

# ORTOP Modular Robot v3.0

## Chassis Assembly

### Idler Wheel Assembly

Build two wheel assemblies, one for each side of the robot.

**Parts Needed:**  
**Chassis Assembly**  
**BAG 1**

- 2 – Axle Hub with set screws
- 2 – Axles
- 8 – Socket Head Cap screws, 1/2"
- 2 – 3" wheels

**NOTE:** Parts for only one assembly shown; two must be built.



### Assembly



1. Slide the axle hub onto the axle as shown at left.
2. Tighten the set screw to the flat side of the axle. (See photo to the left.)



This is the completed axle assembly.

**NOTE:** make a second axle assembly for the other wheel.

**Parts Needed:**

2 – axle assemblies plus wheels and screws.



**Assembly**



3. Slip the wheel over the axle assembly.

4. Insert and tighten the four cap screws into the axle hub.

**Note:** Be careful not to over tighten the screws or you will damage the wheel.

**NOTE:** make a second wheel assembly for the other side.

Set aside the two idler wheel assemblies for use later in the Chassis Frame Assembly.

# Drive Motor Assembly

Build two of these, one for each side of the robot.

## Parts Needed:

### Chassis Assembly BAG 2

- 8 – Socket Head Cap Screw, 1/2"
- 2 – 40 Tooth Gears
- 2 – Motor Hubs w/ Set Screw
- 2 – DC Drive Motors

**NOTE:** Parts for only one motor assembly shown; two must be built.



## Assembly



1. Insert the gear on to the motor hub with the flange on the hub facing into the gear.



2. Attach with 4 cap screws.

**NOTE:** the screw heads are on the gear side.



3. Slide the gear assembly onto the motor shaft about 1/8" from the motor bushing.
  4. Tighten the motor hub set screw onto the **flat part** of the shaft.
- Make a second motor assembly for the other side.

## Drive Wheel Assembly

Build two of these, one for each side of the robot.

### Parts Needed:

- 8 – Socket Head Cap Screw, 1-1/4"
- 2 – 3" Wheels
- 2 – Gear Hub Spacers
- 2 – 80 Tooth Gears
- 2 – Axle Hub with set screws
- 2 – Axles

**NOTE:** Parts for only one wheel shown; two must be built.



### Assembly



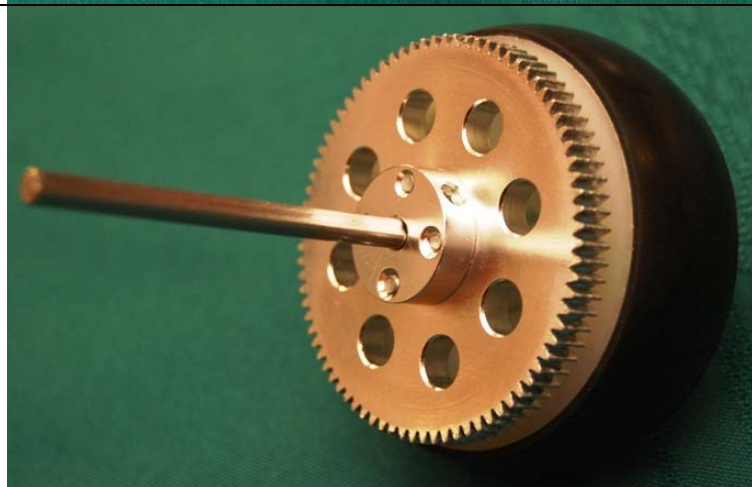
1. Slide the axle hub over the axle as shown. The axle hub should be about 1-1/4" from the end of the shaft, with the extended lip of the axle hub facing outward towards the short end of the axle.
2. Tighten the set screw to the **flat side** of the axle.



3. Insert the 4 screws through the mounting holes on the wheel.
4. Slide the gear hub spacer over the screws.



5. Slide the 80-tooth gear over the screws.



6. Slide the wheel assembly on the axle assembly.
  7. Tighten the 4 screws.
- Note: Be careful not to over-tighten the screws. Notice that the screws do not extend beyond the back side of the axle hub. Over tightening can damage the wheel.**

Set aside the two Drive Wheel Assemblies for use later in Chassis Frame Assembly.

