

## Birth of a Restomod!

### Part #1

This is the first in a series of short articles where I will try to explain the issues and hurdles that we jumped over during the 8 year build of our green 67 Mustang. We initially acquired it in 1996 on a lark - knew nothing about the hobby and although we had some mechanical skills, had never done major renovations before. We THOUGHT that we could 'drive' the car and have some fun - I was lucky to make it the 3 miles to my house!! The floors were rotted, the front suspension was ready to fall off, and the power steering was leaking faster than it could be filled. We also found that it had a later model 302 motor, with a Craftsman Socket shimming in the Alternator (someone had at least painted it Ford Blue!!) The paint was 4 layers deep, and EVERYTHING was painted maroon! Note to self - next time, take someone along who knows issues with Mustangs!!!

We started to disassemble it - and here is the first lesson - you simply can not catalog enough - document beyond what you THINK you will remember - tag EVERYTHING, and take TEREBYTES (that's PC lingo for LOTS) of digital photos. Unfortunately, not knowing any better, we didn't do much of any of this - cost us some time and materials later.

Second MAJOR lesson - have a plan from the outset - we didn't know about the convertible conversion process initially, nor did we know about the 5.0 Fuel Injection possibilities. Back then, the internet did not have the WEALTH of information that is out there now, nor were there as many options.

When we stripped EVERYTHING off of it to a bare hulk, it was real helpful to have an old trailer axle to strap to the rear springs. At this point, two adults could lift the front end and wheel the body around. We took all of the major sheet metal items to a company in central FL that immersed the parts in hot lye - it removed all the paint, bondo, sealer and rust. No "soft metal" items were allowed (aluminum, pot metal etc) After they washed this off, they sprayed everything with self-etching primer - things rust within 5 minutes if left exposed in south Florida! While this process is excellent, there is one issue - over time (thankfully it was a LONG time till we painted) some of the lye would leach out from several of the overlapped surfaces and the primer would bubble and flake off. Eventually this ceased on its own.

Photos show: #1:My two "helpers" in the hulk, #2:Sheet metal parts loaded on trailer going to get "dipped", and #3:layers of paint (Original Aqua, yellow, metallic blue, and maroon) on turn signal assemblies.





## Birth of a Restomod

### Part 2

Well, once we decided to go Fuel Injection and T-5 manual tranny, we also looked into switching to an 8.8 rear. Back then, I believe that there was only one company (Windsor Fox) that would 'convert' an existing 5.0 fuel harness for installation into an older vehicle. Thus, we set out to find parts. We came upon a wrecked 92 Florida Highway Patrol car with everything we wanted, including the A9L computer. We set about stripping the parts out of the car, then took out all other parts that could be sold for spare change. Since Ebay was not available back then (or at least I was not aware of it) we were pretty much restricted to local folks that wanted a window etc. Ebay would have been MUCH better!

At this point, we really didn't know exactly what we were going to do with the motor, or if/how we would change the rear differential. We DID post the original 302 motor and C-4 Tranny for sale - note to all you guys out there - IF you leave these things for your wife to deal with while you travel out of the country, make sure she understands that the Engine Stand DOES NOT go with the motor being sold!!! (I'll pay for mentioning that, I'm sure---)

Lessons here: Have some 'demolition' tools available - like a cutting torch and/or and air chisel. Remember, if the frame is damaged and not salvagable, why not cut off the front end - makes engine removal easier! Also, be ready with an engine hoist and engine stand. For the wire harness, I got carried away attempting to 'clean it up' and remove all of the dried tape etc. Windsor Fox declined to rebuild it and instead I had to buy one of their harnesses outright. Although they are now out of business, I have seen several other companies who make complete harnesses for this conversion. DON'T be afraid of the wires - in retrospect, and especially given the wealth of information currently available, I could have rebuilt the harness myself. Also, you can plan on buying all new sensors, like the O-2, Mass Air Flow, EGR etc. Likely on an older car they are worn or corroded. In any case, SAVE EVERYTHING related to the engine and drive train - we also decided to keep the Ford Special Service tag denoting the vehicle as belonging to the Florida Highway Patrol

Photos - #4: Wrecked Car in Garage, #5: Engine removal out the front.



## Birth of a Restomod

### Part-3

In this segment, I'll cover my home made rotisserie. Although I was just learning to Mig Weld on this project, I got REAL tired REAL quick of welding on my back and having hot splatter fall on my legs and stomach - SO, I devised my own rotisserie which employed large sawhorses. I started by going to the local metal store (like Jeffords near the airport) and bought some 1/4" plate steel that would span the tail panel and also reach across the front frame rail. To this, I welded some short sections of 3" diameter pipe. In order to get the front 3" pipe in the same plane as the one protruding out the back, I had to weld some extensions on my front bar to raise it about a foot higher than the lower frame rails. I bolted the front device to the lower frame rails, and bolted the rear attachment to the same points that the rear bumper normally bolts to. For the front, I used a large standard saw horse, placed across the front end. I lifted the car so the 3" pipe rested on the saw horse, and then constrained the pipe by using two long lag bolts into the top of the saw hores either side of the pipe. For the back, I initially used a similar sawhorse placed in line with the rear of the car, but judged this as too unstable. Instead, I built a large "A" frame structure out of 2x12 such that the 3" pipe protruding out the rear of the vehicle rested in the top of the "A". This proved to be quite stable. The car was balanced normally on two regular jack stands with about 1-2" of play. All I had to do was slightly lift the car and remove one jack stand. I could then rotate the car in that direction and use the remaining jack stand to support it at the 90 degree position. If anyone would like them, I still have the steel structures - you'll just have to provide your own saw horses and wood supports! As for the welding - it is not difficult and gets better with practice. I have some training videos if anyone would like. I still find many uses for the MIG to this day - a very worthwhile investment.

