



**Purpose: EXRAY install onto vehicles with JAKES Disc Brake kit, EZGO short hub & Bad Boy Buggies Disc Brake Systems.**

**Date: REV-E, UPDATED 5-16-2013**

The Hydraulic Jakes Disc brake kits include spindles with a welded caliper bracket. The EXRAY 10MM speed sensor bolt mounting is different than other vehicles, with a simple set of brackets and one drilled hole.

**Section 1 – Jakes Disc Brakes (PG 1).**

**Section 2 – Bad Boy Buggies Disc Brakes (PG 7)**

**CAUTION:**

**When drilling into the caliper bracket assembly will require removing the wheel hub assembly.**



**Use caution when supporting the vehicle on jack stands and wear eye protection at all times.**

**After drilling the mounting hole ensure to properly clean the axle stub to prevent shavings from damaging the bearing assemblies.**

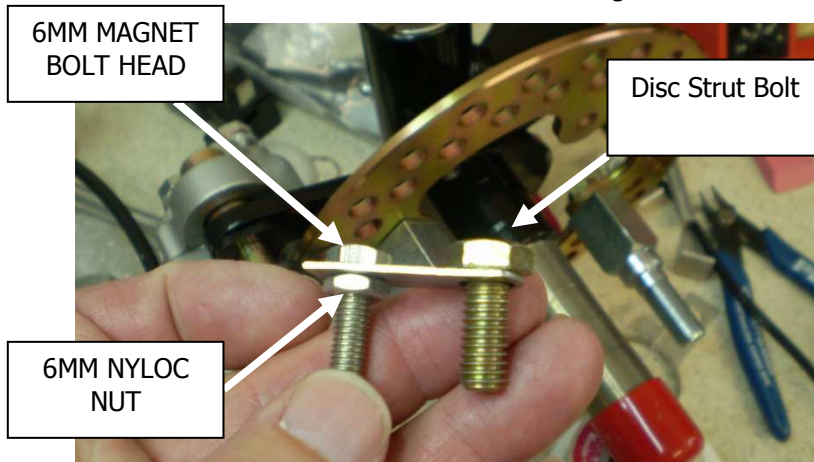
**SECTION 1: JAKES DISC BRAKES**

**Step ONE:**

- Jack the vehicle and place onto jack stands.
- Remove Wheel
- Remove the brake caliper and carefully hang out of the way with ZIP-cable ties, do not dangle from the braided hose!

**Step TWO:**

- Locate 6MM magnet bracket, install 6MM Magnet through small bracket hole without any jam nuts (Jam nut is included in case it is needed for spacing)
  - Use the M6 NYLOCK lock nut and the M6 MAGNET BOLT
  - Tighten 6MM BOLT and NUT to no more than 11ft lb.
- Remove 1-DISC ROTOR bolt and install magnet as shown



Note: The Wheel HUB is not shown for clarity of pictures.

Assume when installing the disc rotor, the caliper will have to be removed during this procedure.

**EXRAY onto JAKES & BB Buggies Disc Brake Installation Supplemental Instructions**

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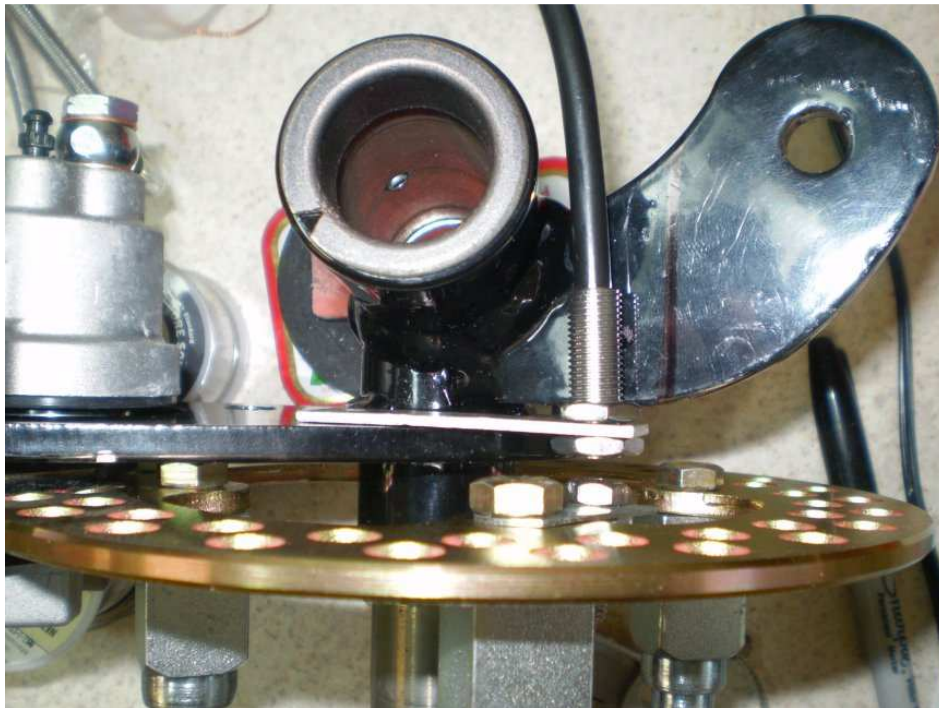
**Step THREE:**

