R12 to R134A Conversion on 1988 Mustang LX 5.O

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Mustang LX 5.0 (July 2001)

This page will hopefully guide you through a conversion to R134A. I tried my first conversion using one of the parts store's $35 conversion kit on a 1989 BMW 535i that did not last long at all. I wanted to learn from that mistake so that I would be better prepared to do one of my own vehicles.

The 1988 Mustang LX 5.0:

5-speed is a daily driver that my wife uses. She was complaining that the A/C did not work well. The system was working fine, yet I knew that Ford's black o-rings are only good for 5-7 years before they start leaking. Advice that I sought was to stay with R12 if I could. Yet, with the price and limited supply of R12, I felt that this car was an excellent candidate for conversion. This page does not go into detail on such things on how to remove the radiator. This is well documented in any Chiltons or Haynes manual. I learned about the basics of A/C systems as well as studied the RetroFit Message Board at Aircondition.com (http://www.aircondition.com). I highly recommend this site for information.

Introduction to the A/C system.

Here's a basic outlay for the system in mine. This is similar throughout the 79-93 (Fox) Mustangs. This could also be similar to other Ford systems. From the compressor (the piston machine driven by the drive belt), you will notice two lines connected to the compressor fittings. The fitting on the left is the high side. Notice that there is a small cylindrical object on this fitting. This is the high-pressure relief valve. Also notice that the high-pressure line is smaller than the low-pressure line. On the high-pressure line, you will also see one port. This is where you connect the high side of the gauge set. This line then goes into the condenser. The condenser is located in front of the radiator. Liquid refrigerant is carried from the high side of the compressor, through the line, into the condenser. It is the condenser's job with airflow to extract heat from the refrigerant. Now the liquid exits the condenser and follows through the liquid line into the evaporator (located inside the cabin). Within this line is where the orifice is located. The orifice allows the refrigerant to expand and cool. The now cold refrigerant circulates through the evaporator where air (from outside the cabin at NORM setting, inside the cabin on MAX setting) is blown through and cooled. The refrigerant then exits the evaporator to the accumulator (cylindrical tank at firewall, passenger side).

The accumulator (sometimes called the dryer) is what traps any moisture as well as filters the system via the desiccant bag contained within. You will see the Low Pressure Cycling Switch on the top of the accumulator. The LPCS is there to turn off the system when the low-side pressure reaches a certain PSI. Not only does this help keep the evaporator from freezing, it also will protect the system in case of a low charge. The refrigerant is in a gaseous state and flows to the compressor, which compresses it and returns it to the liquid form. You will see the low-side service port on the low-pressure compressor fitting. Thus completes the circuit.

PLEASE READ:

Before servicing any equipment, please follow all safety precautions. When working with the refrigerant system, please use safety glasses. A refrigerant leak can instantaneously freeze skin and body parts.

Tools:
- 7/8" open-end wrench
- 6.0 metric Allen wrench
- 1/2" and 5/8" fuel line disconnects (I bought a set of "Air Conditioning & Fuel
- Line Disconnect Tool Set" - Part #25052)
- 12mm socket
- 5/16" wrench or socket
- 7/16" deep-well socket

- 10mm wrench or socket
- 12" crescent wrench (Optional, I didn't have a wrench for the large nuts on the low-side line and accumulator tank. They must be 15/16", 1", or larger.)
- A/C gauge set (I rented this)
- Vacuum pump (I rented this)
- Engine Degreaser
- Brass bristle brush

Parts:
- Motorcraft accumulator/drier tank w/switch w/hose
- Motorcraft liquid line w/fixed orifice
- Motorcraft high-pressure line
- #6 (3/8") green RES o-rings ("Factory Air" brand - Part #26220 - 1 package)
- #8 (1/2") green RES o-rings ("Factory Air" brand - Part #26221 - 1 package)
- Ford FS-6 Suction and Discharge o-rings ("Factory Air" brand - Part #26115 - 2 packages)
- 2 - 8 ounce bottles of PAG oil
- 1 small bottle of Nylog (optional)
- 3 - 12 ounce cans of R134A
- High- and low-side R134A service port fittings and label
- 1 bottle of Flush Agent

