



User Guide

"C-Base" Kit Chassis for the 2009 *FIRST* Robotics Competition



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Contents	Page
1. Overview	3
2. C-Base Bill of Material	4
Additional Drive Base Parts Bill of Material	
3. Part Pictures	5, 6, 7
4. Assembly Instructions	8
5. Wheel Assembly	8
6. “Short and Wide” Assembly Instructions	9
7. “Long and Narrow” Assembly Instructions	12
8. Attach Toughbox to C-Base	16
9. Credits	17
10. Part numbers and Prices	17

1. Overview

- 1. This C-Base chassis is designed for use in the 2009 *FIRST* Robotics Competition (*FRC*).**
- 2. Each registered FRC team will receive parts for one C-Base chassis in their *FRC* Kit of Parts (KoP).**
- 3. The C-Base is provided in kit form, with assembly required for usage. Full assembly instructions can be found in this manual.**
- 4. The C-Base can be assembled in “Short and Wide” or “Long and Narrow” orientations. Instructions for both are included in this manual.**

2. C-Base Bill of Material



Item	Component	Qty	Part Source	Part Number
1	C-Channel	6	AndyMark	am-0202
2	Corner Connect	8	AndyMark	am-0212
3	Gearbox Brace	2	AndyMark	am-0203
4	Gearbox Bracket	2	AndyMark	am-0204
5	3/8-16 x 7" screw	4	AndyMark	am-1055
6	1.86 PVC Spacer	4	AndyMark	am-0243
7	2.50 PVC Spacer	4	AndyMark	am-0244
8	3/8-16 Nylock Nut	4	MSC	87922050
9	1/4-20x1.75 SHCS	32	MSC	71126155
10	1/4-20x5/8 SHCS	8	MSC	80263072
11	1/4-20 Nylock Nut	40	MSC	52591294
12	¼ id washer	8	Fastenal	33078 (or other)

Additional Drive Base Parts

Item	Component	Qty	Part Source	Part Number
1	2009 FIRST Slick Wheel	4	AndyMark	am-0210
2	3/8" id bearing (1614ZZ)	8	AndyMark	am-0209
3	250 Sprocket Spacer	2	AndyMark	am-0207
4	S35-22LE Sprocket	4	AndyMark	am-0245

3. Part Pictures



Item 1, C Channel, Qty. 6



Item 2, Corner Connect, Qty.8



Item 3, Gearbox Brace, Qty. 2



Item 4, Gearbox Bracket, Qty. 2



Item 5, 3/8-16 x 7" Screw, Qty. 4



Item 6, 1.86 PVC Spacer, Qty. 4



Item 7, 2.50 PVC Spacer, Qty. 4



Item 8, 3/8-16 nut, Qty. 4



Item 9, 1/4-20 x 1.75" SHCS, Qty. 32



Item 11, 1/4-20 nut, Qty. 40



Item 10, 1/4-20 x 5/8" SHCS, Qty. 8



Item 12, 1/4 washer, Qty. 8

2009 FIRST Slick Wheels (am-0210)



Note: FIRST Slick Wheels with bearings already installed have an AndyMark part number of "am-0284".

1614ZZ Ball Bearings (am-0209)



250 Sprocket Spacers

(am-0207)



22 Tooth Alum. Sprockets

(am-0245)

