

Installation and Operations Manual
AVC-1 James Research
Firmware Version 1.00
Manual – 06/21/2009

Description --

The AVC-1 manufactured by James Research provides the user with automatic stereo or mono volume control. The AVC-1 can be used with a Stereo or Surround Sound audio system as well as a cable or satellite box. When properly installed and adjusted, the AVC-1 will automatically keep its output at a constant listening level regardless of any variations in the input signal feeding it. These variations happen normally when changing channels or breaking in for a loud commercial or going back to the quieter main program just after a loud commercial.

The AVC-1 employs the latest in microprocessor and analog technology in its internal workings to provide the user years of uninterrupted service. Simple connections on the back panel include stereo inputs left and right, stereo outputs left and right and a coaxial +12vdc power connector. Power requirements for the DC power supply, included with the unit, are +12 volts DC at 100 milliamps maximum. Any 12vdc power supply rated 100 milliamps or better works well. The power supply should be capable of supplying power on a 2.5mm coaxial connector with plus on the tip. Transformer linear type power supplies tend to have less noise than smaller and lighter switching supplies and should be a consideration when purchasing one. There are Universal type power supplies available at many electronic stores or you can order one from us on request. On the front panel are four leds to indicate the current status of the unit and a AUTO/MAN mode switch for enabling and disabling the automatic volume control function of the unit.

Installation --

The user will need to analyze their system and determine how the AVC-1 will best suit their needs. If the user has a cable or satellite box connected to a TV using the TV's internal sound system, the user will need to connect the output of the cable or satellite box to the input of the AVC-1. Then connect the output of the AVC-1 to the associated input of the TV. If the user is using the HDMI feature of their cable or satellite box and the TV has an HDMI input, the user will need to use the HDMI input on the TV that has optional RCA phono type jacks for the audio input. This allows the user to run high definition video to his TV and still use the RCA phono type audio connectors.

If the user is using an external sound system instead of the sound system internally located in their TV, and then the user will need to connect the output of their TV to the input on the AVC-1. Then the user will need to connect the output of the AVC-1 to the input of their external sound system. These connections are made using RCA phono type cables usually purchased at any neighborhood electronics stores. Some dollar stores sell these inexpensive cables.

Another configuration in using a satellite or cable box with a TV and an external sound system would be to connect the input of the AVC-1 to the cable or satellite box output and the AVC-1 output to the input of the external sound system. This would bypass the TV altogether and would not use the TV for any sound output or control. This might be a configuration a user would use if he owned an old TV that had only 75ohm cable input and no RCA phono type audio inputs or outputs.

Unfortunately late model analog type TVs that don't have RCA phono audio inputs are not supported by the AVC-1. The user could possibly purchase a RF Modulator with video and audio inputs to make use of this type TV with the AVC-1. Or they may consider connecting his system as explained in the above paragraph.

Next the user will plug in their wall mount type power supply into the power jack of the AVC-1 and then plug the power supply into a 120VAC wall receptacle.

Other configurations with other systems are possible, but for the sake of a brief discussion, we only covered the three most likely to be used.

Power Up --

When power is applied for the first time to the AVC-1, the unit will run a self check test. The self test is running whenever the leds are sequencing and flashing. If for some reason it fails this test, the unit will turn on the red OVL led adjust itself for no boost or cut and halt processing. At this point your distributor should be contacted for repairs. Please include serial number. This event is rare and is most likely never to occur. At power up the unit will also remind the user of the current operating mode. One flash equals MUSIC/MOVIE mode and two flashes equals TV/CABLE/SATELLITE mode.

Watch Dog Circuit --

After power is applied and the RUN led begins to flicker, a watch dog timer circuit in the unit has been enabled. What this means to the user is that if for any reason the software in the unit does not continue to run, the unit will automatically detect this and attempt to recover and resume the normal operation. This means that the user may not ever see an interruption in normal operation. Events, which are rare, that can cause this event to occur are power glitches, external EMI radiation, internal microprocessor memory errors, radiation particles and other unknown causes. This is a feature that is generally found only in high level digital equipment such as flight control systems, medical monitoring equipment, etc where no interruption of service can be tolerated.

