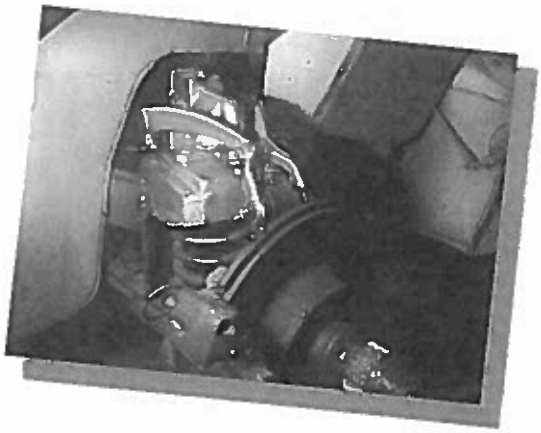
was attaching the wheel assembly to the shock. This picture shows the installed wheel assembly and the repaired shock tower.



I offer my sincere appreciation to many members of the British Car Forum (www.britishcarforum.com) for the advice and recommendations provided along the way as this project evolved. There are several solutions out there for repairing the Healey shock tower; this one worked for me.

FRONT SHOCK MOUNTS

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I read with interest the article in the January 2002 Austin-Healey Magazine about the aging membership and the possibility that some of the expertise of Healey mechanics might be lost with the passage of time. In that vein I thought since I am doing quite a bit of work on a Healey right now, I might share with others some of the challenges that I am encountering and what I believe is the best remedy for them. I apologize that I might be redundant to the experiences of many of you since my experience with Healeys is very recent, but much of my past work on British marques has been on MGs and most notably the MGA and the MG Midget as well as other marques, and so hopefully this will be helpful to some of you.

My current repair work on the Healey is on one of the front shock mounts. The shock is correctly mounted by four bolts which run through the shock base plate then into the frame member which is the uppermost portion of the coil spring tower assembly. The upper coil spring locating "hat" is made with the shock mating surface welded to it with about a 5/8-inch spacing between the horizontal surface for the shock to sit on and the coil spring upper locating hat.

This 5/8-inch spacing provides what amounts to a horizontal slot in which nuts have been welded under the shock mounting plate to anchor the shock absorber. In my case, all of these nuts, which are actually inside the frame member, were broken off. Previously, someone had drilled and driven very long bolts upwards from the underside of the upper coil spring locating hat in order to fasten the shock in place. Needless to say, this was not a very exact method to secure the shock absorber or to ensure its exact location as is needed for alignment of the front wheel. Eventually these long bolts worked loose and as they pulled every which way they finally broke the top metal surface on which the shock was sitting.

Well, I have devised and completed a way to make this repair without having to completely cut the frame apart, considering that the nuts were welded to the inside of the frame member. I have also maintained the originality and integrity of the frame and all other components.

The horizontal 5/8-inch space which is between the shock mounting surface and the coil spring top locating assembly was created when the frame was originally welded up by inverting a stamping with is four sides which was approximately 6 1/2 inches by 3 1/2 inches. With a disk cut-off wheel I cut out the front or right side vertical portion of this inverted stamping. I then cut a piece of 5/16-inch steel plate to fit into the horizontal slot, approximately 6 1/2 x 3 1/2 inches, which positions it directly under the shock mounting plate. To ensure the position of the shock for alignment purposes, I center-punched through the shock mounting holes with a self-centering punch into the 5/16-inch plate. I then pulled the plate out, drilled and tapped it for the original size bolts, put the plate back into position, again ensured the position of the shock for alignment, drew the bolts up tight, and then welded the front outer edge of the plate to the frame member so that it would not move out of position if the shock was ever removed again at a later date.

The original piece of metal that I cut out to gain access to the area under the shock was then welded back into position from whence it had come, concealing the 5/16-inch plate inside. The frame, spring perch and shock platform look exactly as original, even though they are hiding a new plate with new threads for the shock inside.

SHOCK TOWER REPAIR

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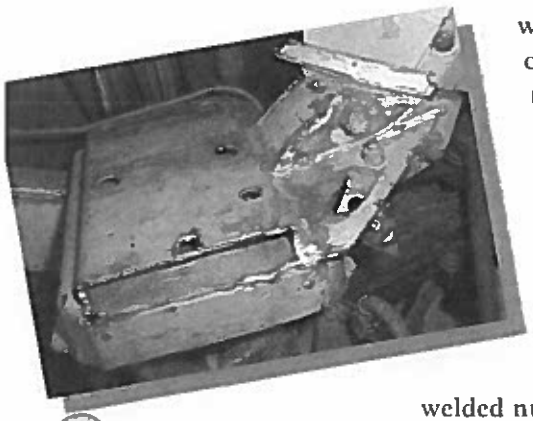
As Healey owners have learned, the design solution for attaching front shocks to the tower is prone to failure — the welded nuts break loose. When I removed the shocks for overhaul, I noticed that several of the welded nuts had broken loose making it impossible to firmly re-attach the shocks. This picture is of the shock tower after removing the shock.

The repair solution I selected involved having a metal plate cut, drilled and tapped. This plate would be inserted into the shock tower after cutting the wheel side end out. This picture shows the plate as received and before grinding to proper size.

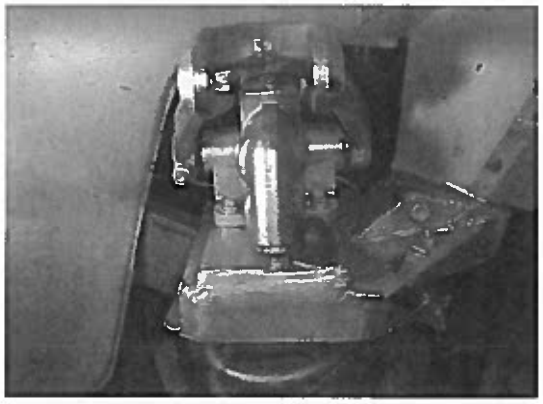
The first operation was to cut the end out of the shock tower. I used a pneumatic 3-inch cutting wheel. This picture shows the shock tower after cutting out the end plate and removing any welded nuts remaining.



The next operation involved grinding the metal plate to get it to tightly fit into the shock tower. The plate was manufactured to fit the largest shock tower so the amount of grinding is dependent on the actual size of the tower — mine was smaller. Also, in the left front tower there was weld material in the far right corner and the plate had to be ground to go over that material. This picture shows the plate being inserted in the tower.

After much trial-and-error grinding, inserting, and more grinding and inserting, the plate was properly inserted. The next operation involves installing first the rebound buffer, then the shock. I used lock tight on the bolts. This picture shows the plate in place in the tower, ready for installation of the rebound buffer and shock.

After the rebound buffer and shock were installed, I welded the plate to the bottom (frame) of the tower so that it would never move. After some grinding of the welding and application of some JB Weld, I declared victory. This picture shows the shock tower with buffer and shock installed and the opening in the tower covered.



The last operation

WRAPPING UP A BASKET CASE

From: Leo Kob, Philadelphia Chapter

PROLOGUE

It was late fall, 1975. Another Phila Inquirer classified ad for a 1962 Big Healey. My comulsive call produced the profile I'd been looking for...under 40,000 miles, second owner, (personal friend of original), lost garage space. Sounded like a perfect candidate for my future son or daughter (I wasn't married yet). I got there expecting to knock the $750 asking price down to $500 for another BT7....but walah, it turned out to be a coveted BN7; my four-year search had ended. The young owner appeared to be a muscle car candidate, obviously had little knowledge or interest of British bloodlines. It had a factory hardtop but I astutely pointed out that it had no 8-track, so we settled at $700. He didn't even want extra coin for the factory louvered hood.

The car was dissassembled, inventoried, and boxed in two weeks. Living in a condo at the time, storage of this, two BT7 and a BJ8 rolling chassies was a problem (I assumed I'd either have three kids or two kids and a wife who would rather have a big Healey than an air-conditioned Mustang II or AMC Pacer (hey...the country was in the aftermath of its first energy crisis). A good friend who had a large barn where he was hiding a number of woodies and mid-fifties trucks from his wife agreed to help me out. My rolling chassies were supposedly safely burried under straw bales, but somehow the BN7 didn't make it past the chicken house. No big deal, until I found out through his wife ten years later that the chicken house had no roof. It was now Swiss cheese from the firewall back. Another Mark 2 BN7 hadn't turned up since that time (only 355 two-seaters were produced). I kept it because....I'm a PA Dutchman who can't part with anything...

Fast-forward 15 years to summer 2000 and a chance encounter at my current storage site with a veteran freelance welder who's wife always wanted a Big Healey. He took a look at the BN7 chassis and agreed it was a basket case. So did a couple of his buddies who estimated it was at least 100 pounds lighter than at birth. Don isn't nuts, just likes a challenge. He figured the frame could be brought back by piecing a wrap around the drafty 28-guage box frame. This way all points of attachment would remain undisturbed. All he needed to get started was one more certified welder to declare the mission " impossible" . I had no problem finding one.

To raise the odds against success, Don agreed to let me do some of the welding despite the fact I hadn't struck an arc since redoing my BT7 in 1980 (solid car) . We set out to do the job with a MIG machine, gas welding set, grinder, levels, come-a-longs, timber, assorted vice-grips, sandblaster, big air compressor, jacks, standard metalworking & mechanic's tools, and the coveted BMC shop manual (couldn't find more than 2 pages on bodywork).

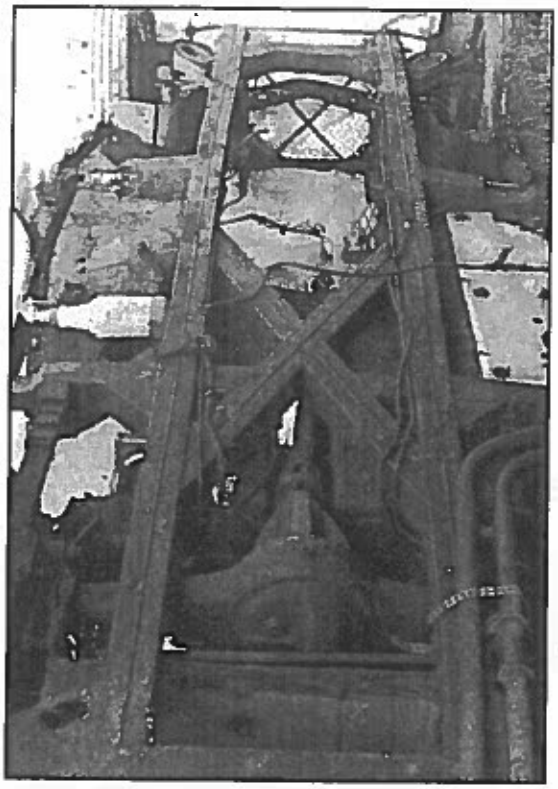
Before we started, he confirmed timesheets would not be filled out..he just wanted his own Healey and we didn't want our wives to throw reality back in our faces if and when the mission was completed. So I had bartered a BJ8 rolling chassis and drivetrain for Don's makeover of my swiss-cheesed BN7 chassis.

This excursion is presented as a low-budget but effective way to restore a big Healey frame & chassis. It relates an amatear's first-hand experience, as guided by a highly experienced structural welder who posesses a great capacity of patience. The caper wouldn't have been been launched if time and money were significant considerations. Rationale: two stubborn PA Dutchmen determined to keep this BN7's "numbers" intact. Our progress will be relayed in upcoming issues of the FLASH. I'm not attempting to compete with the pros, rather pass on the trials & tribulations of structural restoration performed the down-home (spelled "hobbyist's") way . Now that we've successfully completed the BN7 chassis (yea, we have the skin on), the next project's labor could be cut by about 25% by applying the learning experiences to be shared in this series. Comments and recommendations from readers who have had similar or more experience are welcomed. Next month: Setting up.

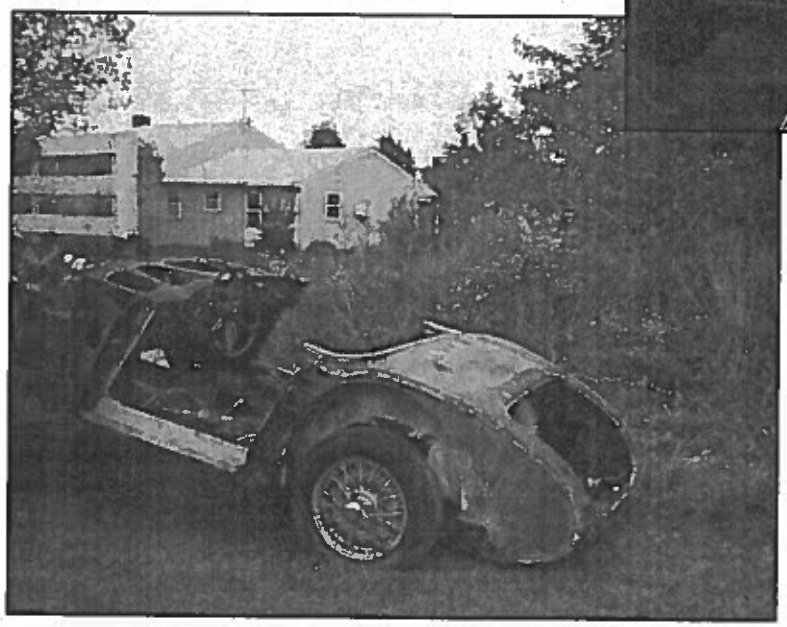
Leo Kob's BN7 Restoration Project

The Body

The Frame



Prior to Disassembly



After 10 years weathering

Wrapping Up a Basket Case

Chapter 2: Preliminary Surgery

by Leo Kob

Second in a series about an amateur's excursion into big Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

Before the wrapping process could begin in earnest, we had to separate the coveted BN7 rear tub, remove all of the floorpans, siderails & rockerpanels, most of the outriggers.

Lesson #4:

When chipping factory spot welds, use a tiny chisel and a big hammer, not vice-versa. Drilling won't cut it either. Big chisels tear too much metal, especially when it's oxidized for a couple of decades. Removal of mine wasn't a big sweat because the trunk floorpan, side boxes and rear bumper brackets were nearly disintegrated, along with a troublesome percentage of the inner wheelwells. Somehow the rear skirt rail survived. Get a machinist's chisel (not available at local building supply houses) which is only about 1/4" wide. A pair of electrician's dikes (wire-cutters) are helpful.

The factory must not have had a strict policy on the maximum number of spot welds that were to be shot into the rear tub. Based on my extensive ?? experience stripping 3-BT7's and this BN7, the count varied by about 30%. Hopefully there was a minimum number established to pass 'QC' inspection. I suppose only a select group of concours judges now know the 'official' number. Perhaps each car's count reflected the mood of the assembly line on the day of production.

LESSON #5:

When those stubborn bolts won't back out of their nuts after soaking in safety-clean or liquid wrench for a couple of months or years, heat's the answer. Be sure to heat the nut, not the bolt or both will expand simultaneously. Obviously this isn't done in a conventional or microwave oven... an oxy-acetylene torch is the weapon of choice. Practice on a few bolts that aren't part of the car before attacking the real victim. The ball-bearing seat adjusters are frozen on many cars. If penetrants don't work, heat usually quickly brings them back. These are expensive replacement items. Soak the old ones in safetyclean and light oil after heating to insure they don't refreeze. For prolonged storage, keep them in sealed freezer bags (oil won't evaporate).

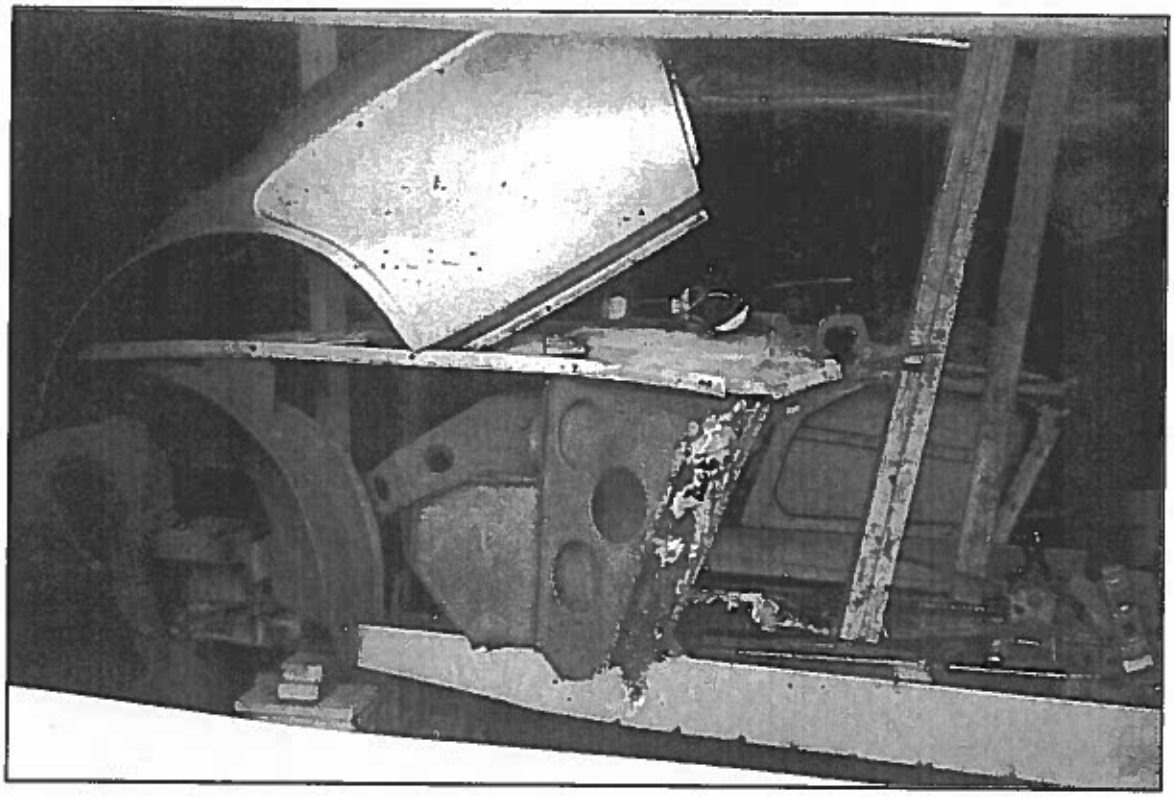
LESSON #6:

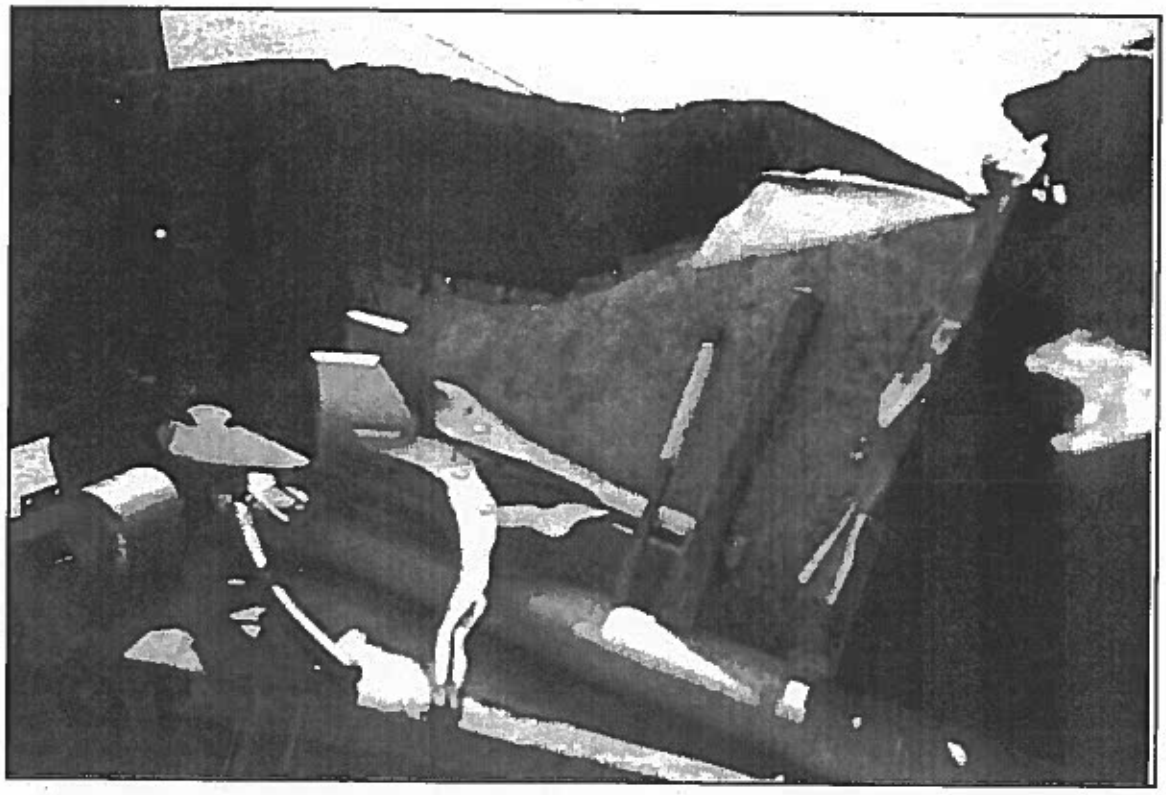
Strip and replace one side of the car's belly at a time. This will provide dimension references that will be lost if both sides are stripped simultaneously. If the doorsills must be replaced, mark the point of intersection with the inner sills; the angle is critical to aligning the doors with the fenders later. The shop manual's frame dimensions are very accurate, but it's difficult to use their chassis references the first or second time. It may be better to remove/replace one or two structural items at a time rather than peel back everything to the frame before doing any replacements. Example: do the outriggers one at a time, then the inner sills, then the doorposts. Rockerpanels shouldn't be installed until the doors and fenders have been lined up...but I'm getting ahead of myself.

If you have questions or comments on this caper, contact Leo Kob, leo.kob@villanova.edu or Don Williams (the welding maestro) at 717.664.2313.

Next Month: Wrapping & relaxing the frame.

Front door post supports removed after new inner sill is mounted, on left side.





Tools for spot weld removal. Note small size of machinist's chisel. Old trunk box in background.

Wrapping Up a Basket Case

Chapter 2: Preliminary Surgery

by Leo Kob

Removing right side inner sill after left side's replacement is tacked into position.

Don carefully burning away old doorsills while retaining doorseal trim.