- Locate 10MM Sensor bracket
- Mount 10MM Sensor onto bracket with threaded end barely protruding, loosely tighten nuts



**Step FOUR:**

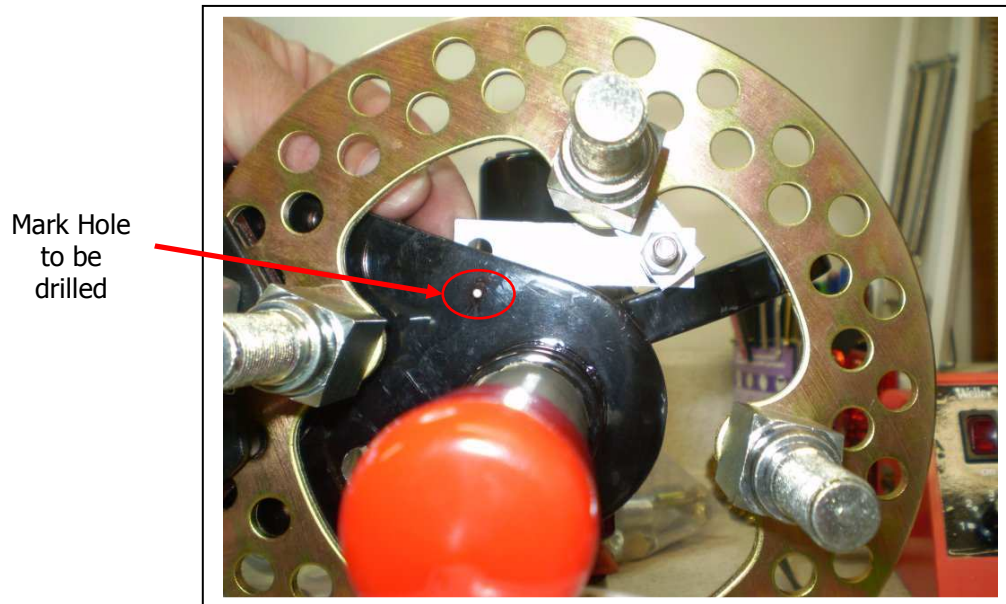
- Install the 6MM Magnet bracket onto the Disc Rotor as shown below at a slight angle inward "closer to the axle stub" and loosely tighten.
- Carefully lay the 10MM Sensor cable as shown and align the two ends.



## EXRAY onto JAKES & BB Buggies Disc Brake Installation Supplemental Instructions

### Step FOUR Continued:

- Align the bracket and magnet, use a light permanent marker to locate the hole as shown below. The Sensor should be loosely laying against the steering turn buckle arm as shown.