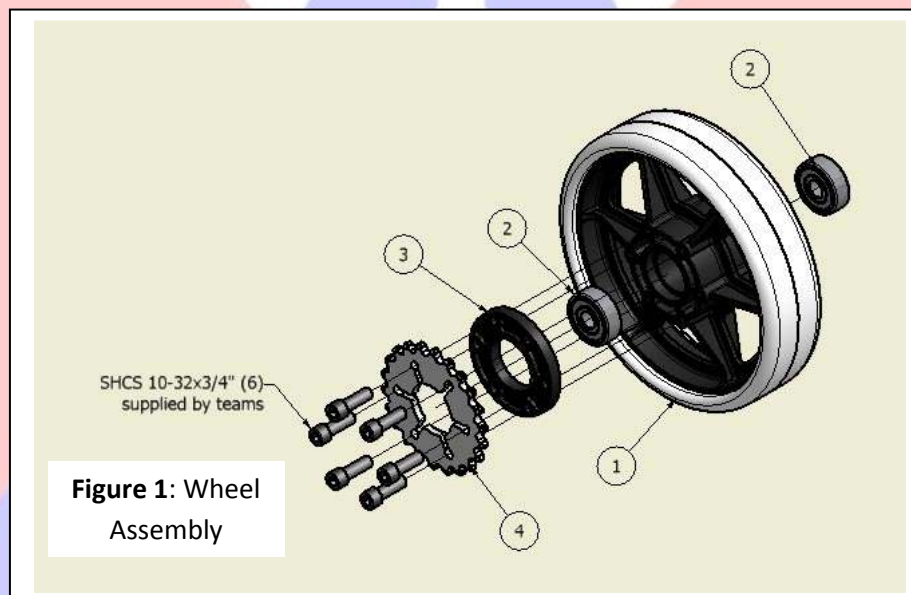


4. Assembly Instructions

1. Ensure you have all the parts from the BOM (page 4).
2. Decide if you wish to make a “Long and Narrow” drive base, or a “Short and Wide” drive base.

5. Wheel Assembly

1. Press one 1614ZZ Ball Bearing (item 2 in Figure 1) into the bore on each side of a FIRST Slick Wheel (item 1 in Figure 1).
2. Tap the holes with a #10-32 tap.
3. Insert 6 (six) #10 screws through the S35-22LE sprocket (item 4 in Figure 1) and 250 Sprocket Spacer (item 3 in Figure 1). These screws are not provided in the *FIRST Kit of Parts*. We recommend #10-32 or #10-24 screws that are $\frac{3}{4}$ " long.
4. Tighten the screws to the wheel.



6 **“Short and Wide” Drive Base Assembly Instructions**

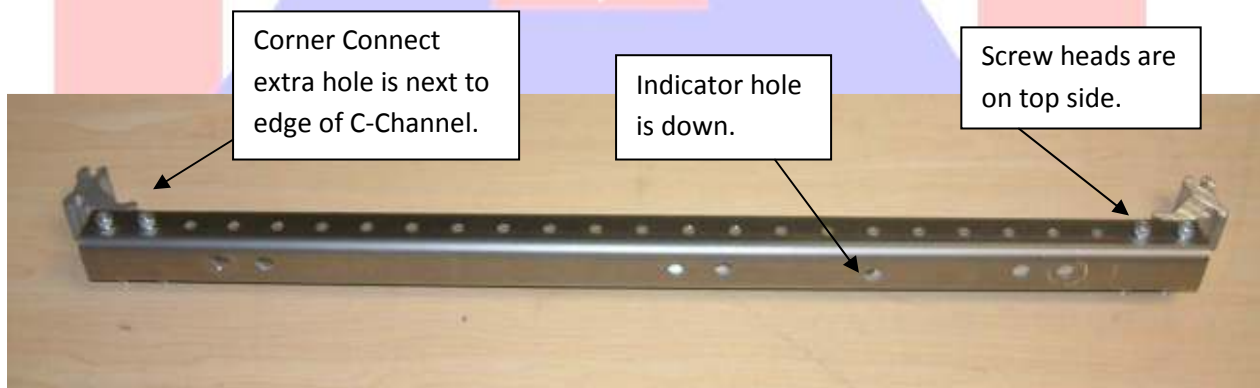


Short and Wide: Step 1

Cut 4 of the C-Channel pieces to 25" long.

