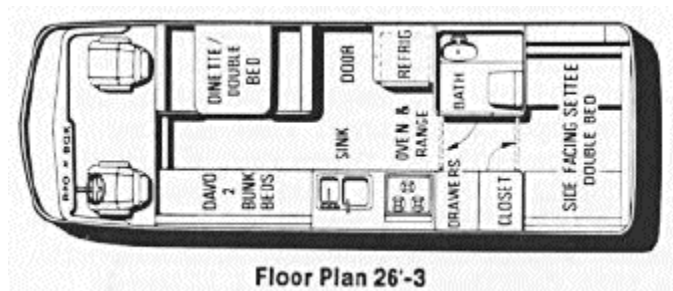


## **“The rebuilding of Norman’s 75 Eleganza II-X, 01-09-75”, Rev.2**



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On the 1st of September 2002, I became the proud owner of a 1975 GMC Eleganza II Motor Home (MH), which had last been tagged in 1981. Due to many unfortunate circumstances, the previous owner (PO) had left the vehicle parked, uncovered, beside his home in the weather extremes of Houston, for the preceding 21 years. The responses from my friends and family ranged from “Wow that’s great! What a neat project.” to “Are you out of your mind? Do you have any idea what that will cost to restore?” I simply responded with “Well, my therapist thought it would be good for me to take up a new hobby so ... 8-). And what a hobby...



### **My first observations -**

"Virtually anything made with rubber in or on the MH had succumbed to sunlight or atmospheric deterioration. If it was made from steel, it was rusted. If it was made from fabric, it had rotted and mildewed. If it was made from particleboard, it was swollen and crumbling. Various critters had set up residence throughout the vehicle. I discovered four fire ant nests in the walls, mud dobbers attached to every surface imaginable, spiders and silverfish in all the dark places, red wasps under every cover and an assortment of lizards, which helped to keep the tree roaches and silverfish in check. The skylight covers had disintegrated and there were leaks along the roof seams, windows and vents. The amazing thing was that the floor was reasonable sound, with the exception of the areas adjacent to the driver and passenger cockpit seats, which had begun to delaminate at the outer edges. Both the rear fiberglass cap and the roof air conditioner cover had lost their gel coating. The clearance lights and sanitary vents were cracked and leaking. The chrome was shot and rusting. The windshield was fogged and who knows what the inside of the various tanks might look like. Needless to say, I certainly had my work cut out; but then again, I have always enjoyed a good challenge 8-). What a sow's ear it was. With a little magic, perhaps I could yet find the silk purse...



### **Back to school -**

After the initial shock of a \$500 towing bill to get my new prize across town to a storage lot closer to my condo, I made the first of many runs to the local auto parts store for some new toys. Jack stands, a creeper, inspection mirror, several wire brushes, spray paint, solvents, cleaners, paper towels, grease, oil, etc., the parts guy is loving this... “You say you got-a what?” He asked, rolling his eyes. Then off to the tire store to look for some rubber... “16.5” E rated did you say?” Thus began my education about GMC Motor homes.

Returning home, I fired up my desktop and hit the Google search engine. Low and behold, I discovered a whole underground society surrounding these things. If I’m nuts to tackle one of these puppies, at least I’m not alone. I spent the next several weeks surfing, downloading and reading. I went through two printer ribbons and half a box of paper. With printouts in hand, I headed over to the storage lot and ripped open my new toys from the auto parts store. It was like Christmas in September. I couldn’t wait to start taking things apart. “Holy Smoke”, I thought as the wheel well exploded with the discovery of that first fire ant nest. I was prepared though, with my trusty large economy



size can of “RAID!” acquired after discovering the first of many red wasp nests under the hood. I made short work of the fire ants and went through two cans of solvent prepping innumerable rusty bolts for surgery. If you have never tried it, I highly recommend “PB Catalyst” solvent. It beat the pants off of “WD-40” for cracking rusty bolts. Off with the carburetor, off with the alternator, off with the fuel pump, etc, etc, it was so exciting. I never knew you could fit so many mud daubers inside of an air breather. Then I found the little compartments under the front seats. What were these little white things rolling around under there? They look like eggshells but were only about a half-inch in diameter. What? I thought, would lay eggs that size. SNAKES, you fool. The hair on my neck stood up. Bees never bothered me much, as I had been a beekeeper many years back, but I had a healthy respect for snakes of any variety. Fortunately, a thorough search yielded three more fire ant nests but no snakes. I was sort of relieved 8-|. For those living in the northern regions, who might not be familiar with fire ants, they are capable of wiping out most small animals and have even been known to kill cattle, so I wasn’t really surprised to find that there were no rodents or snakes around. It was almost two weeks before I saw the last of the fire ants. Some weeks later a fellow from Florida suggested that the eggs were most likely from lizards. I’ll take his word for it.





### **Ceiling Vents -**

My next stop was across town at one of the local RV stores to find a couple of replacement ceiling vent covers. “Nope, haven’t seen one of those type covers in years” was the salesman’s reply. “You need to buy you a couple of these here new fangled expensive kind of vents and cut you a couple of new holes in the roof so they will fit.” Thinking that I should probably start out on a more conservative footing, I opted for a couple of the standard 14”, sort of square replacement covers instead. I find this typical of most salesmen. They always want to sell you what they have rather than what you really want or need. With my trusty drill press and pop-rivet gun, I had my ceiling vents repaired within an hour. Removing the original covers from the vents, I drilled out the pop-rivets, which held the original stainless steel (S.S.) brackets to the plastic. I then used a “nibbling tool” (available from J.C.W.) to trim approximately 1/16” from the attaching edge of each original bracket to provide a good clearance fit. I think it’s so clever how the manufacturers change the dimensions of things ever so slightly, so they can sucker you into spending a bunch of money for a piece of plastic junk. Using my trusty Dremel Tool grinder, I carefully removed the rivets and cheap bracket from the new cover leaving four 1/8” holes. I then drilled 1/8” holes corresponding to the pop-rivet locations of the original S.S. brackets and attached them to the new cover. Presto!



Instant replacement covers for my original vents 8-). Not the perfect fit perhaps, but for \$20 and a little elbow grease they keep the rain out and work as they did when it left the factory. The only thing left was a minor change in the shape of the replacement seals to allow for the rounded corners and a strip of foil tape to mask the small holes left by the pop-rivets that were removed. Although this is really only a cosmetic maneuver and not required. A buffing wheel and some silicon spray brought the aluminum back to life. With a few drops of oil for the motor bearings the vents are almost as good as new.

### **Wheels & Tires -**

Once I got the MH to the storage lot, I was seriously concerned about the wheels. I had endured three exploding tires during the tow and a fourth after I got the vehicle up on the new jack stands. The twenty-one plus-year-old tires were good enough to hold air for the first 5 miles of the 23-mile trip. We were only moving at 20-25 MPH knowing we were on thin ice, but my luck didn't hold. The trip was a disaster, but I will spare you the gory details. I first went to several of my friendly neighborhood tire stores looking for 16.5" tires. You can no doubt guess the outcome of that exercise. I then went back to the web and read all I could find on that subject and decided I would be better off biting the bullet for a new set of seven Alcoa aluminum wheels. There went my allowance for the



next six months, but they do look fantastic 8-). Now all I need is a working MH to put them on... I felt if I needed to move this thing again, I certainly need new rubber under it. Reasonably priced 16" E series tires can be obtained pretty much anywhere or at any time. So, I will hold off on getting the tires until I'm ready to move it, but I need to have the rims on hand. It also boiled down to the fact that there was relatively minor difference in the price of a new set of 16.5" tires versus the 16" tires with new Alcoa rims. The rub came when the SOB (the other kind) who sold me the Alcoa's shipped them via second day Fedex, who happened to leave them on my patio in the rain. I specifically told the guy that I was in no big hurry to get them. I don't plan on doing business with either of them again 8-}. I could have driven to Dallas and picked them up myself, for a lot less than what I paid in shipping charges.

### **Air Bags -**

The only thing more frustrating than my hunt for tires was my hunt for replacement air bags. I had fabricated a set of 4"x 4" x 16" blocks to jack the suspension up on the advice of the tow truck driver. The original bags (can you believe it?) were still on the MH and to my surprise they held air, but the guy wouldn't hook his truck to it without the 4 x 4's. Fortunately, I got the one smart tow truck driver in Houston. Talk about





hens' teeth, if it weren't for the web, I'd still be looking for a set of suspension air bags. I called up the nice lady at Gateway Motor Home Parts <http://gmcmotorhomeparts.com/> and promptly nuked my Mastercard for a brand new set of air bags with the aluminum cones. I'm sure glad they only installed two of these puppies on this box. A few days later I happened across a cardboard box under the sofa. Low and behold what do I find, but a brand new 25-year-old air bag. It should be interesting to see if it will hold air. I found out that the GMC air bags are a single source item manufactured by "Firestone". Visions of "721" flashed through my mind. Further investigation yielded information on a recently developed new "Four-bag design" product that seemed to have many advantages over the original, however I thought it best to stay with the original, until I had a much better grasp of the situation and a few more bucks to invest.

### **Shock Absorbers -**

I spent considerable time reading about shock absorbers for the GMC and searching out various opinions offered by many other owners concerning their experiences. It was difficult for me to decide which way to go in this matter. I discovered that there were several different manufacturers producing shock. The main sources seemed to be Caspro, (Part No.?), Bilstein, (B46-940 front and B46-950 rear) and KYB, (front KG5435 and





KG5436 rear). I also found that a P.O. had installed Bilstein shocks on the front and put KYB shocks on the rear in my case. Both were rusted extensively and were in very bad shape. I guess I made my final choice based on the fact that I couldn't come up with a good reason to use two different brands and I had received many positive comments on the service life of the KYB's. We shall see how they work out and I will let you know the results some day. The shocks were also obtained from Gateway.

### **Engine Oil Fill Tube -**

I noticed that the rubber elbows on the oil fill tubes were cracked and needed replacement. But after thinking about it for a while, I saw this contraption as little more than something else to break. Besides, who would rather stand out in the weather adding a quart of oil, when they could do it from within the comfort of their living room? Having removed the original fill tube hardware back to the stack pipe on the front of the old 455, I took a pipe cutter and shortened the piece with the cap on it by an inch or so. Then, after removing the small flange that used to attach it to the front frame and using a six inch strait piece of leftover radiator hose, the two pieces were wedged together, where I felt they should have been in the first place. Just for appearances, I decided to give both pieces a coat of high temp, gloss black engine enamel paint prior to final assembly. The



fit was so good, that hose clamps were unnecessary. This arrangement left at least an inch or more clearance for the engine hatch cover and no more leaky rubber elbows to worry about 8-).

### **Brown Nasties in the Coolant Overflow Tank? -**

The inside of the coolant overflow tank was deep brown in color and virtually opaque. The tank, although needing a new rubber hose, was functionally sound, but it just looked like the devil. So, how you may ask, does one remove the brown nasties from the inside of this vessel? I thought I would try the old burnt coffee pot or dirty bottle trick. Remove the tank, insert 8-10 regular ice cubes and shake the dickens out of it. After several minutes of this exercise, dump out what's left of the cubes and rinse with clean water. Low and behold, it was clean and just like the new ones they sell in the J.C.W. catalog.



### **Back to the Engine -**

To my amazement the antifreeze/coolant looked fine and seemed to have done its' job for the past 21 years. There were very minimal signs of corrosion in the coolant system. However, it took about an hour to drain the oil, as it had become so viscous that it came out like honey. Another trip to the auto parts shack netted a new 165 deg. thermostat, radiator hoses (they took a while to find), heater hose, clamps, a low pressure radiator cap (actually I modified a high pressure radiator cap by trimming the spring), engine coolant, oil, oil filter, sparkplugs, fuel pump, fuel filter for the Rochester carburetor, carburetor rebuild kit and solvent, distributor cap, plug wires, in-line fuel filter (to be added ahead of the fuel pump), assorted fuel line hoses, assorted vacuum line hoses, air filter, more wire brushes, more spray paint, a set of sway bar bushings, a new torque wrench and a compression gauge.

After removing the spark plugs, several squirts of 30-weight oil and a long blast of WD-40 were injected into each cylinder and allowed to soak. I then went to get a cup of coffee for a couple of days. Returning, I used a ½" ratchet and turned the engine over by hand several times to make sure that it would. No binding or strange noises were observed. I then installed all of the replacement parts over the next few days and awaited





the arrival of a new (rebuilt) 100 Amp alternator and the carburetor which had also been sent out for rebuild. I will return to this subject again later...

### **The Interior -**

It was obvious that the particleboard furnishings were shot and would have to go, so they went... It took several days and several trips to the dumpster but it was certainly educational. At least they used screws instead of the staples and glue found in the junk they make today. I take that back about the glue. Everywhere I read on the web, folks were commenting about the poor insulation used in the original GMC MH design, so I set out to tackle that situation. Using a hacksaw blade to trim the original sparse application of urethane insulating material, I trimmed it to a depth of ½ inch where it wasn't already missing (which was usually the case) from the inner frame surface. I then began cutting panels from the six 4'x 8'x 1/2 "sheets of rigid foil backed urethane insulation board (R rated @ 3.6) I had purchased from the local Home Depot and then sprayed expanding urethane foam to fill any and all of the remaining voids prior to positioning the new insulation panels. Finally, I used 2-inch aluminum foil tape to completely seal each panel in place. This also served to restrict the expanding foam from escaping through the cracks, leaving a clean, and airtight foil surface. I estimate that the relative 1-inch





urethane layer topped with foil and new headliner or wall panels should yield an R-value in the neighborhood of R-8+. Not bad considering what it was to start with (my guess would be around R-3+ maybe...). I should offer a cautionary note here. Application of the correct amount of expanding urethane foam can be a bit of an art form. Apply too little and you may have poor adhesion with excessively large voids. Apply too much and it may result in a bulging distorted surface that can be a minor pain to correct once it sets up. Anticipate that it will expand by 100% volume. Tape only along three of the panel edges initially and wait an hour or so to tape the fourth edge. This will permit excess gases to escape and not form a bubble that could distort the surface. Any excess foam can be trimmed flush with the surface when it hardens and can then be taped over. There are several benefits to this approach. First of course, the overall energy savings and comfort factors improve substantially, then there is the reduced likelihood of any condensation problems in humid environments such as we have here in Houston or along other coastal regions. It is also relatively impervious to water, so leaks of any kind should not result in any serious consequence. But best of all it provides a sealed metal barrier, eliminating access to those little nooks and crannies where any and all of the creepy crawly critters can hide or make mischief. The aluminum foil does the same thing to their teeth when they try to chew on it! 8-) But, just like the original insulation, urethane panels will BURN AND PRODUCE TOXIC GASSES if they catch fire.



Always keep in mind that it is fire resistant, not fire proof. I have read that many of these fine vehicles had met their demise as a result of electrical fire. After examining the condition of the wiring in mine, it was certainly no surprise. It took me about 30 seconds to decide to remove 100% of the existing power system wiring, both AC and DC, on the simple grounds of safety. Having worked in the electronics-engineering field for the past 30+ years, I had an idea there were serious improvements to be made here anyway. So, although I hadn't yet decided on all of the details, I felt there were several basic changes that had to be made. First and foremost should be safety, followed by practicality, functionality, serviceability, durability and lastly expense. The electrical service needed to be relocated to a more serviceable location. I have decided to locate it on right-hand side of the generator compartment just behind the left rear wheel well. This area will eventually be enclosed within the galley cabinet. There will be a minimum of AC or DC wiring in either the ceiling or walls. I saw no practical way to access these areas once they were properly insulated and sealed anyway. The cable chases along the wall to ceiling seam will supply power to all receptacle strips and lighting fixtures, which will be attached to the wall surface behind or under the overhead cabinets. A 2/0 DC house power cable, connecting the battery isolator bridge, will run in a conduit under the frame, from the engine compartment to the generator compartment. Primary lighting will consist of florescent fixtures, including the bath, although I may keep a couple of those



cute little spot reading lights over the various bunks. I also toyed with the idea of installing a system of baseboard heaters similar to those found in many northern residences, which employ hot water re-circulation, as an option to enhance or replace the original LP furnace. In essence, it would require the routing of a copper loop around the main compartment and the installation of radiant baseboard heaters and a series of valves and bypass loops to channel engine coolant to each heater. I felt that two heaters would suffice to get the job done. One could be located at the base of the wall between the dinette seats and the other at the rear, along the base of the hatch between the LP and generator compartments. It would work in a similar fashion as the original hot water tank pre-heater circuit. The major problem with this comes in the form of implementing of a thermostat to regulate the heat being supplied to the system. It is a sort of an all or nothing arrangement unless one engineers some rather sophisticated control circuits. So much for the simplicity... Of course it would never actually replace the LP furnace, unless one only wanted to heat the living area when the engine was running. Everywhere one looks, there seems to be a compromise.

