



SADfab Delrin Bushing Kit Installation Instructions

For 90-05 Mazda Miata

Kit Contents:

Bushings:

- ☐ X4 FUCA delrin bushings (front upper control arm)
- ☐ X2 FLCA-f-f delrin bushings (front lower control arm, front location, front bushing)
- ☐ X2 FLCA-f-r delrin bushings (front lower control arm, front location, rear bushing)
 - ☐ X2 FLCA-F Offset bushings with lock screws (front lower control arm, front location)
See supplemental instructions
- ☐ X2 FLCA-r-f poly bushings (front lower control arm, rear location, front bushing)
- ☐ X2 FLCA-r-r poly bushings (front lower control arm, rear location, rear bushing)
- ☐ X8 RUCA-i delrin bushings (rear upper control arm, inner location)
- ☐ X4 RUCA-o poly bushings (rear upper control arm, outer location)
 - ☐ X2 RUCA-o Spherical kit bearing housing, snap rings (AIB-10t bearings not included!)
See supplemental instructions
- ☐ X4 RLCA-i-f delrin bushings (rear lower control arm, inner front location)
- ☐ X4 RLCA-i-r poly bushings (rear lower control arm, inner rear location)
- ☐ X4 RLCA-o delrin bushings (rear lower control arm, outer location)
 - ☐ RLCA-o NASA/SCCA "metal content rule" fitment

Sleeves:

- ☐ X4 FUCA steel sleeve for delrin (front upper control arm)
- ☐ X2 FLCA-f steel sleeve for delrin (front lower control arm, front location)
- ☐ X2 FLCA-r steel sleeve, bronze bearings, poly (front lower control arm, rear location)
- ☐ X4 RUCA-i steel sleeve for delrin (rear upper control arm, inner location)
- ☐ X2 RUCA-o steel sleeve, bronze bearings, poly (rear upper control arm, outer location)
 - ☐ X4 RUCA-o Spherical kit spacer sleeves and seals ☐stock ☐V8R (camber bolt)
- ☐ X2 RLCA-i-f steel sleeve for delrin (rear lower control arm, inner front location)
- ☐ X2 RLCA-i-r steel sleeve, bronze bearings, poly (rear lower control arm, inner rear location)
- ☐ X4 RLCA-o steel sleeve for delrin (rear lower control arm, outer location)
 - ☐ RLCA-o NASA/SCCA "metal content rule" fitment

Misc:

- ☐ X8 Poly bronze camber bolt location washers
- ☐ X10 Short grease fittings (1/4-28)
- ☐ X12 Long grease fittings (1/4-28)
- ☐ X? Misc swag

Tools and supplies needed:

- Press or a decent (large) vice. You may substitute a ball joint press, C-Clamp, or even a threaded rod with an assortment of nuts, washers and a piece of pipe. Flame is not necessary to remove OEM rubber bushings and just makes a mess!
- Piece of 1-1/2" schedule 40 pipe at least 3" long. Sched 10 or 40 weld tee will work too. Or any cylindrical thing with a hole in it at least 1.580" ID and no larger than about ~1.630". You can typically get schedule 40 black iron pipe pieces from home depot racing or the plumbing outlet of your choice.
- Wire brushes, a flat file, maybe some sandpaper.
- Hand drill, and multiple batteries if cordless. Recommend a corded drill with a 1/2" chuck.
- Drill bits- 7/32" for grease fittings and 7/8" for reaming delrin bushings. If you have a NASA/SCCA compliant kit you will need a 3/4" bit in addition to the 7/8" for reaming bushings. If you have access to a proper 7/8" hand reamer, even better.
- 90° 3/8" counter sink cutting bit (nice to have but not necessary, 82° or 100° will work too)
- Grease, any type as long as it isn't silicone based. We recommend marine type, water proof, lithium complex grease.
- Grease gun
- Various hand tools, sockets, wrenches etc. to remove the control arms from the car.
- Hammer
- Punch
- 1/4-28 tap and tap handle (starter or plug tap, do not use a bottom tap) for grease fittings
- Degreaser, stiff brush, rags and a hose
- Quality set of internal snap ring pliers, **for RUCA-o spherical kit only.**
- Epoxy, RTV, or sealant of choice for grease fitting and NB arms.
- Beer, a healthy library of expletives, and a full weekend.

