

Phoenix Maintenance & Development

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NIROPS Closeout, NIFC, Boise



Phoenix Operators

🌀 Big Thanks!

- Kelli Gammons
- Ed Guzman
- Mark Rhodes
- Chris Brenzel
- Kristina Butler
- Jill Kuenzi
- Brian Teats
- Rob Navarro



Development Goals / End Game

● Miniaturize

- Current dimensions = 20"T x 14"W x 22"L
- Retrofit the scanner to no more than 16"T X 14"W x 16"L
- Net system weight reduction of ≈ 39.7 lbs

● Automate

- Next generation

Previous Improvements Implemented

● Ekinox INS/GNSS

- Repeatable/streamlined calibration
- Upgraded Multiband GPS Antenna
- Comparable to Applanix INS performance

● New Mirrors

- Scheduled to be replaced in FY2020

● Noise in N149Z Eliminate

- Carbon foam shielding

Noise Issue



Figure 1: Boitest 11k Fire 2015

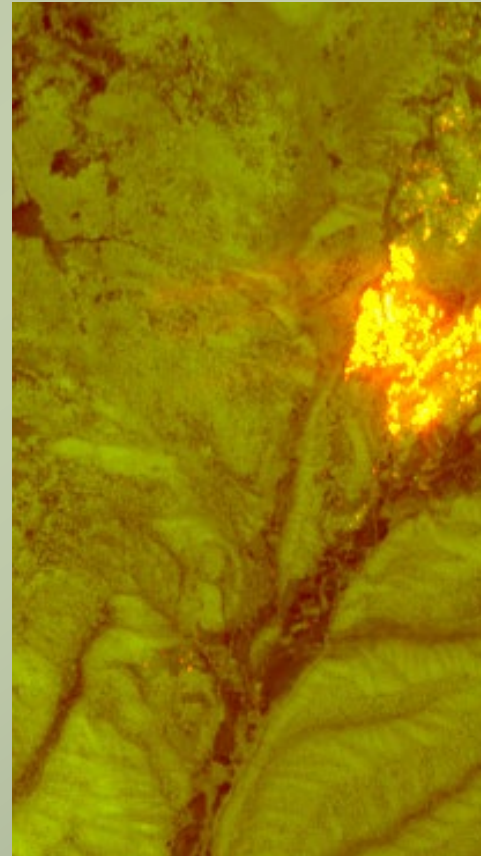


Figure 2: Decker Fire 2019

New Mirrors

● Current Mirrors

- Steel/Quartz (Heavy)
- Ageing wear on mirror surfaces
- 87 – 88 % reflectivity in IR bands

● New Mirrors

- Aluminum with cut honeycomb pattern (Light)
- Environmental proactive coating
- 97 – 98 % for current and upcoming IR bands
 - Addition of the 0.865 and 2.2 μm

New pre-amp and signal conditioning

- Allow addition of SWIR bands to system.
- Pre-Amp board
 - An implementation of a transimpedance amplifier
- Signal Conditioning board
 - Fully differential output (low Noise)