### **Insulation everywhere -**

I realize that some GMC owners will look at my insulation project and see it as a





daunting task, nice, but perhaps overwhelming. The fact of the matter is, it doesn't have to be. This is not rocket science. I choose to completely revamp my insulation because the interior had suffered such damage through 21 years of neglect, that it made more sense, in my case, to do the whole thing at once. However, it is quite practical to obtain the same benefits one piece at a time. I would suggest starting with the entrance door as a way to practice the technique and begin to enjoy the additional benefits and comfort of having a well-insulated GMC. All that is required to begin, is a single 4' x 8' x 1/2" sheet of the reflective urethane insulation panel, (my choice, others flavors may be used) a single can of expanding urethane foam, a 2" roll of foil tape, a box cutter knife, a screwdriver, a putty knife, a tape measure, a 4' sheet rock square (this acts as a straight edge for making longer cuts), a hacksaw blade (this is used to trim lumps and irregularities from the original insulation), and an hour or two to complete some portion of the task. Removal of the door latch mechanism will also require a pair of long needle-nose pliers to extract and re-install the retainer clips. After the interior panels are removed, use the hacksaw blade to trim the original insulation back to a depth of 1/2" over the entire surface to allow clearance for the new insulation. The urethane board is cut as close to the dimensions of the frame segment as possible such that the least amount of expanding foam is required to fill in around it. Measuring from the inside recessed edge of the frame to the outer lip edge of the opposite side will permit the panel to be slipped





within the wall segment and actually be held in place by friction with the frame as it is centered. Carefully cut each panel and test it for proper fit, trim the edges as may be necessary. Then carefully remove the panel with the aid of the putty knife. The foam may be applied to either the frame or the panel just prior to final insertion. This is where the guess-timate comes in. Observe the overall surface of the remaining original insulation, in particular the void areas, which do not make direct contact with the new panel. Spray the expanding foam around the edges in a zig-zag pattern over the surface so that it will fill about 50% of the existing voids. Hold the can upside down when applying the foam or you will reach a point where you run out of gas before the can is empty. Wearing old clothes, rubber gloves and safety glasses when you work with the foam is advisable. It can take days for the foam to wear off the skin. Soap and water will not remove it, nor will most solvents! Have plenty of paper towels handy for any accidental over-spray or drip. Depress the valve slowly when applying the foam. On hot days, it can blast out of the can with quite a force and end up in places you would rather not have it. Be careful where you set the can when you have finished applying the foam. It will continue to slowly drip from the nozzle for several minutes and could make a mess before you realize it. I always have a plastic pan handy to rest the can in and catch any drips. The foam will begin to expand as soon as it hits the air, so apply it fairly quickly and then reinsert the panel into the wall segment and position it as you had done



previously. Once the panel is in place, tear or cut lengths of the 2" aluminum foil tape and seal the edges to the structural members. Align the tape with the frame and press it along the seam working out the air to seal the surface. Do this on three sides. Leave the fourth and final edge open for a little while (20-30 minutes) so that the excess gas can escape as the foam expands to fill the voids and bond the new insulating panel in place. This will prevent the foam from forming any large bubbles under the panel and causing it to bulge or dome out in the middle, leaving a nice flat surface. If the foam happens to ooze out along the edges a bit, don't worry about it. The foam will set up and can be trimmed away with your knife or hacksaw blade after a couple of hours. If there is a bunch of it, grab a couple of paper towels and catch the blob, being careful not to get it on anything you don't want insulated. I found it easiest to apply the foam to the wall, but then applied it to the panel for the ceiling sections so it wouldn't drip on my head. In actuality, there will always be some modest air bubbles remaining when all is said and done. This is not a problem as these small sealed air pockets aide the insulation process. In fact, the urethane foam essentially forms a semi-rigid plastic sponge trapping billions of tiny insulating air bubbles.

If an excess of foam is applied, it may cause the panel to bulge outwardly slightly as it expands, unless you give it a path to migrate. You want to end up with a nice flat



finished surface. If a given panel should begin to budge after about 30 to 45 minutes, gently push against the panel to move it back flush with the surrounding surface, while the foam is still soft in the middle. In most cases this burping of the panel will allow any surplus trapped gas to escape. Once again, avoid getting the expanding urethane foam on your skin, hair or clothing, as it will take several days to wear off. Use disposable surgical gloves (get a large box at the pharmacy), safety glasses, and clothing you might wear while painting a ceiling. Apply the foam slowly at first, by gently pressing the valve to judge the rate of flow.

Another benefit of positioning the new panel under the edge or lip of the wall or ceiling structural member is that when completed, a slight gap of approximately 1/8" is formed between the actual surface plane of the new insulation and the surface of the frame. This will leave a small air gap between the foil on the urethane panel and the backside surface of the headliner or wall panel. This little bit of airspace acts as another insulating buffer zone to slow heat migration. The foam actually serves several functions. First of course, it acts as a thermal barrier. It acts to prohibit the formation of condensate on the interior of the body when the inside air temperature is colder (when the AC is operating) than the outside temperature. Condensate will not readily form upon a urethane surface, nor do you want any condensate forming in the walls or ceiling to cause corrosion on the





skin of the aluminum body. A third benefit is that it acts to reduce ambient sound levels by dampening vibration, so it doesn't sound like you are bounding down the road in an aluminum box and any outside noise levels are significantly attenuated.

The small gap between the headliner or wall surfaces and the urethane also permits the installation of up to 1/4" of additional insulating material without significantly stressing the panels. Aluminized fabric type insulation such as the "Microfoil" insulation material could be employed. (I obtained a 4" x 50' roll of the material to play with). Northwestern Ohio Foam Packaging Inc., 123 South Shoop Avenue, Wauseon, OH 43567, 800-339-4850, <http://www.nofp.com>, manufactures this product in various widths and lengths. I intend to experiment with it in the ceiling, under the carpeting and at other locations throughout the MH. An insulating "R-value" on the order of R-10 or more can be obtained in certain GMC applications by supplementing the urethane insulation with this type of product. According to the manufacturer, phone orders from GMC owners, who identify themselves as being GMC owners, would not be required to buy the usual 125 foot minimum roll size. GMC owners may order any roll length they need and it will be shipped direct to them (Many thanks to Ken Burton for negotiating this nice little benefit 8-). The cost for a 4-foot width x 125-foot length roll was \$1.10 per running foot (6/03). Prices may vary in other quantities.





Protect your fabrics, carpet and furnishings from the urethane foam. Any porous surface will suck it up and likely be there for the duration. Use plastic drop cloths and masking tape to cover and protect any surfaces adjacent to the work area, as you would do if you were painting.

If you happen to be doing a major remodeling job, you might want to give serious consideration to installing additional insulation while the furnishings are removed and the walls or ceiling are open. It makes the job so much easier. It also allows one to access and service all of the utilities that are normally hidden from view and normally somewhat difficult to access. The foam will usually take several hours to cure completely within the wall or ceiling section. At that time, the panels should feel firm to the touch when pressed upon, over the entire surface. If there are any slight bulges or irregularities in a finished panel, don't worry about it. Once the new wall coverings or headliner are in place, it will be invisible. In a worse case scenario, where one has really goofed and overloaded the panel with much too much foam, to the point it bulges 1/2" or more, don't panic. Place a straight edge across the adjacent structural members and using your trusty hacksaw blade, carefully slice the bulge away and cover the surgery with several strips of aluminum foil tape to restore the finished waterproof metallic surface. This situation arose on only one occasion in my case. Near the left rear corner adjacent to the taillight,



there was no structural frame to gauge against and I accidentally over-did-it with the foam. Otherwise, insulating the GMC is a piece of cake!

The wall segments behind the bath module and the ceiling segments above the bath module are a bit tricky. Because of the minimal clearance in these areas, a long handle trim tool was devised from a 48" length of 3/4" aluminum flat stock and duck-tape attaching a hacksaw blade. The hacksaw blade was carefully bent to form a 1/2" offset so that it would reach the surface of the original foam so that it could be cleanly trimmed. It was also a little tight when applying the aluminum foil tape along the seams in these areas. But, with patience, it can be done and the finished product is well worth the effort in the end.

Another modification I made, with regard to the headliner segments over the refrigerator and bath modules, is that I extended them to the full width of the ceiling just like all other headliner panels. I did this in order to maintain uniformity over the entire roof area and not to have any hot spots on the roof at these points. This also extends the surface of the moisture barrier, so any potential leak would migrate to the edge of the roof-wall seam and not flow directly into the bath or refrigerator areas. Again, it was a little more work, but I felt it would be worth the extra effort in the long run.



The roof vent will eventually incorporate 12VDC exhaust fans to vent the furnace exhaust (which will be relocated beneath the refrigerator compartment and the heat from the refrigerator coils and compressor. They will be coupled to the power circuits of these appliances so that they cycle in unison with them.





The more BTU's that can be shed through the use of insulating materials, the lighter the workload on the air conditioning and heating systems. The environmental systems will perform better, last longer and provide a more comfortable climate for the occupants. Insulation is much cheaper than an AC system and has a lot fewer parts to wear out or break. I can't ever remember hearing of anyone having to service his or her insulation.

It is much more difficult to explain this process than it is to perform. I have perhaps made it sound more complex than it actually is, but I hope this will be helpful to those who may have been reluctant to give it a try.

**12/02/02**

### **The headliner panels -**

After reading an article by Mike Teet that I found on his web page "1977 Palm Beach, Reptar Wagon" at <http://teamteets.org/gmc/>, I decided I really liked and would borrow a number of his ideas. In particular, his application of FRP Paneling Sheets (Fiberglass Reinforced Plastic) for the replacement headliner is a terrific idea. With a pair of tin





snips, a hand drill and my trusty Dremel Tool Saw for the curves, I managed to create a rather tidy set of replacement headliner panels. I opted for the textured gloss white variety FRP (found once again at Home Depot, @ \$26.50 per 4'x 8' x 1/16" sheet) to do the job. They are aesthetic, easy to clean, highly reflective of light, which makes the interior seem much brighter and best of all, water rolls right off the stuff. Any future roof leaks will not damage this new headliner. Isn't that clever? The original GM dimensional specs for the first headliner panel, which has the forward ceiling vent hole, are 72.75"w x 50.90"d. It turned out that upon measuring of the original panel, I found it had shrunk longitudinally by about a half inch. Therefore, the new panel was cut to the original specification. The old ceiling panel was then centered over the new one and used as a template to determine the cutouts for the holes.

All measurements worked out to within 1/8 inch of center upon installation and only required relatively minor shaving of the holes in order to true the edges. Use of the original dimensions did not result in a tight fit side to side. There appeared to be adequate room for an additional 1/4" insulating pad or blanket between the panel and the ceiling without any sign of binding. Initially, I decided to mount the new headliner panels directly against the re-insulated ceiling without additional insulating material at the present time. I wish to experiment with the "Microfoil" insulation first and do some



before-after comparison measurements, so there will be some empirical data available to compare the effectiveness and performance of the new materials. This should provide some additional information to for those who might be considering the approach I have taken to enhance the R-factor, before going through that expense and effort. The techniques being employed in my reconstruction make it less difficult for me to do than it might be for others, so why not...

Something that has always bothered me about the automotive industry has been their prolific use of sheet metal screws to attach any and everything. I am personally very fond of machine screws and bolts, stainless steel fasteners in particular. So as I happen to own a self-retaining nut insertion tool, a complete number drill set, a tap & die set and a desire to prevent this ugly duckling from rattling apart from vibration as I go down the road, I intend to replace much of the existing hardware with the right stuff. "Death to sheet metal screws and particleboard!" For example, each of the screws used to attach the headliner retaining strips have been replaced by self-retaining nuts and 8-32 x  $\frac{3}{4}$ " flat head S.S. screws. The various wall panel seams, which meet at structural members, are covered with  $\frac{3}{4}$ " x  $\frac{1}{8}$ " aluminum flat metal strips, which are also installed with self-retaining nuts and 8-32 x  $\frac{3}{4}$ " flat head S.S. screws. These will eventually be painted with white enamel paint to blend in with the wall panels and permit easy removal for repair or



replacement of these panels in the future. I plan to employ similar techniques throughout the MH. It is a little more work now, but should be a lot less work in the future.

### **The Door Handle and Latch -**

I really have to throw a sack full of at-a-boys at Jim Bounds at Cooperative Motor Works down in Orlando, FL. <http://www.gmccoop.com/>. Jim has been unbelievably helpful and fully entitled to major accolades. When I get this buggy back on the road I plan to drive down to meet this fellow and at the least, buy him a large meal. In my latest packages from the Coop, I received most of the rubber necessary to overhaul the MH windows, several tubes of Dow 791 sealant to address the multitude of remaining leaks, a sack full of S.S. screws for the rear hatch and a shiny new exterior door handle mechanism to replace my rusting original. Now, as Jim explained, “there are two ways to go on these. There is the lesser expensive unmodified version of this Kenworth substitute or there is the slightly more expensive modified version of the same.” Well, I’ve got more time than money, I told him, so I ordered the former. Having just acquired a new digital camera a few days ago, I decided to burn up some RAM with a few shots of my handiwork, modifications and the installation of this new door handle. I only wish I’d had the camera when I started this project, so folks could have seen just how bad it really looked the day I brought it home...





Removing the old door latch was relatively uneventful. After detaching the two panels in the lower half of the door, the handle mechanism came out without much difficulty. I could easily see the differences between the two parts. The keyway for the lock cylinder would require filing a bit to accept the original cylinder. In addition, the primary lever arm was T-shaped to allow attachment to the inner handle. The replacement had an L-shaped lever attached. Four flush rivets attach the mechanism to the chrome faceplate. These must be drilled or ground off to separate the two and allow access to the large pivot pin upon which the lever is mounted. The pivot pin is also riveted from behind onto this plate and must be drilled out. In this manner, the original T-shaped lever is removed from the original handle and will be re-installed on the new one. A through hole large enough to accommodate a 10-24 hex head screw was drilled through the pin. A thin square nut, which fit the recess on the back of the plate, was used to secure the screw and epoxy was used to hold it in place. This method of attachment would permit greater ease of repair, should it become necessary in the future. Both the plate and the exposed portion of the handle were once again pop-riveted together, making it ready for installation. The original paper gasket under the latch crumbled upon removal. So, to make a watertight seal, a small amount of DOW 791 was applied to the under surface before final attachment.



The modification and installation itself was not difficult. However, as I was doing an overhaul of the door, the addition of new insulation, a new door seal, a new lower interior panel, refinishing of the interior latch panel and the attachment of my new Ragusa interior aluminum pull handle required about two days to complete. I have yet to repaint the original window frame. That will have to wait until I decide to tackle the windows.

### **12/03/02 - More New Toys -**

While surfing I happened across a web site for Ragusa Pattern & RV Products out in Santa Ana, CA. They can be found at <http://www.ragusarv.com/>. They supply a variety of products for the GMC MH and they are certainly worth looking up, if you haven't already. While overhauling my entrance door I decided I needed a new interior pull handle and I wanted something a little more substantial than the soft plastic covered original. So I opted for one of Ragusa's RV-26 aluminum pull handles as a replacement. While I was at it, I got a pair of their RV-01 mirror brackets, an RV-83 Aluminum final drive cover and an RV-30 Aluminum transmission pan. I decided upon the last two, when I found that the original steel components had no drain plugs to permit fluid changes. I thought that was a rather clever engineering trick to get the customer back to



the dealership service department on a regular basis. Last, but not least, I decided I had better get one of their RV-101 jack hooks to have on hand the next time I might need to lift the hind leg of this animal. To cap off my Ragusa shopping list I decided to add one of their RV-97 Triple Battery Trays as a replacement for the small pile of rust that had once been the original engine battery tray. It also gets a coat of black enamel along with the new mirror brackets. The nice thing about black paint is that you don't have to be concerned about what shade of black to look for or if one vendor decided to change his shade of black from what shade the competition is selling 8-).

The interior door handle panel was originally covered with a cracked vinyl covering which had begun to peel and allowed the steel panel to begin to rust around the edges. With a little help from a heat gun, the vinyl covering was removed and the panel was sanded and painted with a gray primer coat. After it dried, a coat of white enamel paint was applied before the hardware was installed. I decided to put a coat of black enamel on the new aluminum door pull handle for a little contrast. As with most of the items one gets from Ragusa, they come naked, so you have the choice to make them whatever color you choose. The original pull handle was in very poor condition so it was a cinch it had to be replaced.





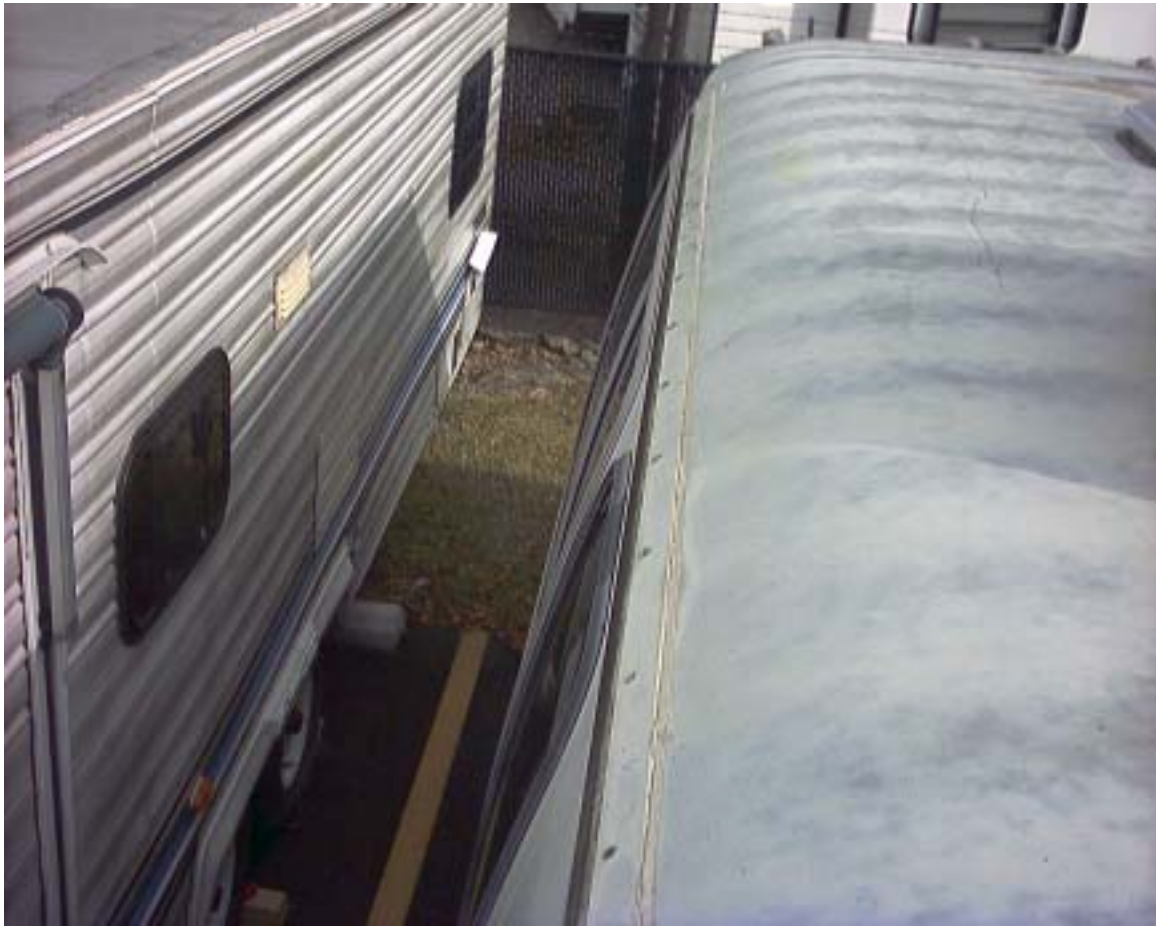
Another of my stops on the web was at <http://www.tzeplus.com/>. There, I ran across TZEplus of Calgary, AB (that's in Canada gringos...) where I found the answer to my dilemma concerning the particleboard overhead cabinets that went into the dumpster. Mr. Darren Paget answered the phone and my many questions. After some discussion about my design ideas, I came to the conclusion that he was the man to build a set of custom cabinets for my E II-X. Aluminum just seems like the perfect way to go in my mind. It just seems a bit foolish to surround an LP Gas stove, oven and furnace with particleboard cabinets, in the first place. But that is the way they did things back in 1975. I decided to go with a full line of aluminum overhead cabinets from the sofa behind the drivers seat all the way back to the rear window. Then I requested two additional cabinets to replace the one over the dinette area and the short cabinet behind the bath. The original clothing closet and storage drawers/cupboards will not be replaced during my reconstruction. Instead I intend to extend the new galley counter/cabinet back to what was the rear edge of the original closet position against the generator compartment. In the process, a new sink will be located to the rear (left) of the original MagicChef stove/oven position, set in a new color coordinated countertop with a new two-burner LP range unit. All of which, will be set atop a new nine-foot aluminum cabinet. Let those pesky termites chew on that a while... At any rate, the tentative delivery date for the overhead cabinets would be toward the end of January 03. So, that gave me about eight



weeks to finish prepping that side of the vehicle and finalize the design of the new galley. The addition of two new overhead cabinets (above the sofa and another to the left of the original galley cabinet) along with the redesigned galley counter and under-counter cabinets should actually exceed any loss of original storage space. I have also decided to do away with all of the former drawers and cabinet doors. Aluminum sliding door panels will be utilized in their place. This should further reduce weight, simplify the design and continue to reduce the number of flammable components. A new convection microwave oven will be installed to replace the original MagicChef appliance. A newly designed slender exhaust fan will mount behind the galley cabinet instead of within it.

