User's Guide

TMAG5170 Orbital Attachment

ABSTRACT

This document serves to accompany the design files for the joystick attachment for the TMAG5170 EVM. These design files are provided as an example and may be used in a 3D printer to generate a demonstration of a simple joystick function using a three-dimensional Hall effect sensor.

Design files described in this document can be downloaded from Orbital Design Files.

Table of Contents

Trademarks

1 Introduction

This orbital joystick uses an N52 grade cylindrical magnet as a magnetic field source to demonstrate the ability of TMAG5170 to sense all three cartesian components of the magnetic field vector. The magnet is attached to a 4-40 nylon screw which allows the range to the sensor to be adjusted and serves as a handle for the user. The screw is attached to a slider which can move freely along a curved arm, and this arm is able to rotate 360 degrees about the base. This motion effectively allows freedom of movement following a spherical coordinate system. Monitoring the output of each X, Y, and Z axes allows for simple mapping to a 3D coordinate system. More details related to this operation can be found in *Measuring 3D Motion With Absolute Position Sensors* (SBAA512).

Nylon components were selected as they are non-magnetic and will not interfere with the magnetic field and bond well when glued.

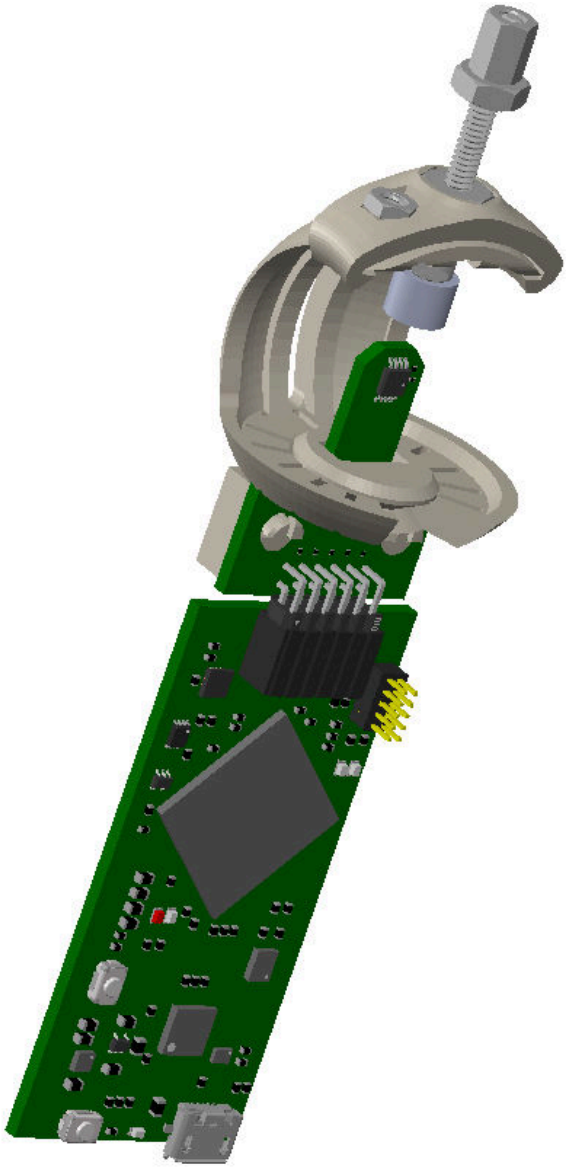

Figure 1-1. TMAG5170 Orbital Attachment

2 Assembly Guide

Item	Description	Quantity
Clip On Base	Base.STL	1
Orbital Arm	Arm.STL	1
Orbital Slider	Slider.STL	1
1/4" dia. x 3/16" thick Cylindrical magnet	NdFeB (N52): available at K&J Magnetics	1
1" 4-40 Hex Socket screw	Nylon screw: available at McMaster Carr	1
4-40 Hex Nut	Nylon Hex Nut: available at McMaster Carr	2
4-40 Stand off: 1/4"	Nylon Hex Standoff: available at McMaster Carr	1
8333-20G	Super Glue	0.02 oz
4-40 Stand off: 1/16"	Nylon Hex Standoff: available at McMaster Carr	1 (optional)
1/4" 4-40 screw	Nylon screw: available at McMaster Carr	1 (optional)

