



Toolkit Doc19 Upper Arm MCB
May 11, 2011

General Safety Instructions

- Always wear an ESD wrist strap when reaching into the robot.
- Do not drop any screws into the robot. Any lost screws may cause the robot to malfunction. If you drop any screws into the robot, do not turn on the robot until you have contacted Willow Garage Support.
- When removing screws, save screws by type. You will need screws that you have removed when replacing the components.
- Use extreme caution when removing any cables. All cables are very difficult to repair or replace if broken.
- Do not attempt to fix any electrical problems that are not specified in this document. Contact Willow Garage Support before attempting to service your PR2.
- If you have any questions about using this document, contact Willow Garage Support before proceeding.

Pre-Start Checklist

- Before starting to remove and replace a PR2 upper arm MCB make sure you have completed these steps:
- Review instructions for “Robot Overview, Torque Tools, Loctite” and “Setting Torque Driver”.
- Unplug robot from wall electrical power.
- Power down robot and turn off DC breaker (red rocker switch on rear panel)

Required Tools and Materials:

- PR2 Tool Kit and PR2 Accessory Kit



Upper Arm Cover Removal

Remove Upper Arm **Outer** Cover – 2545.
It is strongly retained with Velcro. Peel the
Cover off starting from the top edge.

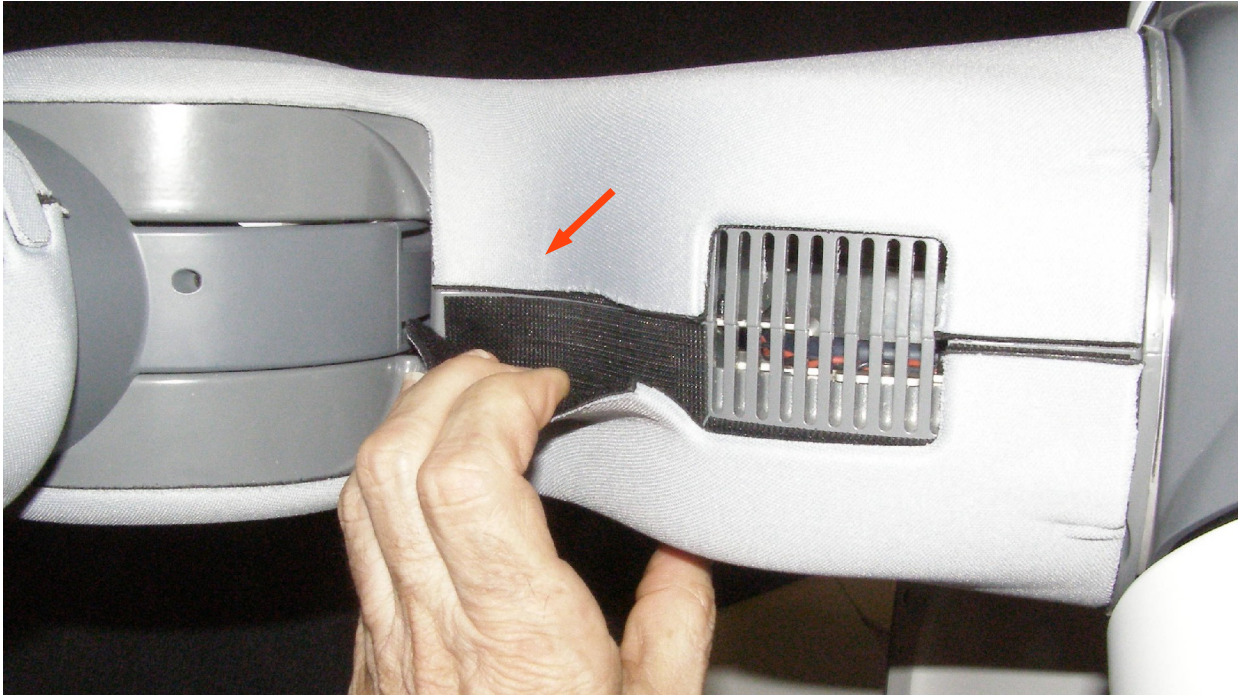


Fig 1

Upper Arm MCB Removal

Using the 2.5mm bit with the T-handle driver, remove the 2 MCB Sled screws. 2009-06 (Fig 2)