**12/07/02 -**

I got another couple of packages from J.C.W. in the mail today. Among them were a new Classic RV Cover and a Kreem Products (805) 386-4470, fuel tank prep and elastomer liner/coating kit with more than enough material to refurbish both fuel tanks. I think I will have to put the fuel tank job on the back burner for a while though, at least until the weather substantially improves. I removed the original outside mirror brackets, windshield wipers, spare tire bracket and AM/FM radio antenna, along with a CB antenna that had been mounted atop the roof mounted air conditioner (AC) housing. I



also removed the RG-58/U CB antenna cabling which a PO had snaked up through the refrigerator roof vent. Fortunately for me, the cooler weather had slowed the response of the rather large red wasp population that had set up residence under the AC cover. I was able to dispatch them all without incident. I then unboxed my new Classic RV Cover and draped the MH per the enclosed instructions. To my surprise, the cover that I had ordered, which was said to fit a 24'1" to 28' vehicle, was large enough to cover my MH even had it been equipped with an eight foot satellite dish erected on top. There were nearly two feet of fabric dragging the ground after it had been drawn up with the lashing cords, and the tires were 6" off the ground with the frame on jack stands. So, I plan to RMA this one back to J.C.W. and order the 20'1" to 24' version in the AM. BTW, the "/U" designator on the end of the RG-58/U indicates "ultraviolet or UV resistant" for those who might not be familiar with such trivia 8-). Don't buy any coax cabling without the /U designator.

While I was on the roof I decided to check out the temporary sealing job that I had hurriedly done a few weeks before. I had run out of the DOW 791 sealer in the middle of things and had completed the job with another brand that the parts house guy assured me was of comparable quality. I wish I could have handed that gentleman a few of those red wasps in gratitude for his honesty. The sealant he sold me had cracked and shrunk as the





weather cooled into the 30's and the roof was leaking as bad or worse than when I started. When Jim Bounds tells you something, you can take it to the bank... Needless to say, I will had to scrape that crap off and do it right a second time 8-(. FYI, I found a Houston supplier for the DOW 791 Sealant, Silicone Specialties, Inc., 2211 Sabine, 77007, (713) 862-3900 if you should happen to need some of the stuff while you are in town. As an emergency leak repair measure, I had applied a strip of the 2-inch aluminum foil tape, the same stuff I had been using with my insulation, over the outside of several leaking seams. **DO NOT DO THIS IF YOU VALUE YOUR PAINT JOB!** Mine was shot anyway, so I was more concerned with temporarily stopping the leaks and water damage until I had time to effect proper repairs, than I was with the remains of my existing finish. This was purely an emergency and temporary stop-gap measure.

**12/10/02 -**

The weather had been cold and rainy for the past few days, so I had been continuing to surf for more data and order additional parts. I borrowed a Summit Racing Catalog from a friend, <http://www.summitracing.com/>, and discovered they had all the goodies to rebuild my HEI distributor. I also found a neat contraption called a Perma-Cool Transmission Filter Kit with Temperature Gauge, P/N PRM-10677 (\$79.95 12/02), which is an External Transmission Filter add-on. These should come in handy when I decide to



get back to the power train. (I have an aversion to lying on wet ground or even blacktop unless it's absolutely necessary). My 100-yard supply of 2" aluminum tape was beginning to run low, so I made another trip down to the local Home Depot. After studying the situation concerning wall coverings, I have come to the conclusion that these FRP panels, from which I cut the new headliner, would work fine for the wall panels as well. Most of the vehicle remodeling I have observed seems to favor fabric or carpet type coverings. Although I think fabric looks nice, the nature of these materials is that they tend to shed, producing fiber dust, absorb cooking odors, tobacco smoke, various fumes, odors and/or similar potential allergens. They can also be somewhat more difficult to clean and are generally poor reflectors of light. Although, they may provide better sound deadening qualities than FRP, I felt it would better suit my sensitivities. With this in mind, I decided to pick up another three 4' x 8' sheets of the white FRP panel material to begin covering the wall in the dinette and living area. We shall see how this works out. Along with a few more cans of urethane foam I got some  $\frac{3}{4}$ " flat and  $\frac{3}{4}$ " x  $\frac{3}{4}$ " angle aluminum to cover and securely fasten the edges of the panels. After these molding pieces are cut, they will be finished with white enamel paint to blend in against the walls. This should contrast well with the flat black trim paint finish, with which I intend to repaint the window frames (after they have been refurbished of course 8-).



### **The LPG Tank -**

I was most impressed with the fantastic job that Richard Waters of Troy, Michigan, (1976 Palm Beach TZE166V100710) <http://www.digitek-asi.com/gmc.html> did with his LP Tank Compartment Refurbishment [http://www.digitek-asi.com/gmc\\_lp\\_gas.html](http://www.digitek-asi.com/gmc_lp_gas.html). He wrote an excellent article and has some great photos of the project. Another outstanding article I found was by Richard Archer (1976 Glenbrook) <http://www.gmcmotorhome.com/> at Tech Info [http://www.gmcmotorhome.com/commodore/propane\\_tank/index.html](http://www.gmcmotorhome.com/commodore/propane_tank/index.html). As you can see from the before photo of my LP compartment, I have a long way to go. Hopefully, mine will look as good as theirs when I finish a few months from now. In the mean time, this too will have to take a back seat to other phases of the project.

### **The Furniture -**

Needless to say, the fabric and padding of each and every piece of furniture and cockpit seats had either died from UV poisoning and/or mildew. As I don't do upholstery, I will be forced to send these items out for an overhaul. There are a number of facilities locally available to handle that job. The frames showed signs of minor rusting but are basically sound and functional. A little elbow grease and some spray paint should take care of the





rust. I intend to stay with the basic upholstery color scheme of beige or tan (I believe GMC referred to it as CAMEL for the exterior paint), so the cabinets will be powder coated in a similar shade of coffee tan. I think light brown carpeting in the cockpit will accent the whole thing against the textured white walls and ceiling. But, all of this will have to wait at least until late summer if not beyond. (I work the graveyard shift at the local Post Office with a Monday/Tuesday night weekend) There are a whole lot of other things to address before I get down to the floor coverings.

**12-22-02 –**

Today is the big day to awaken the sleeping giant. My mechanic friend who rebuilt my Rochester Quadra-jet carburetor came over to re-install it. I picked up a new battery and a 5-gallon gas can to feed the old 455. I cut a length of fuel line hose and ran it from the gas can to the fuel pump. We then found we had a problem with the ignition switch and decided to hot-wire the beast instead. Holding a fire extinguisher in one hand and a large screwdriver in the other, I shorted the contacts on the starter solenoid and said a quick prayer as the starter began to awaken the long dormant engine. At first, there was a long low growl as the innards of the beast began to churn. Then a sporadic series of individual cylinder firings caused a series of shudders and small clouds of dense white smoke



erupted from the tailpipe as the oil I had injected into the cylinders began to burn off. My friend rotated the distributor a bit and yelled, “Hit it again”. Once more, a hail of sparks jumped from the starter solenoid and a series of explosions blasted a hole in the rusty exhaust pipe donut behind the right exhaust manifold. This allowed several long yellow fingers of flame to escape through the opening. My grip tightened on the fire extinguisher as a lump began to form in my throat. The smoke from the exhaust drifted across the parking lot and the rumbling misfire of the engine filled the air, then silence... “Hit it again”, my friend yelled once more, as he continued to tweak the carburetor and twist on the distributor. Another flurry of sparks and the beast came alive! I yelled to my friend, but he could not hear me above the roar. A cloud of rust and mud dauber nests rained down upon the ground below. Then, to my amazement, the smoke began to clear and the roar diminished to a smooth and steady idle. “It’s alive! It’s alive!” I exclaimed. What a Christmas present, I was happy 8-).



We let the engine run for a several minutes to let the oil circulate through it's innards, while we checked for any sign of leaks, strange sounds, smells and such. The noise was almost deafening in the wheel well, as a result of the hole in the exhaust coupling. Everything seemed to be going well until I noticed a large drip of oil falling from the fuel pump. I wiped it with my finger to be sure it was oil and not gasoline. The source of the drip wasn't immediately obvious. After a few more moments I called for my friend to kill the engine so we could have a closer look. It turned out that the front seal along the intake manifold had given way and was blowing an oil mist into the fan, which then blew it back all over the front of the engine. It looks like the intake manifold would have to come off along with the exhaust system. I suspect it was at about this point that I began to consider a new Edelbrock Model 2151 intake manifold and a set of Thorley headers. There seemed to be a lot of discussion on the web about these toys. The installation of either item was well outside my practical automotive servicing experience. But there has to be a first time for everything. So, it's time, once again, to do a little more research... I was just overjoyed that the old 455 would run after sitting dormant for all of those years. Many had told me, that the engine would have to be pulled and rebuilt. Others said they were certain it would never fly. Alas, it was only a brief run and there were moments I thought that it might literally come apart. But in the end, I think it let the wind out several of my detractor's sails when the old 455 settled down to a smooth idle 8-).





### **The drip rails –**

When I discussed the particulars of resolving my many roof leaks with Jim bounds, he advised me that I would have to actually remove the drip rails and reseal the roof and wall seams to get at the root of the problem. Application of sealant along the surface edges of the rail is of little value. I had no idea of the mess I'd find beneath them. The original sealant had dried in many areas and the screws attaching the rail were severely corroded. I had to use an impact driver to break most of them loose and managed to remove them all except for one, which sheared. It is extremely difficult to drill out a screw from a piece of aluminum. It is far better to grin off the broken screw flush with the plate, then move over slightly and plant another screw, if at all possible. It took several hours to scrape, wire brush and sand the surfaces with a green scrubby pad. Nine pop-rivets on the passenger side had completely corroded to the point that the heads fell off and required drilling before being replaced. It took between four and five tubes of Dow 791 sealant, for each side, to repair the multitude of leaks. 10-24 Philips flat-head S.S. screws were then used to re-attach the cap-rail to the body once again. Rusted steel screws are a bummer to remove from aluminum. The sooner they are replaced, the better. The longer the original screws remain in place, the more likely they are to break off when attempting extraction and require major surgery.





The original sealant resembled something akin to plumbers putty and was hard in some areas but rather gooey in others. There were occasional small voids where water and debris collected, allowing the forces of nature to eat away at the pop-rivet fasteners which attached the roof panel to the under-rail. A stiff putty knife, wire brush and more green scrubby pads served to remove the old sealant. Solvents should be used sparingly to avoid damage to the surrounding finish. Masking the area with masking tape would be a very good idea if you value the existing finish. A good clean surface is necessary to obtain a quality seal.

Two pop-rivets and the force of the drip rail clamping the top edge, attach the door gutter strip to the body. It would, in all likelihood, be necessary to remove or at least break the seal along the drip rail, in order to effect repairs to a damaged door gutter. It is comprised of a fairly light gauge piece of aluminum and could be easily damaged by the force of a ladder or much of anything else resting against it.

Extreme care should be taken when removing the drip rail such that it is not bent or twisted as it is removed. It is comprised of fairly heavy gauge aluminum, but the 18-foot length of this piece makes it somewhat unwieldy and difficult to handle by oneself. Get some help if you need it. I don't believe they make these things any more, so if you bend



one up, you could have a major problem. All screws should be removed before attempting to lift it away from the frame. A light pressure applied with a screwdriver or putty knife should lift it out away from the frame. Work slowly. If it doesn't want to let go, do not force it to the point of bending the rail. There is a small chance that some P.O. may have foolishly (out of ignorance) applied an adhesive (like liquid nails) rather than a sealant (like DOW 791) to the piece during a previous repair. If this is the case, you have a minor problem! A wire saw may be fashioned from a couple of dowels and some piano wire, which may then be slipped under the edge of the rail and used to carefully slice through the sealant joint. This tool will cut through a layer of DOW 791 Sealant like butter, but will require a bit more elbow grease to get through a layer of adhesive. If one should find oneself in this situation, I would suggest you call for reinforcements.

There are six critical sealing points along the drip rails. These are where the various panels come together and form a corner of sorts. The first two are located almost directly below the outer most rear clearance lamps at the rear end of the rails. This is where the fiberglass cap joins with the aluminum wall panel above the rear side windows. The next pair are at the junction of the rear cap and the aluminum roof panel, where they meet that same wall panel several inches forward of the first two trouble spots. The last critical location is at the forward end of the rails, where the fiberglass cap joins with the



aluminum roof panel and meets the wall above the corners of the cockpit side windows. Each of these locations has a substantial opening or clearance gap, which must be filled with sealant prior to re-installing the rail, in order to assure proper repair of the leaks. That is not to say that sealing the rest of the rail is any less important, but that these points should receive extra care, as the gaps at these points are much larger by comparison. With the old sealant removed, one can literally see through the joints inside the living compartment at these points.

After the rail has been removed and the surfaces cleaned, a thorough inspection should be made of each pop-rivet to ensure they are structurally sound. These are the main structural tie points, which secure the aluminum roof panel in place. You may notice that no rivets are to be found anywhere else across the surface of the roof. This is because it is attached to the roof framework with an industrial adhesive or glue. I found this a little surprising at first, but it rather makes good sense when one thinks about it, as it maintains the integrity of the surface and simplifies the construction.

When everything has been cleaned up and it is time to reassemble, position the tubes of sealant along the roof at intervals so you can complete the application in a single operation. The sealant will “skin over” and begin to cure after only a few minutes, so it is



best applied in a continuous manner from one end to the other forming a single patch. This is why it's good to have help when performing this type of repair. As I was working alone, I did things a little differently than I might, had some help been available to me. First of all, I was concerned about getting sealant down inside the threaded holes where the screws attached the rail. In hindsight, I don't think it really matters all that much. But, to avoid this, I inserted inverted pop-rivets into the holes before I began to apply sealant to these areas. Because I wanted to be certain that the heads of the pop-rivets securing the roof and wall panels were protected, I applied a coating of the sealant over them as it was being applied along the length of the roof and wall edges meeting the lower rail. Trying to apply four or five tubes of sealant quickly, while keeping it where it belongs, can be taxing on the hand muscles. Having a rag and a putty knife handy will save having to make extra trips down and back up the ladder. Moving the ladder is enough of a challenge. Although I'm sure there are other techniques for applying the sealant, the best approach for me ultimately came to making several individual passes. By that I mean, I applied a bead along the length of the roof seam first and then went back and applied another bead along the length of the wall seam. Apply a third segmented bead down the length of the recess in the lower rail, leaving small gaps, perhaps a half inch wide at the location where each mounting screw hole resides. Lastly, with the rail positioned upside down on the roof, I placed two heavy beads down the





length of it, on either side of the raised structural rib running down the middle. This rib engages into the recess in the lower rail and locks it into position. At this point we are ready to re-attach the rail. Starting from the center, lift the rail from the roof, inverting it, and carefully positioned it such that the mounting holes align. Then inserted the first 10-24 Philips, flat-head S.S. screw, into position and began to tighten it. As this is done, the sealant will be compressed between the two surfaces and began to ooze slightly along the edge. I then proceeded to the next screw position, installing a screw and continuing all the way down to one end of the rail. Prior to securing the last screw on the rail, the end cap must be installed. The lip of which, fits under the edge of the rail, so it must be installed just prior to the last rail screw being secured. I then returned, once again, to the middle of the rail where I repeated the process in the opposite direction, finally installing the end-cap at the other end of the rail completing the operation. It turned out that my use of the inverted pop-rivets in the holes was unnecessary. I had initially been concerned about alignment and positioning of the rail as it was being resealed. But as it turned out the use of the pop-rivets only served to slow the operation down. Another discovery I made was with regard to cleanup when all was said and done. If the sealant is still fresh and fluid, it can be cleanly wiped from a surface with a little acetone on an old cloth. If it has set a bit, it is just as well to let it cure completely and then trim it with a single edged razor blade or a sharp putty knife.