Wrapping Up a Basket Case

Chapter 3: Wrapping and Relaxing the Frame

by Leo Kob

Third in a series about an amateur's excursion into big Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

Lesson #7:

After blasting, the frame was secured to the jig's rails with C-clamps. The largest structural items (such as outriggers) were installed using vendor-supplied replacements wherever possible. Then Don began wrapping the frame with hand-bent 11 gage steel shapes. Wherever practicable, channels were formed and welded on two sides. Small shapes had to be cut to get around anchor points and tight intersections such as crossmembers and outriggers. Approximately 200 shapes were pieced together. Each was beveled from the outside in, and a small gap was maintained over 90% of each side to insure full penetration welds.

Don experimented with a number of MIG setups. He got the best results running 035 core-shield wire with his argon pressure at 7lbs, heating @ 100 amps DC. The biggest problem was heat opening up the ingenious original seam welds. Recall this was one of the first British cars to not have a wooden chassis. These appear to have even undercut the economy of early 70's Japanese car platform construction. To control heat, short stitch welds were spaced about 1-1/2 inches apart and then filled in with two or three passes rather than running continuous beads from one end to the other. Where the original seams popped, the wrap and seam had to be ground out and then rewelded. These spots become visually evident by tapping completed welds with a substantial hammer, revealing hairline cracks.

All tapped holes were preserved by drilling or burning holes in the wrap (before final welding). The old bolts that were threaded in all holes prior to sandblasting were kept in place during the wrapping process for protection.

Lesson #8:

Warping is the devil's free gift to a rookie frame restorer. Cutting and welding the myriad shapes can be mastered if you have the right instructor. The wrapping process is tedious and repetitive; over a man-month of cutting and welding was expended. The real challenge is controlling the frame's expansion lengthwise. Don did the heaviest welding during the winter to minimize overheating the original 28-guage frame. It was not only clamped to the jig; wooden posts (6"x6") were wedged from the barn's against the jig's rails. We discovered the rear had lifted about 3-1/2" during our preliminary hanging of the doors to line up the fenders with the rear tub set in place.

Don left me running scared that I'd lost my prize for a couple of weeks. In the meantime (without my knowledge) he reviewed his strategy with a couple of other veteran structural welders. When I arrived for our next session he had removed the vertical posts and all the c-clamps beyond the engine-mount area. Two come-a-longs were mounted at the rear crossmember. He began to heat the lower side of the frame in the area of the engine mounts to a cherry red. I tried to pull the rear down with the come-a-longs, however only an inch or so of recovery was achieved. We heated it for about an hour this way, then walked away after drawing the come-a-long as tight as possible. We probably had over a ton of force on each framerail at this point. Don's look wasn't one of controlled optimism; I was mentally drifting toward compromising one of the BT7 frames as a substitute base for my BN7 rear tub. We left for lunch and some more sandblast sand.

Lesson #9:

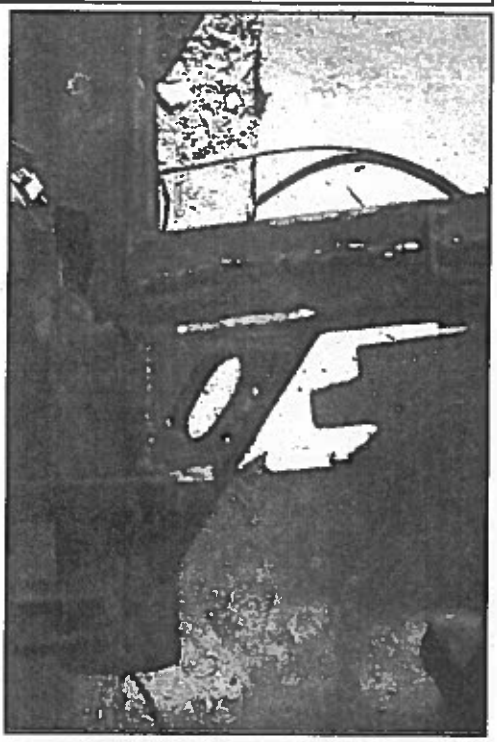
Returning a couple of hours later, we immediately noticed the come-a-long cables appeared slightly less taut than when we left. They were quickly backed off...measurements were taken with a couple of four-foot levels (the centerline of each rear bumper bracket's top bolthole should be level with the top of the inner sill on each side). We were within 1/2" !!! Another session of heating and we slightly overpulled the rear down by the end of the afternoon. The key to Don's relaxing method was carefully controlling the amount of heat along the frame at the engine mounts in the VERTICAL direction. Allowing the top half to overheat would have resulted in either stretching the frame or tearing the top of the frame's steel due to the downward pressure at the other end. Heating and relaxing heavier steel is as much an art as it is a science, something most bodymen have little or no experience doing. I learned there's a big difference between sheet metal welders and structural welders. Be sure to match your problem with the right guy.

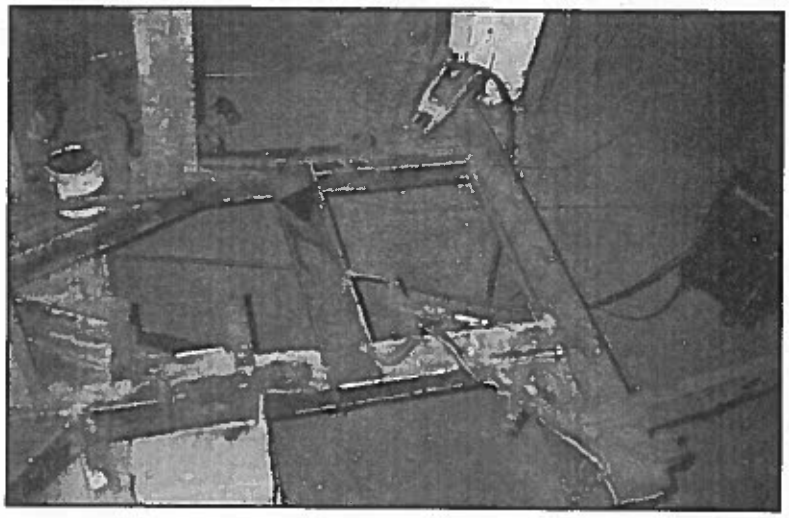
If you have questions or comments on this caper, contact Leo Kob, leo.kob@villanova.edu or Don Williams (the welding maestro) at 717.664.2313.

Next Month: Preliminary fitup of aftermarket chassis parts

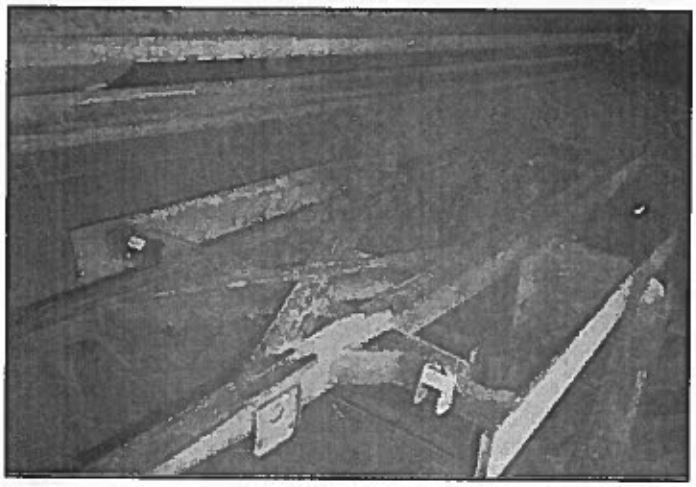
Wrapping Up a Basket Case
Chapter 3: Wrapping and Relaxing the Frame
(continued)
by Leo Kob

Trunnion with 3 of four sides welded prior to grinding.

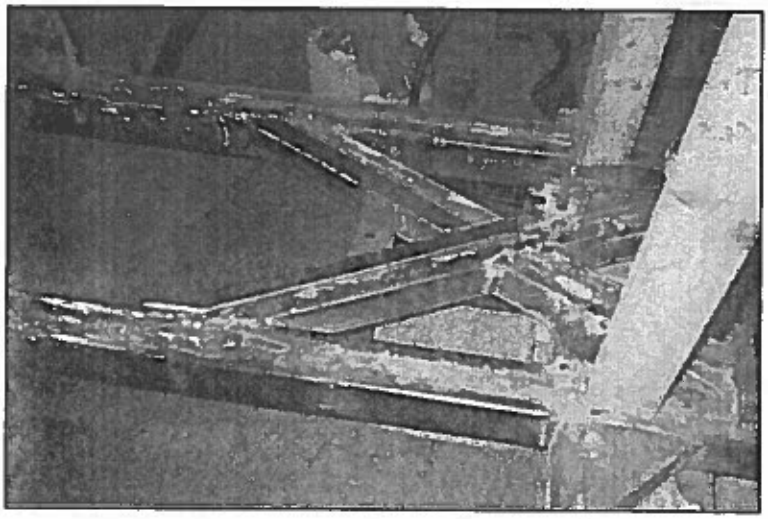




Wrapped frome rails in trunk area. Crossmembers not yet done. Old trunnion in foreground not yet cut out for replacement.

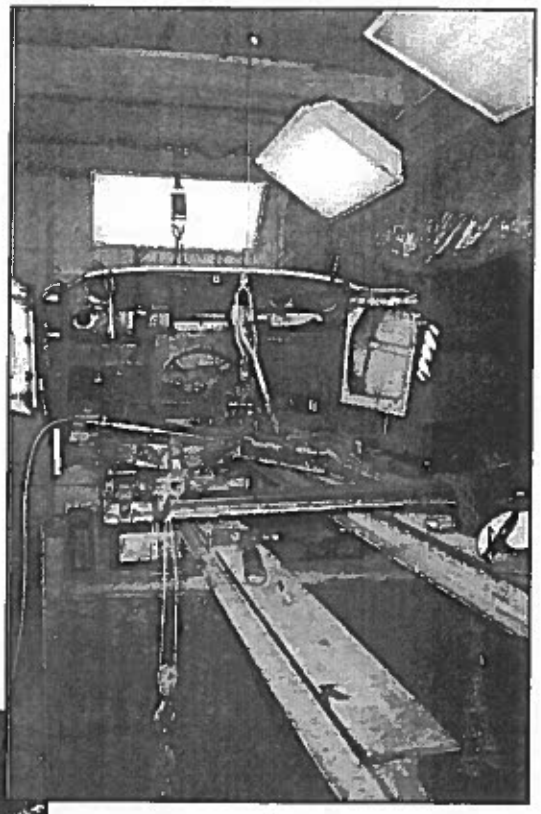


Wrapped cross members from top.



Wrapped crossmembers from bottom. Entire frame is hanging in preparation for sand blasting after wrapping was completed.

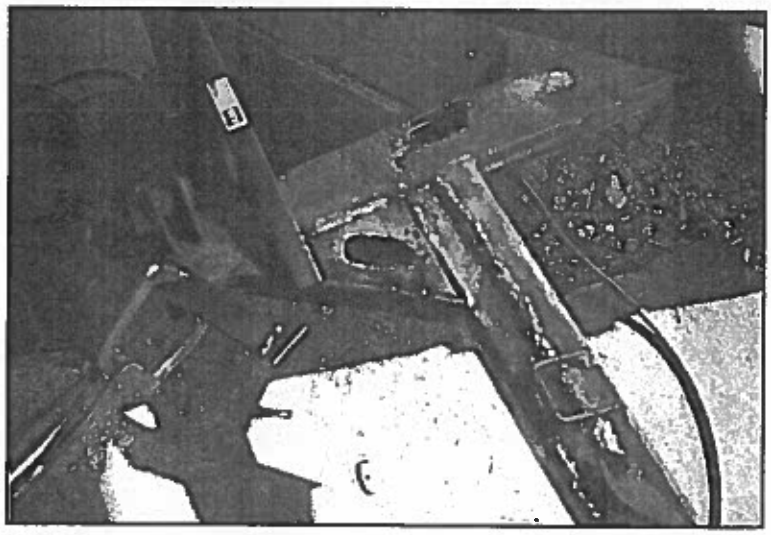
Wrapping Up a Basket Case
Chapter 3: Wrapping and Relaxing the Frame
(continued)
by Leo Kob



Rigging to pull down rear of frame while heating in motor mount area.

Rear shickle trunnion tack welded into position. Note gaps to obtain strong full-penetration welds around piece.

Don welding seam on top of frame. Wood posts provide downward pressure.



WRAPPING UP A BASKET CASE

CHAPTER 4: FIRST FITUP OF AFTERMARKET PARTS

Fourth in a series about an amateur's excursion into big Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

Lesson #10:

Save the rot until the project's complete. We started chassis reconstruction by replacing the forward outriggers before cutting away what was left of the inner sills. I had a dozen or so to choose from that had accumulated as I purchased a few abandoned projects over the last 25 years. All were dimensionally correct. As it turned out this wasn't a plus. After tacking in place, old floorboards were cut away. Level checks across the frame perpendicular and at several angles were taken after welding the outriggers in place to insure no warpage occurred. The intermediate (inner) sills came next. Since my wheelwells behind the doorlatch posts were pretty much gone, the tub had been removed earlier. Its reconstruction became a separate project. Each old sill's point of contact with the front wheelwells was marked to establish elevation. There wasn't a second point of reference since most of the lower doorposts were rotted away, so we couldn't reference BMC's diagram. Learning the hard way, we discovered the sill's length should be 59-3/4", over 1/2" less than the aftermarket units we'd used. Since the inner sill spans between the front and rear wheelwells, it can't be too long (can be a little short). Not having the rear wheelwell in place, we didn't discover ours was too long until long into the fitup process: we were ready to reinstall the tub and new shutpillars. We could have lost over a day pulling the tub & rockerpanels apart to recut the sill. Don's skill saved us: he surgically cut all three lapped pieces with his torch without warping or burning holes in the remaining sheets. A few quick passes with a grinder and it looked like a lazer had been there.

Now for our biggest surprise: For some reason we still can't deduce, the aftermarket inner sills were fabricated a full 1/4" narrower than original. They aren't lapped at the bottom to permit adjustment even though they're made in two pieces. It wouldn't have mattered if the new outriggers were made longer to compensate. We had two choices: either shim the entire length of the sills, or shim the outriggers. Since the bottom of the sills show , we shimmed the outriggers.

Sacred BMC dimensions (outside to outside of sill): 51-1/2" at centerline of rear outriggers, 48-3/4" at centerline of front outriggers (BMC diagram numbers 42 & 36). We had struggled for some time figuring out why our chassis was about 1/2" too narrow after tacking the new intermediate sills in place. As a last act of desperation, we measured what was left of the old intermediate sills and dicovered the width discrepancy. From this experience, checking original parts' dimensions against those of aftermarket parts became a regular routine before tacking replacements in place.

Lesson #11:

C-clamps are worth their weight in gold. We had eight, and they never hit the ground. After insuring the sills were in proper position, we attacked the door hinge pillars. Sill elevation is extremely important to successfully fitting up the rest of the chassis. Since we didn't have two points of dimensional reference due to so much body rot, the best check we had was laying a level from the top of the new inner sills to the invert of the rearmost (higher) bolthole of the original rear bumber bracket support in the trunk (BMC dimension 14). These supports were replaced later. BMC dimensions 13 & 62

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We worked doorpillar fitup from the chassis' front rearward. To fit replacement hinge posts the front shroud and fenders must be installed. Loosely fit the new pillar in place using the fender's doorpost flanges as a guide. Next, hang the door. Use at least half hinge bolts or the door will sag. Begin tweeking the fender and pillar until a clear swageline exists between the door and fender vertically. When you feel lucky, run a couple of self-tapping sheetmetal screws through the post into the chassis' scuttle. Note that the aftermarket hinge pillars are purposefully too long. This allows you enough metal to bend a bottom flange which will eventually tie the post into the rockerpanel.

Now, C-clamp the bottom of the fender to the new inner sill, and lay the new rockerpanel along the bottom of the door, clamp to the inner sill. If this lineup isn't following the profile of the inner sill, there's probably something wrong with either the inner sill's position, or the front shroud/fender line-up. If you're putting on aftermarket fenders and there are problems at this point, try reinstalling your original fenders if they're still available. I thought it was sales hype the first few times I heard redneck restoration shop reps at Carlisle's import/kit car gala say they'd rather patch old factory fenders than wrestle with aftermarkets. But I learned to appreciate the cascading problems that are generated by aftermarket fenders that are too long: you either must try to stretch the whole body a half-inch or so, or do some tricky cutting in each fender's midsection where there's no swage to hide the welded seam. We'll devote a future chapter to patch panels (I put them on the rear fenders). My front fenders were not recent aftermarkets. We tackled conversion of a par of NOS BJ8's which necessitated moving each fender's doorpost flanges rearward more than an inch. Over a dozen spot welds had to be opened. That little machinist's chisel mentioned in Lesson #4 worked wonders. We removed and rehung the first side's door at least a dozen times before a satisfactory line was created between the door and front fender. The C-clamps must have been reset twenty plus times. Nothing like learning through experimentation! Our parting thought is a repeat of Lesson #6: we reworked the most cancerous left side before pulling apart the more substantial right side of the car from the front fenders back to the rear door (latch) posts. Having the best side as a reference helped us work through the pinch-points encountered on the sicker side.

If you have questions or comments on this caper, contact Leo Kob, leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.

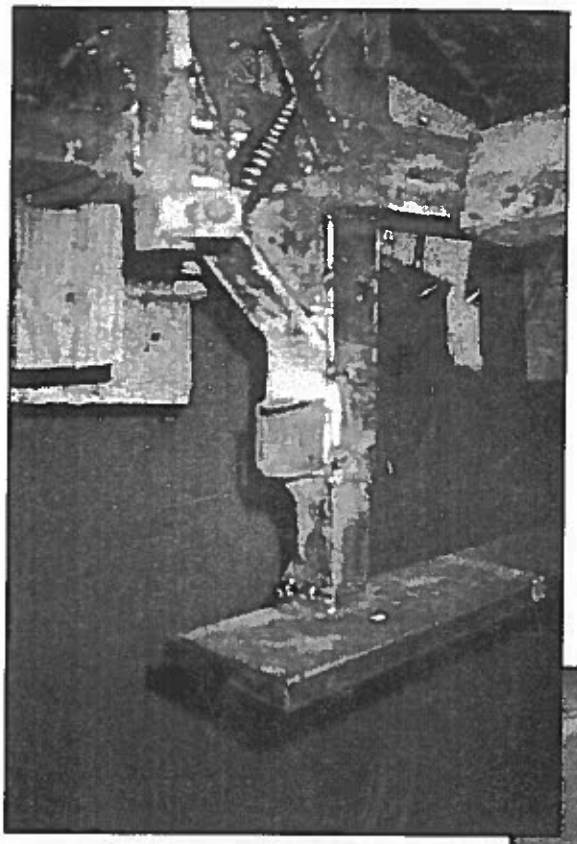
Next month:

Continuing Fitup of Aftermarket Parts

Wrapping Up a Basket Case

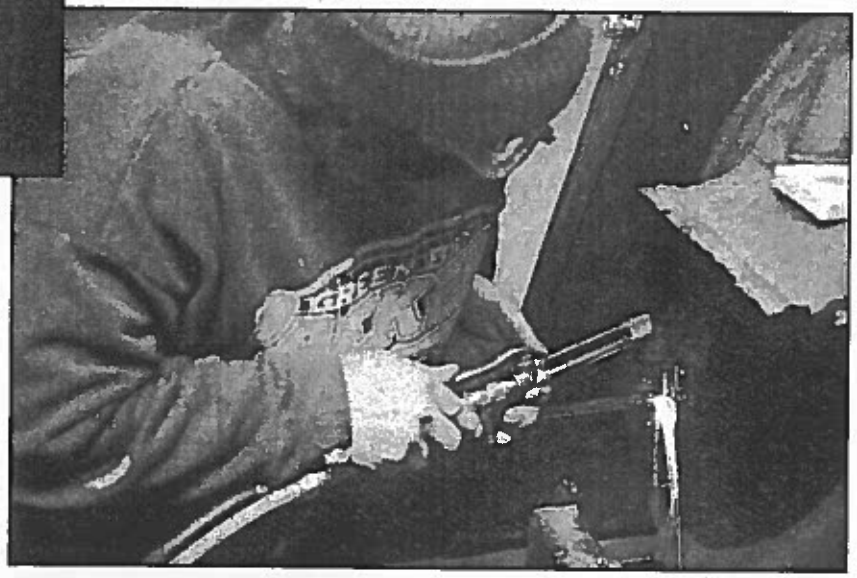
Chapter 4: First Fit-up of After-market Parts

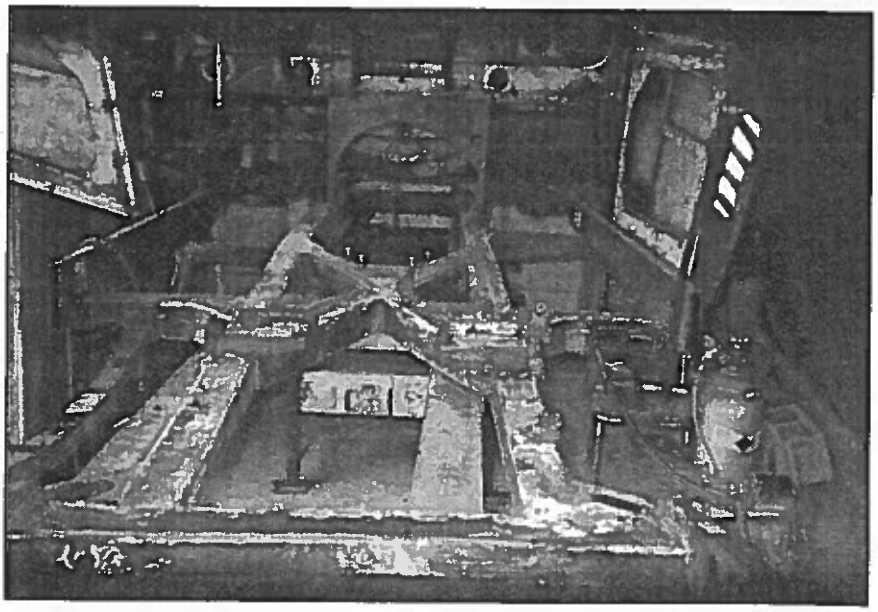
by Leo Kob



Above: Chapter 4, Lesson 10. Outrigger shimmed 1/4' and tacked to compensate for thinner replacement inner sill.

