

Load Cell Calculations:

Sensitivity = 1749 pC/lb - see cal sheet from Kistler, 0-200 lbf range

Amp Settings:

Sensitivity = 17.5 pC/mV * MV = measurement unit
 $\rightarrow \text{lbf}$

Further explained in In-lab Arduino notes

Scale = 10 mV/Volt * for every 10 lbf applied 1 Volt will be output

NOTE: This will be different w/ in-line charge amp Ask Patrick about the sensitivity for that equipment

* micro controller input allows 0-5V range

$$\rightarrow 5\text{V} \cdot 10 \text{ lbf/V} = \boxed{50 \text{ lbf max}}$$

* if greater measurement range is needed, increase scale

Resolution:

Microcontroller is a 10 bit chip $\Rightarrow 2^{10} = 1024 \text{ bits}$
w/ scale @ $10 \text{ lbf/V} = 50 \text{ lbf max}$

$$\boxed{50 \text{ lbf} / 1024 \text{ bits} = .049 \text{ lbf/bit resolution}}$$

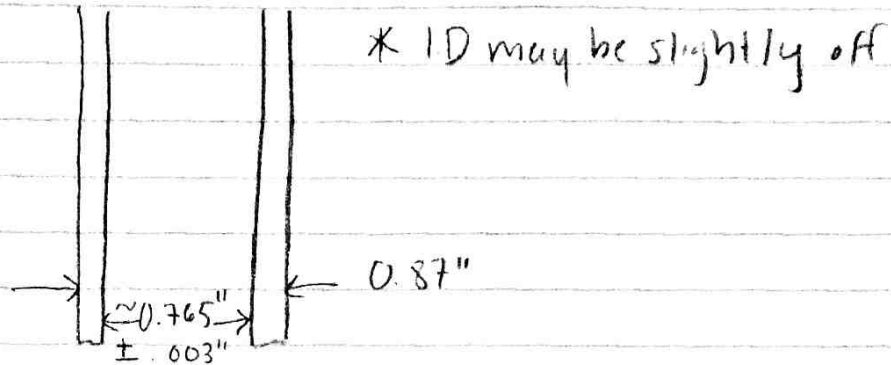
Analogue to Digital conversion

$$V_{\text{meas}} = \text{Binary} \cdot (V_{\text{range}} / \text{bits})$$

$$V_{\text{meas}} = \text{Binary} \cdot (5.0 \text{ V} / 1023.0 \text{ V})$$

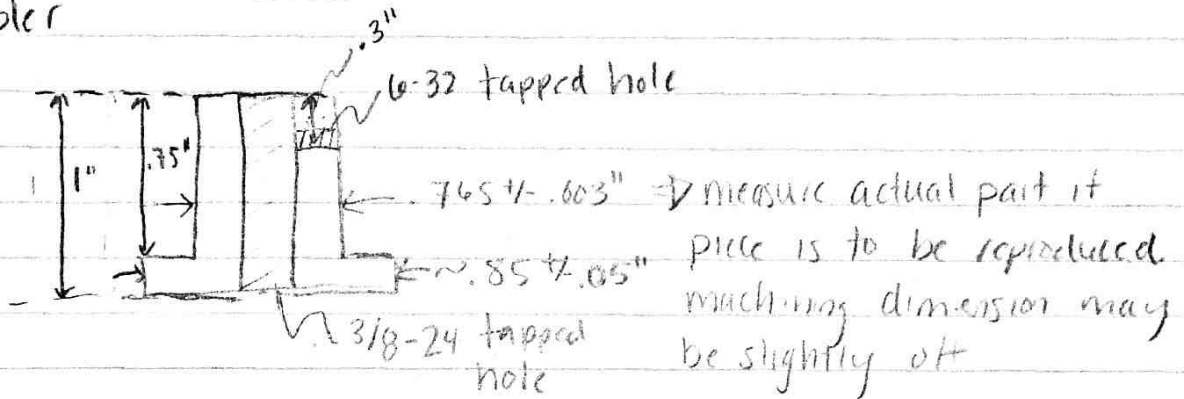
} micro-controller reads volts from amp in binary (0-1023), use this equation to convert from binary to voltage