As with many of the repair projects on the GMC, drip rail repairs are not technically difficult and with a little planning and preparation, will proceed a bit easier. Gather all repair materials ahead of time and be sure to have a drill and a few pop-rivets handy in case you find some that need replacing. It might not hurt to run a thread chaser through the attachment holes in the lower rail to remove any rust or corrosion. A dab of anti-seize compound on the screws would also reduce the need to use an impact driver several years down the road, should the rails ever require removal again in the future.

I am reasonably confident that it will not be necessary for me to perform this exercise for quite a few years. The 791 Sealant is a fairly stable, flexible and waterproof material and I used enough of it to fill virtually the entire void area beneath the rail. Unless this area is subject to some form of physical damage down the road, I doubt it will require service in my lifetime. But, if it does, those stainless steel screws will be a whole lot easier to remove than the original fasteners.



Be sure the surfaces are thoroughly clean before beginning application of the sealant.



Be careful not to rest a ladder against the thin metal of the door cutter.





The 18' aluminum rail cap can be awkward to handle without assistance.



As the cable anchors attached to the cable chase below the rail on the inside of the coach had previously been removed, I decided to go one step further. Using the vacant screw holes as injection ports, I proceeded to fill the underside of the drip rail channel with expanding urethane foam. I felt that this would serve to act as a double seal along the drip rail seams from the underside, on the off chance that I might have missed a spot on top (which was not likely, as I really loaded it, to the point an excess of the 791 oozed when rail was screwed down tightly). I used a bit more sealant than might have ordinarily been needed to fill the channel void completely. My concern was that even though the exterior leak had been repaired, I didn't want any voids on the underside, which might catch and hold moisture should the upper seal fail at some point in the future. My concern was that, should moisture accumulate in a void under the drip rail, and should it ever freeze, the expanding ice could further compromise the seal once again and put me right back to square one. I suspected that the extent of the damage I found might have been the result of such an ice formations over the years. By the way, this is really a cool sunny day, two-man project. I managed to do it alone, but it was a lot of work. In hindsight, if I had to do this repair all over again, I would give serious consideration to having it done by a professional shop like the GMC COOP. P.S. Subsequently, several days of steady rain have shown absolutely no sign of a leak along either of the drip rail seams 8-).



### **Rear hatch –**

It took some serious effort to remove the screws from original rear hatch, as they had corroded severely, to the point that the heads of the original Philips screws had little or no head left. I broke two Philips bits in my impact driver during the operation. The new ¼-20 S.S. screws and anchors I obtained from the GMC COOP made a nice repair. No more rusty streaks down the paint on the rear hatch. To make sure I got the best seal, a dab of Dow 791 sealant was placed on the anchors prior to seating them. I then ran a bead of 791 around the entire outer edge seam of the rear hatch to supplement what was left of the leaky original rubber hatch seal. This was done without removing the hatch or the original seal. I replaced the screws, one at a time, so as not to cause any further damage to the seal, under the advice of Jim Bounds. Another tip for sealing the rear hatch was offered by Charles Wood of OK City. He suggested I use of a length of vacuum hose, forced into the seam to repair the seal around the hatch. Topped with a bead of DOW 791, it would then be permanently fixed in place and certainly stop any leaks along this seam. It could then be painted as necessary (or not). I have it on good authority, that the 791, due to its' flexible nature, doesn't take paint very well. But as it comes in a variety of colors, one should be able to obtain a flavor, which is both functional and esthetic.



As with the other interior surfaces, I trimmed the original sparse urethane foam from the interior of the hatch, to permit installation of the new urethane sheeting, filling the voids with expanding foam and applying foil tape to the seams of each segment. While doing so I discovered that the license plate lamp assembly was badly corroded, warped and leaking. It too, would have to be replaced. I also found two large clumps of RTV sealant covering respective large holes on the floor, adjacent to both sides of the rear hatch. A rather nasty looking harness fed through the hole below the license plate, which had been used to feed a P.O.'s TOAD lights. This mess would have to go. This original harness would have to be replaced with a new through-hull weatherproof connector and a couple of small panels would have to be fabricated from aluminum flashing and installed to cover and seal these holes. This area of the floor could then be sealed and insulated in a suitable fashion.

Initial measurement of the areas adjacent to the generator compartment, beside the seat/bed, indicate that there should be room to locate a 120VAC/12VDC converter/charger along with an auxiliary cooling fan. This could provide relatively easy access to the unit and substantially shorten the wiring run to the house battery. It is unlikely that the original BUZZ-BOX will be retained. It makes much more sense to take advantage of current technology. A modern voltage converter, such as the Model "Statpower 40+" Converter or the Progressive Dynamics, Marshal, MI., [www.progressivedyn.com](http://www.progressivedyn.com), Model "DM-9140R" (reconditioned unit, \$129.00)





and their “Power Wizard” control panel (new unit, \$29.00) would offer a considerable improvement in weight reduction, performance and features. One of these will no doubt find it’s way to my shopping list... However, I don’t plan to trash the old BUZZ-BOX. Even though there are better devices available today, it is still quite functional and reliable as one of the most sturdy built battery chargers ever designed. It will find a new home in my garage, where, I’m sure, it will continue to offer many years of useful service as a conventional battery charger.

This area will also likely be the spot where the main AC electrical panel, DC fuse panel and monitor panels will reside. I hope to consolidate all of the electrical utilities within a single enclosure, making it much easier to service, upgrade or modify any of the electrical house circuits. Instead of the conventional duplex receptacles that were originally employed, several (hexplex) power strips with integral surge suppressors, individual 15 amp circuit breakers and power switches (just like the ones used with your computer) will be installed at several convenient locations throughout the cabin to provide AC power. They will be surface mounted on the wall behind the overhead cabinets for easy of access or replacement should they become defective.



**01-10-03 –**

**The refrigerator enclosure–**

It was time to tackle the insulation on the ceiling and rear wall of the refrigerator enclosure. Upon inspection, I determined that there were four screws holding the original Norcold refrigerator in position and set about removing it from its' lair. After about thirty minutes of pulling, pushing, prying, pounding, a few expletives and some consternation, I made the command decision to get the hammer out. My efforts so far, had yielded a displacement of only about three inches, and it appeared it wasn't going to get any easier. I therefore shattered the top and right side facing boards, whereupon the box all but fell out in my lap. I was surprised to find that my refrigerator had developed middle age spread over the past 28 years. Measuring the cabinet, I discovered that the sidewalls had swelled by a full half-inch or more on each side and across the back of the refrigerator. This meant that it was at least, a full inch wider than the hole from which I had been trying to remove it 8-(. By the way, lifting this item is another two-man job. It can hurt you. If you have to take one out or install one, get some help. For the moment, it too will have to rest in the corner. Much of the interior plastic is cracked and discolored. My first impression is that it will have to be replaced, but I will eventually



clean it up a bit and see if portions of it might be resurrected for spare parts. I have been rather disappointed with the prices I found for replacement multi-mode refrigerators. It just seems to be a little beyond reason to spend \$1,500 or more for what I view as little more than a fancy ice chest. The key to building a better ice chest is **MORE INSULATION**. So I have decided to enter upon a grand experiment. With a budget of about \$500 for this new appliance, I propose to utilize a conventional 8 cubic foot refrigerator, coupled with an inverter, such that it will optionally run on 12VDC. A cabinet design having a minimum of 1" of urethane insulation surrounding it (R-7.2+) and a reasonable ventilation system to draw the excess heat out through the existing roof vent, should aid the efficiency considerably. Although most conventional refrigerators vent through a lower frontal grating, this simply dumps undesired BTU's out into the living compartment where they have to be pumped outside with even more energy consumed by the air conditioner. Another thing to consider is weather or not the appliance contains a freezer. The BTU's needed to make and keep ICE require more than double the amount of energy that a refrigerator alone requires. Why not just have a decent ice chest with two dollars worth of ice in it for ones favorite beverage? Is the convenience of having a gallon of ice cream and a couple trays of ice at hand really worth the added overhead in terms of energy and dollars? I'd rather have a \$1000 coupon for "Dairy Queen" and not worry about a thaw.





### **Insulation adjacent to the shower module –**

I'm sure that many owners would either skip the task of insulating above or behind the shower module, simply because of the working clearance, which is less than an inch in most places. Option "B" would of course be, to remove the shower and continue with the insulation. It has been decided that "B" was not really an option, as I am a one-man operation, recovering from my adventures with the refrigerator. In order to access the right rear portion of the shower module, the right side panel was removed. It was held in place by several screws and a large quantity of RTV sealant along the front or leading edge, which had to be cut with a knife. Using the trim tool fashioned from a 48" length of  $\frac{3}{4}$ " wide aluminum flat bar stock, with a hacksaw blade taped to one end, I trimmed the original urethane to permit installation of a layer of  $\frac{1}{2}$ " urethane board. Once the original insulation had been properly trimmed, the new sheet could be maneuvered into place and sealed with foil tape. As in other areas, a quantity of expanding urethane foam was applied as needed to fill the remaining voids and to act as an adhesive to help secure the panels in place. My intension has been to eventually insulate all of the interior surfaces of the MH. Without question, it is a great deal of work, however the benefits should be well worth the effort in the end, regardless of climate. The wall area behind and the ceiling above the shower have proven to be the most difficult to address so far.





I noticed that the original adhesive used to attach the front panels, to the fiberglass surfaces of the shower module, had become brittle and detached in certain areas. This will require some additional consideration as the shower is refurbished. The light fixtures, faucet, shower head and toilet fixtures will also require further attention and possible replacement.

#### **Heater hose connections to the water heater -**

My first thoughts upon seeing the plumbing for the water heater engine coolant circuit were something on the order of, how the GMC design engineers thought you would ever repair or service the hoses in this circuit. Until I had removed the refrigerator, dismantled the cabinet below it and extracted the wall segment and cabinet to the left of the refrigerator, I thought it virtually impossible to access those hoses or their clamps where they penetrate the floor. I wondered how many GMC owners had ever considered the need for servicing these elements. It seems certain that, if they haven't, they certainly would one day. The rusty brackets, which retained the hoses along the frame, were riveted in place. The mud and road tar which caked the lower portion of the through-hull elbows left no clue as to how they would be detached if they became defective. While chatting with Charles Wersal, of Duncanville, Texas (near Dallas) one day, he advised me that under all of that debris were a couple of screws that attached the through-hull



elbows to the frame. After some serious exercise with my trusty impact driver and 16 oz. hammer, I finally managed to break it loose and extract it from the frame.

After studying the arrangement, I made a decision that the risks of such a configuration outweighed the benefits offered by the pre-heater circuit. I had visions of cruising down the Interstate one night, losing a coolant line back there and smoking the engine before I even realized what happened. The odds got even worse when I considered that the co-pilot might be driving. So, with a wink and a nod, the pre-heater circuit disappeared forever...

The plumbing and utilities are a couple of pages down on the priority list at the moment, but there are a couple of things that I have concluded will have to change. The original water lines which, traversed the ceiling from behind the bath module to the galley sink, were coming out along with the auxiliary fan and pipe duct that supplied warm air to the rear wall of the shower and the AC receptacle in the ceiling. All were dysfunctional and impractical from a service standpoint. I have to wonder what the GMC engineers were thinking when they designed these items. I'm sure they must have seemed like a good idea at the time to somebody, but for the life of me, I can't imagine why. I am convinced that their time would have been far better spent designing a decent bidet for the bath rather than that poor excuse for a ventilation system. Now there's an idea...



**01-27-03**

### **The rear cap headliner –**

I have been debating whether to attempt refurbishing the rear cap headliner or to junk it out and fabricate something on my own. My skills with fiberglass repair are to say the least dismal. My attempt at repairing the outside of the rear cap, frankly, looks like crap. So, I plan to help someone with appropriate talents stay gainfully employed. If I extend the depth of the last FRP headliner panel to the full 48-inches of the sheet, I will only have a relatively narrow curved portion of the ceiling remaining to cover down to the edge of the rear window. Two similar curved pieces would be required to fit between the rear hatch window and rear side windows. Segments of  $\frac{3}{4}$  inch aluminum angle could be attached with epoxy and pop-rivets to the lip of the rear window along the strait portions of the frame to form a retainer for the edge of these panels. These can eventually be covered with a trim molding. The upper corners are the only real challenge in terms of a covering, as they are semi-spherical in shape. But then there is the question of where to put the speakers. Why not make a couple of bastard corner speaker covers to cover these spots? Then I could junk the old cracked and discolored cap and not have to worry about it! This should make an interesting modification.



**02-10-03**

### **Electrical Chase/Cable Tray Cover –**

Like many other GMC owners, I have been pondering a replacement for the molding strip or covering for the cable tray at the roof wall seam. In measuring the width of the aluminum tray I found it was exactly 3 inches wide from the top to the bottom edge. The overall length of the tray measured exactly 18 feet. I then happened to notice a scrap piece of "Panduit" wiring tray stuffed up on a shelf in my garage. The cover supplied with this tray has a toothed lip, which locked nicely over the edge of the aluminum rails on the GMC cable tray. The cover is made from flat white PVC (although it comes in other colors, could be readily painted or covered with ones choice of fabric). The Part No. C3WH6 Panduit Tray Cover is also exactly 3 inches wide 8-). It comes in 6-foot lengths, packed 6 lengths to the box. The spec's may be found on the Panduit web site at: <http://www.panduit.com/>. Do a parts search for Part No. "C3WH6" and you should find a picture and specification sheet for the product. The two tray rails measure 18 feet each, so the box of 6 covers completely covers both trays (36 feet total) front to back. I obtained the covers from a local commercial electrical supply house. The price, for the C3EH6 covers was \$1.74 per foot or \$67.82 with local taxes. If one decides to replace a





portion of the tray cover, such as the section over the door, then the cost would be lower accordingly. As I am reconstructing the entire interior of my GMC, and it is all but naked inside, I chose to replace the entire length on both sides. When in place, the covers fit tightly over the tray rail lips and form a slightly concaved curve, rather than being flat. I had to use a bit of force (small rubber hammer) to work it over the rail lips, but once in place, it locked down firmly. If one should want to finish the cover in some color other than the original flat white (standard automotive paint should work nicely) or a fabric. Refinishing should be done before final attachment. I was able to remove the cover, without damage, with the aid of a large screwdriver, twisting under the lower edge/corner and slowly prying, while working it back over the bottom rail lip. But, a secondary finish, could easily be marred if one were not very careful. The PVC material may be readily drilled, sawed, cut with a carpet knife or box cutter when required for wire clearance. It only took about 15 minutes to install all six sections, however, as I said, the inside of my 75 E II is essentially naked at the moment 8-).

All of the electrical wiring from within the walls of the GMC has been removed. Each wall section has been insulated and sealed. The overhead cable trays will serve as an accessible cable chase for all of the new wiring installation throughout. Re-routing the trunk cable, which supplies the taillights, back-up lights, brake lights, rear clearance



lights, license plate lamp and both rear speakers, entailed cutting these lines near their rear connectors. A series of splices will have to be made in this bundle, as it is re-routed through the drivers side cable chase. While inspecting this wiring, to my surprise, buried under a pile of urethane and particleboard crumbs at the bottom of the left rear corner, I discovered yet another fire ant nest 8-0. Fortunately, there was one good blast of Raid left in the can 8-).

### **02-11-03**

I made the final decision not to refurbish the original cab or rear interior cap pieces. In light of my lack of skill in this area, I have decided to fabricate new panels to replace these items with the same FRP panel material from which I fabricated the new headliners. This will likely entail more work, however I feel the final result should be worth the exercise. I have begun insulating the cab ceiling and planning the placement of key aluminum structural elements for the attachment of the new cab ceiling panels.

I received a call today from Darren Paget at TZEplus informing me that my new overhead cabinets, raised aluminum engine hatch and a full compliment of Timkin wheel bearings are on there way south. Mr. Charles Wersal of Duncanville, Texas (near Dallas)



stopped by with a trailer to retrieve the cab cap, rear cap, galley sink and some other odds and ends to be used in the rebuilding of his 1975/26 Glenbrook GMC. I have tried to salvage as many of the original interior items as has been possible, so that other GMC enthusiasts might make use of them in their reconstruction efforts.

After further deliberation, I also made the decision to employ these same textured gloss white FRP panels used for the headliner to cover the interior walls as well. I completed the installation of the wall panels on the dinette wall from the door to the edge of the cab. The left seam of this wall segment aligns with the aluminum structural member where the cab fiberglass is joined to the frame. An additional length of  $\frac{3}{4}$ " aluminum angle secured with machine screws along the top of the original large aluminum angle where the floor and wall join, serves as a bottom edge retainer for the panel segment below the dinette window. The curved upper edges of this wall panel were fitted to slip under the  $\frac{1}{16}$ " notch of the window retaining brackets. I utilized the full 48" width (actually height) of this panel, so that the top edge reaches about  $\frac{1}{3}$  of the way up along the side of the window. The lower left corner was trimmed to fit along the edge of the step behind the passengers seat. All of these cuts took some care and careful measurement to assure that the panel would conform to the curve of the wall without excessive binding. After the whole panel was trimmed and fitted in place, four holes were drilled for the screws used





to hold the mounting bracket for the dinette table to the wall. Two smaller “L” shaped panels were fabricated and then fitted along each side at the upper corners of the dinette window. After these had been properly positioned, another set of holes were drilled to accommodate the  $\frac{1}{4}$ -20 x  $\frac{3}{4}$ ” mounting bolts for the dinette overhead cabinet. A short rectangular panel was lastly fitted to the remaining segment directly above the center of the dinette window. Small segments of plastic “H” molding were used to join the seams of these four panels. Using the  $\frac{1}{16}$ ” lip of the window retaining brackets to secure the panels around the edges of the window, it was unnecessary to fabricate additional retaining hardware for the panels. The use of any adhesive was also unnecessary. With the wall panels installed in this manner, the window brackets may be removed and the window unit may be removed for servicing without difficulty. This same method of fitting the wall panels around the window frames will be applied to the remainder of the wall panel installation.

