Cool Air for the Hornet

I have derived great pleasure from "Doc", our '51 Hornet Club Coupe, since it came our way in early 2010.

Everything about this car has been perfect with one exception: Even with the superb fresh air ventilation system, Texas summers just make this car unpleasant to drive for 3 to 4 months out of the year.

It was with this deficiency in mind that I set out to install an A/C system in Doc.

I wanted to stay away from those shiny black plastic units that seem to be so common in the aftermarket A/C world. It just seemed that a car of this elegance deserved a period-correct, retro-looking under dash unit.

After much research, I settled on an all metal and chrome self-contained under dash unit from Vintage Air (www.vintageair.com). For reference, this is model 672001-VHY, "Mark IV Styline Underdash Evaporator". I opted to leave the existing stock heater unit in place.

The MK IV unit protrudes a bit farther out from the dash than I would have preferred, due to the heater box behind, but it does fit well, and leaves ample leg room for the center seat position, even for a 6'2" guy like myself.

Here are a couple of pictures of the underdash unit mounted in place:

The Vintage Air guys are located in San Antonio, just a couple of hours drive from my home in Austin. I found the salesman to be knowledgeable and efficient. He helped me choose an appropriate-size condenser (Parallel Flow 14" x 24"), as well as the commonly used Sanden 508 compressor. I splurged an extra $50 to get the polished compressor body.

I've installed several A/C systems on my classic cars, and over the years have acquired the necessary tools to do the job right. Since I have at least 3 more cars I plan to equip with A/C, I felt I should have the proper tools for the job. These include:

Master Cool 71550 A/C Hose Crimper

This tool at about $175 on the 'net, has paid for itself many times over in time and expense, and has eliminated the need to pay a shop to make up my hoses. Best of all, I can fabricate the hoses one at a time, right on the car and insure a perfect fit. (Note: Vintage Air sells

Electric Vacuum Pump

Do NOT waste your time on one of those Harbor Freight venturi air driven units. Spend a few bucks ($100 +/-) and get a good electric pump that will do the proper job of evacuating all moisture from your system before charging

A/C Manifold/Gauge/Hose Kit.

This unit, of course, is absolutely mandatory for evacuating the system with the pump above, and then proper charging with refrigerant. I've found the units from Harbor Freight at around $60 work just fine.

Mastercool 53351 UV Leak detector kit

While not absolutely necessary, I've found this kit handy to have in the rare occasion you have a leak in your system. It comes with a 12V-powered UV light, and all the dye and fittings needed to accomplish the job. at $60, it's a great tool to have around. Turns out it got to stay on the shelf for this project, but I would have hated to have to wait a few days for shipment of this if I had problems in the heat of the moment (pun intended).

A good quality hose cutting pliers

A/C refrigerant hose can be quite pricey at $2.20 to $5.00 per foot. I've kept a sharp eye out on eBay and managed to buy new 25 ft surplus rolls for $10 each. Short of this, of course, you can just order your raw hose and fittings from Vintage Air. They also offer an EZ Clip hose and fittings, which require a less expensive tool, but I prefer sticking with the more common "beadlock" crimped fittings, which look much more professional. It takes a length of #6, #8, and #10 hose to complete the installation.

When all my system parts were in hand, I estimate the total cost was right around $1,000 (not counting the tool cost of course).

My biggest obstacle with the installation was coming up with a suitable mounting bracket for the compressor. I've reviewed all available postings on the Hudson forum which document other Hudson owners' experience with A/C installation. There are many possible variations, including mounting the compressor on the right side of the engine under the exhaust manifold.

After much study, and with previous experience with a similar system I installed on my 1959 Jaguar, I decided to opt for a single-belt system to drive the water pump, alternator, and compressor. My installation would use an "L"-shaped mount for the compressor and alternator, using the existing generator mount bosses on the lower block, and the two forward head bolts to secure the upper end.