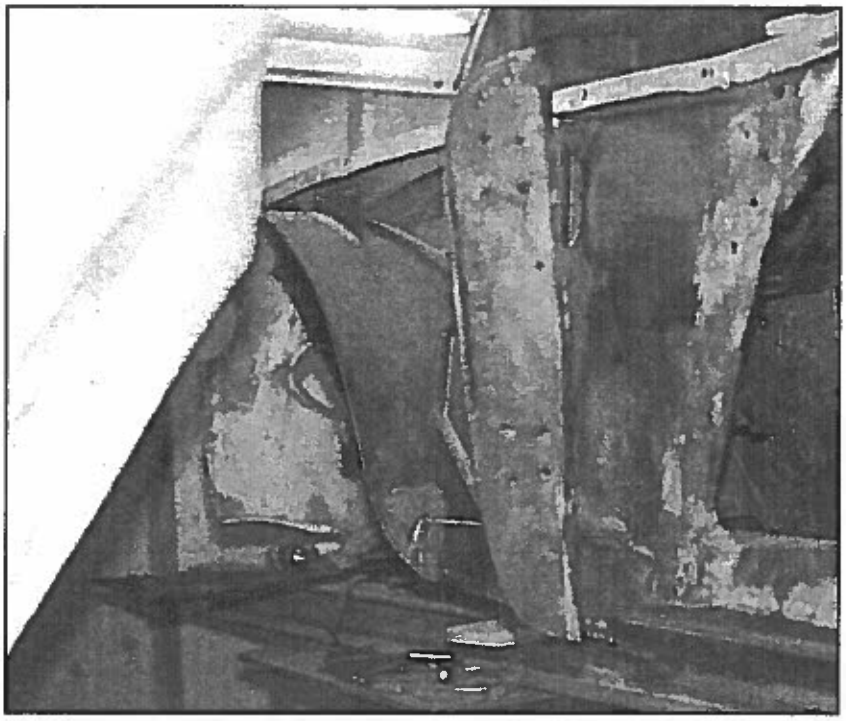
Below: Chapter 4, Lesson 11. Shortening right inner sill about 1/2".



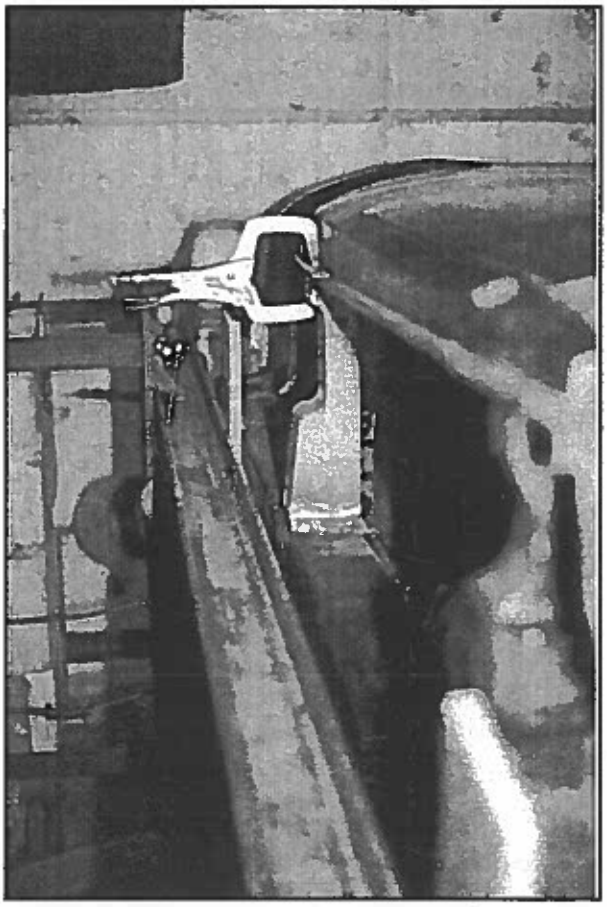


Left: Chapter 4, Lesson 10. Preliminary inner sill fit up. Left front outrigger missing, right front not yet removed. All floorboards removed.

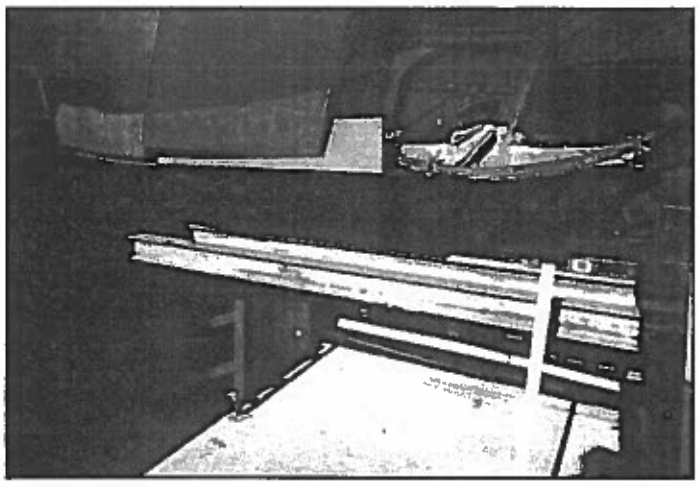
Right: Chapter 4, Lesson 11. Hinge doorpost peeled back to permit rust repair of scuttle and inner sill attachment.



Below: Chapter 4, Lesson 11. Rocker panel clamped in place, gaps between front fender, rocker, and door checked before welding left - front outrigger.



Chapter 4, Lesson 11. Preliminary line-up of reworked front fender and re-hung door. Rear springs installed to verify outrigger location.



Wrapping Up a Basket Case

Chapter 5: Continuing Fitup of Aftermarket Parts

by Leo Kob

Fifth in a series about an amateur's excursion into big Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

In last month's action-packed episode, we discovered the intermediate sills and new fenders may have dimensional problems, depending on the source. Outriggers, rockerpanels, rear bumper bracket supports, doorpillars fit well. This month we'll share the trials and tribulations of fitting the door shut (rear) pillars. Note that both the front (hinge) and rear (latch) doorpillars are purposefully made longer than necessary, leaving room to create a bottom flange for anchoring them to the rockerpanel.

Lesson #12

Don't go crazy welding up chassis parts until all the body sheetmetal is lined up. In lieu of tackwelding, self-tapping sheetmetal screws (1/4" & 5/16") save a lot of time and allow for rework. After using C-clamps to get the hinge doorposts, rockerpanels, front fenders lined up, all were screwed before tacking. Since we were working toward a void beyond the door, (rear tub was still off the car for major surgery), Don minimized the use of tackwelds. This conservative approach saved a lot (but not all) of frustrating rework since adjustments were required during rear bodypanel fitting.

Lesson #13

Install the doorlatches in the doors and strikes on the new doorposts before starting shut pillar fitup. Be sure to install all the strike backing plates. Add a spacer the thickness of the aluminum facia (shut face finisher) since it will get in the way during fitup. Earlier we had loosly installed new quarter panels with sheetmetal screws to the rear tub. After setting the tub onto the frame and clamping it into position with C-clamps, the rear shroud and fenders were added. The trunk rear skirt rail ('ribbing') should follow the shroud's radius. The ribbing's two struts must then slip into the rear bumper support brackets without distorting the rails. Now the fun (spelled 'frustration') began. Oh yes, unless you're a pro or there isn't much rework being done to the door latch pillars, install pullcords on the doorlatch levers if the door pulls are not operational. A 12" length of #12 AWG insulated building wire does a nice job and won't tear up your hands (the latch springs are pretty strong) during the dozens of door operations needed during post lineup.

Lesson #14

Patience is a must to successful installation of rear doorposts. Shortcutting this operation will show up badly in the final product. C-clamp the rear quarter panel's bottom flange, inner sill, rockerpanel, and rear doorpost together. Use two or three clamps rather than trying to do all with one. Small vice-grips allow some room for tweeking compared to full-size bodymen's C-clamps. A duck-bill vicegrip also helped. The first mission is to line the door's latch up vertically with the doorpost's striker assembly. There's almost 1/2" of play in the striker mount. Before adjusting too many times, make sure the door still lines up with the rockerpanels. The horizontal gap along the rockerpanel and vertical gap along the front fender should be the same width. Run your hand along the fenders then over the rocker and the door to insure the panels form a smooth plane. Obviously the door and fender swagelines should form a continuous visual line.

Ideally, the strike will line up with the doorlatch when its mount is close to the middle of the adjustment slots. This leaves room for later tweeking. Adjust the post and quarterpanel until the rear shroud hugs the top of the post and the latch works. If the shroud lines up with the top

Wrapping Up a Basket Case

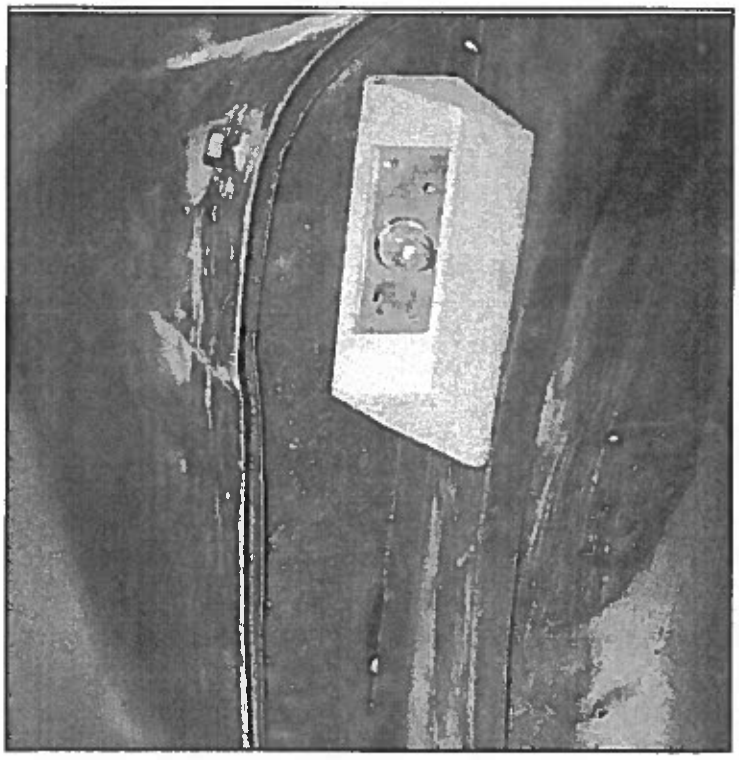
Chapter 5: Continuing Fitup of Aftermarket Parts (continued)

of the door, affix the doorpost panel to the quarterpanel with a couple of sheetmetal screws and secure the quarterpanel to what's left of the rear wheelwell. Scribe a line to mark the edge of the quarterpanel patch on the wheelwell in case the screws are removed later for adjustment. Now the rear fender can be slipped into place. The swage in the fender's sidepanel should line up with the door's. The gap between the rear fender and the door should be even in width and the width should match the one between the front fender and the door.

In extreme cases, lineup problems anywhere along a side at this juncture probably requires the entire process to be repeated beginning with readjusting the front door, rockerpanel, and all the rearward pieces. When all's right, the rear fender's bumblebee radius should match the shroud's. If things are close, run three or four bolts between shroud and both rear fenders, screw them into the doorposts. Put a few larger (5/16") sheetmetal screws along the bottom of the rockerpanel to tie the fender and quarterpanl into the inner (intermediate) sill. Now its time to sight down each side of the car to judge bodypanel fit. Running your hand across all joints provides as good or better determination. The door should latch and unlatch freely. The door should open without rubbing the front fender's midsection. And the final (most difficult ?) achievement is obtaining a clean clad of the fenders over each rockerpanel's overlap. The rockers are indented at each end to make this happen. It's very difficult to get this right unless the car's frame is elevated above the floor. We were working at 36" and I would have liked to have another 6" (Oh, grow up!!).

If you have questions or comments on this caper, contact Leo Kob, leo.kob@villanova.edu or Don Williams (the welding maestro) at 717.664.2313.

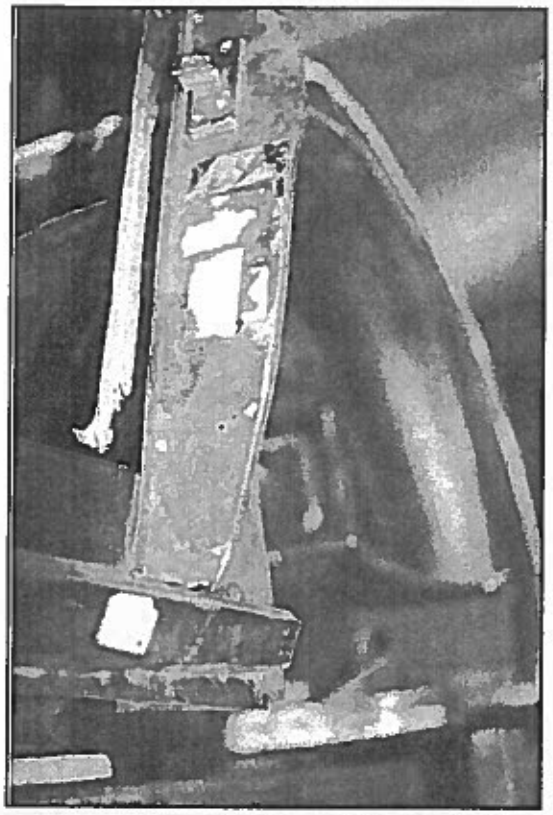
Next Month: Pappa's Little Fitup Helpers



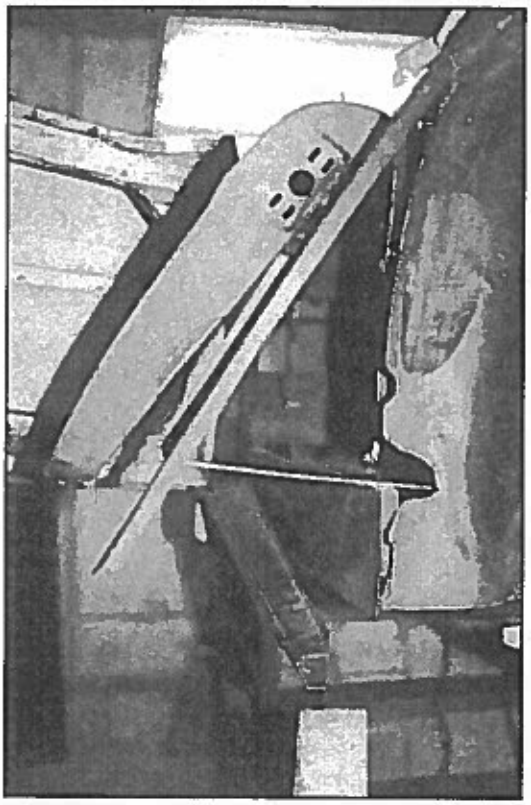
Left: Lesson #14: Shutpillar screwed into forward (inner fender) quarterpanel and rocker. Door installed to test latch line-up.

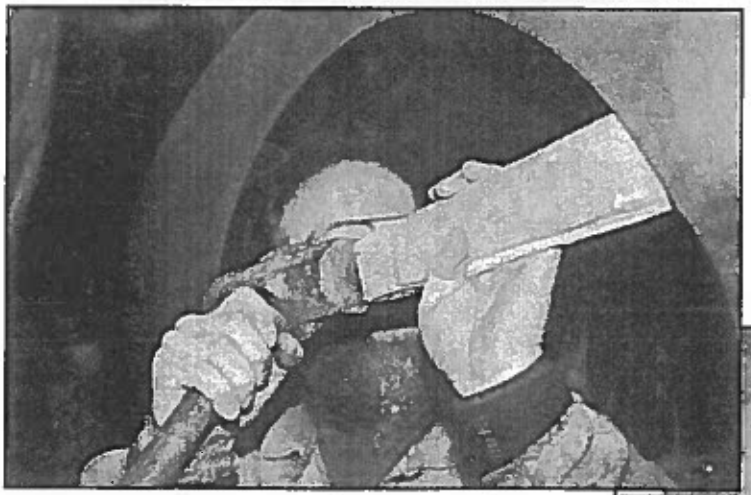
Wrapping Up a Basket Case

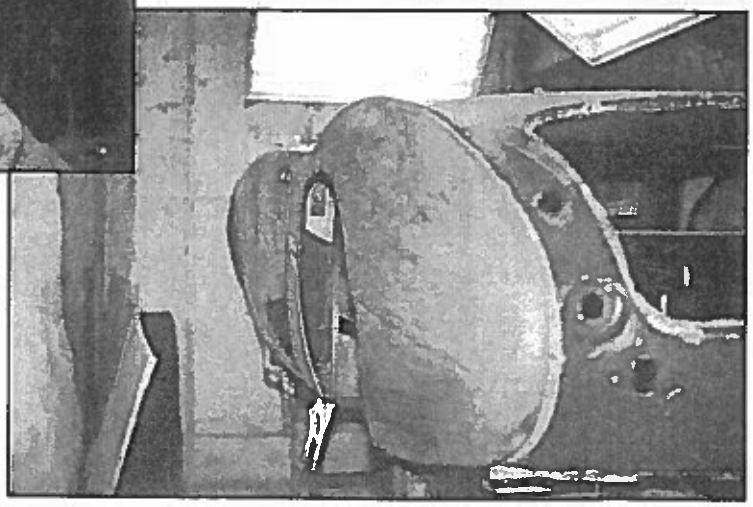
Chapter 5: Continuing Fitup of Aftermarket Parts (continued)



Below: Lesson #12: Critical juncture: rocker panel, shutpillar, intermediate sill and rear forward quarter panel. *Below (far):* Lesson #14: Aligning rear shroud and fenders before tack-welding shutpillars and rocker panels.







Above (far) Lesson 13: Preliminary alignment of aftermarket shutpillar assembly (latchpost). Hand-formed flange lays on top of rockerpanel. *Above: Lesson #14:* "Helping" the shutpillar and shroud line up with rear fender on right side of car. Working 36" above the floor helps alot.

ENCOUNTER 2002... AUSTIN-HEALEY... THE FIRST 50 YEARS

by Allen Rosenberg

Its 2002 and time for some early Encounter hype. This year's premiere Healey event will be held in historic Princeton, New Jersey, at the beautiful Princeton Marriot Hotel and Conference Center. The site is nestled in the heart of Forrestal Village, a unique Euro-Style shopping village located about 5 minutes from the historic downtown area and Princeton University. The village features many fine outlet stores, (one of which will be ours for our regalia store which will be open to the public, so get creative and plan to bring items for sale), a large food court, covered parking and, for those of us able to partake, an AARP office! Hey, you only have to be 50 (like the Austin-Healey), to belong!

Early plans call for a Wednesday afternoon scenic drive to another wonderful historic New Jersey town, Flemington, where we will visit "Northlandz" (check out their web site @ www.northlandz.com). "Northlandz" features a model railway extraordinaire, (featured in the Guiness Book), which includes 8 miles of track, 35 foot mountains and thousands of buildings. Also featured is a doll museum, 2,000 pipe organ and theatre, 94 room dollhouse mansion, outdoor, ride on steam train, art museum and much more. We are working on the final stages of coordinating dinner with this exciting event and should have that finalized and included in the next edition of the Flash along with Encounter and hotel registration information and a complete schedule of events.

Other events will include a very challenging, two level, gymkhana, where cars will start downstairs in the bowels of the parking garage (and you thought that singing in the shower had amazing acoustics) and end up on the roof level for a dramatic finish after climbing the ramp in true "hill climb" fashion. Additionally, we will have a great funkhana adjacent to an outdoor barbeque, and a popular car show, where the cars will be lined up along the village streets which will be closed to other vehicular traffic. An all other British car show, sponsored by the New Jersey Triumph Association, will be staged adjacent to our show on Saturday. On top of all of this, we will hold a charity auction, game night, kid's stuff, wine and cheese reception, awards banquet, numerous tech sessions, and some surprise, special guests.

So mark your calendar now for Encounter 2002, August 14th to the 18th.

You don't have to be an "Einstein" (yes, he lived in Princeton), to know that you will have a great time!!!

WRAPPING UP A BASKET CASE

by Leo Cob

CHAPTER 6

PAPPA'S LITTLE FITUP HELPERS

Sixth in a series about an amateur's excursion into big Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

Lesson #15:

Little shims and big solid fist go a long way in getting through Lesson #14. Don's experience working heavy metal as a rigger as well as a structural welder provided me with a lot of simple ways to get through seemingly impossible dead-ends or Catch-22 fitup situations.

Satisfactory lineup of bodypanels is aided by having an array of shims and applying a variety of forces. Misusing a few common tools also helps.

Shims: get an assortment of square steel bar stock, small sheets of various thickness sheet metal (20- to 11-gage), some short sections of steel angle (1/2"- 2") and steel channel (1" - 3"). Wooden wedges came in helpful. A few old large flat screwdrivers and small wrecking bars were put into service as both shims and gentle prys.

Wood blocks: we found everything from standard 2"x 4's to 6"x 6" useful.

Hammers: a wood mallet is nice, but wood

blocks struck by a common hammer does just as well. Both ends of conventional claw hammers in Don's hands turned out some nice bends and flattened several bad waffles despite the fact they are verboten at body-shop trade schools (could it still be fallout from old building trades' jurisdictional issues). Don produced better work faster with carpenter hammers than with my low-end bodyshop hammers and dollies that Pep Boys charges over $50.00 for. Don's square (bare) fist was also very effective. After practice, I came close with my fists, but they had to be fitted with a good quality pair of welder's gloves. Don's hands have long lost their active nerve endings from handling hot metal. I don't plan on trying to get into his league.

Lesson #16:

Heat many times does a lot more to get a good fit than banging and hacking. One of the most difficult places to get a good fit is wrapping fender bottom flanges over the rockerpanels. As mention in Lesson #14, the rockers are indented to take both fenders' overlaps and still produce a smooth plane across the three. In my opinion, the first place to look when assessing the quality of a Healey's bodywork is this juncture. A lot of hidden pieces come together here. My front fenders' bottom flanges were turned in a bit too high, not allowing them to cleanly wrap around the rocker. Don showed me how to make the fix without pulling off the front fenders; but the door had to come off again. The fender was pulled out at the bottom and a 6" long wooden block inserted inside the flange. The bend's outside was hammered with a sliding motion to soften its overly tight break. This produced a bend with a radius significantly larger than the rocker's. The block was then removed and the fender tightly clamped against the inner sill, covering the rocker's indent. The lower section was gently heated with Don's gas burning head's rosebud tip. Spreading the heat followed by a few hard, square hammer hits from the bottom made the fender follow the rocker's profile. Reheating a second time while working a ½" wide screwdriver between the fender and rocker rounded the panel by stretching to produce the proper curvature above the break. A little dab of body filler will provide a perfect fit. It took about 90 minutes to pull off this caper on each side.

