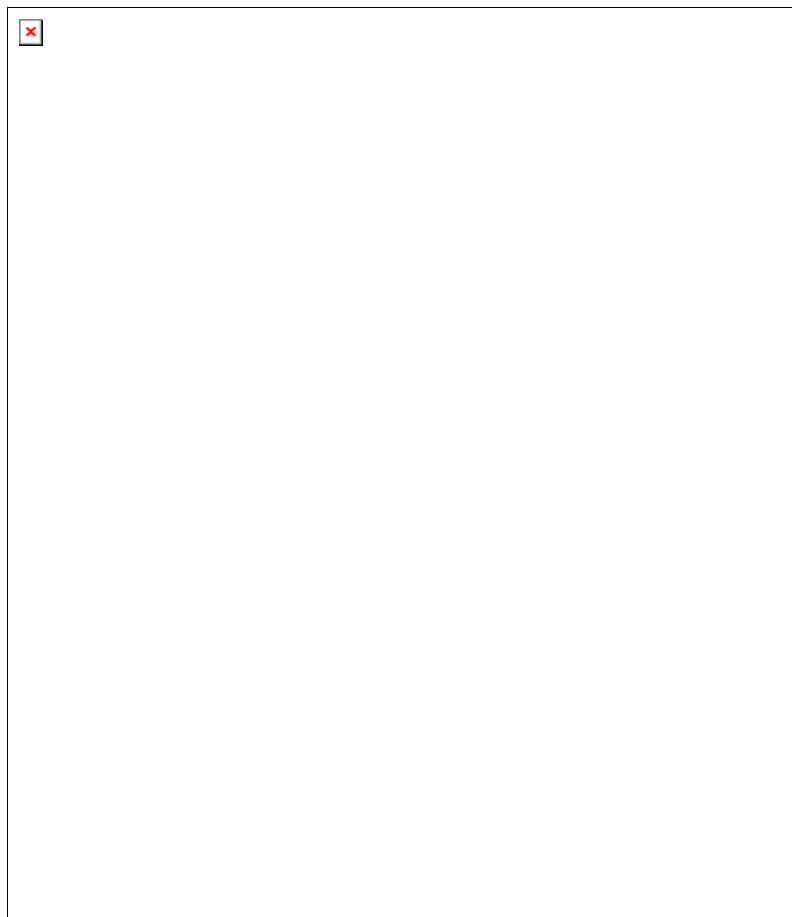




Mad Professor Amp Model CS-40



An introduction to the Mad Professor

This amplifier was first suggested as the natural termination of the B.J.F.-pedal line and suit most playing situations and therefore it was stipulated that it would have 40 Watts of output power, extensive tone controls to allow setting of the base sound and have definition at all power levels.

Now there can be no amplifier for guitar without distortion and therefore the guitarist is given a choice in life via the two inputs, while still being a one channel amplifier.

For the distortion it was defined that the amplifier should be capable of producing high definition, high density distortion at extreme power levels meaning full output, and in a sense the amplifier was designed backwards from full power output to low levels, thereby defining full power output distortion to let the other sounds fall from that as a consequence as in 'get the distortion right and the clean sound will be defined'.

It was set up that the amplifier should access classic guitar sounds as defined by recordings and sound memories but that it would be done differently, avoiding as far as possible typical topologies. This means that the soul of this amplifier lies in definition more than a signature tone.

Definition means here that as far as possible limitations to sound have been addressed.

The power amp alone would have 7 distortion mechanisms that most of them stem from limitations in peripheral circuitry and throughout amplifier measures have been taken to reduce the influence of peripheral circuitry and give as fast response as possible.

Much attention was paid to reduce the compression normally found in tube amplifiers as while compression is handsome it is hard to remove once in the circuit. By addressing this, compression can be added at will. The MP CS-40 therefore has a rather big power supply for an amp in this power range and the reserve power allows 40W's defined as clean output, while producing 75W full power distorted output, square wave at high slew rate.