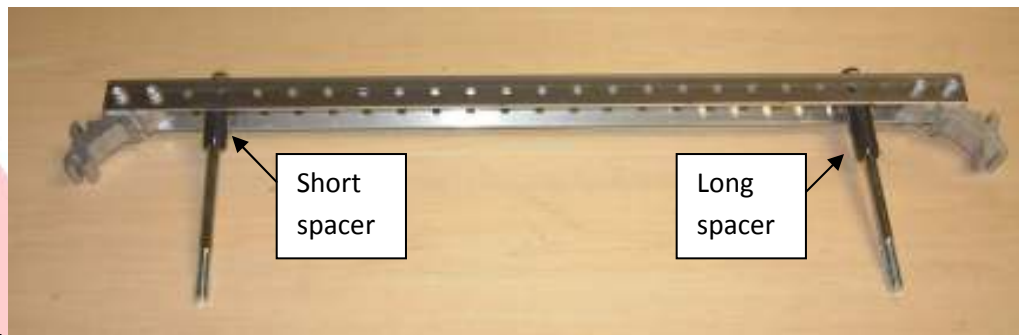
Short and Wide: Step 2

Assemble the Corner Connectors to the ends of the cut C-Channels. Be sure to insert the screws from the “top” of the C-Channel, knowing that the indicator offset hole is down. Also, assemble the Corner Connects so that the extra hole is next to the edge of the C-Channel. Make 4 of these assemblies.



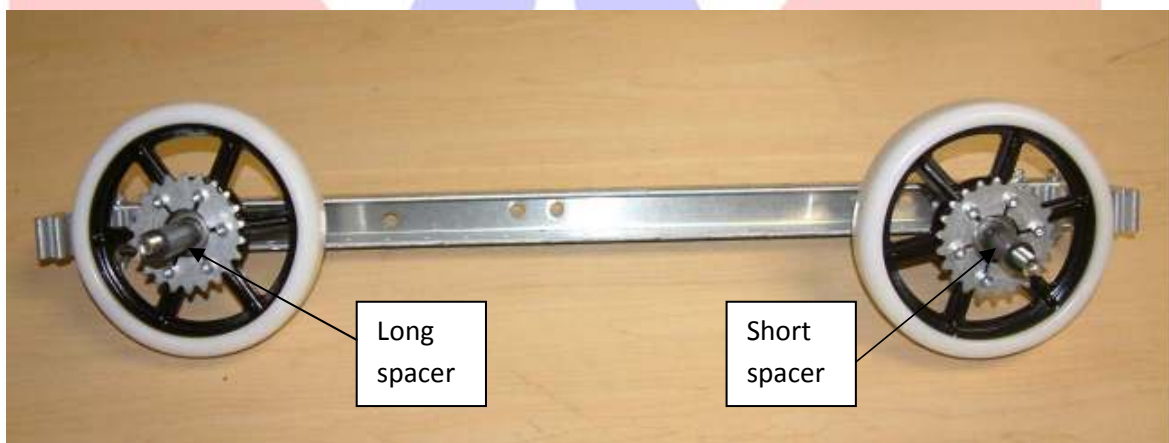
Short and Wide: Step 3

Insert the 3/8"x7" long axle screws, and 2 spacers.



Short and Wide: Step 4

Insert wheels and 2 more spacers



Short and Wide: Step 5

Add in 2nd C-Channel and Corner Connect ass'y, with the screw heads on same top face.



Short and Wide: Step 6

Assemble in the Wheel and C-Channel assembly as shown below. Fasten end C-Channels as desired. Shown is a method that will provide a 36.5" wide C-Base assembly. Notice that the left side is assembled a bit different than the right. Both sides can be assembled like the right side is assembled for a 37.5" wide C-Base.



