

## TOP-OF-THE LINE MILLENNIUM 75 ALL-FET CLASS-A POWER AMPLIFIER.

### EB-2000/342, THE “MILLENNIUM 75” ALL-FET CLASS-A DIVER STAGE AND REGULATORS.

The “Millennium 75” driver is a Top-of-the Line driver circuit, intended for ribbon/electrostatic speakers and high-speed cone speakers. Its high speed, high resolution and transparency makes it equally applicable in high-end home systems as in studio monitor and recording applications. Its unprecedented tonal balance lets you use it in full-range systems and its silky mids and highs make it ideal for mid-range and tweeter drivers. Within its power range it can compete with all power amps on the market, irrespective of price.

With a maximum supply voltage of  $\pm 50V$  ( $\pm 55V$  unregulated), it can deliver up to 100W into 8 Ohm. If the power supply and the output stage/heatsink are chosen correctly, 75-80W of this can be delivered in pure Class-A.

The circuit diagram is shown in fig. 1.

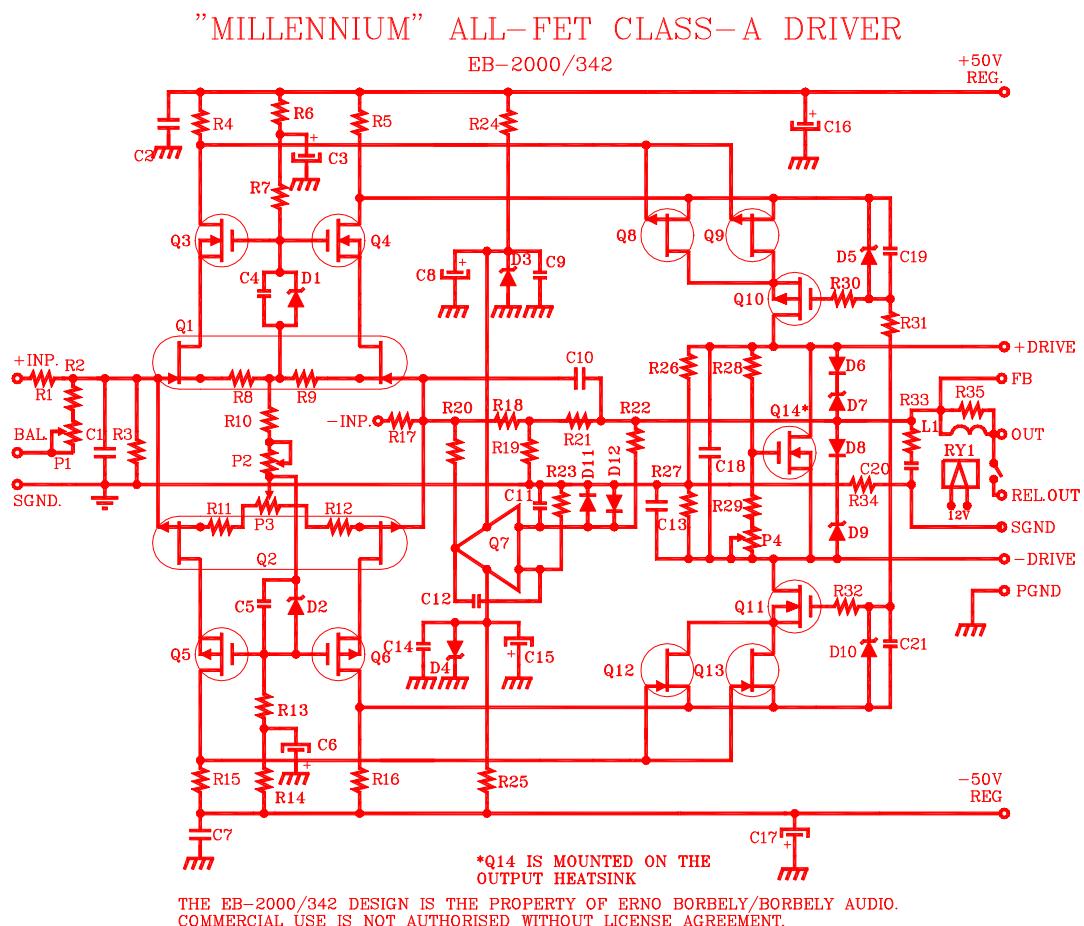


Fig. 1. The “MILLENNIUM” ALL-FET driver circuit.