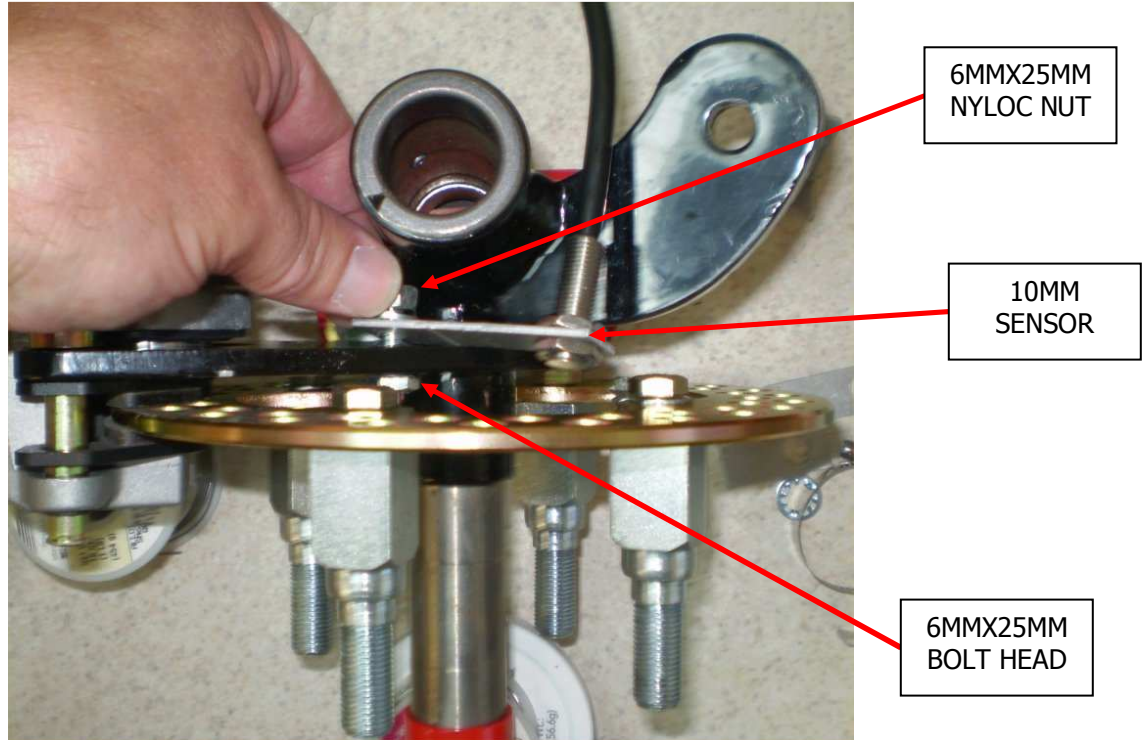
- Remove wheel hub and wrap axle stub with clean rag
- Drill a 6.5mm, 0.250" (1/4" hole) for the MET350-021 SENSOR 10MM bracket mounting bolt. Use caution to not damage the spindle shaft or threads. (The drill chuck will be close to the shaft).
  - NOTE: The picture shows the Jakes sidle assembly removed from the vehicle for clarity of photo's, the hole can be drilled with the assembly on the vehicle.



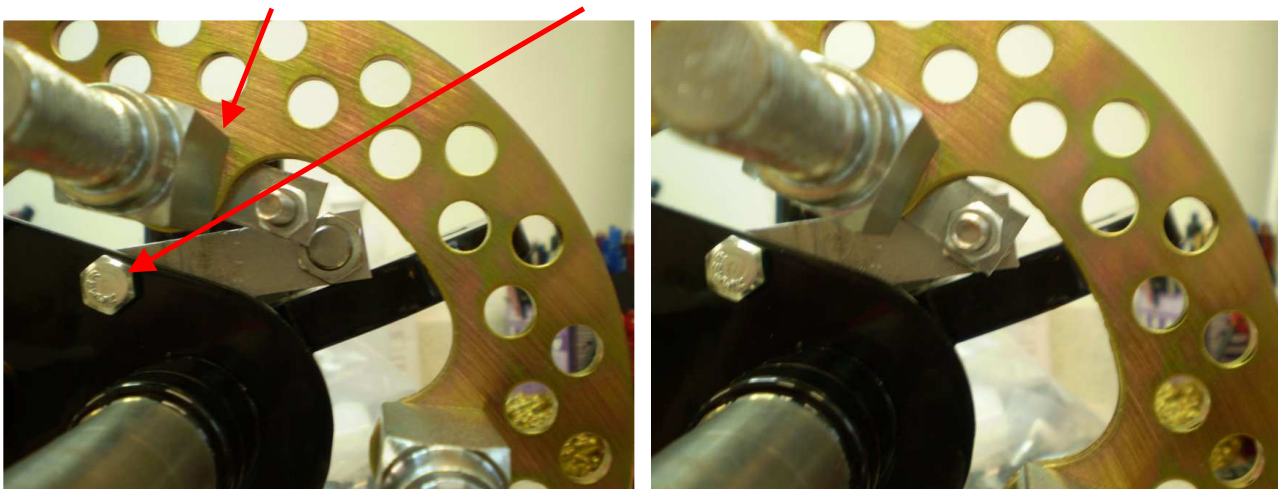
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**Step FIVE:**

- Install the MET350-021, Sensor M10 cable bracket using M6x1x25mm (basically a 1/4-20x1" bolt) with the threads facing towards the steering knuckle (AWAY from the disc rotor).
- Use HDW110-002 FLAT WASHER and HDW200-011 M6x1 NYLOCK nut.
- Loosely tighten bolt so it can be adjusted.