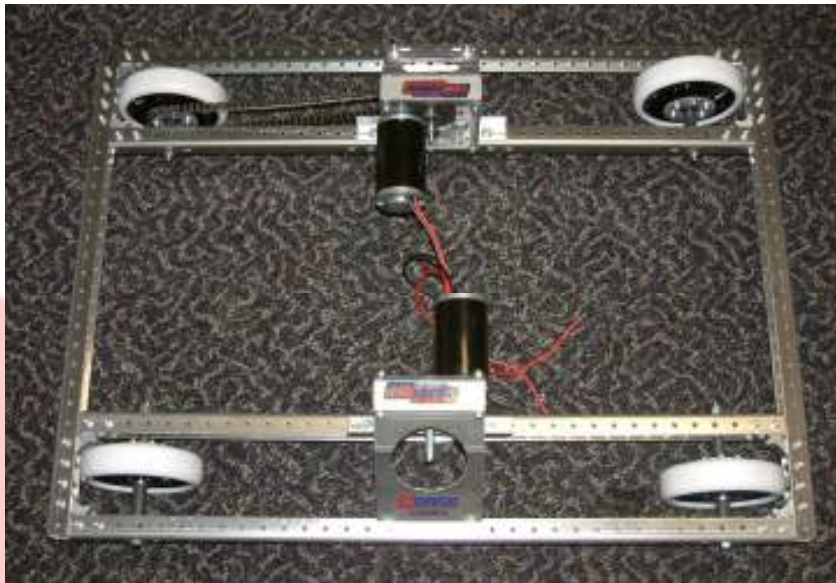
Short and Wide: Step 7

Assemble in the 2nd Wheel and C-Channel assembly on the opposite end of the C-Base.



For Toughbox assembly, please see page 16, within the "Long and Narrow" drive base instructions.

7. **“Long and Narrow” Drive Base Assembly Instructions**



Long and Narrow: Step 1

Cut the C-Channel

