

# **PROJECT**45

## **Lear45 Simulator Toggle Switch Matrix**

**The Search:** Trying to find the right toggle switches for the L45 simulator build has been more than challenging. At first glance in the Lear45 cockpit, the toggles are one of the most recognizable items that you would think should be easily found at a Radio Shack for example. But this is far from the truth of the matter. After at least two years of “OFF and ON” searching, I now feel fairly comfortable with the information that I am releasing.

**The Switch:** There are a total of seventeen Honeywell “TL” Series toggle switches in the Bombardier Learjet, Model 45 flight deck. Six of these toggles are “LOCKING” switches in various configurations. The other eleven are “STANDARD” switches; however, they are special because they have a red protective boot around the toggle for accidental splash protection. The “TL” Series also has stepped leads to further prevent accidental shorting between the terminals.

**The Problem:** As we know, each and every system in this aircraft has at least one redundancy system, meaning that the toggles are either double pole or four pole. If we were to use authentic aircraft parts, the cost of just these 17 Honeywell toggles would reach nearly \$1,000 for the set! The challenge for the Lear45 simulator builder is to find a cost effective solution and maintain the authentic look of the switches.

**The solution:** The toggle switches listed below are from the same Honeywell “TL” Series that populates the Lear45 cockpit. All of the listed switches look and operate like the real part; however, in most if not all cases, the listed switches have been simplified in an attempt to reduce cost and complexity. Only one pole is required in all of the listed switches. If, however, you choose to create outside lighting on you simulator, for example the “NAV Lights”, these would require a double pole switch and some hardware logic. In this example you would order 2TL1-1 rather than 1TL1-1. One pole would be used for the computer simulation and the second pole would be used for the hardware logic to operate your outside lights.

**The source:** The best and cheapest source for these switches that I have found, (so far) is [www.onlinecomponents.com](http://www.onlinecomponents.com) I have found that their website is easy to navigate and the search function is second to none. Their prices are more than fair and the availability is posted on each and every part. They say the factory lead time is six weeks for parts out of stock but in reality, it is much less in most cases. Feel free to look for other sources for these and other must have switches, but if all else fails, you’re covered.

I used [www.mouser.com](http://www.mouser.com) to double check most of the research on these switches. Mouser has an easy to use data sheet and spec sheet to verify switch positions and functions.

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### **LOCKING TYPE “TL” SERIES TOGGLE SWITCHES:**

| <b>Function</b>    | <b>Honeywell#</b> | <b>Poles</b> | <b>Circuitry</b> | <b>Cost</b> |
|--------------------|-------------------|--------------|------------------|-------------|
| LANDING GEAR       | 1TL1-2D           | 1            | OFF-ON           | \$31.65     |
| L ENG COMPTR       | 1TL1-1A           | 1            | ON-OFF-ON        | \$32.46     |
| R ENG COMPTR       | 1TL1-1A           | 1            | ON-OFF-ON        | \$32.46     |
| PITCH TRIM PRI/SEC | 1TL1-1A           | 1            | ON-OFF-ON        | \$32.46     |
| EMER LIGHTS        | 1TL1-1M           | 1            | ON-OFF-ON        | \$27.82     |
| PIT TRIM BIAS      | 1TL1-7E           | 1            | (ON)-OFF-(ON)    | \$33.53     |

**NOTE:** There are other less expensive alternatives to these “TL” series switches. If you want to save a few bucks and are not overly concerned about the exact authentic function of the switch, there are some others in this same family that are less expensive. The cool thing is that they still look like the real part!

Use 1TL1-E to substitute for: 1TL1-1A and 1TL1-7E (\$19.53 each)

This is an ON-OFF-ON switch that ONLY locks in the center position. When you pull it out of the center position to move to one of the other two positions, it does not lock, meaning it could accidentally be hit and knocked back into the center locking position. This may be a great alternative to any switches that you do not plan to model in the simulation and only plan to keep as dummies.

Use 1NT1-3D to substitute for: 1TL1-2D (\$24.75 each)

This is an ON-ON “NT” Series switch that looks as close as your going to find to the “TL” Series switch. This switch has an extra terminal where the OFF would be.

**NOTE:** These prices are subjects to change by the supplier, Online Components!

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## Lear45 Simulator Toggle Switch Matrix

### STANDARD TYPE "TL" SERIES TOGGLE SWITCHES:

| Function          | Honeywell# | Poles | Circuitry     | Cost    |
|-------------------|------------|-------|---------------|---------|
| L RUDDER PEDAL    | 1TL1-7     | 1     | (ON)-OFF-(ON) | \$18.18 |
| R RUDDER PEDAL    | 1TL1-7     | 1     | (ON)-OFF-(ON) | \$18.18 |
| L AHRS SLAVE      | 1TL1-1     | 1     | ON-OFF-ON     | \$18.46 |
| R AHRS SLAVE      | 1TL1-1     | 1     | ON-OFF-ON     | \$18.46 |
| L LDG TAXI LIGHTS | 1TL1-1     | 1     | ON-OFF-ON     | \$18.46 |
| R LDG TAXI LIGHTS | 1TL1-1     | 1     | ON-OFF-ON     | \$18.46 |
| SMOKING / BELTS   | 1TL1-1     | 1     | ON-OFF-ON     | \$18.46 |
| STROBE / BEACON   | 1TL1-1     | 1     | ON-OFF-ON     | \$18.46 |
| RECOG LIGHTS      | 1TL1-1     | 1     | ON-OFF-ON     | \$18.46 |
| ENGINE SYNC       | 1TL1-1     | 1     | ON-OFF-ON     | \$18.46 |
| NAV LIGHTS        | 1TL1-1     | 1     | ON-OFF-ON     | \$18.46 |

**NOTE:** There are other less expensive alternatives to the "TL" series switch. If you want to save a few bucks and are not overly concerned about the exact authentic look, check out the "NT" Series. They still have the red rubber seal inside!

Use 1NT1-1 to substitute for: 1TL1-1 (\$13.19 each)  
And 1NT1-7 to substitute for: 1TL1-7 (\$13.12 each)

**NOTE:** These prices are subject to change by the supplier, Online Components. Please take the time to study this document and the Honeywell "NT" and "TL" Series documents before making your final purchasing decision.