- Align the 2 brackets (10MM Sensor and 6MM Magnet) as shown below, rotate the hub to ensure they align:
- Tighten DISC ROTOR BOLT and the SENSOR BRACKET BOLT (Leave the 10MM sensor for next step).

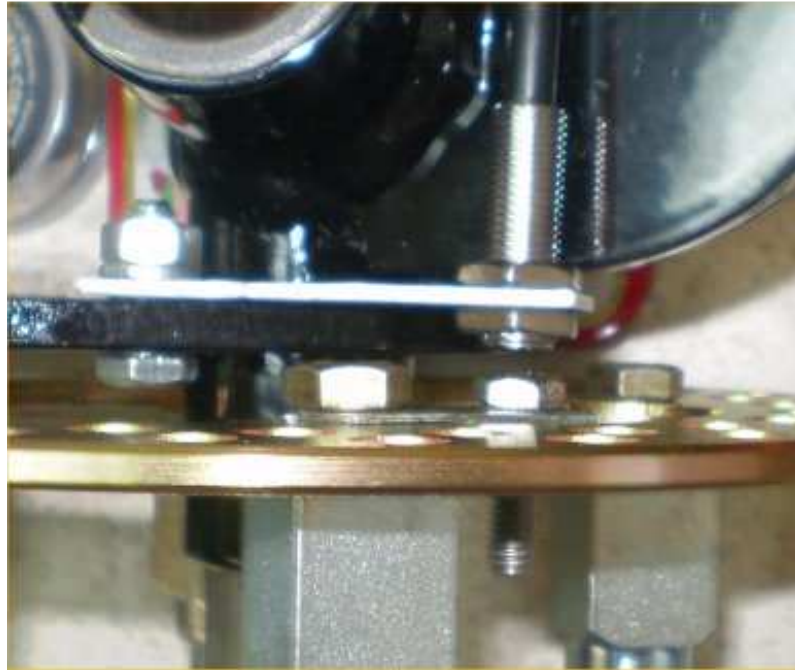


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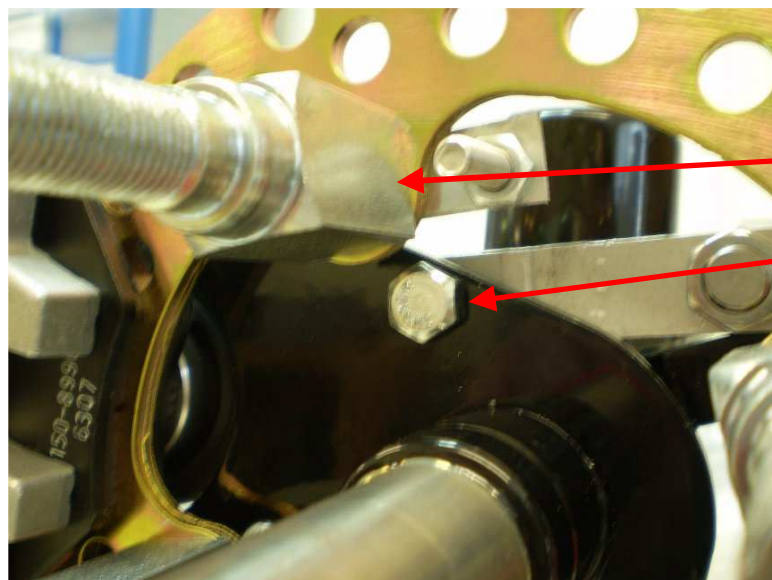
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**Step SIX:**

- Align the 10MM Sensor gap with one sideways cable tie which is about 0.250" gap (6mm gap).
- SLOWLY rotate the wheel and ensure the sensor and bolts do not collide or interfere that can damage the sensor.
- Tighten the 10MM SENSOR nuts. DO NOT OVER TIGHTEN!