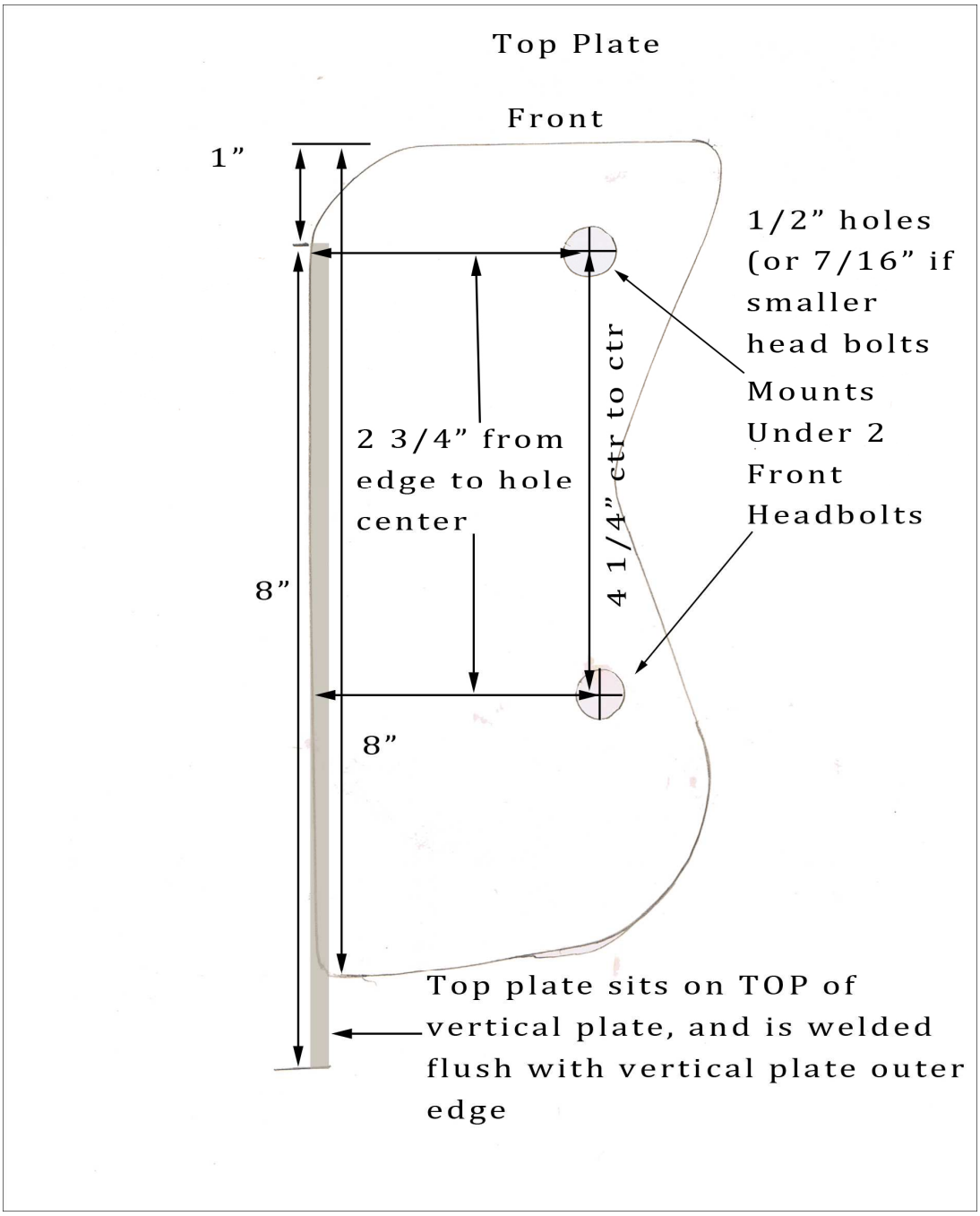
The compressor would mount low on the bracket, with the alternator positioned just above the compressor.

I decided to use 1/4" thick steel plate for the vertical plate of the mount to provide adequate rigidity, and enough depth for drilling and tapping mounting holes, but then chose a thinner 12 gauge metal (about 1/16" think) for the shorter leg of the "L" bracket, which will mount underneath the two forward head bolts. By using the thinner metal for the upper plate, and eliminating the original washers under the head bolts, I didn't have to worry about sizing longer head bolts.

