CHAPTER 7

Your Project Is a Miniature Vehicle: Build it Like One!

7.1 Building Models Like "Real" Automobiles Are Built

Auto manufacturers build their cars as they do for ease of assembly and to address quality-control issues. As a scale vehicle miniaturist, your objectives are almost identical: you want to be able to assemble your model in the best possible way to maximize the quality of the final result by minimizing assembly-tolerance and finish risks to the model during final assembly. Think about the model as a series of subassemblies making up major assemblies which are, in turn, integrated with other major assemblies to finally create a complete scale miniature automobile. Said another way, if your goals are realism and a relatively trouble-free assembly experience, think about ways to build your model as if it was in 1:1 scale.

The parts and projects shown in this chapter are either part of Mark Gustavson's *Dream Truck*[2], his scale models of the Lincoln-Mercury Lynx prototypes, his *New Age Mercury,* or a vintage-styled '50 Ford coupe.

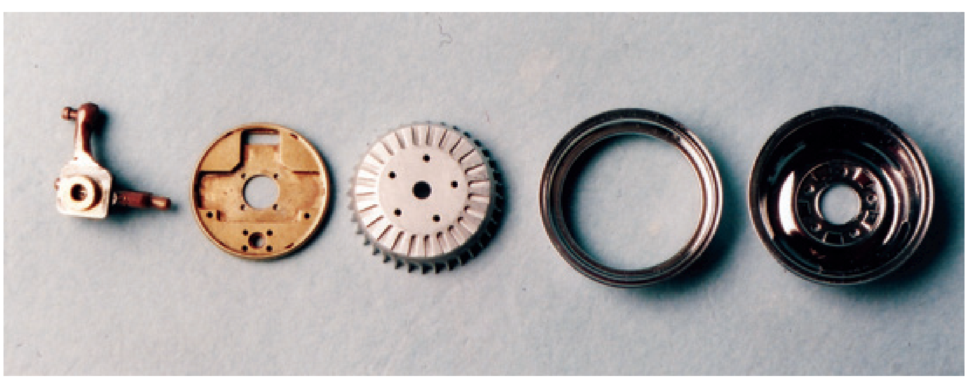


Figure 7.1: Though the work is labor-intensive during fabrication, the best way to build a realistic model is to build it in a way that most closely resembles how 1:1 parts are assembled. In this view, from left to right: A spindle was scratch-built, cast in brass, and then machined to interface with . . . the machined Bendix brake backing plate. Note the four holes around the central hole that index to four corresponding holes drilled in the fascia of the spindle. The brake backing plate . . . fits inside the reverse side of this vintage Buick finned brake drum. This drum as been machined in aluminum and will not be painted or plated. Note that the five central holes for the lugs index to the wheel. The rim is in two parts; not a 1:1 approach, but an acceptable compromise for ease of assembly.

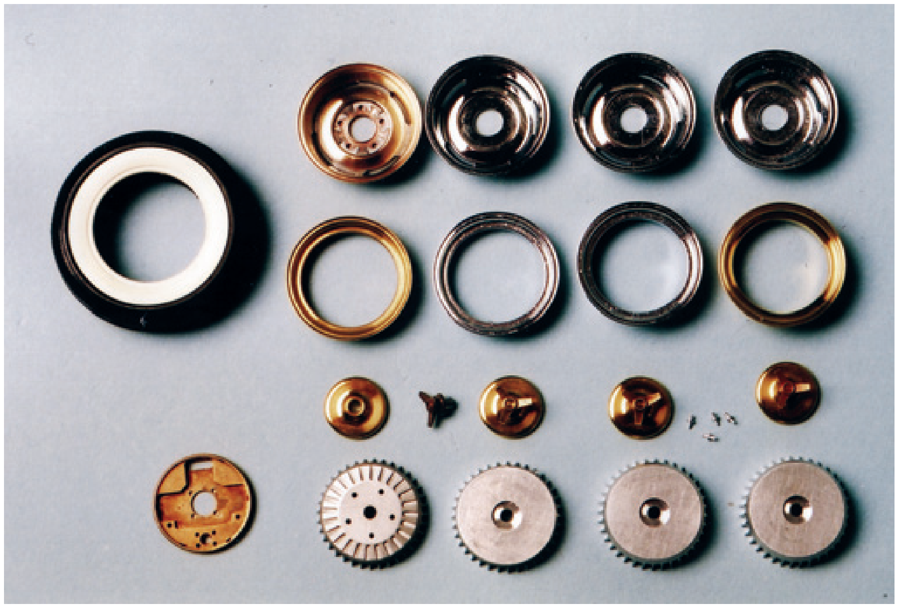


Figure 7.2: The rim was machined from brass to fit a specific tire. Threaded shafts (0000-160 in diameter, and available from The Morris Company) will be fitted to the five holes in the brake drum so that the rim can be mounted with scale hex nuts and removed for display. The three-ear spinners fit into the wheel cone that, in turn, fits inside the center of the wheel.

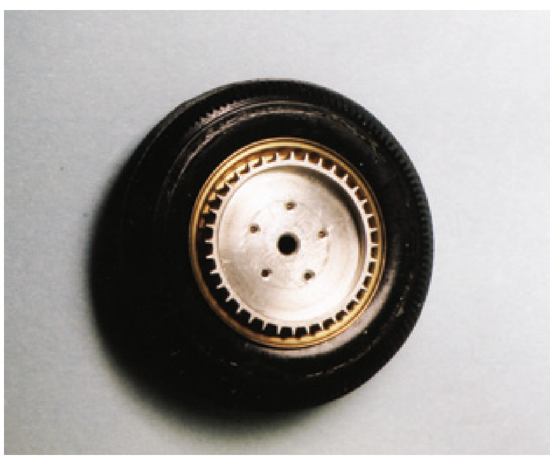


Figure 7.3: From the backside, note the carefully-managed tolerances between the outside diameter of the Buick brake drum and the inside diameter of the rim. There is a sleeve on the fascia of the spindle that indexes into the back of the brake drum.

Figure 7.4: The cast and machined spindle is index-drilled to exactly match the Bendix brake backing plate that fits closely into the drum brake which, in turn, matches the bolt pattern of the rim. The taper on the OD of the brake backing plate matches the taper on the ID of the Buick brake drum to insure a fool-proof, same-every-time fit. Compare this photo to Figure 7.3.

Figure 7.5: Flipped over, the rim (complete with the center cone and spinner) fits tightly into the Modelhaus tire. Compare this image to Figure 7.2.

7.2 Does Your Model Use Body-On-Frame or Unibody Construction?

Determine the body structure of your model. Is the subject vehicle body-on-frame construction, or is it a unibody model?

Body-On-Frame. If the subject employs body-on-frame construction, construct a floorboard and a separate frame (if the kit isn't already configured in this way). If the kit's frame and floorboards are molded as one piece, cut the kit's flooring away from the frame and scratch-build a new floorboard from raw materials (plastic or brass), using the kit part as a rough guide. This new floorboard will be attached to the body shell during construction, rather than to the frame. The plastic frame can then be used (after clean-up), you can scratchbuild a frame (see Chapter 10), or you can take the modified plastic frame to a jeweler and have it cast in brass. In any case, you have simplified your final construction tasks, and created a fresh canvas for your undercar and interior detailing tricks.

The frame should have small pins affixed to the top side (in hidden areas) that will index to correctly-located holes in the floor pan, or you could actually bolt the frame to the body through the typical "outriggers" using the micro-miniature bolts now available; all so you can a test-fit that frame to the same place on your body repeatedly as you check out the fit and integration of the many parts of your model as you develop them. Also, (assuming you're not building a convertible or roadster), cut open your doors, trunk and hood and fit the hinges before you attach the floorboard to the body shell. You'll have to assemble the model through the openings in the body, but if all the major components have been previously (and positively) located, this is not the difficult task that it seems. The goal here is to do the preparatory work to permit you to have a problem-free final assembly where the many assemblies go together easily.

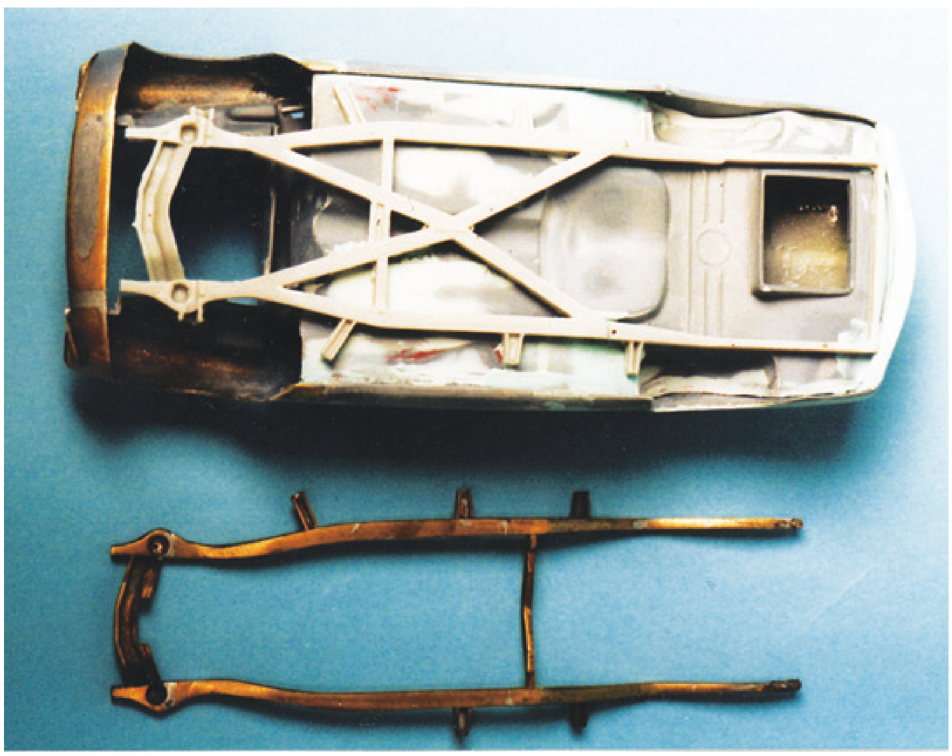


Figure 7.6: One way to create a body-on-frame model is to cut the frame away from a kit floorboard, and then cut the floorboard away from a frame on a duplicate part. Careful work will be required, and there will inevitably be work required to get everything to fit together. Here, an AMT '50 Ford frame has been cut in this manner, with work now going on to fit the floorboard to the body. The plastic frame can also be cast in brass for a more substantial element to the model.

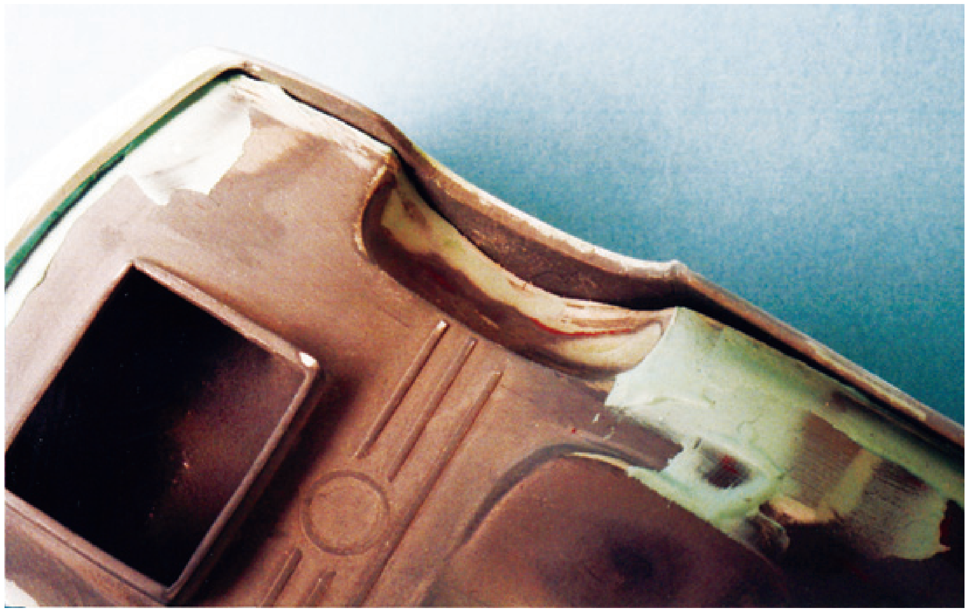


Figure 7.7: One task is to get the floorboard to mate up tightly against the body panel. Once everything fits, and the doors are cut out, and the floorboard can be correctly installed into the main body. Here, this process is in an early stage, with strip styrene being applied around the rear wheelhouses so that there is almost no gap between the body and floorboard. Be careful to correctly locate the floorboard, since it will also locate the frame, and you want to be certain the axles are correctly placed on the model. Take your time here.

