Circuit to Automatically Boot PC when Power is Applied

This circuit is used to automatically boot a PC when 110 Vac power is supplied to the PC with any optional power switch on the PC power supply turned on. To start a PC's boot process the power switch on the front panel closes two pins on the front panel header on the PC motherboard. These two pinsare typically indentified as Pwr Switch positive and Pwr Switch minus. Pwr Switch minus is simply V-zero (ground), so any momentary connection of Pwr Switch Positive to any V-zero (ground) will start the PC's boot process. The following circuit was designed to provide just such a momentary grounding of the Pwr Switch positive line when 110 Vac power is applied to the PC.

When 110Vac is applied to the PC power supply the power supply enables a 5Vdc line on pin 9, typically a purple wire (identified as a 5Vdc standby power) on the ATX header. This circuit uses this 5Vdc standby power signal as the power source for the circuit, and as the start signal to activate the circuit and boot the PC. The circuit is a derivative of a typical timing circuit based upon the 555 timer IC. To create the momentary grounding of the Pwr Switch positive line this circuit uses a 555 timer circuit to create a single momentary voltage pulse which is applied to a transistor wired between the Pwr Switch positive line and ground. While the transistor closure could have been between the Pwr Switch positive and Pwr Switch minus lines, to simplify the connections it was decided to simply connect the Pwr Switch positive line to ground.