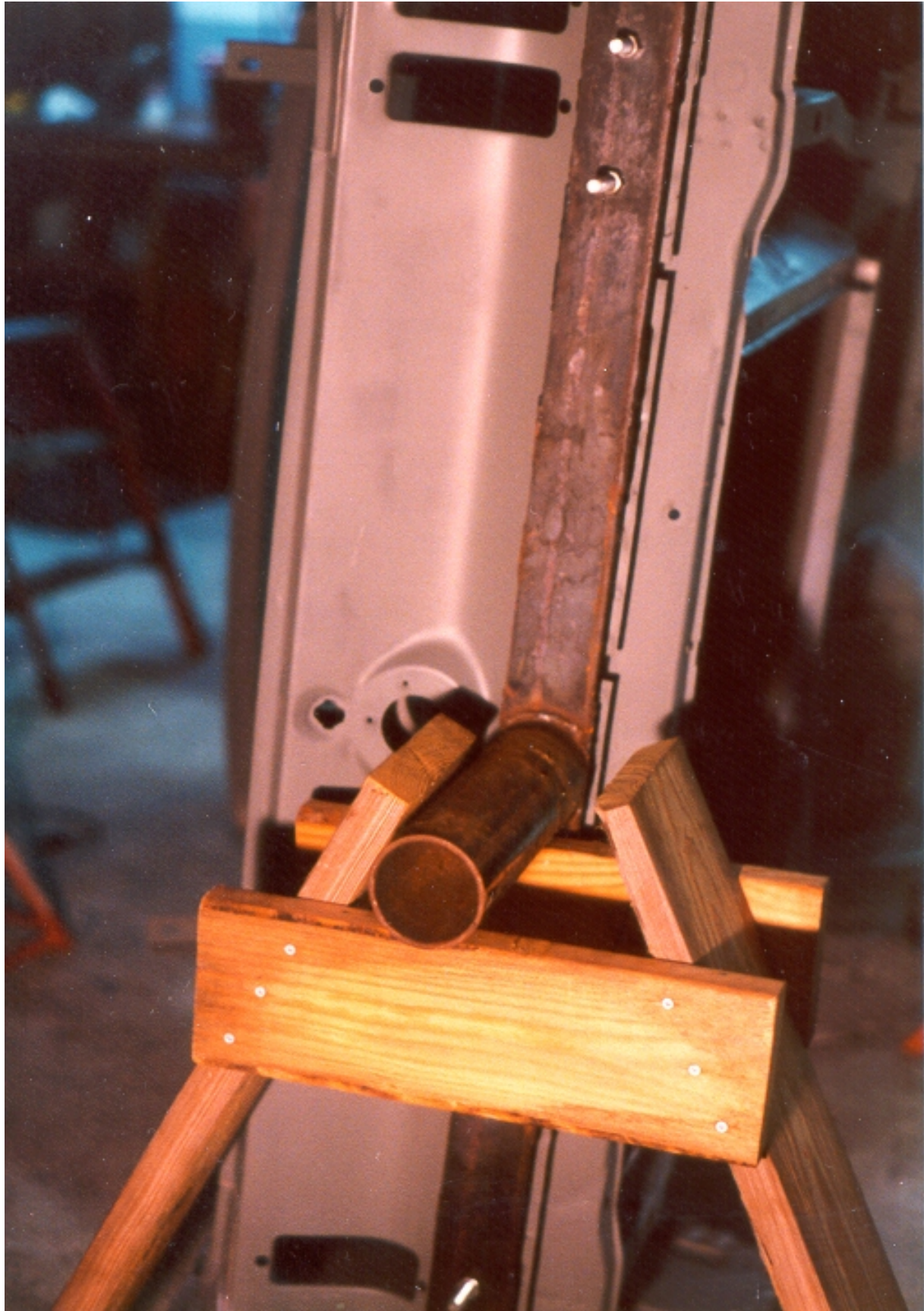
Photos: #6: Vehicle Rotated on initial rear support. #7: Vehicle rotated on NEW rear support #8: Closeup of new rear support #9: Wide shot of front support saw

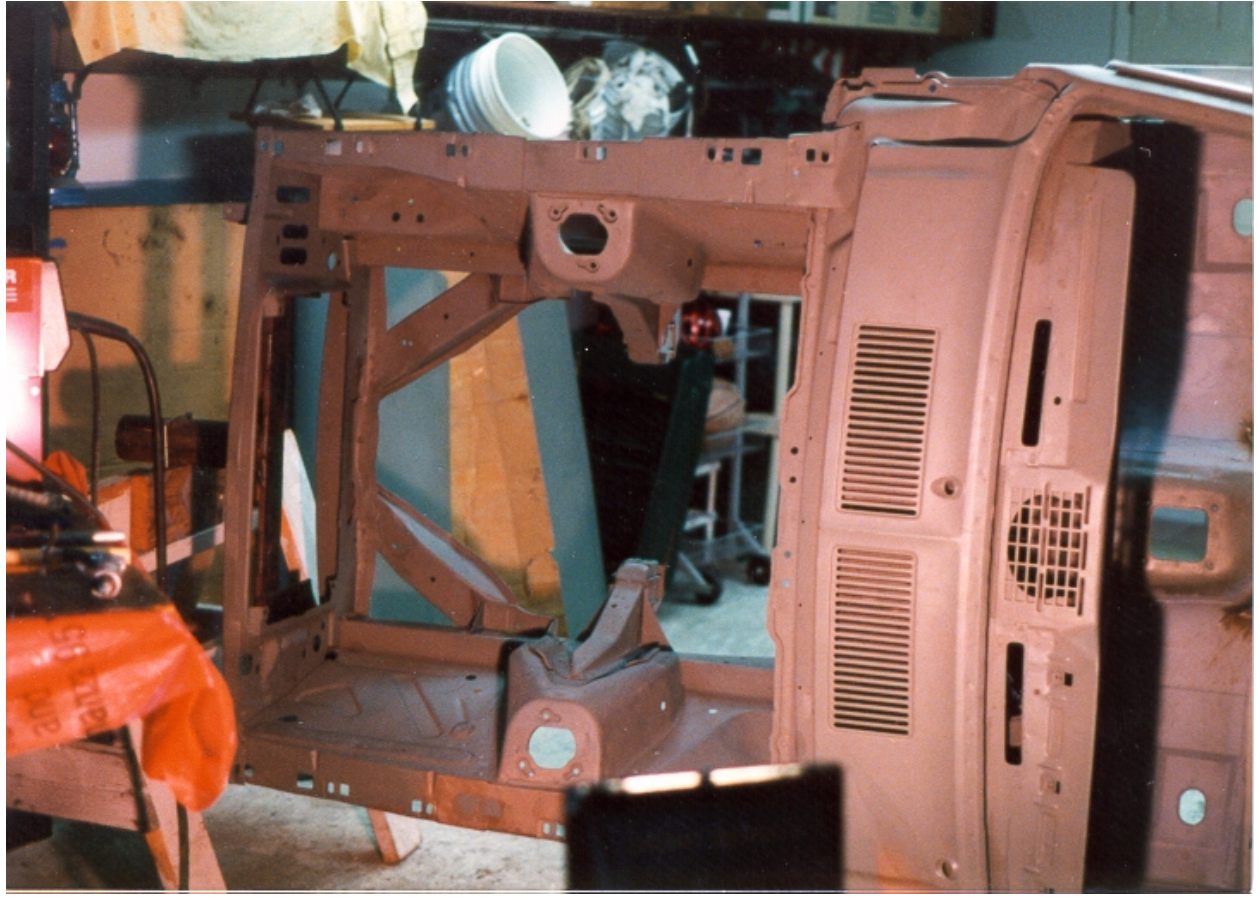


horse.









### *Birth of a Restomod, Part 4*

In this segment, I'll cover the sheetmetal repairs and how we got there. After completely removing ALL parts of the vehicle, I took the major metal parts (body, doors, hood, trunk deck) to a company in Wachula FL that immersed the parts into a hot lye solution that removed all paint and bondo. They followed this with immersion in an acid solution which removed all rust. Finally, after the parts were pressure washed clean, they were painted with a self etching primer. There are MANY blogs on the internet that talk of this procedure – and they run the gamut from absolutely terrible to wonderful. For my part, I DID experience some post process primer peeling away near some overlapped metal joints, but it was easily corrected and only lasted about 1 or 2 months. As I took several years to fix all the sheet metal needing repairs prior to paint, this was a non issue (I am convinced enough of this process that I intend to do a similar rust removal series on our newly acquired Corvair when the time comes.)

