

PS Systems EB100S

Midi Tube Guitar Amplifier

Acquisition, Repair & Mystery Log

1/11/02 S. Kennedy (edit 8/21/04)

Proof of Existence

I stumbled upon this amp quite by accident on eBay after looking for proof of its existence for years! I first saw the ads for it in 1993 in Guitar Player magazine. There was no photo, only an illustration. This unit sold for \$1500-\$1800 in 1992/93. The company must have gone out of business in 1993 or 1994 because their trail turns cold quickly.

There was some conjecture on the internet that they were sued by Groove Tubes over their speaker emulator design. Apparently their design infringed on the R. Aspen Pittman patent, as later "The Power Tool" units had that patent number on a sticker on the bottom (one of mine does, the earlier serial number unit does not).

I have wondered for years whether this amp actually made it to production! 2 1993 ads in Guitar Player magazine (June & November 1993) showed a hand-drawn illustration and not a real photo of the unit. Just before Christmas 2001 I discovered the truth... it WAS out there after all!

Acquisition & EBay Listings

This particular unit was listed in early December 2001 for an opening bid of \$200 and it went bidless. It was relisted in mid-December for an opening bid of \$100 and no reserve when I found it. I was the only bidder, and got it for \$100 plus \$50.00 shipping.

The unit was shipped from Massachusetts around the first of the year and arrived 01/08/02 via UPS Ground. It was double-boxed but lacked the proper internal packaging volume. It wobbled from side to side inside the second box. One corner of the front-panel was bent and there was a small ding in the left side-panel but it did not otherwise look too bad.

Initial Condition & Tests

I gave the amp a cursory internal inspection before I plugged it in. The EB100S front panel was dark when power was applied. A relay on the solid-state amp board continuously chattered although the tube filaments did light up.

The first problem found by careful physical inspection was a major power supply problem caused by a mechanical design oversight. The 3 main voltage

regulators (LM7805, LM7915 & LM7815 front-to-back) had all their leads severed and were not operating at all. It is unknown whether this damage was pre-existing or caused in shipment, but I postulate that it might have been pre-existing (logic follows during repair log).

Power Supply Problem

The severing of the regulator leads was caused by the fact that the "plate" heatsink the regulators were mounted to was simply a thick "L" bracket (8.5" tall), connected to the chassis with only 2 screws at the bottom. There was no top mount for this plate and in addition to heatsinking for the regulators, the plate also served as a shield and mounting surface for the MIDI / Processor circuit board. This increased the mass for inertia to act upon during impacts & vibration.

Since the plate was free to move at the top, any impact to the chassis could cause enough movement to snap the legs off the regulators (which are mounted toward the bottom of the plate, about 3 inches up) where they enter the body. They could also be fatigued over time by vibration for the same reasons.

I replaced the regulators (w/NTE) and I drilled a hole in the back panel to install a top mount made from a small "L" bracket. If the regulators break again, this amp will have larger problems to worry about first! The plate is now pretty stout.

Fully Repaired... NOT!

When the power supply was back in operation I expected the front panel to come on but it didn't. The relay constantly chattering on the amp board changed character but this was the only outward sign of change. I disconnected the ribbon cable connecting the power supply and Midi board to the front panel assembly and the relay chatter stopped, and the turn-on relay properly engaged after a few seconds of delay. Something on the front panel wasn't right!

I disassembled the front panel subassembly to inspect the circuit board. All outward indications were normal. No signs of heat or burning, etc.. I DID find that the unkeyed connector for the main ribbon cable had caused a second problem... the ribbon cable had been plugged in backwards!

Problems Compounded

Apparently the previous owner had dropped the unit or bumped it good. This severed the voltage regulator legs. Since the front panel didn't light up, he must have opened it up as I had and had simply gotten the cable plugged-in backwards when he put it back together.

Since the previous owner had obviously missed the main problem (the voltage regulator connections) he simply compounded MY repair problems. This is the most likely scenario as to why I got it so cheap (\$100 plus \$50 shipping) and why I was able to repair it easily.

New Problems, Next Layer

Once the proper cable orientation was restored, the front panel came up and everything appeared to work! However, after experimenting with the amp for awhile (with 1kHz sine wave and a scope) it became apparent that there was another problem. The tube amp could not generate an undistorted sine wave, nor a very large signal. One half of the waveform clipped and distorted very prematurely. Almost no heat was being generated in the internal speaker emulator load resistor and the output waveform was always low and distorted.

I found that one of the output tubes was internally shorted in some way. For good measure I replaced all the tubes (3 x 12AX7A and 2 x EL34S). I checked the bias settings for ballpark (crossover method, about 35mA) and the unit was burned in under load and signal for a day. No sweat, I think it is fully functional! All I need to confirm is the MIDI I/O. All internal functions seem to be spot-on.

Success...Finally!