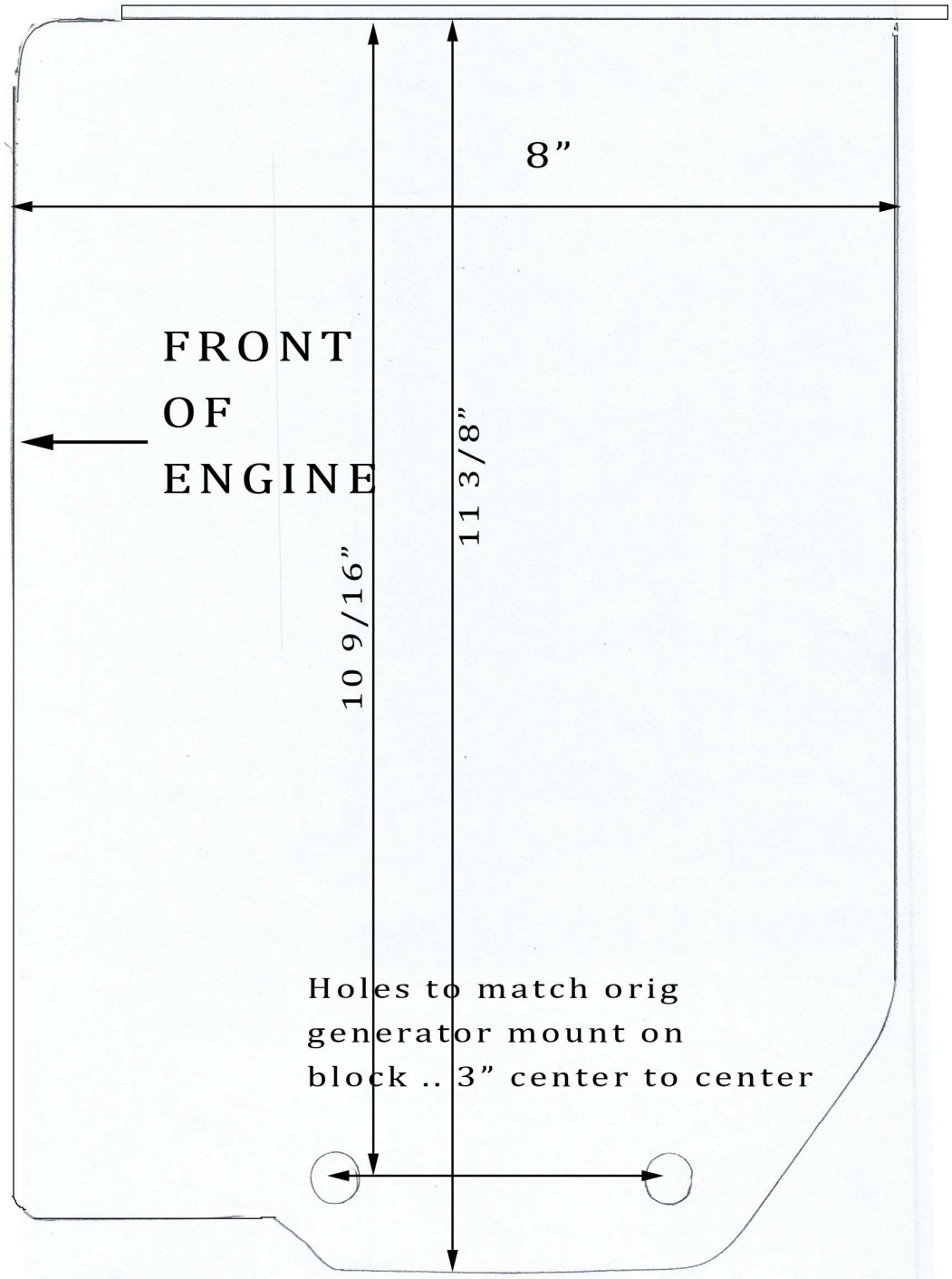
I used a TIG welder to weld the upper plate onto the lower, then added an additional 1/4" x 1/2" reinforcement bar underneath the joint for additional strength.