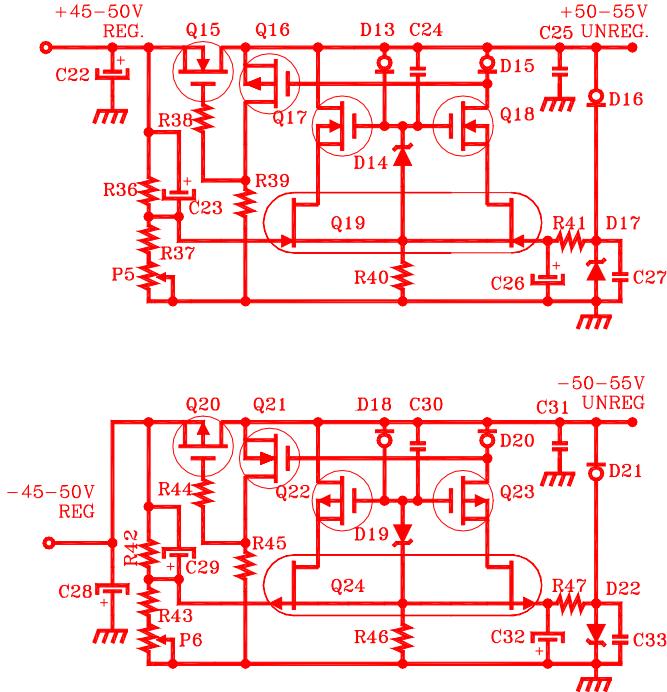
The circuit is a fully complementary design, using only FETs as active elements. The input stage is a complementary differential cascode FET circuit, using dual monolithic JFETs as input devices and MOSFETs as Cascodes. The second stage consists of two JFETs in parallel and a MOSFET, connected in Cascode. The JFETs are operated at 8mA each, providing a total of 16mA drive for the output stage.

The bias circuit is a Vgs multiplier, using a MOSFET. The MOSFET itself, a TO-220 device, is selected according to the MOSFETs used in the output stage and is mounted on the output heatsink, if necessary. This ensures proper bias tracking with the different output MOSFETs. The output offset is

tracked and controlled by Q7, which is a JFET-input opamp. Two shunt regulators provide  $\pm 10V$  supply voltage for the opamp.

The driver circuit is supplied from on-board ALL-FET discrete regulators see fig. 2.

## "MILLENNIUM" ALL-FET REGULATORS EB-2000/342



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Fig. 2. ALL-FET discrete regulators.

Each regulator is one half of a complementary ALL-FET power amplifier. The regulators are made up of a differential JFET/MOSFET Cascode input stage, and a single MOSFET driver and output stage. The reference voltage is provided by 6.9V low-noise buried-zener reference diodes, which are fed from JFET constant current sources. Output voltage can be adjusted between 30 and 50V. Minimum input/output voltage difference is 4V, but, to make sure that the regulator is always operating correctly, we recommend a difference of 5V. Maximum input voltage is 55V.

### **EB-2000/115 and EB-117/400 ALL-FET CLASS-A OUTPUT STAGE.**

Recommended output stage for the "MILLENNIUM" driver is the EB-2000/115 or the EB-117/400 for 75-80W output power into 8 Ohm. The 115 and the 400 output board uses 8 pairs of TO-3P GSD output MOSFETs. The output MOSFETs are matched and do not require source resistors. The EB-2000/115 and the EB-117/400, if properly heatsinked, can deliver up to 75W in pure Class-A, and 150W in Class-AB. The schematic for EB-117/400 is shown in fig. 3.