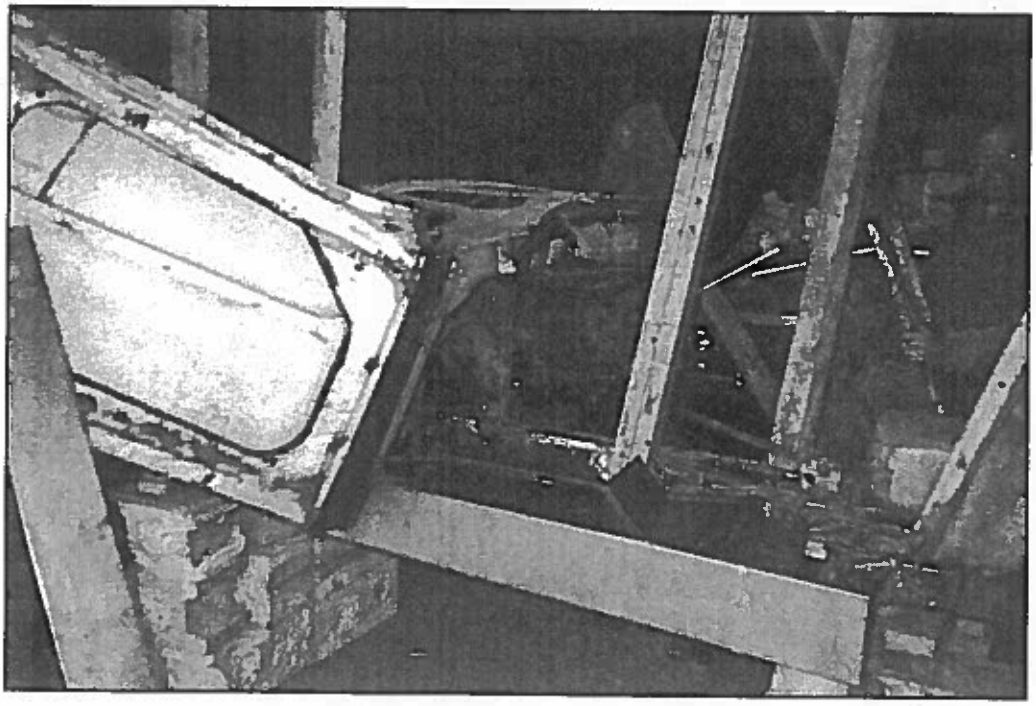
Lesson #17:

A little physics: too much hammering makes metal brittle. Applying heat to a low glow (not cherry red) followed by a gentle cool down (don't quench it) will relax steel without altering its strength appreciably. Don't wack really hot thin-gauge metal or it'll stretch too much or tear. Practice with scrap pieces a few times before doing the real thing. Clamping prevents funny distortions (such as eyebrows) from creeping up at the most inopportune time and place(s). When working a surface that will be exposed such as a rockerpanel, be sure the final profile is slightly concave rather than convex. This allows application of a little filler to make the final surface smooth. A raised surface can't be ground smooth if the metal's only 16 gage or so thick: you'll burn a hole first.

If you have any questions or comments on this caper, contact Leo Kob, leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.

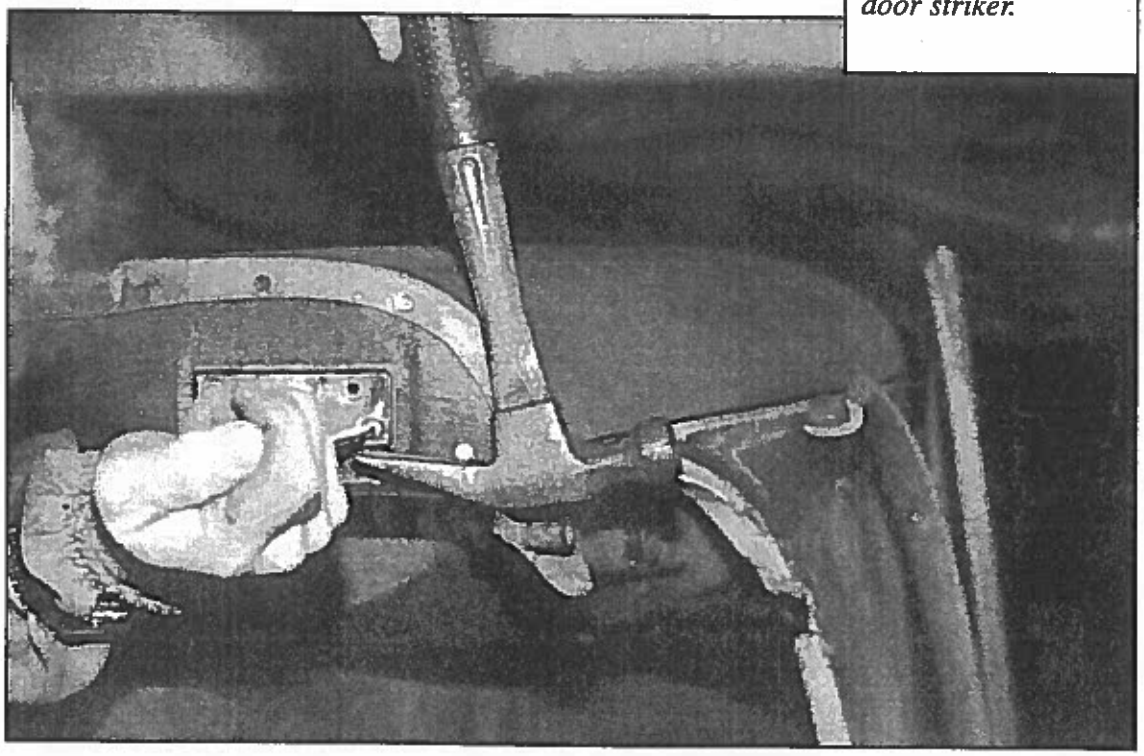
Right: Lesson 15A: Classic 2" x 4" block holds door open without interfering with work.

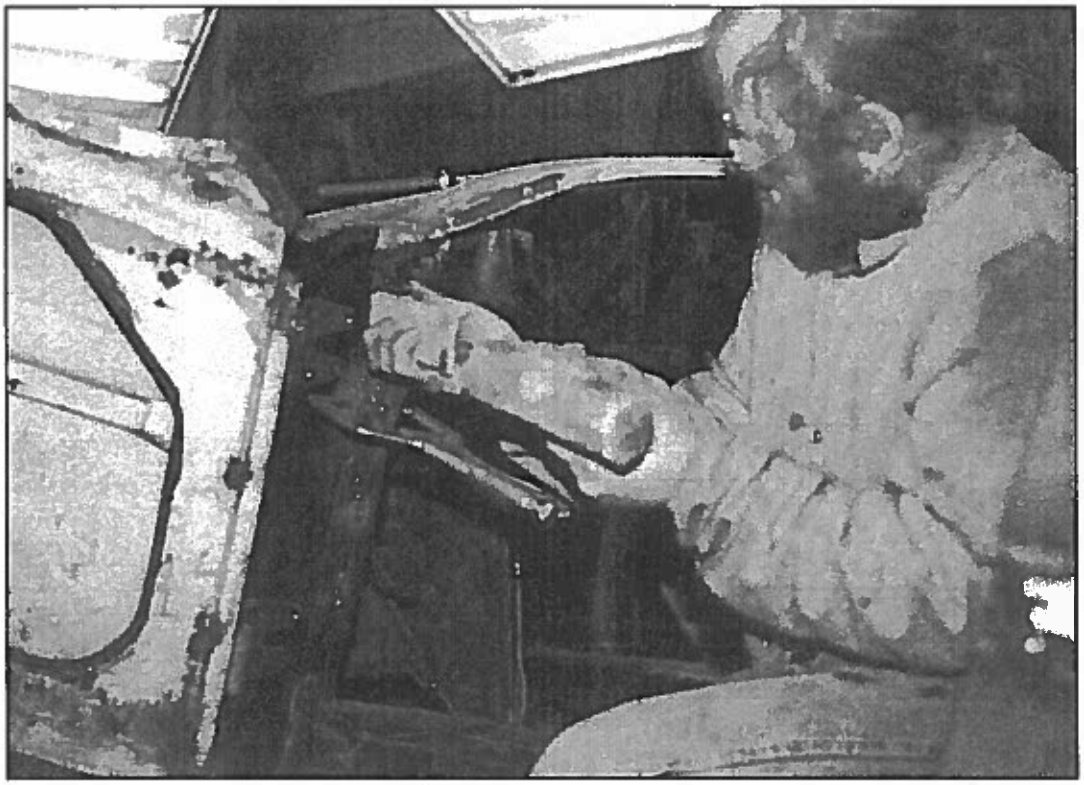
Wrapping Up A Basket Case



Left: Lesson 15 A2: 4"x4" posts extend to ceiling beam to prevent frame movement on jig during jacking.

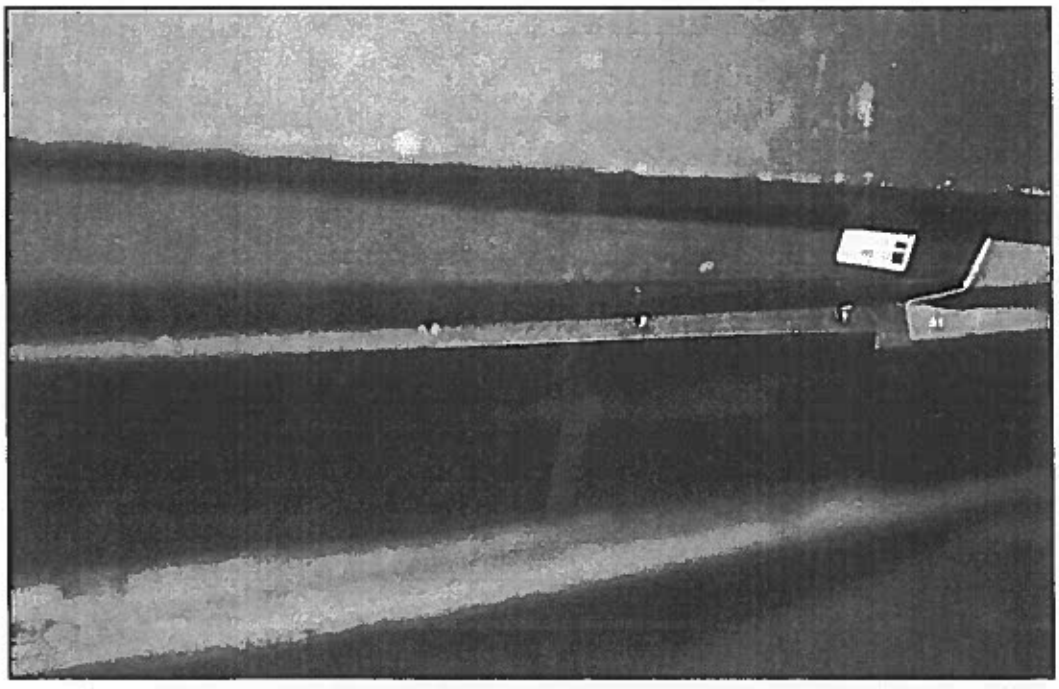
Below: Lesson 15B: Conventional claw hammer provides just the right amount of leverage to adjust door striker.



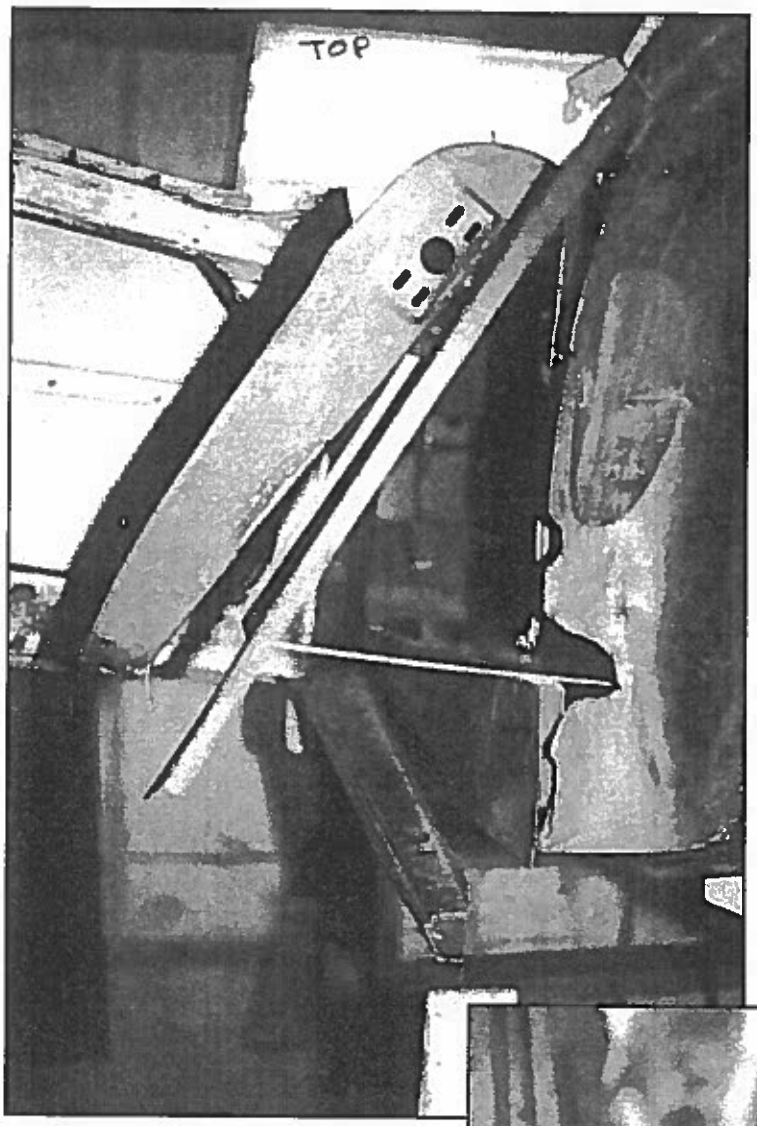


Left: Lesson 15C: Five pound sledge and woodblock reset hingepost during door alignment process.

Right: Lesson 16B: Fender overlapping indent in rocker panel. initial fitup.

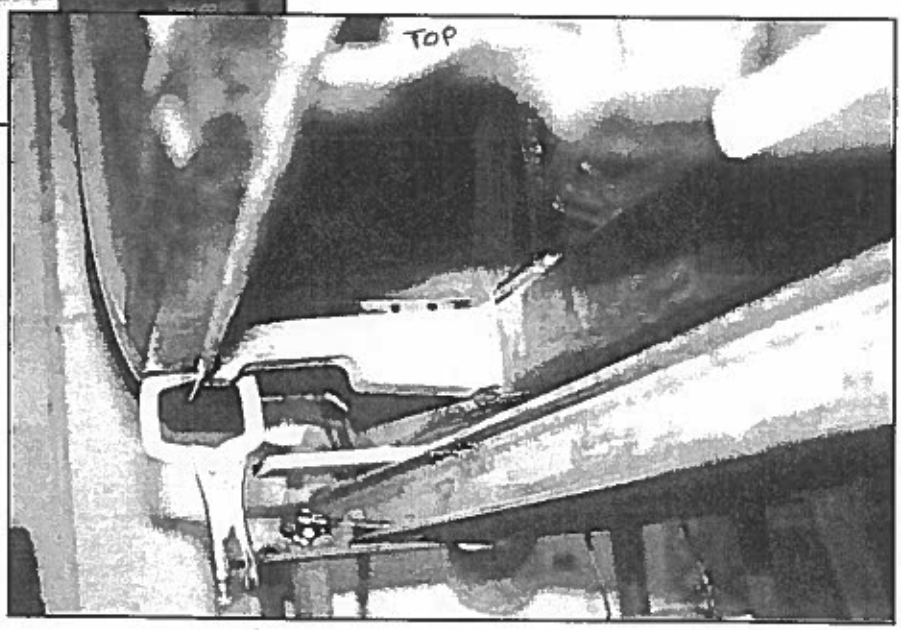


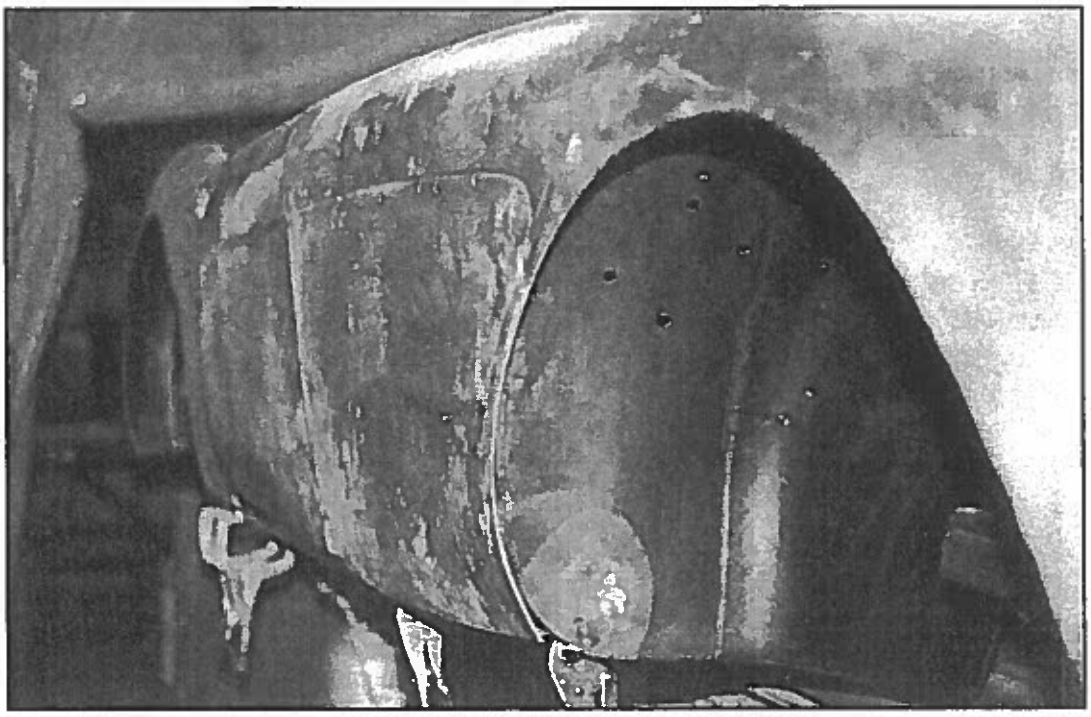
Wrapping Up A Basket Case



Lesson 16, C1: Critical intersection: doorpost, inner quarterpanel, rockerpanel and fender.

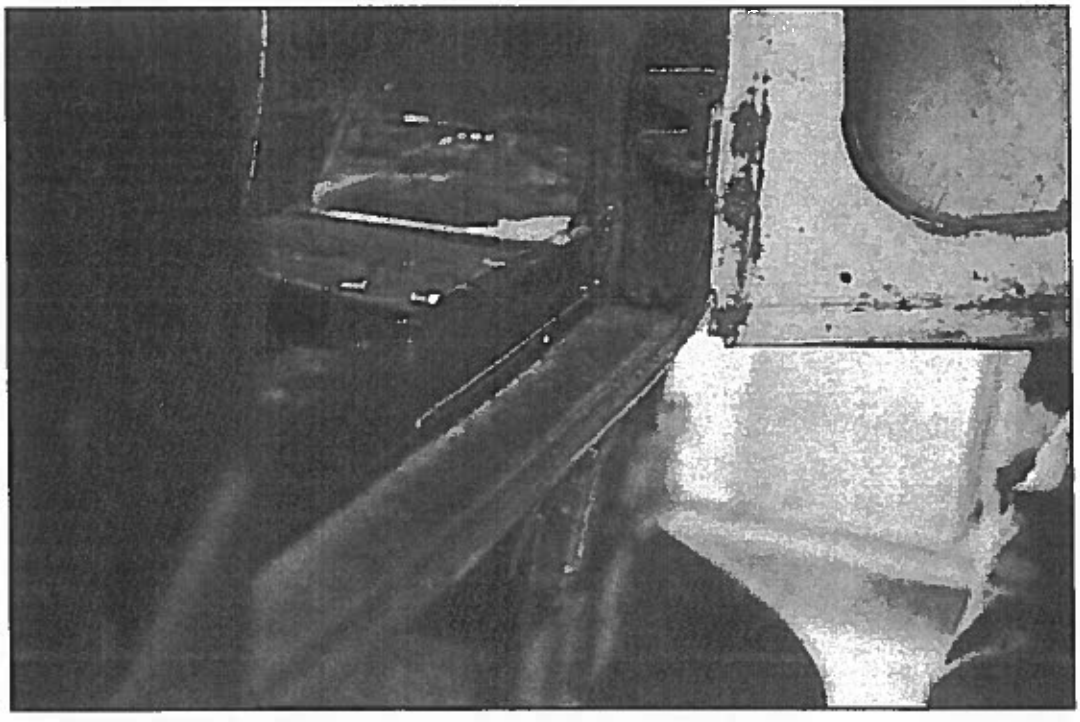
Below: Lesson 16, C2: C clamped rocker ready for tack-welding.





Above: Lesson 16D: Initial fitup of right side rockerpanel - shim required to align with door's contour.

Below: Lesson 16E: Shim brings right rockerpanel out for perfect lineup with bottom of door.



WRAPPING UP A BASKET CASE

By Leo Kob

CHAPTER 7: GIVING THE REAR TUB A MAKEOVER: PART 1

Seventh in a series about an amateur's excursion into big Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

Lesson #18:

As can be seen in the first photo, there wasn't much of the tub's skin left to make over. Fortunately, the framework which supports the shroud across the top of the wheel wells was sound. Ditto for the rear (trunk-wall) bulkhead and rear skirt rail (rib that supports the shroud under the trunk lid). Tub reconstruction must concentrate on maintaining the correct gap along the door's vertical edge (latch-or shut- pillar). The shut pillar and forward rear wheelwell repair panels illustrated in the second photo have to be adjusted in tandem. None of this can begin until the front fender, door hinge pillar, and rocker panels are aligned with the doors. This procedure was the subject of Chapters 4 & 5. At the time, these members were joined with sheetmetal screws and a few tack welds. Don't go MIG crazy yet...there's virtually no chance anyone can get all these components lined up the first time. Lack of patience at this juncture will send the project into a tailspin towards disaster.

