by arrow in display window.

MUTE button mutes output to speakers. Display indicates MUTE and speaker LEDs will be off when system is muted. *If you have no output sound, make sure the MUTE function is not turned on*

Button #1 Selects A Source.

Button #2 Selects B Source.

Button #3 Toggles between A and B Source.

Button #4 Selects A amplifier.

Button #5 Selects B amplifier.

Button #6 Toggles between A amplifier and B amplifier.

Button #7 Selects A speaker set.

Button #8 Selects B speaker set.

Button #0 Selects C speaker set.

Button #9 Toggles between A speaker set and B speaker set.

Multiple speaker selection: The ABX Comparator allows up to two speaker sets to be selected at the same time. Simply press the speaker selection buttons (7, 8, and 0) within 2 seconds of each other. The ABX Switch will not allow 3 speaker sets to be selected at the same time. Press any speaker button again to exit this mode. *Make sure your amplifier(s) is/are safe into low impedance loads before using this mode.*

The ABX Switch has a programmable power up state. To set the power up state of the ABX switch to the current state of the ABX switch press “ON-OFF” followed by “REC” followed by “REC”.

This remote requires the “REC” button to be pressed twice before the “REC” code is actually transmitted. This adds a bit of security to prevent unintended changes to the desired power up state.

Quick Blind Test Mode

Refer to Formal Blind Test Example on next page using the simple setup diagram for basic system setup.

First use the VOL UP and VOL DOWN arrow keys to set the listening level the same for two components you want to compare.

Then, pressing the “STOP” key enters and exits the **quick blind test mode**. In this mode the front panel LED’s are turned off and the volume display is set to “00” so no indication is given to the listener as to what components are selected.

If the “toggle” keys on the remote (keys 3, 6, and 9) are used to compare source A / B or amp A / B or speaker A / B even the remote operator can quickly lose track of what is currently selected. After deciding what sounds best (or worst), pressing “STOP” again exits the quick blind test mode, turns the displays on again, and reveals what is currently selected. Press STOP again to continue this test for as long as desired.

The Formal BLIND ABX Test Mode

This unique listening test procedure capability with the ABX Comparator absolutely separates the wheat from the chaff. When you decide to advance from one test step to the next, the ABX Comparator’s built in random number generator decides whether to switch from one of the components under test to the other, or not to switch. You won’t know whether it switched or not. Your choice of which component is “better” will depend only upon your ears. You probably won’t like being “wrong” as often as the ABX comparator tells you are, but that’s not its fault. When anticipation bias is eliminated, all that purple prose bites the dust. Have fun with this amazing capability, which may humble your golden ears.

There are a few ABX Comparator conventions we need to discuss before diving into the formal test mode.

The **ON-OFF** button is used as a “qualifier” to provide for multi function button use. Some buttons can have more than one function if the ON-OFF qualifier button is pushed first.

For example, the number “1” button normally is used to select Source A. However if the ON-OFF button is pressed followed by the number “1” button, this will cause the ABX Comparator to enter the formal blind test mode. If you just tried that yourself, you can exit the blind test mode by pressing **STOP**.

The **ON-OFF** button also acts as a qualifier to change the functions of the **ENTER** and **INPUT** buttons.

The **ENTER** and **INPUT** buttons are used to define the two separate systems that the ABX Comparator operates on when in the formal blind test mode and to switch between these two systems.

The **ENTER System** is a *combination of source, amplifier, speaker, and volume levels* selected for one side of an ABX comparison.

The **INPUT System** is a *separate combination of source, amplifier, speaker, and volume levels* for the other side of an ABX comparison.

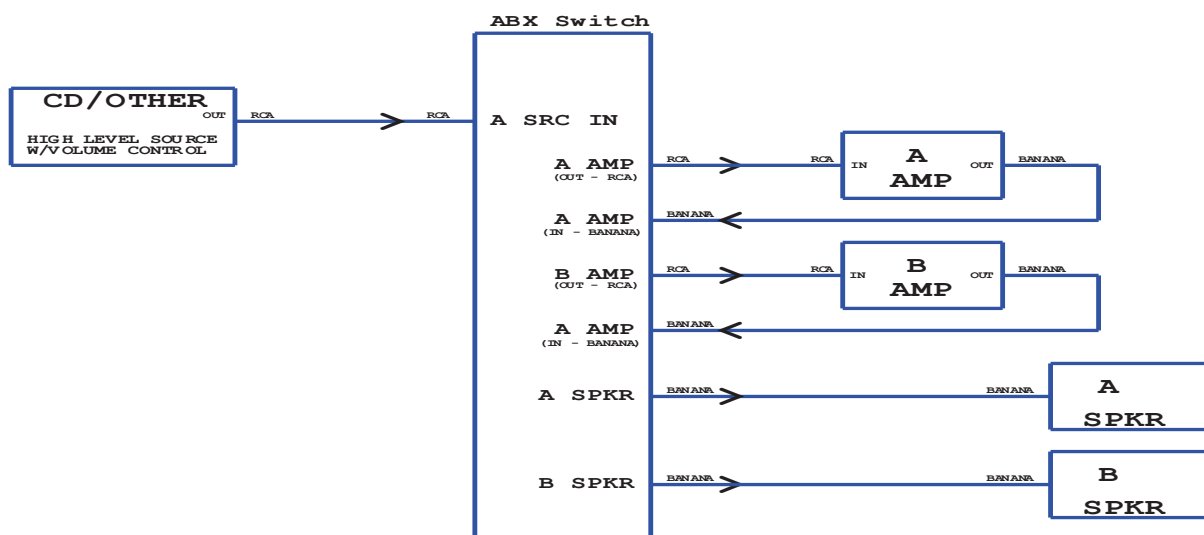
Note that Both Enter and INPUT systems can share components as desired.