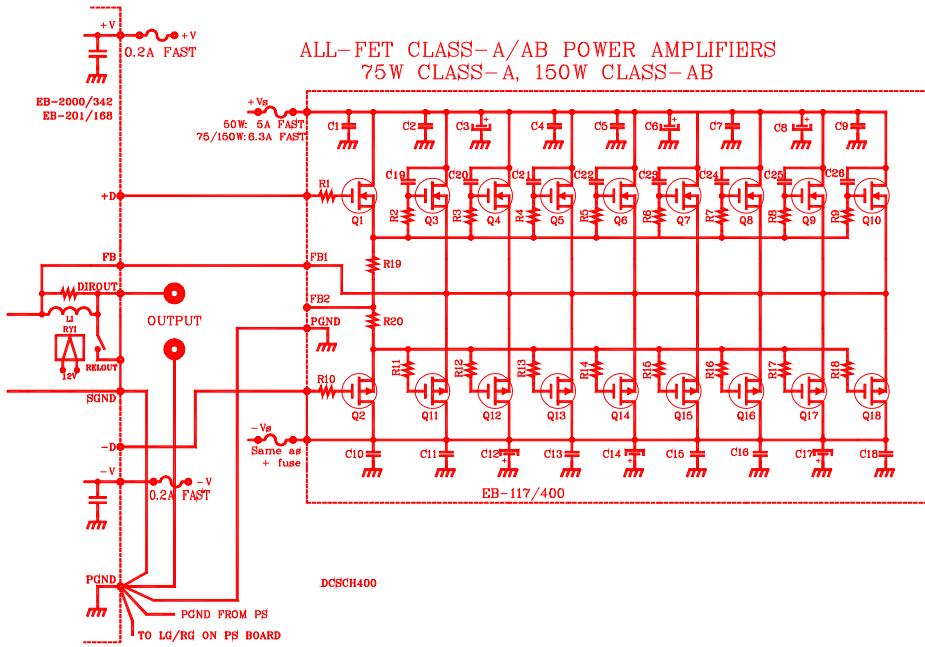
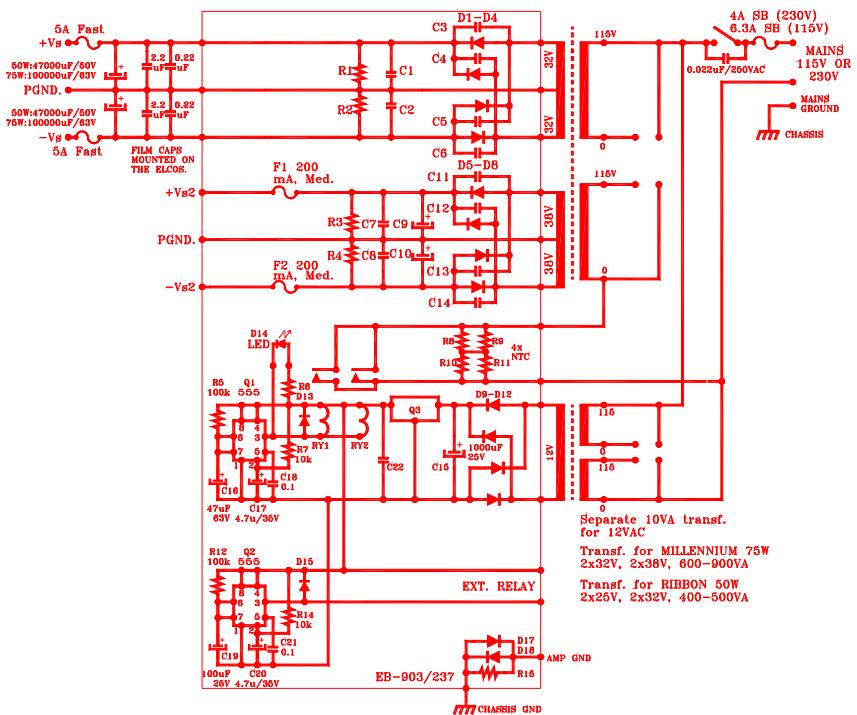


Fig. 3. The EB-117/400 ALL-FET Class-A/AB output stage.