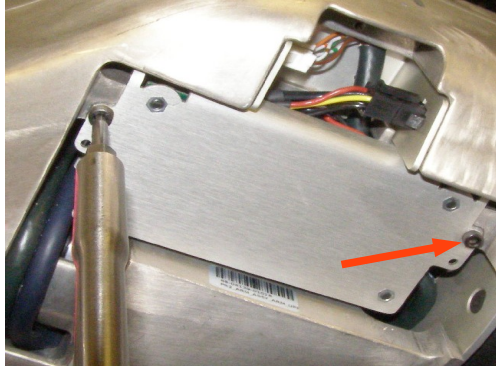


Fig 2

Pivot the MCB Sled - 4286 out (Fig 3)

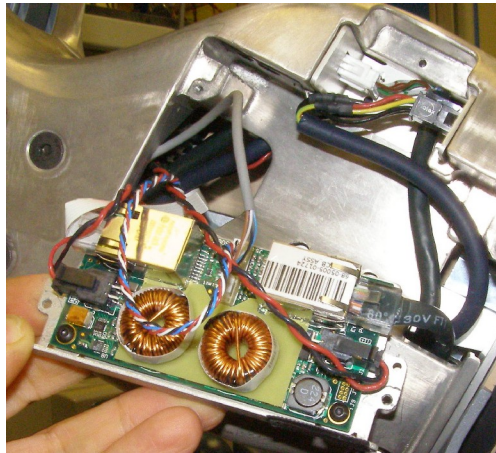


Fig 3

Upper Arm MCB Removal

Disconnect the 6 cables as shown. (Fig 4,5)