The next panel I chose to install was a 4’x 8’ segment, reaching from just left of the galley window to the right side of the rear window above the Generator compartment. In measuring the locations of the structural members in this area, it was determined that the height of the wall segment to be covered measured 48 and  $\frac{9}{16}$  inches from the underside of the cable tray, to the top edge of the aluminum structural beam traversing the midline





of the body. This posed a bit of a problem, as the FRP panel was only 48" wide. Unless the additional 9/16" could be accounted for, the panel would not exhibit the proper curve and fit the contour of the body. I chose to address this by cutting a strip of FRP, 9/16" wide from a piece of scrap material and attaching it with several lengths of 3/4" aluminum flat metal along the upper edge of the midline beam. Holes were drilled near the base of the frame studs and self-retaining nuts were installed at six inch intervals to secure the flat metal strips and the 9/16" shim. This left a narrow lip, approximately 3/16" in depth, which would retain the lower edge of the new wall panel. Another 3/4"x 48" section of flat was secured in a similar fashion to a stud which formed the right hand edge of the wall panel. In all cases, 8-32 self-retaining nuts, along with 8-32 x 3/4" flat head Philips Stainless screws were employed to attach these aluminum retaining strips.

The rectangular holes for the galley exhaust vent and the left side access hatch were marked from the outside of each of those openings with small pilot holes at each corner and then neatly sawed from the inside to form clean cuts. Short sections of aluminum flat were then installed about the perimeter of each the holes to form a protective bezel and vinyl door guard molding strips were installed along the edges to protect the edges. These were secured with 6-32 FHSS screws and a thin bead of Dow 791 sealant under the edges in order to form a watertight seal at these points, thus preventing moisture from



entering the wall at these locations.

After extracting the furnace I found it to be home to both red wasps and more mud daubers. It seems there was an entire ecosystem residing in my GMC 8-). For the moment, the furnace will have to wait in the corner, until I have a chance to inspect and service it. It will eventually find a home beneath the refrigerator pod. But, now it is time to get back to the major endeavor of insulating and headlining so I will be ready when my shiny new TZE cabinets arrive.

### **02-18-03**

Today, my new TZEplus custom overhead cabinets, raised aluminum engine cover and Timkin wheel bearings arrived 8-). The engine cover and bearings will go on the shelf for the moment, but I was most anxious to see how the cabinets would look against the new headliner and wall panels. The coffee colored, powder coated finish of the new aluminum TZEplus cabinets, contrast well with the textured white FRP material. An opening along the length of the cabinets' backside will permit easy routing of the various electrical cables traversing the cable chase. As the cabinets arrived without pre-drilled mounting holes, some study was required to determine the best way to attach them.



Without the use of some sort of shim stock, as was present on the original cabinets, the mounting surfaces did not align with the original threaded fasteners. After carefully measuring the spacing and centers of the original mounting holes, I decided it was best to make a modification with respect to the factory mounting arrangement, by fabricating a new aluminum bracket to simplify the attachment at the rear tie points. Using lengths of one-inch aluminum angle, which corresponded to each individual cabinets overall length, I fashioned brackets by using a sheet metal brake (large bending tool) to form a single,  $\frac{1}{2}$  inch, reverse 90 degree fold, along the length of each piece. Looking at the edge of the bracket, it resembles a "Z" with 90-degree bends, having a one-inch surface and two  $\frac{1}{2}$  inch surfaces. I then positioned the wide (one-inch) surface of the bracket under the cable chase (with the PVC cover installed), marked and drilled four  $\frac{1}{4}$  inch through holes and attached it to the wall with  $\frac{1}{4}$  inch by  $\frac{3}{4}$  inch Allen-head screws. This arrangement forms a  $\frac{1}{2}$  inch lip, upon which the rear edge of the cabinet firmly rests. I then measured, marked and drilled  $\frac{1}{4}$  inch through holes to correspond to the four original mounting holes along the top leading edge of the cabinet and fastened it with the same hardware, securing the new cabinet in place against the ceiling. It was thus unnecessary to drill any mounting holes in the rear of the cabinet yet it is supported along the entire length of the rear surface. For proper symmetry, the forward (left hand) edge of the cabinet was aligned with the leading edge of the cable chase.



These cabinets are considerably lighter than the originals and were not very difficult to mount. The bracket permits the cabinet to be hung against the wall without even having the top retaining screws in place. Although it might have been a bit easier to have some assistance in mounting the cabinets, it was not entirely necessary. It will also be easy to route the 12VDC and 120VAC wiring from the cable chase to the new florescent light fixtures and receptacles, which will be attached behind and to the underside of them. To keep stored items from vibrating and sliding around within the cabinets, a thin rubber matting material will be attached to the inside surfaces after all other installations are completed. The over all length of the new portside overhead cabinets is 18'.

**03-25-03**

### **Clearance Lights -**

The original clearance lamps were in terrible shape. The lenses were faded, cracked and leaking badly. Virtually all of the mounting screws were corroded and many required drilling to effect removal. The thirty holes in the roof required for mounting of these fixtures were also a major source of interior leaks. So, the only practical solution to the problem was replacement. Optronics, Inc., at 401 South 41<sup>st</sup> Street East, Muskogee, OK





74403-6233, Telephone: (918) 683-9514, [www.optronicsinc.com/trailer.htm](http://www.optronicsinc.com/trailer.htm) was my choice of vendor in this instance. I opted to purchase a complete replacement set of (5) red fixtures (P/N: CB-21RS) for the rear and (5) amber fixtures (P/N: CB-21AS) for the front. In addition to these, I ordered (3) extra amber fixtures to replace the porch lamp, LP and Battery compartment lamps. Each fixture comes complete with new gaskets, mounting hardware and use a standard A-194 Lamp. They have the same basic footprint as the original GMC clearance lamps. Optronics does not offer a white or clear lens for this model, but then again, insects are not attracted toward the amber light at night as they are with white lighting fixtures. The total for all thirteen (13) fixtures came to \$44.52 + \$6.95 S&H and delivery was prompt. A NOTE OF CAUTION should be mentioned here. ANY lamp fixtures and/or switches employed in the LP or Battery compartments MUST BE EXPLOSION PROOF. That is, they must be sealed gas-tight, so that they cannot possibly produce a spark when actuated, which could act as an ignition source to flammable vapors, which might be present in these areas. Failure to properly install gas-tight fixtures or similar electrical devices in these areas could result in serious personal injury, death, and damage or total destruction of the MH. This is no place for "Rube Goldberg" type installations.



I located a local cable supply company, Anixter Wire & Cable, 9655 W. Tidwell, Houston, TX 77041, Telephone: (713) 293-4400, which was able to provide me with a 500-foot spool of P/N 2A-1202 cable, (12AWG, 2-conductor, with Red and Black 600V rated insulation in an unshielded PVC jacket) at a price of \$0.13/ft or \$65.00. By comparison, Beldon Cable, P/N 9489 was quoted at \$0.68/ft. or \$340.00 for a 500-foot roll having the same specifications. Caveat emptor folks! With the new cable, I intend to replace all of the original 12VDC house wiring. This will provide a clean 12AWG return circuit for all devices, reduced line voltage drops, reduced frame electrolysis, minimize ground loops and avoid more than a few potential fire hazards. Any good electrical supply house or cable supplier should be able to provide this type of wire so shop around. Just remember to check the specs. I ran into another minor problem with regard to mounting the new clearance lamps. In several instances, the holes in the fiberglass had either been damaged or were excessively large when it came time to install the new fasteners. I wasn't about to replace the original leaky rusted steel toggle-bolt fasteners with more of the same. Once again, I resorted to my trusty self-retaining nut insertion tool and a pair of threaded aluminum inserts to make the attachments. To repair the oversized or damaged holes, the hole was first patched with regular "JB Weld" epoxy (not the 5 minute variety, it is worthless) to strengthen the site. The under-surface of the fiberglass was cleared of the urethane foam and a piece of tape was applied to cover the



holes from the bottom. The epoxy was mixed and poured in from the top, level with the hole. Once the epoxy had set, the hole was re-drilled to provide a clearance fit for the nut insert. A backing washer was added and a dab of “Dow 791 Sealant” was applied around the base of the nut prior to insertion and expansion to form a gasket. Finally, a pair of 8-32 Philips flat head S.S. screws were used to mount the fixture. Even if a tree branch takes one of these beauties off, it is highly unlikely it will ever leak again. Death to toggle bolts!

With the lamps installed, the leads were soldered directly to the wiring harness and shrink tubing was placed over the connections. I decided against using the original push-together connectors, as they, like all connectors over time, tend to oxidize and develop higher resistance resulting in electrical problems. This is more pronounced in humid environments. The only drawback to this approach might be, 30 years from now, who knows if anyone will have retained the antiquated skills of soldering wires, when it comes time to replace them again.

For those that are simply replacing their clearance lamps, without other interior modifications or repairs, requiring removal of the interior ceiling caps, the entire process can be accomplished from the outside. The only catch was the rusty screws in the toggle



bolts. Several of mine had corroded to the point of destruction. The fiberglass surrounding these fasteners is very brittle and can crack if any significant lateral force is applied while attempting their removal. But, that's why they make "J.B. Weld Epoxy".

I used the same techniques to install the porch, LP and battery compartment lamps. The only difference was that a thin bead of "Dow 791 Sealant" was applied around the edges of the globes used in those compartment fixtures, to form a secondary gas-tight seal.

Leaks around the clearance lamps can at times be difficult to identify. The fixtures are mounted upon curved surfaces and leaks may appear at a considerable distance from their source, as water will follow the curvature to a lower point. Sometimes it is easier just to replace the seals and or the lamps, than it is to spend a lot of time hunting down the specific source. Removal of the front and rear caps will provide access to the interior surfaces and make identification easier, however, these items are old and brittle. They can be severely damaged with very little effort, so care should be exercised when removing them. The original headliner panels are also fragile and may be structurally weak. They tend to sag and likewise will carry water away from the entry point. Another consideration when trying to locate the source of a leak is to make sure the vehicle is placed in a level position. Any incline can result in the leak appearing several

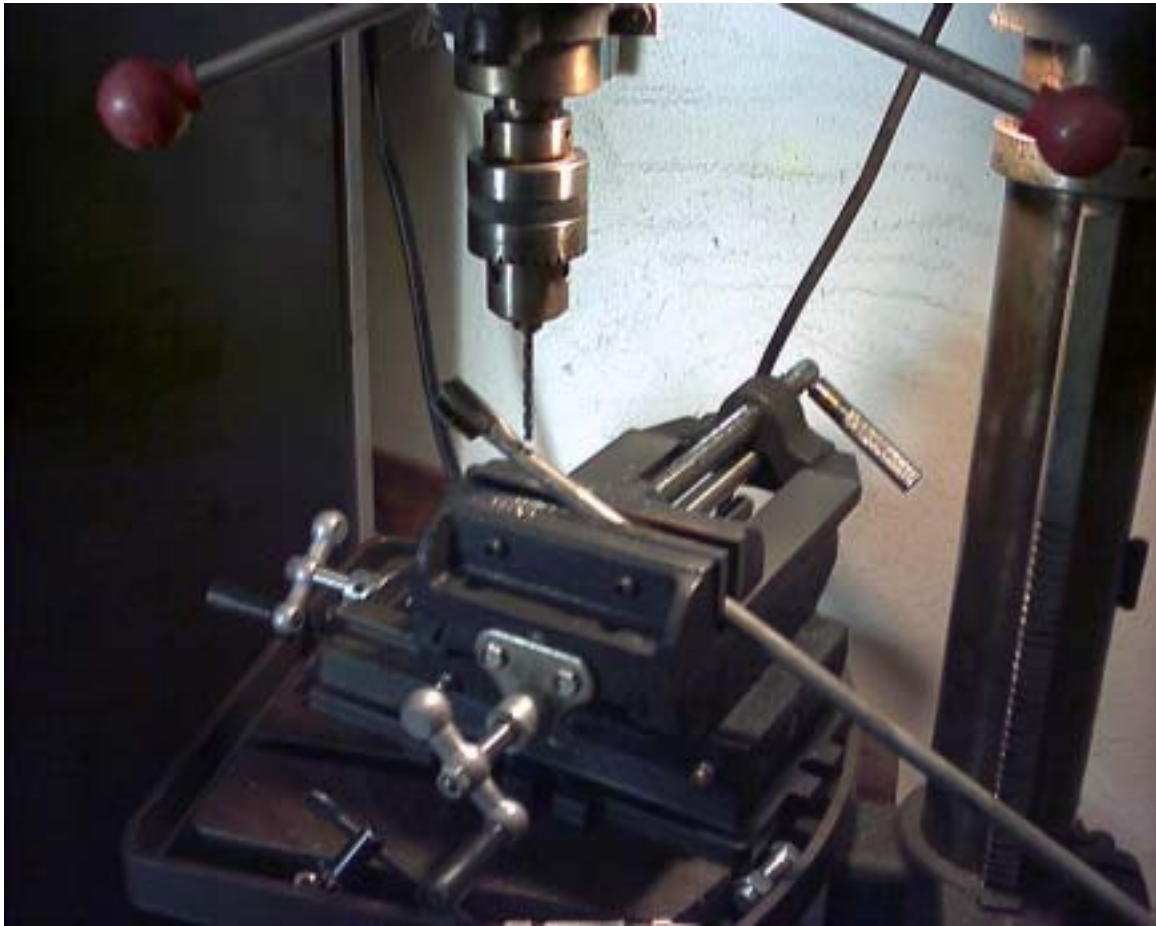




feet from its' origin. Don't forget to replace any rusty screws you find with stainless steel and apply a dab of "791 Sealant" under them when you do. These may not be the source of the present leak, but they will certainly be the source of tomorrows' leak.

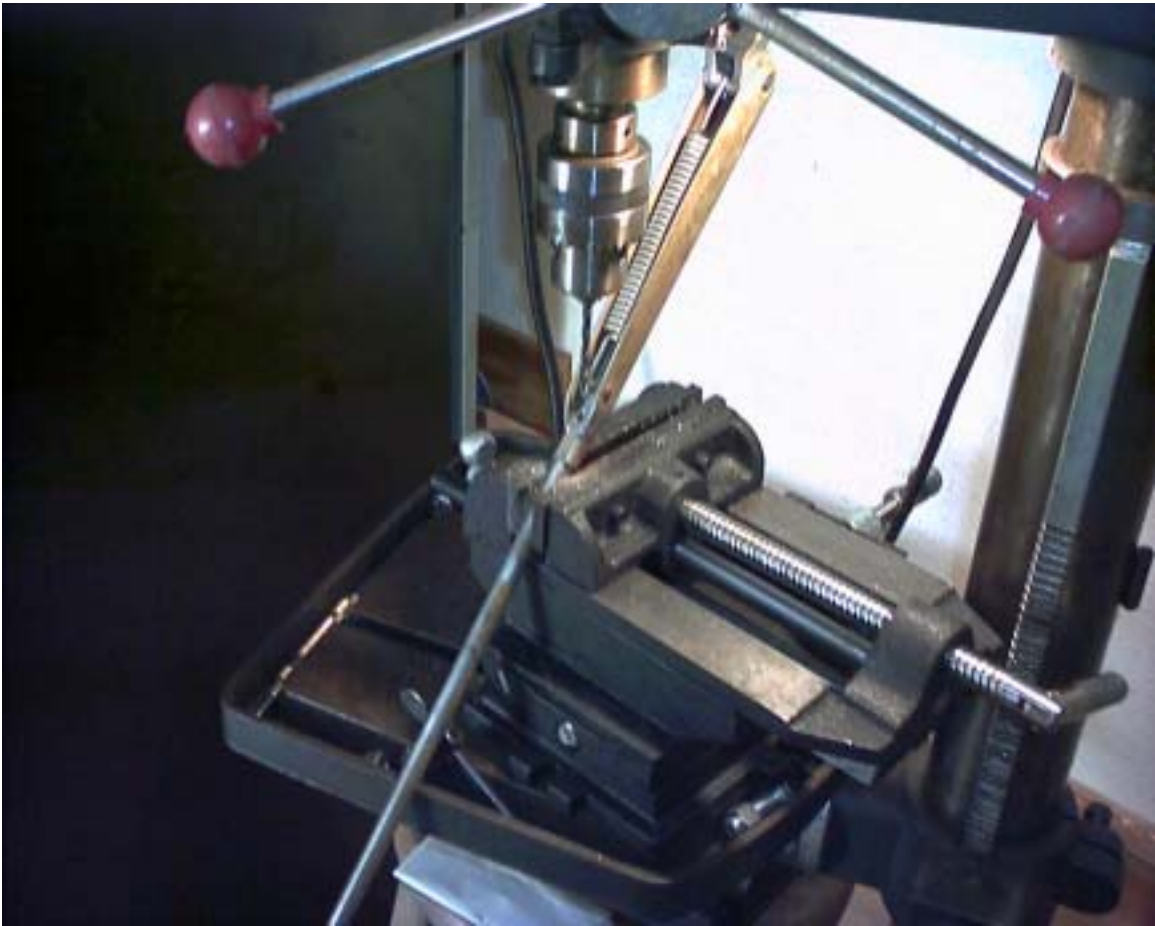
### **Windshield Wipers -**

The original finish on the Trico wiper arms had gone away. The old chrome cap nuts had long lost their luster in a rusty mess. After removing what was left of them, a small wheel puller was used to extract the arms from the mounting posts. A search of the net yielded new part numbers for the washer nozzles and hoses, along with replacement blades. I also happened upon a commentary concerning a nifty little modification. The original washer hoses had been retained along the edge of the wiper arm by a series of little plastic clips. Fragments of these remained, but I wasn't sure if replacements for such items were still available. The modification I refer to does away with these pieces by routing the hose literally through the center of the arm. It simply involves drilling two small holes in the arm.