1. For the short side of the frame, you must cut 2 of the C-Channel pieces to the appropriate size. These will be the front and back C-Channel
2. Make a mark aligned with the small 1/8" hole.
3. Cut the frame using a hack saw, band saw or other means of cutting metal (the cut is made at the 1/8" hole, which makes this piece 27" long).

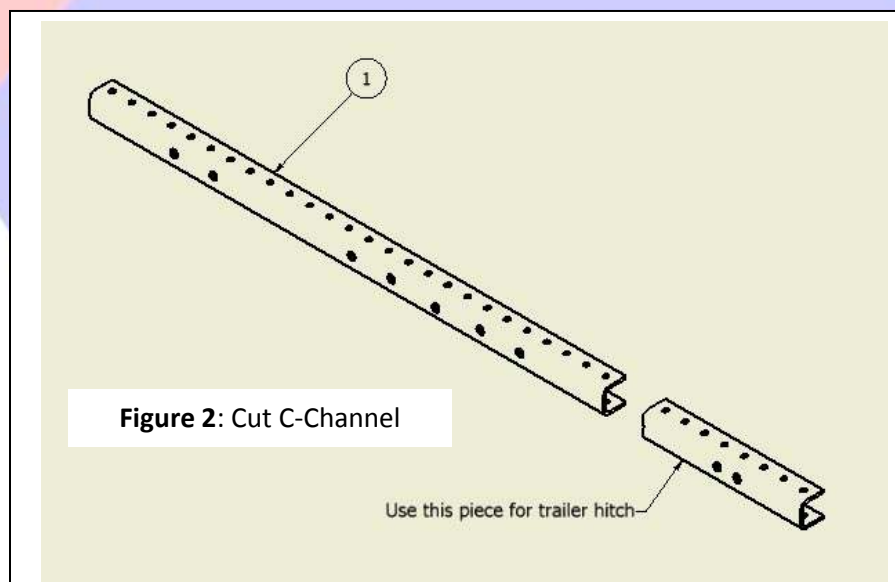
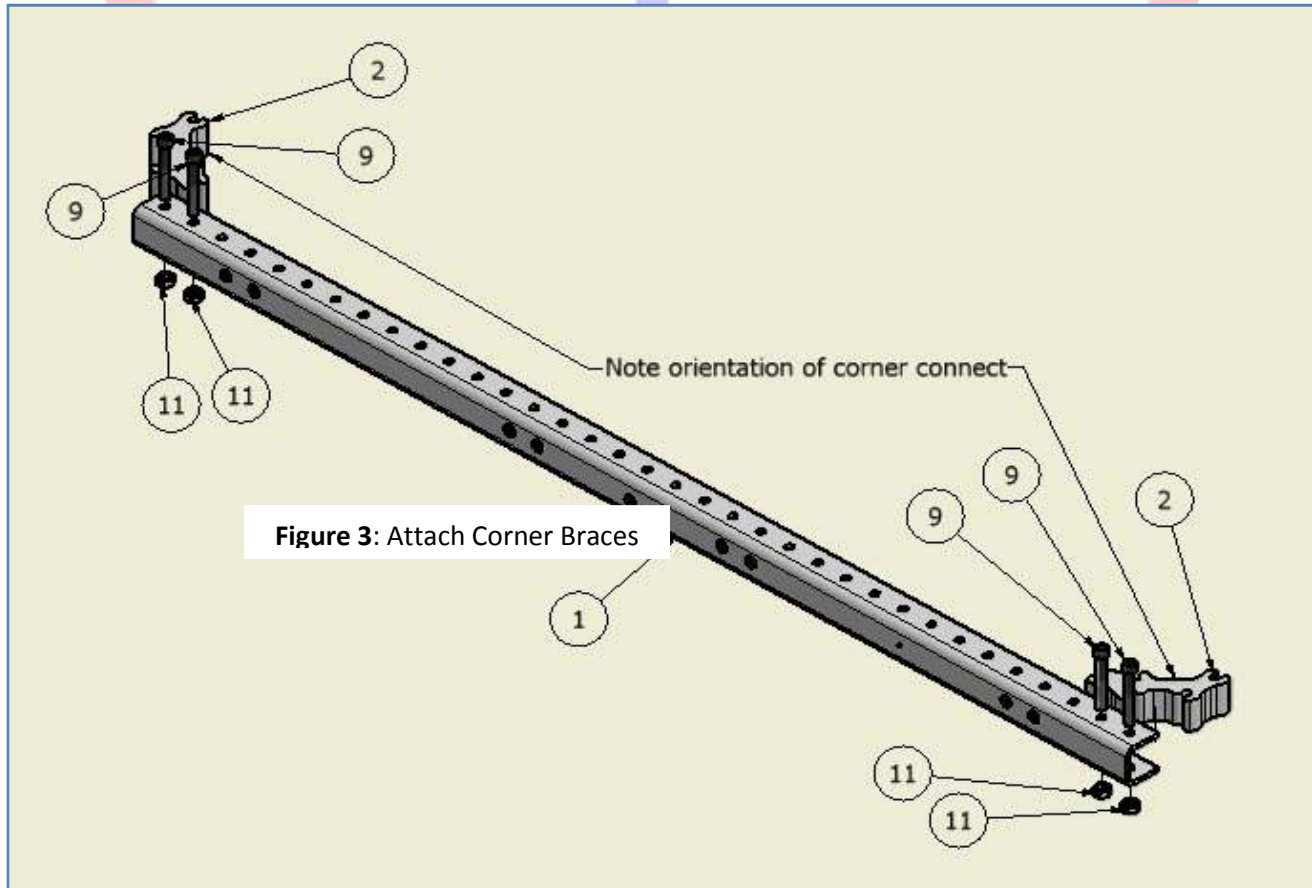