# Chassis Frame Assembly

## Parts Needed:

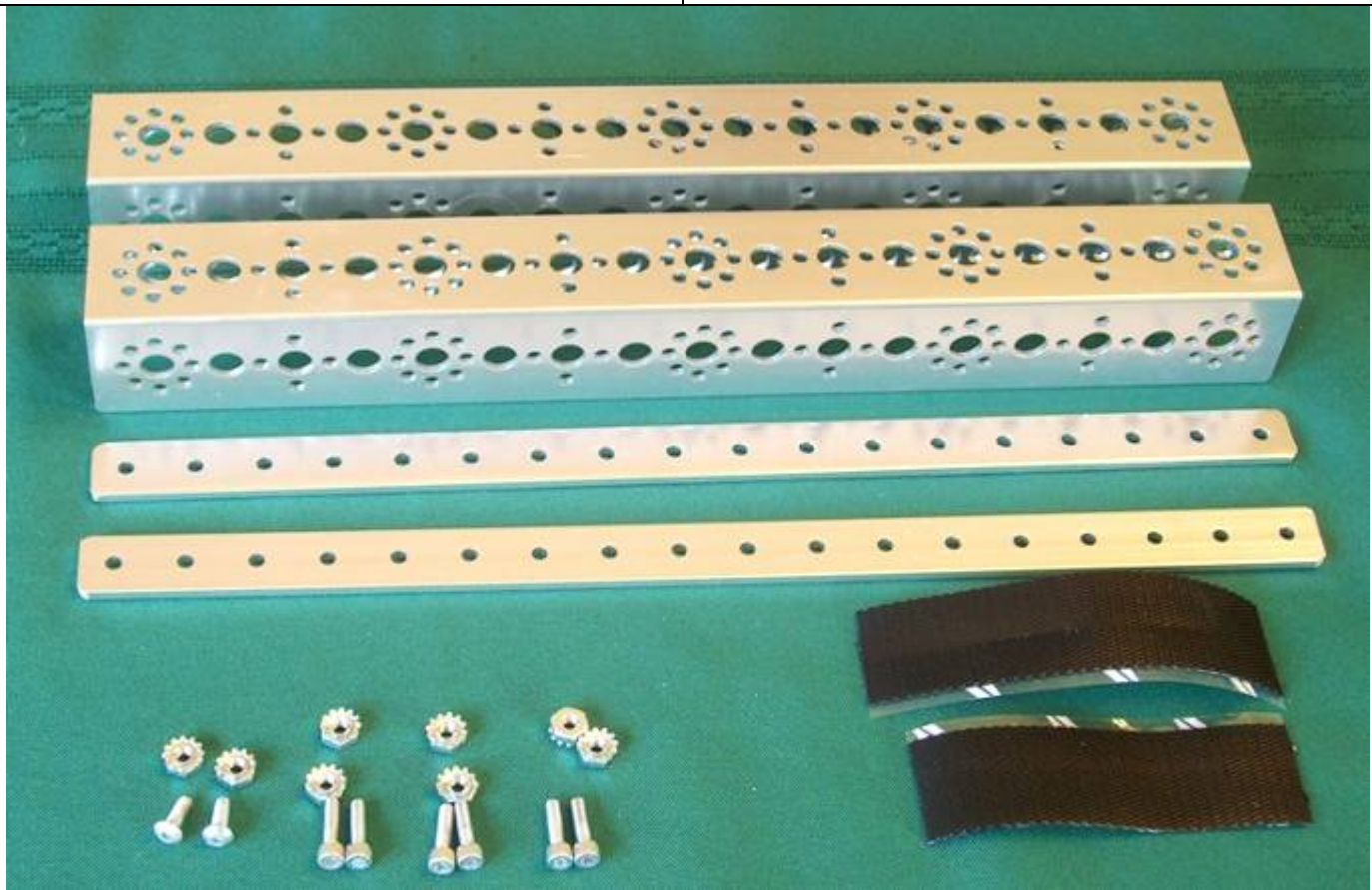
### Chassis Assembly BAG 4

- 6 – Socket Head Cap Screws, 1/2"
- 2 – Button Head Cap Screws, 3/8"
- 8 – 6-32 Nuts
- 2 – 4" Lengths of Hook and Loop Fastener (Hook Part)

