Front End Electronics Crate
ICC O/V Interface

The current version (Rev. C) relies on trim-pot settings for the Over Voltage trip points. It would be best if we use fixed values to create a predetermined trip level.

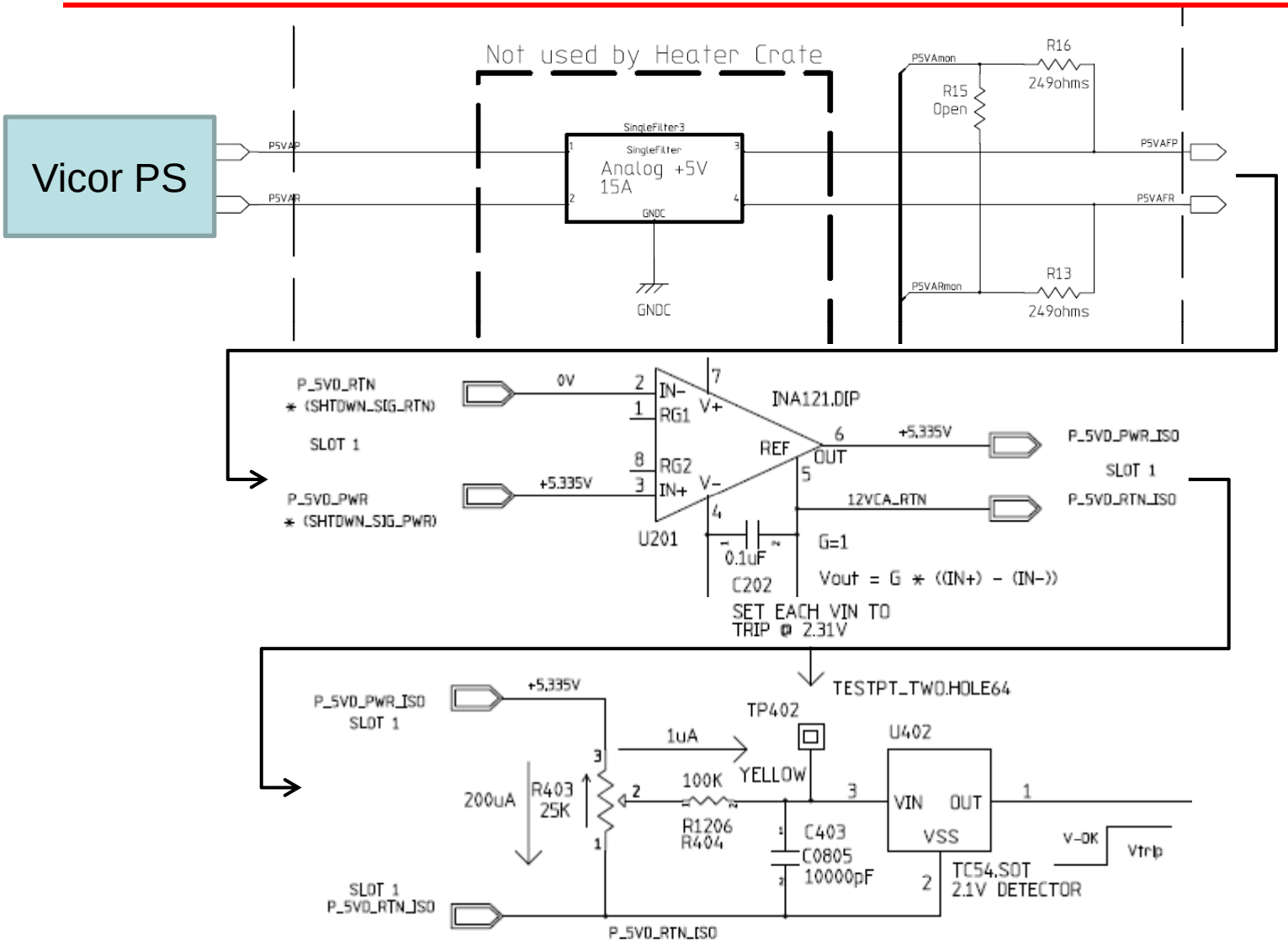
First we need to pick the trip points we consider an Over/Voltage condition. A level 5% and no more than 10% above each voltage rail for the trip point will be used and we will simplify circuitry wherever possible.