Installation:

1. Mark LCA-i eccentric (camber/cam) bolts locations. Remove control arms from the vehicle.
2. Remove old bushings from control arms. Make sure you support the control arms properly (Fig. 1), so that you don't bend them. For example- do not press the RLCA-i bushings out by resting one end of the arm on the press and pressing out the other side, squeezing the 2 legs of the arm together (Fig. 2). Use the pipe or press plates to "receive" the old bushing.



Fig. 1

Support the bore you are pressing the bushing out of, on press plates or a piece of pipe. FUCA pictured.

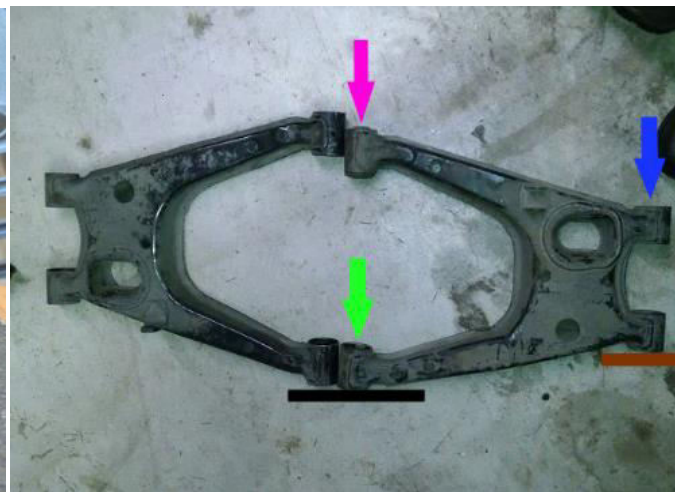


Fig. 2

Damaged bent arm from incorrectly pressing inner bushings out.

In Fig. 2 the arm was bent when an attempt was made to press the top bushing (pink arrow) out while the lower bushing bore rested on the press plate (black rectangle). The lower bushing (green arrow) should have been the one to be pressed out when the lower bushing bore is resting on the press plate.

Exceptions to this are the FLCA, RUCA-i and RLCA-o bushing locations. You can set one end of the arm on the press, while pressing the adjacent bushing out, flip and repeat. See Fig. 2, you can press the top bushing (blue arrow) out while the bottom bushing bore rests on the press plate (brown rectangle). Care should still be taken with this method. Watch to make sure the arm isn't flexing too much with a stubborn bushing, use the other method when in doubt.

It may be necessary or make it easier on some bushings to remove the rubber flange on one side. These are easily cut with a razor or torn off with a pair of pliers.



4

Flange to be cut/torn off. (FUCA pictured)



Flange removed. (FUCA pictured)

3. Clean control arms and bushing bores and remove any burrs, rust, or other high spots within the bore (Fig. 6), or on the edges (Fig. 5) of the control arm bore. Use a file, wire brush and/or sandpaper as necessary. If any burrs or high spots remain on the edges, the bushing will not seat all the way into its bore and you will have installation issues. Now would be the time to paint or coat the arms if you wish (you may want to drill and tap the grease fittings first too, skip ahead to that step for details).



Fig. 5
Weld spatter from when the arms were originally manufactured that needs to be filed down so the bushing seats all the way.



Fig. 6
Rust blob on the ID of a control arm bushing bore that needs to be wire brushed out.

*****Some NB control arms have a hole in the bore than needs to be sealed up for grease fittings to work!!!***** Epoxy or weld hole so grease doesn't escape. RLCA-o and FUCA do not need to be sealed due to 1 piece bushing design.

4. Press delrin bushings in. Lightly grease the OD of the delrin bushings and the ID of the control arm bore and use a vice, or press to press the bushings into the arms as follows:

FUCA: 1 piece bushing that doesn't protrude out the back of the bore, so you can set the bore on a plate and press it all the way in. Flanges face away from each other.

FLCA-f: 2 piece bushings that press in each side of the bore, each piece is different, there is a front and a rear. The thicker flange bushing faces towards the rear and sustains the braking loads.

RUCA-i: 2 piece bushings that press in each side of the bore, each bushing is the same and has no orientation.