Installation Adjustment --

Normally the AVC-1 will require no input adjustment for audio devices that output near to the Audio Industry Consumer level standard, $\frac{1}{2}$ to 2 times more than standard. This is a standard set by the industry for DVD, CD, VCR, STEREO, SURROUND SOUND and other devices that have an audio output. This allows easy exchange of audio signals between devices. The AVC-1 always attempts to adjust its output to $\frac{1}{2}$ of this standard in order to guarantee operation over a broad spectrum of devices. Some devices are quite while others are loud and it is better to cut the signal than boost to preserve or improve the signal to noise ratio. The AVC-1 can do this in the range of 4 times less or 4 times more than the standard. Any signals out of this range results in a green or yellow flashing led on the front panel. Audio signals that are in range of $\frac{1}{2}$ of the standard result in only a green RUN led indication.

Some cable/satellite boxes have non-standard levels that tend to be high for the AVC-1. If this happens the yellow CUT led will tend to stay on and may flash from time to time indicating that unit is at maximum cut of 4. In order to improve this, the user will need to select either the 'C' for Consumer level or 'P' for Professional level on the input configuration switch located on the back of the unit. The center position is labeled 'H' for Half Consumer and is normally operated in this position. This will cut the signal accordingly giving the AVC-1 a greater dynamic range to adjust and provide better volume regulation. If after selecting the 'P' and the unit still indicates a flashing yellow CUT led mostly, you have an extremely high input signal and you need to contact your distributor if this happens. If the AVC-1s' input is connected to a device that does not adhere to this consumer standard and has an output volume control, the following procedure on the next page should be used.

After the user has verified his AVC-1 is properly connected and the mode switch is the AUTO mode with no display blanking, the user will need to adjust his system to an output level that best suits the range of audio output levels from each channel viewed. The volume control the user will be adjusting is always the volume control of the device that is feeding the input to the AVC-1. In the case of using the TV's internal sound system, the user should be adjusting the cable or satellite box volume control. In the case of using the external sound system, the user should be adjusting the TV's volume control. The user can do this adjustment by simply reading the leds on the front panel of the unit. With the AVC-1's front panel switch in the AUTO position, tune the quietest channel ever used. Now adjust the volume up if needed until the yellow CUT led come on. Now let the unit stabilize for at least 10 seconds. Now turn the volume down until the CUT led goes out. Now continue to slowly turn down the volume until the green BST led is on. Always give the unit at least 10 seconds to stabilize. The AVC-1 is designed to turn down faster than it can turn up and this is the reason for this wait period. Now continue to turn the volume down until the BST led begin to flash. Stop at this point and let the unit stabilize for 10 seconds. If the BST led remains flashing, the AVC-1 will now be able to adjust for the broadest range of levels that will be fed to it. If the user happens to do this not on a quite channel, the AVC-1 will not be able to adjust the levels as well as it should. Quite channels can be found either by scanning and listening or by reading the leds on the AVC-1. Yellow CUT led channels are loud and green BST channels are quite. Try starting with the volume in the middle position initially. Volume adjustment into the unit can sometimes be a little tricky, because cable and satellite operators are constantly changing the levels, and it may require some time and patience to achieve the best results. If there are really no quite channels coming out of your cable or satellite box, you may try adjusting to a normal channel by adjusting the input volume to no BST or CUT leds for a normal input level. Some cable or satellite boxes may require you to turn their volumes completely up.

Contact your distributor if you are having a problem that you cannot seem to be able to resolve. Please include serial number.

Front Panel Leds --

The AVC-1 front panel leds are designed to let the user easily know what their unit is doing. With the Mode switch in the AUTO position the leds display the following:

BST - Green led for Boosting. The AVC-1 is currently boosting the level to maintain a constant output level. Flashing means the unit is at maximum boost.

CUT - Yellow led for Cutting. The AVC-1 is currently cutting the level to maintain a constant output level. Flashing means the unit is at maximum cut. Note that if both the BST and CUT leds are off, the level presented to the unit is at the correct level and the unit is not boosting or cutting.

OVL - Red led for Overload. The AVC-1 is currently cutting the level at maximum and the input signal is above the maximum for the unit. The user should turn down the volume into the unit if this occurs. Also indicates an internal microprocessor problem has been detected at power up.