The new hoses came with new green RES-style o-rings. Also, the hoses were of the barrier-style and the accumulator has the newer XH7 desiccant making them compatible with both R12 and R134A use. This is marked on the hose and the tank has a decal that notes it is for R12 or R134A. For the Motorcraft parts above, I bought mine through Torrie McPhail. I highly recommend Torrie for *any* Ford OEM needs. The prices and service from his company are a refreshing change to buying dealer parts.

Procedure: (Disassembly)

Now for the nitty-gritty. First, the A/C system will tax the cooling system of your engine. Now is a good time to look at installing that 180-degree high-flow thermostat, that three-core radiator, even that fan clutch for Special Service Vehicles (Police). Jim Dingell at PPI sells the Police fan clutch. I put in a 3-core Modine radiator (Part #2305). Start off with having a shop empty your A/C system, please. You should be able to find a shop to do this for free, for they are keeping your old R12. Drain the coolant system. Loosen the fan bolts, and then remove the belt. Remove the fan and shroud, then the radiator. Open the high-pressure line (goes from compressor to condenser) at the compressor fitting with the 7/8" wrench. Use the 12" crescent to open the low-side line (goes from compressor to accumulator tank) at the compressor fitting. Now use the 6.0 Allen wrench to remove the compressor fittings. Remove the 4 old o-rings from underneath the two fittings. Use the 5/8" fuel line disconnect to uncouple the high-side line at the condenser. To remove, press the tool into the connection until you hear a "click". Then twist and pull the line. The tool needs to come out at the same rate as the line, or you end up fighting yourself to uncouple the connection. Discard the high-pressure line. Use the 1/2" fuel line disconnect to uncouple the liquid line from the condenser. Back at the accumulator tank, use the 12" crescent and 7/8" open wrench to open the line coming from the evaporator. Use the 7/16" deep-well to remove the two nuts holding the bracket to the firewall. Disconnect the low-pressure switch's electrical connection. Now remove the tank.

You will use the 5/16" to transfer the bracket to the new tank. Use the 5/8" fuel line disconnect to uncouple the liquid line from the evaporator. Now use the 10mm wrench to remove the two screws that hold the brackets to the condenser. You will notice the condenser is set into the car much like the radiator. I drained what oil that I could out of the condenser. I then used Engine Degreaser and a brass bristle brush to clean the outside of it. I also blew a strong stream of water through the fins of the radiator. Once the outside of the condenser was clean, I used Flush Agent and poured several ounces into it. For about 10 minutes, I rotated the condenser from side-to-side to distribute the flush throughout the condenser. I then repeated this upside down, draining as much of the Flush Agent as I could out of it. I then used compressed air and the "pop" method to completely blow it out. The "pop" method is holding one finger over the small tube while shooting compressed air into the large tube, let your finger go and allow the air to "pop" out. Even though the evaporator was still inside the car, I then poured a few ounces into it, let it sit for 10 minutes, and then "popped" the flush back out of it. Once this was done, I then used a small screwdriver to straighten any bent fins of the condenser. Now was the time to remove the compressor from the car (12mm bolts) and drain the oil from it. Turn it over and turn the clutch a few times by hand to get all of the old oil out. I then opened one bottle of PAG oil poured a few ounces into the compressor and turned the clutch by hand a few times. This "washes" out the compressor. Drain the PAG from it.

Check all spring-lock connections and clean. Leave no traces of the old o-rings here. Replace any springs within the spring locks that appear worn. You are now ready for assembly.