Lesson #19

Here's how a structural expert made up for an earlier faux pas. Recall that while the frame was wrapped in 11-gage channel, heat raised the rear half a few inches (Chapter 3). It was pulled down while heating near the engine mounts. The third photo shows the wrapped frame just before the tub was initially reset after cutting out all the bad panels. Unfortunately, it appeared that the frame creeped back up about ¼"...doesn't sound like much, but this indirectly translates itself visually to the doorline gap width...here a ¼" variance over the height and/or length of the door is obscene. It wasn't practical to try to repull the frame downward again - by now we had everything forward of the tub lined up quite well, and there was an equal chance that the second attempt might result in overpulling the frame which would create a worse problem. It was time to cheat a little. The inner wheelwell repair quarter panels and shut pillars were already in place. The largest aftermarket piece shown in the first photo is the rear heelboard. The top had to line up with what remained of the spare tire deck & battery hatch cover (canted face). A satisfactory fit was achieved by shimming the rear bulkhead's bottom flange with 3/8" angle. The rear heelboard could be adequately supported by overlapping the tapered heelboard/floorboard transition with the flat floorboard extending under the seats. Since the length of flat floor-to-heelboard overlap was short, this gap could be filled with weldment and not be noticeable.

After all fenders were installed and aligned with the doors, the shim was stitch-welded, then ground and smoothed out with a steel filler. The resultant fix is barely noticeable after painting. Fotunately most of this area is hidden by the rear wheels, differential, and fuel pump.

Lesson #20

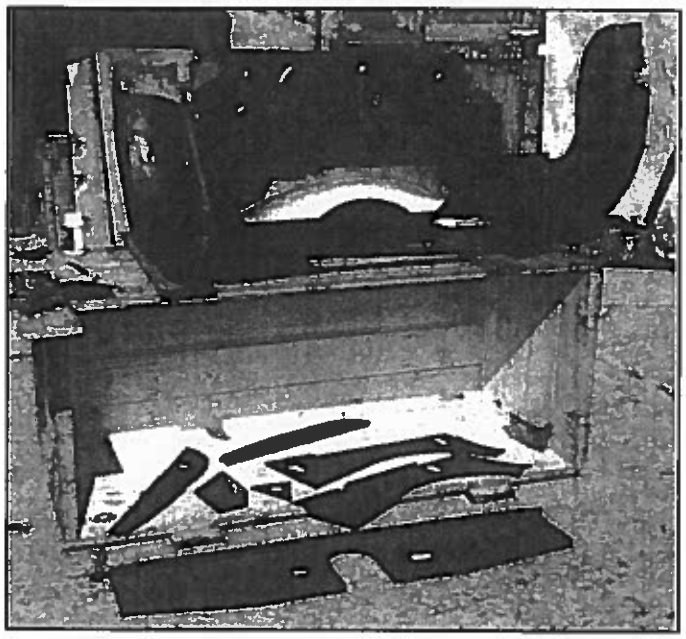
Make sure all structural members are fitted before installing flat pan and pressed floor steel. The entire assembly was pretty wobbly at this juncture...I was getting my first exposure to the classic "semi-monocoque" design (which departed from the classic British wood-ribbed chassis). The next aftermarket piece we fitted began to make the structure stop swaying like St. Louis' arch in February. Still working off our 30" high jig, this piece was a snap to tackweld into place

since it sits vertically and only has to insure the rear deck is horizontal - a simple check since the jig is perfectly level. As mentioned above the (two-seater) BN7's heelboard does not span the car's entire width - there are sloped floorboards that extend beyond the frame on both sides. These reduce the need for extensive fitup of this large and structurally significant slab of steel. It was necessary to support vertically from above and below the deck using shimmed lenghts of 1" X 4" wood during tack welding to prevent movement.

Lesson #21:

Don't try to get badly-rusted sheetmetal to hold up under MIG welding. Since the BN7's long rear (spare tire) deck was almost swiss cheese, Don ran a stringer made of the same 3/8" angle underneath to provide something sound to weld the new toe-board against. Again, skilled (spelled small-but-adequately-strong) stitch welds saved the pock-marked deck (which gets covered with Armacord), and began to take the sway out of the tub. After filling and painting, the axle cavity formed by the trunk bulkhead & heelboard looks factory-fresh.

If you have any questions or comments regarding this caper, contact leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.

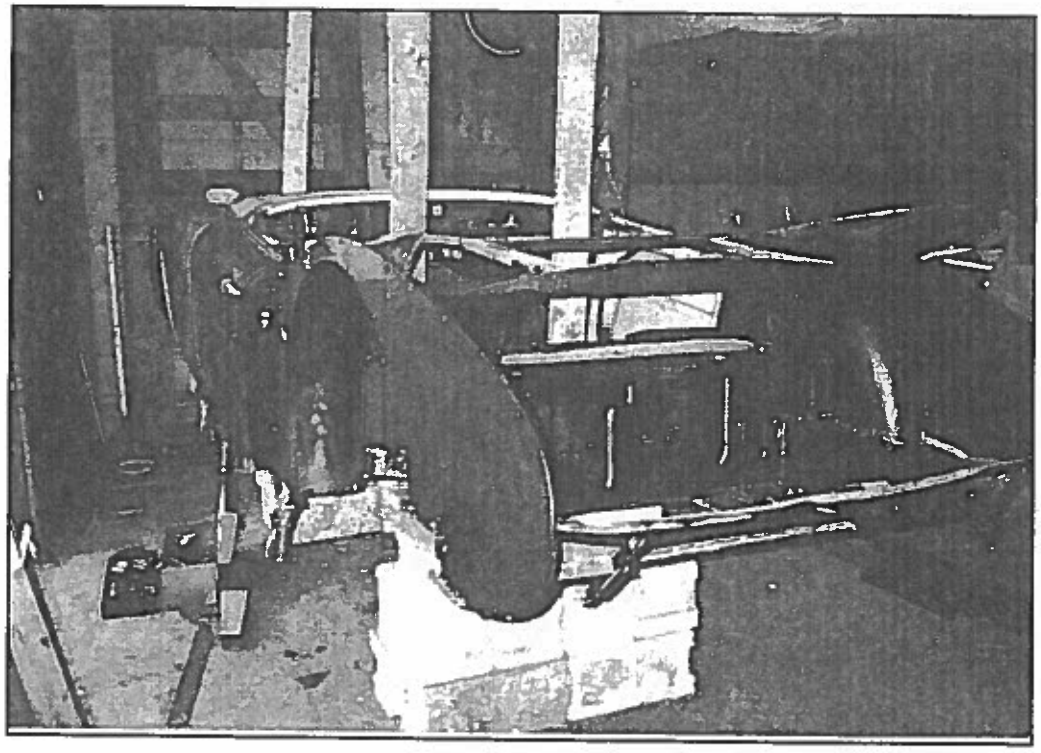


Above: Aftermarket Structure shapes for job's forward end.

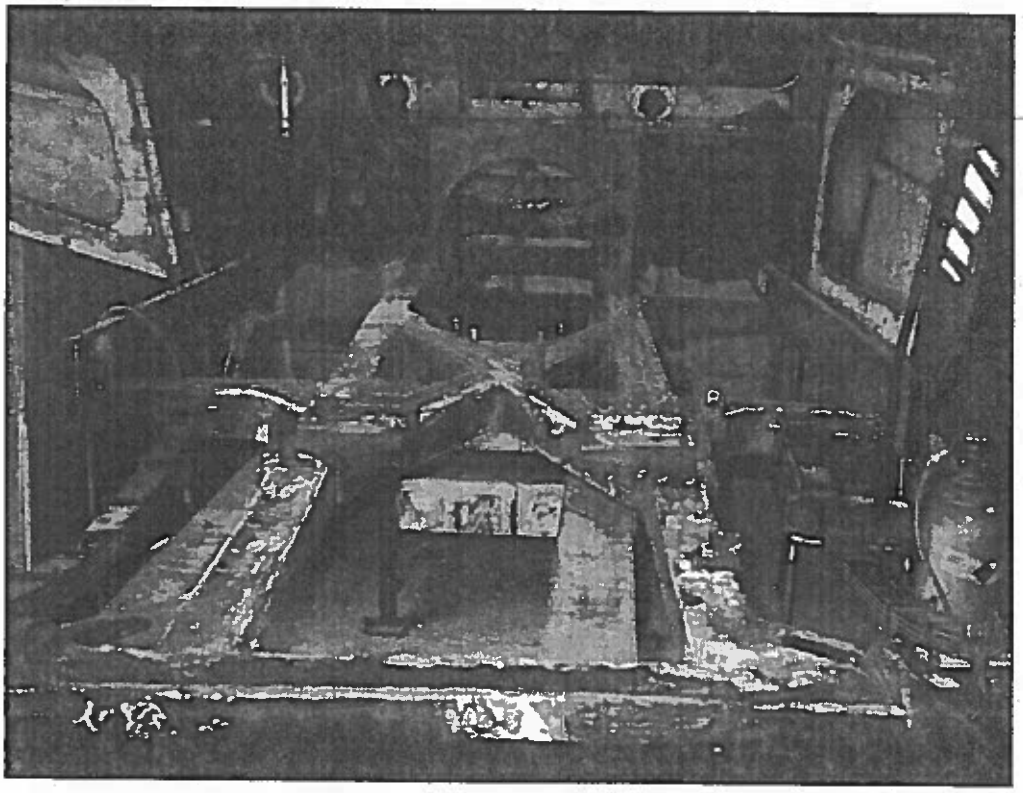
WRAPPING UP A BASKET CASE

CHAPTER 7: GIVING THE REAR TUB A MAKEOVER: PART 1

by Leo Kob

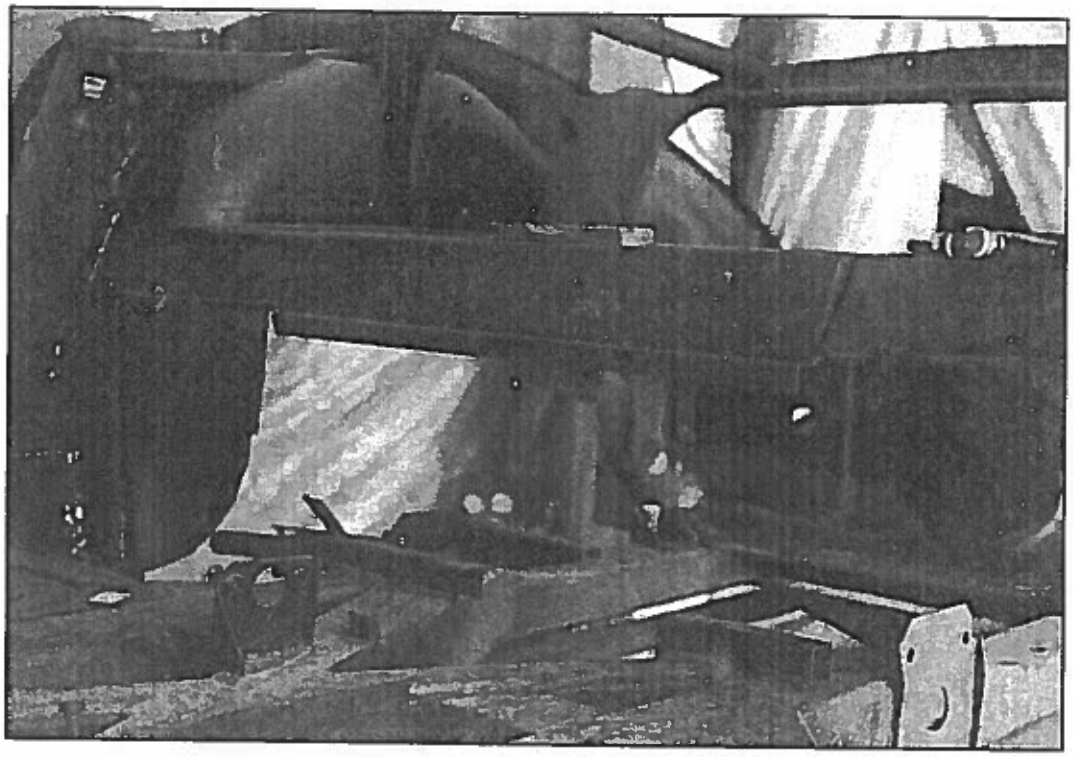


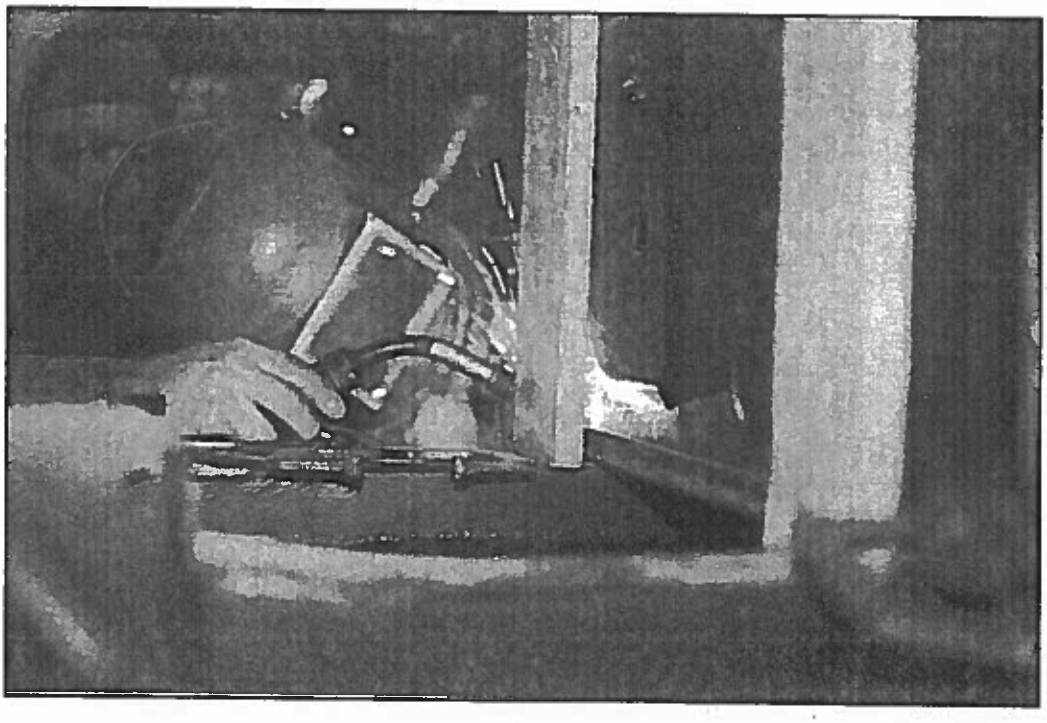
Left: First fitup of left shut pillar and wheelwell repair quarterpanel using vice-grips.



Right: Wrapped frame ready to receive tub.

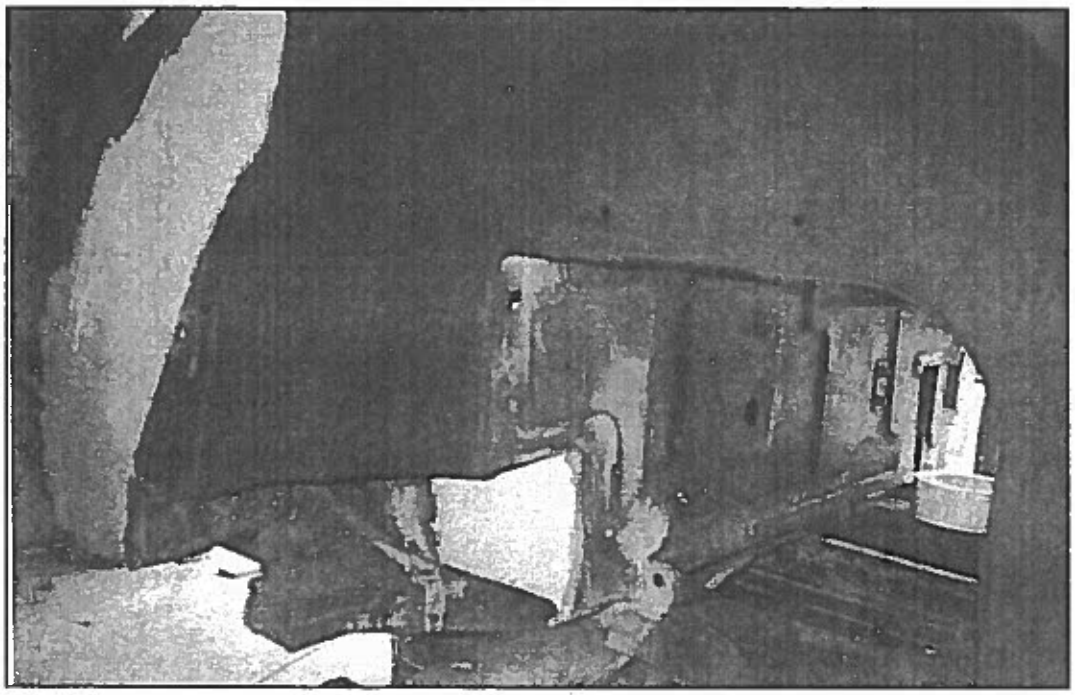
Right: "Air Space" to be filled with new heelboard.





Left: Tacking the rear bulkhead shim into place after bracing.

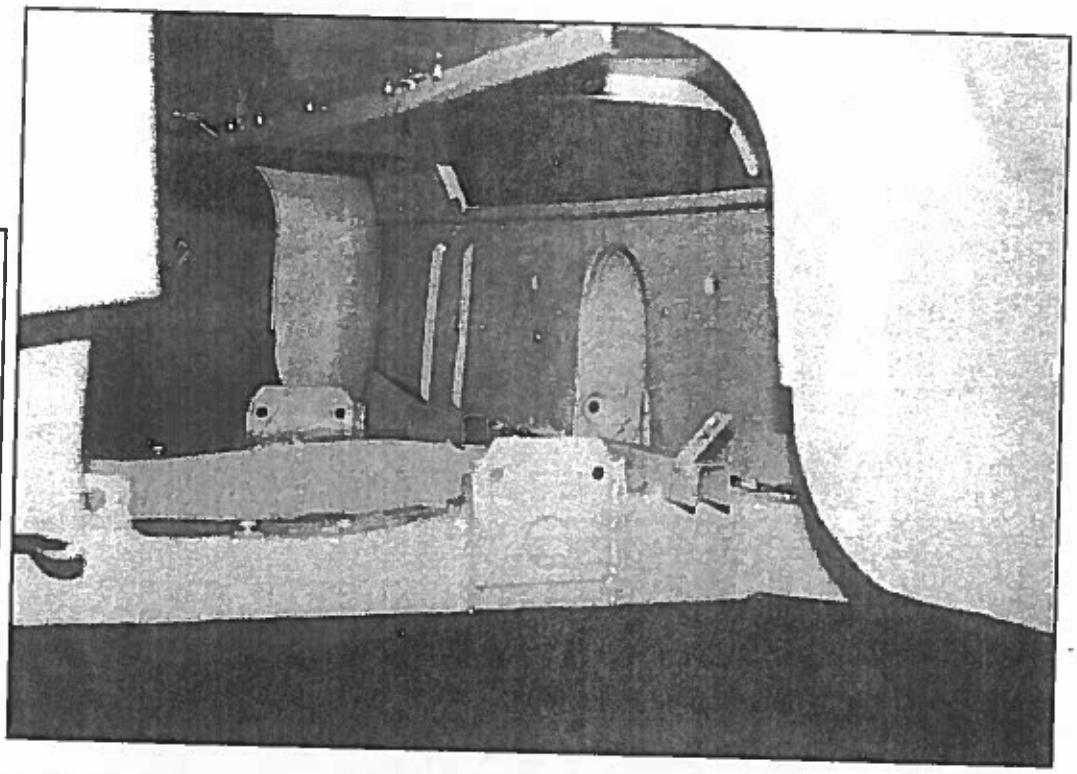
Wrapping Up A Basket Case



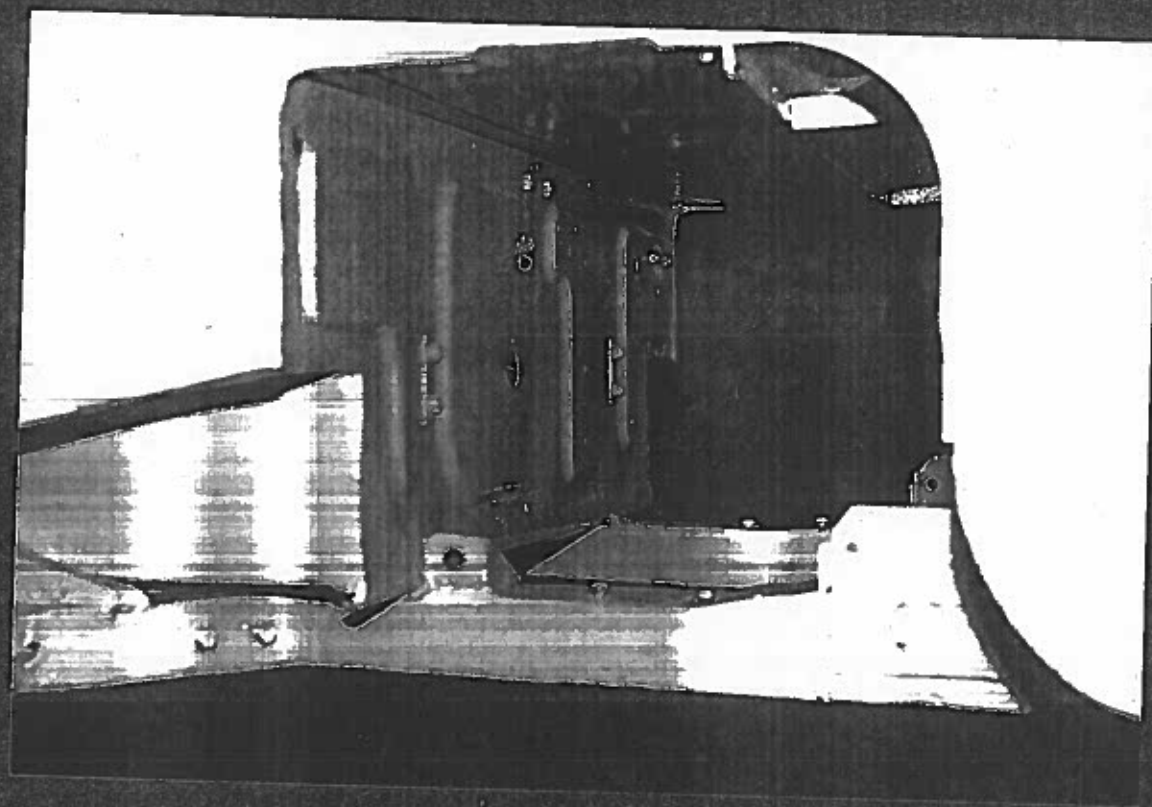
Left: Completed shim after grinding and filling.