RUN - Green led for power and run status. The AVC-1 is currently sampling and processing the level for the selected channel. Every flicker of the led is a complete program cycle. The AVC-1 samples and processes 16 times per second. Flashing means either the Mute button is pressed on the remote upstream of the unit or the audio signal has fallen below what the unit defines as no audio. If this condition is not relieved within 4 minutes the unit will enter sleep mode and all of the leds will go off. Normal operation is reestablished by providing an audio signal to the unit. Note the unit will not make adjustments to the level unless there is an audio signal present. If the signal is choppy and goes on and off, the unit will only adjust only when the signal is active. An example of this would be intermittent talking and would increase the time required for the unit to adjust.

AUTO/MAN Mode Switch --

The AVC-1 AUTO/MAN mode switch does exactly what it is labeled. In the AUTO position the unit will readjust its output to maintain a constant level regardless of the input. In the MAN position the unit will not cut or boost the level in anyway and it is the user's responsibility to control the volume. It is the same as if the unit was not there. In most cases the unit will be left in the AUTO position. Note that the BST, CUT and OVL leds will be off in the MAN mode. The AVC-1 will resume automatic function as soon as the switch is placed back in the AUTO position.

Volume Adjustment Mode Selection --

The AVC-1 AUTO/MAN mode switch also provides a way the user can select the Volume adjustment mode at power up. This is provided so that users can select either MUSIC or TV operating modes. The MUSIC mode will select different operating parameters than the normal TV mode when adjusting the volume. This mode is remembered even if the unit is powered down and will resume the selected mode at power up. The user can toggle to next mode by simply moving the AUTO/MAN switch from the AUTO position to the MAN position and returning it to the AUTO position within 2 seconds. The unit will then flash all of the leds on the front panel to indicate which mode is selected. Two flashes equal TV/CABLE/SATELLITE mode and one flash equals MUSIC/MOVIE mode. On power up the unit will remind the user which mode it is in by flashing all of the leds once or twice to indicate the mode.

If the user runs the AVC-1 in MUSIC/MOVIE mode while actually in TV/CABLE/SATELLITE mode, the unit will not be as able to normalize excessively low input signals. Conversely if the user runs the AVC-1 in TV/CABLE/SATELLITE mode while actually in MUSIC/MOVIE mode, the unit could over boost on excessively low input signals.

Normal Operations --

Under normal AVC-1 operations the user will see the BST and CUT leds going on and off with a near normal level channel. They will also see the BST led coming on and may go to flashing for a low level channel. Or they may see the CUT led going on and may go flashing for a high level channel. They should never see the CUT led flashing and the OVL led on. If this occurs the input volume is definitely too high and should be turned down. You will find in time that the AVC-1 is quite a handy device to have connected to your entertainment system and will save you countless remote volume adjustments made manually. When we built the first prototype, we could not believe how long it had been since we needed to make a volume adjustment when watching cable TV. The only volume adjustments were made to the surround sound system to adjust the listening level.

The sleep function is also a handy function of the AVC-1. When your entertainment system is shut down for the evening, the unit will see it as a loss in audio signal and begin to flash the RUN led. After 4 minutes all leds will go off and unit will go to sleep and not annoy you with flashing lights etc until you restore the audio signal to the unit by restoring power to your entertainment system. Your AVC-1 uses so little power, under 0.1 watts, that there is no need in worrying about vampire power consumption of the unit and turning the unit off. However if you turn the unit off and restore power the next time you power up your entertainment system, that is not a problem as well, for the AVC-1 will immediately select no gain or cut as it's default setting then self test and then start making adjustments immediately.

Response Times --

As previously stated, the AVC-1 turns the volume up slower than it turns it down. In fact after a level has been accredited as being adjusted as normal, there is a 7 second delay, TV/CABLE/SATELLITE mode, and a 10 second delay, MUSIC/MOVIE mode, built in the unit for turning the volume up. This is necessary due to nature of most programming. It provides some damping and adds stability in maintaining the volume level. However the unit will respond immediately when turning the volume down.