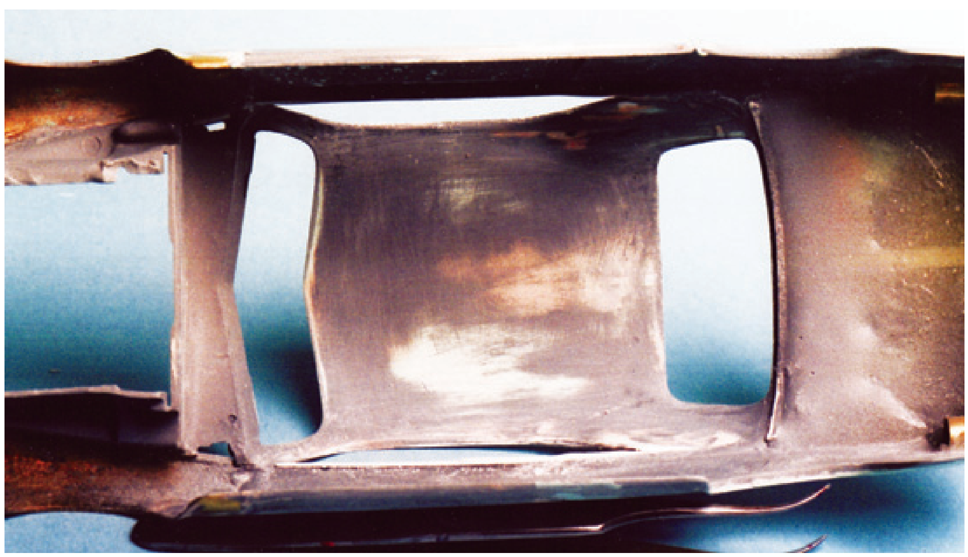


Figure 7.8: In this shoebox Ford, the roof has been pieced together from several parts, requiring bodywork on the inside of the roof. After making sure that the parts are securely attached to each other, use standard bodywork techniques to smooth out the inside of the roof. This model is still in the early stages of this work.

Figure 7.9: The other way to create a realistic body-on-frame model, when you don't want to open the doors, is to mate the interior tub to the floorboard to the bottom of which the frame will be placed. On the *New Age Merc,* this technique was tried successfully but note that the frame still had to be cut loose from the kit floorboard to achieve this method of construction.

Figure 7.10: It's obviously important to be certain that you've located the interior components on the floorboard so that it fits accurately into the body. Here, a narrowed '58 Thunderbird dash, and front and back seats, were mated to lengthened '60 Starliner door and rear quarter inner panels.

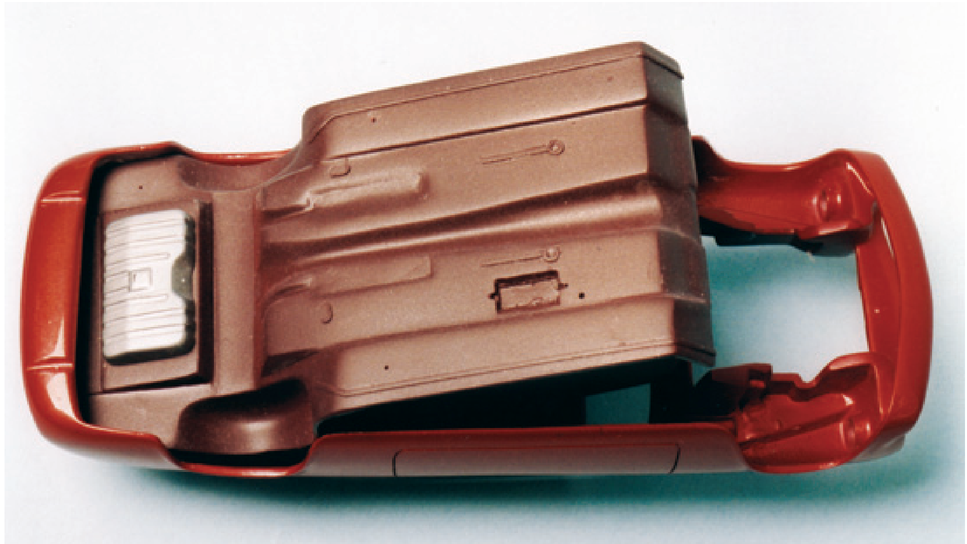


Figure 7.11: You have to develop a scheme to get the combo floorboard/interior tub into the body without damaging the bodywork and paint. A lot of work went into engineering this approach on the *New Age Merc*. Note how the interior/floorboard assembly angles into the body as shown, and then drops straight "down" . . .

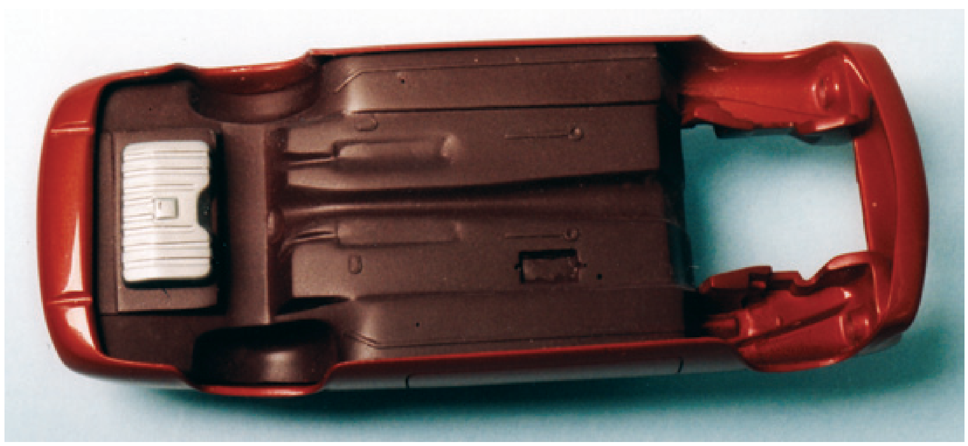


Figure 7.12: . . . into its final position in the body. More work could have been done to widen the rear wheelwells to fit more tightly into the inside of the rear quarter panels. Now, the modified kit frame attaches to the underbody.

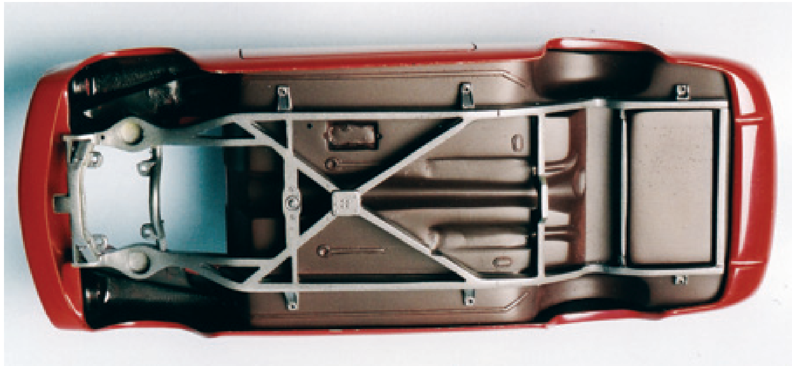


Figure 7.13: A ’60 Starliner front frame clip was fitted to the AMT ’49 Merc frame to display a more up-to-date suspension set-up on the *New Age Merc*. The frame here needs additional parts installed, as well as brake and fuel lines. This approach to creating a body-on-frame model produces a good result, but you need to be careful to measure *many* times as each major component is prepared.

You can use the kit frame when your project is essentially based upon an existing kit. Otherwise, you’ll need to scratchbuild a frame from plastic or, preferably, from brass, which will provide a stronger and more stable platform onto which to install all of the suspension components. See Chapter 10 for a photo essay on how the *Dream Truck*[2] brass frame was built.

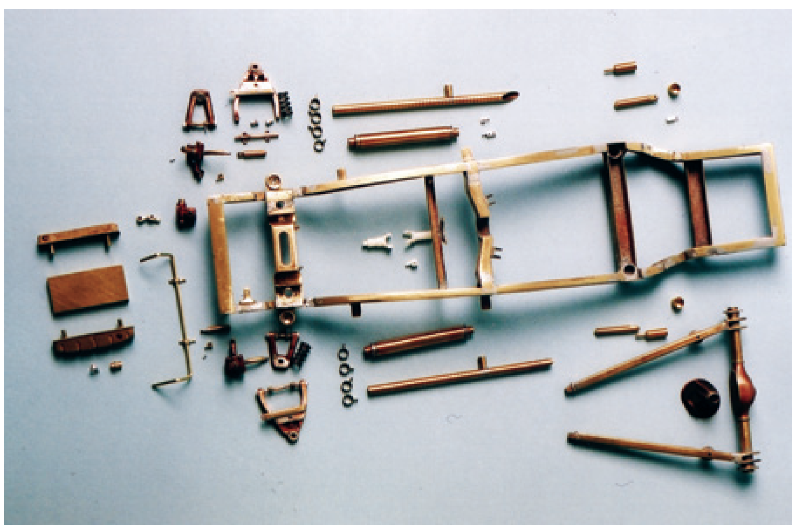


Figure 7.14: Here is the soldered brass frame (and most of the related parts) for the redesigned *Dream Truck*[2] project. Once assembled, the complete frame will attach to the underbody of the model with small, specially-machined 000-160 hex bolts that will go through the prototypical holes in the frame outriggers and then into the bottom of the cab. These will be capped by bolts in the floor of the cab where each bolt head fits inside a recessed “cone.” Small photo-etched “rubber” biscuits will fit over the bolts atop the frame. This bolt-mount assembly approach is both achievable with some work, and authentically realistic. The rear axle assembly is built from 12 separate parts, all silver-soldered together. The gear set attaches to the axle housing with 0000-160 bolts. The leading brackets on the rear axle trailing arm attach—with small bolts—to the brackets on the frame crossmember. At the front of the frame, the brackets to pick up the upper and lower A-arms have also been fashioned and soldered to the frame and crossmember.

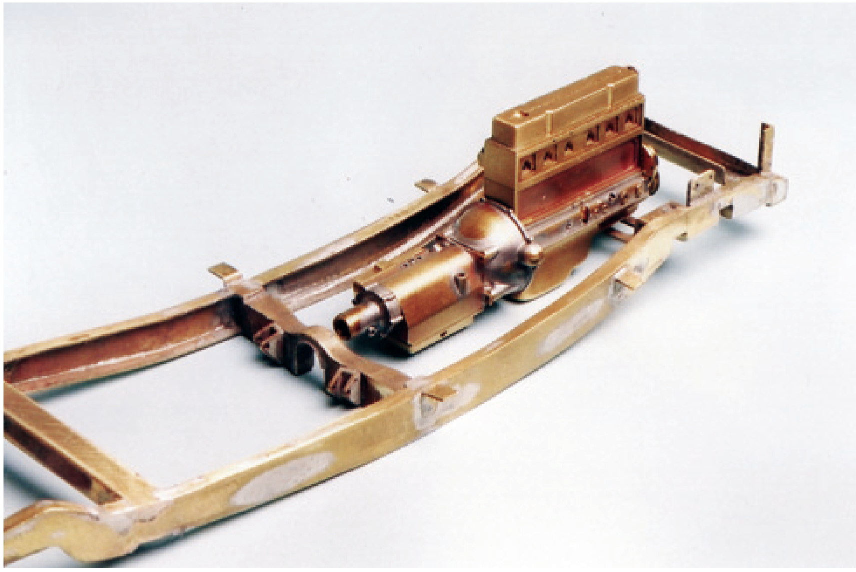


Figure 7.15: The brass frame is dimensionally stable and displays near-accurate scale thickness. The importance of this fact is measured by the reliability and predictability of the frame's dimensions and shapes when it comes time to fit other components to the frame, and the relative ease of final assembly when all the parts and subassemblies come together. The front crossmember features brackets for the upper and lower control arms, which provide a stable platform for further mechanical detailing. The basic engine and transmission are laid in the inside of the frame at their approximate locations. Their locations will be finalized after placing the frame into the body and deciding where the engine can fit to clear the firewall. Note that the frame-to-body outriggers have been soldered to the frame but not yet drilled for the body-mounting bolts.