Pressing the ON-OFF button before pressing ENTER will define and save the current settings of the ABX comparator as the **ENTER system**.

Pressing the ON-OFF button before pressing INPUT will define and save the current settings of the ABX comparator as the **INPUT system**

After the two systems are defined, pushing the ENTER or INPUT buttons alone will switch to that system.

Formal Blind Test Example using the simple setup diagram.



Let’s assume you just want to compare two amplifiers using two different sets of speakers to understand how the speaker load affects your choice of amplifiers or vice versa.

Make the connections shown above using a preamplifier connected to A SRC INPUTS and some music source connected to the preamplifier and the preamp volume control set to some normal low-level output.

For this test make sure that you are set to Source A (button #1)

Now match levels between the components under test as follows:

Select A SOURCE (button #1), A AMP (button #4), and A SPKR (button #7). Set the ABX volume level using the VOL up and down buttons so the display reads 80. *Now using your preamplifier volume control set the overall sound level to what you desire to test at.*

Select A SOURCE (button #1), A AMP (button #4) and B SPKR (button #8). Adjust your ABX volume so that the overall sound level is about the same as above. *This will probably show a different display volume number.*

Select A SOURCE, B AMP, and SPKR A and adjust ABX volume again.

Finally select A SOURCE, B AMP, and B SPKR and make final volume adjustments.

Fine tune the settings by selecting A AMP, B AMP, A SPKR, and B SPKR in order and adjusting the volume of each using ABX VOL buttons to match levels as closely as possible. *Note that you are adjusting actual volume here, not matching the volume numbers on the display.*

The ABX Comparator saves the volume levels of the combination of components you have set, not the volume of each independently. Given two sources, two amplifiers, three sets of speakers, with any two speakers pairs at once used too, there are 96 different volume settings maintained in the ABX Switch; a sub volume and a mains volume left / right pair for every possible combination of source, amp, and speaker. These volume settings persist through power cycling.

Now define the two systems you want to test. We will assume you want to first test A AMP and B AMP using A SPKR.

Select A source, A AMP, and A SPKR. Now press the ON-OFF button followed by the ENTER button. This defines the ENTER System.

Then select A source, B AMP, and A SPKR. Press the ON-OFF button followed by INPUT. This defines the INPUT System.

Now toggle the sound back and forth with the INPUT and ENTER buttons to make sure the levels still match and that the two test systems are shown correctly on the LED lamps.

Blind test mode activation

Once two systems have been defined with the “ENTER” and “INPUT” switches, and the volume of the two systems is closely matched, you are ready for blind test mode.

It is important to realize that volume has a tremendous effect on how the brain perceives audio. A system that is slightly louder than another system has a tremendous advantage in being selected as the better sounding system. Take care in matching levels. A sound pressure meter and a white noise generator, used at moderate levels, are recommended for this purpose. However, careful level matching by ear will probably work well for you.

Press “ON-OFF” followed by “1” to enter the blind test mode. The LED’s will go out, the relays will click, and a “1” will be displayed (to indicate test 1), and “blind test” will be displayed.

A random number is “grabbed” when ON-OFF followed by “1” button is pressed to enter blind test mode. That random number is used internally to select either system “ENTER” or system “INPUT” for the **8 tests** that are used in the blind test mode. *You won’t know the starting system at this time.*

The VOL UP/DOWN or CHAN UP/DOWN buttons will either advance or retard the test number. Wrap occurs, so TEST 8 plus VOL UP will go to TEST 1, TEST 8 plus VOL DOWN to test 7.