Abnormal Operations --

Abnormal operations in the AVC-1 can only occur if the input volume is adjusted out of tolerance to the unit or the supply is out of regulation and feeding bad power to the unit. All other abnormal operations are usually caused by miss-wiring, bad connectors or entertainment controls not set properly. Or input level switch not set properly on rear of unit.

External Sounds --

The AVC-1 does a great job in monitoring the power levels applied to the listener and adjusts accordingly to maintain a constant listening level. However the AVC-1 will not adjust for any external sounds that cause the listener's ability to hear their program. Items like loud children, jet noise, car and motorcycle noise, loud conversations or appliance sounds will change the required listening level for the user and will need a manual adjustment made by the user. This will generally be made downstream of the unit such as in the stereo or sound system level. Or the TV output level if no sound system is used.

Sound Effects --

Some Stereos, Surround Sound systems and some TVs have sound enhancing features such as bass boosting, sound equalization and different surround sound simulation modes. Whenever these features are turned on, it may seem that the AVC-1 is not regulating properly. The unit is still feeding the proper signal level to the sound output device, but the output device is modifying the signal in a way that changes its' output power level. If this is not a desired effect, try turning those features off and normal AVC-1 regulation will be restored. When possible any sound enhancing devices should be connected upstream of the AVC-1 to allow the units to make adjustments after the effects have been applied.

Error Logging --

In addition to all of the above features of the AVC-1, the unit also keeps a permanent record of all current operating mode, A to D calibration parameters, power cycles, hours of operation, overload minutes and watch dog timer errors in its internal flash memory. What this means to the user is that if your unit comes in for repair, we will be able to see how you unit is performing and analyze any steps needed for a complete repair.

Trouble Shooting Guide --

No or low level sound -

1. The audio cables are either bad or not properly connected.
2. The volume is down on the TV.
3. The volume is down on the cable/satellite box.
4. The volume is down on the external sound system.
5. The power is not connected to the AVC-1. Verify RUN led on.
6. Cable/Satellite box or TV no audio output. Check mute button
Check flashing RUN led. It should be steady.
7. Running in MUSIC/MOVIE mode while viewing
TV/CABLE/SATELLITE mode.
8. Input level select switch selected wrong.

Too Loud -

1. The AVC-1 is in manual mode.
2. The CUT and OVL leds are on and the input volume is too high.
3. The TV volume is too high.
4. The external sound system audio level is too high.
5. Not wired properly or bad connection or bad cable.
6. Input level select switch selected wrong.

Poor Level Regulation -

1. The input volume to the AVC-1 not adjusted properly.
2. Not wired properly.
3. Input level select switch selected wrong.

OVL Led On Steady after Power Up -

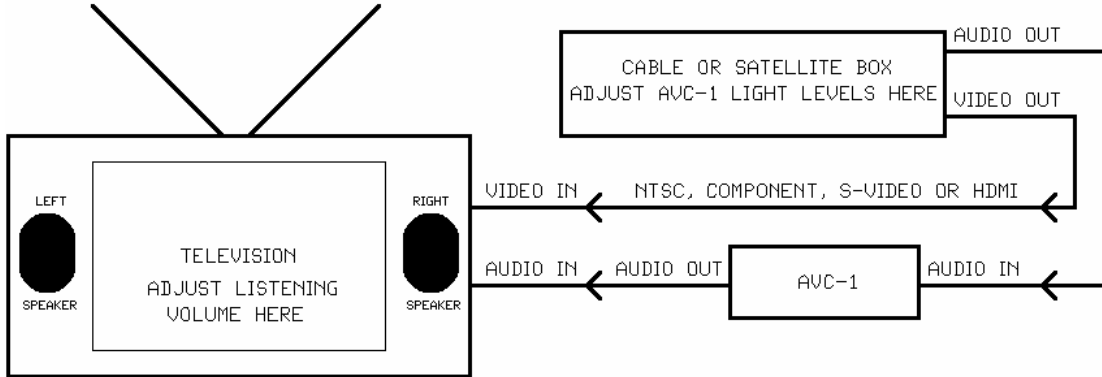
1. AVC-1 in bypass mode. Internal Microprocessor Error.
Unit needs repair.
Try Flash Memory Reset by powering up with AUTO/MAN
Switch in MAN. Then power back up in with switch in AUTO.

All other problems please contact your distributor.