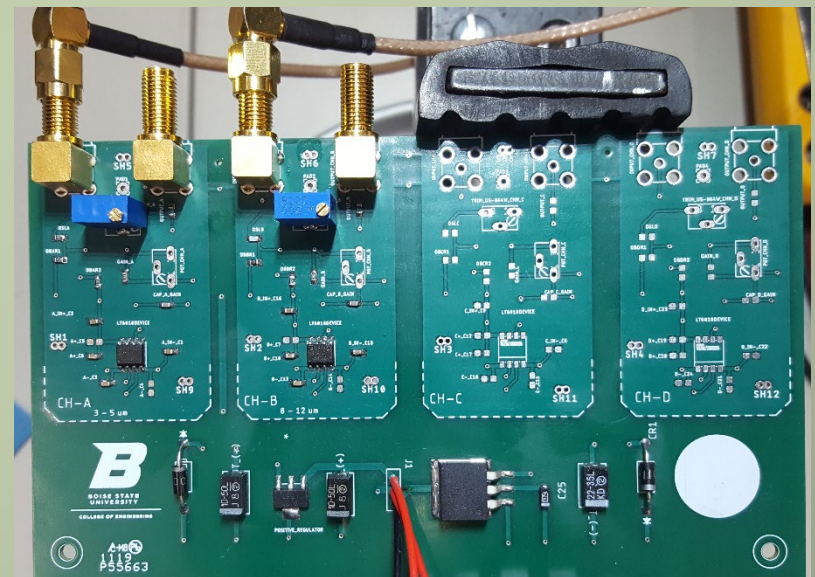


Figure 3: New pre-Amp

New pre-amp and signal conditioning

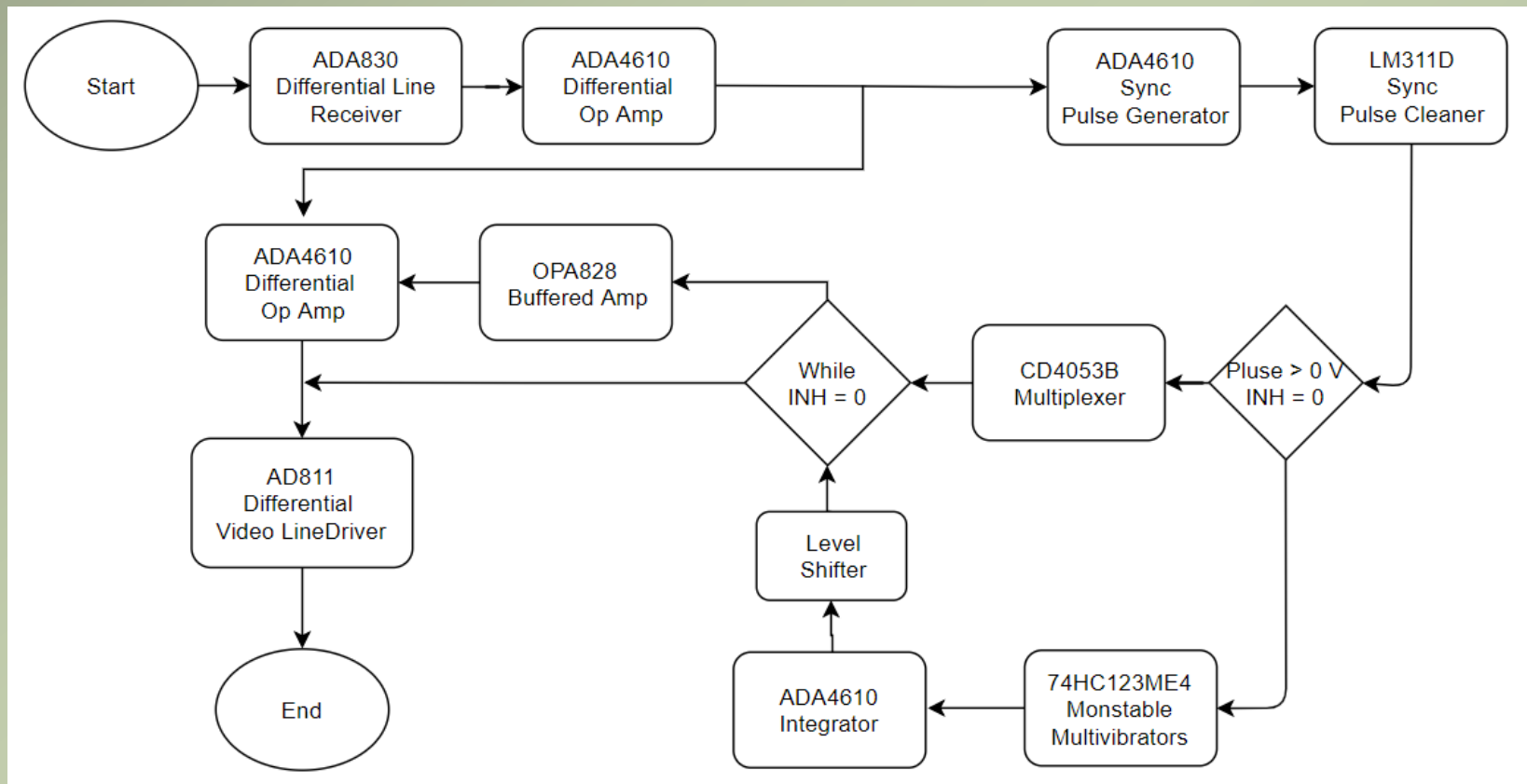


Figure 4: Overview of channel B on the