Using a drill press, an outboard hole is drilled in the underside of the arm just below the blade attachment bracket (saddle) at an angle to permit easy insertion and threading of the washer tube through the shaft. To start the bit at an angle and prevent it from walking or skipping away from the intended penetration point, a small file may be used to score a little groove at the location of the desired hole. The bit is fed with a very light pressure until it has begun to penetrate the surface enough to remain on center. If this light pressure is maintained, a neat clean hole will result. Rushing the activity could result in a broken bit and other headaches, so take it slowly. After the bit has broken through, a deburring tool or jeweler's rat-tail file is used to remove any sharp edges.

A second angled hole is drilled at the base of the arm where the washer tube will exit the shaft and thread through the length of the spring. The same drilling technique is employed with the second hole. Repeat the process with the second wiper arm. A wire wheel placed in the drill press can then be used to clean and prepare the entire surface of the arms prior to painting them. Just prior to painting, wipe the arms with a solvent such as acetone to remove any oil or fingerprints. I chose to paint them with SEM 39134, "Trim Black" automotive paint, (along with a couple of window frame pieces) on the recommendation of Jim Bounds. This self-etching paint requires no primer coat and leaves a smooth satin finish that reduces reflected sunlight glare and contrasts well with



other finishes. It dries quickly and a second coat may be applied if desired. This is the same paint that will be used to refinish each of the aluminum window frames when it comes time to refurbish the windows.



The better the metal is cleaned and prepared, the better the final finish that will result.





Coupled with a new set of ANCO Stk. No.52-20 heavy duty, 20" (508mm) wiper blades, ANCO Stk. No. 48-03 washer nozzles, washer tubing (which is supplied with the nozzles) and stainless steel cap nuts the wiper blades are ready to go back into service. The TRICO parts were a special order item at the parts store I was using, so I went with the ANCO items that were on the shelf. The alternative TRICO wiper blade assembly, Part No. 64-200 (silver finish) or Part No. 64-201 (black finish) should match the original OEM parts. The TRICO blade refill is part No. 72-200.



A small service loop is left in the ends of the washer tubing to prevent kinking of the line and to make them easier to attach. A dab of anti-seize goop was applied to the knurled spacer on the drive shaft to make it less difficult to remove later on.

#### **04-08-03**

For the past several weeks I had to be out of town for a training course, so I was unable to make any progress with my reconstruction project. I did however, take the opportunity to use my trip to visit with several other GMC owners, look over their GMC's, chat with them about their experiences, repairs, modifications and plans for future renovations. Each and every one was a wealth of information and I am most grateful to them all for their generous hospitality, information and advice.



**05-07-03**

### **Bath Vent -**

I discovered another large red wasp nest inside the bath exhaust vent/fan housing. While trying to remove the original vent, the blades began to crumble in my hand. It looked like I would have to add one more fixture to my shopping list. I managed to locate, what appears to be a direct replacement vent fan for the bath in the J.C.Witney catalog, Item # 13UC5736R, "Compact Exhaust Vent with 12V Fan, 6.25" OD, 1.5Amp" \$39.95. UV had eaten mine leaving the crumbs for the wasps. The new escutcheon (lower flange which attaches inside the bath) is substantially shorter than the original and doesn't sleeve the fan through to the fan body. So, I used the original component with the new fan element. Otherwise, there would be a gap exposing the underside of the roof to significant moisture from the shower. The J.C.W. replacement unit is of much lighter



construction, stamped metal, as apposed to an aluminum casting of the original fan. The fan motor is only about 20% of the physical size of the original and looks like it came out of a "Mattel" toy. It really looks cheap and if the old one weren't completely shot, I wouldn't even have considered installing it. As they say, you pay your money and you take your chance. It was easy enough to install though. It is essentially the same diameter, but slightly shorter, having lighter gauge plastic components as well. It took longer to drill out the pop-rivets from the original than it did to hang the new one. The original had six mounting holes. The J.C.W. model has eight. The roof surface was first cleaned with a putty knife and a thin seal of Dow 791 was applied. Eight self-tapping #8 sheet metal screws were used to anchor and seal it down. All in all, it should be serviceable for a few seasons, but it's not my idea of a long-term fix. The original vent was leaking so badly, it had to be replaced and I was trying to save a buck. Unless, at some point, I decide to go with another source, I will in all likelihood rebuild the old one and press it into service once again. A 5-6" DC axial muffin fan would fill the bill nicely and an 8" round aluminum cake pan, with a little paint, would make a fine top hat. Toss in a toggle switch and it should be as good as new.

Of course there is always option "C", when the funds become available (maybe next season). The "Fan-tastic Vent" offered by Scott Nehoda with Adohen Supply Company,





1270 Lear-Nagle Road, Avon, OH, 44011, Telephone:(440) 937-5694, comes highly recommended. Go to <http://members.aol.com/adohen1/page/Adohensupply.htm> for the details on one of the best solutions for vent replacement that I have happened across.

**05-24-03**

### **More Parts**

The past few days have slowed my progress. Having managed to stretch the devil out of some ligaments in my knee, I was forced to take some R&R time. This has afforded me the opportunity to practice my typing once again. The Mastercard folks should do well this month. I called Jim Bounds at the Coop yesterday and ordered a set of replacement flexible rubber break lines, a new bath faucet and a rear hatch window seal. I then drug out the "Summit Racing" catalog and had them ship me a new Edelbrock Performer Intake Manifold, Model EDL-2151, two Flowmaster 70 Series, mufflers Part No. "FLO-52573", two Flowmaster 70 Series, Heat-shields Part No. "FLO-51022", and a set of gaskets, Part No. "SUM-G1423" and "MRG-404". I then sent an order off to Duane Simmons of 4320 Fernwood Ave., Orange, CA 92869, [simmee@juno.com](mailto:simmee@juno.com), Phone: (714) 633-4731, for one of his new Polyethylene Battery Tray units, \$35 + \$7 S&H, for the



battery compartment. Both “Ragusa” and “TZEPlus” offer high quality battery compartment slide tray assemblies, and I had strongly considered both of their products. However, I happened to have a box full of salvaged slider assemblies from old electronics equipment chassis that have been taking up space in my garage for years. So, I have decided to roll my own (pun intended). My next stop was at the internet site of Franklin Auto Parts, <http://franklinautoparts.safeshopper.com> for a Petronix Model No. 1181 ignition unit, \$57.95 + \$4.04 S&H, to replace the breaker-points and condenser on the 6KW Onan generator. Fellow GMC’ers Lawrence Gaskins <http://www.picturetrail.com/GMCLawrence> and Ken Henderson <http://www.gmcmhphotos.com/gallery/showalbum.php?aid=287&uuid=kenhenders> seem to have been the innovators of this nifty little modification to the original Onan generator and I thought it sounded like a pretty good idea. After this, I made a call to Jack McHaney, at 1157 FM337, Medina, TX 78055, [jvmchaney@78055.com](mailto:jvmchaney@78055.com), Phone: (830) 589-2431 who fixed me up with a new set of Thorley Exhaust Headers and the necessary hardware to finish the overhaul and redesign of my old 455’s exhaust system. The last call was placed to Mr. Dick Paterson [dick@paterson-gmc.com](mailto:dick@paterson-gmc.com) to obtain a set of Stainless Steel Exhaust Port Crossover Plates to solve, what appears in my mind to be, the biggest design defect of the 455 Engine. The new set of Thorley headers look very nice, out of the box. They came with new hardware and gaskets. The flanges slip comfortably



within the input tube of the new FlowMaster 70 series mufflers. The FlowMaster mufflers will feed into dual 2.5" exhaust pipes. They should keep the backpressure and noise to a reasonable level. Coupled with the new Edelbrock intake manifold, the old 455 should breathe a whole lot easier. The optional aluminum heat shields were added to the mufflers, to help reduce the level of radiant heat against the cabin floor and help dissipate the exhaust heat. The new Polyethylene battery tray I had received from Duane Simmons, received a coat of leftover gold spray paint, just for grins. Matching it up with a couple of my recycled rack slides should make for a stylish battery compartment 8-). I had been trying to figure how to get rid of that gold spray paint for years. Now I have the most expensive looking battery tray in town 8-).

It will be several weeks before I can install all of these new toys. I have yet to remove the old exhaust system, clean, inspect and paint the frame. My mechanic buddy is up to his eyeballs in other obligations, at the moment and I simply don't feel up to tackling the intake manifold and associated top end work alone. I would much rather hold off and wait to get competent assistance with it, rather than potentially make any costly mistakes, which might delay the work even further.





### **455 Exhaust System**

The exhaust system was a shambles. Where it wasn't missing, it was full of holes. Aside from a couple for brackets, none of it would be salvageable. I went back to the web once again, in search of a solution to this mess. Fortunately, I was not the first to run up against this situation and I had several excellent options to choose from. I could always rebuild the existing system in its' original configuration. That option didn't last long. Many owners had decided to increase the diameter from the original 2 1/2" exhaust to 3", thus reducing backpressure on the engine and increasing horsepower. That sounded reasonable. Then there was a group who favored replacing the dual mufflers with a single muffler located at the rear instead of in the middle under the forward section of the living compartment. This cut the expense by 1/2 for mufflers. But then I happened upon some photos on a website by Mr. Lawrence Gaskins of West Union, WV, <http://www.PictureTrail.com/GMCLawrence> which showed, what I thought was a rather clever exhaust system design. The system modifications he had made to his 1973 Painted Desert struck me as ideal. He has installed the Thorely headers, maintaining his 2 1/2 " diameter pipes and routing his tailpipes out under the drivers side of the living compartment ahead of the rear wheels. Some had expressed concern about the heat from





the exhaust system adjacent to the fuel lines and other equipment in this area. I had already made the decision to relocate my fuel circuits behind this location, so that would not be a problem for me. In addition, I had decided to install additional heat shields on both mufflers and an auxiliary heat shield between the exhaust pipes and body to further cut the heat radiating to and through the floor. The shortened 2 ½" circuits would be less expensive than going to a longer 3" circuit. The individual exhaust legs of the dual design, in conjunction with the substantially shorter tailpipes, would reduce the backpressure to a minimum while affording the lowest sound level.

Other advantages of utilizing a side porting exhaust system are that it frees valuable real estate along the starboard side of the chassis frame. Such space might be used to permit installation of larger capacity fuel tanks, sanitation tanks or compressed air tanks for the suspension system. It serves to re-distribute weight forward and moves a significant source of heat away from the fuel tanks and LP circuits. Removing the single tailpipe assembly from within the frame structure should make everything easier to service.

About half of the original tailpipe was gone. It also looked like a P.O. didn't know how to properly place the hydraulic jack, judging from the bend in the lower frame rail near the cross member under the LP compartment. Fortunately, it wasn't serious. The LP plumbing will be replaced and re-routed to the starboard side where the furnace will be



relocated under the refrigerator.

Very little of the original paint remained on the frame and undercarriage. A good deal of wire brushing, sanding and general preparation would be required to clean things up prior to re-painting. It would have been nice to have a power washer to remove the layers of mud and loose debris covering the chassis before hand, but it was impractical to do in the middle of the storage lot. Of course, it would also have been nice to have the ability to do a full frame off restoration, but that wasn't an option for me either. The original mufflers and exhaust system literally broke apart when the support hardware was removed.

No amount of pounding would separate the exhaust plumbing. It had been fused with rust and would have to be sawed apart where it turned to pass through the frame. The tail pipe centering brackets, which held the pipe in the frame came out with the aid of a breaker bar to loosen the corroded bolts. Although the bolts attaching the exhaust pipes with the manifold ahead of the mufflers had been treated with plenty of solvent, three of the four bolts snapped off while attempting removal. As little trouble, as it is to apply a little anti-seize to bolts, exhaust bolts in particular, I don't know why folks don't use more of the stuff. It sure does make life easier for the next guy.



The underside of the ¾" plywood deck flooring on the 75 Eleganza II is entirely covered with a thin sheet of aluminum flashing metal bonded to a layer of foam insulation board. A layer of oxide, mud and dirt seem to have protected it quite well over the years. Aside from surface rust, the torsion bars, frame and other elements of the undercarriage appeared to be structurally sound. There were no indications that there had ever been any structural damage or repairs, so it looked as though I was facing a major cleanup operation, but didn't have to worry about the integrity of the chassis.

The remains of the parking brake cabling and associated hardware were removed, along with the rusty brackets, which held the pneumatic lines and fuel circuits. The parking brake elements would be discarded. The remainder of these items would be replaced and rerouted, along with the LP plumbing. The fuel tanks would have to be dropped and overhauled. A large crack was discovered in the sanitary tank, so it would have to be replaced. The retaining brackets, which held the sanitary tank, were severely corroded as a result of the leak from the tank and would also require replacement. New muffler and exhaust pipe brackets would have to be fabricated to support the new exhaust system. All of these chores would be done with an assortment of hand tools and a rechargeable hand drill, while lying on the creeper. Is this what they mean when they say I'm lying down on the job?





### **Wheel well insulation -**

A rather ugly aspect of the interior that many GMC owners seldom see because they are generally hidden from view, are the wheel wells. With the new galley design, they will be much more visible, so they will need a serious facelift. The original thin layer of foam covering the wells were trimmed and sections of 1/2" aluminum foil backed urethane insulation material were cut to cover each surface. Each section was fitted together with 2" aluminum foil tape at the seams and then the remaining voids were filled with expanding urethane foam to bond the insulating panels in the same manner as had been done previously for the ceiling and walls. The location of the various mounting screws through the wheel well, which attach the liquid-vapor separation and leveling valves were marked for possible future access and service. The original fasteners for these items were replaced with new S.S. hardware. Large voids along the top of the well, where there are two surface elevations to clear the wheels, were filled with scrap segments of urethane board prior to applying the more expensive expanding urethane foam. Finally, a top piece was installed to cap the enclosure forming a solid shelf.

When the insulating foam had cured, forming a sealed rigid surface, sections of FRP panel were cut to cover the insulation and provide a bright clean finished exterior surface.





The FRP was bonded to the surface of the urethane with a bead of 791 Sealant around the edges. The corners were trimmed with appropriate internal or external vinyl corner molding.

The wheel wells will of course, eventually be entirely enclosed within the new galley cabinet and the new starboard utility area. This will serve to further slow the loss or gain of ambient heat within the GMC and afford a clean, waterproof surface lining the interior of these new storage compartments. It will also serve to act as a secondary structural barrier in the event of a catastrophic rear tire failure on the vehicle and further reduce the level of road noise.



### **Door molding replacement -**

While sitting upon my freshly insulated galley wheel well this morning, cutting scrap sections of FRP panel to cover it with, I happened to glance over at the discolored and fractured door jam molding. I then noticed the similarity of the PVC outside corner molding with which I was about to install as trim on the outside corners of the wheel well panels. They appeared to be exactly the same width. With my trusty utility knife, I cut off a section of appropriate length and began to carefully trim the single 90-degree side free from the main U-shaped portion of the FRP molding. Presto! I had an exact replacement for the original door molding. After removing what was left of the old molding the residual adhesive, the new molding was snapped into place over the edge of the doorframe and fit so well that no adhesive was required. It looked great. The molding was part of the haul for the last trip to Home Depot where the FRP paneling had been obtained. It sells for about \$2.00 per 8' length. Two sections and a sharp utility knife were all that were needed.

Jerry Richardson of Torrance, CA saved me another trip back to Home Depot to verify the correct part number for the molding strip. It's officially called "Vinyl Endcap, 8', Part No. 73018 and sells for \$1.79 each". Thanks Jerry.



The original door molding had turned yellow, brittle and had fractured in several places.



The new door molding fit like a glove and looks good against the new wall panels.





**06-04-03**

### **Standard Rear Brakes & Suspension**

I had decided to take a few days off in June so that I could tackle several of the more involved refurbishing tasks. At the forefront of the list stood the rear brakes and suspension system. There is a great deal of information concerning the braking system available on the web. There are many variations and configurations to choose from and many opinions concerning the virtues and vices each exhibit. It had been a couple of decades since I last did any kind of brake job, so I wanted to review the available technical information pertaining to the GMC, discuss the subject with several of those who have gone before and assess my options. I felt that a disk brake conversion, although technically superior to shoe brakes, was a bit more than I wanted to tackle at this stage of the game, so I resolved to stay with the original basic design. The wheel cylinders would certainly require a rebuild kit at the least, after sitting so many years, but it seemed more practical to just change them out. A number of GMC owners I spoke with, had decided to change out their wheel cylinders to a larger diameter. The original cylinder measured  $15/16$ ". Some had decided to utilize  $1 \text{ \& } 1/16$ " and others preferred to use  $1 \text{ \& } 1/8$ " cylinders. There were numerous arguments expressed both for and against



this practice, that don't need to be rehashed here. I eventually concluded that a switch to the 1 & 1/8" cylinders would be the way to go in my case, so that's what I went looking for. A pair of Bendix Part No. 33710, (at \$31 each, he certainly saw me coming) were obtained from a local parts house, but a second pair would have to be special ordered from them. Not wanting to wait, I obtained four or five other numbers from the net and hit O'Reiley's and Autozone without success, (not listed in their computers). I eventually stumbled across the Wagner Part No. WC86000 (formerly P/N F86000), which O'Reiley's did have in their computer (at \$15 each).

I also wanted to install the new "Check Valve" type bleeder valve stems. The two different numbered cylinders each have different sized bleeder valve threads requiring the use of different bleeders. The Bendix Part No.33710, 1 & 1/8" cylinders, which happened to be installed on the middle wheels, use Check Valve Bleeder Number 12701, which is 3/8"-24 thread, 1.19" OAL. Wagner Part No. WC86000, 1 & 1/8" cylinders, which happened to be installed on the rear-most wheels, use Number 12704. Both types sold for \$11.89 each. These devices allow one to bleed the brakes without assistance. The replacement brake shoes used were P/N 462 and sold for 16.99 each, for a set of four shoes. The small pads always face forward while the large pads always face the rear.