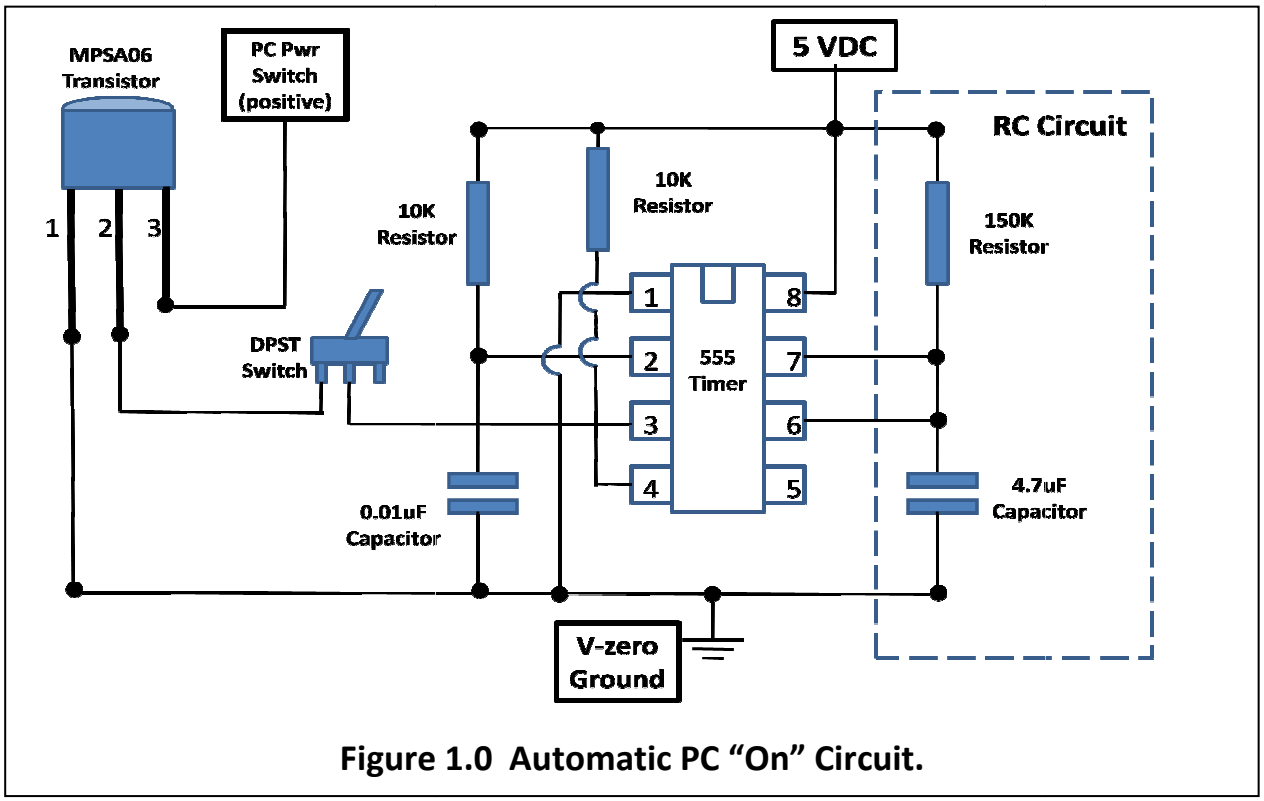

Figure 1.0 Automatic PC "On" Circuit.

The timing circuit is shown in Figure 1.0 and consists of three parts, the 555 timer circuit, a RC circuit which defines the 555 timer pulse duration, and the transistor which provides the momentary grounding of the Pwr Switch positive line. Table 1.0 lists the pin connections for the 555 timer IC. For my circuit I

actually used a 556 timer IC because it was cheaper and more available. The 556 timer IC is simply two 555 timers incorporated into a single chip. The pin callouts listed in Table 1.0 still apply; one just uses

555 Pins	556 Pins	Item	Comments
1	7	V-zero	Sinked to zero voltage (ground)
2	6	Trigger	Sourced to 5 Volts via a 10K resistor, and Sinked to V-zero (ground) via a 0.01uF capacitor
3	5	Output	sourced to Base terminal on MPSA06 NPN transistor or equivalent
4	4	Reset	not used and source to supply voltage of 5Volts thru 10k resistor to prevent extraneous resets of timer
5	3	Control	not used and left unconnected, a 0.01 uF capacitor can be connected to V0 to protect from electrical noise
6	2	Threshold	Connected between the resistor and capacitor of the timing RC circuit.
7	1	Discharge	connected same as pin 6
8	14	V-source	source to supply voltage of 5Volts (5Vdc StandBy power on ATX header)

Table 1.0 Pin Callout for Timer IC Chip.

one of the two timers on the 556 chip.

The circuit uses an RC circuit to define the timer pulse duration. The RC circuit is attached to the threshold pin on the 555 timer IC which will turn off the chip's output when the voltage on the threshold pin reaches an acceptable value. In order to achieve a pulse duration of approximately 1.0 second the RC circuit used a capacitor of 4.7 uF and a resistor of 150 Kohms. The timer with its RC circuit will hold the 555 IC's output pin (pin No. 3) high (at 5 volts) for approximately 0.5 seconds. This high voltage is applied to a NPN transistor which acts as an electrical switch to connect the Pwr Switch positive line to ground. The transistor has three legs: the emitter (1), the Base (2), and the Collector (3). The transistor is wired with the output from the 555 timer to the Base (2), Chassis Ground to the Emitter (1), and the Pwr Switch to the Collector (3). Initially the circuit was wired using a 2N2222A transistor, but this setup proved problematic due to the transistor continuing to provide grounding signals long past the 0.5 second pulse duration. It was believed that noise on the output pin from the 555 timer continued to result in erroneous closures of the 2N2222A transistor which resulted in the PC turning on, and then turning off. Eventually the circuit was re-wired using a MPSA06 NPN transistor (i.e. general-purpose amplifier) which eliminated the transient grounding effects that were occurring after the 555 timer pulse was through.

The Power-On circuit was wired up with three external connections, one to the Standby Power line on the ATX header, one to the Pwr Switch positive line, and the last connection to chassis ground. In order to allow selection of whether to enable booting on applied 110Vac, a double pole, single throw (DPST) switch was used to connect / disconnect the circuit from the 5Vdc standby power line and the Pwr Switch positive line. The only drawback of this switch circuit is that if the PC is powered down, cycling the DPST switch will restart the PC if the power AC cord is still on. To eliminate this behavior the Standby power line was removed from the DPST switch and the switch only connected or disconnected the startup circuit from the Pwr Switch positive line.