Trip points should not be so tight as to become a nuisance to normal operation.

There are basically two monitoring channel types in the current design.

1. Voltages 5V or less (3.3V, 5V and +/-5V)
2. Voltages 15V to 48V (+/-15V, -28V and +48V)

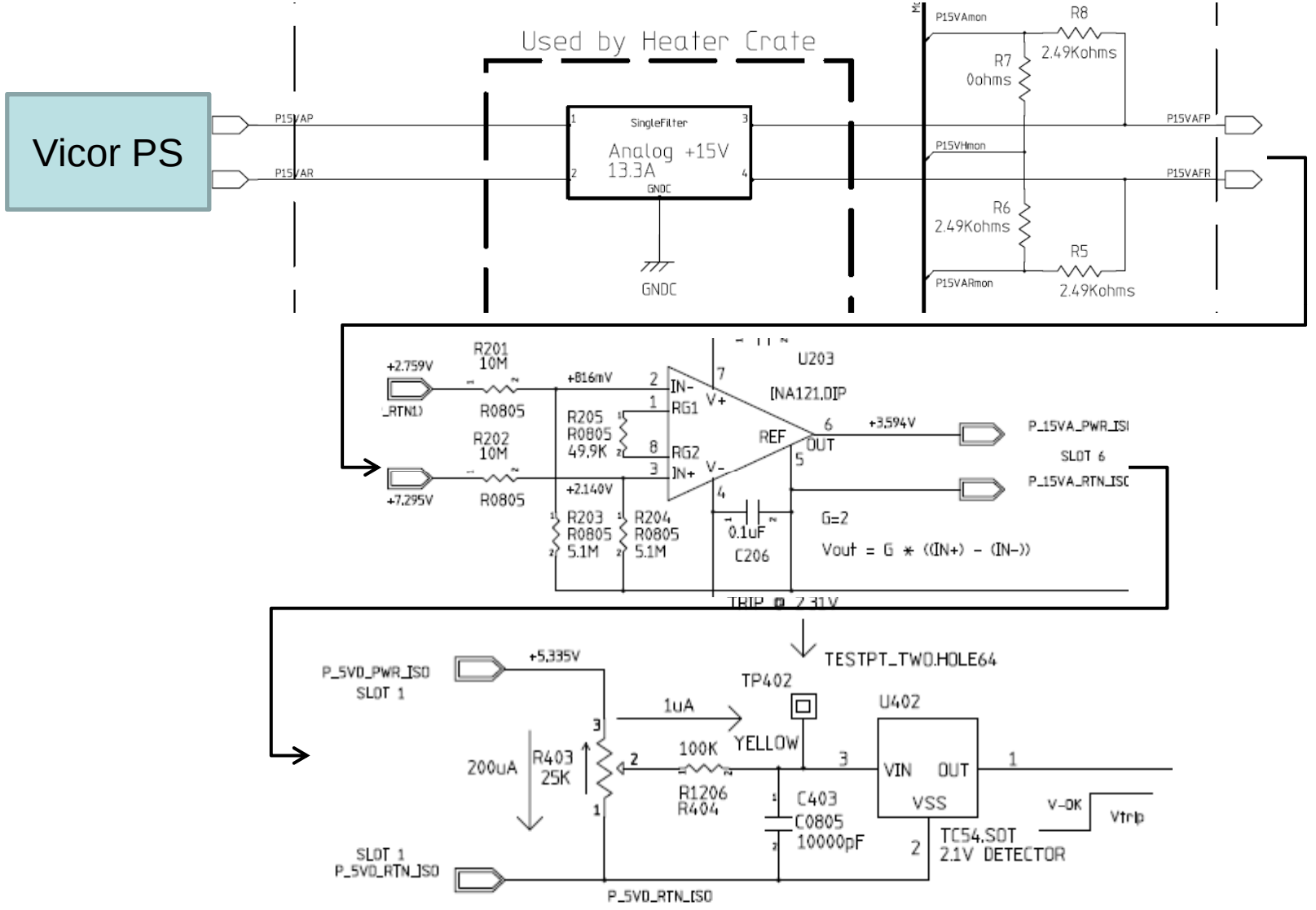
DECam
O/V Channels 5V or less



Circuit Description
Rev. C

- For voltages 5V and less there are no dividers in the Filter Box. The resistors in the filter box only limit the current on the connector pins.
- The ICC input uses an Instrumentation Amplifier to provide isolation between it and the electronics crate. The amplifier has a gain = 1 and allows the polarity to be swapped to get a positive signal on the negative rails.
- The output of the amplifier is divided and filtered before going to the comparator. The comparator trips at 2.1V.

DECam
O/V Channels 15V to 48V



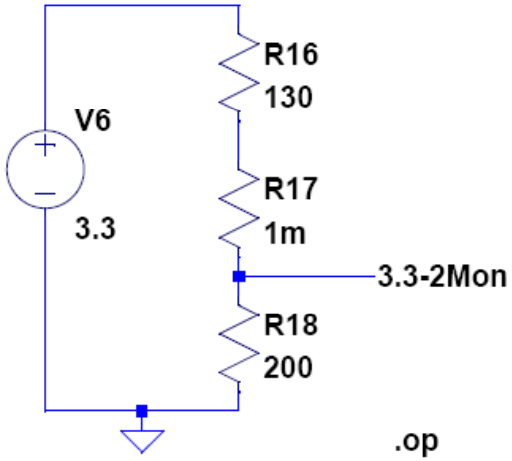
Circuit Description

- For voltages 15V and higher there is a divider in the Filter Box. The resistors in the filter box not only limit current on the connector pins but divide the signal to a nominal 5V level.
- The ICC input Instrumentation Amplifier has a common mode input less than 15V so must be divided to meet that level. The amplifier is set for a gain = 2.
- Like the previous circuit the output of the amplifier is divided and filtered before going to the comparator. The comparator trips at 2.1V. A potentiometer is used as a divider to set the input to the detector chip.

Circuit Changes to Consider

- Options:
- Adjust the Filter Box Monitor circuit so the divider provides a nominally 2.0V level.
- Since all rails have a common reference point we can eliminate the resistance on the return leg thus holding the common mode voltage to less than 3V.
- Normal operation will have 2.0V at the rated output voltages. A 5% increase will raise this level to 2.1V and active a trip.
- We will keep the Instrumentation Amplifier for the isolation
- We will remove the large value resistors on the Amplifier and set the gain = 1.
- Remove the trim-pots.
- All the circuits now look the same.