### EB-903/237 POWER SUPPLY.

The recommended power supply for a "MILLENNIUM" mono block power amplifier is the EB-903/237 PS. It contains independent PS for the output stage and the driver circuit. The main electrolytics for the output stage are not included on the board and are not included in the kit. Minimum recommended value for these caps is 47000uF, however, use 100000uF if possible. The PS board also contains two independent timers, one for the slow-turn-on circuit and one optional one for the output relays. For the timers to operate properly, the 12VAC should be supplied from a separate 10VA transformer. The mains transformer should be rated at min. 600VA. The EB-903/237 schematic is shown in fig. 4.



POWER SUPPLY FOR ALL-FET 50/75W CLASS-A MONO BLOCKS  
EB-903/237/PS75W237

Fig. 4. The EB-903/237 POWER SUPPLY FOR 75W MONO BLOCKS.

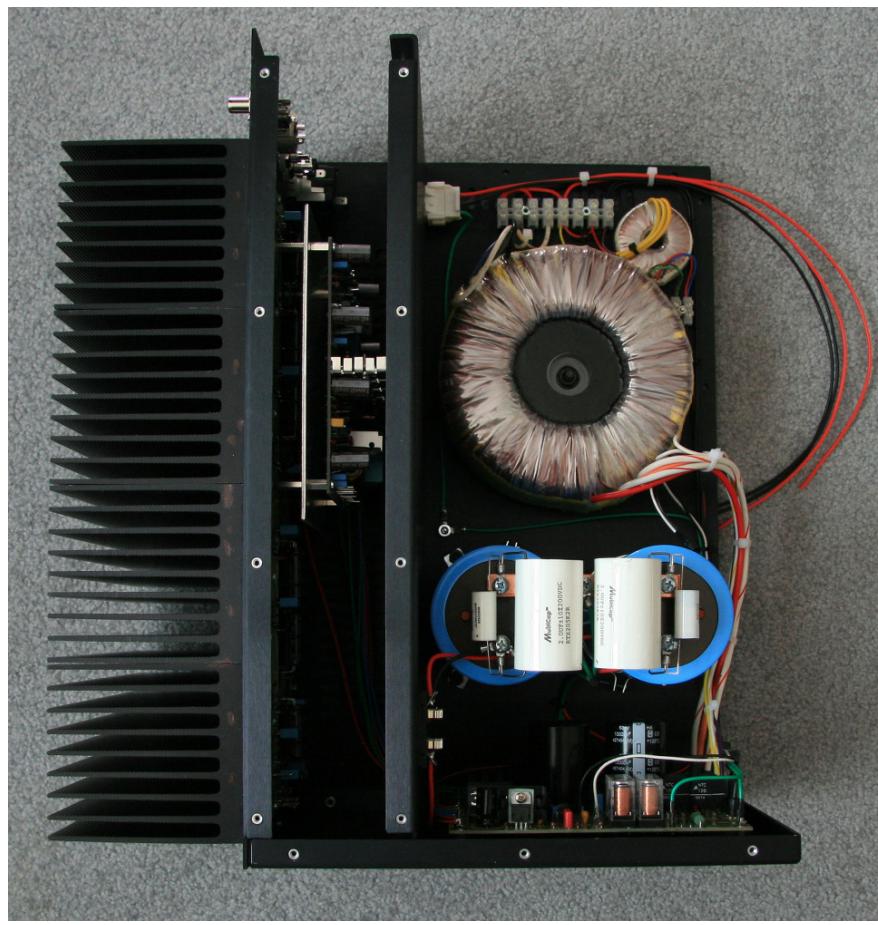


Fig. 5. The Millennium 75 as implemented by LB Audio, California.

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