At each test step, the ABX Comparator either changes to the opposite system, or not, depending upon what it feels like doing to mess with your mind. 😊

You can listen to each test step for as long as you desire. **Make detailed notes of course, labeling your written observations identified with each test step.** *Once the 8 tests have been listened to and you decide what you like best (or don’t like) you can reveal which system goes with which test.*

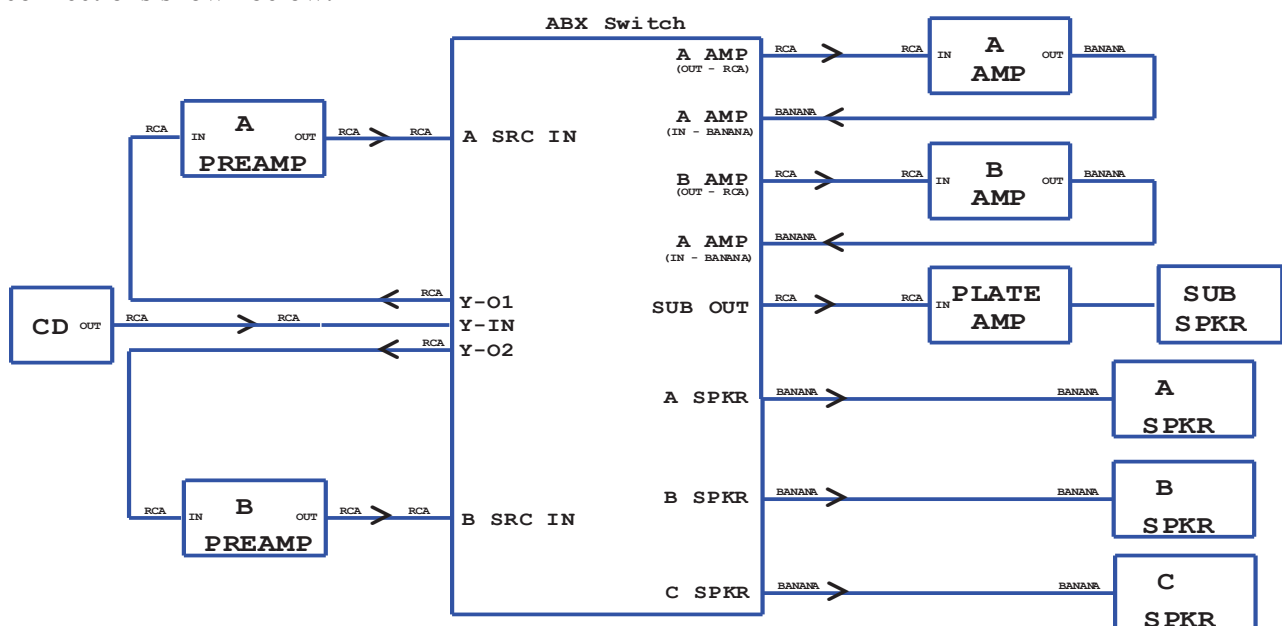
To reveal what you were listening to above, press the “MUTE” button to toggle the LED’s back on. You can now step through the tests again, using the VOL UP/DOWN button, and see which system was selected for each test. It should be noted that there is a 1 in 256 chance that all 8 tests will select the ENTER system so no changes will occur throughout the entire test. Likewise there is a 1 in 256 chance that all 8 tests will select the INPUT system.

At any time during blind test the MUTE button will toggle LED’s on/off, you need not wait until the end of the test to reveal what you are listening to. Similarly, at any time during the test, you may press ENTER to change to the ENTER system (A), press INPUT to change to the INPUT system (B), or press “0” to return to the current random test (X). “A” or “B” are displayed in place of the random test number when this occurs

To exit and end this blind test after you have evaluated your results press ON-OFF followed by “0” or simply press the STOP button.

If you now want to repeat the test defined above using B speakers, redefine the ENTER and INPUT systems and run the test again.

To set up the possibility of testing all possible combinations set the ABX Comparator up with all of the connections shown below.