- Check the 10MM Sensor bracket mounting bolt will not impact the DISC ROTOR bolt as shown it safely passes below the bolt head.



DISC ROTOR BOLT

10MM Bracket Bolt

**Step SEVEN:**

- Re-grease the wheel stub and bearings and install per manufacture specifications.
- **Zip tie the sensor cable to ensure no pinch points, slowly rotate the steering wheel LOCK LEFT to full LOCK RIGHT and verify the cable it not stretched or pinched.**
  - **This is crucial step before driving the vehicle!**
- Re-install the brake caliper assembly and torque mounting bolts per manufacturer specifications.
- Install the wheel and tighten wheel nuts to manufacturer specifications.
- Check brake operation after the vehicle is drivable.
- Ensure speed sensor cable does not rub tire at steering wheel full lock to lock positions.

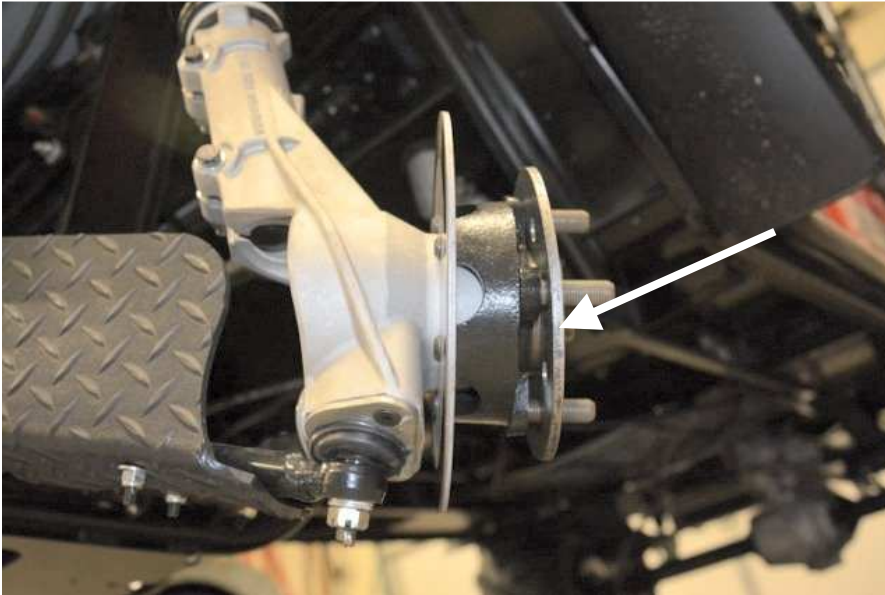
**WARNING: IMPROPER INSTALLATION OF THE CABLE CAN CAUSE STEERING ISSUES AND SAFETY HAZARDS.**



## **SECTION 2: BAD BOY BUGGIES 2 & 4 Wheel Drive DISC BRAKES**

### **Step ONE:**

- Jack the vehicle and place onto jack stands.
- Remove Wheel
- Remove the spacer plate as shown to allow a drill bit to drill the disc rotor:



**Bad Boy Buggies  
photos Courtesy of:  
Customer**

### **Step TWO:**

- Locate 10MM Sensor bracket
- Mount 10MM Sensor onto bracket with threaded end barely protruding, loosely tightly nuts