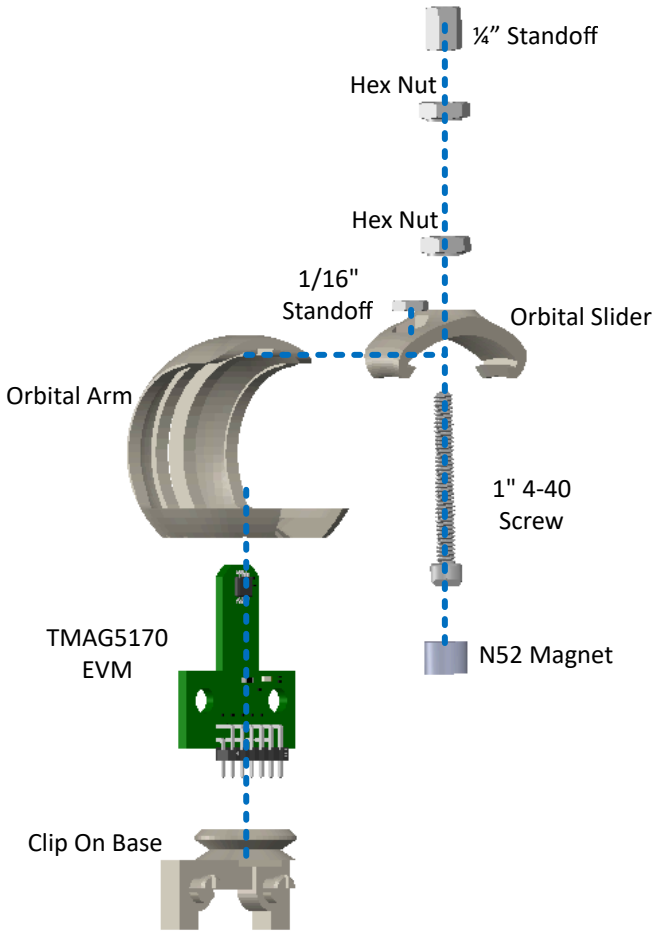

Figure 2-1. Exploded View

Step 1- Print the Orbital Slider (Slider.STL)

This is the printable slider for the orbital attachment. Notice the indented seat for the set screw nut and for an optional slider clamp screw.

Figure 2-2. Orbital Slider

Step 2 - Glue in the 4-40 Hex nut in the center set screw opening

Glue the Hex nut in the center opening shown below. Additionally, glue in the 1/16" 4-40 standoff in the off center clamp screw indentation if desired.

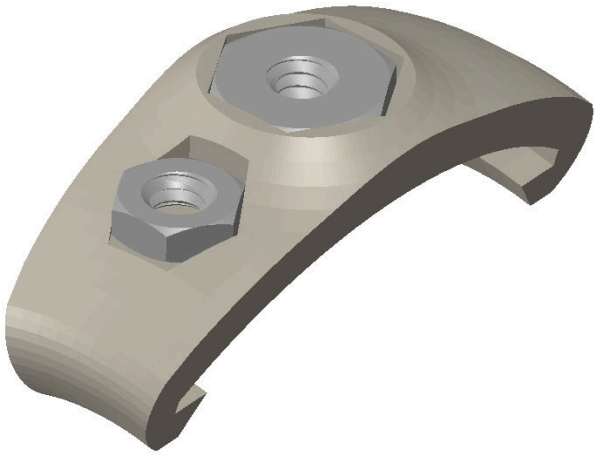

Figure 2-3. Orbital Slider Assembly

Step 3 - Print the Orbital Arm (Arm.STL)

This is the central fixture of the assembly. It will clip into the attachment base and serves as a guide for the slider assembly already printed.

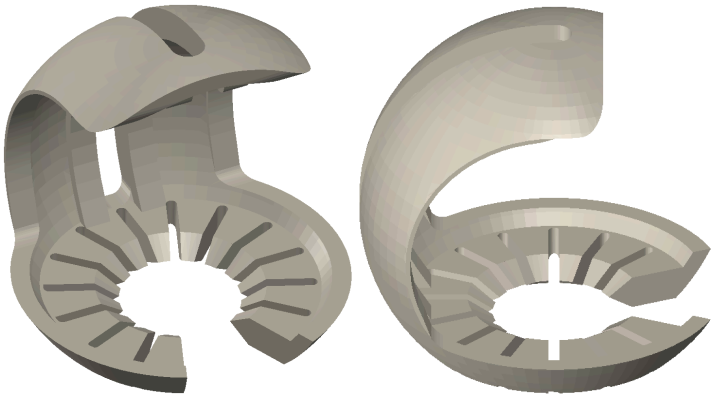

Figure 2-4. Orbital Arm

Step 4 - Guide the Orbital Slider onto the Orbital Arm

Figure 2-5 shows how the slider can easily slide onto the top of the arm.