What came back from the tanks was a fair amount of “swiss cheese” metal. At least I knew where I had to remove and/or repair it! Also, besides repairing the rust weakened areas, we began to install the body strengthening members that were part of our convertible conversion kit.

In the end result, we replaced both rear quarters, both front fenders, the hood (in order to get the in-hood turn signals), both entire floor pans, and parts of the lower sections of both doors. The frame strengthening involved ¼” plate metal welded along both side rails, across the car in front of AND behind both seat pans, and a series of plates up and over the transmission tunnel. In addition, there are two channel tubes measuring 2”x2” that connect the front and rear frame rails, and a 4”x6” channel tube that connects the right side rail to the right front frame rail. This last piece serves as a torque box. The coupe has a factory torque box on the drivers side only, while the real convertible has one on both sides. ALL of this welding was greatly facilitated by the home-made rotisserie that was detailed in the last article. Only after the entire set of new floor pans and frame strengthening members were installed did we proceed to cut off the roof. Had we done this first, the body would have folded in half!

Lessons to learn here: We did most of our cutting with a high speed die grinder / cut off tool. This was an invaluable device that made LOTS of sparks, and was greatly enjoyed by the boys. To properly use this device, you need LOTS of AIR! Our little garage compressor was essentially useless, and thus we acquired a significantly larger unit to handle the required CFMs (Cubic Feet of Air Per Minute) of the tool. When looking at a compressor, the higher the number of available CFMs at rated PSI (usually 90 or 100), the better. For any given compressor, the lower the PSI requirements of a tool, the more CFMs from the compressor that will be available. (example: a compressor capable of 18 CFM at 90 PSI may have as many as 25 CFM at 40 PSI) Second lesson: Mig welders are GREAT, and are not that expensive. Best to get one that uses GAS to shield the weld vrs a unit that must use flux core welding wire and no gas. The gas is a mix of argon and CO-2 and forms a ‘shield’ around the immediate area being welded to reduce splatter and eliminate oxygen from the weld. I learned that welding is an ART – you can learn the technicalities but it takes PRACTICE! Some of my welds are prettier than others, but so far (knock on LOTS of wood), they have all held. I still use the welder frequently to repair or build new items. Final lesson – when reinstalling quarter panels, ESPECIALLY non-NOS, you need the doors installed to perfect the alignment. I didn't

do this, and didn't really see the mis-alignment until WELL after paint time! Now I know that Non NOS parts are anything but exact replicas!!

## *Birth of a Restomod, Part 5 Front Suspension*

This installment will show the installation of the Mustang-II style front suspension. Without doubt, this was the best modification I made to the car, and truly makes it nice to drive. The essential elements are the removal of both shock towers, and the installation of a cross member along with appropriate suspension attachment points to accommodate two “A” arms with a conventional spring and shock between them. Because of the arrangement of the modification, a power rack and pinion steering system is employed. The unwritten benefit is the incredible increase in engine bay area and the stiffening of the front end.

We began with a complete kit from ROD & CUSTOM Motorsports, Florence SC. Mr Willie Osborne is a great guy to work with, and we acquired several other items from him at the same time (such as 4 wheel disk brakes, Haywire wire system, and complete A/C system) The kit contains all elements to make the conversion, including such items as steering column U-Joints and complete front wheel disk brakes. As the car was already stripped to bare metal, the removal of the engine was not an issue. We carefully cut around the circumference of the shock towers and removed everything down to the box frame rail. I also removed the strut rod brace points across the front of the car, though this is not required. Photo 1 shows the area covered by the former shock tower and the newly welded in cross member along with the upper spring perch and the right side motor mount. There is no significant measurements involved for the cross member – simply place the cross member in the center of the shock tower opening and keep it square to the frame rails. The cross member comes with brackets covering two sides of the box frame rail, while the upper spring perch has brackets covering the remaining two sides of the box frame rail.

With these parts welded in place, most of the remaining items are bolt on. Shown in photo #2 is the completed right front suspension including both “A” arms, spring, shock, spindle, disk and brakes. At this point, wheels can be reinstalled and the vehicle rolled as necessary.

The next step was my most feared. In order to properly place the engine mounts, the block has to be suspended over the engine bay in the exact location that it will eventually sit. Brackets are bolted to the block, while the supplied engine mounts are trimmed in their vertical length to place the engine correctly. The vertical portion of the mounts are then tacked to the cross member, and the block removed from the area. Once clear, the vertical mounts are securely welded in place, followed by a horizontal brace from the vertical mount outward to the box frame rail. Though I was VERY worried about getting this correct, it all worked out in the end.

Two items remained – the steering setup and patch panels to fill the voids left by the former shock towers. For the steering, Rod & Custom will either modify your existing column (making it shorter) or sell you an IDIDIT column (which is really a modified GM setup). I chose the IDIDIT, as I also wanted the tilt function available with that model, AND the ability to modify the turn and tilt levers to incorporate the Hi/Lo Headlight switch and the Fog Light switch. Installing the column itself is very easy, and it is joined to the power rack and pinion steering box via two U-Joints and a shaft bar, all supplied in the kit. The patch panels are preformed. They may either be welded in and finished accordingly, or bolted in. I opted for the bolt in, thinking that it might make access to the side of the engine easier in the future. In the end, that was unnecessary, as there is plenty

of access room without removing the panels. (a big block installation may be different however)

Photo 3 shows the completed installation of the cross member, engine mounts, rack and pinion steering box, and front sway bar. I would highly recommend this modification to anyone with an older car that wants to improve the handling while really opening up the engine bay.

## *Birth of a Restomod Part 6 Paint*

This segment will detail some issues related to primer and paint application. Although I have had no formal training, I did have the good fortune years ago of assisting a good friend in the military who painted my car and an aircraft we were rebuilding together. Like welding, it really is an art that takes practice to get good at. I was just lucky! After all the sheet metal repairs were done, we applied the MINIMUM amount of body filler to smooth out any high and low spots. There are many who don't believe in body filler, but if you use it, there are two things to remember. One, it is **POUROUS!** Water **WILL** seep thru from behind and ruin your paint! Metal covers holes, **NOT** bondo! Second, it will shrink if applied in great gobs. You must build it up slowly, with no application being greater than about 1/4"! We tried to use the minimum necessary.

In order to paint in our garage (which was a standard 2 car width, with an additional 1 car width that I had built on to the side of the house) we built our own paint booth. This was simply some 1x2 furring strips screwed to the sheetrock ceiling which served as tack strips for heavy clear plastic acquired at Home Depot. Once the plastic was stapled up, we applied a second fur strip over top of the original to sandwich the plastic between them and hold it firmly. The bottom of the plastic was allowed to drape over the floor several feet and was held in place with multiple 2x4 sections. In order to make a door, Home Depot sells an adhesive zipper – press it onto the plastic, open the zipper, and cut your door opening. For ventilation, we installed several furnace filters into one side of the “booth”, and a box fan into the other side. If I were to do this again, I would add more filters, as the fan attempted to draw too much air and the sides of the booth kept moving inward due to the negative pressure. Finally, just prior to paint, we wet the floor with water from a pressurized bug sprayer – just damp enough to keep any dust at bay. For underneath the car, we used Eastwood's Chassis Black. For those not familiar with Eastwood, visit their web site and get their catalog. I have not found a better source for restoration supplies, specialty paints, and body tools.