current signal conditioning board.

New pre-amp and signal conditioning

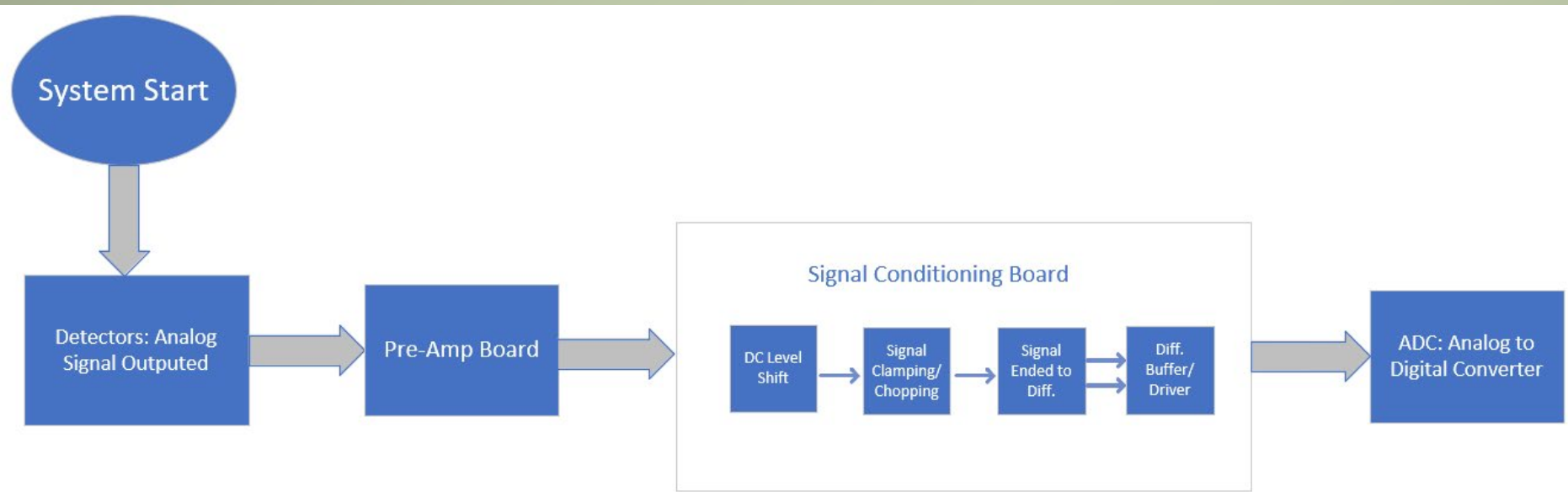


Figure 5: Overview new pre-amp and signal conditioning board channel.