RLCA-i-f: 2 piece bushings that press in each side of the bore, each bushing is the same and has no orientation.

RLCA-o: 1 piece bushing that protrudes out the back of the bore. You will need to press these into and through the arm into the piece of pipe or press plates used for bushing removal. The flanges at this location face each other, so the bushings press in from the "inside" between the 2 bushing bores, opposite of what you would think.



Fig. 7
Press bushings in
according to the
pink arrows.

5. Drill and tap for grease fittings. Use a center punch to locate the exact position for the drill to start (Fig. 8), and drill through the steel bushing bore and all the way through the delrin bushings to the inner bore of the bushing itself.



Fig. 8 marking the drill location with center punch



Fig. 9 drill through the control arm into the bushing bore

Tap the drilled holes for 1/4-28 as shown in Fig. 10. If you have a counter sink cutter, it would be a good idea to chamfer the drilled holes before tapping. You only have to tap through the steel, and just a bit into the delrin (0.250" at most). Not fully forming threads in the delrin will help seal the fitting. Center the hole to be in the middle of the bushing bore, you want to aim for gap left between the 2 bushing halves inside the control arm bore. Install the fittings into the poly locations (LCA inner rears and RUCA outer) prior to installing poly in step 7. Deburr the ID as necessary for the poly locations, after drilling and tapping.



Fig. 10
Tapping to 1/4-28
for grease fittings.

Fitting sizes locations:

The kit includes 10 short, and 12 long grease fittings and are installed as follows:



Fig. 11
FUCA- short fittings, installed straight down
pointing at the ground



Fig. 12
LCA inners (all 8) - long fittings, installed in
the "hole" of the bushing bore gusset. See
Fig. 13 for clarification. Install the fittings into
the poly locations (LCA inner rears) prior to
installing poly in the next step. Deburr the ID
as necessary for the poly locations, after
drilling and tapping.

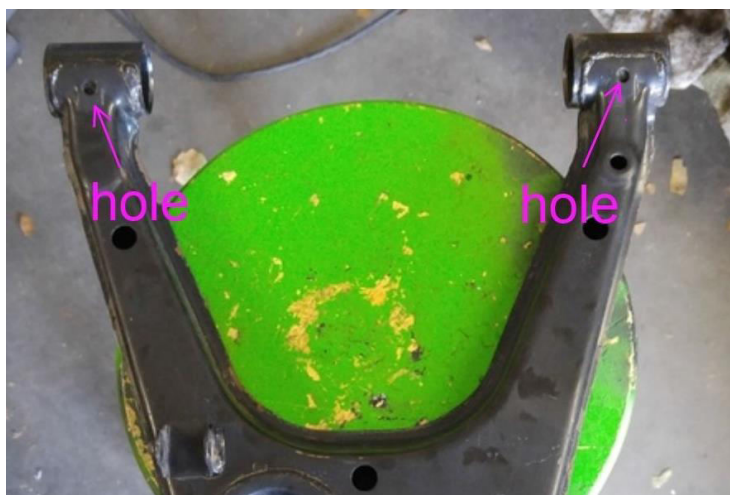


Fig. 13
Inner hole location. RLCA-i pictured

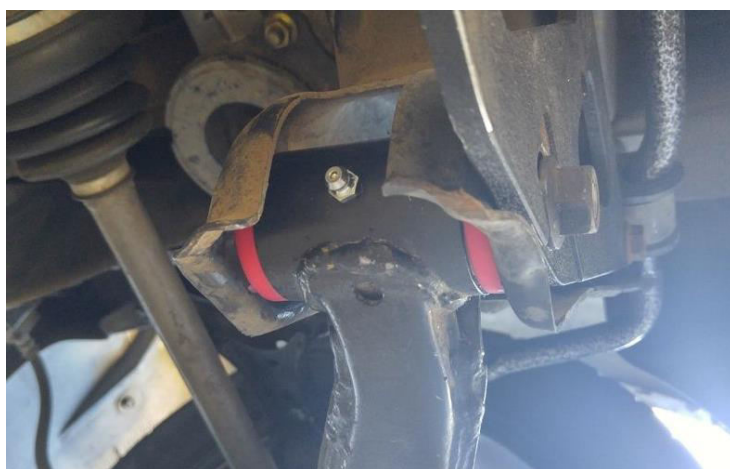


Fig 14.
Alternate LCA inner grease fitting mounting-
For NA chassis only or cars without bracing
that have the "window" cut into the sub frame.
You can install the grease fitting as pictured for
easier access (short fitting pictured, but you
will use the long fittings included in the kit for
that location). RLCA-I pictured but the FLCA is
similar.