The main body is Dupont Chroma Base and Chroma Clear. It is **VERY** important to **NOT** mix different vendors when applying primer and paint. I depended entirely on the advice of my local paint and supply shop for guidance. (Locally, I have found Saratoga Paint and Auto Body Supply located on Trade Road by the county jail to be an excellent source of these items) This paint and clear coat are not difficult to use, but you will need a good HVLP (High Volume, Low Pressure) spray gun and an appropriate breather mask. While I did not use one, I would use a full **NON-LINT** body suit were I to do this again. These are available from Eastwood at a very reasonable price and would have meant less wet sanding when the clear coat cured!! The biggest issue to face in the painting is that once you start, you **MUST** get the clear coat on within a few hours, so everything has to be ready to go. I would estimate that 90% of the paint ordeal is in the preparation and setup.

Following the application of clear coat, wait the specified time before performing the color sanding. This process involves sanding the entire car, by hand, with 1500-2000 grit paper. This is almost like paper for your laser printer! The real effort here is to knock down any orange peel or imperfections. After the wet sanding, the car is buffed with several varieties of polish (similar to different grades of sand paper) and then finished off with a quality swirl remover (I favor McGuire's products for this) It is a **VERY** laborious

process, and was the point where the participation of the boys ceased! You MUST be careful with this as it can be easy to burn the paint with the buffer if applied too aggressively. While I was lucky enough to not have this happen, I did have one problem that almost brought me to tears. After all the sanding and polishing was done, I attempted to install a vertical door edge guard on the passenger door. It promptly chipped all the paint off the door where it was being applied. Needless to say, the entire door had to be sanded, repainted, cleared, sanded again, and repolished. Those door edge guards wound up in the trash!

One trick I have learned since is block sanding. Just prior to final primer application, the car is lightly dusted with dark, inexpensive lacquer paint, and then sanded. This will easily reveal those small dents that are virtuously impossible to see in the primer, yet show up so well in the glare of sunlight – I'll get that part better next time!



### *Birth of a Restomod, Part 7 Rear Disk Brakes*

In this installment, I'll cover some of the issues that I encountered when converting the rear axle that I acquired with the 1992 Florida Highway Patrol Car to Disk Brakes. At the time, there really weren't very many options or suppliers of complete kits as there are today. The likes of Stainless Steel Brake Company and Master Power Brakes have made this MUCH simpler. Nonetheless, I was determined to proceed.

The first thing to know is that the rear axles must be removed in order to remove the existing brake backing plate. This involves removing the rear cover from the 8.8 differential and taking out a small bolt that holds the center gear pack pinion inside the differential. This allows each axle to be pushed inboard slightly in order to remove the "C" clip that retains the axle in the differential assembly. Issues to be concerned with here center on the small bolt mentioned above – it is threaded near the head of the bolt and can sometimes break if it was previously over-tightened. As is USUALLY the case when doing some modifications, you talk yourself into doing some ADDITIONAL mods, just because you 'happen to be in the area' For my part, I decided to convert the rear gears to 3.55 (from 3.08), add an Auburn "Spool" (locking differential) and convert the axles to 31 spline (from the 28 spline OEM style) with 5 wheel studs. Yes, I know it was probably unnecessary, but-----

Anyway, with the brake backing plate removed, you now have a small flange with 4 bolt holes. See Photo 1. From this point, the supplied brackets bolt to the axle flange, the rotor is installed over the hub, and the brake caliper bolts to the supplied brackets. Photo 2 shows the complete brake assembly – note the spacers between the two supplied brackets – my initial spacers were too short and the pads would not align with the rotors! Photo 3 shows both brake assemblies and rotors on the axle.

Next comes the hydraulics. I opted to make all new lines for the car using stainless steel tubing. The flaring of this material is not as easy as steel, but I liked the bright finish on the tubes. Instead of one flex line from the body to the axle (as in OEM), I tee'd the line above the rear end and utilized one flex line on each side direct to the caliper. (Just happened to have two flex lines---) The vendor supplied a dual disk master cylinder and a proportioning valve. As the shock towers were removed, the installation of this (much larger) master cylinder presented no issues. (Photo 4) The proportioning valve is necessary to allow you to adjust the differential braking between the rear and front wheels. Essentially you perform some braking tests and adjust the valve so that the front brakes supply the higher level of stopping power.

All that remained was the emergency cables and bleeding the system. The cables hooked up without issue (Photo 5) to the lever that extends from the center of the caliper piston. Now for the bleeding – I learned two items here: First, when using DOT-5 fluid (which is silicone based) it is virtually impossible to get a firm pedal! We bled that thing for WEEKS! Silicone fluid is generally preferred in older cars as it does not attract and retain moisture (can you say internal corrosion) like DOT-3. It is also NOT corrosive to paint. BUT, it DOES keep thousands of entrained TINY bubbles in it! I've since learned that the best way to bleed DOT-5 is to allow it to GRAVITY drain thru the system, thus avoiding to the maximum extent any introduction of those tiny bubbles. The second thing I learned is that with calipers that have internal emergency brake actuators, it is critical to adjust the caliper for the pads to be VERY close to the rotors, and to frequently apply the emergency brakes to KEEP the calipers in adjustment. These type calipers

were originally from early 70's GM products like the Olds Toronado. Apparently from what I learned following installation, they were very troublesome back then, as few mechanics understood the adjustment procedures. Those of you with late model Ford Trucks will note that the rear disk brakes actually have DRUM brakes for the emergency setup INSIDE the hub of the rotor. I think this is a MUCH better setup than the internal style employed in these calipers.

In retrospect, it would have very likely been better to leave the original drum brakes given the type of driving that the vehicle will likely encounter. The rear disks would be the better choice if the car were used in heavy brake applications such as road racing.

### *Birth of a Restomod, Part 8 Air Conditioning*

This article will cover the installation of an under-dash air conditioning unit. While this would not be a very likely modification here in the North Country, we felt at the time in South Florida that it was mandatory, even in a drop top! (Yes, we often had the A/C going to blow cool air in our faces while driving around downtown Miami with the top down in our 2000 GT!)

This kit was developed by Vintage Air of San Antonio TX, and was complete with the exception of a compressor. While it could be used with either R-12 or R-134, the availability of R-12 and the tight controls that the EPA has on that product make it a no-brainer to choose the R-134 route. The system works with any compressor, and, in this case, we chose a Sanden with the Serpentine belt pulley to match our '92 5.0 engine.