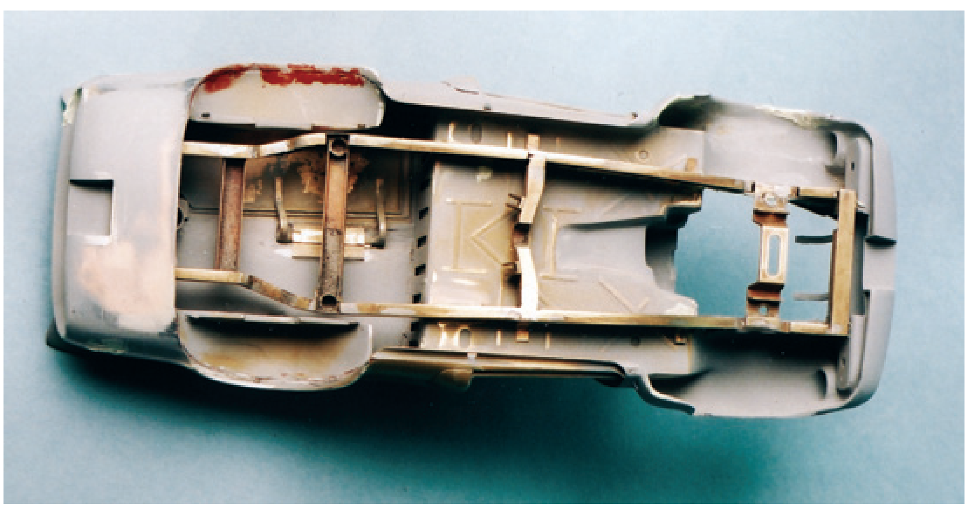


Figure 7.16: Because all of the brass parts are dimensionally stable, the frame fits into the body of the *Dream Truck*[2] the same way every time. This way, the interface between the parts can be repeatedly checked against the background of major components—whose interface with each other is also dimensionally stable—so that otherwise undetectable parts-interface/interference problems can be solved before painting and final assembly occurs. This is a way to achieve realism and avoid difficulties. Ultimately, the frame will positively locate to the body with bolts that will pass through the outriggers into matching holes on the underside of the cab floor and the bed floor still to be fashioned.

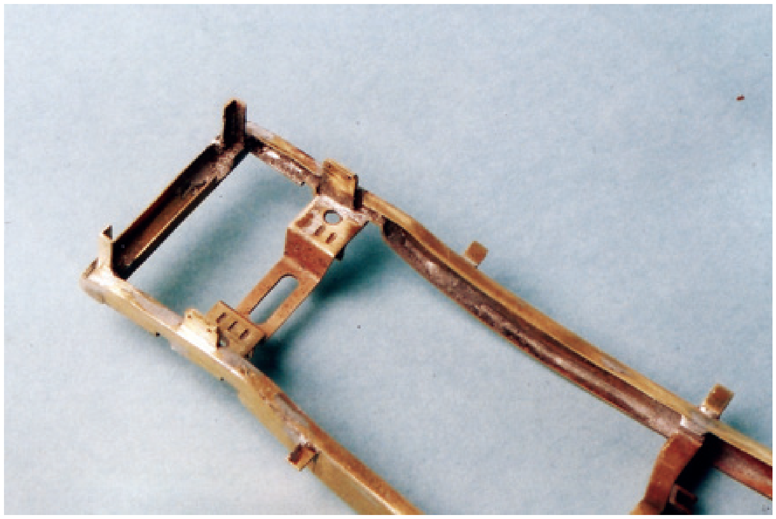


Figure 7.17: The L-shaped vertical brackets at the front of the frame make up part of the radiator support and those shapes index into the body, helping to reliably locate the body to the frame. The upper A-arms bolt to the upright shape just inside the frame rails, and the longer lower A-arms bolt to the bottom of the front crossmember before it angles downward to clear the oil pan.

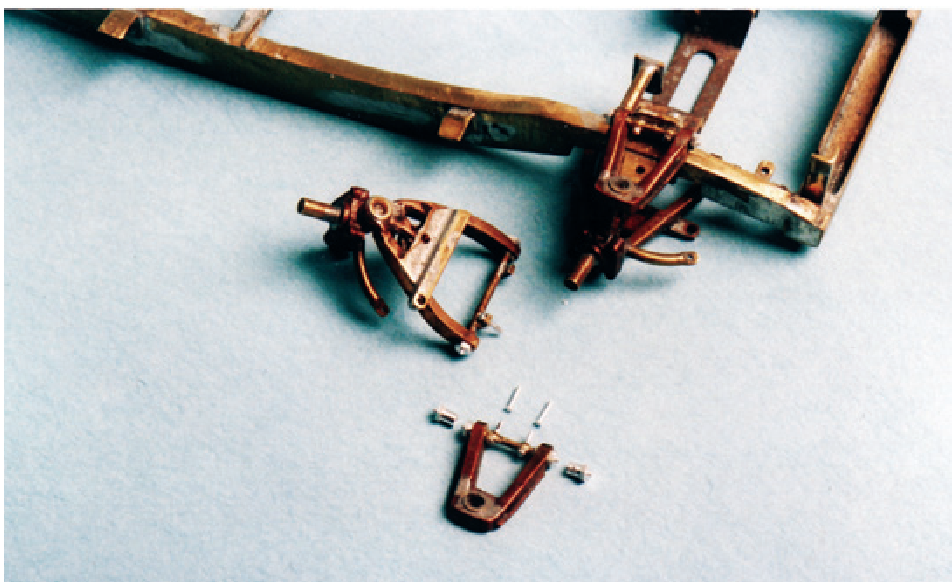


Figure 7.18: Cody Grayland machined the upper and lower control arms (complete with the bosses through which the mounting bolts are run) and the bolts that locate the control arm in the upper A-frame. The control arms are attached almost exactly as if they were 1:1 parts: the bushing slips over the shafts, which have been placed within the concentric "holes" through the pivot points in the upper and lower arms. The upper control arm bushing setup is comprised of five parts, as are the lower control arms.

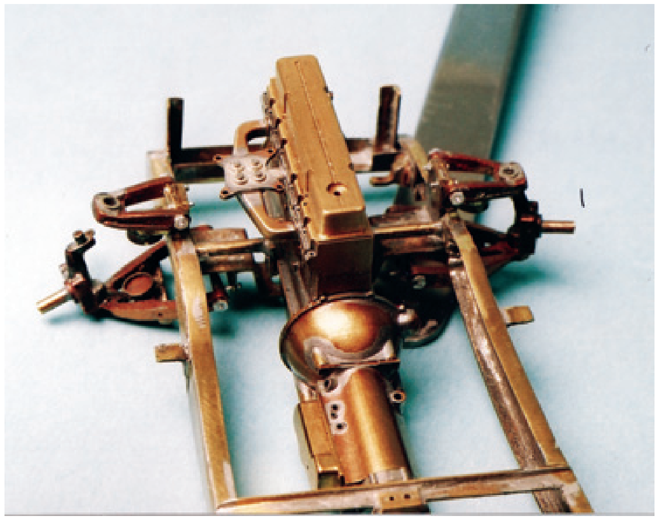


Figure 7.19: In this view, the upper and lower control arms are starting to be assembled, and the motor mounts are in place, which "locates" the Chevy inline engine in the chassis. With the basic front suspension parts in place, details like locating the steering box, tie rods, sway bar and other elements can be reliably placed and then fitted to the bodywork. If interferences (whether direct conflicts or those created by the compounding effects of parts as they are assembled) are discovered, the body can be modified while still in the primer stage. The centerline of the front spindles has been exhaustively checked to make sure that it plants the center of the wheel in the center of the front wheelwell opening.

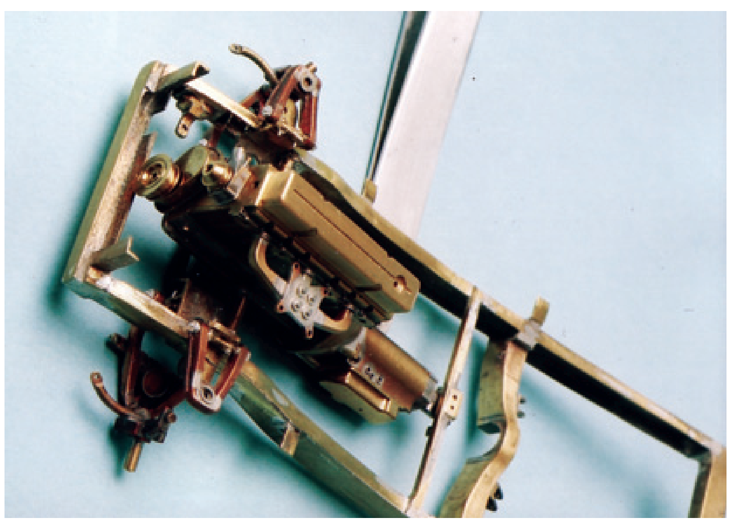


Figure 7.20: More detail on the front of the engine can now be added so that the radiator placement can be finalized. With each step, the increasingly complicated assembly is reconciled with the bodywork to make sure everything fits. With this much in place, aftermarket working ball joints can now be considered. Note the small round sleeves already soldered into the apex of the upper and lower control arms. As this progressive assembly procedure goes forward, it's time to install the backing plate/wheel/tire assembly which will, in turn, be checked for fit with the bodywork. A vintage airbag setup has yet to be fashioned.

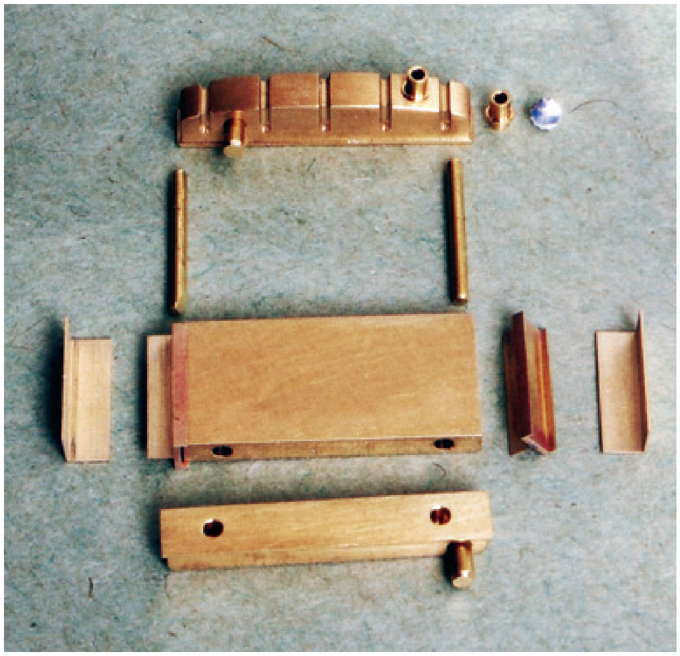


Figure 7.21: The multi-piece radiator assembles easily and the same way every time. The blank center section is used only to determine the overall size of the assembly for creating and checking the overall fit of this assembly to the body and other mechanical components; the center section will be replaced with a properly-detailed radiator at a later time.