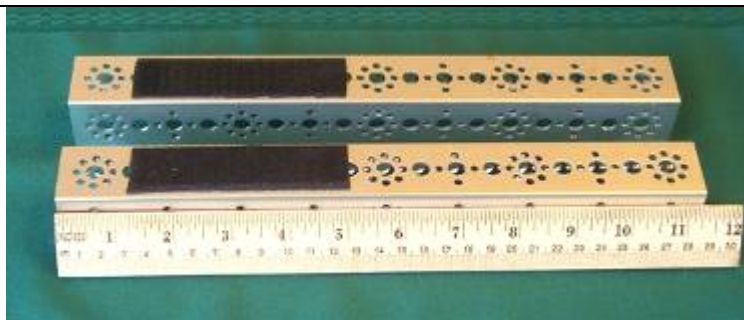
### Chassis Assembly BAG 5

- 2 – 288mm Channels
- 2 – 288mm Flat Bars

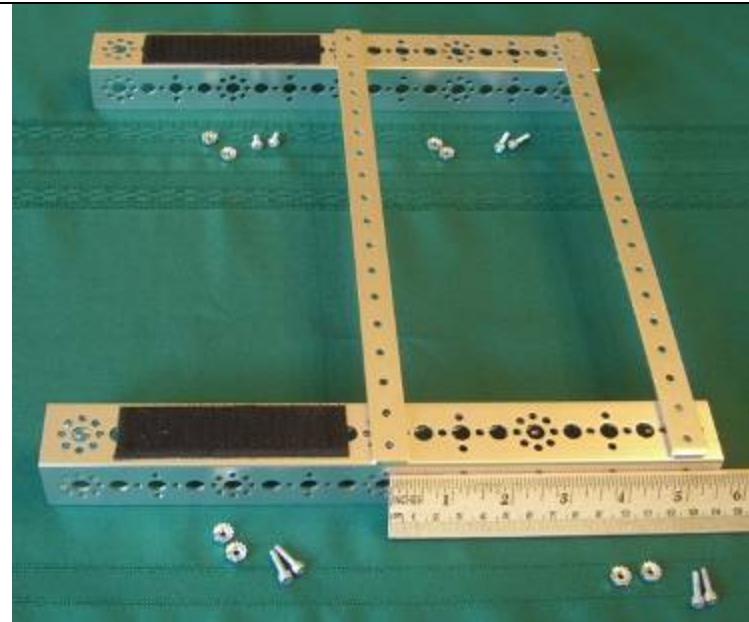
**NOTE:** Bag 4 is inside Bag 5



## Assembly



1. If the hook part of the hook and loop fasteners are not already attached to the channels, peel off the covering of the adhesive back of each strip and attach them to one end of each channel about 1-1/4 inch from the end. Do not cover the 8-hole rosette at the end of the channel.