As you will do a lot of work under the dash, it would be very helpful to remove both front seats. In our case, the seats had not been installed yet. Installation starts with the removal of the existing heater, heater duct, defroster hoses, and the cover for the center panel outlets above the radio, all of which are discarded. Also removed at this time are the control panel and the glove box. The control panel has its OEM cables removed and replaced with those from the kit. The glove box gets slightly modified by cutting off the right rear corner and attaching a cover plate such that an additional inch of clearance is provided behind the closed glove box. Next, we install the provided outlet louvers in the top center of the dash, and one at each kick panel. (I made a slight modification to the kick panel louvers by installing small chrome trimmed lights that worked off the interior light circuit during this step)

Now comes the really nice part. The entire system is enclosed in one housing – this includes the fan blower, the heater core, and the air conditioning evaporator core! Simply lay this assembly on the floor, hook up the cables to the control panel and the ducting to the dash louvers and defroster outlets, and you're ready to lift into position under the dash and secure to the firewall! Photos 1 & 2 show the unit already lifted under the dash, while photo 3 shows the protrusion thru the firewall which contains the heater inlet and outlet, and the two fittings for the A/C Freon hookups. The small blue wire is for control of the A/C compressor clutch. Note also that there is a manual cable control of the engine coolant flow to the heater core. With one power wire hookup under the dash to the fuse box, the interior section is complete.

Next comes the under-hood part. The engine fan and radiator must be removed in order to attach the A/C condenser in front of the radiator. Clear instructions are provided and the condenser fits nicely in front of the radiator. The final mechanical portion is the installation of the compressor. As our 5.0 engine had an A/C compressor originally, the appropriate brackets were already available and we did not require the kit provided by Vintage Air for attaching a compressor to a classic 289. We DID have to play with the compressor alignment slightly to keep the serpentine belt on its pulley. Now the only two items remaining were to make the hose hookups and service the A/C system. The coolant hoses were simple and required a short visit to the local parts store to get hoses with the proper bends. The A/C hoses, while supplied with all the correct fittings and plenty of hose material, had to have the fittings professionally crimped onto the hose once proper

lengths were determined. While this could have been done locally, the company offers this service for free if you will send the assemblies to them. So, after cutting the hoses to the desired length, AND marking the orientation of the fittings on the hoses, they were sent to the vendor where some very nice hammer-crimps were applied. (These fittings are over 1" in diameter and require special dies and repetitive hammering to properly apply them to the rubber hoses.)

The sad part is that I never got to service the system! By the time we got this done, and worked thru some issues following completion of the vehicle, we were deeply involved in moving from South Florida to Saranac! For some reason, I just never have had the need to service the system yet, BUT I may try this next summer. The service procedure essentially involves evacuating all air from the system and holding the vacuum for at least 30 minutes. This also removes all moisture, which, when mixed with Freon, becomes corrosive. Once the vacuum is observed to be holding (no leaks) a measured amount of Freon (1.8 lbs in this case) is injected into the system. To properly perform this, a set of A/C service gages are required along with a vacuum pump. The instructions provide proper suction and discharge pressures that should be observed following proper servicing and also provides some suggestive corrective action should any issues crop up.

I would rate this kit as a well made, well thought out accessory for your car. It is certainly worth the effort if you want to have A/C available in your classic Mustang!

### *Birth of a Restomod, Part 9 Convertible Roof*

This article will cover the installation of the convertible roof onto our now modified, FORMER coupe. This roof installation employs most of the normal guidelines and procedures to be followed in the installation of a factory roof, but is modified in certain key areas due to the fact that the vehicle is not an original convertible.

One of the first areas that is significantly different is the latching mechanism to the windshield header area. Normal convertibles have a hook shaped latch assembly that grabs a slot that is molded into the header. In this case, the roof bow rod assembly has a 2" long stud that protrudes down from the front cross bow. This stud is guided into a round cylinder (one each side) that needed to be welded to the windshield header. Shown in photo 1 is this cylinder. The cylinders have allen socket set screws to secure the studs inside of the cylinders. The windshield header assembly is then covered with a molded fiberglass piece that is supplied with the kit.

The next step is to set the pre-fabricated bow rod assembly onto the vehicle with the windows up and the header bow studs secured into the windshield cylinders. The assembly is checked for squareness and height adjustment, and then welded onto body stiffeners located inside each rear quarter panel. We now have the skeletal sections of the roof complete.

Now we begin the soft materials installation. As is the case with OEM roofs, the first items to be installed are the web belts, sometimes referred to as "pads". These are nylon web belts that connect the various bow rods together and keep them adjusted in relation to each other. Again, as is the case with OEM top installations, the MOST CRITICAL MEASUREMENT is the distance from the rear deck (trunk lid area) to the rear bow rod.! With this set using tape and string, the web material is stretched from the windshield (#1) cross bow, over top of the two intermediate bows (# 2 & # 3), draped over the rear bow (#4) and anchored to the rear deck. See photo #2. One major difference that actually made this installation easier was that the web material is anchored ON TOP of the rear deck area instead of being attached to tack strips that would then get screwed inside the vehicle. Notice also that the web belt is pop riveted to the bows with large head rivets. This is not only stronger than staples, but the large head prevents 'pull thru' of the material.

The next step is the installation of the rear window. This is virtually the same as OEM with the primary difference being, again, that it is anchored ON TOP of the rear deck area just forward of the trunk lid vrs being tacked to tacking strips that must then be screwed inside the vehicle. This made the top MUCH easier to install vrs the OEM model as all work was done out in the open and the window could be stretched as needed before being attached to the body. Note in photo 3 the pop rivets holding the window to the body and the line of nickel-monel staples across the top of the window into the rear (#4) bow rod. The additional black material protruding out the back and the sides of the vehicle is the well bag liner that gets installed UNDER the rear window and main roof. The main consideration here is that the window be installed high enough to keep the zipper UNDER the main roof material (to be installed next).

The final major portion is next with the main roof installation. See photo 4. The primary alignment location is the rear bow (#4) and the seam in the top of the roof. With this aligned, the sail panels of the roof are pop riveted to the sides of the body and leading edge of the trunk area. The top is then stretched around and over the leading bow (#1)

and glued and stapled underneath. A final row of staples is applied in a very straight end to end pattern thru the roof and into the rear (#4) bow. The roof has strips of material that align with the #2 and #3 bows, and these are wrapped around those bows and glued onto themselves. The roof also has strips of material that wrap around the rear quarter vent window area and are glued onto the bow rods – notice the speed clamps holding the left side strip in photo #4.

As in the case of OEM roofs, the staple line into the rear (#4) bow is covered with “wire-on” molding – this is material covered woven wire braid that folds onto itself once stapled to the roof and capped with chrome tips at the left and right ends. The final item to be installed is a piece of “C” shaped strip molding that is carefully bent to follow the contours of the body opening. It is applied directly over all the pop rivets used to hold the rear window and roof to the body, and uses “snap-capped” sheet metal screws to fasten to the body. These snap-capped screws are used to attach the boot cover once the top is lowered into the well area.