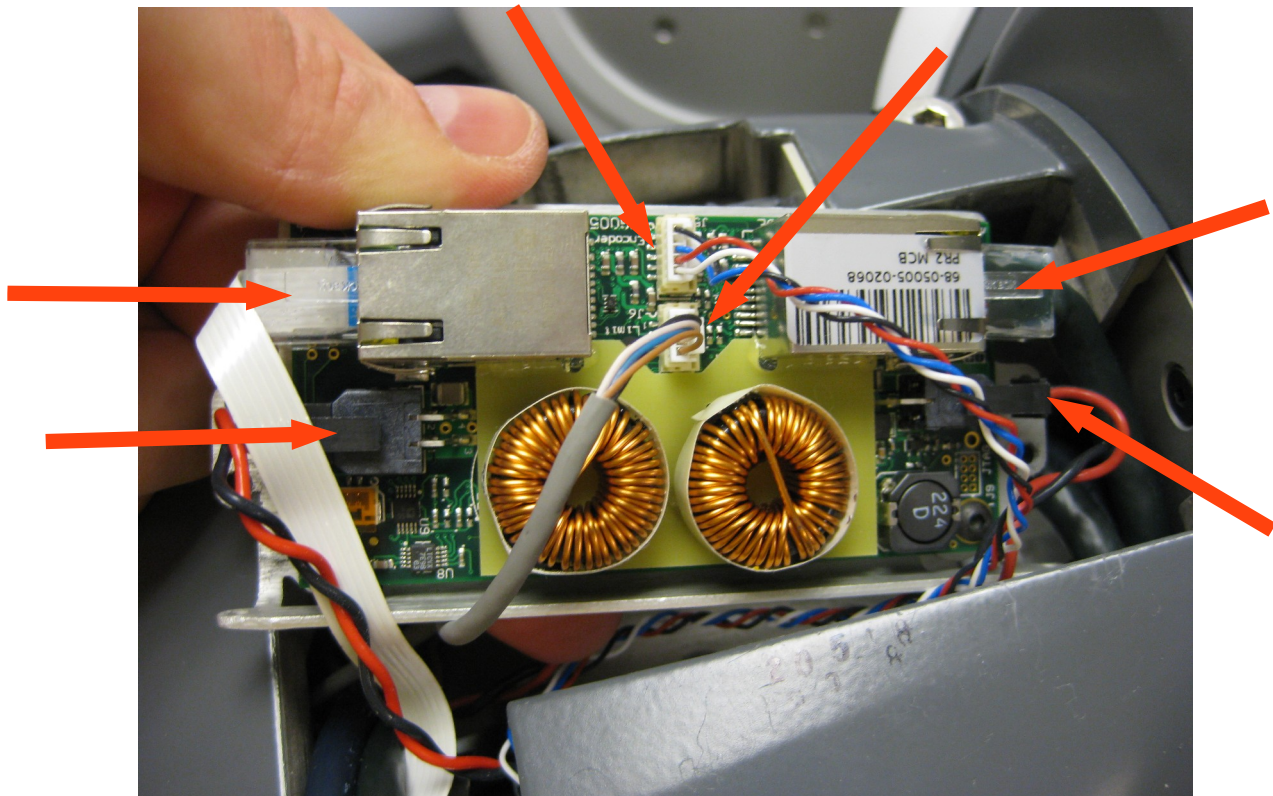


Fig 4

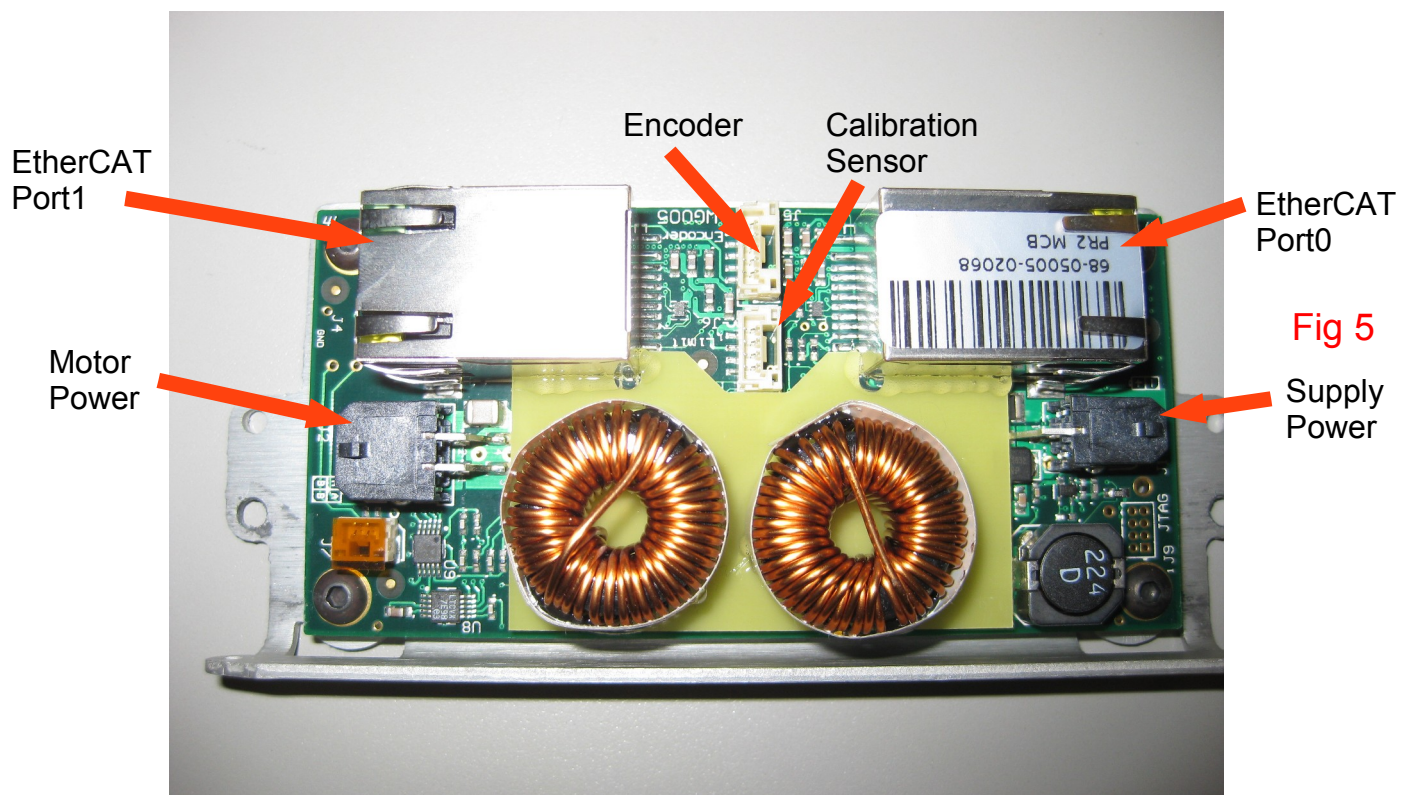


Fig 5

Upper Arm MCB Install

Plug in small both JST GH cables first (Fig 6,7)