Figure 2: Cut C-Channel

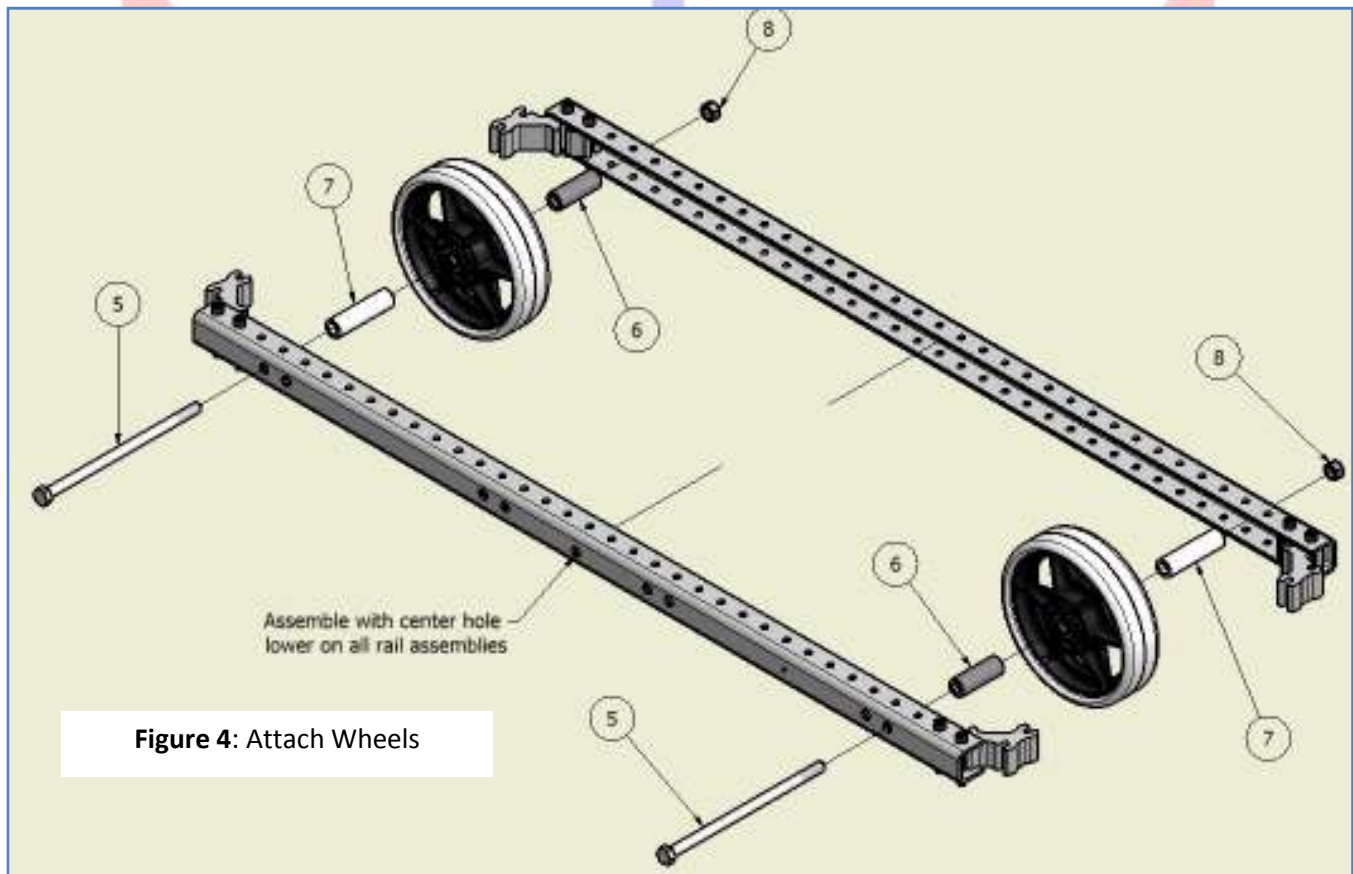
Long and Narrow: Step 2

Assemble the Corner Connectors to the ends of the cut C-Channels. Be sure to insert the screws from the “top” of the C-Channel, knowing that the indicator offset hole is down. Also, assemble the Corner Connects so that the extra hole is next to the edge of the C-Channel. Make 4 of these assemblies.



Long and Narrow: Step 3

Insert the 3/8"x7" screws into the outer holes on the C-Channels as shown in Figure 4. Insert a short PVC spacer on one axle screw and a long PVC spacer on the other axle screw. Add in the Wheel assemblies, as shown in page 8. Insert opposite length spacers over the axles, as shown in figure 4. Add on 2nd C—Channel assembly, then add 3/8" nuts, but only finger tight.



Long and Narrow: Step 4

Attach Front and Back to drive sub-assembly, using 4 screws and nylock nuts per corner, as shown in figure 5.