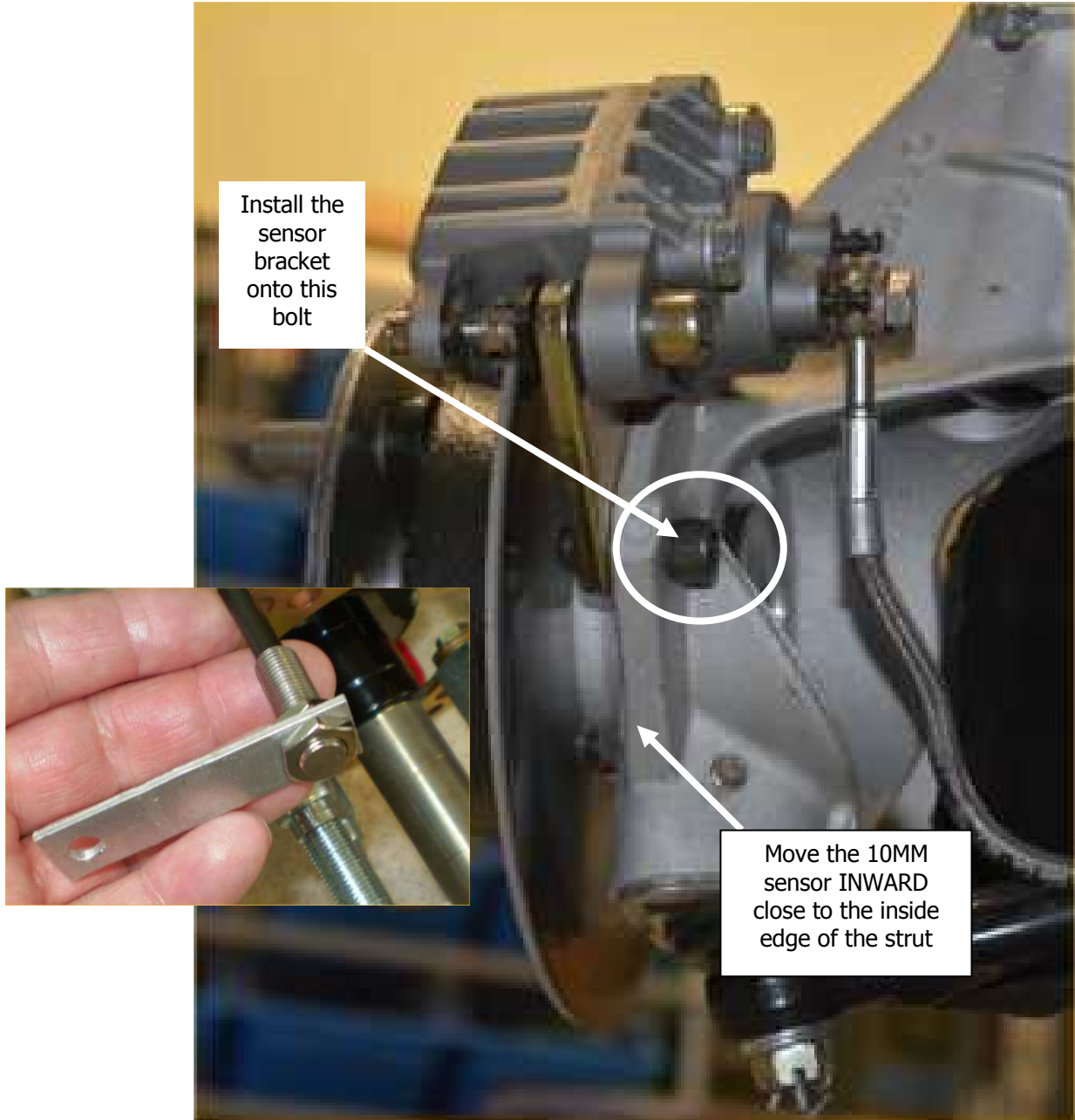


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**Step THREE:**

- The Sensor should be loosely laying against the steering turn buckle arm as shown.