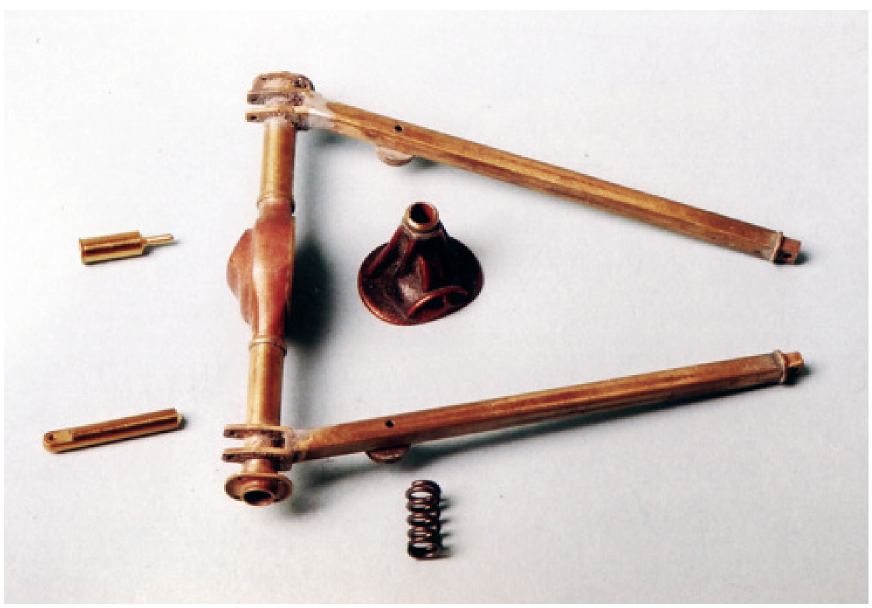


Figure 7.22: The rear axle of the *Dream Truck*[2] is a typical lower trailing arm design located by a Panhard bar, upper control arms, coil springs and shock absorbers. The upper control arms, Panhard bar, and a four-corner airbag setup, based on the rare '58 Ford option, are yet to be built. The center section and gear set are brass cast from plastic masters. Once again, this complete assembly will bolt to the frame, permitting adjustment to the rear axle assembly to align with the rear wheelwell openings and inner bodywork of the bed.

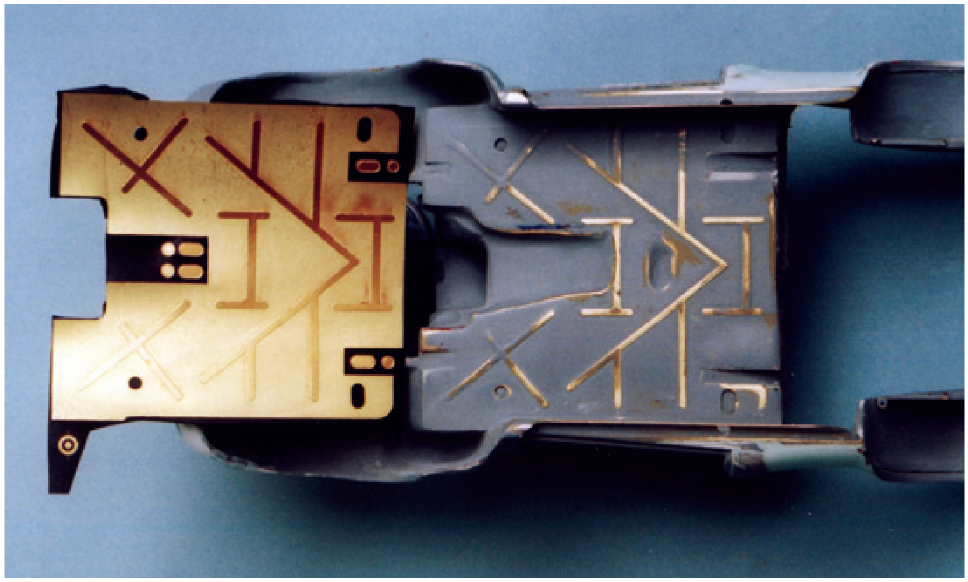


Figure 7.23: Note the structural detail underneath the cab of the *Dream Truck*[2]*;* this comes from a photoetch sheet created by Bob Wick and Fotocut (Fred Hultberg). The gas tank will be dropped in place between the rear frame rails through the top of the bed (before the double-hinged bed cover is installed) because the body design won't permit the gas tank to bolt in place from underneath. This is one of the issues to be considered when building your model: How are you going to assemble it? Develop and write down an "assembly manual" to guide the final construction of your scale miniature!

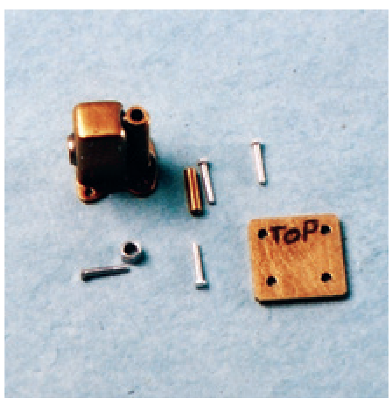


Figure 7.24: The brake system is approached the same way. The master cylinder will bolt to a dimensionally-stable "platform" that will be placed in the firewall (the square piece here labeled "top"). With this mounting plate made a part of the firewall prior to painting (thereby finalizing the location of the master cylinder), the brake lines can be bent from steel wire, attached to machined fittings, and placed and test-fitted, permitting any interference problems to be resolved before final color is applied to the model.

Unibody Car. If your subject matter features an integrated body and stressed/structural floorboard, construct the underbody platform (either by modifying the kit piece or by scratch-building one), but do not attach that platform to the body until you have finished all of the work that requires full access to the inside of the body. For instance, open and hinge the doors, hood and trunk, modify the inside of the body and the inside of the roof to remove ejection pin marks, etc., and to smooth out any bodywork that might have been done *before* you bond the unibody platform to the body. Make whatever changes are necessary to the platform, including suspension pick-up points, before proceeding. Then, *and only then,* mate the platform to the body shell. This body/platform assembling procedure allows you to stabilize a body that has been weakened if you have opened the doors, hood and trunk. Of course, you will assemble your model through the panel openings, but that isn't much of a problem if you work out the integration of components at each step in construction: each subassembly must fit with other subassemblies which, in turn, fit into larger assemblies of components. This assembly scheme also allows you to add details to the front and rear sub-frames and the components attached to them, before they are installed on the model.

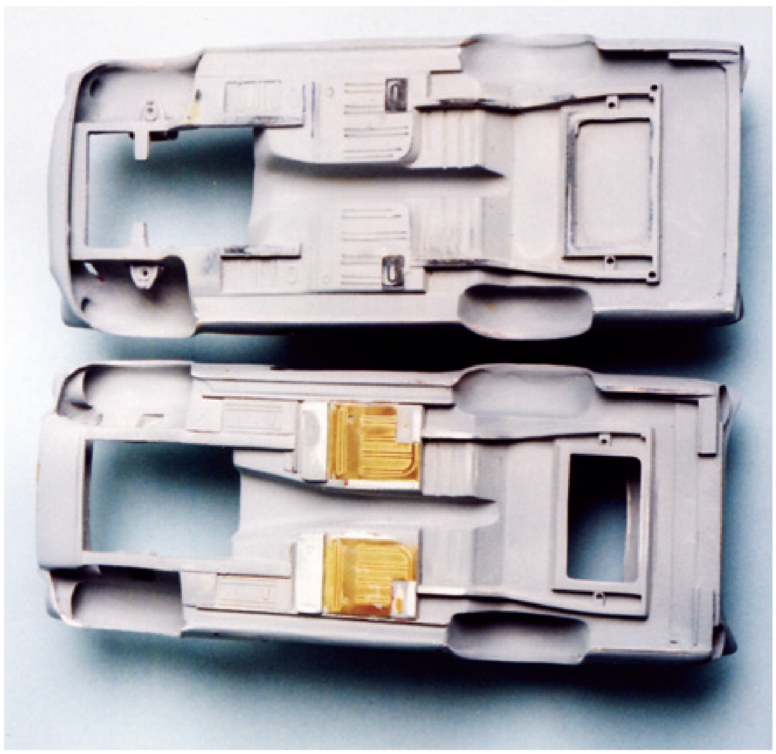


Figure 7.25: A unibody model presents some special issues for the builder. Create the underbody and bond it to the body once the doors have been removed, and the inside of the body has been finished. The brass panels with the structural detail shown here are photoetched. All suspension and drivetrain components will attach to the underbody structure. These two models will be replicas of two of the four "lost" Lincoln-Mercury Lynx dream cars from 1964.

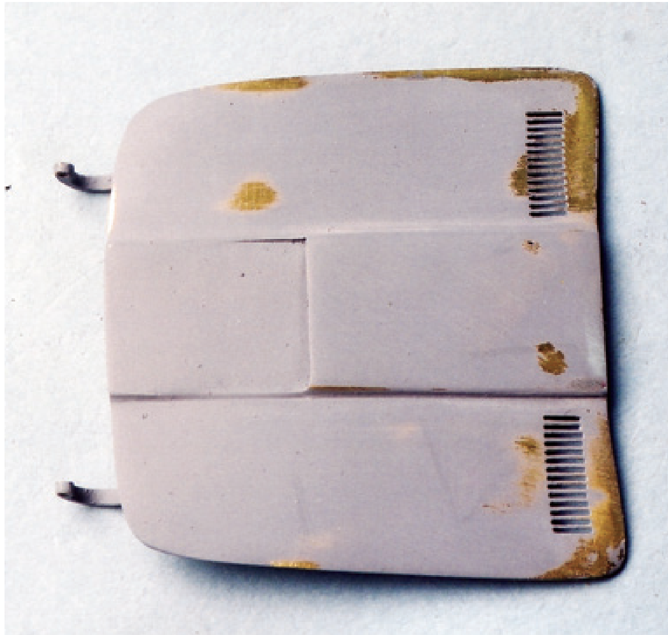


Figure 7.26: The hood for the second Lynx prototype has been hammered from brass and fitted with photoetched vent panels soldered to the hood before the hood opening shape in the body is finalized so that the final shapes of the hood and the hood opening can be matched for an exact fit. Note the formed hinges at the front of the hood (made from rectangular brass rod) that will bolt to a “receiver” up under the upper panel of the body between the headlights and just forward of the hood. Any fitment and interface issues—for instance, making sure that the hood will close over the engine and fit flush with the adjoining body panels—can be solved before the model is painted and assembled.

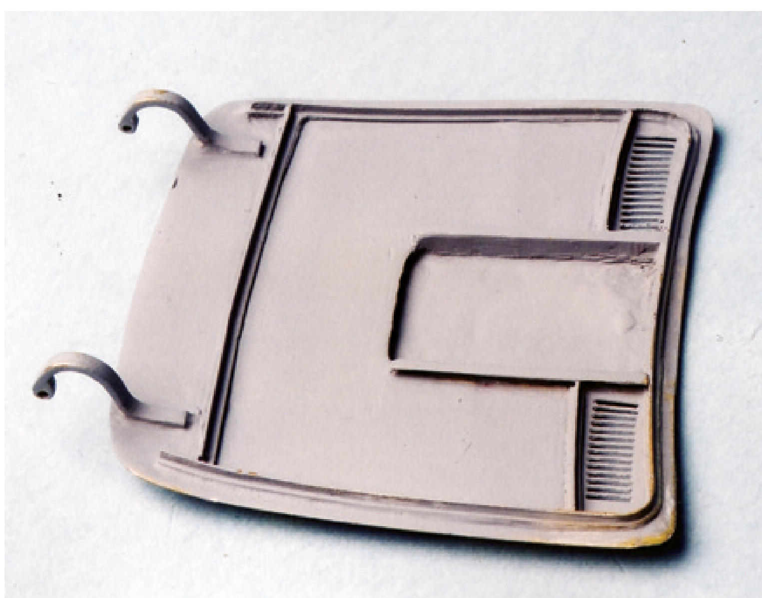


Figure 7.27: The underside of the brass hood has been fitted with soldered-on structural supports and solid brass rectangular rod to represent the hood-hinge arms.