By definition there is always distortion and the question is more of the content and level of distortion to any given guitar sound more than clean versus distorted. To allow different shades of distortion and access the elusive feel of sound ample control is given to the texture of treble and distortion as these in many ways set sounds apart.

The amplifier is best viewed as a one channel amplifier with options.

There are five controls and two inputs addressing gain and power levels and seven controls setting EQ.

For the gain:

A choice of two inputs is given, Normal and Abnormal. Normal gives sensitivity enough to drive full power at low distortion, whereas Abnormal gives a choice two modes, FET and Tube to access heavy gain. This selector sets the texture of distortion and optimizing in FET mode for high level distortion and in tube for standard tube response. For high level distortion the grid space of each tube is exposed to overload and to obtain definition at these distortion levels the function of rectifier distortion as is the effect of an overloaded grid, when current flows into tube or more precisely when grid takes on the function on the anode, has been controlled,

(This is not adjustable but fixed), so that high level distortion is well defined.

Abnormal input is also equalized to allow definition at high preamp gain, but can be used for the brighter less distorted sounds

Volume control sets the gain of the preamp regardless of chosen gain structure.

For the output:

A choice of three controls is given, the Master and Powersuck are meant to work in conjunction for setting compression and swiftness of amplifier response as well as output level.

The Master and Powersuck perform different functions to warrant their place on the panels.

One can view the Master as a sensitivity control for the power amp while the Powersuck is the final output control.

The Powersuck:

This control not only affects power level but also the compression of power amp. At lowest level the power amp is overloaded and the controls will have less effect as the power amp distorts what is fed to it as it would if full power were to be fed to the speakers, though then the compression and distortion of the speakers would interact more.

In conjunction with the other controls on amp the feel of power distortion can be approximated and different types of power amp distortion can be set at reasonable levels

There is also a Boost control, that has a dial on front panel and a switch jack on the back panel and is controlled via a footswitch that also has a boost dial. The purpose of this boost pedal is to allow setting of two power levels for lead versus rhythm while sound set would stay about the same. At near full output this boost will add only distortion as the power amp runs out of reserve power to raise output further. This is a power amp control.

As amplifier is capable of producing heavy preamp gain, a loop is provided at the back panel so effects that would thrive after main distortion generation can be placed in the loop. This includes echoes and some modulation effects.

As there are many standards set for this kind of effects the loop has been given two choices of levels to

suit studio equipment or standard pedals. The level of the loop is set via the Nature control at the back panel and with each of the two levels there is also a choice of mild treble boost on the dial of this rotary control. This loop is of the series kind

The hidden sounds:

Through the loop the amp is divided in two parts, that can be used separately.

By using the return jack as input power amp is accessed and through this a pure sound can be set.

Controls active in this mode are Nature, Master, Boost, Presence and Powersuck

The purity of sound in this mode stems from the low phase shift introduced

A different preamp can be used and via an A/B box channels witching be made, but this use of power amp alone is one sometimes preferred by those looking for very vintage tones

Tone controls:

Amplifier is equipped with a standard tone control net as in Bass, Middle, Tone balance, while in addition to this it has a Treble control that set the treble of the tone balance and a Focus switch.

Tone balance sets the upper midrange emphasis and the balance of treble and bass, while the Treble and Bass controls the outskirts and Middle controls the depth of the network.

Focus switch:

This has four modes two to the left and two to the right.

The Focus selector sets the way the tone control works and allows to the left a hollow midrange with or without treble emphasis, and to the right , denser midrange with or without treble emphasis. The use of this control is to set response for desired distortion level and speaker array.

There is also a Presence control, voiced a bit apart from the range of Treble, Tone balance, Focus treble emphasis. This control is a part of power amp and sets the brilliance of amplifier

On the back panel there is also a Nature control. This is mainly for setting the level in the loop but allows a slight treble emphasis too the extreme sides of this four position switch.

