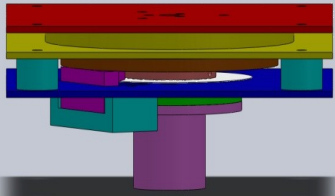


Spinner Assembly: Design Review



Not Shown:

- Micro DC Motor
- 15 Tooth Brass Gear 15mm PD
- Small Gear Mounting Collar
- Flexible Coupling



Payload Mounting Plate



Flexible Coupling



Attachment



Bearing Housing



Multi-Load Bearing



Hollow Shaft



65 Tooth Steel Gear 65mm



2500 Tick Encoder Disk



Insert



Spacers



Bus Cover Plate



Optical Encoder



Slip Ring Spacer



Encoder Mounting



Bracket



Slip Ring



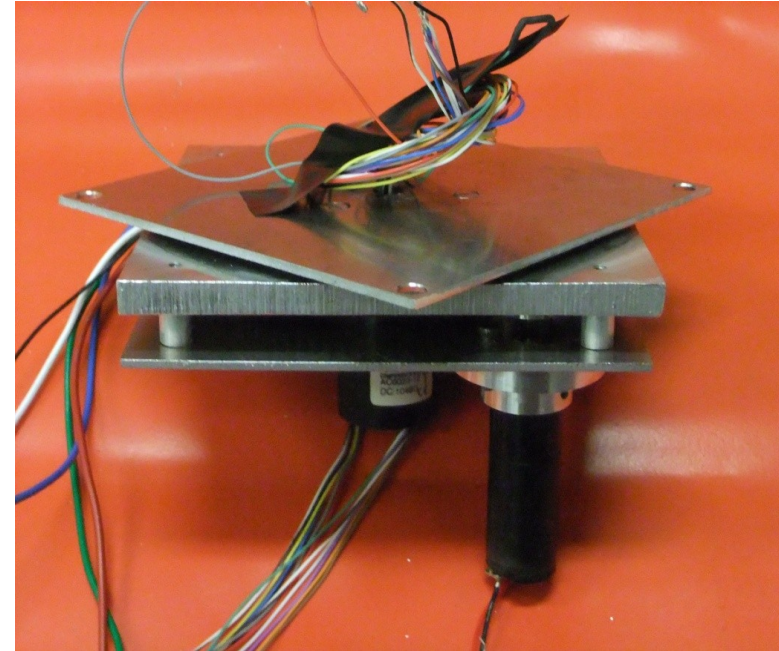
Specifications

Max Angular Velocity: 1.7
Hz

Motor Controller: Pololu
QiK TTL Interface

Slip Ring Channels: 12

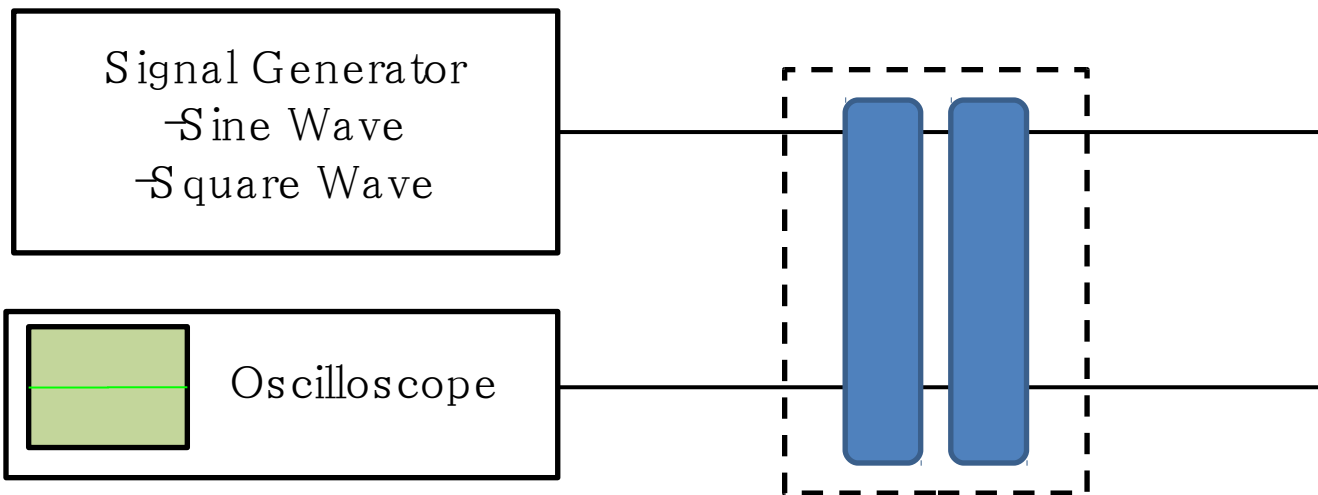
Dimensions (Interface
Space): 100mm x 100mm
x 18mm



Spinner Assembly:



Setup:



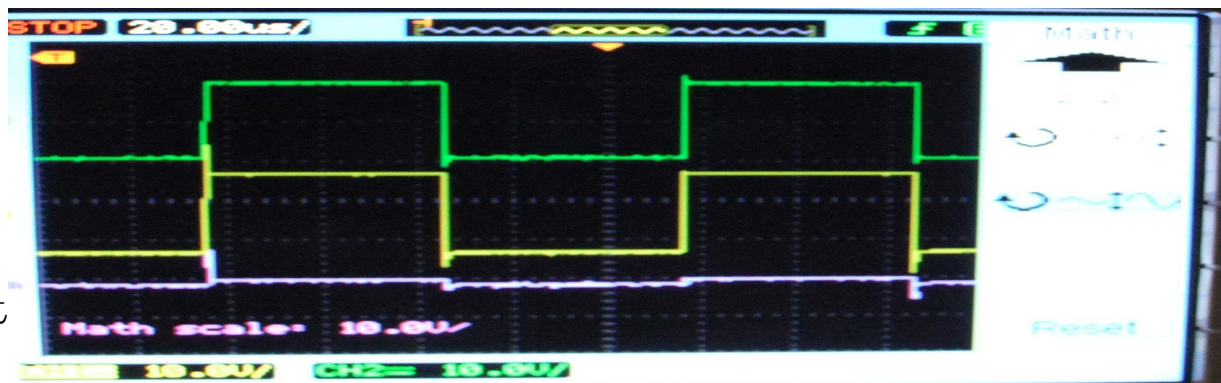
Testing

Spinner Assembly rotating at
1.7Hz

Sample Square Wave Output (10 Volts/div,
1kHz):

Transmitted
Signal

Input
Difference



Spinner Assembly: Qualitative Testing



Results:

Noticeable signal distortion appears at frequencies > 1 KHz

Significant signal distortion appears at signal frequencies > 1 MHz

Conclusion:

5 MHz Sine

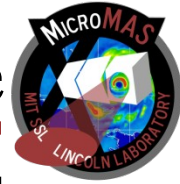
Wave serial
Transmitted Signal

Problem
Input

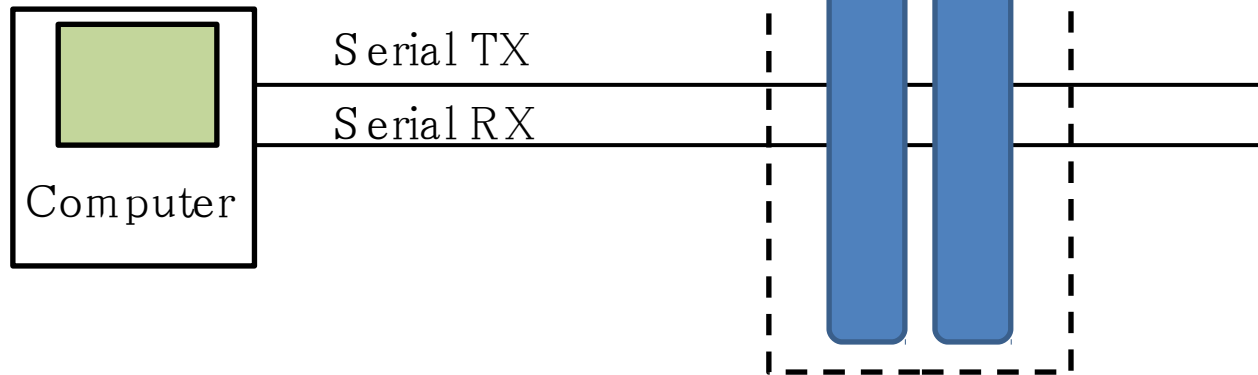
minima
Difference



Spinner Assembly: Quantitative



Setup:



Spinner Assembly rotating at 1.7
Hz

Results:

1,000,000 bytes sent; 0 errors

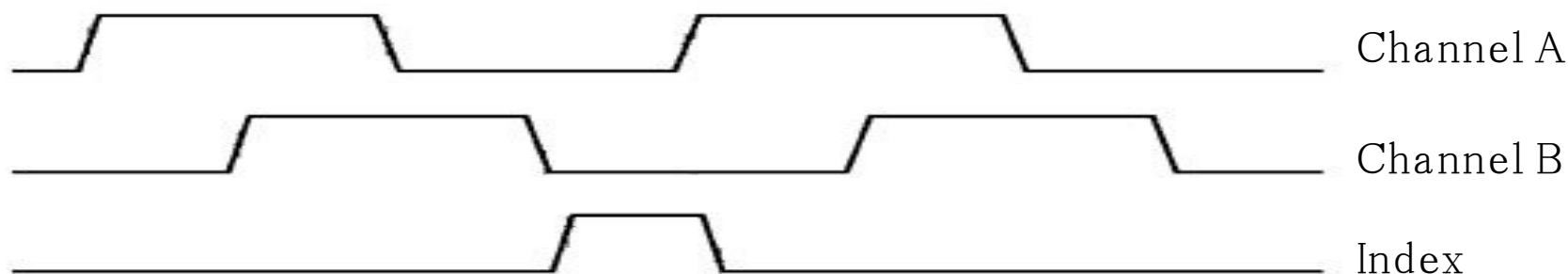
Error probability < 0.0000054 with 99%
confidence

Conclusion:

Slip ring interface is suitable for serial data

Testing
Relative roll angle between the bus and
payload is given by an optical encoder with 2
arc minute accuracy

US Digital Sample Timing Characteristics



Observed Timing Characteristics



Spinner Assembly redesign was successful

Meets volume, data transmission and pointing knowledge requirements

Next Step: Selection of Space Rated Components