7.3 Building Subassemblies and Components

Use a "locating pin" approach to install most components. Since the subassemblies on your model must be test-fitted repeatedly before completion to be certain that the parts fit together in the same place every time, you need to develop a way to positively locate one part to another assembly. One excellent way of doing this is to install small metal pins in pieces that will match up with holes in the mating surfaces, to positively locate the various minor and major components.

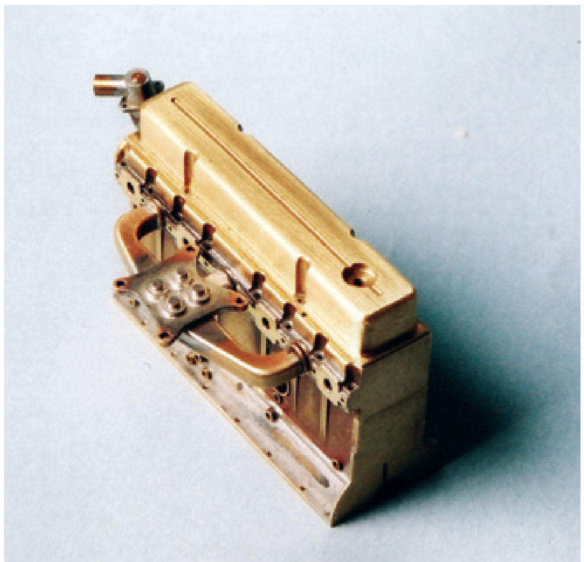


Figure 7.28: The DT^2 engine can only be assembled authentically if it uses pins to positively locate the many parts. The machined intake manifold will attach to the machined intake ports on the engine block. Small shafts are inserted into the intake manifold. The outside diameter of the pin is the inside diameter of the "receivers" in the engine block and in the intake manifold. When finished, the individual exhaust manifold flanges will attach to the exhaust ports so that the dimensions of each part and their relationship to other engine and adjacent parts are "set" to insure repeatability and accuracy of fit. Mounted into a machined receiver on the engine block (with the intake ports alternating with the exhaust ports), the intake manifold fits in the same place every time. The valve cover features an incut line to mimic a similar design on the hood and bed cover. With the engine bolted to the engine mounts, parts fitment and related construction issues can be addressed throughout construction so final assembly will go smoothly.

Is the Vehicle Comprised of a Series of Convincing Subassemblies? Once you have defined your goals and determined the nature and range of your basic mechanical and styling details, the next step is to visualize the completed, "whole" model by figuring out the sets of subassemblies that will comprise your project. In doing so, the entire scope of the model becomes more manageable and less daunting, especially when complex models are being built. This procedure will also help to create an accurate miniature that will go a long way in convincing the judges and viewers of the realism of your entry. Make *each* part, and *each* subassembly, a masterpiece model *in itself*. It is important to fashion each element of the model as if it could be entered in a contest without being combined with other parts. By treating each part, then each subassembly composed of those individual parts, as authentic masterpieces of details, the final subassembly of parts will be very convincing. In turn, larger assemblies of subassemblies, treated as if they alone would determine the character and quality of the entire scale vehicle, will result in a miniature with superior fit, finish, and realistic appearance that are consistent and convincing throughout.

This "subassembly-to-subassembly" construction approach can apply to a wide array of parts. Consider the following.

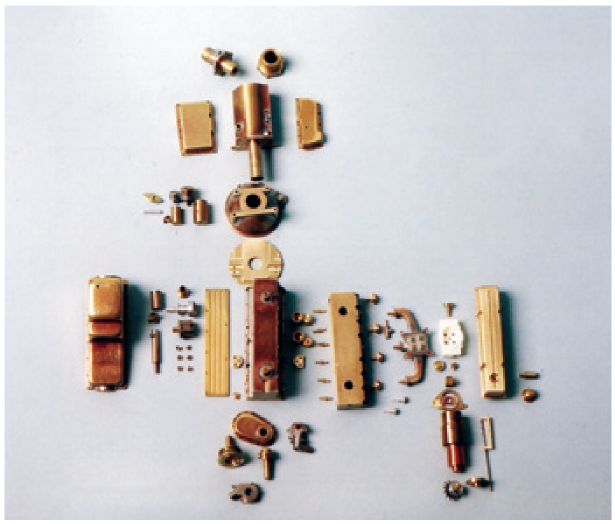


Figure 7.29: The engine for *Dream Truck*[2] is a vintage Chevy inline six mated to a vintage Hydramatic four-speed auto transmission. In this overhead view, most of the parts for the engine and transmission can be seen. All of these parts pin or bolt together which, once again, permits these parts to be reliably assembled to one another, and to be "dry assembled" for placement in the frame, which will allow any interference or assembly issues to be resolved as the bodywork is ongoing and before the paint is applied. One thing to think about is how to assemble a difficult set of parts *predictably and reliably*. You need to develop an assembly sequence and then write it down so you don't forget!

Figure 7.30: The Chevy starter is multi-piece and bolts to the bellhousing. This component approach allows repeated assembly, prior to painting and detailing, to check how these parts fit to the engine block, and how the entire assembly interfaces with the frame and other components.

Figure 7.31: Similarly, the generator (*Dream Truck*[2] is built to 1961 mechanical standards) is a multi-part assembly, and everything goes together easily. The armature was turned from copper to simulate the armature windings when it is seen through the small "windows" in the generator housing.

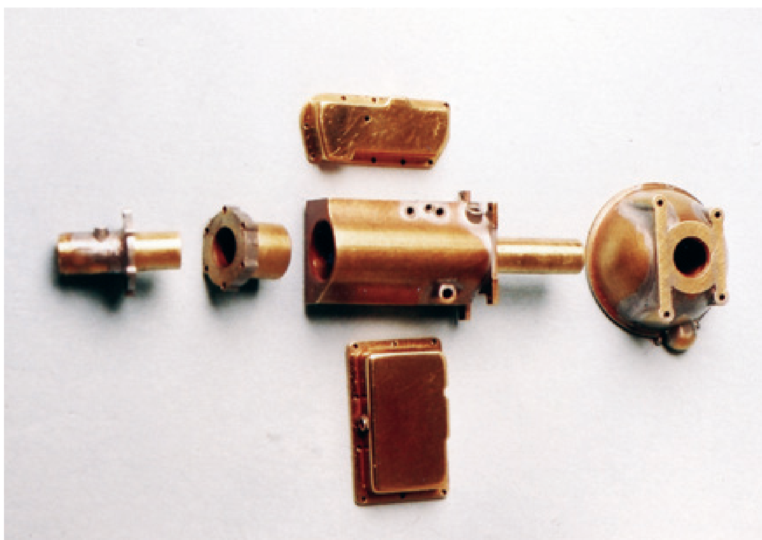


Figure 7.32: The GM Hydramatic was machined based on vintage dimensioned drawings. Note that this Hydramatic is an early version, without the much-later cooling lines, an interesting historically-correct detail. The bottom and side pans (both of which will be chrome plated) will bolt to the transmission housing, and the two-piece tailshaft interfaces with the U-joint machined to fit.

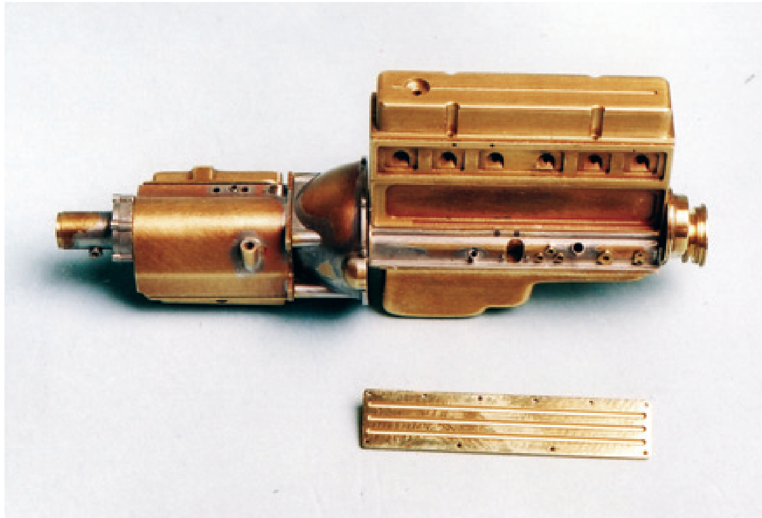


Figure 7.33: The passenger side of the engine shows the meticulous detail, as well as the Hydra-matic transmission fully-assembled and in place. The side cover is machined, will be polished and chrome plated (along with the valve cover and oil pan), and will be attached to the side of the block with look-alike hex “bolts” (but without threads). Note that the oval front cover and lower pulley are in place here.

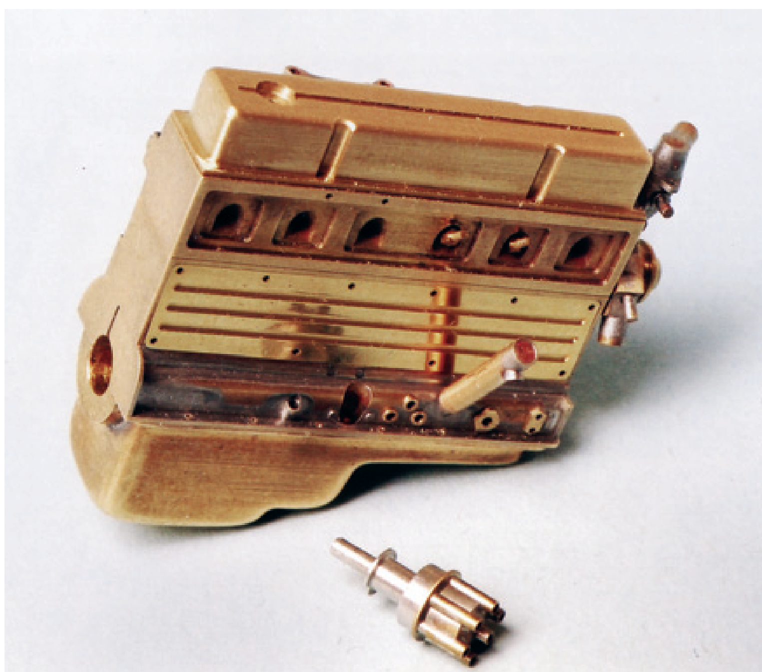


Figure 7.34: With more components in place, further detail on the right side of the block can be seen. The upper and lower radiator hose fittings are placed here to check on fit. Note the machined 6-cylinder distributor.

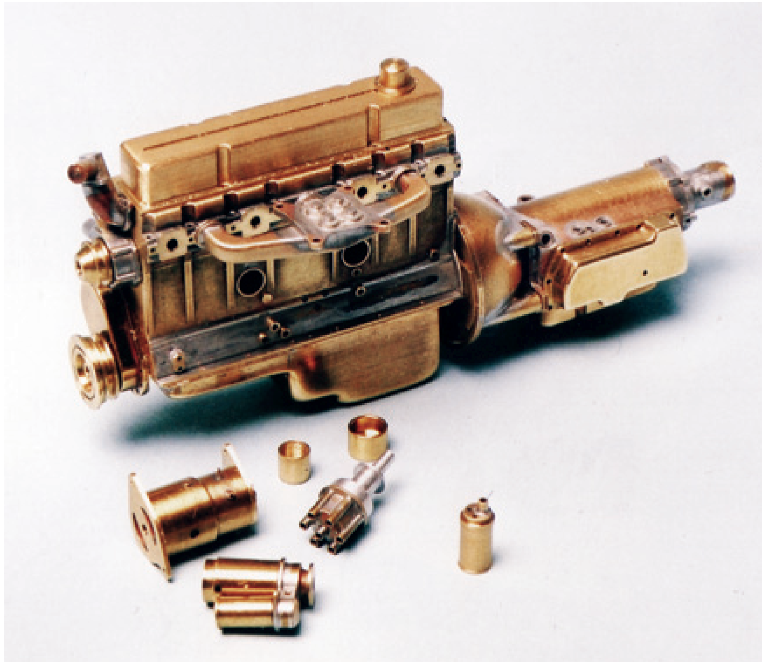


Figure 7.35: With most of the engine components seen here, the length of the fan belt can be determined once the assembled generator is located. The entire engine—composed of a series of sub-components—will become a major assembly that will be integrated with the frame assembly and that, in turn, integrate with the bodywork assembly. The goal is that the final construction will be uneventful and won't require any unplanned last-minute changes to the model that typically damage components and compromise quality. Refer to Figure 7.20 to see how the engine fits to the frame.