New ADC/DSP

- Upgrade from 32-bit to 64-bit OS
- Analog Digital Converter (ADC)
 - 4 -16 bit - Fully Differential Channels
 - 30 % Useable bandwidth (Increased Resolution)
- Digital Signal Processing (DSP)
 - Receives the INS data
 - Triggerable off sync pulse
- Designed by Sheldon Instruments

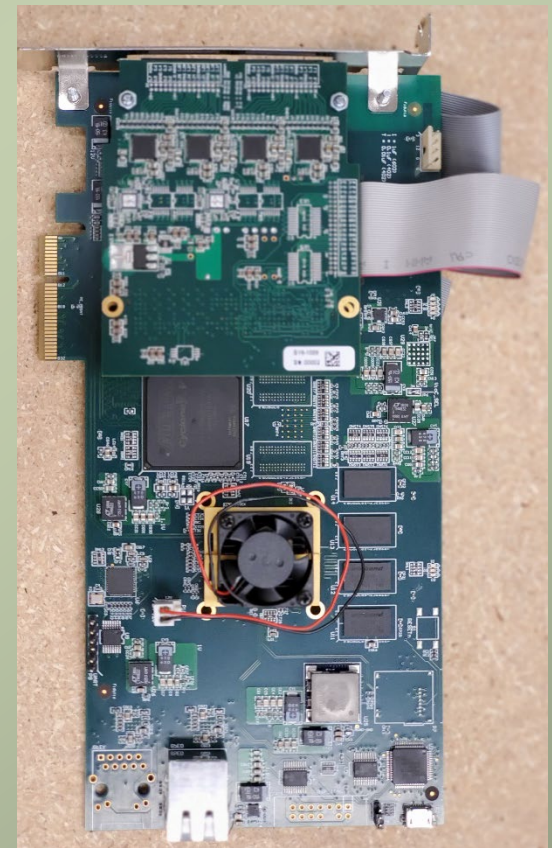


Figure 6: New ADC/DSP

Motor Redesign

- Current motor
 - High altitude DC brushed
 - 400 Hz driven (Unstable)
- New Motor
 - 28 V Motor controller
 - Digital encoder with generated sync pulse
 - 32768 counts per revolution
 - 19 lbs reduction in weight



Figure 7: Current motor assembly parts.

Motor Redesign



Figure 8: New motor assembly parts.

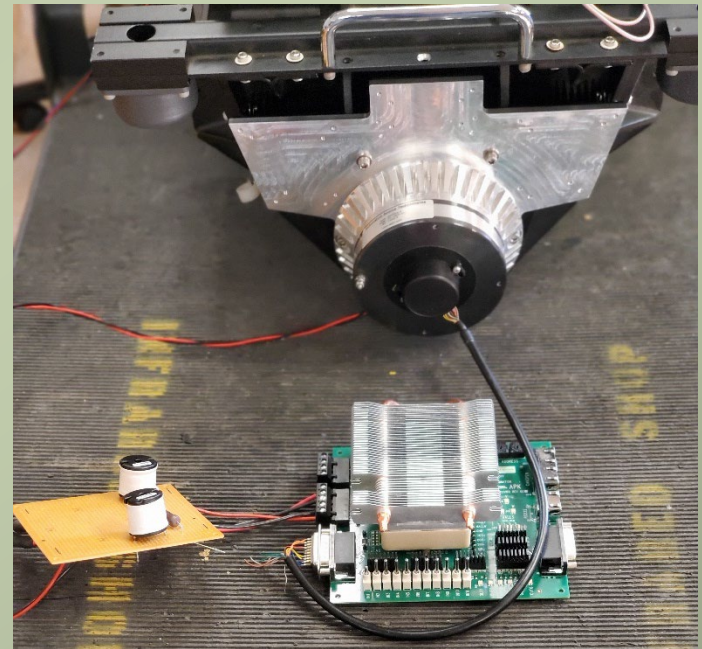


Figure 9: new motor with controller/development board.



Future upgrades

● Cryocooler

- Replace Phoenix liquid nitrogen (LN2) cooling system.
- Reduce height of scanner
- Eliminates need for in mission scanner access

● Aircell replacement

- Improve connectivity with increased bandwidth.

Big Announcement!

- System Renovation = New Name