Next on the list of replacement items were all of the flexible brake line hoses, which are available from Jim Bounds at the GMC Coop. Several of the retaining clips for these hoses were severely rusted and broke while being removed. Standard “C-clip” type retainers will substitute fine for the originals, however the ones I had on hand were only half as thick and required the use of two per fitting. I had seen enough of the parts house for one day.

After disassembly, all parts were thoroughly cleaned then inspected for wear and function. At first there was some concern about the condition of the spindle, bearings and races. There were minimal quantities of what appeared to be three different varieties of grease remaining on the bearings, however there were no obvious signs of discoloration or wear, so I decided to simply repack them with fresh grease and save the bearing replacement job for another time. I had just received my very own shiny new TZEPlus super deluxe bearing tool a few days earlier and had a full complement of replacement Timkin bearings on hand, just in case.

The various springs, retainers, self-adjuster and drums appeared to be in good condition. Masking was applied to the spindle, friction and bearing surfaces of the drum and all were then briskly wire brushed to remove the surface rust. They were then given a good





coat of Hi-Temp, gloss black engine enamel paint to protect them and improve the esthetics. The old parking brake cable, through-plate guide, lever arm and cross bar were removed and discarded as their function would be replaced by the new in-line hydraulic brake lock valve, J.C.W. Part No. 73UD4432T, \$26.95, <http://www.jcw.com>, which would be installed later. This is a manual type brake lock valve is suitable for use with the new silicone brake fluid. It will be mounted in the same location as the original parking brake handle.

The knock out plugs where the self-adjuster mechanism is usually accessed, were still in place at the bottom of the backing plates. With the aid of a stout center punch, a 16-ounce hammer and more than a few expletives they were finally removed. The trick was to start pounding along one edge and continue until the plug began to tare away from the backing plate then continue to strike along the tare until reaching the opposite edge. It only cost me one blue fingernail to get them out 8-(. The resulting holes were then deburred with a file and painted. Finally they were plugged with appropriate plastic plugs to keep debris and critters at bay.

After the paint had dried, the brakes were reassembled with the new shoes. The bearings were repacked and the drums were reinstalled. Appropriately detailed procedures for





servicing and adjusting the brakes are available in the service manual. Once again, this is not rocket science, but one should get an economy size bar of “LAVA” soap or tub of “Go-Jo” as it is a rather dirty job.

The bogie assemblies were wire brushed, cleaned, inspected and painted with “Rustolium” gloss black enamel paint as well as the adjacent frame. The grease gun had been loaded with Hi-Temp bearing grease, so it was also used to grease the bogie pins. Finally, the new set of KYB shock absorbers were pulled out and installed along with the new air bags with the aluminum cones. Working alone, the entire process consumed two full days for this novice.

Going back into the Christmas toy box, I retrieved the “Ragusa” mirror brackets, final drive cover and transmission cover that Santa had brought 8-). The mirror brackets also received a coat of gloss black enamel and were a snap to install with the stainless steel screws that had been included. Removing the original final drive cover exposed a thick encrusted layer, which had to be chiseled away from the inside of the housing. My gut feeling is that this gearbox had not seen the light of day since it was closed at the factory back in 1975. A putty knife and modest quantity of solvent were used to clean out the drive so it could be inspected. Surprisingly, everything seemed to be in pretty good



shape, so the new aluminum cover was installed and a couple quarts of fresh Hi-Temp gear oil were added. Unlike the original cover, the new cover has a drain plug and a port to attach a temperature sensor. It also holds an extra pint of gear lube and has integral cooling fins to help dissipate the heat that tends to break down the oil. The instructions that came with the new cover were easy to understand and aside from the mess involved in removing the original cover, the exercise was rather painless. If you are good, perhaps Santa will bring you one 8-).

Another trip to the auto parts shack yielded a new filter and gasket for the THD-425 transmission. I was puzzled at first that the new “Ragusa” transmission cover didn’t come with a gasket. As it turns out, the gasket is included in the package with a new filter. However, it does not include a new O-ring for the filter attachment tube. This had to be obtained separately. Fortunately, I happened to have an O-ring kit in the garage, which saved me yet another trip back to the auto parts store. It seems I spend so much time there lately that the other customers are beginning to ask my assistance, thinking that I must be an employee 8-(.

Dropping the transmission pan is an even bigger mess than was the final drive. It contains several quarts of fluid, which begin to drain as soon as the first couple of bolts



are cracked. Have a large container and drip tray in place under the pan before you begin to remove the bolts. A roll of paper towels would also be handy to have. Safety glasses are also in order during these exercises, as these liquids make very poor quality eye wash. A ready source of fresh running water should be available just in case of an accident. One can never be too careful when working around automotive fluids, cleaners and paint.

After the original transmission cover has been removed, the gasket surface should be cleaned and dried. The filter is retained within the underside of the transmission due to the friction supplied by the O-ring on the upper tube of the filter. One should be certain that the old O-ring is extracted with the old filter and does not remain lodged within the port. Carefully apply a new O-ring to the new filter just prior to installing it. Be careful not to nick or abrade it. The O-ring should offer a snug fit and hold the filter in place without other support. Reuse of the old O-ring is not recommended, as the seal, over time, may become compromised and allow fluid to be drawn into the transmission around the filter. The new aluminum transmission cover, similar to the final drive cover, has a drain plug, a temperature sensor port, both internal and external cooling fins and extra capacity for fluid. The only negative aspect that I noticed was the fact that it extends slightly lower than the original cover. This characteristic slightly reduces the overall





ground clearance of the drive train. As a result, it might be more subject to damage from debris or drag impact when traveling over uneven road surfaces. The aluminum construction offers much greater cooling ability than the original steel covers, however overall impact resistance is somewhat reduced. I am strongly considering the installation of a rock guard or deflector screen over the lower portion of the engine compartment to safeguard these potential points of impact. On the whole, I am more than satisfied with the features offered by these products and feel they will help extend the useful life of my GMC.





The O-ring rests against a lip on the upper filter tube.



A very thin film of Type 2 “Permatex” was applied to the lip of the cover; just enough to hold the gasket in place while it was being installed. It isn’t really necessary to seal the surfaces. This variety remains soft and is easy to remove later.



The original steering damper, which is installed just behind and attached to the front cross-member, was flattened on the bottom side. The damaged damper and the skid marks along the bottom of the transmission cover indicated that a P.O. had managed to bottom out the front end on more than one occasion. “Moog” Part No. SSD55 is the replacement damper.





If I had known the sad condition of the oil coolant lines, when I fired up the engine back in December, I would have waited to change them before doing so. It took only one turn of the cooler side fitting to break the line in two. They had deteriorated to the point of nearly falling off. Surprisingly, it didn't look that bad on the outside. As they age, they become a weak link in the system. If one of these hoses were to fail while you are bounding down the highway, it might only be a matter of a minute or so before the entire contents of the oil pan were pumped out onto the ground. Another scenario might involve a less than catastrophic pinhole failure, which could spray a mist of hot high-pressure oil upon the exhaust manifold resulting in a dandy engine flash-fire. Did I say "less than catastrophic"? Neither of which, are any fun to deal with. Changing these hoses was another trivial task. I would suspect that they are generally changed much less frequently than they should be. After seeing how they can weaken, I plan to move them to a higher position on my regular maintenance list. A few minutes with a flare nut wrench and a good flexing or folding of these hoses should provide a reasonably good indication of their condition. They take a lot of abuse from the heat of the engine oil coursing through them and from the elements without. They should be inspected at every oil change.

The next Christmas package contained the new TZEPlus elevated aluminum engine cover. It only took a few minutes to attach the twist latches and foam rubber lip seal.





The original plywood hatch was set aside and the new hatch was set in place. The underside is completely covered with a fairly stout insulating blanket that should reduce both heat and engine noise within the cab. The cover optionally comes with air shock lifters for the bells and whistles crowd. I'm of the opinion that if I am inclined to lift the cover, I want to move it out of my way so that I can easily reach what's beneath it. I may attach a pull down stainless prop rod to each side later on, but I prefer fewer moving parts. Moving parts tend to increase my maintenance workload, are something else to fail and add extra cost to a device. Over the years I have had to replace literally hundreds of depleted pneumatic lifter devices that don't any more. I have never had to replace a prop rod. It's just my way of doing things. The anvil is the perfect machine. The TZEPlus aluminum engine cover sits right alongside the anvil in my book.

The next project on the list entailed replacing the felt weather strip around each of the windows. The materials were obtained from Jim Bounds, once again, at the GMC Coop. There are two varieties of this material. The "U" shaped felt track strip which fits within the window frame recess and seals the edges of the sliding glass pane when it is opened or closed. The other type is referred to as vertical felt and is the little "T" shaped strip (looking at it end wise) that is held within the vertical aluminum piece running along the center facing edges of the window glass. An instruction sheet comes with the weather



stripping that explains in some detail how to remove what's left of the old stripping, clean the frame and install the replacement. A screwdriver, putty knife and green scrubby pad made short work of the rusty residue that remained after extracting the old material. A utility knife and a leather punch (to cut a neat series of drain holes at the appropriate locations along the lower track) were the only installation tools. The original stripping had been secured in place with a rather tenacious adhesive of some variety, but the new stripping fit so well, that no adhesive was necessary.

Having replaced the weather stripping around each of the sliding windows. All was going well, having replaced the stripping on all four main compartment windows, I was a bit nervous about the step in the instructions which says to utilize a block of 2" x 4" and a hammer to remove the vertical edge molding from the glass. But to my surprise, it worked rather well, at least until I got to the passengers cab window. I first started on the outside to remove the vertical molding from the movable pane. It took considerable force, much more than any of the previous pieces. I split the 2" x 4" block and had to get another to continue. It finally broke free, half way through the second block, from the adhesive (black, RTV?) and corrosion bonding the aluminum vertical to the glass. It took a razor blade and green scrubby pad to remove the stuff from the edge of the glass.



The headache came while attempting to remove the vertical from the fixed pane on the inside. Suspecting more adhesive/sealant on this pane, I proceeded to shatter the second 2" x 4" and was concerned that I might be approaching the shatter threshold of the glass itself. Finally the lower edge started to move as I worked upward with my strikes. I noticed that the aluminum vertical was beginning to bow in the middle. Stopping to examine the piece, I found that it contained two corroded 1" sheet metal screws attaching it to the frame at both the top and bottom. Neither screw was obvious on prior inspection, due to the level corrosion. I managed to remove the top screw without much difficulty. However, the bottom screw was situated within the frame channel and was virtually inaccessible without removing the entire window frame. With a prayer and a new block of 2" x 4", I decided to go for broke. Hammering the lower edge of the piece, in an effort to shear the screw, the head of the corroded screw pulled through the frame the hard way. The surgery was a success, but now there was one dandy curve in the vertical. This should test my metal working skills. There was a healthy application of the same adhesive/sealant holding this one in place as well. Unfortunately, there appears to be no easy way to determine before hand, that any type of adhesive or sealant might have been applied under this vertical member. Why it was done in the first place is beyond my comprehension. The screws are another matter. If you are attempting to



replace the felt stripping on the vertical members of the cab windows, be very carefully check for any screws attaching it to the frame on either end.

The drivers' side vertical member didn't offer quite as much trouble. After the upper retaining screw had been extracted, the piece was worked from the upper edge downward until the rusty head of the lower retaining screw broke off and the vertical fell free. Once again, the razor blade and scrubby pad were brought to bear on the adhesive, which had held the piece in place. The replacement stripping around the frame is slightly thicker than the original material, so each of the vertical pieces must be trimmed by about 1/8" to provide a clearance fit between the two surfaces. Otherwise the vertical would drag against the edge of the new rubber strip and cause it to bind when the window is opened or closed.

Another item to replace when servicing the windows, are the screws and plastic inserts which, retain the latch handles in the sliding panes (also available from the GMC Coop). As there appear to be no leaks between the window frames and body, it will not be necessary to remove and reseal them. The only thing remaining is the application of a coat of SEM. 39134, "Trim Black" automotive paint. As it stands, I'm inclined to try masking them off and painting them in place, one small section at a time. We shall see...





Adhesive had been used to retain the vertical bar in addition to the screws.



**06-30-03**

### **The fuel system –**

After close examination of the fuel filler assembly, I was not impressed with the original design. Judging from many comments I read on the GMCNet forum and in the archives, neither are a bunch of other folks. I found numerous comments relating to problems filling the fuel tanks through the elaborate kluge of the fuel system plumbing. As the tanks began to fill, air trapped in the lines would belch and slow the process. So, I decided to extract all of the original fuel filler assembly from the present location adjacent to the drivers seat, and relocated it, in modified form, to a location further back on the side of the coach. Darren Paget is one of those who decide to implement such a change and did a wonderful job in addressing this problem. I intend to follow in his footsteps, so to speak.

With the kick panel adjacent to the drivers seat removed, the fuel filler assembly may be accessed. After extracting the pop-rivets, which secure the assembly and filler port door the upper portion of the filler can be freed. The lower portion is attached to a long section of pipe, running through the frame to the fuel tanks with a rubber coupling.



Breaking this coupling permits removal of the filler. A hacksaw blade was used to cut through the fiberglass around the periphery of the filler port. With the port completely removed, the resulting hole could be filled with fiberglass and sealed. A small sheet of aluminum flashing was first pop-riveted over the interior of the hole to provide a firm surface upon which to build the patch. The patch actually consists of several layers to integrate with the rest of the panel and form a permanent repair. Layer one is comprised of what is called "Dyna-Hair". It is a resin material containing long filaments of fiberglass, which forms a mesh, giving the fiberglass a great deal of strength in all directions. I chose to use this particular material because of its' ease of use and the fact that I had absolutely no experience in the application of fiberglass. This was my first attempt at repairing fiberglass and without any outside technical assistance to rely on, I thought it would get the job done with a minimum of hassle. It may not have been the best approach, but I feel it produced reasonably good results. The trick, I found, with any of this resin business, is the amount of hardener that is mixed when preparing the material. If you follow the instruction on the box, be prepared to work at warp speed. This stuff will set up before you finish mixing it! My advice is to only use about 15-20% of whatever amount of hardener the instructions call for. The material will set up just as well, but will allow about 4 or 5 minutes for it to be applied. Even then, it is amazing just how fast 4 or 5 minutes will pass when you are trying to uniformly cover an area and





smooth the surface. I wasted a couple of batches before I got the hang of it. Mix just a little more than you think you might need. Don't worry about wasting the stuff. It's relatively cheap. If you have never done this sort of thing before, it is a lead pipe cinch that you will botch a batch or two. Fiberglass application is one of those hands-on sorts of things. You can read about how it's done all you want, but until you actually do it a few times, you won't really understand what it's about, sort of like having sex 8-).

The edges of the hole were lightly sanded to rough them up and allow the patch to properly adhere to the panel surfaces. The "Dyna-Hair" layer was applied such that it extruded inward along the edges of the aluminum backing plate and formed a rough irregular surface slightly below the surface level of the panel. I let it cure until the surface was cool (about 30 minutes) and then lightly sanded the material removing any peaks.

The next step was the application of a layer of "Bondo" body filler. The same rules apply concerning the amount of hardener mixed with the resin. In all, three thin layers of "Bondo" were applied, gradually building up the surface until it formed a smooth uniform layer extending slightly above the level of the surface of the panel. Each individual layer was sanded with successively finer grades of sandpaper to gradually





form a surface contour matching the exterior panel. When sighting down the edge of the surface, the patch should form a continuous smooth surface without any irregularities to indicate that there was ever a hole there in the first place. The trick is to work into it gradually. Build it up just above where the finished surface should be and sand it down to the finished surface. Granted, this is not the sort of thing I would want to do for a living. But, it isn't rocket science. It is also advisable to mask off the work area so that you don't drip the fiberglass or filler on the surrounding finish. A coat of primer paint will be required when the patch is complete to seal the surface provide a base coat prior to repainting the area.

Now I realize that I will likely attract some heat from the fiberglass purists out there that begin to twitch at the mention of the word "BONDO", but you have to realize that this was my first ever attempt to effect a repair of this nature. SO GIVE ME A BREAK! What do I know? I'm an electronics hack for crying out loud! The solder wouldn't stick!

When the patch was complete, I returned once again to the interior of the panel, where the insulation process was continued. Separate urethane panels were fitted and expanding foam was applied to fill the obvious voids. Finally, strips of foil tape were applied to the edges, sealing the entire interior surface.



As the original kick panel would be replaced with a new FRP wall panel section, a segment of aluminum angle with two self-retaining 8-32 nuts was pop-riveted to the forward most diagonal cross member to provide a fastener for the leading edge of the new panel. This approach would provide continuity of the interior wall surfaces and gain a couple of additional inches clearance adjacent to the cockpit seats where utility consoles could be installed.

With the exception of the small cable chase just below the windows, both cockpit walls will now be completely sealed, air tight and waterproof. There are no more pathways for hot air and fumes to ingress from the engine compartment. Any aromatic dribble that might result from filling the fuel tanks can't find it's way around the filler tube and into the cockpit wall.

Eventually, the plywood cockpit flooring beneath the seats will be removed and replaced with an aluminum plate and a substantial layer of fireproof insulating material. All of which should substantially improve the comfort factor within the cockpit. An integral engine fire suppression system is also on the drawing board, but I don't want to get ahead of myself.



The flashing is secured with pop-rivets at the corners within the recesses of the panel.



It's not necessary to use the full amount of hardener when mixing the resin.





The “Dyna-Hair” forms a strong patch due to the fiberglass fibers suspended in the resin.



A wide spreader is used with the “Bondo” filler to get a smooth uniform surface.



The “Bondo” is applied in several thin layers until a uniform surface is achieved.