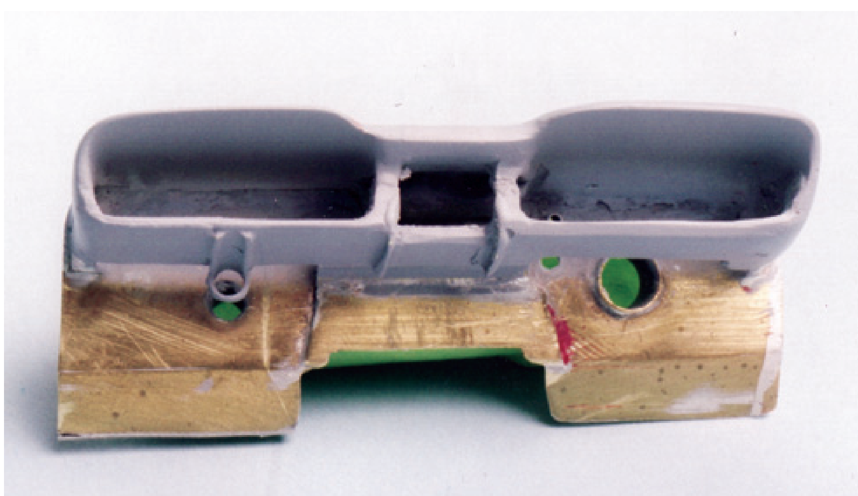


Figure 7.36: The dashboard of the Lynx is a composite of styrene and brass. This entire subassembly has been fitted to the unibody, and will be fully detailed (machined instruments, photoetch instrument faces, operating dash/radio/glove box lights) before placement in the painted model. Note the receiver for the steering column (the brass half-sleeve mounted in the correct position under the dash, and tubing on the brass firewall). The machined steering column will also be fitted and double-checked before any final finishing or assembly.

Figure 7.37: The Lynx dashboard is located to the body using positive mounting points to assure stability and predictability of how parts fit in two ways: a brass sleeve for the heater motor that fits into a sleeve placed in the firewall, and the console (not shown here) that fits up under the center part of the dash which, in turn, pins to the transmission tunnel. Note that defroster vents, the cut-out for the speaker, and the line that will define the painted and padded parts of the dash top.

Figure 7.38: The plastic dash is permanently affixed to a brass structure that not only provides a stable and secure mounting surface for the dash, but also creates a smooth toeboard for the cabin. This view also shows the console in place.

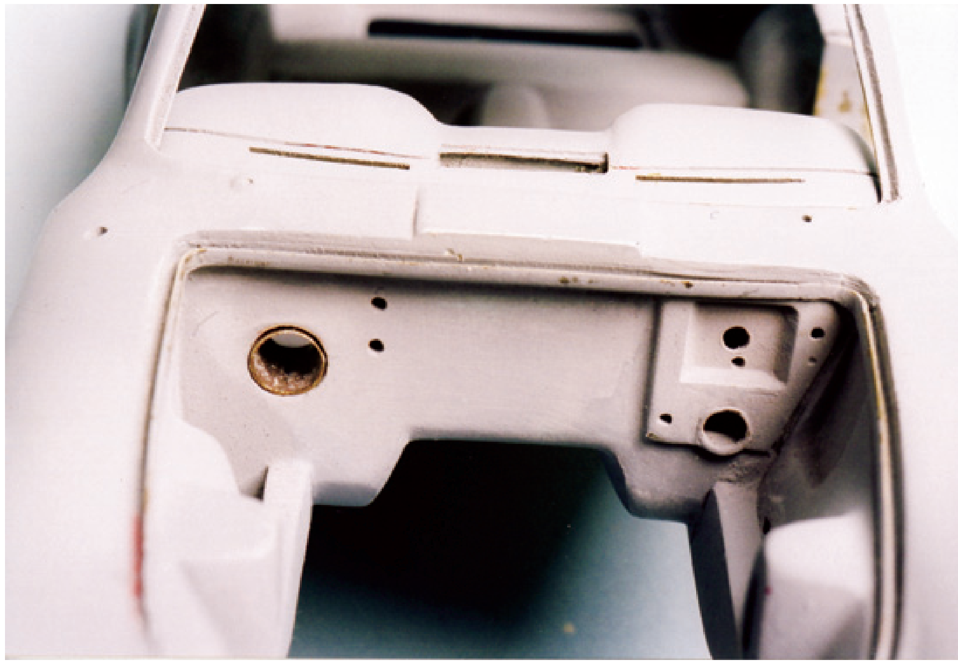


Figure 7.39: With the dashboard temporarily in place against the firewall of Lynx prototype #2, the through-the-firewall heater core (on the left) and the steering column locator tube (on the right) assure accurate and predictable placement. The two holes by the heater motor hole are for the heater hoses, and the openings to the outside of the steering column hole are for wiring harnesses and the master cylinder. Note the brass receiver channel for the windshield; a multi-part separate photoetch "chrome" surround will fit just inside the inner radius of this opening, sandwiching the glass between this panel and the photoetch parts.

Think About How the Parts Interface. When your project requires many parts to fit together, the combined physical intervals between those parts can compound to the point that a seemingly insignificant misfit in each area results in a significant misfit of parts or entire subassemblies to either an adjacent subassembly or to the space the subassembly itself will fit into. It is virtually impossible to think about the shape and size of every part, and how those parts fit with all other parts on the final vehicle without fitting parts together during construction. So, early in the planning stages, you should think seriously about the overall dimensions of major subassemblies and their components, and how each subassembly will fit into the allotted space in the model. By establishing the outer parameters of each subassembly and how that subassembly integrates with other subassemblies in the early stages of construction, you can work within the confines of those parameters and ensure the correct fit of every subassembly into the overall model. By building subassemblies, dimensional errors (or "tolerance drift") can be contained within each subassembly, and not compounded throughout the entire model.

Think about ways to reduce these errors so they are contained within each subassembly. That is, the compounding of panel thickness, the fit between parts, and structural requirements of subassemblies can be compensated for by using techniques that permit some parts to overlap the mating surfaces between the various subassemblies. For example, the extended leading edge of a dashboard (as it fits under the inside of the cowl of a model) could cover up the natural "gap" between the leading edge of the dashboard and the cowl. In that way, you don't need to spend many hours absolutely mating up the dash to the inside of the cowl, which you would have to do if they were to join together surface-to-surface. Try to "cheat" parts so that they appear to be the correct size, or that the entire part appears to be present, even if one end of it is cut short to fit into the available space.

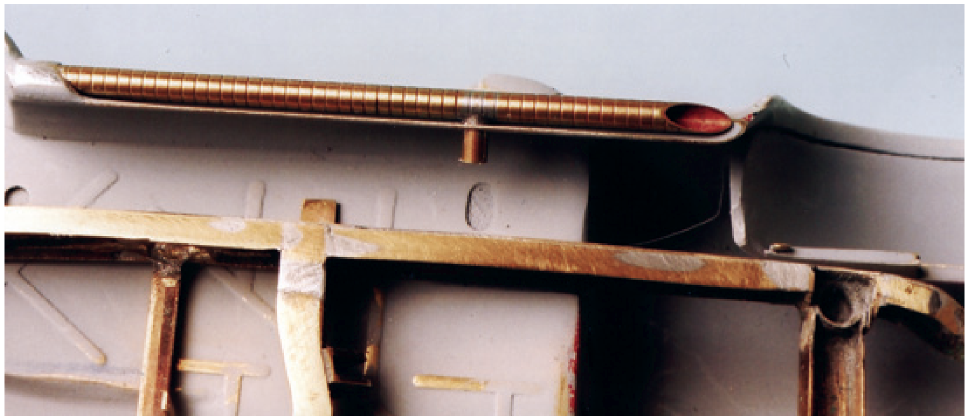


Figure 7.40: On the *Dream Truck*[2], the side exhaust fits into a half-open brass reveal that has been fitted into (rather than merely attached to) the bodywork at the bottom of the cab: The inside diameter of the half-open brass tube is the outside diameter of the lake pipe. Though the length of the lake pipe might suggest that the inlet pipe is at the front, in fact, the exhaust enters the rocker panel side exhaust from the side (note the right angle inlet tube). The placement of this exhaust pipe in a receiver eliminates any uncertainty about how and where the exhaust system mounts to the model.

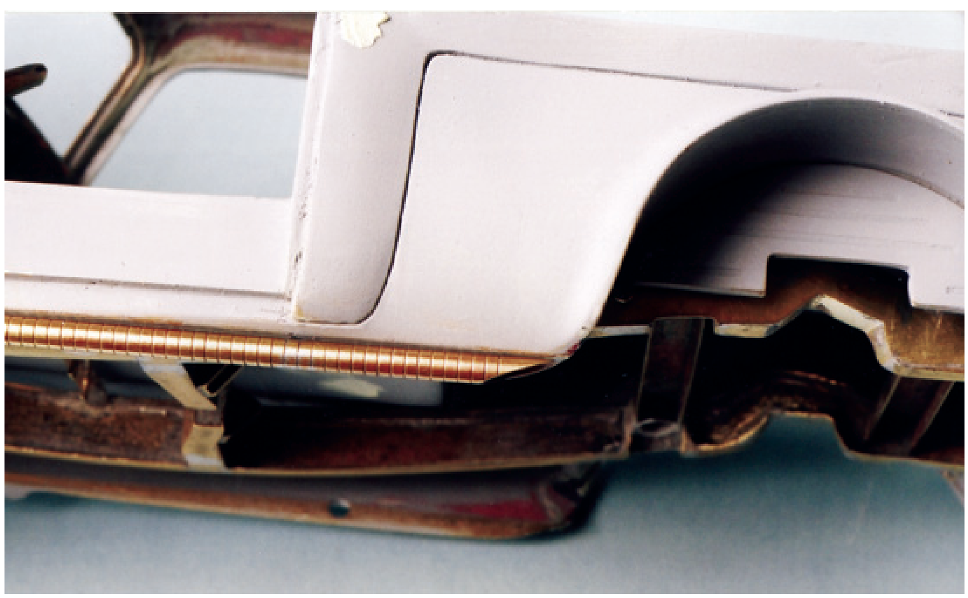


Figure 7.41: Note the concentric rings on the exhaust pipe that match the rings on the front and rear grille work, and note how the curvature at the end of the pipe matches the sweep of the rear wheelwell flare. Think about the interface between styling and function. With the frame in place, the exact relationship between the parts can be identified early, meaning that the final assembly of the exhaust system will go smoothly.

Figure 7.42: The tubular mufflers will mount inside the frame rails and will "hang" on the small machined/soldered brass "hangers." Those clamps will be attached to photoetched hangars insulted by "rubber" straps "bonded" to a bracket that will be bolted to the frame. Of course, the diameters of the inlet and outside muffler clamps, as well as the hangers, match commercially-available brass tubing. Since DT^2 will be built as a "show truck," all chassis-mounted exhaust parts will be nickel plated, and the lake pipes will be chrome plated.

Assemble Major Subassemblies; Each Part a Modeling Masterpiece. If you construct your scale model as the factory does, you'll be able to control size and detailing issues for each component within each subassembly. This also means you will control and limit the impact of each subassembly upon other elements of the model by integrating that subassembly with other subassemblies, then integrating those larger assemblies into the "whole" model. For example, assemble the rear axle as a unit, then fit it to the springs, add the wheels and tires, and then test-install that complete axle assembly on the frame or unibody. If you doubt an assembly will survive much handling, glue together a matching "mule" (at least with respect to exterior dimension and mounting points) and use it as a fitting guide.