Right: New heelboard screwed into place after leveling deck above.

Wrapping Up A Basket Case



Right: Well created by heelboard and trunk bulkhead with reinforcing 3/8" angle stringer supporting spare tire deck.



WRAPPING UP A BASKET CASE

By Leo Kob

CHAPTER 8:
GIVING THE REAR TUB A MAKEOVER: PART 2

Eighth in a series about an amateur's excursion into big Healey frame & chassis reconstruction. A background piece appeared in March 2001 edition.

By now, we had the entire monocoque structure fastened together with many dozen sheetmetal screws, about two dozen tackwelds, and welded heelboard. Throughout the rest of the metalwork, we kept the doors on as much as possible, since any movement due to over tweeking, welding heat, or anger shows up most visually at the gaps between the doors and rockerpanel, doors and fenders. We had the rear shroud in place, and reinstalled the rear fenders.

Lesson #22:

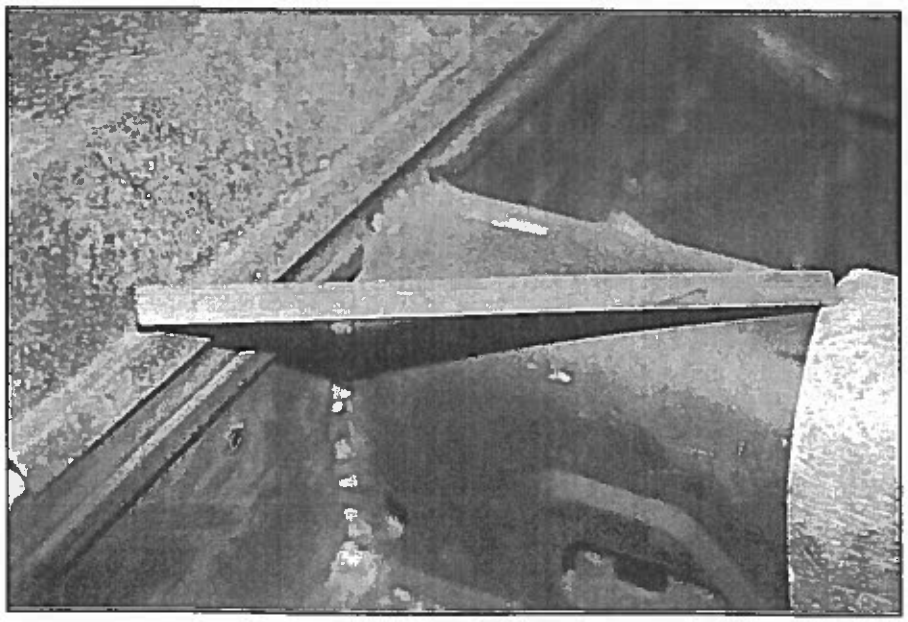
Metalworking with jacks had an unexpected application on my BN7. Being a two-seater, there is a broad span of shroud between the trunk and seatback. Substantial support ribs lie underneath. After looking at a drastic misalignment of the rear cockpit rail supports and the rear shroud, it became quickly evident that this car shared the roofless chicken-house with some other heavy object(s) for some or all of its ten-year hibernation/exile...and my chassis was at the bottom. Having a welder who was also trained as a rigger got us out of another jam.

Referring to the list of "pappas little fitup helpers" in Chapter 6, Don quickly assembled a few wooden blocks and a pair of hydraulic screw jacks. The rear (sparetire)deck had to be supported from the frame below since it couldn't support the jack's vertical thrust from above. Distortions in the web of ribs were pushed out until they followed the shroud's curvature. The shroud was not securely fastened to allow slight overjacking since there is a degree of relaxation after the steel is freed from the jack's upward thrust. Hammering the ribs would have further distored their shape and probably ended up leaving ripples. Incremental lifts were made from side to side, working back & forth while referring to a level spanning the top. Impatient overjacking one side only would have created messy distorations. A few sheet metal screws secured its position, and we moved down to the trunk supporting ribbing. I would probably have spent a weekend pounding and twisting the beast, never getting it quite right. Sometimes, only a jack will do.

Lesson #23:

The trunk's makeover was unilateral- no panels were salvageable. Aftermarket sideboxes are worth the price of admission, as is the curved floorplan.

Welding nice new sideboxes to old, probably rusty inner quaterpanels is tricky. First, Don showed me the advantage of creating stitch welds by making tackwelds and inch or so apart, then coming back and making contiguous tacks until a



Right: More 3/8" mild steel angle pressed into service to replace rear (spare tire) deck flanges.

series of 3/8" - ½" long stiches develops. This keeps the shaky metal from burning through. When it does, the hole gets real big real fast.

Lesson #24:

If you get an unwanted hole started, it can't be closed up trying to add filler to the old surrounding metal. Start by building up on sound metal, making a series of tack-like strikes with the trigger. Let the weldment build up into a small mound to act as a heat sink. Continue to build out to within a 1/16" of the old metal (note: there is a difference between old and bad, i.e. rusted metal), let cool for a few minutes, then bridge the gap with a short burst. The process can be speeded up by laying a brass or carbon backer behind the mess. Don got away with using a piece of wood, but I don't suggest it early into your welding career. The mound must be ground down, but be careful not to generate too much heat-the grinder can burn another hole beside the one you just patched.

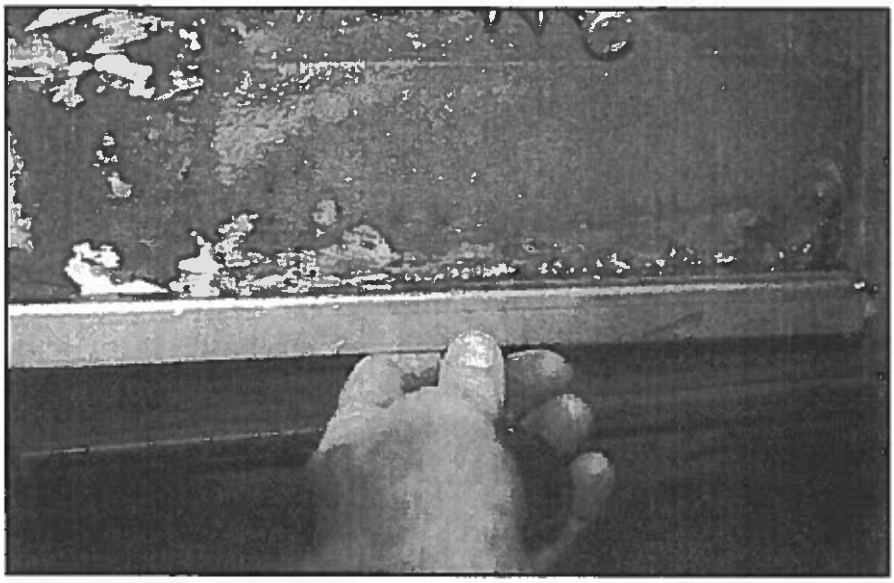
Lesson #25:

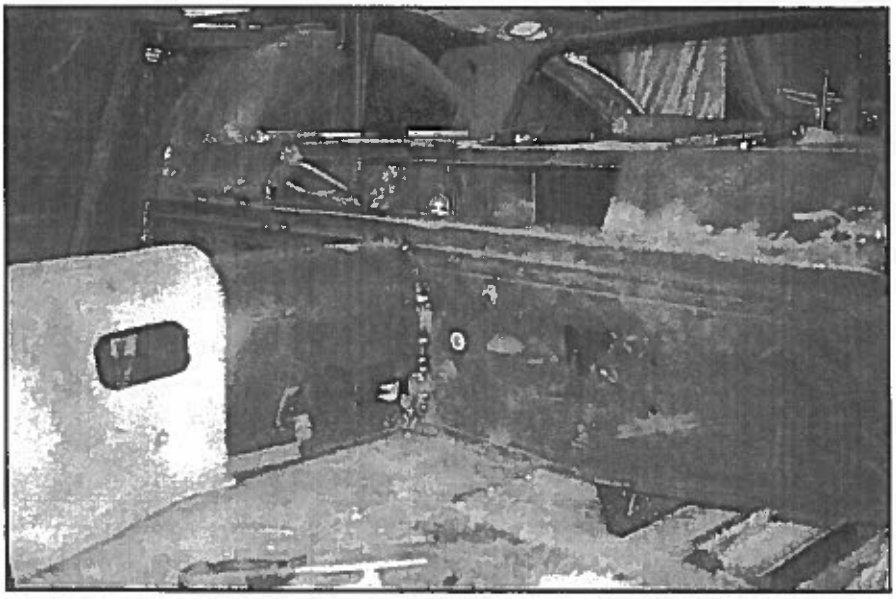
If you find a problem like that of Lesson #22, think about the fallout from the source appearing somewhere else in the chassis. We guessed the mystery weight had probably bent the dashboard supports in some fashion. We should have checked this back in Chapter 5, that is, installed the windshield posts and frame before tackwelding the hinge doorposts. We didn't and got burned. The driver's side was depressed over an inch. Don set up a similar jacking system and had the windshield posts aligned in about two hours. Unfortunately, this operation threw off the left front doorpost alignment which resulted in some nasty rework. By now, you can see why we feel the next project will take at least 25% less hours incorporatingwhat we've learned from our mistakes.

If you have any questions or comments regarding this caper, contact leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.

Below (near): Preliminary flange fitup after cutting away rust.

Below (far): Flanges welded to replacement heelboard providing strength to rear cockpit rail supports prior to shroud fitup.

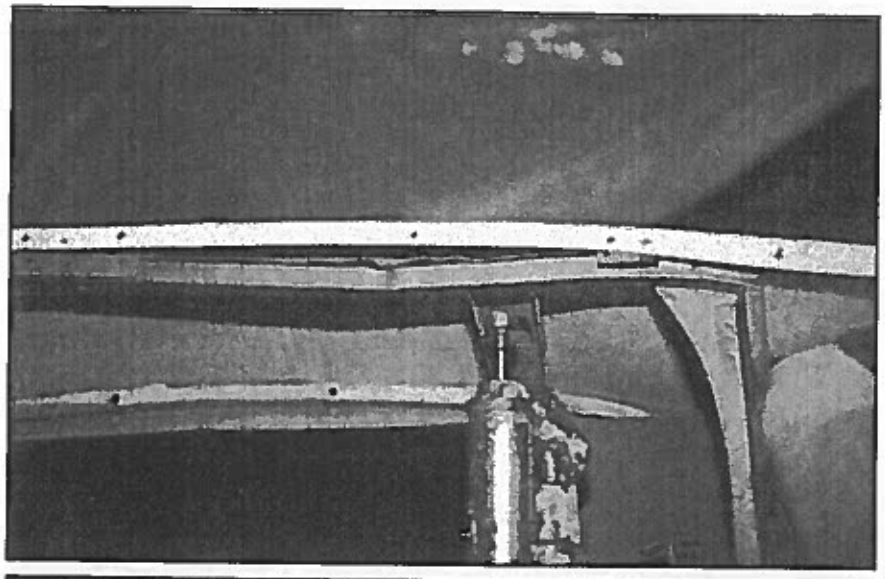




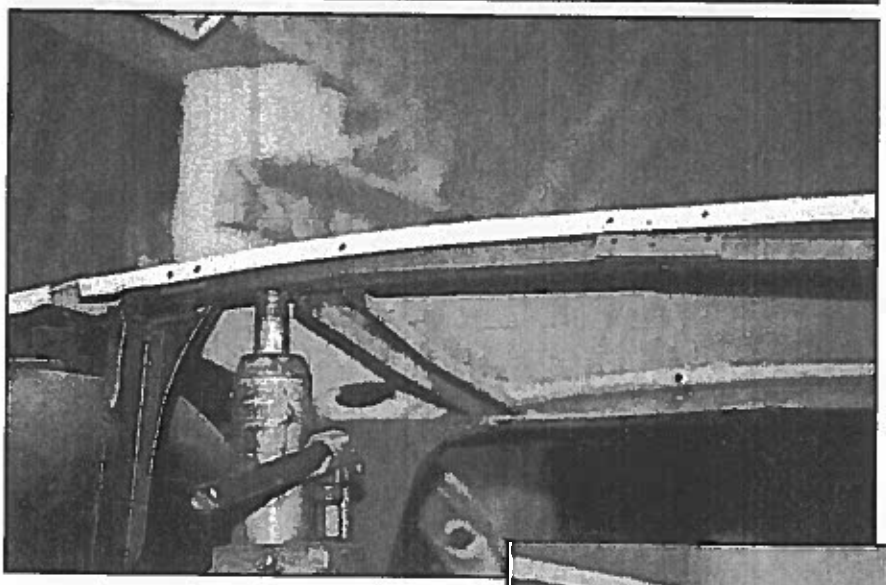
WRAPPING UP A BASKET CASE

CHAPTER 8: GIVING THE REAR TUB A MAKEOVER: PART 2

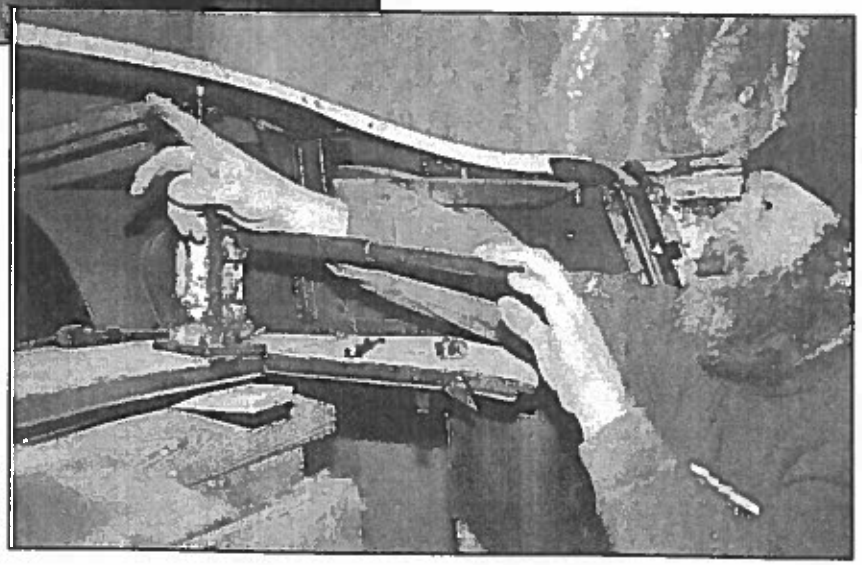
by Leo Kob



Left: Dimpled rail support showing gap between rear shroud's curvature.



Left: One of two hydraulic screw jacks used to realign rail support.

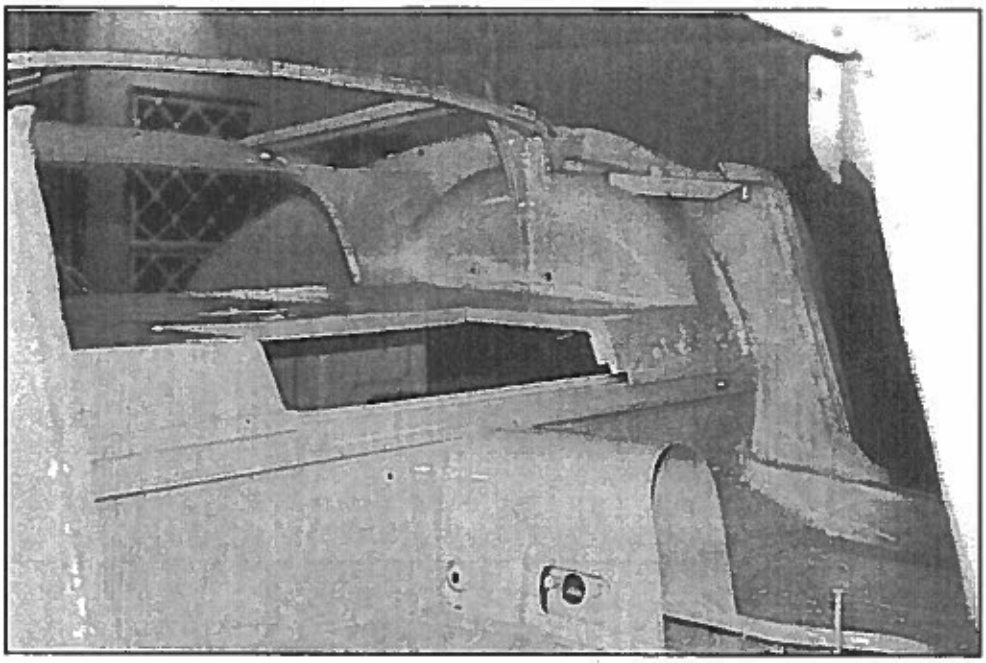


Right: Wood blocking required between frame and underside of rear (spare tire) deck to support jack.

WRAPPING UP A BASKET CASE

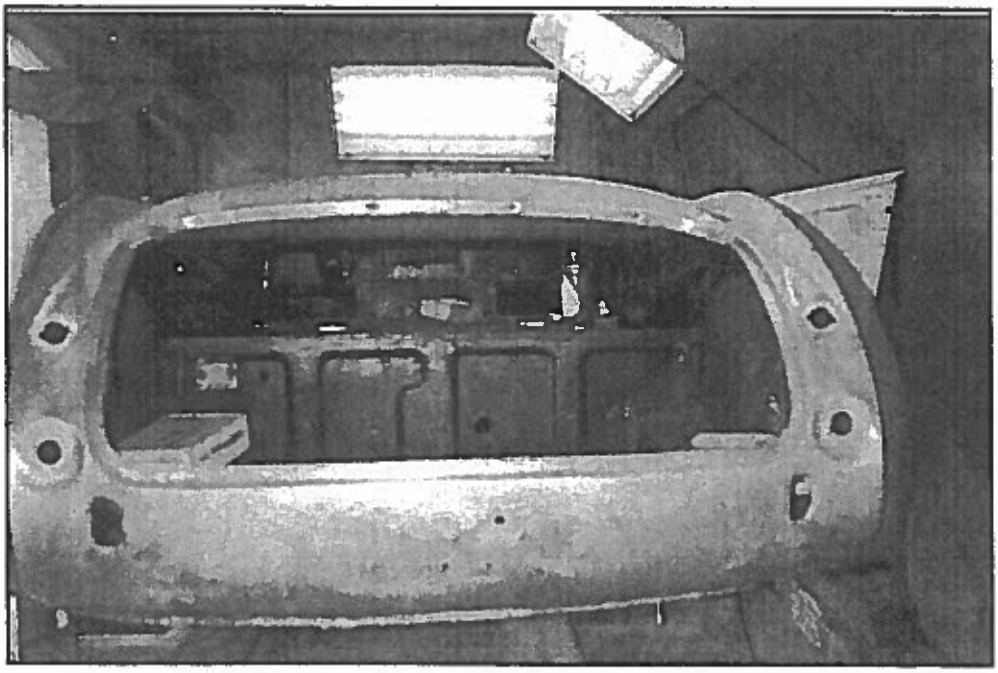
CHAPTER 8: GIVING THE REAR TUB A MAKEOVER: PART 2

by Leo Kob



Above: Finished product: rear deck, heelboard and rear shroud rails in Old English white.

Below: Rails concealed by shroud's aluminum flanges as intended.



Wrapping Up a Basket Case

By Leo Kob

Sheet Metal Patching

Ninth in a series about an amateur's excursion into by Healey frame and chassis reconstruction. A background piece appeared in the March 2001 edition.

Lesson #26:

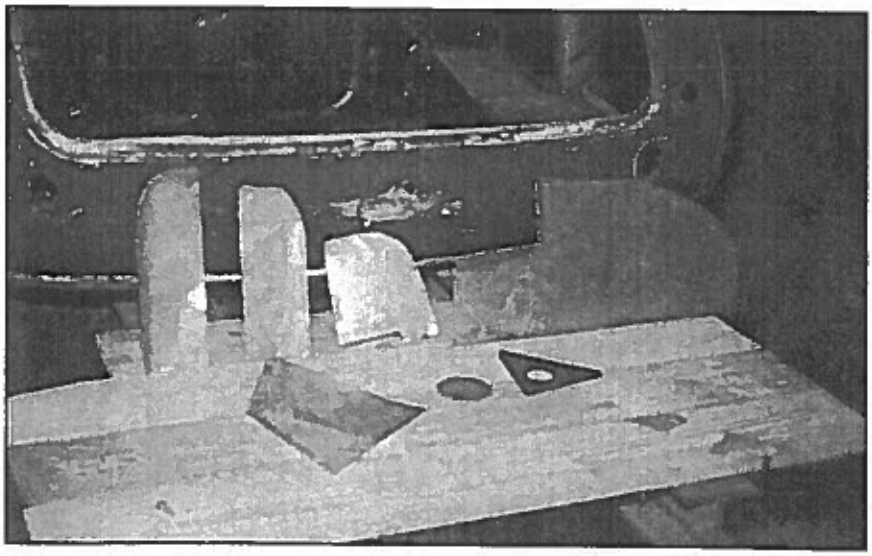
It's easier for amateurs to use slightly heavier sheetmetal than the original to make patches. Welding heavier metal is easier than light-gauge. But the difference shouldn't be carried to an extreme. Don kept the same argon pressure (7 psi), but lowered his MIG welder setting to 90 amps DC, running 023 and 015 (hard to find) coreshield wire for welding 16ga and lighter sheetmetal. We used a lot of 20 gauge sheet for patching the tub. Practice welding scrap pieces together before working on the real thing. If a hole is burned through light metal when welding to heavier chassis steel, begin filling in the lighter metal's hole from the point farthest from the heavy stuff first. The natural inclination is to begin building up the heavy stuff, however the amount of heat required will in most cases further burn the lighter metal, making the problem worse. A situation on the tub occurred while I was trying to weld the bumper support brackets to the chassis. The brackets are 20 gage. They had to be welded to the 11 gage frame wrap described in Chapter 3. Don faced the same situation as my wife and I bringing up six teenagers: it's easier to do the job yourself than spend time training. Don exhibited more patience with me than I sometimes extend to my kids. He made my big hole disappear in less than five minutes; it took me three times that to create the thing in the first place.

