



# Circuit Board Functional Testing

Thomas Helgesen

College Park Scholars – Science & Global Change Program

Electrical Engineering

thelgese@umd.edu

College Park Scholars Academic Showcase, April 30, 2021



## Introduction

Modern day national defense is in large part a technological battle to gain information on the enemy. HTL takes part in this by designing radios for data acquisition.

## Site Information:

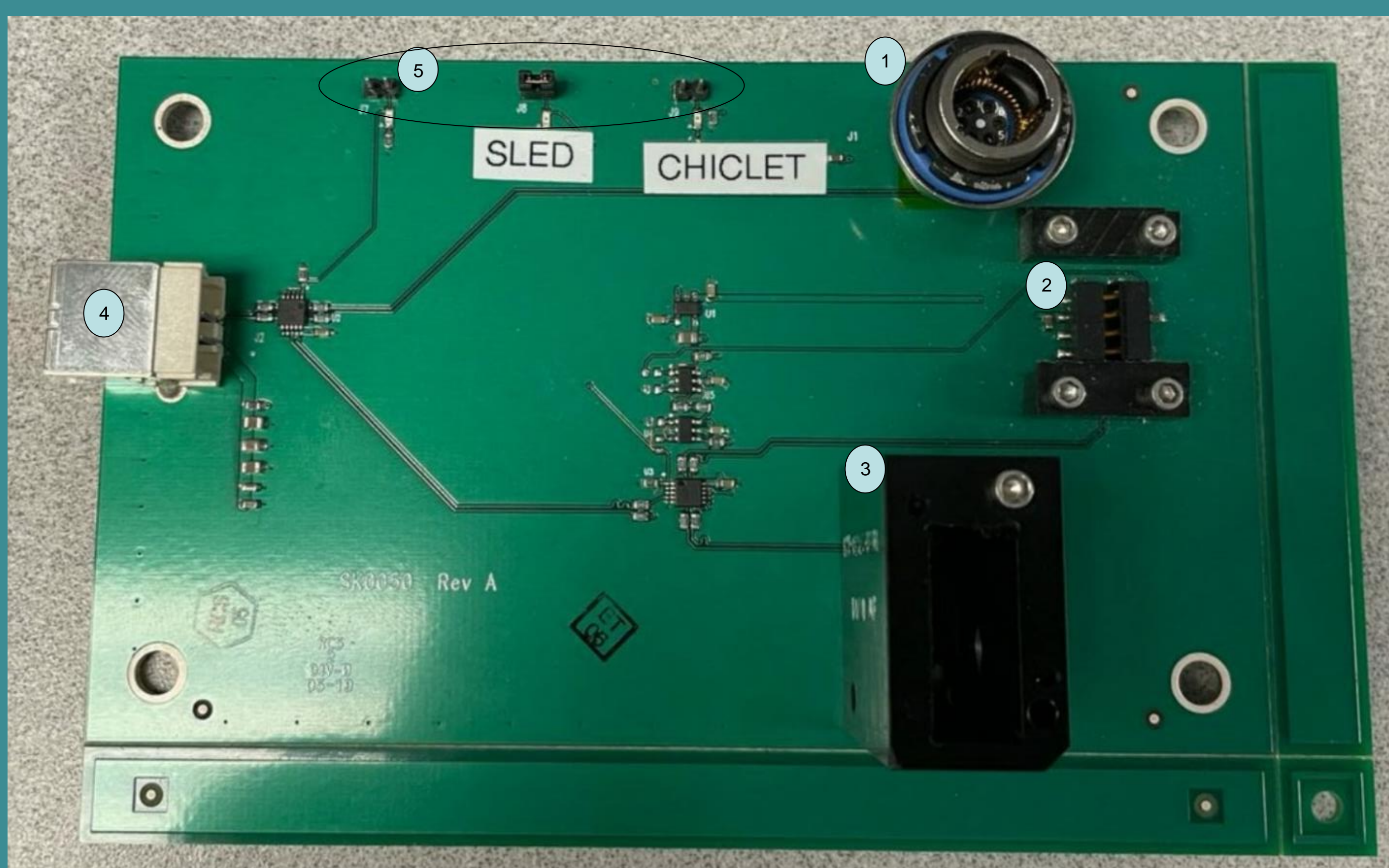
Herrick Technology Labs

20201 Century Blvd, Germantown, MD 20874

HTL makes high performance software defined radios for use in defense applications.

## Issues Confronting Site:

- The board I tested was a support board for programming and testing 3 proprietary data storage devices (similar to USB).
- Based off the figure to the left, the board provides power to and connects one of three input devices (1, 2, or 3) to an output data line (4) depending on which jumper (5) is bridged. All of these functionalities need to be tested before the board is released for use.



The board I worked on. See the three data storage device ports (1,2 and 3), the jumpers (5) for input selection, and the output port (4) that would go to a computer for programming.



A typical workstation used for testing boards.

## Activities:

- Resistance and Voltage testing new boards to ensure proper design and construction
  - Ensuring certain components and pins are electrically isolated
  - Measuring voltages of power rails
- Design Verification Testing to ensure functional aspects of new board
  - Testing input selection logic is working correctly
- Correcting design through resoldering circuit components
- In addition to this specific project, I've done this same testing along with testing of power rail soft start characteristics (switching capacitors to get desired voltage curves upon start up) on more complicated boards. Additionally, I've done schematic and layout designs for customer bound systems, but unfortunately much of my work is confidential.

## Impact:

A few logic gates had to be switched out in order to correct the selection logic for the data devices.

## Future Work:

With the completed board HTL production staff can more easily program and trouble shoot our devices

## Acknowledgments:

I'd like to give a big thanks to HTL staff as well as Dr. Holtz and Dr. Merck.



SCIENCE AND  
GLOBAL CHANGE