Test-fit Every Part Repeatedly During the Design and Construction Process. Think about how that part interfaces with other components. Test-fit everything repeatedly. As you continue to create layers of detail, you will always be amazed at how many glitches will show up as you check and recheck the fit of the pieces that you have crafted. This process can be frustrating, but is much easier to deal with in the early stages of construction and design than it is during final assembly. The goal is to reduce the chances of parts not fitting together when final assembly occurs. Keep in mind the possibility of using one subassembly to determine and locate another subassembly in your model. Also remember to test-fit body parts to check for paint interference.

Figure 7.43: The steering column and Corvette steering wheel for DT^2 generally mimic the steering wheel from the pre-accident version of Spencer Murray's *Dream Truck*. The length of the column and its diameter, as well as the dimensions of the steering wheel and the spoke detail, were all taken from 1:1 scale parts.

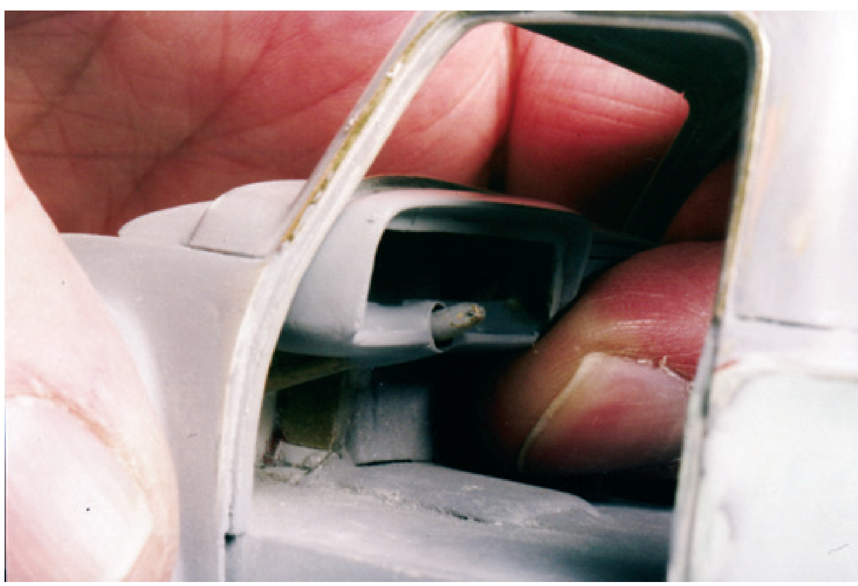


Figure 7.44: The length of the steering column, as it goes through a tube on the dash and over a solid brass rod mounted to the firewall, principally locates the dash in the model. In this way, one assembly becomes an integral part of another assembly, and minimizes the risk of spilled adhesives and other final-assembly tasks that might damage or compromise the quality of the final model. Another positive method of locating the DT^2 dash will be a console that fits tightly to the floorboard and under the dash. Compare Figures 7.38 and 7.52.

Figure 7.45: Because the cab and floor are one assembly, it's essential to create an "insert" that will serve as the molded headliner and adjoining "upholstered" panel. To do that, a part comprised of the headliner, a panel around the rear window, and pieces that fit down inside the B pillars and will serve double-duty as the "receivers" for the seat inserts is created from multiple pieces of .040 sheet styrene. The center of the headliner will receive a pleated insert.

Figure 7.46: The process of readying this part for final painting requires a lot of shaping, putty, sanding, more catalyzed putty, primer and more sanding, all while constantly checking the fit of this part to the inside of the cab roof. As this work progresses, this part is repeatedly placed into the cab to check for fit. Note that small protuberances have been added at the outside corners of the front of the headliner insert, and will eventually locate the upholstered panels that fit inside the A pillars.

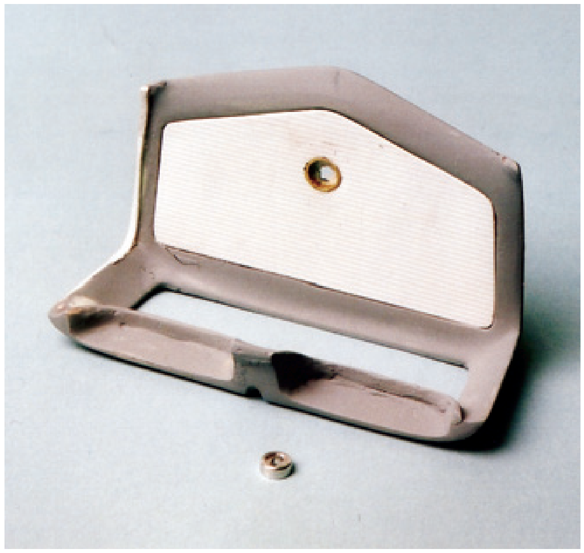


Figure 7.47: Here, the insert is starting to take shape. With the basic configuration determined at this point, the upholstered headliner insert is cut to shape (using a template) and then repeatedly fitted to the headliner so that only the most minimal gap exists between the two parts, to accommodate the anticipated thickness of the paint. Note the short length of brass tubing placed in the upholstery headliner insert. This will be the "receiver" for the machined and chromeed courtesy light bezel seen here in the foreground (a bulb will be placed into the bezel, over which a clear lens will be placed; this is one of the lighting elements of the model). This is another way of stabilizing not only the bezel-to-headliner location but also the placement of the clear lens.

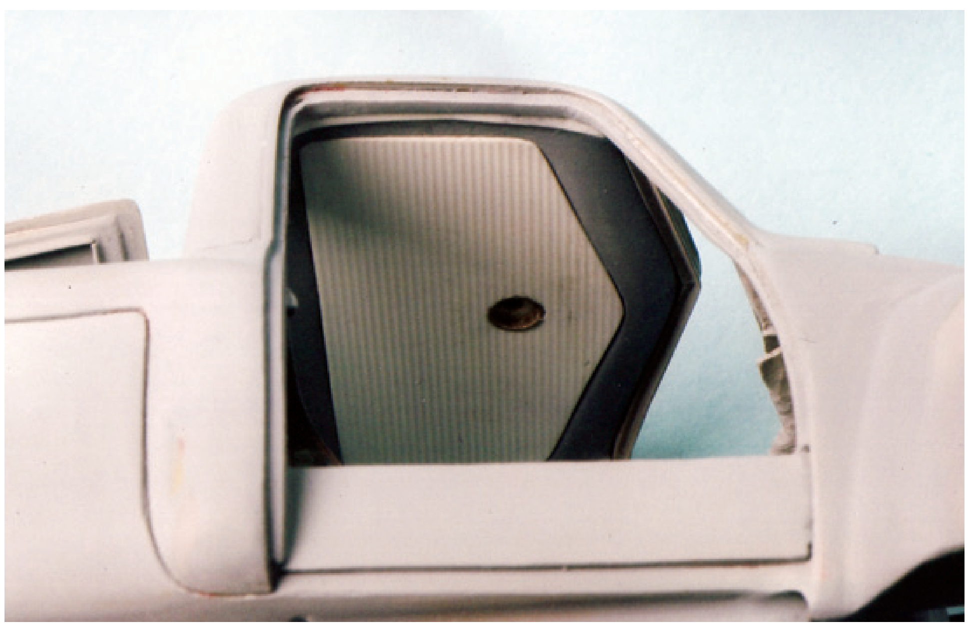


Figure 7.48: This part now fits tightly into the top of the cab. It is almost a friction fit. Here, a little more work will be necessary to make the gaps between the outside perimeter of the headliner and the inside of the roof uniform. The leading edge of the headliner still needs to be modified to mount the sun visors that will pivot and swing sideways. Incuts will be made into the "upholstered" headliner so that the sun visors can come close to being coplanar with the headliner.

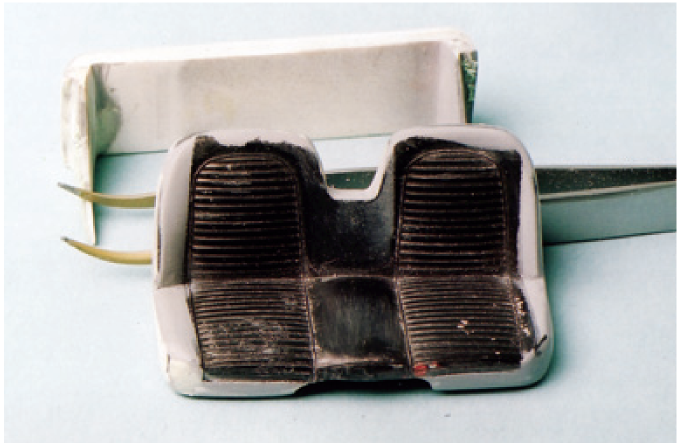


Figure 7.49: The front seat will be a one-piece shaped/bucket seat design, using a section of the rear seat from the Monogram 1958 Thunderbird. Side bolsters have been added (rather than splitting the seat and widening it) to make sure that the driver would sit squarely in front of the steering wheel. The very roughed-in part behind the seat assembly is a "surround" that will be placed inside the cab, into which the seat will fit. This part will be modified so that the passenger seat back will fold forward to give access to a panel that will open to the bed, where the Delco battery will be located.

Figure 7.50: The seat surround, shown in its early stage, is placed inside the cab and beneath the headliner/rear window insert. Note how the shape of the upper seat receiver will sweep up and around and follow the side of the seat. Eliminating or minimizing the part-mating line between these two parts will be a challenge; either a piece of trim to cover the interface or a very tight line will be necessary. Again, prepare an assembly manual to govern construction; there is *only one* sequence that allows the interior of the DT^2 to go together.

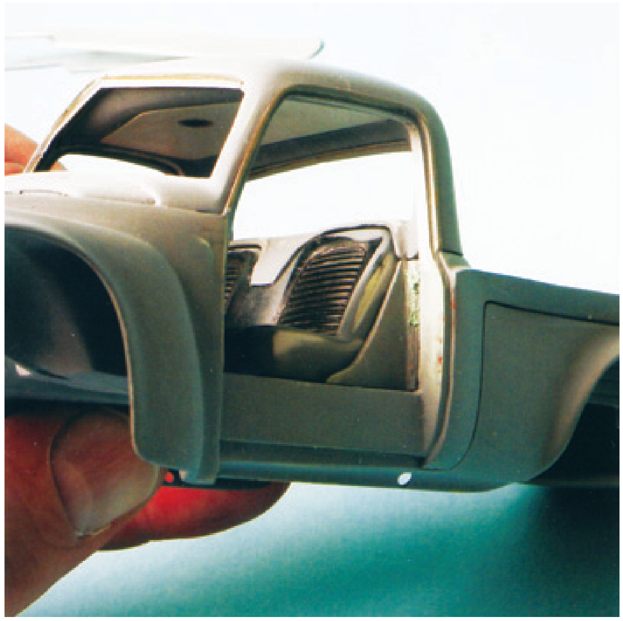


Figure 7.51: With the roughed-in seat in place to check the basic fit of the parts, the question of how these parts will integrate can be fully explored. The seat will slide on tracks, so a bit of the bottom of the seat will have to be removed because the seat can't move upward without reshaping the upper upholstered panel. The shape of the side panel will be changed to sweep more gracefully at its downward angle.