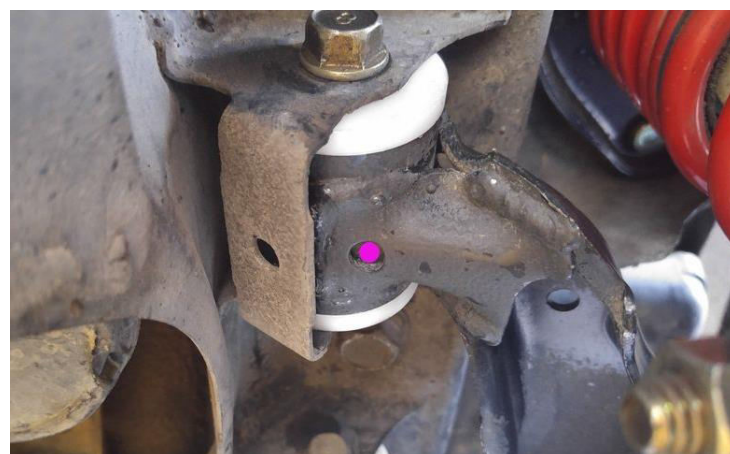


Fig. 15
RUCA inners- Long fittings. The location
depends upon what coilovers and top hats you
have and how much droop travel they offer.
You can install the fitting in the bottom, in the
hole marked by the pink dot, if your
suspension doesn't droop enough to have the
fitting sheared off by the subframe strap
pictured. Alternatively they can be mounted in
the top through the hole of the bushing bore
gussets, just like the LCA inner locations.

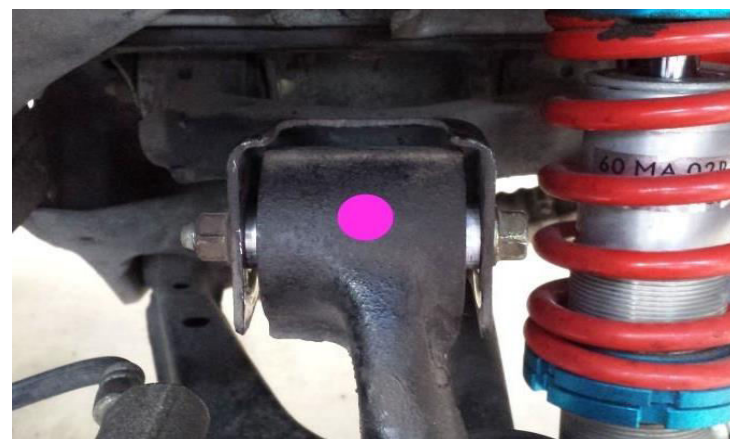


Fig. 16
RUCA outers- Short fittings. Just about
anywhere on the outside part of the casting is
fine, or on the pink dot. RUCA-o spherical kits
do not use a grease fitting here.

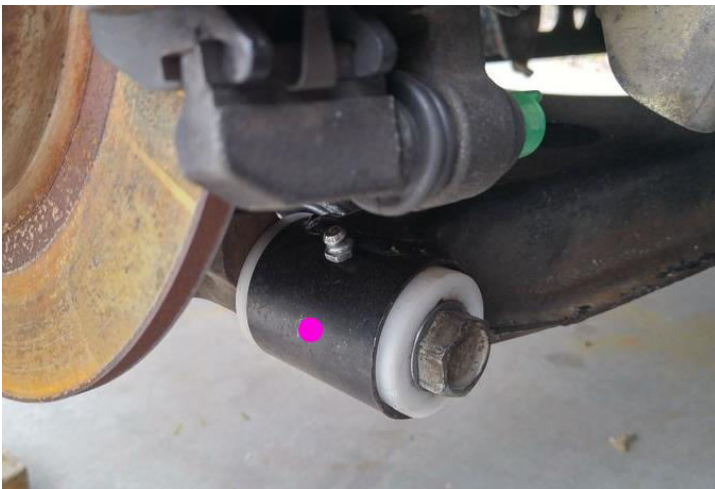


Fig. 17
RLCA outers- Short fittings. Just about anywhere around the OD of the bushing bore will work, the pink dot is best for access (or pointing straight down at the ground). The wheel will have to come off regardless.

