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ECE 492

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### IMD Memo 1

On Thursday February 16, a test of the IMD was conducted to ensure its functionality in detecting ground faults from the high voltage power to chassis ground and characterize the measured resistance curve through duty cycle observed. In order to do this, testing fixtures for the IMD had to be made to provide power and record data.

#### Setup of the Board

I am using two power supplies to power both sides of the board. One is set to 24V to simulate GLV and the electronic ground is connected to earth ground on the power supply. The other is set to 25V as this is the max voltage one can achieve from the bench power supplies.

A multimeter was connected across the 2.2 kilo ohm resistor on pin 8 to measure the  $OK_{HS}$  signal which should be 24V when there has not been a ground fault. An oscilloscope was connected across the resistor on pin 5 which will display the PWM  $M_{HS}$  signal. When there is an open circuit between 25V and chassis ground, the signal will be at a frequency of 10Hz and a duty cycle of 5%.

#### Test Ground Fault Detection

To test the ground fault response of the IMD, I connected the negative of the 25V power supply to earth ground. Within 10 seconds, the multimeter read 0V and the PWM had a duty cycle of 95%.

To achieve different duty cycles, I connected a resistor between the ground of the 25V power supply and its earth ground. Depending on the resistor size, the duty cycle changed with 1.2 mega ohms having a 50% duty cycle. I have included an excel spreadsheet with tested values and plotted the data with a logarithmic trend line.

#### Conclusion

This was a successful test in testing the IMD ground fault and is a step towards meeting the requirement of cutting TSV power in under 30 seconds from the fault occurring. The  $OK_{HS}$

signal will then be tied into a safety loop relay and the AIRS would open. These are the only other points of delay in the system and will be tested later.