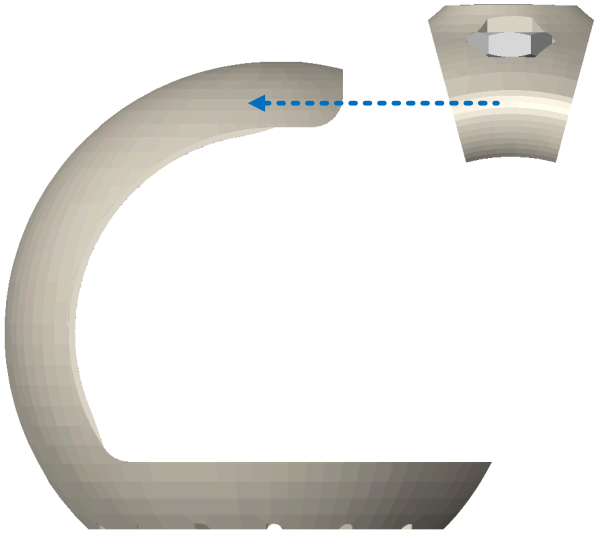

Figure 2-5. Connecting the Slider

Step 5 - Insert the set screw

Insert the set screw from the inside of the Orbital Arm. This will serve as both a handle and a control for the range of the magnet.

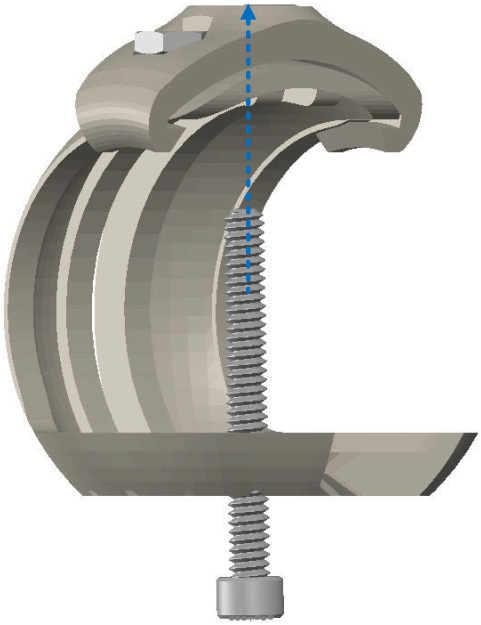

Figure 2-6. Set Screw Attachment

Figure 2-7 shows the how the set screw should appear at full extension.

Figure 2-7. Fully Extended Set Screw

Step 6 - Glue the magnet, remaining hex nut, and 1/4" standoff to set screw

With these items attached, the set screw will no longer be removable from the assembly and the slider will be permanently connected. With the magnet centered on the screw head, the pole of the magnet will be continuously directed towards the sensor location. If desired, it is possible to attach any reasonably sized magnet here, but take care to ensure a pole is directed towards the device. The magnet may be oriented with either pole facing the sensor, but it is necessary to be consistent when correlating position to the observed field.

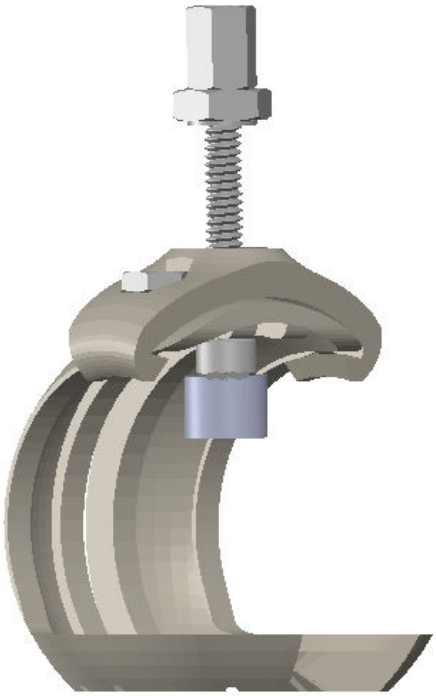

Figure 2-8. Magnet and Handle Assembly

Step 7 - Print the Clip on Base (Base.STL)

This printable piece will serve to connect the attachment to the EVM. The sensor platform will slide through the opening and then may clip onto the circular guides on the base.