Filter Box Dividers



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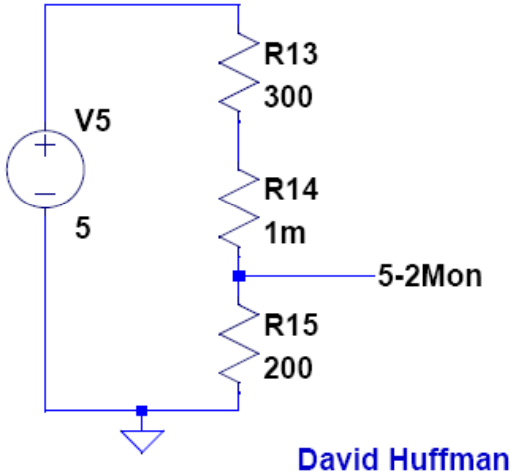
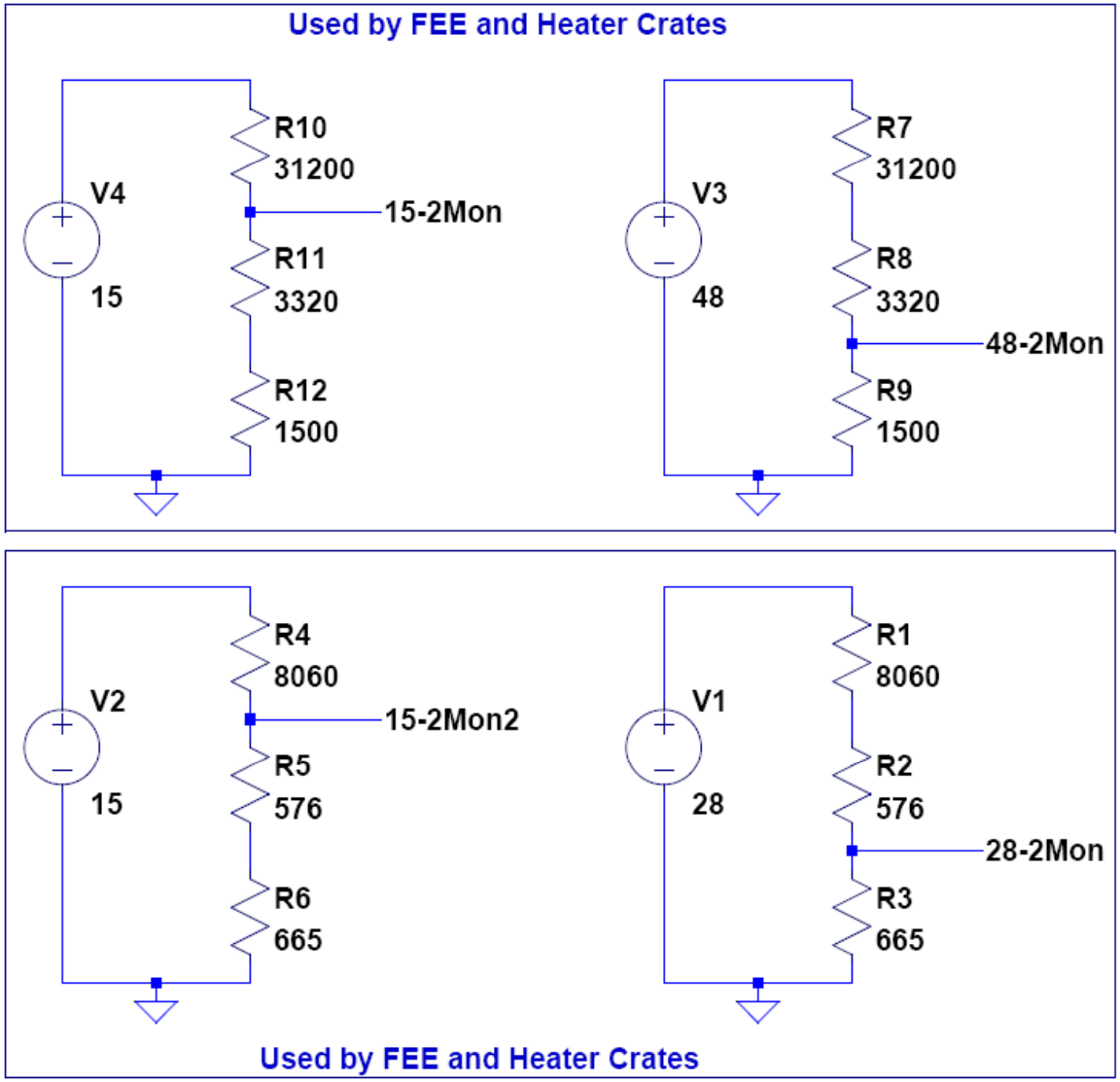
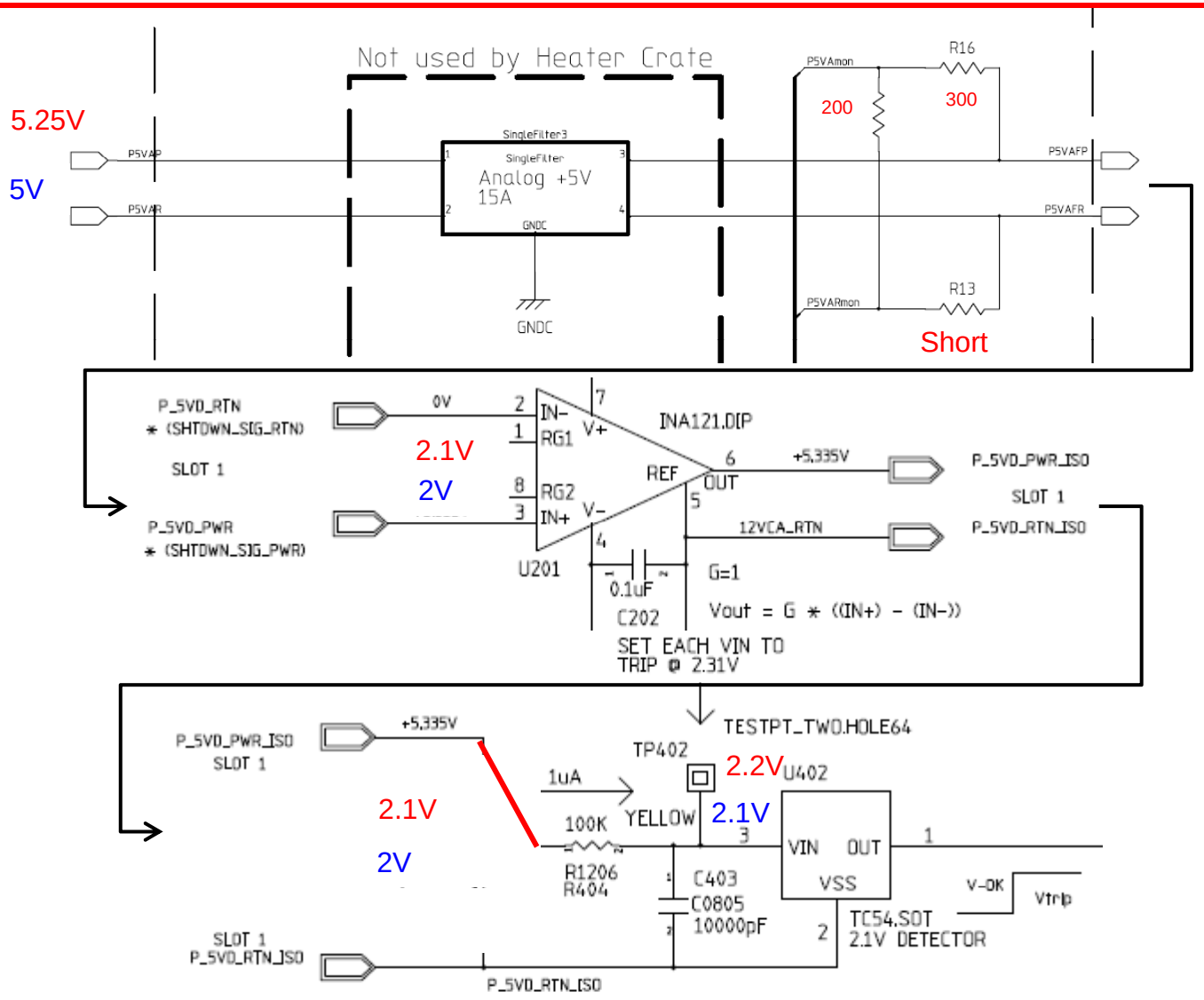


David Huffman
March 9, 2010



DECam
O/V Channels Modified



Additional Considerations

- The detector chips have a +/-2% tolerance on their trip level 2.058V to 2.142V.
- The detector input requires 1uA for bias. Any resistance on the input will drop some voltage and change the trip level. We could leave the 100K resistor to increase the trip point by 0.1V however this puts the trip range between (2.158/2.000)-1= 7.8% and (2.242/2.000)-1=12.1% If we eliminate the drop we get 2.9% to 7.1% So maybe we pick a value of 50K to get 5.4% to 9.6%
- The Filter box will use 0.1% tolerance resistors to set the 2V nominal level.