Cone Dimensions

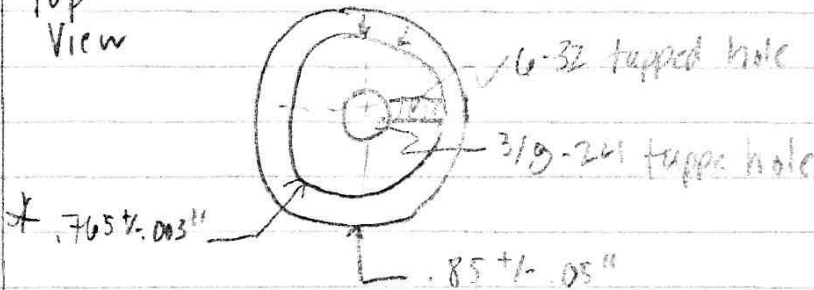


Coupler

Side View



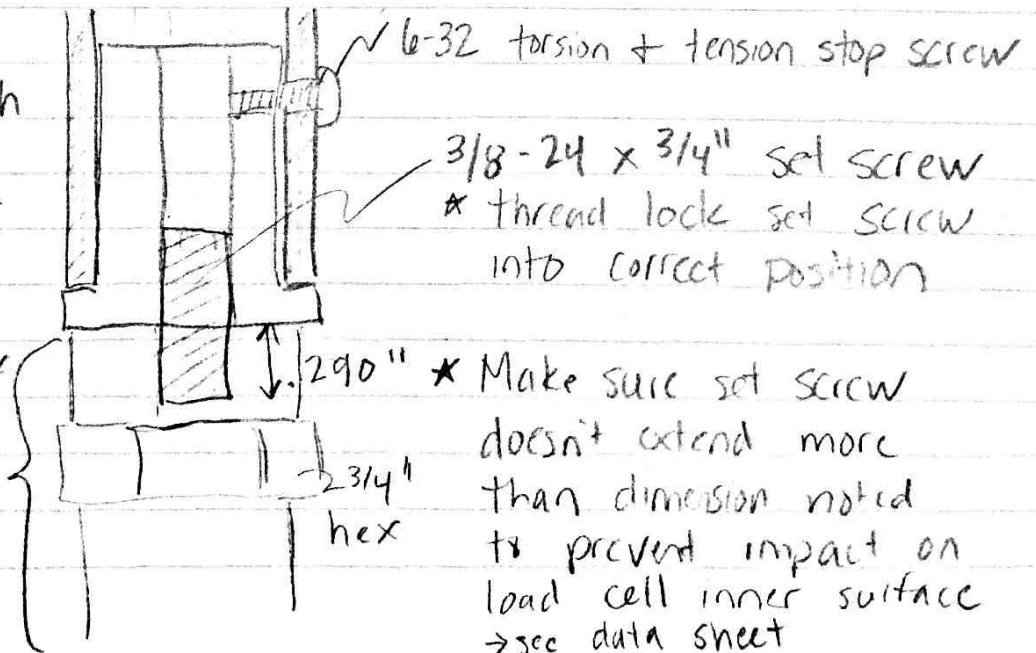
Top View



Assembly

W/ $3/16$ allen wrench
& $3/4$ " wrench
tighten coupler
to load cell
via set screw
& load cell hex

load cell



Power

Microcontroller limits

RAW input $6V < RAW < 12V \Rightarrow$ w/ current batteries we apply 7.4V
VCC - regulated voltage to 5V.

Batteries:

3.7 volt Lithium ion battery

3.7 Volt

110 mAh

\rightarrow in newer
we use 3 batteries
in series for $\approx 11.1V$

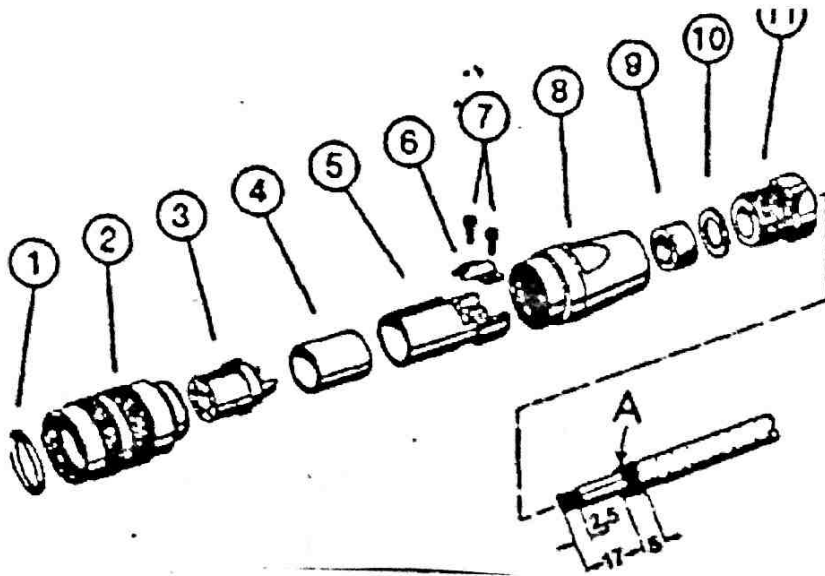
Charging: 1.0C 100 mA for rapid charge

NOTE: USB charging chip has been slightly altered from its default 500mA charge to the alternative 100mA charge to meet the above specs. If you use one of the spare boards you must do this alteration again. See Hook-up guide on Sparkplug website

- ONLY charge on all at a time, not the two in series
- Never short circuit batteries

MOTOR:

- Max Voltage = 3.6 V Min Voltage = 1V
- Operating Voltage = 100mA
- Nominal Voltage = 3V
- Nominal Voltage = 84 mA