Please include serial number.

FIGURE 1.0

USING TELEVISION SOUND SYSTEM
TV WITH DIRECT VIDEO AND AUDIO INPUTS



USING TELEVISION SOUND SYSTEM
WITH ANALOG 75 OHM CABLE VHF/UHF INPUT

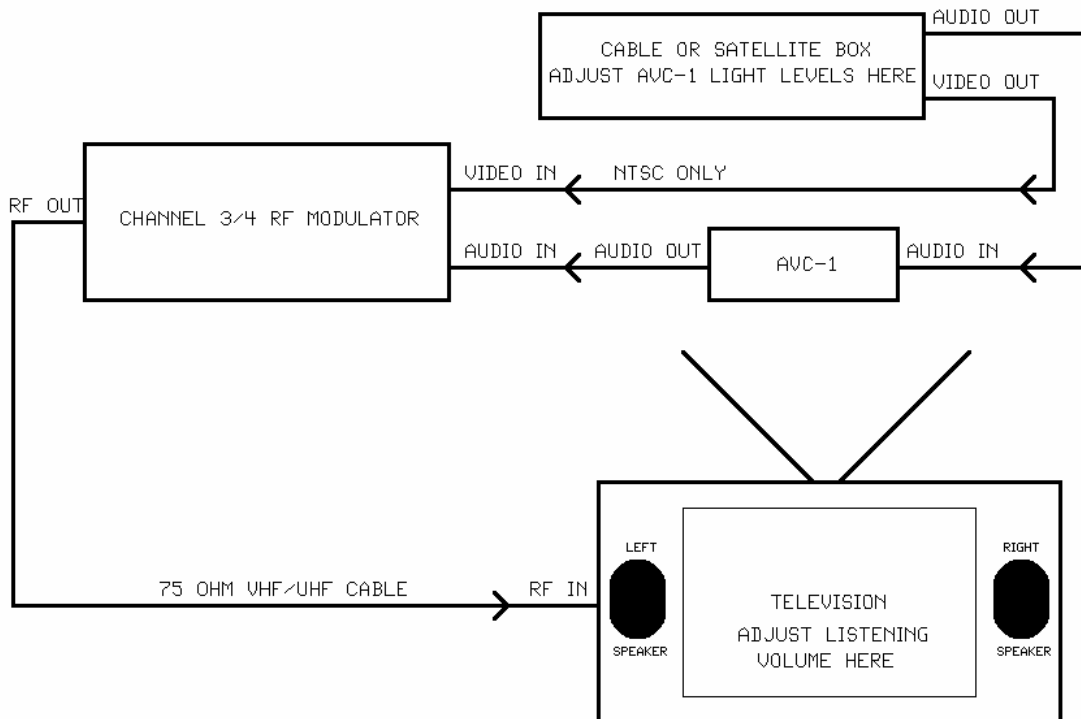


FIGURE 2.0

USING EXTERNAL SOUND SYSTEM AND TV WITH DIRECT VIDEO AND AUDIO INPUTS. FOR CABLE OR SATELLITE CONTROL ONLY. AUDIO SIGNALS ROUTED THRU TELEVISION.