This was our first convertible roof installation – not real sure I would do it again, but it was an interesting lesson in CAREFULLY taking your time and measuring repeatedly. One thing we learned in retrospect would be to do the actual install in the sun or warm air to allow the material to stretch better. The conversion turned out good enough to be a good sun & wind roof, but I would not want to expose the car to rain, as the fitment around the top of the windows, especially at the top of the front doors, is not optimum. From a distance though, it’s hard for most folks to realize that it was not an original convertible. For the time when it was built, we were in south Florida, where convertibles rule the day and most tops are never up - -----

### *Birth of a Restomod, Part 10 – Fuel System*

This article will cover the installation of a complete new fuel system into the 67 Mustang. As many know, the original Mustangs employed a design where the fuel tank was also the floor of the trunk. This meant that if the tank were removed, you would see nothing but ground! While this may have saved Ford some time and effort, it made for a very dangerous configuration during a rear end collision. This issue was exacerbated in the convertible where there is no divider between the trunk space and the cloth material of the rear seat back!

Over the years, there have been at least three different solutions to improving the safety aspects of this configuration. The first employed a vertical sheet of metal at the forward face of the trunk. The idea was that if you were rear ended, the resultant splash of fuel would be blocked from entering the passenger compartment. Not so sure I like that idea! The second method that I am aware of is a product called TANK ARMOR. It is essentially a complete bolt in steel floor plate that goes on top of the fuel tank, thus isolating the tank completely outside the trunk space. Not a bad idea, and one that I may have chosen had I known about it in time, as it is significantly less costly than option 3! The third option, and the one we employed, was a complete fuel tank replacement with a racing fuel cell. The fuel cells employed in a race environment are a plastic type material completely encased in an aluminum shell. Further, the tank is packed with special foam that prevents fuel splash should the tank rupture. See Photo 1 for underside, and #2 for inside the trunk. The tank came complete with a fuel gage and a modified filler neck.

The engine setup in the Mustang was designed around a single feed tube to a mechanical engine driven pump, producing somewhere around 5-7 psi to feed a carburetor. In this vehicle's case, a fuel injection system was to be employed, which meant that there would be a high pressure electrical fuel pump producing about 40 psi fuel to a pressure regulator (see photo #3). What fuel the regulator did not require to satisfy the needs of the engine was returned to the fuel tank via a separate fuel return line, which the fuel cell came equipped to handle.

We originally attempted to utilize the standard Ford plastic high pressure tubing and barbed snap-lock fittings as found in production vehicles, but ran into extreme difficulty installing the fittings. After significant grief, we abandoned the stock fuel lines and went to high-pressure rubber lines with double hose clamps for the stock snap-lock fittings. These lines were used to route the fuel to and from the regulator, but from that point to the engine rails, braided Aero-quip hoses were utilized. These were made in house from stock lengths of hose and aluminum AN style fittings. The fuel is delivered to two Aero-quip brand fuel rails (photo #4) that run fore and aft on top of the engine just inboard of the valve covers. The fuel injectors (4 per side) are plugged into the bottom of the rails before the rails are bolted onto the intake manifold. While the original fuel tubes from the 5.0 engine would have been sufficient, the Aero-quip system was a nice all in one kit – plus I liked the “red” color offsetting the body green!!

All in all, this was fairly straight forward installation except for the stock fuel tubing. I still do not know to this day how they get the tubing expanded enough to fit over the barbed snap-lock fittings without distorting it! In any case, the rubber fuel lines worked just fine, and the fuel cell is almost always a big discussion item!

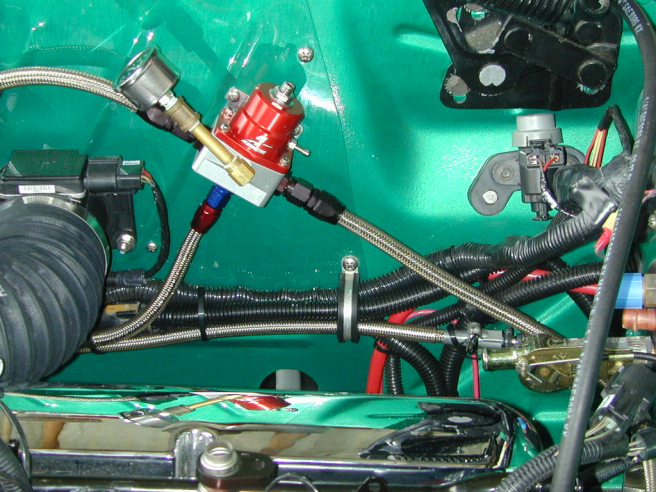






**FUEL SAFE**  
*Racing Cells*







### *Birth of a Restomod, Part 11 – Hydraulic Clutch*

For this installation, the topic will be the Hydraulic Clutch. In the case of our Mustang, it was originally an automatic transmission equipped vehicle. This meant that there were no provisions for a clutch pedal or any of the accompanying linkage to the clutch itself. Original Ford clutches were all built with direct pushrods and a “Z” bar which was allowed to rotate, but which spanned the distance between the left frame rail and the left side of the bell housing or engine block. This system not only required more effort to actuate, but it could also interfere with performance exhaust such as headers.

As I was planning the vehicle, there was an option to install a cable clutch such as found in the later FOX bodied Mustangs. We were about to select this method when the vendor went out of business! For a while, we were not sure how to handle this ‘clutching’ issue, but were soon relieved to learn that JME Motorsports in Southern CA had invented a complete kit to install a hydraulic clutch in early model Mustangs that had been upgraded to use later model T-5 transmissions.

The Hydraulic Clutch essentially employs a Master Cylinder (Photo #1) bolted to the firewall that is actuated by the clutch pedal in similar means that the brake pedal actuates the brake master cylinder. As the Master Cylinder is quite small, the reservoir that holds extra fluid is a small plastic cup that is remotely mounted on the fire wall. The high pressure hydraulic oil created by actuation of the master cylinder is plumbed to a slave cylinder that is bolted to the side of the T-5 transmission utilizing a custom made bracket. Each time the slave cylinder is pressurized, a special stud protrudes from within to apply pressure to the throw-out fork inside the bell housing. There is an attached return spring to return the fork to neutral when pressure is released.

To employ this setup, I also had to acquire a complete clutch pedal assembly and then cut off the small bracket used in stock setups. As the vehicle was completely apart, working up under the dash was very simple. (See Photo 2) The input rod from the master cylinder extended thru the fire wall and bolted directly to the pedal arm. A nice bellows was provided in the kit to keep water and dirt outside the car.

This clutch setup is very nice to actuate and gives the feeling of driving a later model vehicle. I would recommend it to anyone contemplating the installation of a late model T-5 transmission into an early Mustang!





### *Birth of a Restomod, Part 12 – Steering Column*

For this installation, I'll cover the steering column and steering setup. As you may remember, the entire front end suspension of the car was removed and replaced with a Mustang II style, double A-frame style suspension. Part of this was to also install a power rack and pinion steering system in place of the conventional steering box. The power rack is identical to that used in later model FOX bodied Mustangs and is a significant improvement over the original stock unit. Photo #1 shows the engine bay without engine, and clearly shows the power rack and pinion assembly bolted to the front of the new cross member. If you look closely at the red jack stand on the right, you will see the serrated input shaft for the steering gear. For the steering column to attach to this point, it must be shortened and modified to accept large joints that resemble universal adapters for a standard ratchet and socket tool set. As we did not want to do this, the vendor, Rod & Custom Motorsports, also sold an IDIDIT after market column that was already shortened and modified to accept the universal joints.