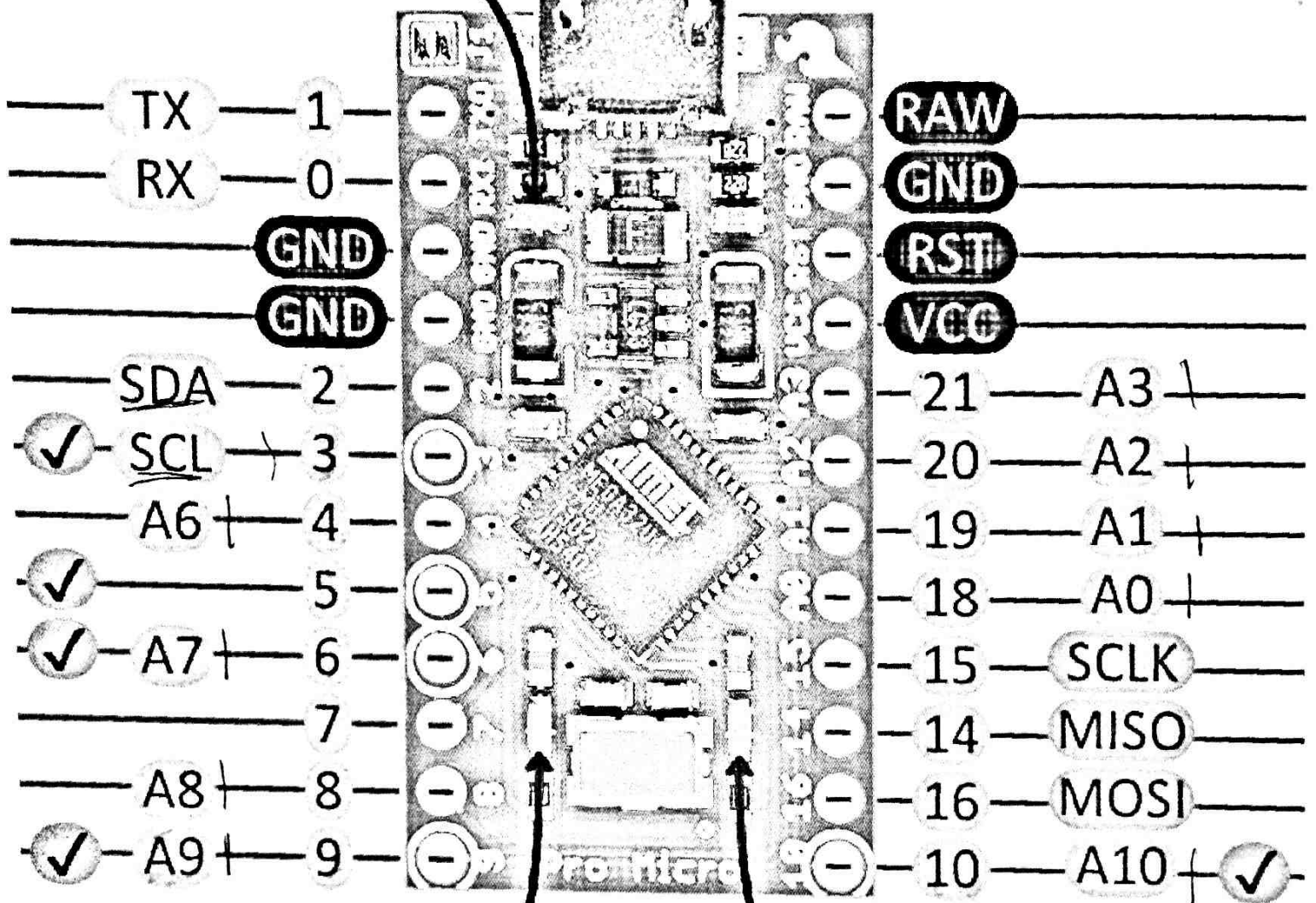
Assembly of connector 1500A57

1. **Attention:** Before stripping the insulation, fit 4, 5 and 8 to 11 onto the cable
2. Strip the cable insulation as in the drawing (A = screen)
3. Solder the cable to 3 (4 serves as insulation)
4. Firmly screw the cable clamp 6 to 5 with screws 7 (screen is firmly clamped under the cable clamp 6)
5. Insert 3, 4 and 5 into 8
6. Screw 2 and 8 together
7. Insert 9 and 10 into 8 and screw up firmly
8. Fit O-ring 1 onto 3

H15.1500A57-2.98

KISTLER

Power LED



RX LED

TX LED

- PWM
- Analog
- SPI
- I2C
- Serial
- Arduino
- Power

can be used as analog

Every pin can be used as digital

Isabelle's notes August 15th, 2014

Force Link and In-Line Amp:

The nuts holding in the Force Link were personally made by Michelle, she documented their dimensions with her notes.

An explanation for the scale factor of Volt to pounds

Force Link sensitivity: 17.49 pC/lbf ← specified on calibration sheet from Kistler

In-line Amp: 1050 pC/5V ← ^{printed} on outside of amp

Math:

$$\frac{1 \text{ lbf}}{17.49 \text{ pC}} \cdot \frac{1050 \text{ pC}}{5 \text{ V}} = 12.01 \text{ pC/V}$$