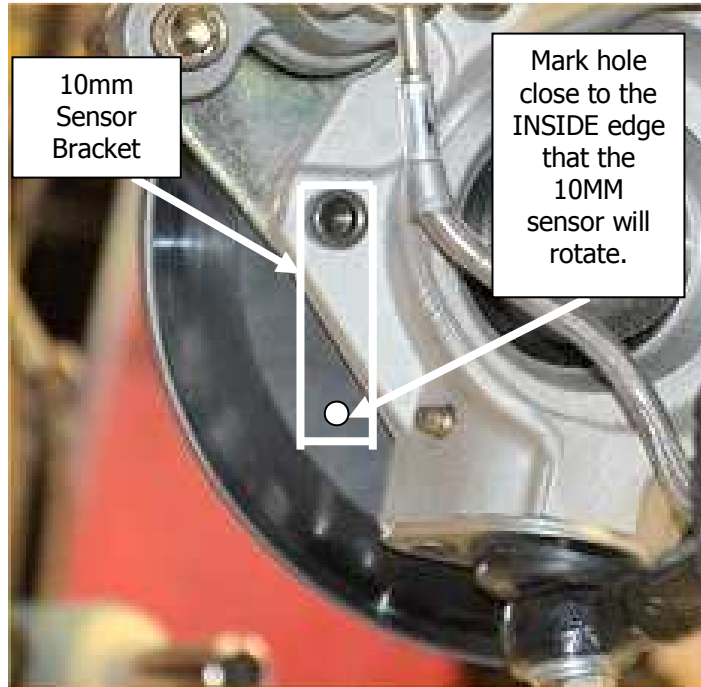


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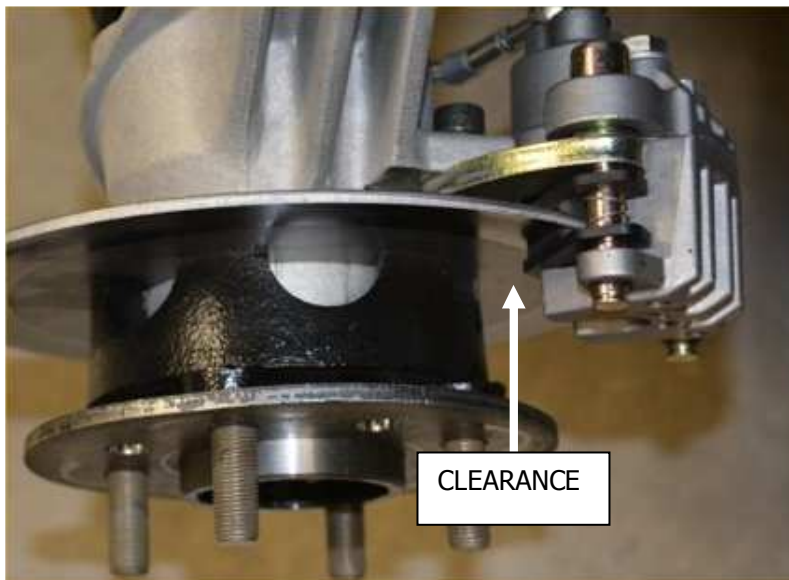
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**Step FOUR:**

- Mark and drill the disc rotor using a 6.5mm, 0.250" drill bit (1/4" hole) for the 6MM Magnet bolt. Use caution to not damage the speed sensor or wheel studs.
- **The hole MUST BE INSIDE of the smooth area not contact caliper or disc pads!**



- Locate and install 6MM Magnet through small drilled hole without any jam nuts (Jam nut is included in case it is needed for spacing but NOT used in this application!)
  - Use the **M6 NYLOCK lock nut** and the M6 MAGNET BOLT
  - Tighten 6MM BOLT and NUT to **no more than 11ft lb.**
- **Rotate the spindle and ensure the magnet will not contact the CALIPER or BRAKE DISC PAD!**



**Step FIVE:**

- **Align the 10MM Sensor gap with one sideways cable tie which is about 0.250" gap (6mm gap).**
- SLOWLY rotate the wheel and check the sensor & mag bolt does not interfere with any component.
- Tighten the 10MM SENSOR nuts. DO NOT OVER TIGHTEN!
- **Zip tie the sensor cable to ensure no pinch points, slowly rotate the steering wheel LOCK LEFT to full LOCK RIGHT and verify the cable it not stretched or pinched.**
  - **This is crucial step before driving the vehicle!**
- Install the SPACER PLATE on the wheel hub.
- Install the wheel and tighten wheel nuts to manufacturer specifications.
- Check brake operation after the vehicle is drivable.
- Ensure speed sensor cable does not rub tire at steering wheel full lock to lock positions.

**WARNING: IMPROPER INSTALLATION OF THE CABLE CAN CAUSE STEERING ISSUES AND SAFETY HAZARDS.**



**Step SIX:**

**The EXRAY is ONLY RATED FOR 48V (60V MAX).** If your BAD BOY BUGGIE is a 64 or 72Volt version, connect the EXRAY to the BOTTOM 48V part of the battery pack (Start from the BATTERY MINUS side of the pack). It was not designed to read 72Volt systems, but can provide information when you battery pack is weak or discharged. 48V battery readings (assuming it's a 72V battery pack reading only 4 batteries):

- Full charge = 54.6V
- Driving, fresh batteries = 45V
- Battery Low = 42V
- Battery Dead = <40V

So for 6 batteries (72V system) with dead battery reads 60VDC (10V / battery) – the EXRAY actually reads 40VDC.

If there are any questions, please contact me (Author: Tony Thorne) through email: [tony@edt-exray.com](mailto:tony@edt-exray.com)

Thank you for your business and hope you enjoy your EXRAY.

Tony Thorne  
EDT LLC