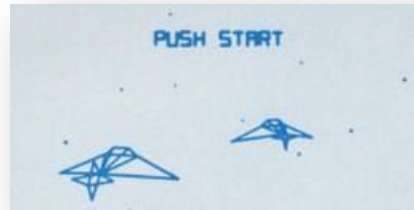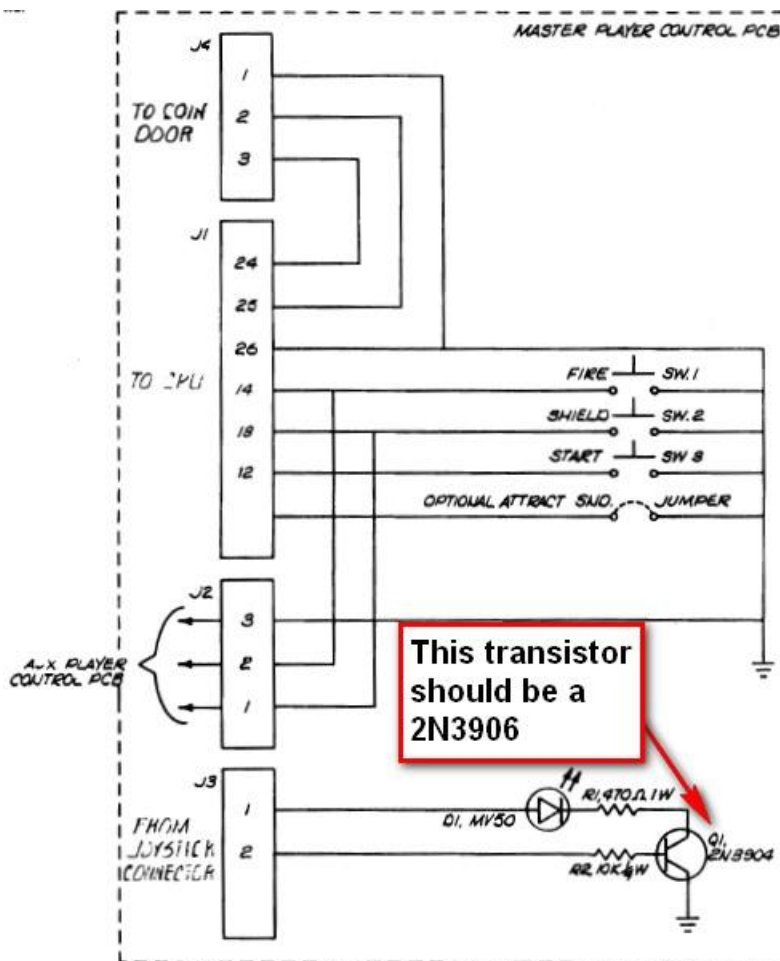# How to Install a START LED on *Tail Gunner*