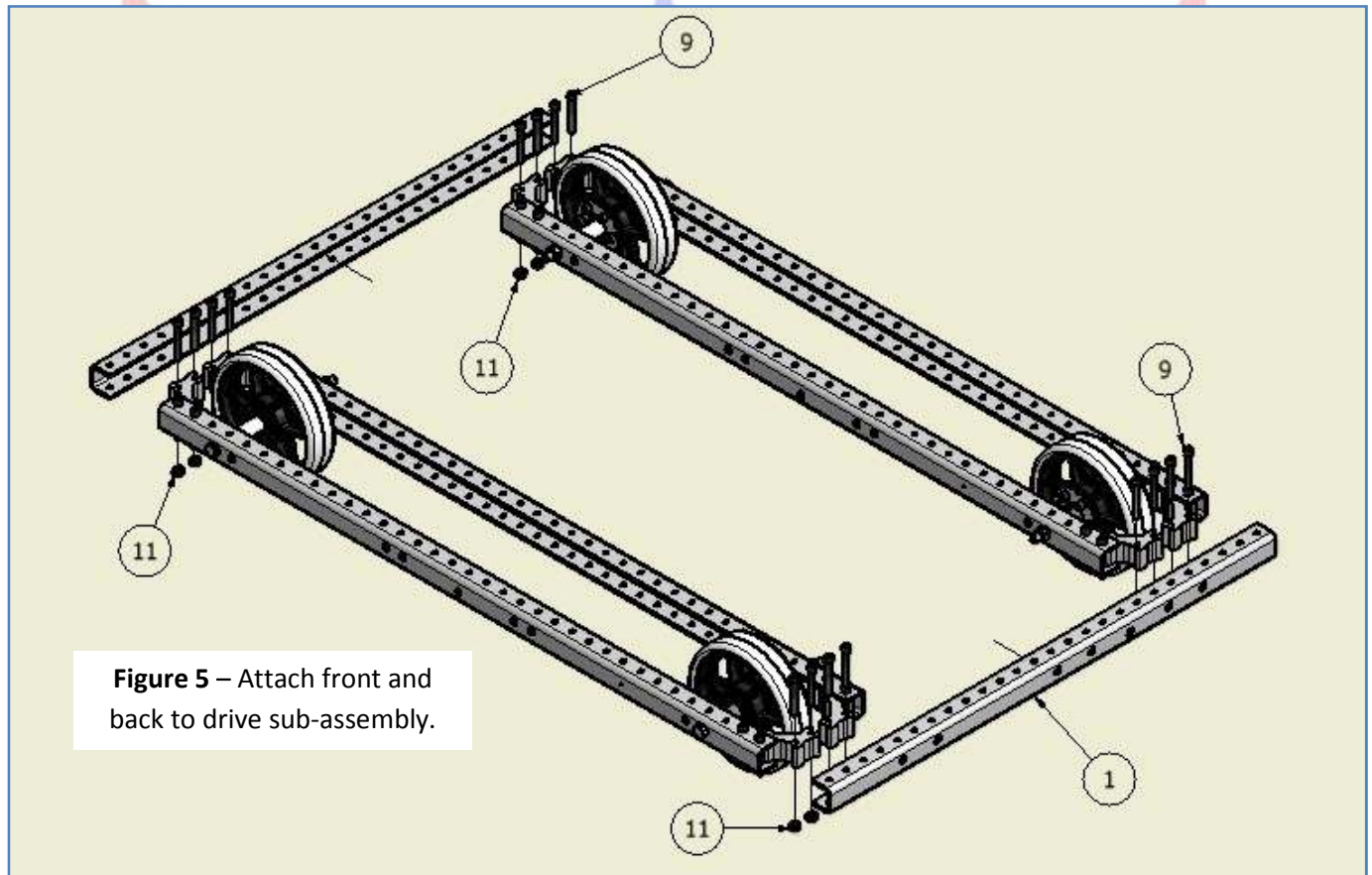


Figure 5 – Attach front and back to drive sub-assembly.

8. Attach Toughbox, Toughbox Brace, and Bracket to Drive-base

- 1. With the Toughbox positioned as in the figure 6, remove the two top screws.**
- 2. Using those same two screws, attach the brace to the Toughbox.**
- 3. Remove the bottom two screws from the Toughbox.**
- 4. Attach the bracket to the Toughbox using screws removed from Toughbox in the previous step.**
- 5. Using four (4) 1/4" – 20 x 5/8" SHCS screws, four (4) 1/4" washers, and four (4) 1/4" - 20 nylock nuts, attach the brace and bracket to the drive base.**
- 6. Repeat steps 1-5 to mount the other Toughbox on the other side of the drive base.**