The IDIDIT column was bare steel, and thus had to be prepped and painted body color. Additionally, I determined that IDIDIT sold accessories that exchanged the standard tilt lever (another option that drove the IDIDIT choice) and turn signal lever with ones that had electrical push-buttons in the ends. These buttons could be used for any purpose, and are momentary contact type switches. In our case, one was wired to a relay that actuates the Hi/Lo beam system, and the other was wired to a set of relays that actuate the Fog lights. Photo #2 shows the disassembled column and the new levers about to be installed. Careful attention had to be paid to properly route the wires so as to not cause interference with the steering shaft inside the column. Photo #3 shows the re-assembled column ready to receive the new steering wheel. The column also has a built in 4-way flasher knob on the lower right side. Both levers and the 4-way knob are billet aluminum.

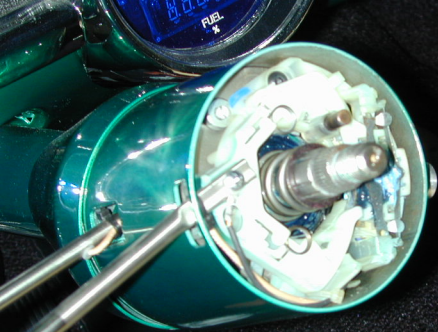
For the steering wheel, we utilized a Grant GT style wood rimmed wheel. This is a nice unit that includes a horn button to interface with the slip ring inside the IDIDIT column. If you look closely at Photo 4, you may notice that the center decal is NOT the Grant GT insignia, but instead a Mustang Pony and the "5.0" logo from the FOX body style Mustang. This was printed at our business and is Silver metallic on gloss black vinyl. To the best of my knowledge, it's the only one in the world!!

The end result is a tilt column, wood steering wheel moving a power rack and pinion steering system. It's a real pleasure to handle and is VERY responsive.











### *Birth of a Restomod, Part 13 – Wiring and Dash*

Now for the REALLY fun part – WIRING! Early on, I realized that the original Mustang wiring system was rudimentary at best, and in the case of the vehicle I had on hand, severely damaged to boot! In doing some research, I discovered a company by the name of HAYWIRE that made various levels of complete body wire harnesses. The levels varied by the number of fuses and individual circuits. For reference, I believe the original Mustang had only 4 or 6 total fused circuits. This was VERY limiting when it came to adding additional equipment such as the engine management computer, fog light relays and Air Conditioning. Since the entire original wire harness was removed, it was easy to start from scratch with a complete new system.

The Haywire system was very well documented, and each wire was not only color coded, but had its purpose labeled on the wire itself. There were a number of auxiliary circuits that could be used for whatever you want. One example of an aux circuit was the power lumbar bars that were part of the '91 Mustang seats. Photo 1 shows the Haywire fuse panel installed on the firewall at the far left end. This aligned perfectly with the firewall pass-thru hole, and makes the fuses very accessible. The primary thing to remember is to proceed slowly and to document ALL activities so that no circuit is overlooked. Work only one circuit at a time, and use tie wraps that can be removed and reused as additional wires are added to an area. Photo 2 shows the dash prior to the installation of the instrument panel. Note how the 'harness' is taking shape behind the location of the panel as additional wire circuits are added and strung to their destination. Also, while adding circuits, don't forget to occasionally do a mock up installation of any parts that may conflict for space. Again, looking at Photo 2, I would frequently insert the instrument panel to ensure it would fit.

Although the instructions were quite clear, you must also pay attention to the circuit loads. IF a circuit is a 20 Amp load circuit, it will not handle a 30 Amp load! In my case, we wanted to use Halogen headlights, which were of a higher load rating than the available headlight circuit. As Haywire thought ahead on this issue, they offered an optional relay system that the headlight circuit could actuate, which would then send a higher load rated wire circuit to the headlights.

Another issue to address are splices. Many folks use the crimp style splices where two wires with their ends stripped back are inserted into a small plastic covered metal tube which is then squeezed to crimp the wire permanently together. While these are generally OK, I was not willing to risk one of them pulling apart up under the dash OR developing corrosion and thus opening the circuit. So, in all cases, I used NON-insulated crimp tubes, which were soldered after crimping and then covered with heat shrinkable tubing to provide insulation. This ensured a positive connection and is analogous to welding the two wires together.

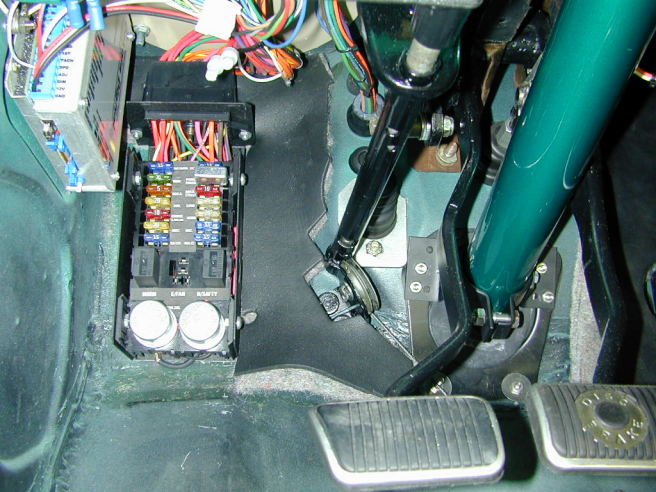
Because there were several additional items being added to the car, you have to get creative sometimes in order to properly install sub-components. Photo 3 shows the location of the fuel management computer – up on top of the glove box! The photo was

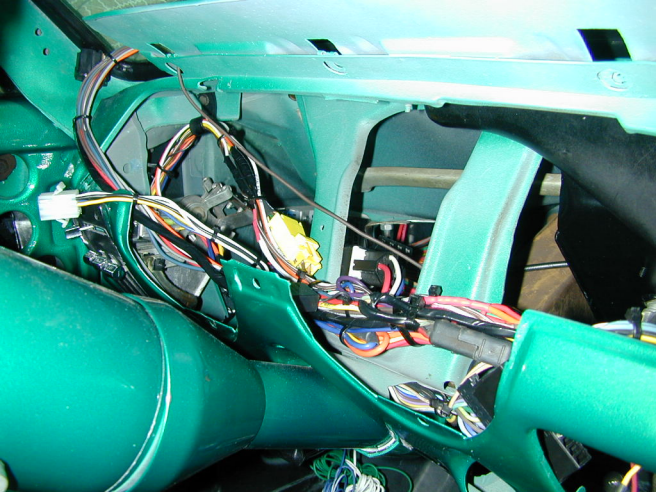
taken by laying on the passenger's floor area and looking up! Small brackets and large tie-wraps make it possible.

On the issue of tie wraps – ONLY use the black ones! I don't remember the scientific reason why, but the white ones will get brittle and break, while the black ones do not. Not sure about the odd colors out there, but I now ONLY use the gloss black ties. Also, there are regular tie wraps and ones that have a small hole at the end that is VERY useful for anchoring a wire bundle with a screw to any area of the car!