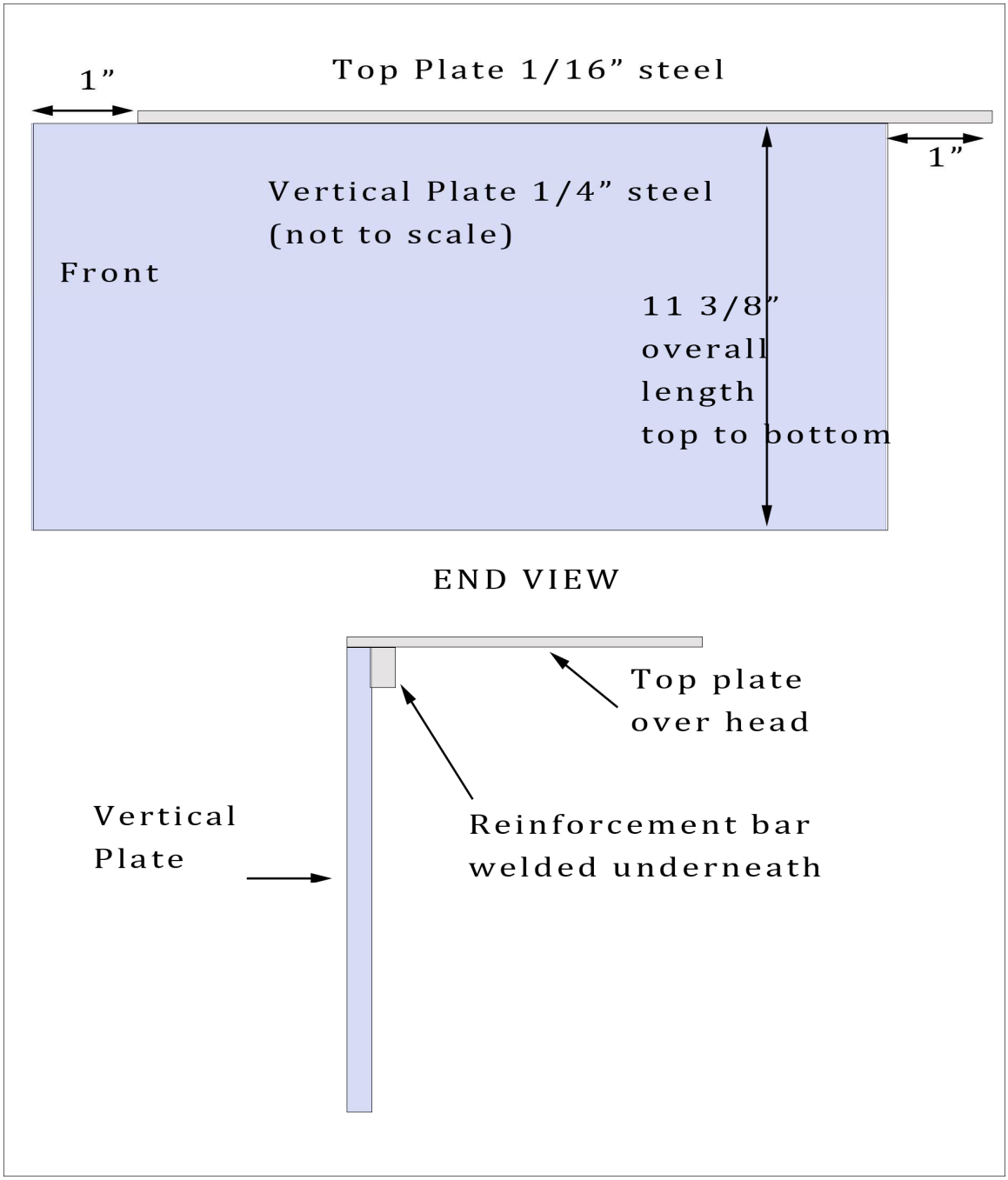
After welding, I used a grinder and rotary sander to clean up the weld, then sanded and polished the metal to a mirror finish. (No, this is not stainless steel, aluminum, or chrome... just plain old steel plate. Once polished, I cleaned up and added several coats of high temperature clear coat to protect the steel). Here's the finished bracket:

Here are the actual dimensions I used in constructing the compressor mount (tracings were taken from the actual completed pieces):



Vertical Plate





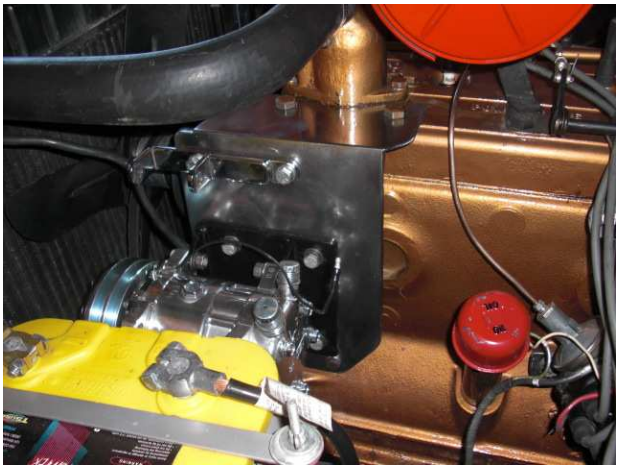
You can download separate acrobat files with actual life-size dimensions of these drawings at:

http://www.auldridge.org/garage/vertical view.pdf..... top piece.pdf ... cross section view.pdf

These files should be exact real life dimensions which can be printed out and used as a template to construct a similar plate (the vertical piece will require 11x14" paper)

Rather than reinvent the wheel, I purchased a ready-made Sanden compressor mount bracket. These are available from many online parts sources, but the cheapest I found was at www.BritishAC .com for $39, and nicely powder-coated. Notice the slotted holes which make it easy to position the compressor fore and aft for a good match up to the driving pulley:

My car already had an alternator, with its own bracket, so I was able to recycle its use for this configuration.



After completing the engine bracket, I temporarily installed it on the engine block for trial fitting and marking of the correct position for the alternator and compressor bracket mounting holes, making sure each unit lined up with the drive pulley. I aligned the AFT-most pulley on the compressor with the drive pulley, in case I might want to employ the forward pulley at a later date.

Each of the brackets was secured to the main mount plate by drilling and tapping holes for 3/8" bolts. I positioned the holes for the compressor mount mid-way between the mount slots to allow for proper fore/aft adjustment.

The alternator bracket had no adjustment slots, but there were 3 positioning shim washers used for the bolt connecting the alternator to the bracket, which gives about 3/8" adjustment. Therefore, it is more critical to get the mounting holes in exactly the right place!

After mounting the compressor on the lowest possible position on the mount, the alternator is mounted above (I positioned the alternator bracket as high up on the engine mount as was feasible).