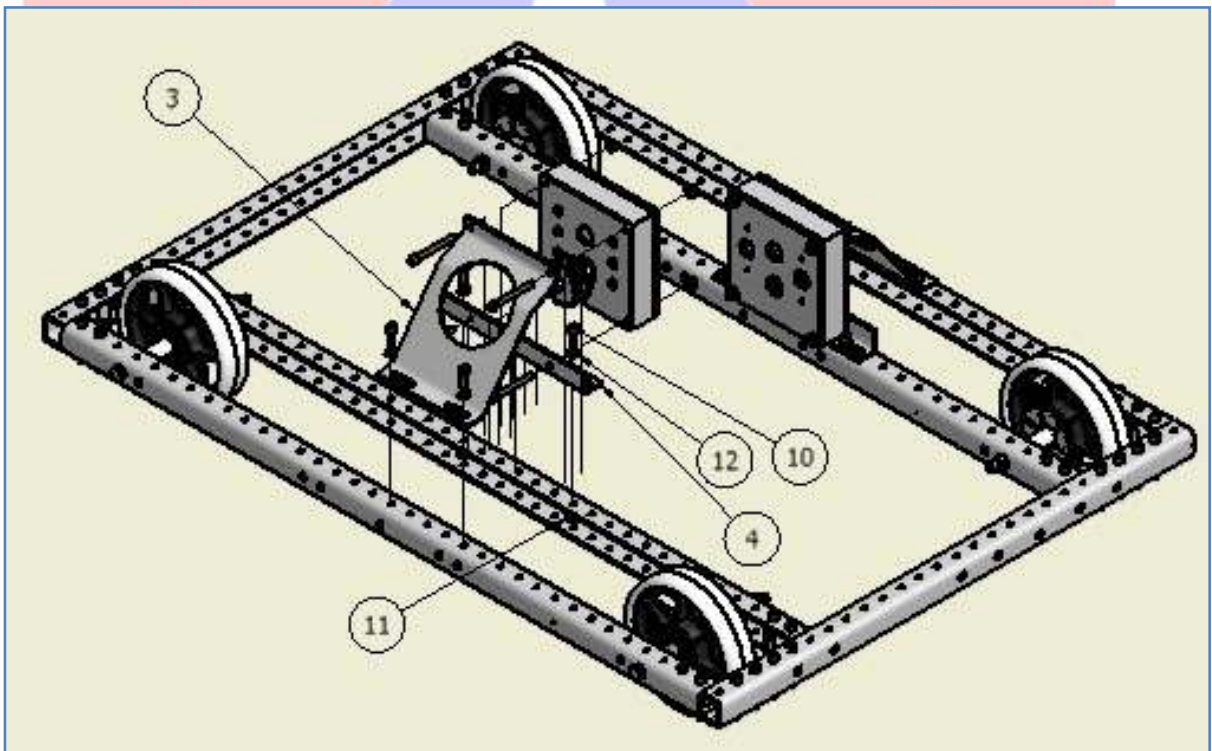


Figure 6: Attach Toughbox, Toughbox Brace and Bracket to Drive-base

9. Credits

We took inspiration to the IFI kit chassis, provided to *FIRST* teams from 2005-2008. While there are some definite differences with this C-Base, we learned much from the design provided by IFI and John V-Neun.

10. Part numbers and Prices

All items regarding the C-Base can be seen on-line at this link:

<http://www.andymark.biz/am-0205.html>

Component	Price	Part Number
C-Base	\$190	am-0205
Toughbox	\$88	am-0145
2009 FIRST Slick Wheel	\$12	am-0210
3/8" id bearing (1614ZZ)	\$5	am-0209
250 Sprocket Spacer	\$4	am-0207
S35-22LE Sprocket	\$9	am-0245
2009 FIRST Slick Wheel with 2 bearings	\$20	am-0284
C-Channel	\$18	am-0202
Corner Connect	\$4	am-0212
Gearbox Brace	\$7	am-0203
Gearbox Bracket	\$6	am-0204
3/8-16 x 7" screw	\$1	am-1055
1.86 PVC Spacer	\$1.50	am-0243
2.50 PVC Spacer	\$1.50	am-0244