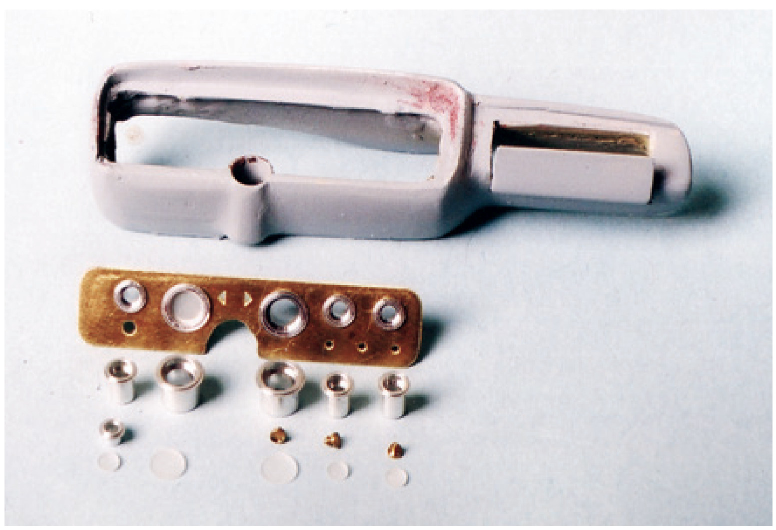
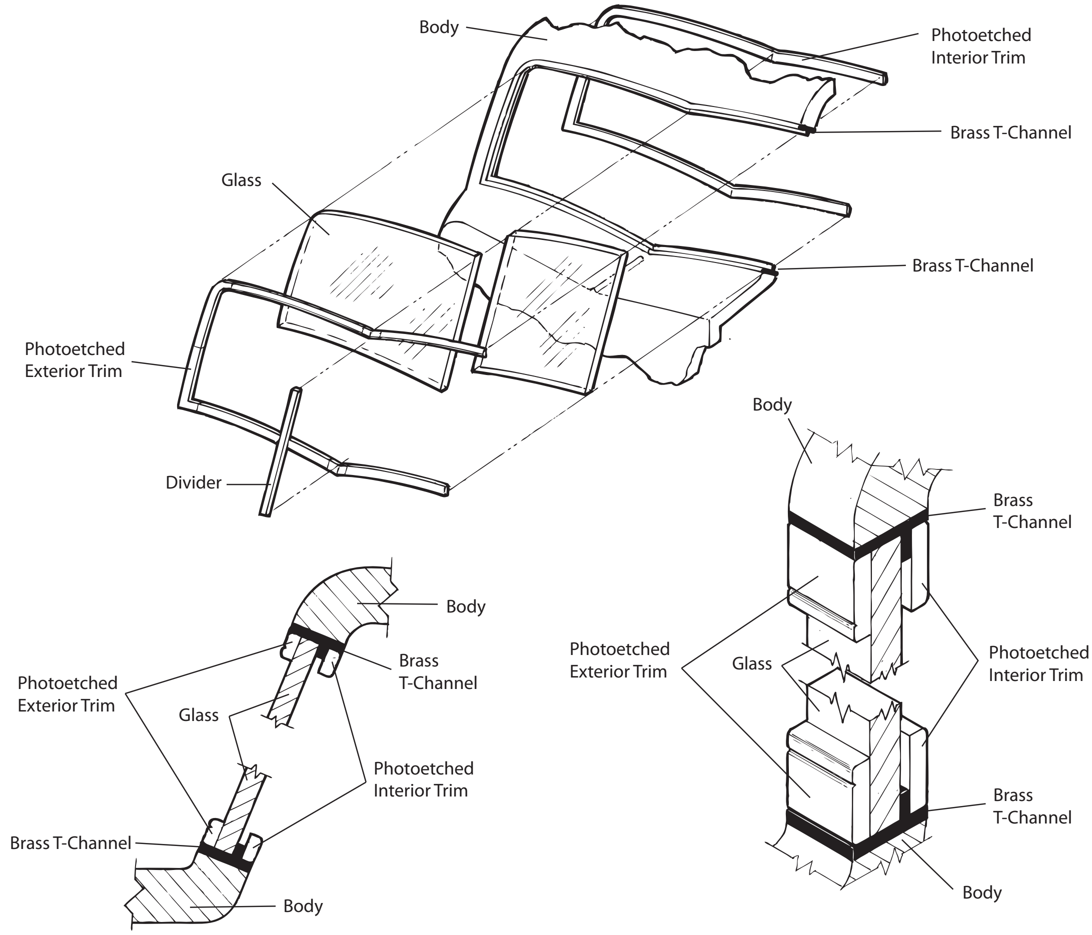


Figure 7.52: The DT^2 dashboard is also a model composed of subassemblies which, in turn, must fit properly into the cab. The dash fascia here is photoetched, the bezels are machined with clear lenses installed, (to the inside of which will be fitted the instrument decals). The steering "tube" will receive the steering column.

Painting the Body; Prepare Your "Chrome" Trim. It's a good practice to concentrate on the body cleanup and modifications as early as possible in the assembly process, to allow plenty of time for your bodywork to stabilize before painting, and permitting you the time to find and fix any flaws. Before you apply your final coats of paint, test-fit the major exterior body pieces (doors, trunk, and hood) and allow for paint thickness along panel edges which can foul up the best plans at final assembly. If necessary, lightly sand the facing surfaces of interfacing panels (e.g., the opening door to fender interface) on the edge to reduce the width or height of the painted panel before applying the final coat of paint. While the body paint is drying, you can concentrate on building and finishing the subassemblies that fit into the body and chassis so that everything is ready to go together within a relatively short time-frame. This reduces the risks of damage to your model because the longer it is left out waiting for the next parts to be finished and installed, the greater the risks of something being damaged, broken or lost. Check out Chapter 11 for tips on how to paint a championship model.

One of the key issues that must be addressed before painting is how to integrate your exterior trim to make sure that you achieve a realistic appearance and not chip the paint or have the parts not fit. One way to do this is to create stand-alone trim that fits inside a defined shape, the final dimensions of which can be determined before painting. (Remember that the interface between the painted panel and the exterior perimeter of the part must be anticipated).

Figure 7.53: The first thing to do is to create a "ledge" against which the real glass, and the inside and outside trim, can be placed. The ledge here was created from "T"-shaped brass available from Special Shapes. Care must be taken to place this ledge, with respect to the windshield opening, so that inner and outer photoetched trim can fit without protruding beyond the dimensions of the surrounding body. See Figures 7.54 through 7.56.



Drawings Not to Scale

- This glass and trim assembly scheme requires a "T" channel which is "deeper" on the outside of the body than on the inside (to accommodate the thickness of the glass);
- The photoetched trim fits tightly inside the "T"-channel fixture in the body, thereby covering any small gap between the outside perimeter of the glass and the inside of the "T"-channel;
- "T"-channel is built and installed AFTER the photoetched trim is on hand because it isn't possible to precisely determine the dimensions of photoetched parts at the art-creation stage;
- After nickel plating, paint the "incut" reveal line in the exterior photoetched trim matte black.
- The "T" channel fits around the entire radius of the window opening;
- Installation sequence: After the body is painted, the inside of the "T" channel on the inside of the channel is painted matte black to simulate the rubber seal; the glass is secured with small drops of Krystal Kleer or similar product; photoetched trim is then installed with small drops of Krystal Kleer applied to the extreme perimeter of the glass;
- Install the inside photoetched trim in the same way (except, of course, that no glass is installed on the inside of the "T"-channel).

Figure 7.54: The best way to do trim (for the windshield and backlight) is to either replicate the 1:1 setup, or come close. These illustrations show how the glass fits into a channel from the outside, over which the photoetched trim fits. This trim will not only bridge any gap between the exterior dimension of the glass and the inside of the brass surround, but also provide a realistic appearance. Note the details on how the inner and outer "chrome" trim, and the glass, will be installed on DT^2 In many cases, 1:1 construction and design details and procedures can be successfully transferred to your chosen scale. (Bob Wick illustrations)

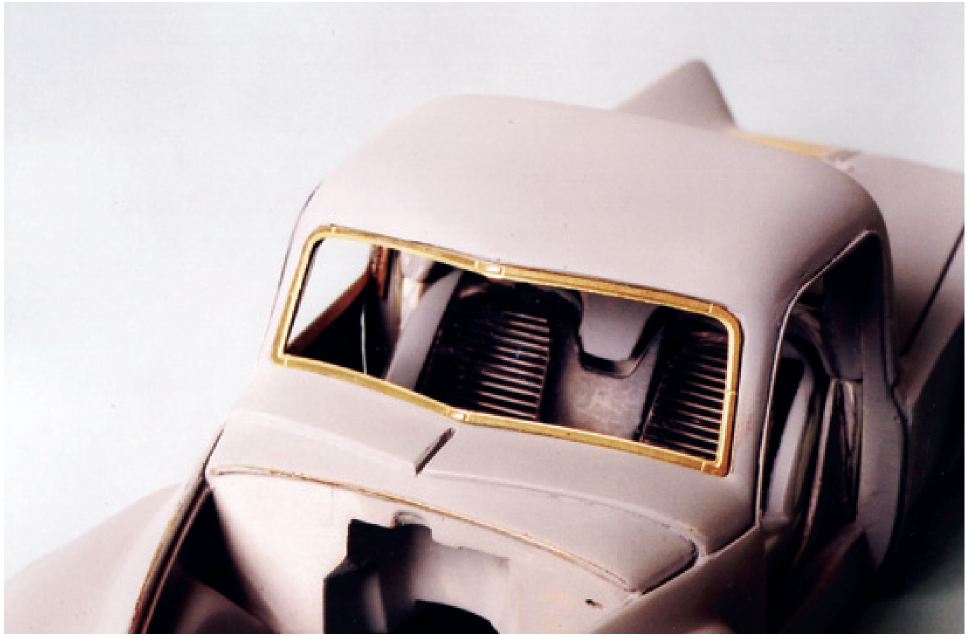


Figure 7.55: The exterior trim was photoetched, with double-cut lines placed in the trim to simulate the likely length of each piece of the multi-piece assembly that comprises windshield trim.

Figure 7.56: Mirror-image photoetched trim parts were drawn by Bob Wick and photocut by Fred Hultberg. Note the "cut lines" which delineate where the several parts that make up a trim set would exist in this application. Note also here the ultra-small Phillips-head screw relief cuts because inside trim is most usually secured by screws. When polished, this trim will be nickel plated (because none of this trim, as anodized aluminum or polished stainless in 1:1 scale, would have a "blue"-chrome appearance.

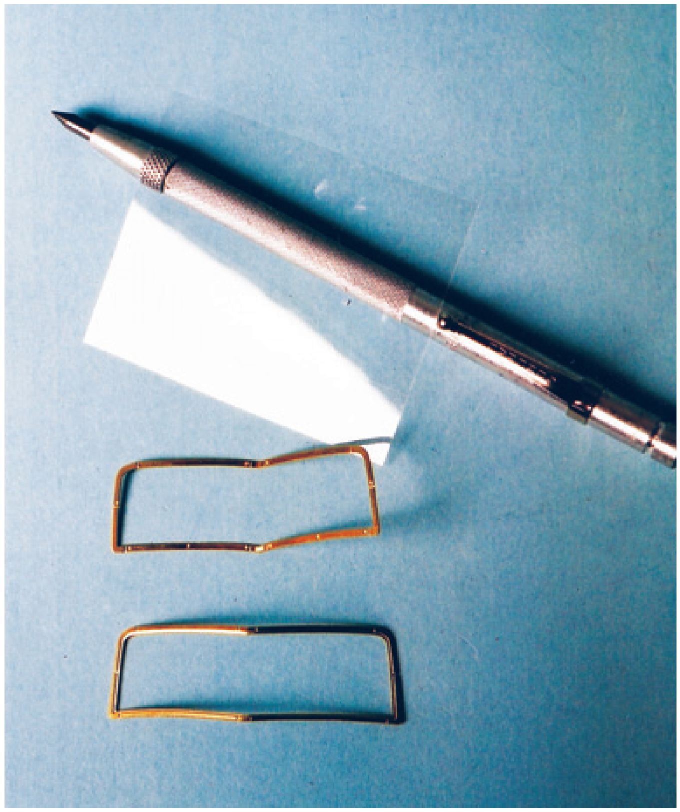


Figure 7.57: Real, scale glass (slide glass, .010 thick) will be mounted. Using the outer trim part (lower) as the template, glass will be cut and placed inside the channel illustrated in Figure 7.54. Nothing "reads" like glass except glass, but using real glass is limited to applications where the shape is flat because custom-made curved real glass is incredibly expensive.

7.4 Take Your Time

A great enemy to quality building is impatience and its companion, the belief that spending a lot of time on a single model is inconsistent with enjoying the hobby. That is one reason scheduling is so important. Excellence in building has a price and, if you pay it, you will be richly rewarded with a work of miniature automotive art. On the other hand, not every model you build needs to be at the highest level . . . Keep it fun, and vary your projects and goals.