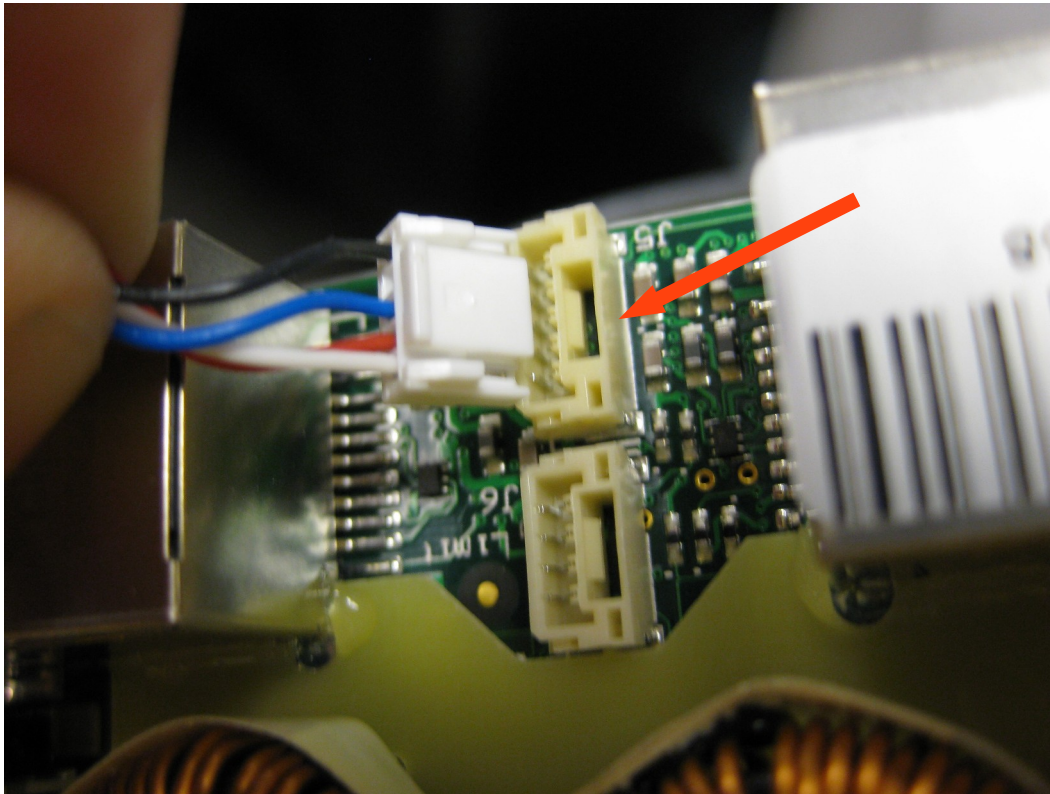


Fig 6

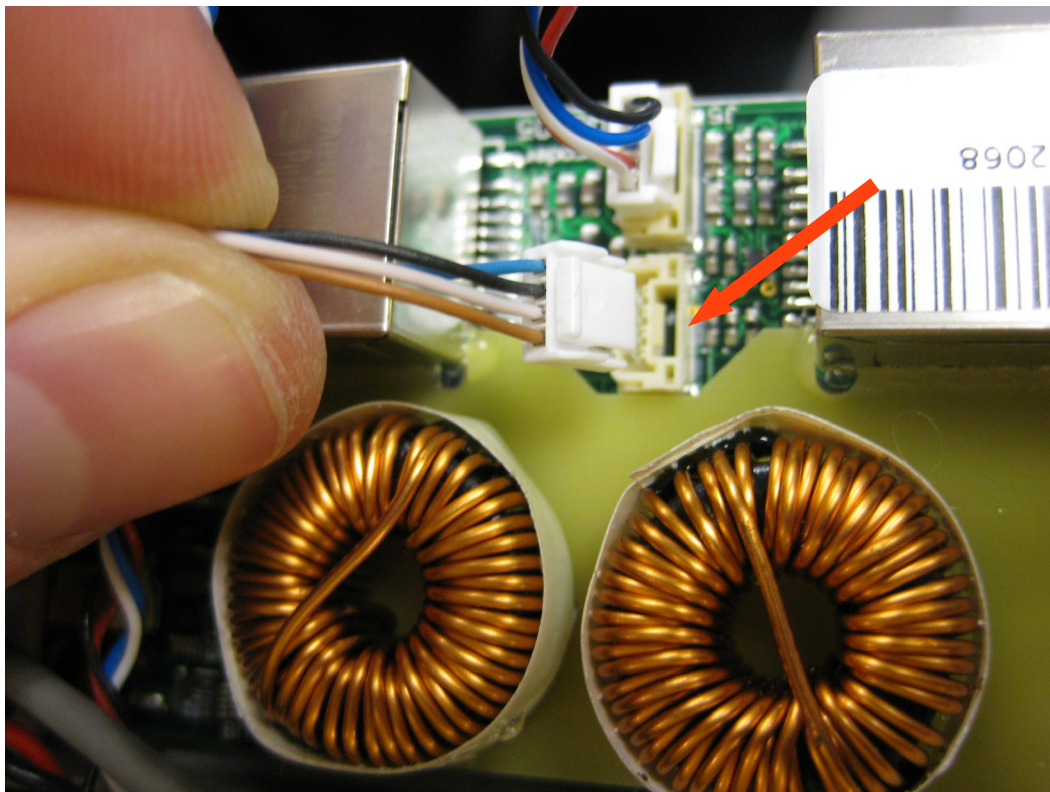
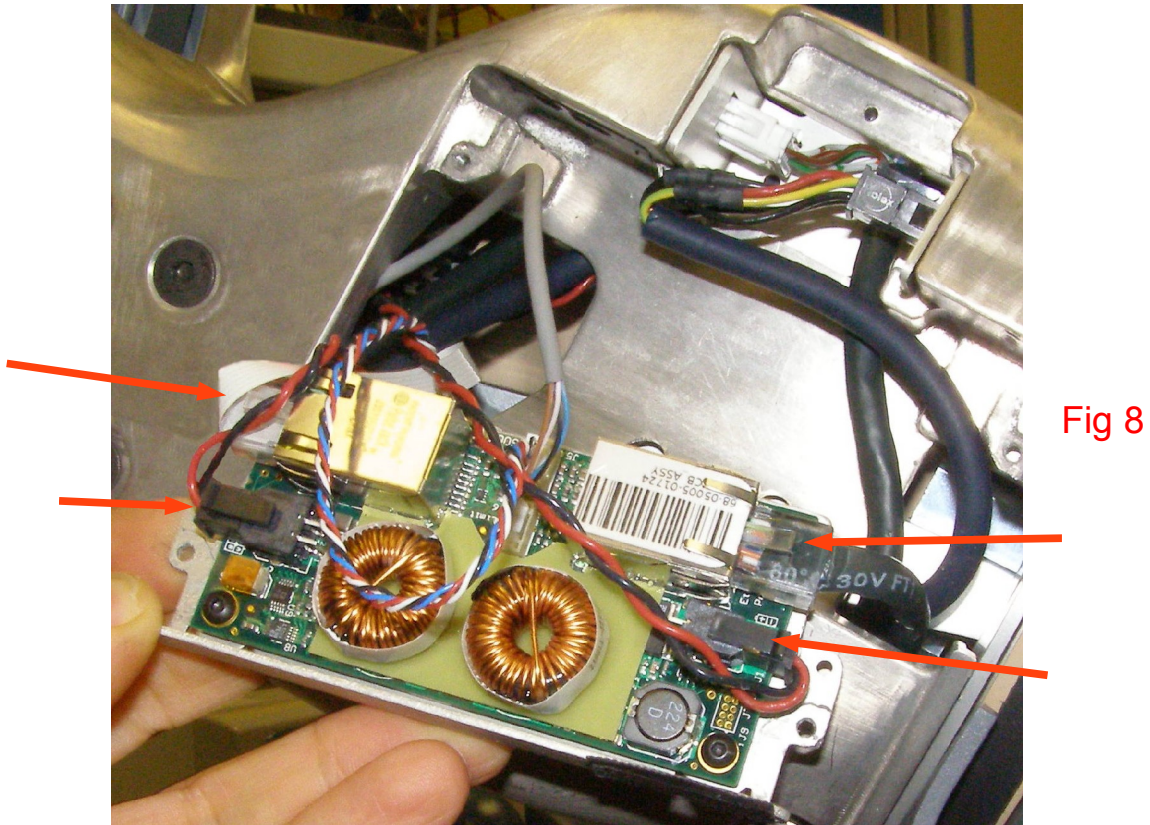


Fig 7

Upper Arm MCB Install

Plug in the 4 remaining cables. (Fig 8)



Pivot the MCB Sled into place being careful not to damage or pinch any of the cables. Using Loctite 248, install the 2 screws and torque to 1.36Nm using the Large torque driver.

Post Install verification

After installing new MCB. Power on the PR2 and then run:

```
sudo pr2-systemcheck
```

If the “check_ethercat.sh” script displays an error, then you may not have properly connected the EtherCAT ports. Also check MCB power connection.

Next, start robot with

```
sudo robot start
```

If motor halts when calibrating pr2_dashboard and look at motor diagnostics.

If “**EtherCAT Device (r_elbow_flex_motor)**” is reporting *"Problem with the MCB, motor, encoder, or actuator model."* Then encoder, or motor connection may not be plugged in.