

Solderless Robot Kit Assembly

MRK-2 Electronics with MRK-1 3D parts

Step 1 - Bolt together the battery compartment, chassis, and circuit board.

Pick up the two white, nylon bolts and push them through the holes in the bottom of the battery compartment. Next hold the bolts in place by putting two fingers into the battery box and on top of the heads of the bolts. Now slide the bolts through the two holes on the chassis (see Figure B.2 A). Last slide the bolts through the two holes of the circuit board (see Figure B.2 B) and attach the nuts (Figure B.2 C). The board should feel slightly pinched as it slides past the two wheel mounts on the chassis. If you can't get the board past the wheel mounts, take off the battery box, pick up the chassis and while pressing the board into place flex it slightly from side to side to cause the sides to bow away from the board. After tightening the nuts as much as possible by hand, try to tighten them a little more with a screwdriver. **To avoid damaging the circuit board, do not use metal tools against the circuit board. Instead hold the nut tightly with your fingers and tighten it with a screwdriver.**

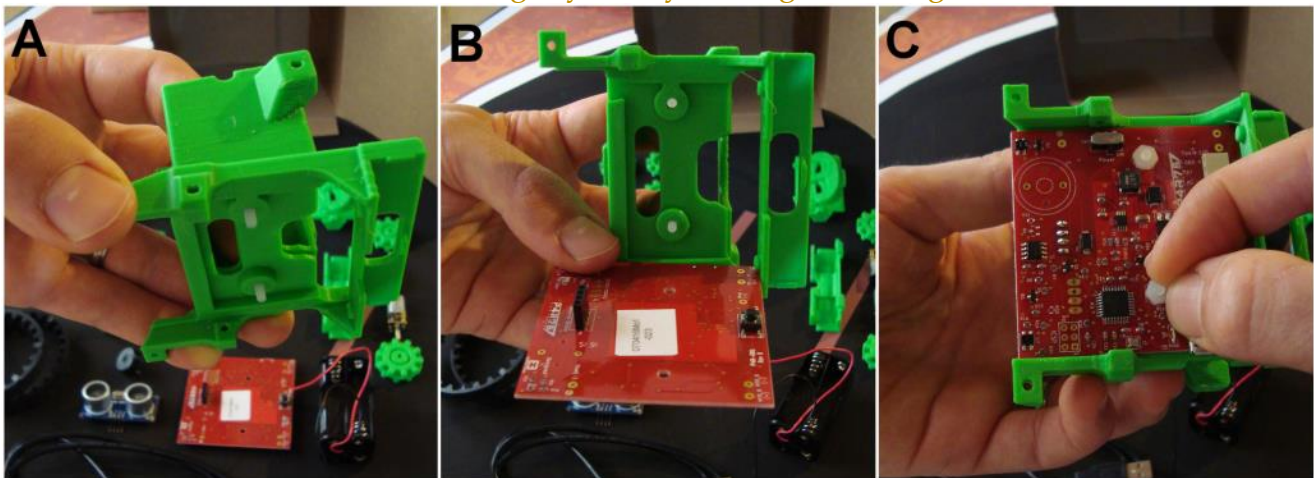


Figure B.2 - Bolting the battery compartment, chassis, and circuit board together.

Step 2 - Install the battery holder.

Run the wires from the battery holder through the battery box and out the hole in the battery box as shown in Figure B.3 A (blue arrow)

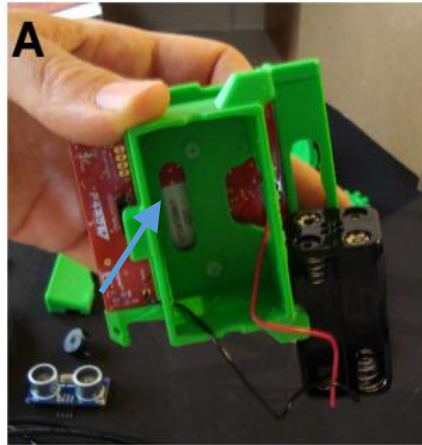


Figure B.3 - Installation of the battery holder in the battery box

The battery connector attaches to the robot's left most connector which is labeled Vbat.

Step 3 – Installing the motors

Snapping the motor cover over the motors may be the trickiest part of assembling an MRK-1. Attempts to force the motor cover in place can result in broken parts; however, when properly positioned the cover can be gently snapped into place. First, with the robot upside down as shown in Figure B.6, place the motors on the back ledge as shown in A. The motors need to rest against the small tabs on the chassis (see white arrows in A). Be sure to place the edge of the motor cover into place first so that it can lock over the circular protrusions and indentions. Then begin attempting to close the cover over the motors (see B) and if needed pull the motors in the direction shown by the blue arrows. The clips on the motor cover should lock over the back edge of the chassis without using excessive force (see C).

It is **very important** that the wires from the motor on the right side (the side closest to us in Figure B.6 A) of the robot connect into the connector on the right side of the board and do not get crossed over to the other side of the board.