Assembly:

Re-install the condenser, radiator, fan and shroud, etc. Re-install the compressor. Open the other bottle of PAG oil and pour 4 ounces into the compressor, then turn it a few times by hand. Now pour 2 ounces into the condenser, and another 2 into the evaporator. This gives a total oil charge of 8 ounces. I started putting the system back together by installing the FS-6 o-rings to the compressor fittings. Remember to lubricate all o-rings with the oil (or Nylog), much like you would an oil filter when changing engine oil. Install the compressor fittings. Install one pair of the #6 o-rings on the smaller of the condenser lines (bottom one). Lubricate the o-rings here and the ones on the opposite end of the new liquid line. Now install the liquid line with fixed orifice. Push the spring-lock connectors together until you hear a "click". Pull back to ensure they are locked. Now install the #8 o-rings on the other line of the condenser. Lubricate these as well as the single one on the opposite end of the high-pressure line. Install the high-pressure line. Do not over tighten. Next comes the accumulator tank. Lubricate the o-ring inside the coupler that attaches to the evaporator. I found it easier to open the tank bracket, slide it onto the firewall studs, and then drop the tank into place.

Start the nut that attaches the tank to the evaporator, tighten, and then tighten the bracket to firewall, then the bracket to tank. Lubricate the o-ring at the end of the hose. Finish by installing the low-pressure line to the compressor fitting. Install the R134A fittings to the service ports. Recheck all work. Wipe any excess oil off of the fittings and connections. Remember to fill the radiator with fluid. Install the R134A service port fittings.

Vacuum and Charge:

Now you are ready to connect the gauge set and vacuum pump. Using an R134A gauge set (or an R12 set with conversion), connect the red line to the high-side, blue line to the low-side, the yellow line to the vacuum pump. Open both high- and low-side valves. You should vacuum the system for at least 45 minutes once the vacuum gets to ~29.5". A vacuum is pulled to boil out any residual moisture in the system as well as prepare the system for the charge. I went one hour. Once finished, CLOSE BOTH VALVES on the gauge set. Now you can disconnect the vacuum pump.

It is very important that the high-side valve remain close while charging through the low-side. The high-side can develop very high pressure. The high-side pressure can cause the can to explode. If you do not feel comfortable with charging the system, please have this done by a qualified technician. Now is the time for charging. Connect a can to the yellow hose, pierce the can with the tap, then open the can tap. Slowly open the low-side valve on the gauge set. You should hear the gas now entering the system. Keep a close watch on the valve and only let the pressure get up to ~50PSI when charging the first can. Once the system starts to equalize, open the valve fully. Charge with the 3 cans (36 ounces) of R134A. CHARGE GAS ONLY! This means, leave the cans right-side up. Since the low-pressure service port is at the compressor, you should only charge gas. Liquid charging can damage the reed valve inside the compressor. Again, having the can right-side up charges gas, upside down charges liquid. When charging gas, be patient. It takes a while to empty the can this way. Put as much in the system as you can without the engine running. Then start the engine, turn the A/C to "MAX" and the fan speed on low to finish charging. I took off the low-pressure switch's connection and would jumper it to turn on the compressor clutch. Doing this, I would run the system for ~15 seconds, then turn it off. I continued this through the first can; increasing the time I would leave the system running with the increase of the refrigerant charge. Charge until both the line leading in and the line leading out of the evaporator is cold. The last step is to adjust the low-pressure switch at the accumulator tank. If you take off the electrical connector, you will see a small screw inside. For R12, that switch should be adjusted to turn off the compressor when the low side pressure reaches 25PSI. For R134A, it should be adjusted to cycle the compressor at 21-22PSI. Turning the screw counter-clockwise lowers the pressure cut-off point. Turning it 1/4 of a turn lowers the point by ~3 PSI.

That's it! Congratulations, you should now have cold A/C. Please fill out and install the label.