The Finished patch should be smooth and follow the contours of the surface.





The Aluminum angle bracket provides a fastening point for the new FRP kick panel.



### **The fuel tanks -**

The next phase of the fuel system overhaul involved dropping and refurbishing the fuel tanks. This was another chore that I had absolutely no experience with, so I talked to a number of people about it and read all I could on the web. As it turned out, to my surprise, there were about 10 gallons of 22-year old leaded high-test petrol remaining in the tanks. It was obvious that there was no way to siphon it out. The drain plugs were frozen in place and wouldn't budge. Another trip was made to the auto parts store to obtain an electric fuel pump, with which I was able to pump most of the ancient fuel from the tanks. The fuel lines were detached at the fuel tank selector valve and separately attached to the fuel pump, which fed into a gas can. I made it a point to have my fire extinguisher handy along with safety glasses and an oil tub to catch any drips. An inspection of the area should be conducted to ensure that there are no nearby potential sources of ignition and the area secured.

After the tanks were emptied, they were unbolted and dropped, where upon the remaining small amount of fuel was extracted. The fuel pump will not remove 100% of the fuel. There will always be a small amount remaining, which must be poured out. The auxiliary tank (forward tank) should be removed first and then the main tank. It quickly became obvious that the rubber fuel lines and couplings had deteriorated to the point they



snapped like a pretzel when bent. If you haven't checked your fuel lines recently, I would suggest that you do so NOW! There is no greater potential fire hazard that I can think of aside from a leaky fuel line. It is the sort of thing that many take for granted, simply because they are out of sight, out of mind. If you find a strong aroma of gasoline shortly after filling the tanks or worse yet, find gasoline dripping anywhere under the vehicle, attend to it immediately. Don't wait, do it or have it done NOW! Loosing the vehicle to fire would be bad enough, but you are jeopardizing your life and that of your passengers by waiting.

The exterior of the tanks showed slight signs of surface rust, but no dents or other signs of significant damage. They were covered with a decent layer of mud, dirt and offered sanctuary to a substantial collection of mud dauber nests on the upper surface. As much of the dirt as was possible was removed with a brush prior to breaking the seal on the level sensor assemble and opening the tank. All of the hoses were removed and a muffin fan (inductive brush-less type fan only) was placed over the sensor opening to force air into the tank to evaporate any residual fuel. **WARNING: A SPARK FROM A FAN OR ELECTRIC DRILL MOTOR CAN DETONATE THE TANK AND KILL YOU!** This is necessary, as we don't want any explosive fumes left inside of the tanks while we are refurbishing them. Ventilate the tank OUT OF DOORS or at least leave the garage door



open. If you have a gas water heater or clothes dryer in the garage, don't even go there. The safest method is to fill the tank with soapy water and wash it out completely. I chose to use the "Kreem" coating kit offered by J.C.W. The instructions recommend just that. The soapy water removes all trace of oily residue from the interior of the tank. I will not go into the details of the procedure here as instructions are provided with the coating kit. However, the basic steps are 1. Wash the tank with soapy water. 2. Rinse with clear water. 3. Wash the tank with Solution "A" (which is a polyphosphoric acid solution). 4. Rinse the tank with Solution "B" (which is MEK or methyl-ethyl-ketone, a known carcinogen). 5. Coat the interior of the tank with the "Kreem" coating, drain the excess and allow the tank to dry. Details pertaining to the individual steps may vary depending on the condition of the particular tank being refurbished, so the individual will have to determine the exact procedure for his individual case.

Tank refurbishing is not a trivial procedure. There are serious hazards involved, as it requires dealing with highly flammable materials, highly corrosive materials, highly poisonous materials and the potential for serious personal injury. Unless you have the facilities and know how to deal with these materials, you are better off taking the vehicle to a properly equipped shop and having the service performed by trained personnel. Many radiator shops offer fuel tank refurbishing services. Prices will vary of course, but





you can expect to spend in the neighborhood of \$200 for each tank. Having refurbished my own tanks, I would certainly consider this a fair price. When using a tank service facility, ask to inspect the tank just prior to coating installation to be certain that the interior surfaces have been properly prepared. Use a good inspection lamp and mirror. The surfaces should be absolutely clean, and metallic gray in color showing no trace of rust. Once the coating has been applied and cured, it should be fairly uniform over every interior surface, white in color and look rather like the inside of a plastic milk jug.

Refurbishing the original fuel tanks is generally more cost effective than replacement. If they have to be replaced, I feel that stainless steel is the only practical way to go.

After ventilating my tanks and ensuring that they were completely dry of fuel, the exterior was thoroughly wire brushed and painted with a coat of "Rustolium" gloss black enamel paint to protect them on the outside. The level sensor assemblies were soaked in a gallon of white vinegar for a short while and brushed to remove any residue. They were then rinsed in hot water, then alcohol and allowed to dry. DO NOT coat the sensors with the tank coating material unless you want to replace them. The coating will ruin the sensor mechanism. They were then tested for mechanical and electrical function. Both assemblies showed approximately 90 ohms when metered and appeared in serviceable



condition. I understand that replacement sensors are available from Cinnabar, Inc., 800-720-2227, for about \$135 each. Ask for Part No.6429669. Be certain to obtain the proper replacement rubber seal for the unit as well.

It occurred to me that even though my level sensors were in good condition, they were after all, more than 28 years old and could possibly fail at any time. With that in mind, I cringed at the notion that I might have to go through the process of draining and dropping the fuel tanks to replace them again in the near future. But I didn't really want to spend the \$270+ for new ones just yet. I therefore decided that while the tanks were out, another little modification with regard to the fuel system was in order. A pair of service hatches would be cut through the floor of the GMC to permit access to the fuel level sensors from within the cabin, without necessarily having to drain and drop the tanks. Measurements were taken to determine the approximate center of the level sensor on the underside of the cabin floor. A pilot hole was drilled up through the floor at this location and a square 8" hatch was cut in the floor corresponding to the level sensor position for each tank. Using the engine battery, a new 750W inverter and my trusty jigsaw, four clean cuts were made in the deck to form each hatch. The short (1") stroke and metal cutting blade used in the saw only penetrated the plywood and a portion of the underlying insulation. The plywood blocks were lifted out with the aid of a putty knife. A hammer



and the putty knife were used to make small slit-cuts in the aluminum sheet covering the underside of the floor along each edge of the hatches. A regular hacksaw blade was then inserted through these small slits and drawn upward to make a clean edge cut through the protective aluminum sheet on each side, without delaminating the surfaces. This permitted extraction of the insulation blocks, which, along with the plywood piece, would be re-used to construct the hatch cover. A 1/2" wide by 1/8" deep recessed lip would then be routed about the circumference of each hatch. Two 9" square aluminum hatch covers would then be fabricated, attached to the cutouts, and fitted within the recess flush with the deck where they would be secured several brass wood screws. In the future, the level sensors may easily be accessed by simply lifting back the floor covering and removing the new service hatch covers. It also makes it a snap to replace most of the fuel lines, should that become necessary as well.

I was concerned that, over time, gravity, moisture and vibration might cause the insulating foam to sag around the area where the service hatches were installed. To guard against this possibility, several sections of 1-1/2" x 1/16" aluminum angle, each 11" long, were cut, mitered and fitted around the edges of the hatch forming a protective frame. The pieces were fitted from the top, but would be attached with 1-1/2" brass wood screws from the underside forming a supporting lip for the insulation layer. This would also





protect industrious fingers from the razor sharp edges of the aluminum sheet 8-). The edges of the exposed plywood deck would also be painted with a waterproof sealer to provide a moisture barrier.

Installing the hatches with the tanks removed was much easier in my mind than doing so with the tanks in place. That is not to say that it cannot be done without that headache, but it took the guesswork out of determining the precise location to center the holes. For the benefit of those who might want to incorporate this modification without removing the tanks, I took a series of measurements to make the job a bit easier. If one or both of the fuel level sensors require servicing, this might make the task a bit less troublesome.

### **Fuel Tank Service Hatch Measurements -**

These values pertain to the 1975 Eleganza II, 26", with floor plan 26-3. They should be applicable to other 26' chassis. The first order of business is to remove any existing floor covering to expose the plywood deck. Using a square and strait edge, measure 37-3/4" from the edge of the plywood deck at the doorsill. Then measure 24-3/4" from the edge of the plywood in the center of the isle toward the front of the vehicle. The intersection of these two lines will result in the location of the forward most right hand corner (facing





the front of the vehicle) of the auxiliary fuel tank service hatch. These measurements are critical to those that follow, so measure carefully. This will be referred to as the “REFERENCE POINT”.

Placing a square along the isle deck seam, draw a line segment 8” from the reference point toward the rear of the vehicle. This will form the right hand edge of the auxiliary hatch (facing forward). Draw two additional 8” line segments, from the ends of this line, perpendicular (at right angles) to the first line toward the galley. This will establish the forward and rear edges of the hatch. Finally, draw one more 8” line connecting these two segments to form the last remaining side for the hatch, on the left (still facing forward). You should now have an 8” square drawn on the floor, which defines where you will make the hole.

Confirm all measurements before dragging out the saw. The reference point corner should be exactly  $24\frac{3}{4}$ ” from the isle seam. It should also be exactly  $37\frac{3}{4}$ ” from the edge of the plywood deck at the doorsill. The rear edge of the square should be exactly  $16\frac{3}{4}$ ” from the isle seam ( $24\frac{3}{4}$ ” minus  $16\frac{3}{4}$ ” equals 8”). You should have an 8” square pattern that is square with the frame of the vehicle.



The next task is to determine the location of the main fuel tank service hatch. Place the square along the right-hand edge of the auxiliary hatch pattern. Measure and mark a point precisely 33" from the reference point toward the rear of the vehicle. Draw an 8" line segment from this point rearward to establish the right hand edge (still facing forward) of the second hatch. In similar fashion as before, draw two additional 8" line segments, from the ends of this line, perpendicular (at right angles) to the first line toward the galley. This will establish the forward and rear edges of the main hatch. Finally, draw the last 8" line connecting these two segments to determine the forth side for the hatch, on the left edge (still facing forward). You should now have a second 8" square drawn on the floor, which defines where you will make the hole for the main tank hatch.

To confirm these measurements, there should be a distance of exactly 33" from the reference point to the right most forward corner of the second hatch. The forward most edge of the main hatch should be exactly 8-1/4" from the isle seam and 25" from the rear most edge of the auxiliary hatch (8-1/4" plus 16-3/4" equals 25"). The pattern should form a square, 8" on each side, square with the frame of the vehicle. Another measurement that may vary slightly, but should be very close, is the distance from the rear most right-hand corner of the main hatch to the bath module. This point should be approximately 2" out from and 4" forward from the front corner of the bath module.



These values should be close, but may vary by some fraction of an inch in either direction, due to the construction of the bath module.

If all of your measurements correspond, the holes for the hatches should fall right on the money. I chose to install square hatches because it was easier to do with the tools at hand, however they could have just as easily been made round. An 8" hole will provide adequate room to replace and service the level indicators or fuel line fittings in this area. Exercise caution when making the cuts for these holes by making certain that the saw blade depth is set to CUT NO MORE THAN ONE (1) INCH DEEP. This will penetrate the plywood sufficiently without penetrating the insulation or contacting the surface of the fuel tank. The insulation and aluminum sheet can be cut manually with a hacksaw blade as was described earlier. Slicing a hole in a tank full of fuel, with a power saw, could result in serious injury or death. You also want to avoid carving up the fuel lines, which may already be defective and leaking. These are some of the down sides to performing this type of modification without dropping the tanks. This type of incision is sometimes referred to, as a "BLIND CUT". There is no way to see what is on the backside of the surface you are cutting. In this case, however we are certain that a tank full of gasoline is down there somewhere. Be very careful!

### **Through the frame chase -**

Another modification related to the space through the frame, formerly utilized by the fuel filler lines, is the installation of a 3" PVC conduit or chase extending from the front of the chassis to the rear. Sections of 3" PVC drain pipe are cut, inserted and coupled through the frame, to form a conduit through which, the pneumatic lines for the rear suspension, a new pair of 2/0 battery cables, air conditioning lines, fuel system electrical wiring, or other circuits may be routed within this protective sleeve. A section of aluminum heat shield would be located around the tube where the new side discharge exhaust pipe will cross beneath it for additional protection. This gets rid of all those rusty little brackets that used to attach everything along the underside of the frame and protects the various circuits from road hazards and the elements. It also reduces the need to take the interior apart to service, add or remove a circuit in the future. The individual conduit segments are simply slip fit together so that in the unlikely event that a given segment might become damaged, it could be replaced. Any moisture, which might accumulate within the conduit, would readily drain from the open ends and seams.

### **Some other ideas to ponder -**

#### **Magnetic-mount radio antennas –**

As most folks know, magnets don't normally attach to either aluminum or fiberglass. But, there is a way to use mag-mount antennas without punching a lot of holes or hanging steel plates on the GMC. There are two fundamental points to consider with this problem.

1. Provide a surface upon which one might attach a magnet.
2. Provide a good ground-plane surface with which the antenna can interact.

One approach to address the first point is to attach a 4" circular flat magnet, approximately 1/2" thick (available from Edmond Scientific and other sources) to the underside of the fiberglass cab roof. It should be installed slightly to the rear of the center clearance light, centered in the ceiling. First, remove all of the insulation from the under-surface of the cab in this area, corresponding to the location where the mag-mount antenna in question, is to be placed upon the cab roof, then apply a strip of clear wide box tape to the roof surface to prevent the magnet on the antenna base from scratching the paint. I have found that if the surface is waxed thoroughly beforehand, the tape can be removed later without seriously marring the paint. (Be sure that there are no metal filings or rust particles clinging to the magnetic base.) Place the antenna over the tape on top of the cab orienting the cable in the desired direction. Taking the circular magnet, which will be attached to the underside of the cab, slowly bring it in contact with the surface until the interaction of the magnets can be felt and allow it to naturally orient itself and align with the antenna base magnet on top of the cab. It is best to have a second person hold the antenna in place until the magnets have aligned, so that the orientation of the antenna does not move or change. The position of the underside magnet is then marked and may be permanently secured to the underside of the roof with a bead of J.B. Weld



epoxy. Leave the antenna in place until the epoxy has cured and securely bonds the lower magnet in place. One or more magnetic mount antennas may be attached to the fiberglass in this manner, however it is best to separate them by a couple of feet or more, particularly in the case of transmitting antennas (such as CB, cell phone, amateur radio, etc.) so that they do not interact with one another.

The second point to be addressed involves the ground plane. This is a technical aspect of the radio business that is important in terms of antenna performance. Without going into a long dissertation on the subject, suffice it to say that if you want any vertical antenna to work reasonably well, it had better have a decent ground plane under it. Basically this consists of a metal reflector, which interacts with the antenna. A sheet of brass screen cloth may be used, cut to cover the entire underside of the cab area, which will be placed above the headliner. The trailing edge of which, is secured at several points along the aluminum cross member at the leading edge of the roof. The aluminum should be thoroughly cleaned at the connection points so that a good electrical connection is formed. This essentially extends the ground plane surface of the entire roof to the windshield and under the new antenna mounting positions.

This modification should provide a very good mag-mount antenna installation at a reasonably low cost.

### **Zinc Anodes**

There are a number of new ideas I hope to try out during my rebuild. One thing, about which I have always wondered, has been the use of zinc anodes strategically placed along the chassis and frame to reduce if not stop corrosion and rust throughout the vehicle. For years I have been saving scrap zinc for such an experiment and now I plan to test out the idea. I have cast several 1"x 4" ingots, which can be drilled and attach at various locations along the frame. It has been common practice to employ anodes on marine equipment and ship hulls to reduce the corrosive effects of the sea. They should prove somewhat effective along the coastline or in areas where salt and other substances are used on the roads for de-icing in the northern latitudes as well.

### **Night Vision**

I have noticed that several owners have added CCD TV cameras and monitors to their GMC's to allow them to see out of the back from the cockpit. A few years back, one of the hats I wore, was that of a sleep laboratory design engineer. Among other responsibilities, I designed video installations. When CCD cameras were first introduced, I noticed that they have a very broad response to the spectrum of light. I subsequently employed both UV and IR illuminators to observe patients in the dark while they slept. With a handful of LED's one could make an IR illuminator, which would allow the camera to virtually see in total darkness. One or more of these devices could easily be concealed at the rear of the vehicle to improve the night vision capabilities of the camera, consuming very little power and without the need for additional conventional

lighting. They could easily be incorporated within the housing of the backup light fixtures.

## Sun Fly

An idea I have been pondering, to minimize the level of roof heating when parked or camping, is a detachable, white fabric roof tent, which would attach to short posts, at various intervals along the gutter with removable clamps. The whole thing could be stored in a small suitcase sized package and would install to cover the entire roof, windshield and rear window. When installed, it would form an umbrella, elevated 8-12" above the surface of the roof and would not impair the use of the roof air conditioner or vents. A removable side attachment could be employed to serve as an awning in place of the conventional permanently mounted variety. I believe that such a device would be more energy efficient and effective than a roof full of solar cells, particularly if a water mister system were adapted for very dry climates.

## LP GAS LEAK SAFETY VENTING TEST PROCEEDURE -

It had occurred to me that a "Gas Leak Safety Venting Test" might be a useful procedure to add to our GMC bag of maintenance tricks. In order to test the effectiveness of an existing or modified venting of the LP compartment:

NOTE: Perform this test ONLY out of doors, NEVER in a garage or similar confined space.

1. Place a bowl, bucket or other similar container partially filled with water inside the LP compartment.
2. Place a few ounces of dry ice into the container.
3. Securely close the LP compartment door.
4. Observe the resulting CO2 fog dispersal to determine if the existing venting is adequate. The resulting CO2 fog will visibly simulate the effect of an LP GAS LEAK. Where ever there is a hole the CO2 fog will escape. LP vapor is heavier than air, just like the CO2.

More on these and other thoughts as we continue down the road...

\* Death to particleboard...

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