By Matt Rossiter

If you're lucky enough to own a Cinematronics Tail Gunner arcade game, mostly likely you didn't realize there was actually a start LED that was originally designed to go into the control panel.
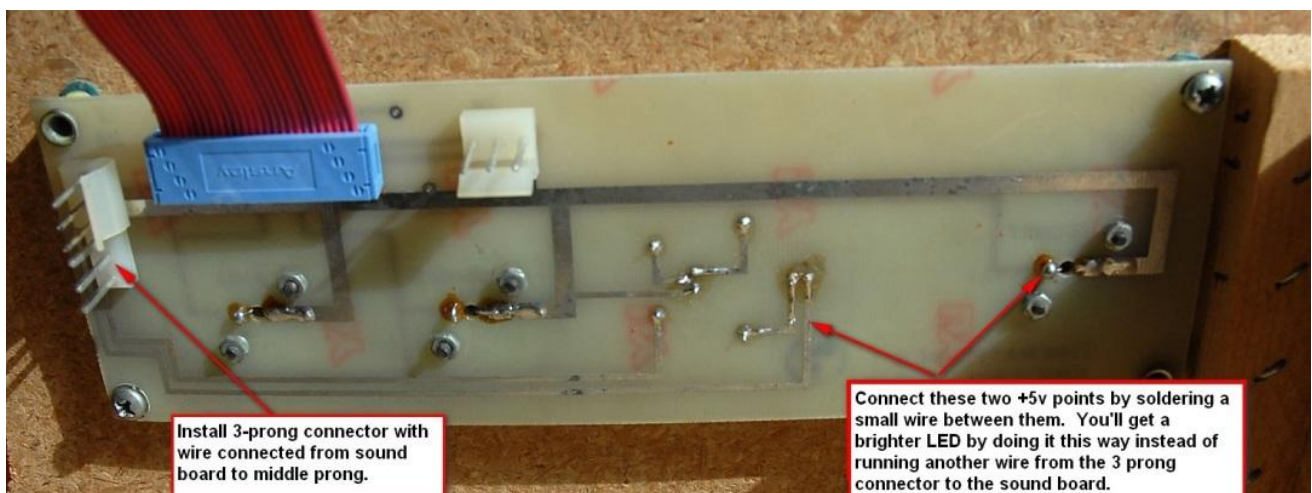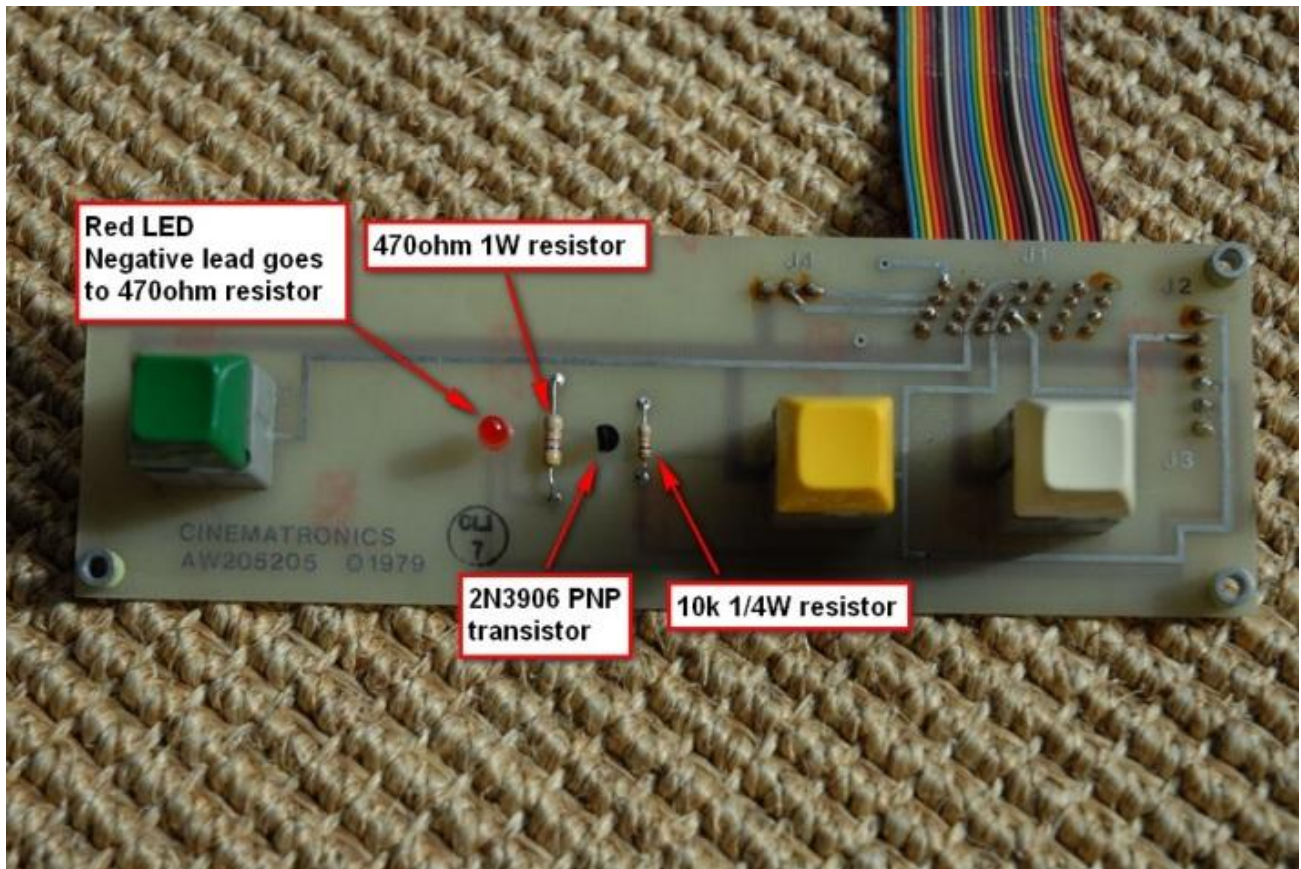
My guess is, Cinematronics decided not to install the LED simply because it's too dim to see when there's a lot of light and wasn't worth the extra cost for parts. However, most of us like having a dimly lit arcade to enhance the ambience, so the LED is very easy to see and pretty cool in an 80's kind of way.

Let's begin by looking at the schematics.

The first schematic here shows that there's a connector on the control panel PCB specifically for the wire connecting the LED to the sound board. The schematic calls for a 2N3904 NPN transistor. I would argue that this is not the correct part. If you install this, then the LED will always stay on until you insert a coin. It will then blink until you press start. When the game is over it will continue to stay on. If you install a 2N3906 PNP transistor, then the LED will always stay off until you insert a coin. It will blink whenever there's any credits in the game as long as the game is not in play. It will stay off during game play or when no credits are left.