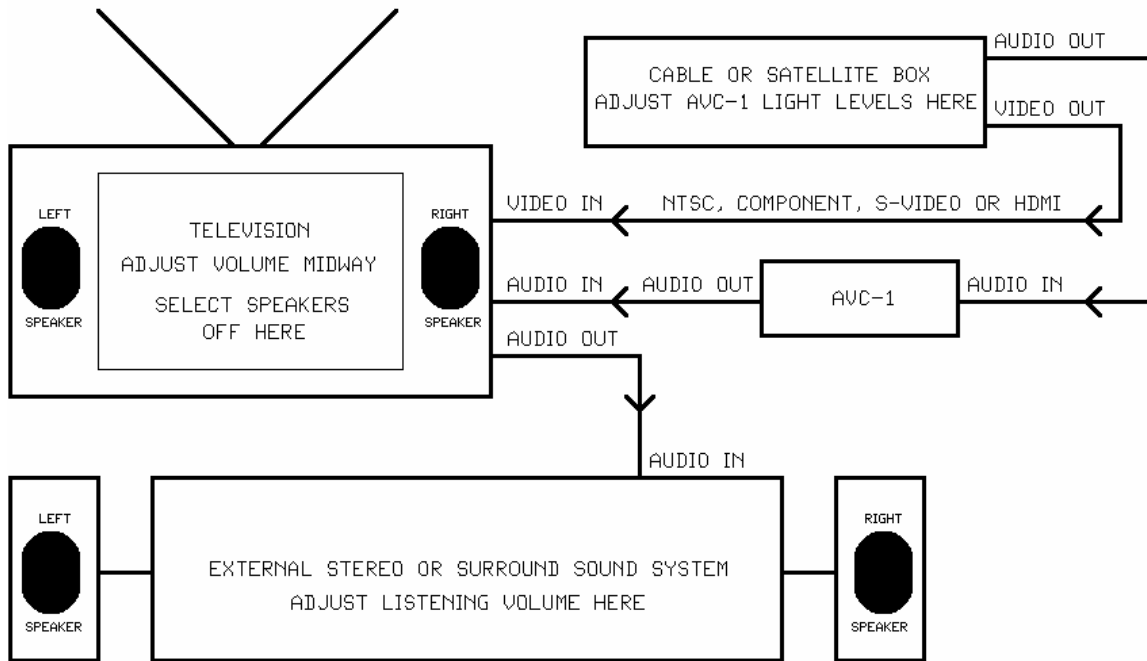


FIGURE 3.0

USING EXTERNAL SOUND SYSTEM AND
TV WITH DIRECT VIDEO AND AUDIO INPUTS.
FOR CABLE OR SATELLITE CONTROL ONLY.
AUDIO SIGNALS ROUTED DIRECT TO SYSTEM.

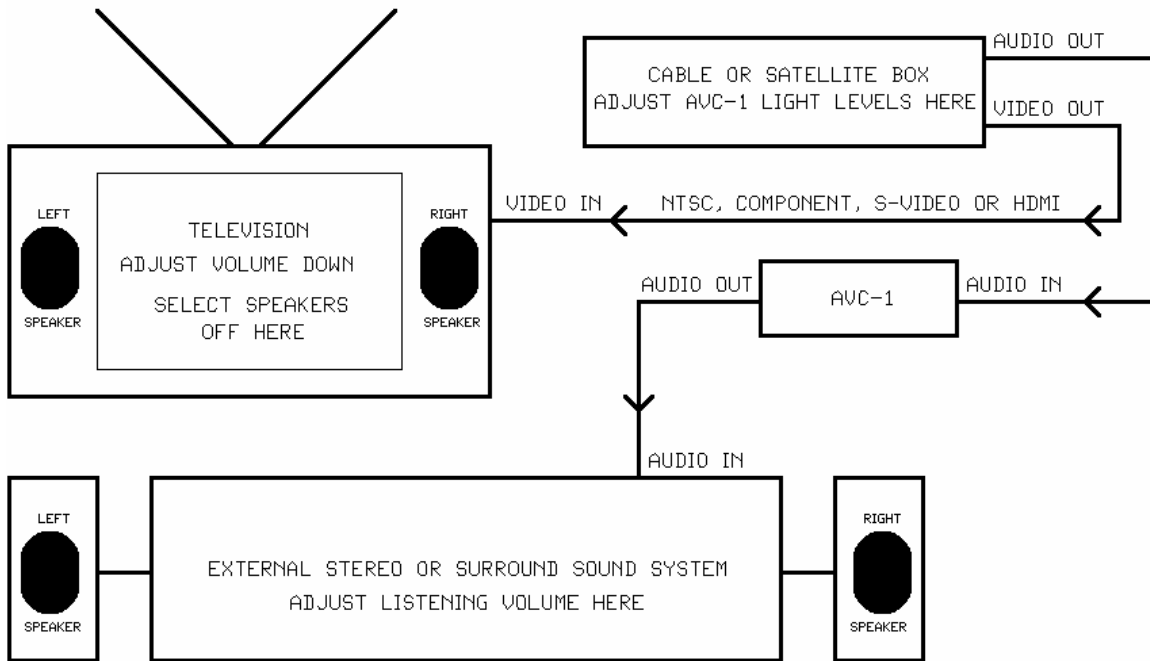


FIGURE 4.0

USING EXTERNAL SOUND SYSTEM AND TV WITH DIRECT VIDEO AND AUDIO INPUTS.
 TOTAL AUDIO SYSTEM CONTROL FOR ALL DEVICES CONNECTED THRU TELEVISION.