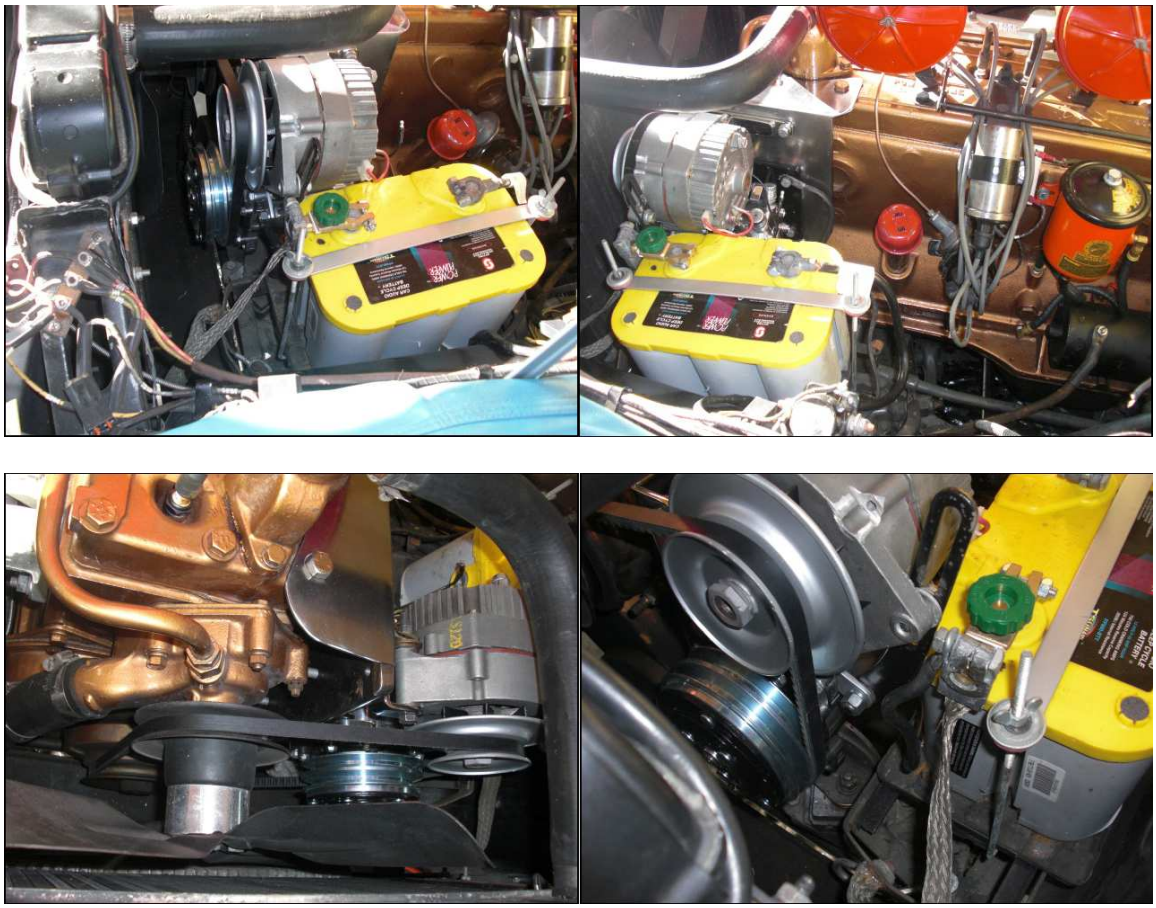
The adjustment for belt tightness is done only at the alternator. The compressor is rigidly mounted at all four mount lugs. I removed the existing alternator adjustment bracket from its original position on the water pump stud, and repositioned it to connect to the outer (and upper) mounting ear of the compressor.

In order for the adjustment bracket to clear the alternator housing, I had to fabricate a small offset bracket (The 1/4" additional thickness was also just enough to perfectly line up the alternator and compressor attachment lugs) to attach to the compressor mount lug, using 3/8" bolts.

I determined the belt size needed by mounting the alternator then lowering it to the slackest position (basically resting on the compressor sitting below), and then cutting an old belt I had laying around which was slight larger than needed. I was able to wrap the old belt around the pulleys and mark the correct length, taking it to the parts store. I wanted to make sure the belt was as tight as possible in the slack

position, to give ample adjustment room as it stretches. I hit it just right on the first try. The belt was so snug that I had to loosen the alternator bracket mount to get the belt over the pulley, but once in position it was the perfect length.

Here are pictures of the completed alternator/compressor mounting:



Note the tight clearance between the battery and the alternator adjustment bracket. I had to reposition the battery box several inches rearward to clear. As I have time, I plan on lowering the battery box platform, to adequately clear the alternator. This will require some cutting, grinding and welding, so that will have to be another day!

To run the refrigerant hoses from the cabin to engine compartment, I decided to use "bulkhead" hose fittings, rather than just drill a hole and pass the hose through a rubber grommet. These fittings provide an absolute leak-tight connection through the firewall to prevent any hot air from entering the passenger compartment. The total additional cost of using these fittings is only about $20, and it simplifies the correct measurement and installation of the hoses.