Finally, one of the items we added was a DAKOTA Digital Dash. Dakota will sell individual digital gages or complete dash panels. These are VERY cool and eliminate all wires to the instrument panel. Looking again at Photo #1, you will see an interface box (aluminum) in the upper left corner. ALL wires that previously went to the dash are inserted into a terminal strip that is very clearly labeled along one side of this box. Even the speedometer, (which is normally a mechanical cable connected directly from the transmission to the speedometer) is replaced by an electronic sensor at the transmission which is wired to the interface box. From the box, there is one computer style ribbon cable that plugs into the instrument cluster. The instruments are all numerical digits and bar graphs for vehicle speed and engine tach. Indicators are provided for both turn signals and Hi\Lo beams. The only item missing was the windshield wiper switch, which I was able to add to the cluster along with a push button to a power windshield washer pump. Photo 4 shows the instrument cluster installed in the dash as it appears with the engine stopped, key on.

Of all the portions of this project, the wiring was my most favorite – I know, only a geek would enjoy wiring a complete car from scratch! Guess I am what I am!!!











13  
WATER  
°F

12.0  
VOLTS

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OIL  
P&I

0 1 2 3 4 5 6 7 8  
X10  
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MPH  
00054.2

0 1 2 3 4 5 6 7 8  
X1000  
000  
RPM  
40

Mustang  
5.0

### *Birth of a Restomod, Part 14 – Windows and Interior*

This will be the final installment of the story about how our car evolved. In this article, I'll cover the final aspects of assembly including the windows and interior. Here again, we deviated from stock Mustang construction in several aspects.

To begin, we worked through the issues of installing the windows. Photo 1 shows all the window parts laid out on the floorboards. To save some funds, I opted not to have the vent window chrome replated – in retrospect, I wish I had, as the spotting on the chrome detracts some from the vehicle's appearance. In any case, we replaced all the belt line and window channel rubber and weather strips, along with the main window actuators. The rear vent window actuators were reusable. Getting the windows to align with the windshield frame, while aligning with the convertible top, AND with each other, was certainly challenging! With a little time and experimentation in performing the adjustments, it worked out. As we installed the windows in the door shells, we also installed a product called DYNOMAT. This material appears as squares of a rubber compound, and is reported to assist greatly in diminishing road noise. This same material was installed before the carpeting was laid into the car. Photo 2 shows the completed door sans the interior cover.

The next issue we had to address was the seats and interior upholstery. Initially, we were going to reuse the standard seats and early on, we had purchased a complete interior upholstery kit from one of the major Mustang parts suppliers. As we had the kit for almost 5 years prior to needing it, we could not return it once we changed our minds (one of those major lessons – DON'T buy stuff until you are ready for it – plans change!) So what changed? A good friend and president of the Magic City Mustang Club had a pair of 91 FOX body Mustang seats, which came equipped with power lumbar! Now, the issue with those seats are that the seat tracks don't fit the early Mustang seat pan. Not to worry – we took the seat rails and welded studs on the bottom in the exact locations to align with the original holes in the floor. The rails actually extend beyond the back edge of the seat pan, but the seats are fully anchored in the car (and we didn't intend on rear seat occupants anyway!!) Photo 3 shows the rails on the bench with the studs facing up. Now for the upholstery – our 'kit' would no longer work due to the newer seats. So, we kept a few of the items such as the windshield post pads and the kick panels and sold the rest on ebay. We then took the two bucket seats and both parts of the rear seats plus a pattern of the door trim to a local upholstery shop in Miami. (One of several things that the Cuban community of Miami excels at is upholstery) Working with the shop. We designed a custom pattern that mixed both cloth material in the seat centers with vinyl material around the borders. For the door trim, they actually pleated the cloth material in the center. We also arranged with the shop to cut their patterns, and prior to assembling them into seat covers, to allow us to place some embroidery on them. Photo 4 shows the running Mustang Pony from our former 2000 GT convertible that served as the template for application of the Pony to our newly created 67 seat covers. In this case, as I ALWAYS do, I deferred to Shirley to pick the colors of the Pony. And as usual, she did an EXCELLENT job in choosing a tone on tone combination so that the Pony is a darker brown that is also woven into the basic cloth portion of the seat. Nice!

When it came to attaching the door trim to the door, Ford employed a spring clip that was embedded in the cardboard of the door trim and is then pushed into small holes in the door. Since we did not want to do that, I found some small rubber plugs at a hardware

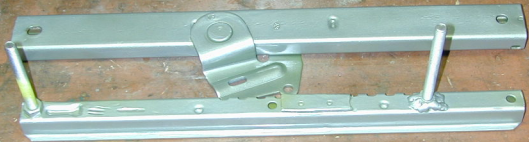
store that expand when a screw is inserted. We placed these into the door holes and utilized stainless steel trim screws and washers placed thru the door trim into the door. These give a nice pattern of shiny stainless screws around the perimeter of the door trim. Next item to be worked on was the T-5 shifter. Back then, I had a B&M Ripper shifter installed. We recently moved this to our '90 "7-UP" car in order to install a replica shifter handle from the 67 year with a fake "T-Lock" handle to actuate reverse. The B&M was a bit too short and was not ergonomically friendly in the 67. For a shifter knob, I had located a black dice that utilized a cheap set-screw to attach to the shifter handle. In order to overcome this, I drilled out the hole in the dice, filled it with JB Weld (GREAT Stuff!) re-drilled it, and tapped the threads to match the shifter. This has worked great and gives me a very unique shift handle. (Since then, I have also taken some green dice and drilled and tapped them to fit the valve stems on the wheels) For the stereo, which is a USA-5 AM/FM/Cassette unit with trunk mounted CD, we utilized a twin cone speaker in the dash (two speakers in one housing) and then modified the doors to accommodate speakers and grills as installed in 65-66 model Mustangs. While at this juncture, we also added courtesy lights from the 65-66 model years to the doors, and then added additional courtesy lights under the dash at each end. Finally, for the rear view mirror, we added an electronic self dimming unit that also has courtesy lights built into the bottom. The lights are great, but after one cold winter in the north country, the self dimming feature has departed the scene – Photo 5 shows the completed interior.

This project took MUCH longer than we ever thought – nearly 8 years, and certainly cost WAY more than we ever intended to spend. An old timer in our Miami Club said that you should never add up what you have spent as it may cause you to cease and desist! I waited till after we were completely done – good thing, as I was shocked beyond disbelief – and I was the one who spent almost all of it!!! There were times during the long process that I would become discouraged – going to a club meeting or better yet, a car show, would almost always re-invigorate the drive. All in all, it was a greatly enjoyable project that was not only educational, but provided a lot of great, quality family time together (though as I got past the paint part, the boys involvement tapered off quite a bit!!) The assistance and support of the family was crucial to the success of this project – just ask Shirley about the convertible top install in between cooking dinner on Thanksgiving day!!

Now, I am in the beginning processes of entering into another rebuild – a '64 Corvair Convertible! I know its "Bowtie", but it is very unique and will present a number of challenges that I will have to overcome. I can hardly wait-----☺







DRIP GRIND  
3 POUNDS  
**Chase Sanborn**  
COFFEE

376  
**Chase Sanborn**  
COFFEE  
NET WT. 3.25 OZ. (92.9g)