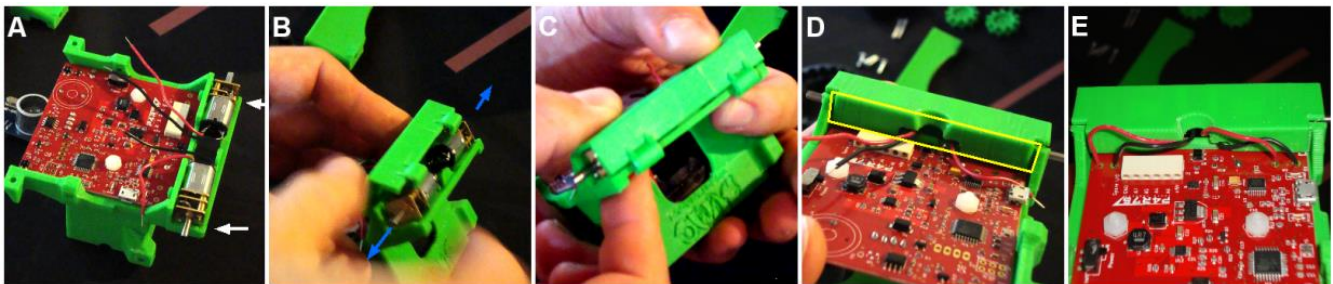


Figure B.6 - Gently snapping the motor cover into place and attaching the motor wires.

Please note that your wires need to come out on top of the robot and not on the bottom as shown.

Step 4 – Attaching the Scoop and Wheels

To attach the scoop, slide it on the front of the chassis and put the long ($7/8''$) 4-40 machine screws through the top hole of the scoop. Press them down through the hole in the chassis (see Figure B.7 A). Then tighten the screws with a Philips screwdriver until their heads touch the scoop.

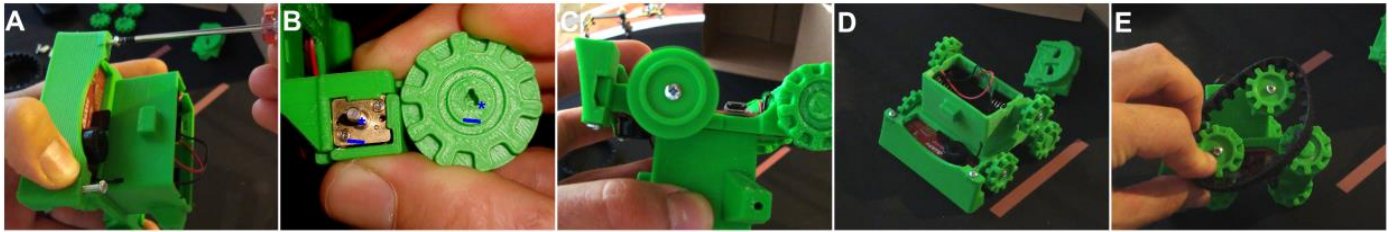


Figure B.7 – Attaching the scoop and wheels

The motor wheels are attached by lining up the flat side of the motor shaft with the flat side of the wheel. In Figure B.7 B, both are marked with a blue asterisk to their right and a blue line about 2mm directly below the flat side. When lined up correctly, these wheels slide onto the motor shaft until they are about 1.5 mm away from touching the chassis and motor cover. Note if the motor wheels are loose and wobbly, they can be secured by applying a single, small droplet of Gorilla glue into the hole of the wheel and clamping the wheel in place with a rubber band or some weight overnight.

The other wheels are bolted on with the $1/2''$ long 4-40 machine screws. Tighten the screws until the wheel no longer spins freely, then back the screw out until the wheel spins freely after being flicked (see Figure B.7 C). Repeat until all 4 of these wheels are properly attached (D). Then pull the rubber tracks over the wheels (E).

If the $1/2''$ machine screws do not slide freely through the wheel, then the hole in the wheel is too tight. Using a $7/64''$ drill bit and your hand or a drill, enlarge the holes in any tight wheels (see Figure B.8) until the machine screw slides through freely and the wheel can spin freely on the screw.

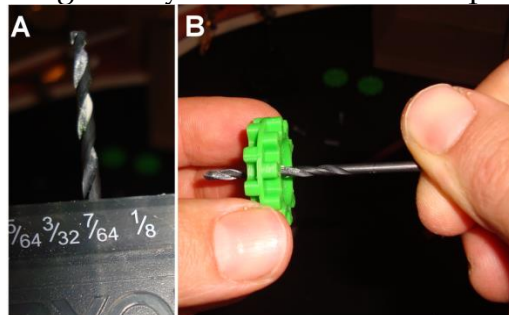


Figure B.8 – Drilling out the hole in a wheel

Step 8 – Guarding fingers and circuits.

The finger guard will protect you from accidentally touching the voltage regulation components which may get hot during competition. It will also protect the robot from your fingers preventing damage from static and debris.

Figure B.9 shows the steps for installing the finger guard. First add an extra nut to each nylon screw (A) so that there will be room for airflow to dissipate heat from your hard working robot. Next if there is a protective film, remove it from both sides of the clear plastic guard (B). Then secure the finger guard in place with more nylon nuts. Tighten them so they can't fall off during competition. Since the finger guard will protect the circuitry, pliers can be used (C). You may have to hold the head of the screw with a screwdriver so that it doesn't spin when you try to tighten the nut (D).



Figure B.9 – Attaching the finger guard