This unit is unique in my experience and appears to be a well-designed and manufactured unit. The spare boards I acquired (from an individual who might have worked for the PC board subcontractor that built the originals) may never come in handy but they should serve as adequate insurance against Mr. Murphy.

Basic EB100S Design

The EB100S contains a variety of sub-sections. These sections are:

- Tube Guitar Amp (50 watt, used as "tone generator")
- Speaker Emulator / Dummy Load
- Active Tone Controls (Standard & Parametric)
- Programmable Dual Stereo Effects Loops (Series or Parallel)
- Programmable Dual Line Outputs
- Programmable Dual LFO circuits
- Full Midi Control, 100 control Presets and assignable functions
- Stereo 100 watt RMS MOSFET output amplifier
- Full "digital" user interface (buttons & LED readouts)

The Tube Amp

The tube amp is essentially a 50 watt RMS Marshall-like JCM-800 (3 x 12AX7A, 2 x EL34) circuit with programmable input tube gain and separate output tube gain, with “Instigator” speaker cabinet simulator and “crunch” button selections. One 12AX7 tube section can be switched in and out of the signal path and its gain adjusted (output tube gain is also individually adjustable).

Speaker Emulator / Dummy Load

The emulator / load section contains the same circuitry as used in the company’s other guitar product, “The Power Tool”. The Power Tool itself contains active tone controls, effects loops, line out, headphone output and a mono 50 watt solid state amp. The emulator/load section are replicated here with all other functions expanded upon.

Active Programmable Tone Controls

The standard tone control circuit is a three band active circuit with a +/- 18dB range. These values are expressed on a scale of 0-100, with 50 being flat.

In addition, a parametric EQ section is also provided. This circuit can also be used as a wah-type effect or tone control. The speed, width and depth of an assigned LFO (low frequency oscillator) can vary these setting selectively.

A presence control is also available to complete the tone controls. Remember, there are no knobs here, only buttons and readouts!

Programmable Dual Stereo Effects Loops

These two stereo effects loops have fully programmable individual Send and Receive settings, can be made serial or parallel to each other and have full L/R pan (“Dry / Wet”) capability.

Programmable Dual Line Outputs

Both Line outputs are fully level programmable. Selectable cabinet simulator: Flat, open backed 2x12 and closed back 4x12 can be simulated.

Programmable Dual LFO circuits

Each LFO (Low Frequency Oscillator) is programmable over the following parameters: Waveshape (7 choices), Smoothness, Depth and Speed. These generators can be assigned to control Output Tube gain, EQ, Program Volume, Pan and Dry/Wet ratio, LFO1 & LFO2.

You can generate Tremelo (if controlling volume) or WAH (if controlling the Tone Stack) or get real wacky and have LFO #1 modulate LFO#2 with 2 different waveshapes then assign THAT to something. Too weird, very cool!

Output Amplifier

A Stereo 100 watt RMS MOSFET output amplifier is provided to drive stereo loudspeakers. The input (Program Level) and output (Master Volume) levels are programmable.

The “Instigator” circuit (a sort of cabinet tonality simulator) is only applied to the signal feeding this amp.

Full “Digital” User Interface

Buttons & LED readouts take the place of knobs and pointers. The EB100S amp was the grandfather of amps like the Line 6 and Fender Cyber-Twin! It doesn't have any built-in digital effects but is fully MIDI programmable and controllable.

As mentioned in a newsgroup post from a few years ago, this amp looks like it was removed from the Space Shuttle! 38 digits of LED 7-segment readout, 48 individual LEDs and 61 pushbutton switches adorn the front panel of this monster.

What you give up in ease of adjustment you gain in programmability and repeatability! It will save 100 of your favorite sets of front panel settings which are all instantly recallable via an external MIDI pedal or via a front panel Preset controller. There are also 2 continuous controller pedal assignments for real-time MIDI control of selected parameters.

Questionable Parentage

Although manufactured by PS Systems in San Diego (better known for their electronic synthesizer, sampler and keyboard memory and expansion products) there are numerous markings and tidbits of information that lead to more questions than answers. The speaker emulator / load circuit has been stated to be a "Palmer D3" emulator circuit. Who is Palmer? What is "D3"?

On the PS Systems "The Power Tool" device, the initials "EBB" are silkscreened in blue script on the rear panel. On the rear panel of the EB100S, it is silkscreened "Ellis-Brooking 100 Watt Stereo Amp". Are Ellis-Brooking (EBB?) the original designers... principals in PS System... or ????. Is the design licensed or in-house using someone elses original concept?

The mystery isn't solved, it has simply gotten more interesting...

8/21/04 *After some additional research it appears that one of the designers of the EB100S may have gone to work for Line 6, then wound up as the Chief Engineer for a major Pro-Audio company.*

As fate would have it, I met his boss almost 25 years ago when he worked locally and our paths crossed in the audio industry. I will try to contact them to verify this connection and try to get some answers to these questions!

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