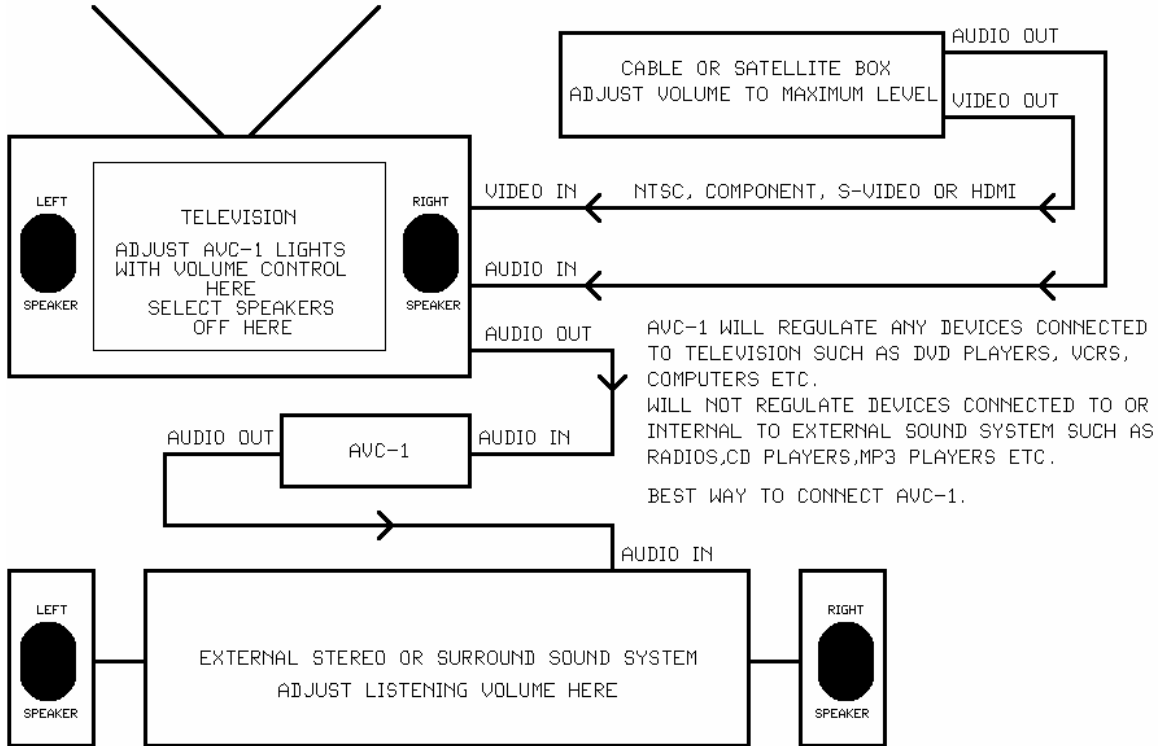
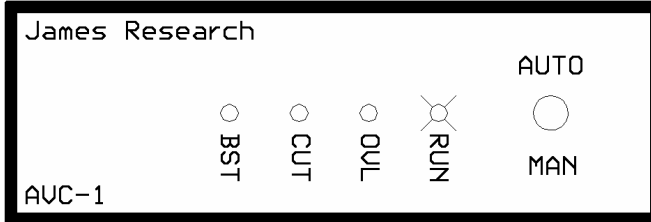