I believe that the two most important elements of a guitar sound is the kind of treble and the texture of distortion as even in what would be recognized as a clean sound distortion creates shimmer as not heard as distortion and much attention has been paid to this to allow settings that are e.g. bright but not piercing and the texture desired for sound and this is why extensive control has been given over treble and distortion.

As the amplifier was designed at first primarily to accept any kind of pedals, attention to distortion functions and filtering that could upset this has been paid in that a base tone for most any kind of pedal can be set while giving a desired bypass sound, as there may be small differences in base tone that can havoc or compliment e.g. a fuzz sound.

One lesson I have learned both in recording situations and in live performance is that what emanates from the speakers may not be the same as what the musician hears. In fact distortions of amplifier may give rise to acoustical distortion in front of the speaker dome, forming a low energy cloud upsetting other waves that have to pass through the cloud, while this can be believed to be mostly a function of the speaker it is also of utter importance what the amplifier produces at the output and this is the purpose of reducing the compression and peripheral distortions of the amplifier.

I have spent numerous hours listening close to the speaker dome both with ear and with different types microphones recording at various levels to analyze the components of sound that creates disturbances and what causes this in amplifiers.

For the MP CS-40 much of what was learnt from this was applied.

This has bearing on sound at all levels and control of this allows casual mic placement in recording and public address and ensures that what sound is set from amplifier is also recorded or broadcasted to

audience and at ease controlled by sound men.

The reason to choose a one channel format for this amplifier was to allow no compromises to that one channel, and that if several sounds are called for at foot control this can be done without limitation to what add on effects would be desired at reasonable level.

Another reason for choosing a one channel format is the full power output and the definition wanted there. There are aspects such as artificial gain at the expense of bandwidth that would lead to uncontrollable instability in a multichannel set up or at any rate make half of the control panel unusable with the current topology at full power output while in its format the controls of the amplifier are always active and useful regardless of setting.

When amp runs at its own distortion the exact composition of treble and distortion can be set to complement most guitars and speaker cabinets.

The soul of this amplifier is total control, definition of tone and flexibility to stand through changes of sound preferences.

Flexibility includes the use of several different tube types and ample bias range to allow this.

While the amp was designed around a now more or less extinct brand of EL34's, it was borne in mind that amplifier should be able to take any kind of appropriate power tube and taking advantage of the tubes used through the reduction of limitations of peripheral circuitry rather than optimizing for a specific tube, as while tubes are believed to be around for a long time yet they most likely won't be the same in years to come and as this amp was designed to take the changes of time circuit was optimized to take different tubes rather than a preferred brand

Other important factors of amplifier design are safety ,reliability and serviceability:

All components used have been examined for appropriate rating to ensure very good marginals exceeding requirements for overload protection, and space between components and protection against surge build up at high voltage points have been calculated. All windings of power transformer are fuse protected and measures have been taken to protect amplifier from tube failure so as to ensure that in the event of breakdown as any amplifier would be exposed to sooner or later, a fuse and tube change should be all needed to have the amp up and running again.

The transformers have ratings to exceed power drawn to ensure stability and reliability under all circumstances.

Under tube failure some components such as the screen grid resistors may fuse and thereby prevent further damage and these are also mounted for easy access and the amp is laid out for easy access of any component- one must assume that no component will last forever.

As this amp was designed and is built by amp service technicians, (builder is Jukka T. Mönkenen of Wahvarikellari) failure mechanisms in tube amplifiers have been examined and as far as possible been prevented in the design and ease of serviceability has been born in mind for swift service.

Cosmetics:

In a sense the sounds of the amp is the cosmetics as the soul of the amp lies elsewhere, in the definition of sound and in the circular holes that makes the amplifier play faster.... but the exterior is of importance in amp design and this has been taken care of by a well known architect that also plays the guitar, taking a break between designing a hamburger restaurant and a University to make a cabinet design to stand the changes of time.

Bjorn Juhl

Aka Mad Professor

Proprietor of BJF Electronics

<http://web.archive.org/web/20060528095942/http://www.custom-sounds.se/static/en/27/>

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