

12 Volt Universal Plasma Ball Controller

This PDF is intended to compliment the 'Controller' schematic with pertinent information related to building a function generator controlled Plasma Ball.

The 'Controller' circuit board is extremely easy to prototype or a completely assembled mini board can be purchased from Aurorasky. An 85°C Thermal Switch and .001 coupling capacitor will be included to help eliminate the need to track these components down.

Before connecting the 'Controller' to the Plasma Ball mother board three things should be done.

1st, find the 'base' lead on the plasma ball driving transistor. Disconnect and remove any components connected to Base lead. Very often this will be a NPN Darlington transistor. This often is a TIP-122. Insure the land going to the 'base' of this transistor is isolated from everything else on the circuit board. If diode protected, the diode can be left connected.

2nd, the land that was going to the 'base' lead normally comes from the onboard oscillator on the plasma ball mother board. After you isolated the 'base' lead go back to that land that was connected to it. Often a capacitor is coupled to the Base lead and the land. By just removing the capacitor you will isolate the base lead. You might find a zener diode connected to the 'base' lead to insure you don't overdrive the transistor. You can leave that in place if it is there. The other connection point for the capacitor would be an ideal place to solder an 8" piece of wire because it tracks back and connects to the on board plasma oscillator. If a capacitor was not used as a coupling component you might find a resistor or transistor was used to connect to the base lead. Once the component is removed, in order to isolate the 'base' lead, you have found the feed from the onboard plasma ball oscillator. If you have an oscilloscope you can turn the plasma ball on and look at this point. You should see a square wave oscillating somewhere between 25 and 30 kilohertz. If you don't, you will have to search backwards on the circuit board until you find the oscillator output. That is where you should solder the 8" wire to.

3rd, the 'collector' of the driving transistor is always connected to the transformer. Break the land connection by cutting a small piece of the land out. Clean down to the copper both sides of the now discontinuous land connection. You will be soldering the leads of the NC thermal switch to these copper ends. Using a thermal heat paste, mount an 85 degree Celsius normally closed (NC) thermal switch onto either the transistor itself or the heat sink the transistor might be mounted on. The thermal switch will have two leads coming off it. Most often there will only be 1 isolated lead from the thermal switch housing. You must determine which lead that is. Connect the non-isolated lead, the one that is connected to the housing of the thermal

switch to the 'collector' of the driving transistor. You do this by soldering to land portion connected to the 'collector of the transistor. The other lead, the isolated lead, will connect to land portion going to the transformer.

If you are having trouble finding the isolated lead on the thermal switch you can use a heat gun, or cigarette lighter to heat the casing of the thermal switch. When the switch opens one lead will be connected to the casing which you can use an ohm meter to detect. The other lead will be connected to nothing because it is isolated from the switch casing. DON'T burn yourself doing this! Occasionally you might find a thermal switch where both leads are isolated from the casing. I found that these thermal switches work fine as well.

Now you are ready to connect the wires of the 'Controller Board' to their destinations.

The BLUE wire connects to the 'base' of the driving transistor.

The RED wire connects to the +12 volts on plasma ball mother board.

The BLACK wire connects to the Common GND on plasma ball mother board.

You will need to bring the Common GND out to your function generator. Connect an extra wire here so you can bring that wire out as the common GND connection for your function generator.

The YELLOW wire connects to the center pole of Switch 1 (SW1).

The WHITE wire connects to the center pole of Switch 2 (SW2).

Almost finished with the connections! That 6" wire you soldered on the mother board connects to one of the terminals on Switch 1 (SW1) through a .001 ufd capacitor. A low cost disc capacitor will work nicely. The other terminal on Switch 1 (SW1) connects to channel 1 of your function generator. One terminal on the Switch 2 (SW2) connects to channel 2 on your function generator.

IN CLOSING:

You should consider using a RCA PHONO plug between Switch 1 and Channel 1 and do the same for Switch 2. A RCA PHONO plug between Switch 2 and Channel 2! This will make using cables to connect your function generator to your plasma ball a better connecting setup. The common GND wire coming off the plasma ball board will connect to the negative ends of your RCA PHONO plugs. You can see these PHONO plugs in videos for this project. Although this is an extremely easy project to implement, consider hiring a more talented electronic construction type if you do not fully understand these directions. Be well and respectfully,
Steve

P.S. I found it convenient to drill a small hole through the plasma ball mother board and pass all the wires from the very small mini 'Controller' through the hole. I used a RED wire coming from Plasma Ball mother board Oscillator and a BLACK common GND wire coming from the mother board, along with the YELLOW and WHITE wires coming from the mini 'Controller' as the interface wires to the switches and RCA Phono connections mounted on the Plasma Ball side casing housing stand.