FIGURE 5.0
STATUS GUIDE

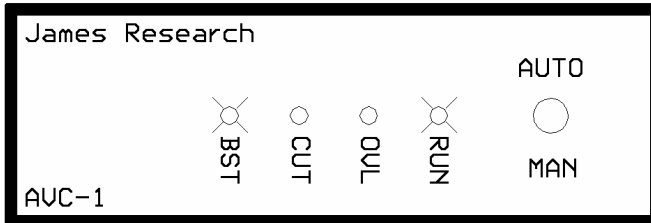
 = ON  = FLASHING

RUN FLASHING = NO AUDIO SIGNAL

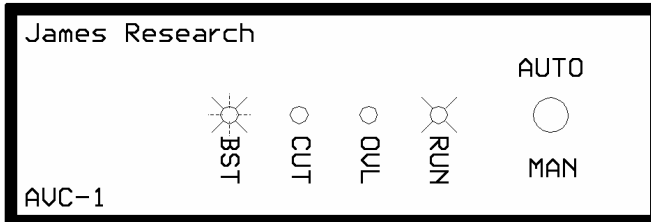
NORMAL RUN OFF = NO POWER OR ASLEEP



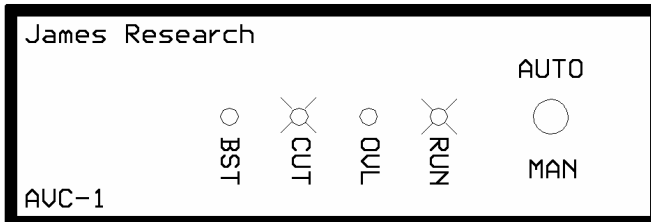
BOOSTING



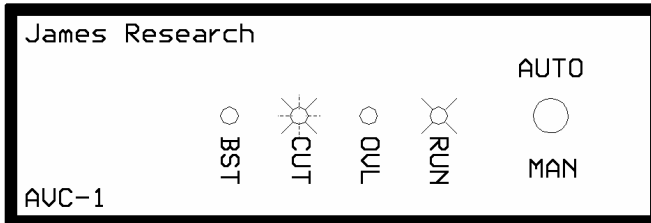
BOOSTING MAXIMUM



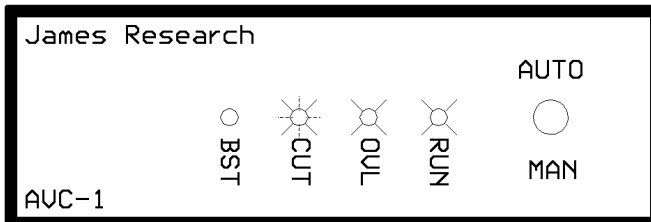
CUTTING



CUTTING MAXIMUM



OVERLOAD



Volume Controller Types Comparison

Digital Signal Processor Type Volume Controllers ---

Pros

1. They are cheaper. (You get what you pay for.)
2. The Installation Manuals are thin. (So much for help.)
3. They hookup only two different ways. (What else can I do?)
4. They respond quickly.

Cons

1. Unit has no front panel indicators to let you know what it is doing.
2. Unit alters the original signal fidelity by digitally changing the waveform.
3. Unit delays the audio signal in time with respect to the video signal due to digital sample window processing. (Translated Japanese to English movies.)
4. Unit introduces noise from sample digitalization of the input signal due to Analog to Digital Converter bit resolution used. (8 bits are not enough when boosting low signals)
5. With suddenly loud changing signals, the unit can produce a popping sound as the DSP reconstructs the next output window and improperly connects it to the last window outputted.
6. Total harmonic distortion and digitally added distortions are higher.
7. They have no return policy. (Too Bad Sucker!)
8. If you reverse the plugs accidentally, the unit will be damaged.

Analog Signal Digital Pot Type Volume Controllers ---

Cons

1. Unit has a higher cost. (Higher Quality costs more)
2. Unit comes with a comprehensive 18 page manual. (Users need to know.)
3. Unit hooks up in more than 2 ways. (Thank God for flexibility.)
4. Unit responds to loud immediately.

Pros

1. Unit has front panel indicators to let user know what the unit is doing.
2. Unit only alters the original signal by attenuating it. All original frequencies at their respective volumes and phases remain the same.
3. Unit processes in real time and does not delay the audio signal in respect to the video signal.
4. Unit preserves a continuous analog waveform and does not add any noticeable noise.
5. With suddenly loud changing signals, the unit immediately turns the volume down.
6. Total harmonic distortions are kept to a minimum.
7. Unit has more than one operating mode.
8. Unit has a 30 day return policy.
9. If you reverse the plugs accidentally, the unit will not be damaged.