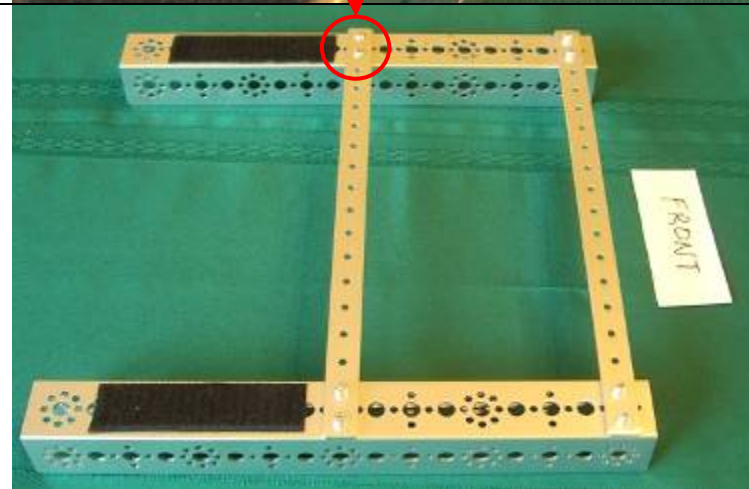


2. Attach the two flat bars to the top of the channel as shown. The two bars are exactly 8 large holes apart (5 inches). The front bar will be centered on the front 8-hole rosette pattern.
3. Use two screws at each intersection.
4. Note that the left rear pair of screws are button head cap screws. The other six are socket head cap screws.

**NOTE: nuts must be installed with the lock washer against the metal part.**



5. Detail showing the left rear pair of screws.



6. Finished chassis frame assembly showing which end is front.

# Mounting Idler Wheel

Mount two idler wheels, one on each side of the robot.

