

TUBE-DELAY

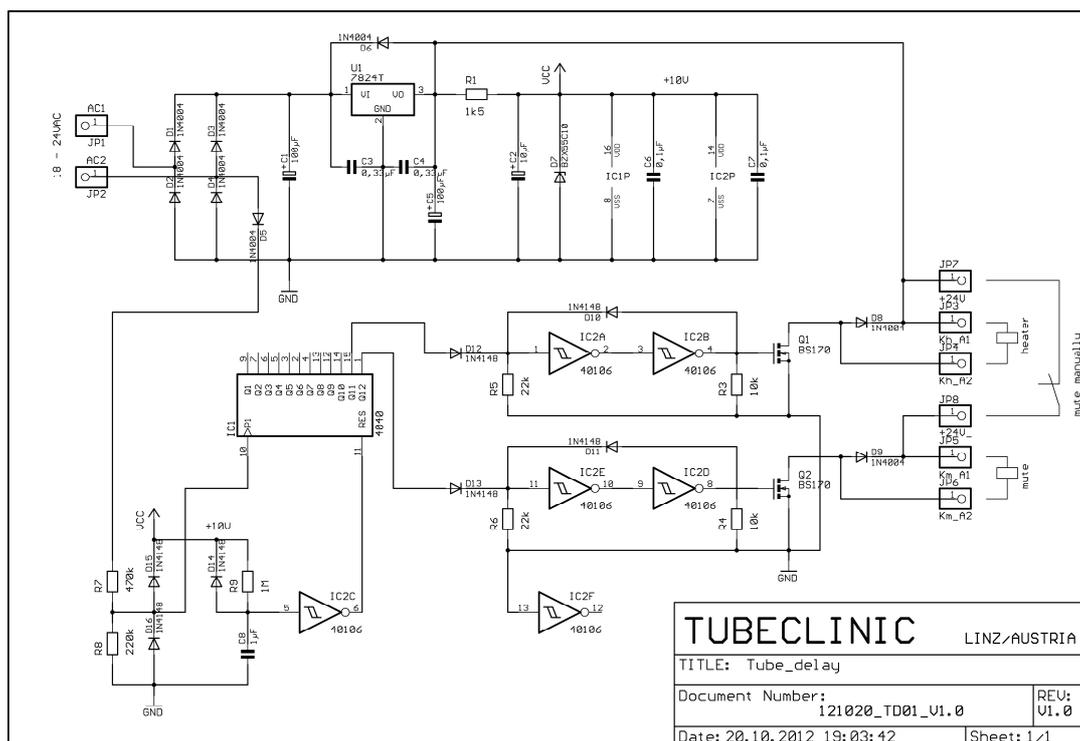
A versatile tool

By Barbara E. Gerhold, "TUBECLINIC"

This design shows a versatile way to get rid of the switch-on misbehavior of tube-circuits.

I received so many eMails from you readers about this theme that I started to design a versatile tool to do this job. Tubes need some time to heat-up and when the B+ is then switched-on, it is sometimes helpful to have some extra delay to unblock the "mute" circuit. Think about a pre-amp -> there will be a mighty bump, when the B+ is switched-on. The extra mute, will prevent it from reaching to the power-amp. This extra mute circuit may also be used manually to mute the music – e.g. for receiving a phone call.

Have a look at the schematic:



You can see, that the circuitry consists mainly of a supply circuit, which feeds both of the relays as well as the digital chips and the digital counter stage together with a latch.

The input should be in the range of 18 – 24VAC and can be connected to a separate winding of the mains transformer or a separate PCB transformer (e.g. 18V/10VA – with its power depending on relays).

Both of the relays are situated outside of the PCB, so you can use any type you wanted or needed. Coil voltage should be 24VDC.

Function:

After passing the bridge rectifier and the smoothing cap, the supply voltage is stabilized by the regulator U1 (24V/1A). From this point, the supply to the relays is taken. Behind this point a Zener-diode is situated, which sets the supply-voltage for the digital chips to +10V.

At the input an additional diode (D5) is situated, which feeds the counted signal (single-way) to the counter input.

The digital counter chip CD4040B is a binary ripple-carry counter, which will advance by one step for each positive going half-wave from the input. Maximum counter value is 2^{12} or 4096. Assuming a mains frequency of 50Hz, the first output at 2^{10} or 1024 will be set after app. 20,5 seconds. Because we need to fix this value, a latch is situated in behind, which will store the logical "1" and energize the first relay called "heater" in the schematic. For not to give place to misinterpretation, this relay has to switch-on the B+. The heaters were switched-on in the moment the mains-switch was set to ON. It shall only prevent the tubes from being damaged by B+ "ON" while not hot. Please understand "heater" as the pre-heating period!

The second step will be finished, when the counter has counted for another 20,5 seconds to reach the value of 2^{11} or 2048 and this will energize the second relay called "mute" in the schematic. Now the circuitry is ready. The total delay of 41 seconds will be enough to have settled all internal supply voltages and all coupling caps charged to prevent the previous mentioned bump from reaching the power-amp.

IC2C realizes a reset feature, which will not reset the whole counter during short mains failures i.e. caused by a HT-switch over by the mains supplier but will reset the circuit truly after a longer duration of mains-out. Tubes will stay hot for some seconds, so there will be no damage to them.

A manual mute can be achieved by connecting the mute-switch between JP7 and JP8. If this feature is not wanted, substitute it by a bridge wire.

This tool can be used also if only one delay-step is needed, either for a delay time of 41 (e.g. for a power-amp) or 20,5 seconds.

If your mains frequency is 60Hz instead of 50Hz, which are common in Europe, each delay time will be shortened to app. 17 seconds, but also this delay-time should be ample for all mentioned applications.

As you know – all information about the printable, full-size schematic and the PCB is again situated in a binder enclosed to this website.

If you have any further question, you can contact me via support@tubeclinic.com .