Lesson #27:

Cardboard patterns are easy to make and support the old adage: measure twice, cut once. Curvatures are tough to measure. I like to use folded dress-shirt cardboard used by most drycleaners for small patterns. Some guys simply use bodymen's masking paper. Little patches can be cut with straight or aviation shears-there are different shears for left and right cutting, and a third aviation shears for straight cuts. The handles are colored for ready identification. These are a must unless you have the luxury of pneumatic nippers. Big sheets can be cut with a torch (later topic).

Lesson #28:

Patches are a snap to weld if they are properly secured before striking an arc. Flat areas can be clamped, however there's no law forbidding use of sheetmetal screws where clamping is impractical. It's hard to get a clean weld if there's an air gap between surfaces. Poor preparation can also result in warpage or creeping of one or both metals, usually different distances. The holes created by self-tapping screws are easily filled in. Note that the patch is placed on the side which is hidden to minimize grinding. After stitch welding, the screws are removed and filled in. Don took the time to run continuous welds between the stitches. The more weldment laid, the more warpage potential. Warped areas can be relaxed by slowly reheating several times and hammering against a dolly or wood with glancing blows as described in Lesson #16.



Right: Rear wheelwell patches cut from 20 ga. sheet.

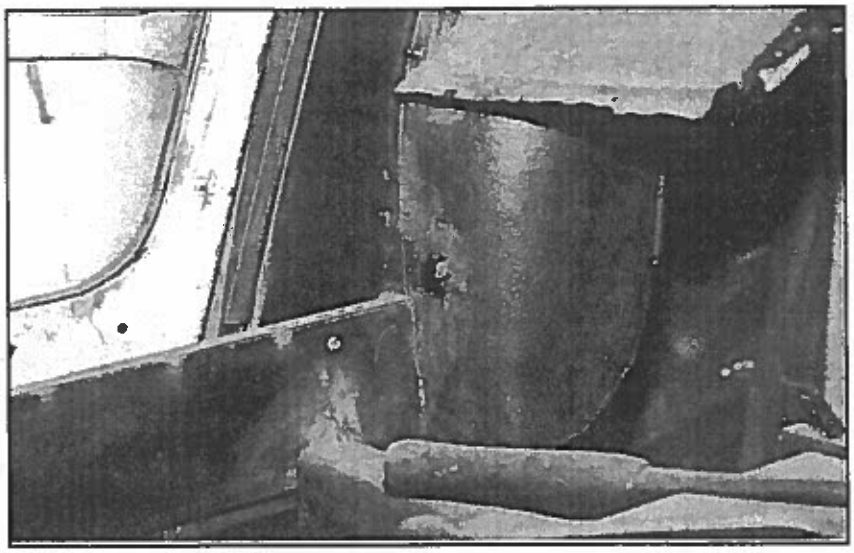
Lesson #29:

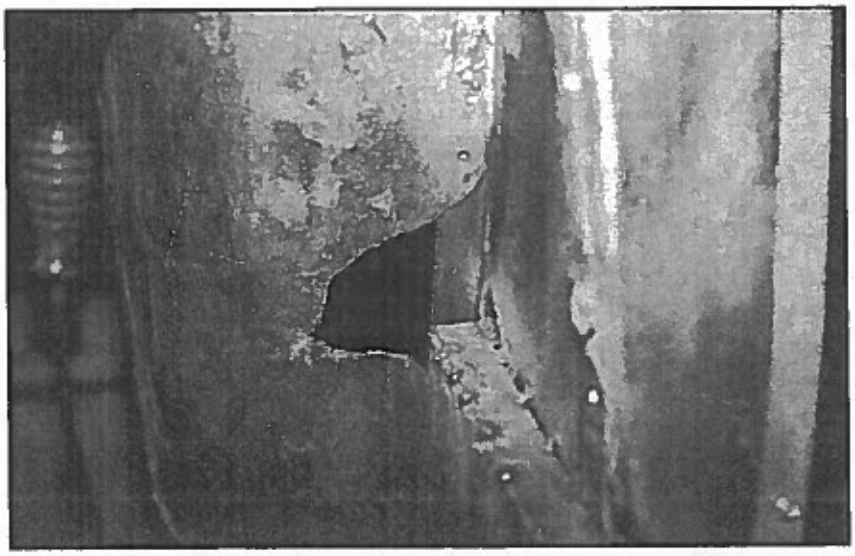
I was strongly advised to not use plastic filler on chassis repairs or any other places that are subject to moisture intrusion (from behind). Why? Plastic filler is like concrete in two ways-it's porous, and has almost no tensile strength (resistance to stretching), while having good compressive strength. Moisture will cause it to break down quickly, and obviously road stresses will pop it out. I used a metal filler compound used by a local boiler manufacturer, however there are several on the market. All metal surfaces to be patched and filled must be ground out to shiny metal, even if it results in making the cancerous spot much larger. Thus, it's important to grind out the area before making the metal patch. Bare metal should extend beyond the patch so the filler can form a positive bond. Grind with a pad whose courseness is in the 20's, or a welder's grinding wheel. The latter are noisy and dangerous, spinning at about 10,000 rpm (non-variable). Wear gloves, face and ear protection. This is not a good place for handwork-save your energy for prepping the body panels for painting later.

Lesson #30:

Most patches are not structural, that is, do not support heavy loads or must withstand road stresses. Thus continuous welds are not always necessary- the more you weld the more chance you have for warpage and burning unwanted holes in your work. Think about moisture instead. If the patch should prevent water seepage into the cockpit or trunk, then weld up a storm-otherwise, just do enough to make the thing stick. If you are creating a fair-weather car, then go easy with the welds. Caution must be exercised to ensure the tub's bottom and cockpit floorboards, etc. are airtight, to insure carbon monoxide fumes have been blocked. There also is a budding group of epoxies going on the market that some say will make autobody welding a has-been in a few years. You may want to experiment, or take an autobody course at an area vo-tech school that is offering instruction on these new systems.

If you have any questions or comments regarding this caper, contact leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.





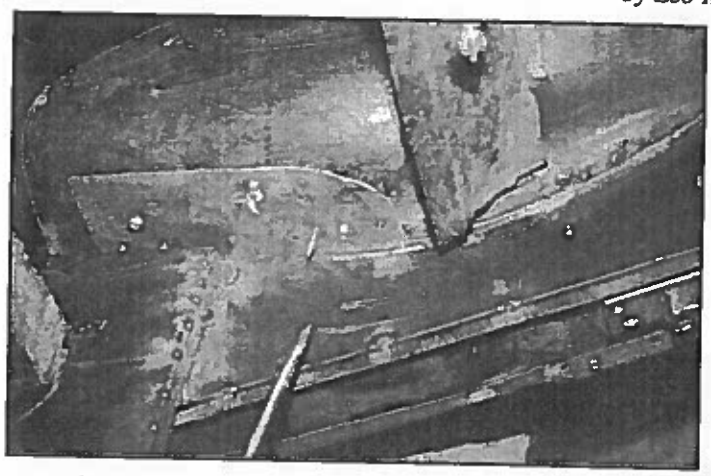
Above: Rusty hole before cutting back to good metal.

Left: "Prepped" hole.

WRAPPING UP A BASKET CASE

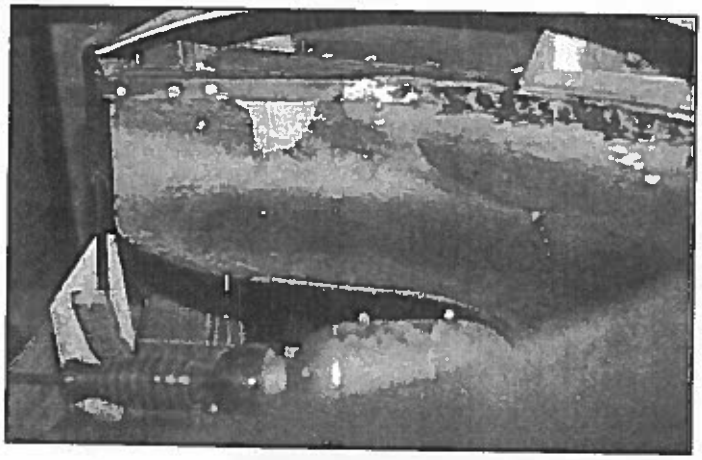
CHAPTER 9: SHEETMETAL PATCHING

by Leo Kob



Left: Patch screwed into place on "hidden" side.

Below: Patch as viewed from "exposed" side.



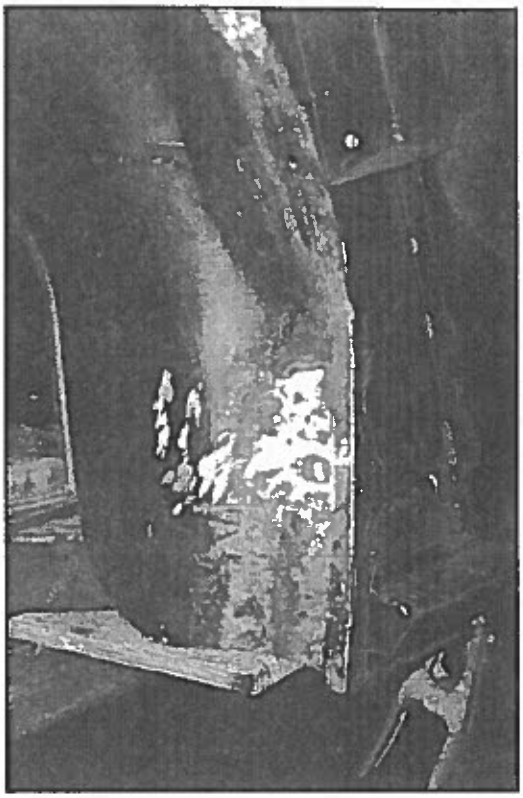
Left: Welded patch prior to grinding.

Right: Exposed side with welds partially ground down

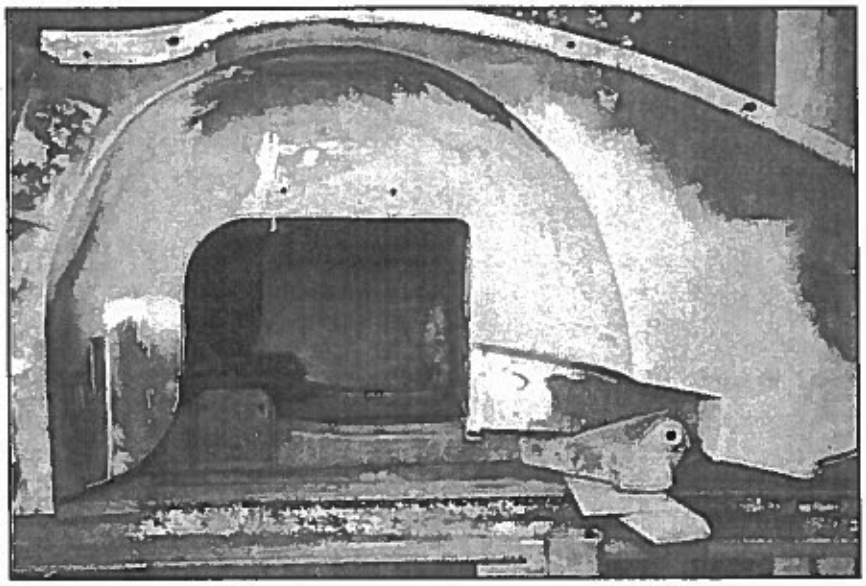
WRAPPING UP A BASKET CASE

CHAPTER 9: SHEETMETAL PATCHING

by Leo Kob



Left: Patch ready for metal filler.



Above: Filling inner side of wheelwell.

Left: Wheelwell ready for etching primer.

WRAPPING UP A BASKET CASE

CHAPTER 10: Trunk Compartment Sheet Metal

Tenth in a series about an amateur's excursion into a BN7 Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

The trunk reconstruction required a nice mix of aftermarket sheetmetal and home-spun shapes- all pieces here are light-gage (20-24). We were pretty well out of heavy structural rebuilding by this time. It's been over six months since we did the initial frame sandblast which exposed the sad state of my trophy. In short, the aftermarket parts did not create a tight fit, however there would have been little advantage in stamping them to tighter tolerances. First, none of this area ends up being exposed on BN7's (the left & right wells are visible on four-seaters, however). Second, if there is so much rust in the this area to replace the aftermarkets,
there most certainly must be a lot of rust repair needed nearby, so patches will be butting up against them. As depicted in the first illustration, the only reusable portion of my trunk bay was the rectangular support framing around the gas tank opening and the vertical bulkhead.

Lesson #31:

Make your sheet metal patches from cardboard patterns. Then lay the patches up in place with 1/4" & 5/16" self-tapping sheetmetal screws, fit the aftermarket pieces in place, and screw together before doing any tack welding. I can't overemphasize the importance of making patterns, both for sheet metal and later in upholstery work. Measurements for curved surfaces and inside-to-inside dimensions for small pieces are seldom right the first time. Incredible time is saved by cutting an approximate pattern, then creating creases along the exact cut lines by simply pressing the pattern against the re-maining or bordering substrate. Don, who's been custom welding for over 25 years, and my trimmer, who's been doing car interiors for an untold number of years, are not afraid to resort to this elementary-school level practice.

Lesson #32:

Before welding the trunk, the entire car's rear should be assembled to insure proper align-ment. The BNC chassis blueprint does not provide enough measurements to do otherwise. We first installed the rear shroud and fenders, then the floorpan under the two side boxes. Next, the two bumper spring bars were slipped through their support brackets extending from the side boxes. The bars & bumper should be securely bolted- the whole alignment's success is expressed by the uniform gap between the bumper & rear shroud. Run a few self-tapping screws between the rear shroud and the new trunk floorpan. Perform the necessary tweeking using all of pappa's little helpers (Chapter), body clamps, and screws. Be sure the ribbing that fits under the trink lid's lower lip seats snuggly into place. We put in new lip supports- they're cheap ($12.00 each) and are very visible.

If you want to be exacting, set the gas tank in place and drill out for the fuel line. There may be the need to drill out for the battery cable, and the fuel pump mounting bracket. These all involve the rear axle box bulkhead common to the trunk. There are also drillings for the BT7 spare tire mounting block (the BN7's spare lays under the rear shroud behind the seats over the battery compartment). The gas tank hold-down straps each have brackets that are secured to the bulkhead. Cars with batteries mounted in the trunk have a wooden spacer fastened to the inner wheelwell that requires three 5/16" bolt drillings. These fasteners are difficult to install with the right fender on.

Note that the aluminum rear shroud is not welded to the chassis: It is fastened to the trunk floor with 19 flat-faced rivets (not pop-rivets). The lower trunk lip is pop-riveted to the ribbing in 13 places. The other points of attachment are screwed. The 3/8" angles running along both sides of the trunk walls are unique to the BN7- they support the full-width trunk deck (the battery is not located in the right well like the four-seaters), and the tool well on the left side has a hatch door.

The left fender did not line up with the shroud exactly. An effective tweeking method was installing the tire, using a short length of 2"x4" as a pry (tire served as fulcrum).

Lesson #33:

Now it's time to begin some serious sheet metal welding. Being a novice welder, I opted to make a series of tack welds at I" +/- intervals, then went back and forth, slowly filling in between until they resembled full (fillet) welds. See Chapter . MIG allows for quick spot-like welds to be made that don't readily burn through light metal. Less metal expansion occurs this way, but a lot of extra time is expended. So what... I didn't set out to do this job for a profit. It's a sweet feeling of success to feel the gradual strengthening of the entire rear half of the car as the screwed components were welded into a structurally-rigid system. Recall that before we dove into this final welding, we had installed all the sheet metal, bumpers, windshield brackets and doors to insure proper alignment. We also should have installed the engine/tranny, but got away without it due to the excessive strength created by the 11-gage frame wrap. Otherwise, we would have been very unhappy at job's end when the doors were to be hung for the last time. John Davies pointed out that there's no sin in leaving a little extra gap vertically when putting in the door latchposts/inner wheelwells...this leaves room for adjusting the doors by installing thin shims behind the doorhinges. We would have saved a lot of fitup time incorporating John's advice months earlier. And I heretofor had assumed he was strictly a motorhead.

If you don't want to go to the trouble, or don't have the completed engine/tranny assembled for weighting the frame prior to completing chassis fitup/welding, weights in the form of solid cinderblocks or scrap steel plates can be spanned between the front frame crossmember & center frame crossmember. The combined engine/tranny weight is pounds.

If you have any questions or comments regarding this caper, contact leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.

Next month: Footwell & Firewall Reconstruction

WRAPPING UP A BASKET CASE

CHAPTER 11: Footwell & Firewall Reconstruction

Eleventh in a series about an amateur's excursion into a BN7 Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

It was about a toss-up: completely cut out the footwells and install aftermarket pieces, or play cut-and-paste. Since Don had so much to do in the rear, I volunteered to do what I do best: cut & paste. The aftermarket toeboards provide the first half of the canted well already. The rest can be made up with patch panels that are fairly simple to fabricate. And the third plus is only one side remains exposed after completion - the padded carpet panels can hide some rough bodywork.

Lesson #34:

Small patch panels that require flanges can be made quite easily with duck-billed vice-grips or by using a length of wide-flange beam. Our frame jig was a couple of feet longer than the car, leaving us with a 30" high pair of beams that were perfect for bending and drilling. Standard vice grips or body clamps combined with a rubber or wooden mallet did the job nicely. If you're careful a ball-peen hammer will make bends quickly with a little practice. The trick is determining how far off your measured (or traced) bend line the edge of the beam or duckbill the metal must be secured to compensate for the radius of the bend. It varies with the metal's thickness and the squareness of the beam's edge. Sheetmetal workers & machinests have tables that provide this info, however one or two test bends will clue you in. Since you're probably only going to use one or two thicknesses of

sheetmetal and one or two bending methods, this hit-and-miss approach isn't frivolous.

Lesson #35

There is little room for mechanized tools in this area. Therefore these patches were welded on the inside rather than the outside (which provided more workspace). This required minimal grinding on the exposed surfaces, ie. those opening into the engine compartment. After grinding the inside, and completing welding of the toeboards nearby, this entire area was finished with metallic filler (not fiberglass body putty-see Chapter). At least a half-dozen passes were made to cover the plug welds (a topic of upcoming Chater 12), and warpage from welding in such a confined area. This is amazing stuff since it can be softened with solvent to a brush-on consistency, minimizing the amount of mechanical finishing required. Be sure to scar the entire surface that will receive the filler after eliminating all rust. Prime the surface with solvent before working in the filler. Do not brush on the first couple of passes- press hard with an applicator. Let the stuff set up before applying each coat. Use a lot of ventillation, and keep the temperature above 70 degrees or you'll die or boredom waiting for setup. It's nasty stuff, so safeguard your lungs. And be sure not to ruin it by going back and rewelding nearby- despite a metallic finish, it will not withstand welding heat, but withstands running temps. Unlike resin bondo, moisture does not deteriorate it.

Lesson #36

If you are replacing a lot of sheetmetal in these areas, be sure to provide fixed nuts for the fiber heatshields that must be fastened to the left footwell and firewall. They use #10-32 bolts with wide fender washers. Again, warpage in this area won't be seen from the inside (cockpit), however make sure that the nuts provide a true point-to-point plane for the fiberboard: it cracks readily if stressed by missaligned fasteners. Best to take the time to fit up these pieces before beginning metallic filler application. It will pop if whacked with bodyhammers/dollies after hardening. There is also a drilling for the accelerator pedal shaft to the carb linkeage bushing support (small oval cup that is secured with two #10-32 philips-head bolts) that may have disappeared during the filling exercise. Don't forget the high-beam footswitch mounting bracket boltholes/fixed nuts. Also, run a bolt or, if necessary, a tap into the old nuts to insure they are not fowled by filler or grinding dust. Other little stuff like holes for the wiring harness straps can be drilled during reassembly.

If you have any questions or comments regarding this caper, contact leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.

Next month: Floorpan Fabrication & Fitup, Part 1

WRAPPING UP A BASKET CASE

CHAPTER 12: Floorpan Fabrication & Fitup: Part 1

Twelfth in a series about an amateur's excursion into a BN7 Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

I doubt that there are many unrestored Healeys still around that don't need replacement floor-pans. For this reason, I'm going to devote a couple of installments on the tricks Don taught me about how to get this right the first time using basic tools. I don't believe all the pieces are available on an outsource basis, simply because many are so easily fabricated by hand. The challenge is getting them

in place so that there won't be squeeks, rattles, and cradles for new rust generation after your prize is put back on the road.

Lesson #37

Understand where floorpan strength is necessary. Before throwing away your old metal, or, if your floors are completely gone, take a look at another car to determine which areas have pressed patterns. These are not for good looks from below- they add strength to the floor, ie provide inexpensive reinforcing. On 3000's it's pretty straightforward- they are needed under the seatframe supports between the outriggers, and on the BN7's, behind the seats and the rear bulkhead. Duplicating these pressings is virtually impossible without some special equipment (such as an English wheel). If you're a real skinflint and not looking to return your car to its original look, a few 3/8" angles or channels can be welded between the frame & inner sill (which spans the ends of the outrigger) on each side to support flat sheetmetal. But watch out: you've got to clear these stringers to bolt down the seat tracks, secure the muffler breackets and fiber heatshield on the driver's side- pretty tricky stuff. I suggest you plop down the asking price for these four pressed aftermarket pieces and give up one of your secret vices for a short period of time.

Lesson #38

Start out by making a full-size cardboard pattern of each piece. This shouldn't be done until the aftermarket pieces have been trimmed and temporarily screwed or clamped into place. Cut & trim all patterns to an exact fit. Next, trace it onto the sheetmetal. Cutting large pieces from a big sheet is tough work by hand or even with pneumatic hand nippers. If you don't have access to a bench shear, Don showed me a quick & dirty way: burn the piece out of the stock sheet with a cutting torch, about an inch from the neatline. Then use a hand shears for a second, exact cut. Skilled metalmen can burn the cut close enough to the neat line to avoid the second cut- they simply touch up their burn line with a grinder. Their secret is to use a piece of angle or some other support to rest their hand against while burning the straight lines. After a few minutes of practice, it becomes a fun experience that brings a lot of satisfaction if you've spent hours slitting your hands trying to cut metal like you do paper with a scissors.

Lesson #39

Your pattern should include all holes, slots and other cutouts that were part of the original piece. Make sure these all line up properly before starting to cut the real thing. Small slots can be made quickly using a fairly sharp cold chisel rather than drilling for a jig saw. A prime example is the L-shaped opening in the center floorboard that accepts the handbrake pivot bracket (welded to the frame). This should be fairly neat so it can be welded solid. The four tapped bolt holes for the overdrive support brackets are par of the frame also. Here, it's easier to notch out oversized holes than try to drill exact size ones in the exact locations.