## Parts Needed:

2 – Idler Wheel Assemblies

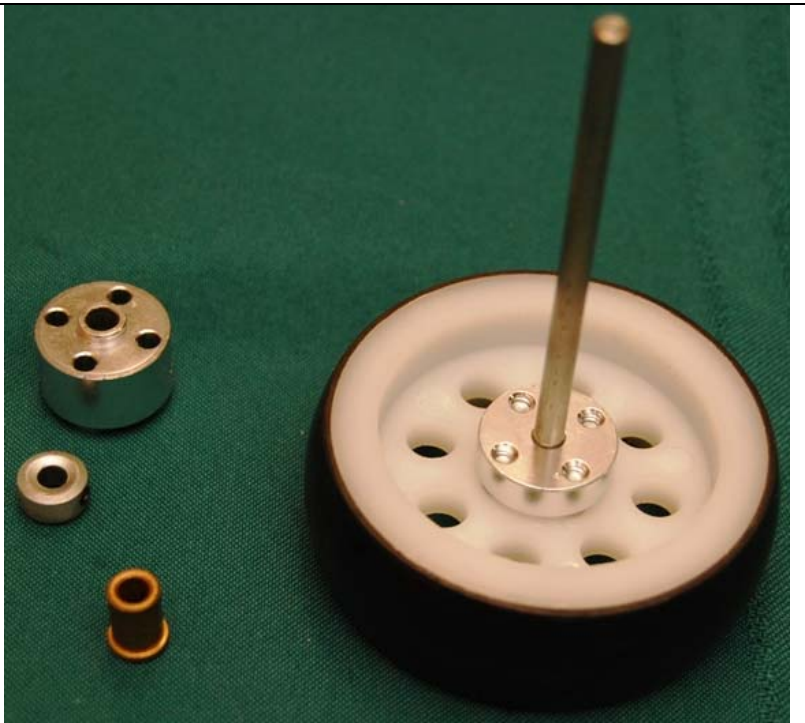
## Chassis Assembly BAG 6

2 – Bronze Bushing

2 – Gear Hub Spacer

2 – Axle Set Collar

**NOTE:** only one wheel assembly shown in photos. Install the second one on the other side of robot.



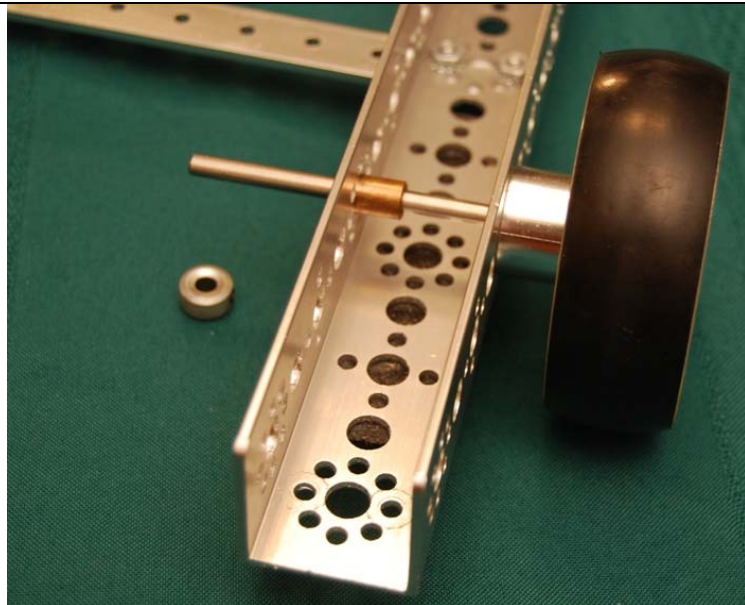
## Assembly



1. Turn chassis upside down.
2. Place the bushing in the inside of the side rail at the 5th hole from the rear of the chassis as shown

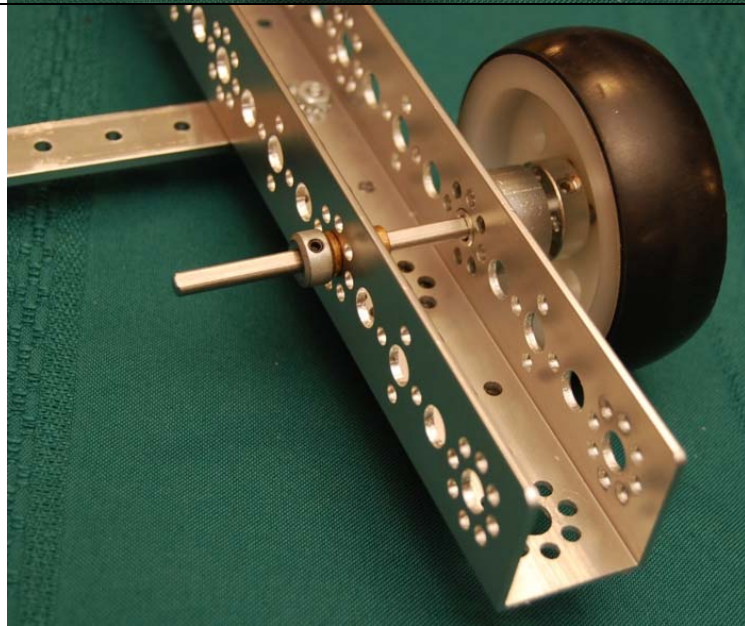
**NOTE:** rear of chassis is the end with the hook and loop fastener glued on channel.





3. Slide the wheel assembly through the hub spacer and then through the outside 5<sup>th</sup> hole and through the bushing. Make sure the lip on the spacer goes into the big hole on the channel.

4. Slide the collar over the end of the axle.



5. Tighten the set screw on the **flat part** of the axle.

# Installing Drive Wheels and Motor Mounts

Install two of these sets, one for each side of the robot.

## Parts Needed:

### Chassis Assmebly

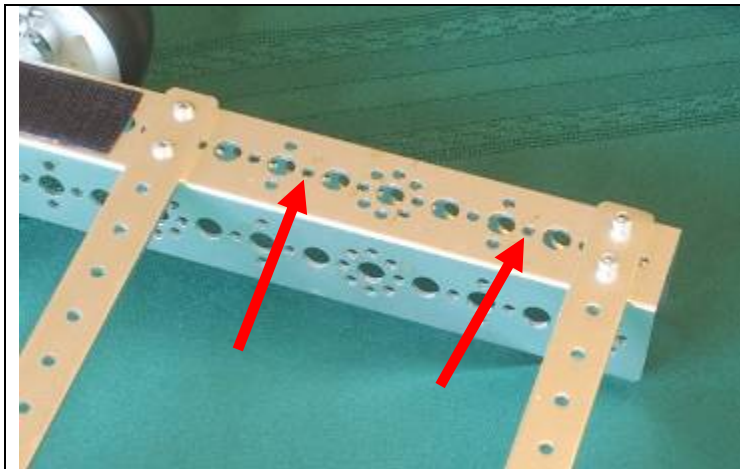
#### BAG 7

- 2 – Motor mounts
- 2 – Socket Head Cap Screws, 1-1/2"
- 2 – Socket Head Cap Screws, 1-1/4"
- 4 – 6-32 Nuts