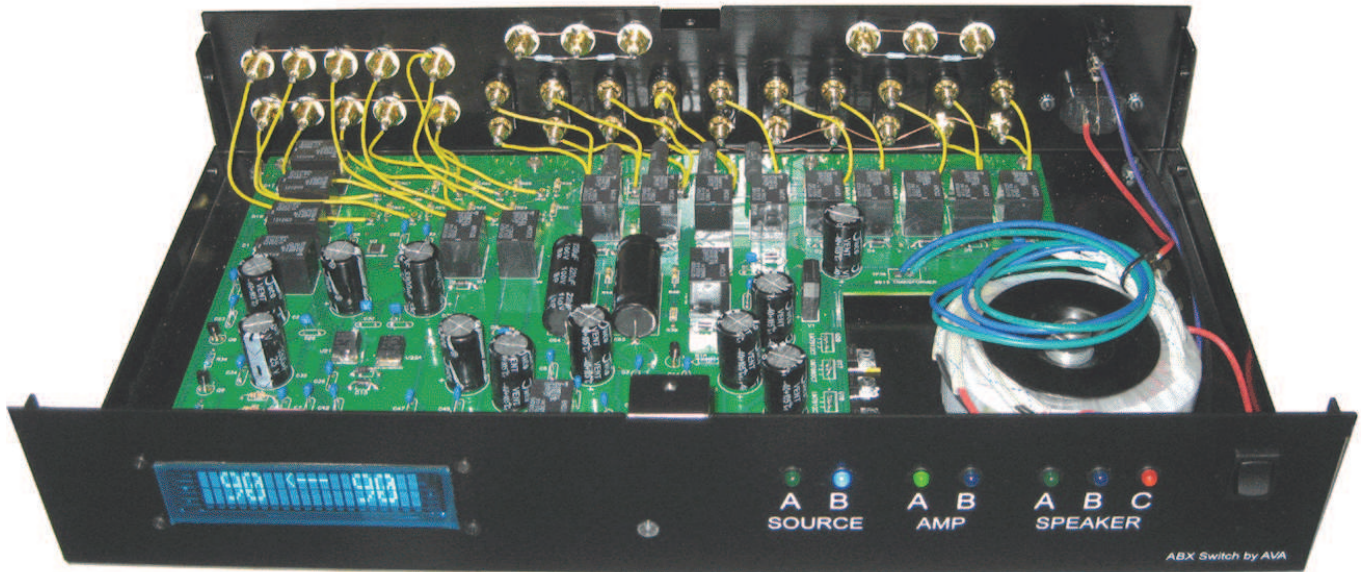


Remote Control Reference Sheet

ON-OFF	Qualifier (used before other keys to change their functions)
VOL UP/DOWN	Adjust L & R volume (both channels together)
CHAN UP/DOWN	Balance...Adjust either L or R volume
PREV CH	Toggle selected side for volume adjust
MUTE	Toggle Mute mode (mute allows volumes to be set with speakers off)
FF	Sub volume adjust. Allows setting sub volume different from normal volume.
Button 1	Select A Source
Button 2	Select B Source
Button 3	Toggle Source
Button 4	Select A Amp
Button 5	Select B Amp
Button 6	Toggle Amp
Button 7	Select A Speaker pair
Button 8	Select B Speaker pair
Button 0	Select C Speaker pair
Button 9	Toggle between A and B speaker pairs
ENTER	Selects “enter system” previously defined by ON-OFF then ENTER
INPUT	Selects “input system” previously defined by ON-OFF then INPUT
ON-OFF - ENTER	Defines currently selected system as the “enter system”
ON-OFF - INPUT	Define currently selected system as the “input system”
ON-OFF - MUTE	Toggle IR display mode (if on, received IR command is displayed on VFD)
ON-OFF - 1	Go to Blind Test mode (operates with “enter” and “input” systems)
ON-OFF - 0 or STOP	Exit Blind Test mode
PLAY	Toggle subwoofer enable. “SUB” displayed if enabled. Enabled implies there is a 6 dB per octave high pass filter on the speaker outputs. Disabled implies speaker outputs are direct.
STOP	Toggle quick blind test mode: Front panel LED’s off, display volume reads “00”
ON-OFF - REC – REC	Write current state of ABX switch to memory to set power up state.
ON-OFF - VOL UP/DN	Adjust display screen brightness up or down
ON-OFF - CHAN UP/DN	Adjust display screen brightness up or down
REW / PAUSE	Sets unit and xmit numbers for multiple ABX switch systems. If altered, ABX switch may become non-responsive with “NS” (Not Selected) displayed. If this occurs, set unit number back to default “3” and xmit number back to default “0”.

When in Blind Test Mode

VOL UP OR CHAN UP	Advance to next test
VOL DN OR CHAN DN	Go back to previous test
MUTE (info)	Toggle LED’s (off to on or on to off)
ON-OFF 0 or stop	Exit end Blind Test mode
ENTER	Change to the enter system (A)
INPUT	Change to the input system (B)
0	Return to random test mode (X)



ABX Comparator Setup, Simple System Cable Requirements (Each connection represents Left and Right)

Single source, two amplifiers, two speaker systems require;

3 interconnect cable sets terminated in RCA plugs

8 speaker cables terminated at the ABX Comparator in Banana or Dual Banana plugs

ABX Comparator Full System Cable Requirements

Music source, two preamplifiers, two power amplifiers, three speakers, and subwoofer system require;

8 interconnect cable sets terminated in RCA plugs

10 speaker cables terminated at the ABX Comparator in Banana or Dual Banana plugs

Note that ABX testing of interconnect cables, speaker cables, and/or power cords is possible if the appropriate duplicate matched preamplifiers and or power amplifiers are used.

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