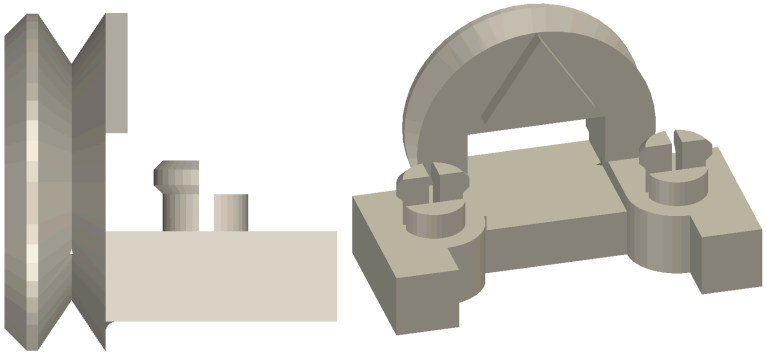

Figure 2-9. Clip On Base

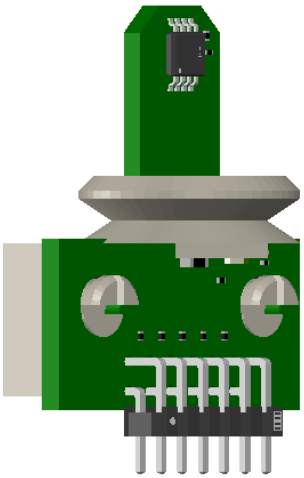

Figure 2-10. Clip With Attached EVM

Step 8 - Connect the Base to the Orbital Arm

This connection will complete the assembly of the attachment and allow the sensor to move at a fixed radius.

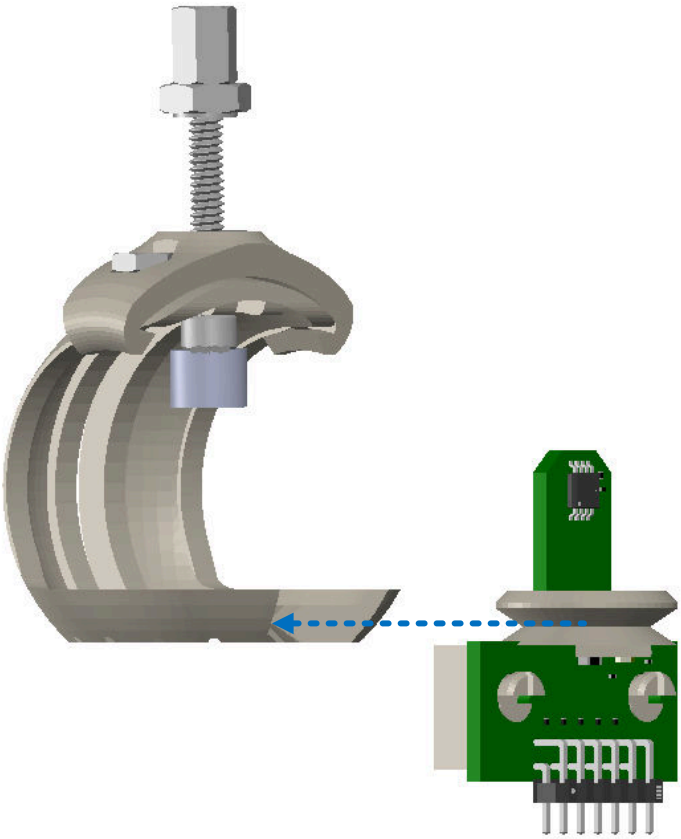

Figure 2-11. Clip Base Connection to Orbital Arm

3 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from Revision * (July 2021) to Revision A (July 2021)	Page
• Added links to the orbital design files	1

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