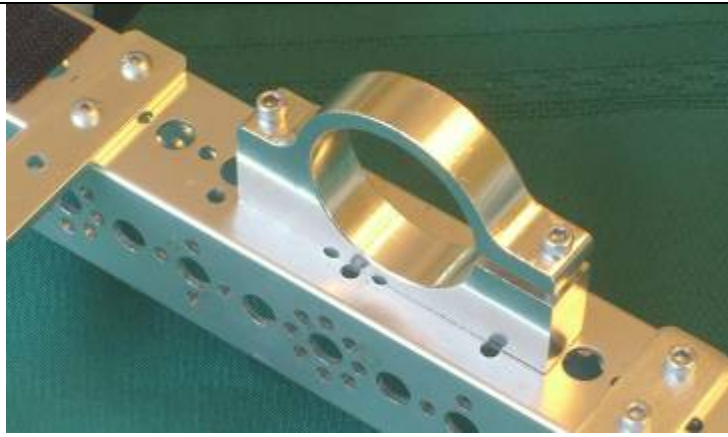
**NOTE:** only one mount shown in photos. Install the second one on the other side of robot.



## Assembly



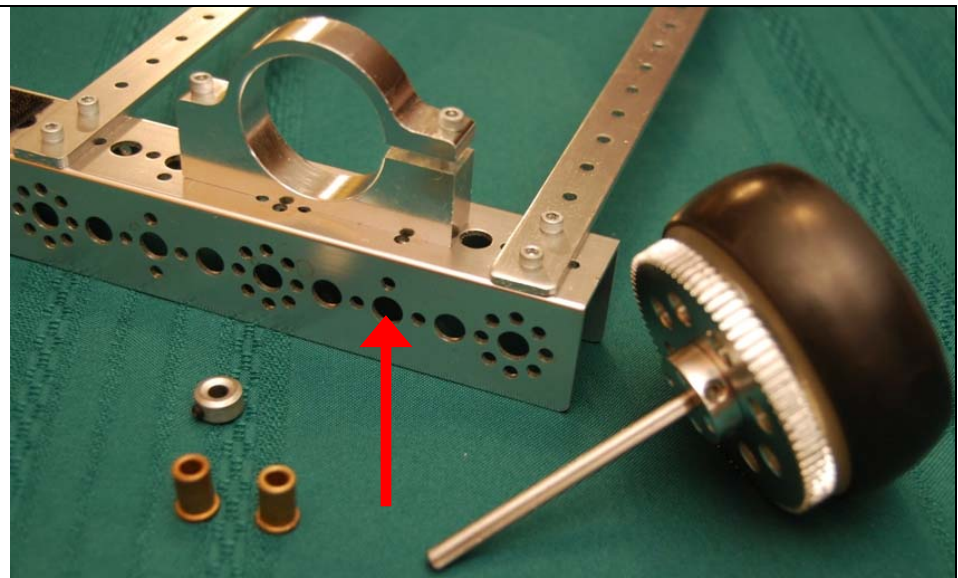
1. Locate the two holes as indicated. The split end of each motor mount faces the front of the robot.



