

Carol-Ann AutoBiasMon V1.00

Introduction

The AutoBiasMon is an original design from Carol-Ann Custom Amplifiers that is the next step from our manual BiasMon system which was released in 2013 and has proven to be highly successful. This new design takes the BiasMon to the next level with automatic biasing, tube state indication, low voltage controlled Standby Switch as well as the ability to select different tube types to run in the same amplifier.

Features and Description

The AutoBiasMon is a microcontroller based software/hardware system built into the amplifier that monitors various tube parameters and voltages inside the amplifier and computes the best operating bias point to ensure the amplifier sounds and plays as designed and it also provides several mechanisms to extend tube life and protect the tubes.

Traditional biasing methods typically give a figure in cathode current (mA) for the bias point. However, cathode current is a variable that depends on the plate voltage and ultimately the wall voltage that can be drastically different from one location to the next and even at the same location during various times of the day, which is the biggest factor that makes an amplifier sound and feel different from room to room.

The TRUE bias point is actually a measure of idling power in Watts. This idle point is not a fixed point as such, but you hear different opinions for a Class AB1 amplifier that range from 50 to 75% idle dissipation, with 100% being the maximum plate power dissipation for the tube, (i.e. 25W for an EL34).

We have selected the idle dissipation point (bias point) for our designs that gives the correct feel and tone and also ensures great tube life.

The AutoBiasMon includes all the circuitry to produce and control the negative bias voltage, which is the voltage applied to the grids of the power tubes to set the idle dissipation power. A traditional bias system consists of a negative voltage supply that uses a potentiometer to set this voltage. The problem is that as the amp is driven harder that voltage goes more positive running the tubes hotter at a point where they are already running hard. This has both tonal and tube life implications, but was just an accepted norm of any fixed bias tube amplifier. However, AutoBiasMon controls that negative voltage within +/- 0.1V at all times regardless of how hard the tubes are being pushed. It does this by using a voltage control system that can be thought of as similar to a DC Motor Controller. The AutoBiasMon circuit is protected from grid conduction and tube faults.

Another age old problem this system eradicates is that of Standby Switch Transients. Despite thoughts to the contrary, the Standby Switch can often cause more problems than it protects from. Almost all Standby Switches used in the Industry are rated for 250V AC switches but in this application being used to switch up to 500V DC. In reality the Standby Switch really does not protect from any problems at all, creates some new ones of its own and is a legacy feature from transmitting tube circuits that was never specified for receiving tubes like those used in a guitar amplifier. However, it has evolved to become a feature many players use and don't want to live without.

The Standby Switch on an AutoBiasMon amplifier only switches 5V DC. The AutoBiasMon

circuit controls the negative grid voltage to turn on and off the power tubes in a slow controlled manner. You will notice no pops or thumps at all when operating this switch.

Finally, probably one of the most important features of this system is the users ability to bias their own tubes and carry out a rebias at any time without ANY experience or tools.

User Interface and Indications

The user interface for this system is very simple, just a single 'Calibrate' button and a multi-color LED, both located on the amplifiers back panel.

The following are the LED Indication colors and what they mean:

Steady Bright Blue – Tubes are running cold, this is a normal condition if the amplifier is on standby or has just been switched on and taken off standby. It does take a few minutes for a tube amplifier to warm up fully, so we recommend not doing a re-calibrate until the amplifier is fully up to temperature. If the amplifier is already warm, simply carry out a re-calibration.

Steady Green – This is the normal condition with no signal applied. Tubes are running correctly

Steady Red – Tubes are running hot. Press the Calibrate button to recalibrate them.

Steady Purple – system is carrying out a Calibration. Do not allow any signals through the amplifier during a calibration.

Flashing randomly between Green, Blue and Red – This is the normal state when the amplifier is being played.

Flashing Red – This is an indication of a potential tube fault. If the system cannot complete a calibration within 3 minutes the Red Led will flash. While this is usually an indication of a tube fault, it can also occur if the calibrate button is pressed as soon as the amplifier has been turned on from cold with no warm up period. Turn the amplifier off, wait a minute and then try again.

Dim Light Blue – This is an internal AutoBiasMon fault. Switch off amplifier immediately, wait 2 mins and retry. If it does this again, please contact Carol-Ann Custom amplifiers.

Full Calibration Procedure (Retube)

1. With the power off, remove the old power tubes and install the new ones.
2. Press and hold the CALIBRATE button while turning the POWER SWITCH on.
3. The LED will flash GREEN three times, release the CALIBRATE button.
4. Keep the amplifier on standby for 3 mins.
5. Take the amplifier in play mode and press the CALIBRATE button until the LED turns PURPLE.
6. Wait until the GREEN LED illuminates. This can take from 20 seconds to 2 minutes for

a new set of tubes.

7. Leave the amplifier on in play mode for 3 or 4 minutes and recheck the LED. If it is BLUE or RED , repeat steps 3 thru 7.

Re-calibration Procedure

1. Allow the amplifier to fully warm up.
2. Take the amplifier off standby and press the CALIBRATE button until the LED turns PURPLE.
3. Wait until the GREEN LED illuminates. This can take from 5 seconds to 1 minute depending how long the amplifier has been on.
4. Leave the amplifier on in play mode for 3 or 4 minutes and recheck the LED. If it is BLUE or RED , repeat steps 2 thru 4.

Tube Type Selection

All of the amplifiers that have the AutoBiasMon system installed have the ability to run several different tube types. It must be said that each model is designed to run and sound its best with its correct tube type, but others can be fitted, at least technically and not cause any problems. The changing of tube types requires removal of the chassis from the amplifier and should only be done by experienced users.

The tube selection is made by way of a dual DIP switch SW1 located on the AutoBiasMon PCB.

These are the correct switch settings for various tube types, where 0 is off and 1 is ON.

0-0 – 6L6GC

1-0 – EL34/KT77

1-1 – KT88/6550