Although not shown fully in this picture, the larger #10 low pressure hose on the left used a 45 degree hose fitting. The hose is then run parallel to the steering column brace, then back up to connect to the compressor. The smaller #6 line to the right just follows the main wiring bundle along the top of the inner fender to connect to the receiver drier. Straight fittings were used for this hose at both ends.

I mounted the receiver-drier in the front left hand corner of the engine compartment, just in front of the battery:

For the condenser, I chose a parallel flow unit with dimensions of 14" x 24". I mounted the condenser as far to the left of the radiator opening as possible (facing the car), to give adequate room for connecting the refrigerant hoses on the right side. I used 2 90 degree hose fittings to route both the hoses straight down from the condenser, and underneath the car. The smaller #6 hose then is routed right back up to join the receiver-drier (via another 90 degree fitting). The larger #8 hose was secured underneath via an Adell clamp through the lower sheet metal shield, to connect to the compressor using a 135 degree bend fitting (with service port).

An auxiliary electric fan is a must with an A/C system. My car already had an electric fan installed, along with a thermostatic switch. Unfortunately, after installing the condenser, there wasn't enough room left behind the grill for the existing fan, which was about 3.5" thick.

I installed a SPAL fan purchased from www.the-fan-man.com. Part #0517 It is a 16" pusher fan that is only 2.48" thick. With an airflow of 1610 CFM, it will be perfect for those hot summer days.

Finally, there was a simple wiring exercise to connect the A/C system. This task couldn't be easier. There is a single, fused, main power wire from the under dash evaporator to tie in to your fuse block (I had previously added a 6-slot switched-by-ignition fuse block underneath the dash, using a 40 amp relay to protect the ignition switch contacts from high current... it was a simple matter to snip off the provided inline fuse, and connect the power wire to an unused fuse position on the block).

From the evaporator, a single wire goes through the firewall (I pushed it through the same grommet used for the main wiring harness) to activate the compressor clutch. This wire passes through a trinary safety switch (provided by Vintage Air) installed on the receiver drier unit. The function of this switch is to cut off power to the compressor in case refrigerant pressures become abnormally high (indicating a blockage in the system) or abnormally low (resulting from loss of refrigerant). The safety switch also has a separate circuit to trigger the fan relay anytime the compressor is activated.

Important note: When initially charging the system, there will not be sufficient pressure at the trinary switch. Therefore, the compressor will not be able to get power. For initial charging, it is necessary to bypass the safety switch (this

requirement, strangely, is not mentioned in the Vintage Air installation instructions).

To facilitate this process, I used insulated male-female spade connectors on the 2 wires coming from/going to the safety switch. I alternated the gender positioning for the two wires, so that I could just disconnect from the safety switch and connect the wire coming from the evaporator directly to the compressor.

Now for the best part: After uneventfully charging the system with refrigerant (Vintage Air suggests about 28 oz. of refrigerant, or slightly more than 2 cans, using high-side pressure as a guide), I fired up the system for the first time.

My first pleasant surprise was to discover that the single belt configuration works flawlessly (I had some concerns that the rather minimal belt contact around the compressor pulley might result in belt slippage). That little Sanden compressor requires such little torque to drive it that there was no tendency for belt slippage or squealing, and no need for excessive tightening of the belt tension. Just perfect results, with a very simple installation.

The next pleasure was sitting in the passenger compartment and getting my first blast of cold air from the system. Holy cow!... this 3-speed fan (dual blower cages internally) puts out a gale force of air, yet with a minimum of air noise. This little jewel was blowing so hard that my hair was streamlined, as though I was in a convertible! Best of all, the air temperature was cold, cold, cold.

I began the initial operation with, of course, highest speed fan, and coldest setting on the temperature dial. In a very short time, I found myself turning the fan speed down to medium, then not long after that, down to low. I swear the amount of air moved at the low position is greater than the maximum flow my wife's Lexus can put out! Once on low speed, then I had to start reducing the temperature knob to prevent having to don ear muffs!

I'm very pleased with this system, and only regret that summer in Texas is just about over!