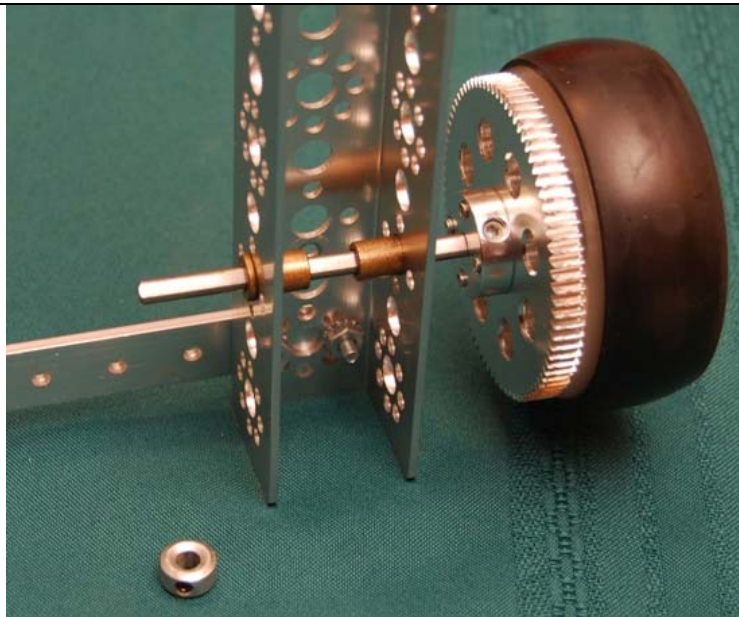
2. Place the motor mount on the channel, with the split end facing the front of the chassis, and insert the longer screw in the front (split) end of the mount and the shorter screw in the back.
3. Attach nuts to each screw and securely tighten the back screw (the shorter one).
4. Leave the nut on the front screw loose for now.

**Parts Needed:**  
2 – Drive Wheel  
Assemblies  
Chassis Frame Assembly

**Chassis Assmebly BAG 8**  
4 – Bushings  
2 – Axle Set Collars



## Assembly



1. Turn chassis on end.
2. Place the bushings in the channels at the 3rd hole from the front of the chassis (as indicated above). The bushings are inserted with the narrow end inside the channel.
3. Insert the drive wheel assembly into the bushings from the outside. Make sure the bushings seat firmly against the channel sides.

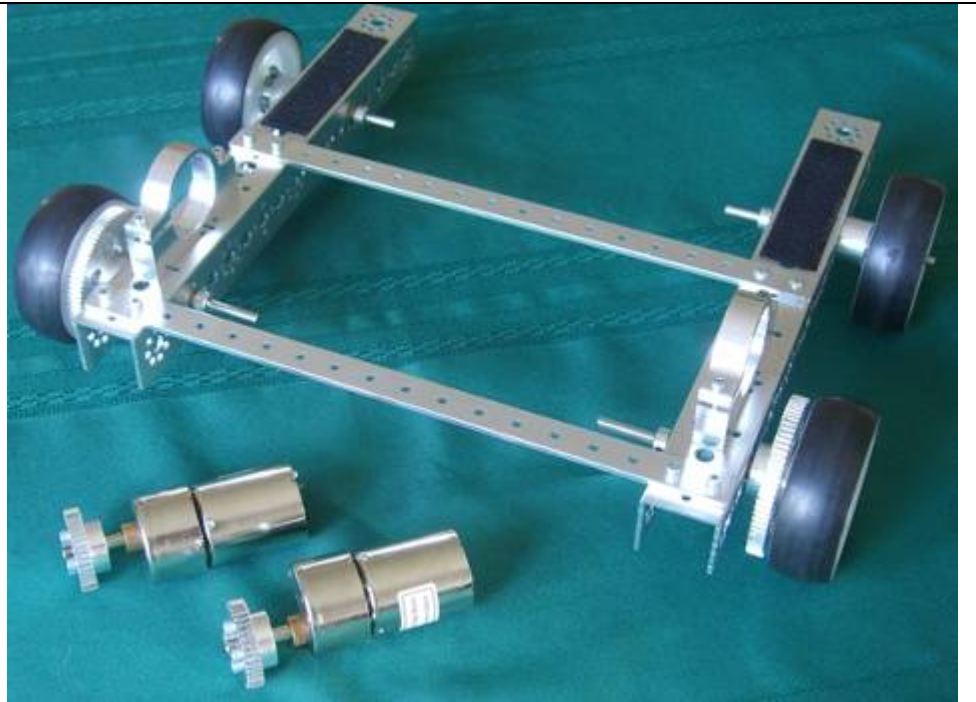


4. Slide the collar over the end of the axle from inside the robot.
5. Tighten the set screw on the **flat part** of the axle.