Here is a photo of the control panel PCB with the components installed. The LED should stand about ½ inch high from the PCB, enough for maximum brightness without minimizing the diameter of light output through the plexi.
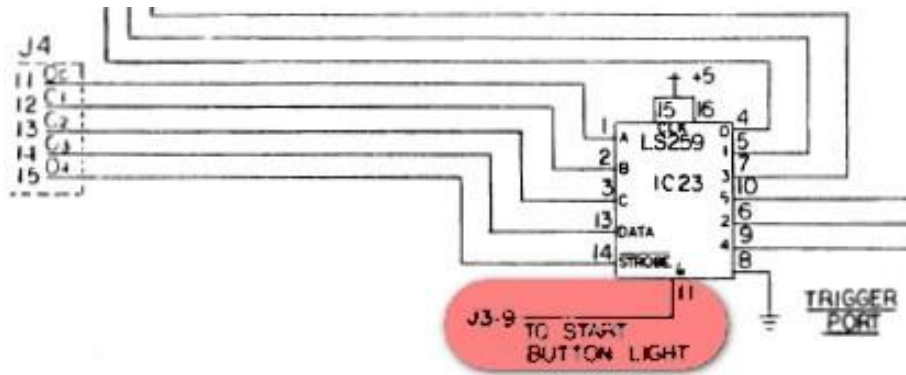

Red LED
Negative lead goes
to 470ohm resistor

470ohm 1W resistor

2N3906 PNP
transistor

10k 1/4W resistor

Install 3-prong connector with wire connected from sound board to middle prong.

Connect these two +5v points by soldering a small wire between them. You'll get a brighter LED by doing it this way instead of running another wire from the 3 prong connector to the sound board.

A) Install 3-prong connector. Wire goes from soundboard connector J3-9 to middle prong.
B) Connect +5v trace to nearest 5v source as shown in photo.

I recommend buying a bag of assorted LED's from Radio Shack. They're cheap and it's always good to have extras.

So now let's look at the schematic on the soundboard. You can see that the start light signal goes to connector J3 pin 9
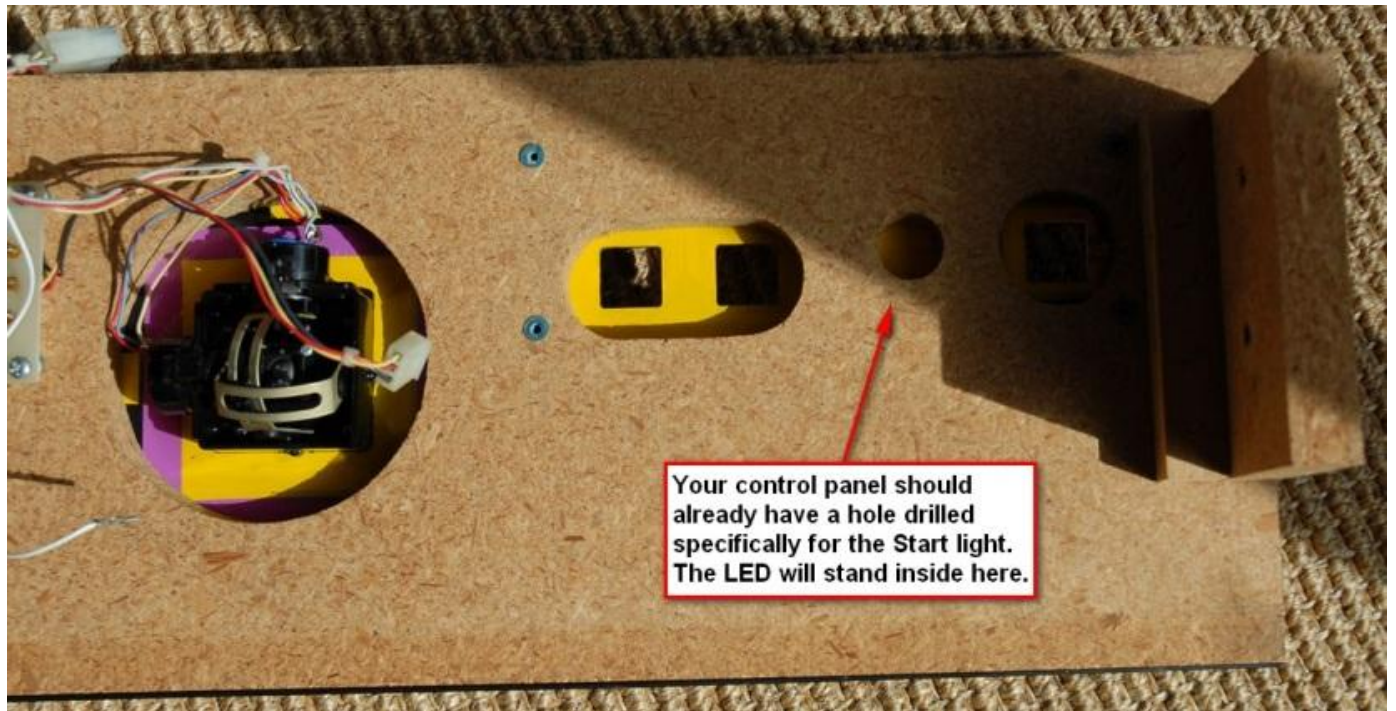
Your wiring harness may already have a wire coming from pin 9 (most likely yellow). If so, then install a wire from the molex connector on the other end to the control panel.

The bottom of the control panel should already have a hole drilled specifically for this LED.

Your control panel should already have a hole drilled specifically for the Start light. The LED will stand inside here.

If you did everything right, you should now see a cool looking "Press Start" indicator on your control panel next time you insert a coin.