Pressures and vent temp - You want to check at idle and at 1800. You need to let the system stabilize a bit by waiting several minutes after inserting a couple of ounces of refrigerant before checking the low and high side pressures and the vent temperatures. I usually go for about 225-250 PSI on the high and 25-30 PSI or so on the low. You should get temps below 40. I can say that when I was charging, I could see that the high-side was creeping up while the motor idled. Once I saw it going over 200PSI, I would take a water hose and spray into the condenser. The high-side would almost immediately drop down to ~150PSI. As far as the vents are concerned, all that I can say is that my wife is happy with how the system now cools. You married guys know that if your wife is happy, you are happy. One other thought, my 88 LX is black. One thing that has helped this car is a complete window tint (35%). I used the metallized tint (titanium). For ~$200, It came with a lifetime warranty. The tint reduces UV by 99% and heat inside the cabin by 71%.

Notes:

High-pressure line end - When I got my new hose, I noticed that the end of the line that inserts into the compressor fitting was not "notched" (take a look at the old one and you will see what I mean). A couple of minutes with a dremel and fiberglass-reinforced cutting wheel took care of that. Oil - There are three basic types of oils used in refrigerant systems - mineral, POE (ester), and PAG. For a conversion where the mineral oil is not being completely flushed out, you should go with POE (called "ester") oil. PAG oil is a better lubricant with R134A, but is not compatible with mineral oil. The conversion kits all contain ester oil. This is another reason that I did not go with a kit, opting instead to buy my fittings, label, and SUVA separate.

Hoses - If you are flushing your system, yet not buying new hoses, do NOT flush the hoses. They are impregnated with mineral oil which should help hold in the smaller molecules of R134A.

O-rings - Always get the green RES-style rings. If you find blue o-rings from "Factory Air", don't use these. They are the black o-rings painted blue. R134A - Both of my Mustangs called for 42 ounces of R12. With R134A, you should charge to 85% of the R12 capacity. 36 ounces of R134A is close enough.

Vacuum pump - I thought about buying a Central Pneumatic venturi-style vacuum pump that runs on compressed air. It goes for ~$10. The closest competition I could find is a Robinair unit for ~$65. Yet, once I read about these units, the CP pump is not a good choice. First, one of the reasons to pull a vacuum on the system is to boil out any water (moisture, humidity) from the system. Water inside an A/C system forms an acid and eats away the system from the inside. Moisture also dispels the refrigerant causing the system to be less efficient. To be able to dispel the water, the vacuum brings down the boiling point of water.

The CP unit pulls 28.3" of vacuum. This means that the ambient temperature of the system must be ~93F degrees or higher to boil out the water as long as the unit is working perfectly. The Robinair unit pulls to 29.7", so the ambient temperature of the system only needs to be ~35F degrees or higher. Plus, the CP unit pulls 4.2CFM at 90PSI while the

Robinair pulls 1CFM at 75PSI. The Robinair unit is a much wiser choice for the BackYardMechanic. Also, note that vacuuming a system does NOT remove the oil. If you do what I did above by adding the 8 ounces of oil to the system before you put it back together, you do NOT charge with more oil.

If you feel real adventurous, you can also buy a new compressor that would handle the higher pressures of R134A better than the factory unit. You can also buy a bigger condenser. There is also a device out called the Smart VOV (Variable Orifice Valve) which replaces the orifice. Check out: http://www.acsource.com/ for more information on the Smart VOV. For what it's worth, if you do decide to install the Smart VOV, you will need to find a shop that will cut out your old orifice and install the Smart VOV in its place. Auto parts sell something that is called a "Liquid Line Repair Kit" which will aid in replacing the orifice with a Smart VOV. One last note, you can install an electric pusher fan in front of the condenser and use a relay to turn it on when the A/C is turned on.

Update (August 2005) - The LX is wrecked. Most of the car is now in the 1989 LX convertible that I have. I even used the A/C components in it. If you have questions about this writeup, feel free to email puterami@hotmail.com