# Final Chassis Assembly

## Parts Needed:

- 2 – Motor Assemblies
- 1 – Chassis Frame Assembly

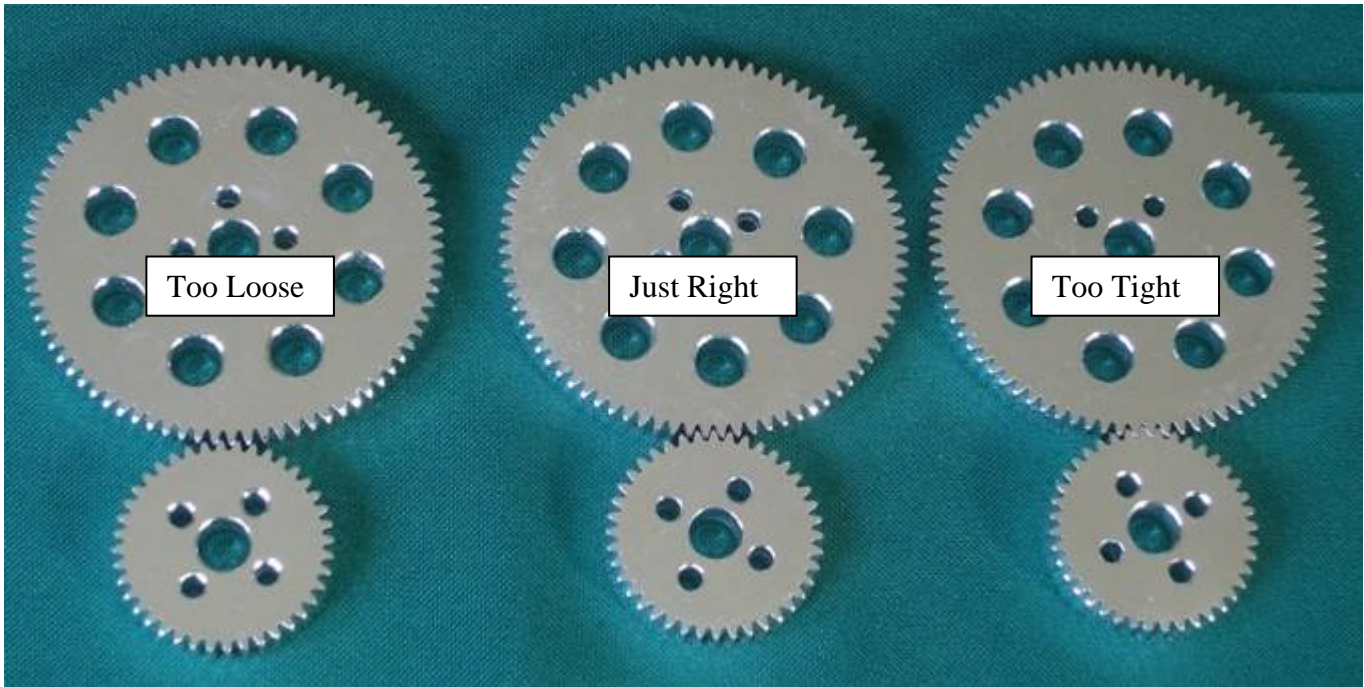


## Assembly



1. Slide the motor, gear end first, through the motor mount from the inside and work the motor head into the mount. The motor mount screw at the split end must be loose for this to work.
2. Push the motor through until the front of the motor is flush with the mount. You may need to loosen the set screw on the motor hub to move the small gear in or out to ensure that 100% of the thickness of the small gear meshes with the large gear. Retighten the set screw.
3. Rotate the motor in motor mount so that the gears mesh. See diagram below for proper gear meshing technique.
4. Tighten the screw in the split part of the motor mount to secure the motor.

## Proper Gear Meshing



This is what happens when the gears are not meshed properly!

## ***Completed Chassis Assembly***