Sealant may be used on the thread of the fittings to help them seal, particularly in the poly locations (LCA inner rears, and RUCA outer)

6. Ream delrin bushings and install the steel sleeves. The delrin bushing will slightly collapse, and may become slightly out of round after pressing them into the control arms, they will take the shape of the control arm bushing bore. This is corrected by reaming them with a 7/8" drill bit. The process is incremental; meaning the more you drill, the larger the ID will become. The delrin doesn't really like to be cut in this way, and won't size to 7/8" immediately after reaming the first time. It actually takes quite a bit of reaming to bring them to exactly 0.875". Use this to your advantage to slowly bring the bore up to size for a nice fit. You want the steel sleeve to be slightly snug, but still able to twist in the bore without too much force. Be very careful not to go too far. **Check the fit often during this process** to be sure you don't go too far and oversize the sleeve bore in the delrin bushing. This will also remove any burrs left from the drilling operation to install the grease fittings in step 5. It's a good idea to get the drill bit started as far into the bushing as possible before spinning the bit with the drill. This will help align the bit with the bore and help keep the cutting edges at the tip of the bit from digging into the delrin and leaving a groove. Use the lowest speed, highest torque drill or drill setting at your disposal. **TAKE YOUR TIME HERE!**

Install the steel sleeves after you are satisfied with the fit, use grease on the sleeve and the ID of the bushing. Fill the gap left between the 2 piece bushings with grease.

Please watch this video for a demonstration and a few more tips on reaming:

URL: <https://youtu.be/9GrjQzfeK-s>

7. Install poly bushings and bronze bearings in remaining locations. Pay attention to the orientation as marked on the package they come in. The grease fittings should already be installed, as per step 5. Install the bearings into the bushings prior to installing the bushings into the arms. For the RUCA-o the bearing should be pushed in until it is flush with the flange side of the bushing. For the LCA poly locations, the included washers will go in, on top of the bearing as shown in Fig. 17 and 18 below. Install the bearing until flush, then place the washer on top and push it down until the washer is flush. This will set the depth of the bearing and you can now set the washer aside until you are ready to re-install the arms on the car, as the washers can fall out of the arms until they are bolted in the car.



Fig. 17

Washer goes in each end of the poly bushings on LCAs after the sleeve is inserted.



Fig. 18

Bearing set to depth for LCA poly locations

Grease the OD of the poly bushing and the ID of the control arm bore just as you did with the delrin, and press the bushings into the arms, and rear upright (for the RUCA-o). If the grease fitting interferes with the bushing and keeps it from seating all the way, you can notch the edge of the bushing with a razor blade to clear the fitting. Insert the steel sleeve for the appropriate location. On the LCAs you can then re-insert the washers into the poly bushings on each end of the steel sleeve.

8. Re-install the arms onto the vehicle and get an alignment! Use the marks you made on the eccentrics to get it “close enough to drive to the alignment shop”. You may give the grease fitting a shot of grease or 2 at this point if you like.

Notes

It's recommended that you grease the bushings every oil change, or more for wet climates. The purpose of the grease is less about lubrication and more about pushing dirt out and keeping moisture out. Dirt ingress is the quickest way to wear out delrin bushings.

Because of the reduction in friction offered by this kit, you more than likely will need to reset ride height, re-corner weight the car, and may even need to increase your spring rate. Most Miata's typically drop about 1/4" or more, after the delrin and poly/bronze install.

If you are removing an Energy Suspension, or Prothane polyurethane bushing kit to install delrin, you may reuse the large washers included with those kits for the RLCA-o bushings. They will be installed in the same way, on the outside ends of the bushings (one under the bolt head, one under the nut).

The FUCA “long bolt” washers should also be used and reinstalled in the OEM configuration/locations.