Lesson #40

A really fun and effective welding technique used here is "plugging". Plugwelds are essentially a macro-form of factory spotwelds. They provide a strong bond between the heavy frame steel (in my case battle-ship strength 11-gage) and the light (16-18 gage) flooring. The first step is to drill a 1/4" +/- hole through the thin sheet only. Then fill the hole enough with MIG to create a small puddle above that spreads beyond the hole's diameter, acting like a screw- or nailhead does for conventional fasteners. There is a lot of frame crossbracing under the center floorpan, which is naturally cut out for the transmission/OD. Consequently this huge piece doesn't need pressed reinforcing. Like every other weld set-up, the floorpan must be solidly secured to the frame before welding- use self-tapping screws or clamps or a combination of each. Don't try to hold it down with wood, etc unless you're very proficient. The rounded plugweld heads are subsequently flattened with a grinder, however don't try for a perfectly smooth surface- none of these pieces show on the finished car. Do a clean job along the edges that are open to view when the transmissior cover is removed if future appearance means a lot to you. The holes left after the temporary screws are removed can be used for plugs, or buttered over with MIG or metal filler (but not bondo).

Lesson #41

Thinking about overdrive tunnels, the aftermarket ones available are for four-seaters; simply cut one back for a two-seater. A torch makes this eliptical cut a breeze. Be sure to cut the rear end so the slots line up for the parking break lever and seatbelt bolts. Also, the aftermarket tranny tunnel floor flange are well worth the price if you're going concours- but here is a place to save a few bucks otherwise: a couple of angles can be welded along each side, with Pep-Boys' quality weatherseal applied to the bottom flange of the tunnel. Sheetmetal screws will secure it adequately to the floor without squeaking. The barrier may not be quite as weatherproof as the original, but does that really matter for weekend flings?

If you have any questions or comments regarding this caper, contact leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.

Next month: Floorpan Fabrication & Fitup, Part 2

WRAPPING UP A BASKET CASE

CHAPTER 13: Floorpan Fabrication & Fitup: Part 2

Thirteenth in a series about an amateur's excursion into a BN7 Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

We were by now out of the insane phases of this caper and into traditional chassis restoration activities. Last month the use of patterns, cutting slots with a cold chisel, and plug welding were addressed. The large center floorboard's fabrication was illustrated. Here, we show the combination of aftermarket and home-made flooring used to complete the cockpit area.

Lesson #42

We installed the left and right floorpan pieces from front to rear. The toeboards had been welde into place back in Chapter , so the footwell and firewall filler wouldn't be damaged. There is considerable overlap between these and the rectangular (pressed) floorboards that span the outrigers. These support the seats. It's a good idea to mark and drill all the holes required for the seat tracks and exhaust system, including the rectangular muffler heatshield before installing these pans for the final time. The best way is by making a pattern of a finished car, since the margin for error using BMC's dimensions is slim- it's hard to get to the reference points they show in the drawing. An error of less than an inch will make nut installatior virtually impossible for the inner seat tracks and front muffler mount due to their location relative to the frame' cross-members and outriggers. I understand that some aftermarket pans come already drilled with fixed nuts if laid out accurately, I recommend finding them unless your old pans are adequate to use as patterns.

Lesson #43

The tranny tunnel track, fiberglass & metal tunnels were next aligned. The parking brake lever must have room to rotate from its pivot which is welded to the frame. An oval slot provides a generous opening laterally, but is a bit lean on wiggle room vertically. The BN7 has two rear kickplates between the rear outrigger and rear axle box bulkhead that are quite wide compared with the four-seaters. Both are creas along two diagonals to mate with the bulkhead and OD tunnel tracks. A true 3-D affair. We had to do a lot of rework on this, however (probably by design) cutting and bending only were required of the flat end flanges. The difficult diagonal bends could be tweeked by hand. So before you return dozens of these babie because none fit exactly right, consider that they may have been designed with one reality of the original Longbridge assembly plant in mind: the cars originally didn't fit up to the kind of tolerances most of today's restoration shops are achieving. In book, he notes that door fitup wasn't achieved at the factor by tweeking the chassis before final welding, rather multiple doors were lifted into place on the assembly line a reasonable match was made. On several occassions, we discovered that other aftermarket pieces were m

We were a year into the saga. For Encounter, we wanted to have the fuel forwarding, brake & clutch hydraulics, wiring harness, firewall & engine bay electrical components, steering & suspensions complete. Not having the engine, tranny, and interior installed would provide an opportunity for clubbers to take close-up photos of a lot of the components, fasterers, etc normally hidden when viewing a completed car. It struck me early into this restoration adventure, that none of the popular restoration guides provide many close-ups of partially-completed chassis vis-a-vie Haynes' treatment of the car's mechanicals. Hence, my motivation for this series.

The radiator was left out for better viewing. Since the rear inner fenders were still pretty rough (don't show on completed car), the rear shroud & fenders were installed for the outing (pure vanity). We tossed the collection of cancered chassis cutouts in Don's pickup, and trailored the rollling chassis decked out in old English white a short fifteen-minute drive from the barn to Lancaster's Eden Resort. In keeping with our PA Dutch tradition, the trailer was constructed from scrap angle & channel. It was a single axle with no springs, decked out in 25-year-old red primer. Don wasn't the culprit on this baby....it was built by a regular at the Watkins Glen track in the late 60's & early 70's. He trailered his 3000 regularly from Pottstown, PA to the track on this baby. It sported one arched ramp that solved the inherent ground clearance problem of most set-ups. Some of you SCCA vets may have known or run against him- Joe Tilghman of Team Tilghman. Unfortunately he fell asleep on the way home one weekend in 1976, leaving his imprint on a roadside tree, never recovering sufficiently to resume his passion.

I couldn't stay at Encounter due to work, however Don stayed to split his time between sharing his experiences a bringing back my basket case and while serving as ZZ Top's road manager/resident alchemist. Bic Healey seemed more interested in the latter than the former. He didn't seem to believe that the surrounding rusted pile could have all come from one chassis. He also cast a disbekieving frown when told we were planning on having the car complete for my wife's birthday the following month...well Christmas was wour fallback.

so rather simple tweeks could be made without disturbing the difficult bends or curvatures or flanges. Here we had to notch the flanges that snug against the bulkhead, and rework the end flanges so the diagonal benc would lay up properly. No big deal after completing the insane frame wrap earlier in the year.

Lesson #44

A final afterthought for those (whom I admire the most) who plan to drive their restored Healey rather than seal it up as trailer trash for concours events only: Rust will reappear along the gaps between the top of the frame and floorpans even if they are sandblasted and painted. Healeys were not undercoated nor did the chassis receive a special coating at the factory- the whole car was shot with lacquor at one time. Even cars that are not driven in the rain very often but stored in unheated garages or less will eventually suffe condensation oxidation. A non-concours act to mitigate this is the application of body caulk to seal all the cracks created by the radiused frame and floorpanels. Welding these would be costly and create major warp Caulking can be applied quickly while the chassis is in the paint bay. By inference, you should recognize that a much more pleasing product is derived from painting or powder-coating the chassis before installing the sheetmetal, suspensions, and drivetrain. If the car isn't going to be in a lot of wet weather, and you aren't doing the restoration to gain a profit on quick resale, don't take powdercoating as a given expense. A well-prepped chassis coated with one of today's one-step enamels produces a great product at low cost; more on chassis coating in an upcoming chapter.

If you have any questions or comments regarding this caper, contact leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.

Next Month: Readying the Chassis for the Paint Bay

WRAPPING UP A BASKET CASE

CHAPTER 14: Readying the Chassis for the Paint Bay

Fourteenth in a series about an amateur's excursion into a BN7 Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

Lesson #45

It's now time to make sure all the points of attachment are where they belong. Those located in the trunk, rear axle box, footwell, and firewall areas were covered in Chapters & , respectively. Hopefully, you won't be insane enough to wrap a complete frame. I had to redrill all the holes required for securing the wiring harness, battery cable, and fuel line along the entire length of the frame. There are approximately . Luckily I had a stripped BT7 frame sitting on its side from which to take measurements- these are not located in the BMC drawings. There are two threaded 5/16" boltholes for the rear exhaust hanger that needed rework. We had preserved all the important drillings and tapped holes elsewhere along the frame, having cut out the 11-gage wrap out to expose them, thereby insuring exact location. Although we had installed bolts in them prior to sandblasting, we ran taps through them all as insurance. It's real hard to do such items as the engine mounts,
after the equipment is installed. The firewall's myriad collection of #10-32 tapped holes were also 'run in.'

Lesson #46

Little touch-up patches overlooked during the 'big wrap' were installed next. A typical example was an end cap to the rear trunk support crossmember. It's little, and hard to secure. An aid comes in the form of welding a small 'handle' to its face. The patch must be cut slightly smaller than the endpiece, and beveled . A clamp or tackwelded support from elsewhere on the frame nearby or the jig itself is adequate to hold it in place for the first few MIG strikes. After obtaining full-penetration welds,

the skeleton can be quickly burned or ground away. Another problem area was a rotted front frame cap that provides the point of attachment to the front shroud's front lip. Heating here broke open the original box beam's seam. Don had to bail me out of this one.....(continue)

Lesson #47

After all welding, drilling, and tweeking was complete, we removed all the body panels. The car was hoisted onto a dolly, and rolled outside where a truck-mounted sandblaster did his thing. The rig was normally used for prepping bridges. It's the best $250 I invested since the stockmarket meltdown two years ago. He even cleaned up the spent medium. The only downside was his pressure was a bit higher than I needed, and a couple of more holes blew open. It wasn't a big deal to patch them before rust would reattack. That same week we were off tho the paint bay, riding on an emotional high- It looked like we may have a completed rolling chassis ready for the Lancaster Encounter!!

If you have any questions or comments regarding this caper, contact leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.

Next Month: Victory in the Paint Bay.

WRAPPING UP A BASKET CASE

CHAPTER 15: Victory in the Paint Bay

Fifteenth in a series about an amateur's excursion into a BN7 Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

Lesson #48

Ah, the agony of color selection. As most of you probably know, the original chassis and body w all painted at once. My wife & I had selected the perfect shade of midnight blue for the body from over 100 chips. We wanted the lower half of the body, chassis, and wire wheels to be old English white (to the purists). Our preferences would undoubtedly keep us out of the concours corral, however this car was for us, not the judges. I was overcome at first sight by Cy Moreland's OEW engine bay. Perhaps it was the wine he served at the club's Chrismas party that night, or the fact it matched his spotless garage floor. So, while several members of our club were busy figuring out how to get Paul Wolgum out of the cockpit of one of Cy's formula 2 vintage racers (is the 1970's considered vintage?), I prepared to commit a cardinal sin: go two-tone wrongly. By dumb luck, I stumbled into a situation that can really take a lot of aest pressure off an amateur restorer. Although I was redoing the chassis on weekends in Lancaster, PA all the other parts were cleaned, sandblasted or wirebrushed over lunch hour or 'after work' here. I happened to pic up a can of almond Rust Oleum at the hardware store to prime the insides of the doors (which don't show up much after the interior is finished). When I delivered them to my painter's shop the following week, it turned c this aerosol was close to an exact match of the DuPont planned to use on the chassis (we had p the wire wheels by this time). Having an off-the-shelf aerosol that matches the chassis makes life a whole lot easier- you can paint in your basement or garage without mixing or setting up an air compressor, etc. Rewor of the chassis can be covered up easily. And those nasty scratches that inevitably occur when a screwdrive slips, or the engine/tranny are lowered into place can be made to disappear with your own hands. So my suggestion is to paint the chassis with a color that is also available in aerosol form.

Lesson #49

Ah, the greater agony of prepping the engine and finding the right color that sticks to blocks hea by exhaust manifolds only partially shielded with asbestos substitutes. After removing the wrong shade of green (or is it blue?) paint from my block with a combination of paint stripper and sulphoric acid (if it's good enough for my spa, shouldn't it be good enough for cast iron?), I was close to death...overexertion, fumes, he

stroke, frustration, you name it. Stripping the engine & tranny was by far the worst operation of this caper. Don and I fabricated a plate that covered the intake & exhaust ports prior to stripping. It was well worth the two-hour effort, and also permitted us to later rig the engine in place without taking off the valve cover.

While I was on a sinful roll, I decided to clearcoat the brilliant cast aluminum transmission/OD housing rather than paint per original. It's a remarkable assembly of fine castings, with no burs or fins, etc. I had the same soft heart for the rear end housing....more negative concours points.

Lesson #50

After using etching primer on the engine, Steve Poules (my painter) hit it with a DuPont ename that I think is indiscernable from the most-popular vendor's aerosol. It was listed for application on '83 or '84 Oldsmobiles. Steve had witnessed Don's & my agony in the barn (his shop is next door) from day one. He took another step and clear-coated the block: what a visual leap forward it produced! Seeing it in the buff motivated me to polish the carb pots, blast & coat the exhaust headers with heat-cured enamel, beadblast an clear coat the intake manifolds (this is a tri-carb), and on and on on right through replacing the choke cables with beauties found at a local bicycle shop (magically, they can be cut to length with dikes).

It was now mid-June, and we had a chance to complete the rolling chassis in time for the August '01 Encounter. I might inject here that there are a number of great painters located arounf the Manheim, PA auto auction. They generally do not get into heavy chassis straightening or do quickie insurance paint-jobs: they touch up newer models usually off their first lease for auction buyers prior to resale. Most are cosmetics experts, and can really match paint. Steve surpassed my expectations. Trouble is, these guys are very busy, and usually only take on or two restoration jobs on at a time as fill-in, and the used car market is now booming...you can't rush them. Some specialize in high-end cars only: an easy screening process is look what they've got waiting in their front driveway.

If you have any questions or comments regarding this caper, contact leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.

Next Month: Preparing Chassis Parts for Rassembly

WRAPPING UP A BASKET CASE

CHAPTER 16: ASSEMBLING THE ROLLING CHASSIS: PART 1

Sixteenth in a series about an amateur's excursion into a BN7 Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

Lesson #51:

If working out of a barn, take advantage of it wherever possible. We did not have a fancy hydraulic lift, so we adopted the bank barn's structure for reassembly. The painter's gurney gave us a working height of about 32"- same as a typical kitchen counter. To give us addtional height when needed, and a clear space underneath the chassis for such operations as installing the seat frames and exhaust system, Don installed slings around the chassis belly which were attached to come-a-longs secured to the barn's upper floor beams. We also had the 4"x4" vertical posts used to hold the frame secure vertically during the frame wrapping escapade (Chapter). This became useful for installing the front suspension.

Lesson #52:

I started reassembly with the fiberboard heatshields on the firewall, footwells & under the driver's side floorboards. Use wide fenderwashers to prevent cracking. Firewall grommets (grease with WD-40 or dishwasing detergent) made ready for laying the wiring harness. It was taped along the fire-wall and both front wheelwells to insure lengths were correct (ie. not too short). The run to the trunk was rolled up under the dash for later.

After rebuilding the brake & clutch master & slave cylinders, I clearcoated the aluminum housings and mounted them. Next came the firewall electricals (voltage regulator, OD throttle switch, OD relay, fuse block). The driver's footwell and fron fender get the turn signal flasher & relay, brake fluid reservoir. The other front wheelwell needs the heater blower and hydraulic brake five-way/brake light switch. The starter solenoid mounts beside the right footwell. on the four-seaters. The BN7's was located insanely in the rear axle bulkhead (which I didn't repeat as was the case for two six-volt batteries nearby). My BN7's horns were mounted on either side of the radiator, while most other models have them mounted on both front fenders' shroud supports. Good wiring harness manufacturers privide pigtails to accomodate the different locations. I checked the harness leads against the terminals on all these components and installed a few of the harness straps, leaving room to tweek around the as-yet uninstalled hydraulic lines. Note that the straps have a top & bottom- check out which way they "scroll" on the pedal box trusses spanning to the front wheelwells and on the wheelwells themselves.

Lesson #53:

Pre-terminated hydraulic lines are almost a no-brainer unless you have a union ticket for process instrumentation installation. For about 100 bucks, you can gain the assurance that you won't be spending a few days redoing a bunch of leaky flanges on tubing you spent a few days mounting on the chassis, but now need to be removed because there isn't any slack for rework. Hopefully you saved the originals to help with the layout. You can cut them into a couple of sections to make them more workable as patterns. The set's tubing I used could be bent by hand, without a bending tool for all but a couple of spots. The key to bending tubing is feeding it through the palms of your hand to your thumbs, much like a golf club grip. Slide it through your grip several times, getting a slightly smaller radius each time- avoid short knee-like bends that result from applying maximum force without the sliding effect: pinching is inevitable. If you don't have your old lines for patterns, try lengths of #10 or #12 solid copper wire. It holds its bend in moderate lengths long enough to get you going.

Lesson #54:

I polished the hydraulic lines, then clearcoated them. Several different straps and clamps were used to secure these lines between the reservoir and master cylinders. The brakelines run forward along the chassis to the five-way hub to which the brake light switch is mounted. My preterminated tubing landed best when the five-way was rotated about 90 degrees more than originally mounted. The clutch line runs from the the master cylinder along the firewall until it drops to a flexible connection on the passenger side of the transmission tunnel bulkhead under the dash, then on to the slave cylinder mounted directly on the tranny's housing. These lines and the wiring harness share some tight spots along the way, so I was careful to not rigidly secure either or any until all were nestled together.

Lesson #55:

Now's a good time to install the engine oil pressure sending tube on and through the firewall for future attachment to the pressure gage- it has a funky bracket that must clear the harness & clutch line. It has a tight spiral built in to handle expansion & engine vibration, and is not a part of the standard hydraulic sets. Pray you haven't lost yours- they't really tough to bend, and very costly as aftermarkets- keep an eye open on wrecks or at flea markets if you need one. This sucker will eventually be connected to the lower left side of the engine block with a short flexible line. That union is also an expensive little casting, and isn't readily available.

Lesson #56:

Before securing the harness & hydraulic lines, run the fuel line, trunk wiring harness, rear brake hydraulic line, and battery-to-starter solenoid cables under the rear of the car. The first two run along/under the left longitudinal frame, latter two on the right (looking forward from above). it's a lot harder to bend the fuel line if originals are lost, particularly the graceful loops needed to connect to the fuel pump mounted in the left side of the rear axle bulkhead. Being able to hang the car from above made these tasks very easy compared to working around a lift.

WRAPPING UP A BASKET CASE

CHAPTER 17: ASSEMBLING THE ROLLING CHASSIS: PART 2

Seventeenth in a series about an amateur's excursion into a BN7 Healey frame & chassis reconstruction. A background piece appeared in the March 2001 edition.

Lesson #57:

Dissassembly of the front suspension may require a long soak in safety-clean, followed by shots of ether (starting fluid), and in extreme cases, the trusty ole' torch (see Chapter). Those fulcrum pins, bush cotters, and upper wishbone joining bolts can be killers if let to the weather unlubricated for extended time. Ball joint forks came in real handy.

Plan on spending about 50 hours cleaning, blasting & painting all the suspension, steering and engine compartment components that comrise the rolling chassis. The work is tedious and requires a lot of old coathangers to space out the pieces for painting. I applied three coats of Rust Oleum high-temperature matt black for most components that weren't clearcoated. This product does not need a primer on raw metal, and must be recoated within one hour of each application- makes for easy evening sessions in the garage. There is a brush-on version that matches the aerosol for touch-up.

Watch the ambient temperature, however- lower than 60 degrees produced some funky results.

Lesson #58:

The L & R front suspensions were partially bench-assembled. John Davies showed me the ins and outs of rebushing, then properly reaming for new kingpins. We secured the upper & lower trunnions to the kingpins, attached the lower a-arms (wishbones) to the lower trunnions so the three messy tapered and dished bush cotters which key into the screwed fulcrum pins into position at the trunnion swivel were adjusted before the assemblies were lifted onto the car. Separately, the front hubs were fit with new bearings, races, and seals. Gotta have the right drifts to make these operatons successful. Also on the bench, the front brake calipers were rebuilt.

So I returned to the crime scene in Lancaster with three pairs of assemblies: the lower front suspensions hinged to the swivel axles, hubs with renewed bearings, and rebuilt calipers/turned disks. The front shocks and springs/lower spring baseplates cannot be installed until after the lower arms are pinned to the frame.

Most of the loose parts remaining need neoprene bushings inserted first. WD40 or soapy water really helps get them pressed into the lower wishbobe arms, upper trunnions for shock upper arms. BMC's shop manual spells out the reassembly sequence.

The only real challenge back at the barn was getting the dust shields to fall in place and compress the coil springs. We braced the car from above while sitting on a gurney, using four 1/4" rods to guide travel rather than wrestle with coil compressors that make me cuss and scratch new paint. Our floor jack pushing against a wood block did the trick. Note that a 2" spacer should be installed betwqeen the shock's upper arm and its base to properly install the hubs onto the axle.

Hold off installing the short, curled hard & flexible brakelines until after the majority of the steering tie rods, idlers, box, etc. are in place. It's pretty hard to get to the various horizontal fasteners otherwise.

Lesson #59:

Installing the rear axle between the two bulkheads is a real trip. Being a novice, I installed the fuel pump, then bent all the fuel lines to insure proper mating. To avoid potential disaster, I subsequently removed the pump and pipe secti between the tank and pump. The long run from the pump to the front was arced along a large radius toward the floor while the chassis was hanging free. Following the recommendation in the shop manual, we jockeyed the whole unit from the right side, up and over the springs. Bump boxs and brake line from front were already in place; shocks, parking brake cable, were not. Don't forget the rubber pads that go between the axle tube and springs prior to securing the U-bolts. There are also a pair of pads..... . plan out the sequence of inserting the anti-sway tiebar, connecting the gas lines, parking brake cable to the axle-mounted swivel, brake line at the center of the axle, shock absorber bases and pressing in the shock absorber links to the axle housing. We benefited from being able to tilt the entire chassis almost 45 degrees while hanging from above. When lateral stability was needed, a strap was run from the barn's walls or column and tightened with another come-a-long. For safety, we kept the gurney under the car's front half. A lot of prying with the wheels both on and off finally got everything in place. We have few pleasant memories of the near all-night marathon one hot night last July.

If you have any questions or comments regarding this caper, contact Leo at leo.kob@villanova.edu or Don Williams (the welding maestro) at 717-664-2313.