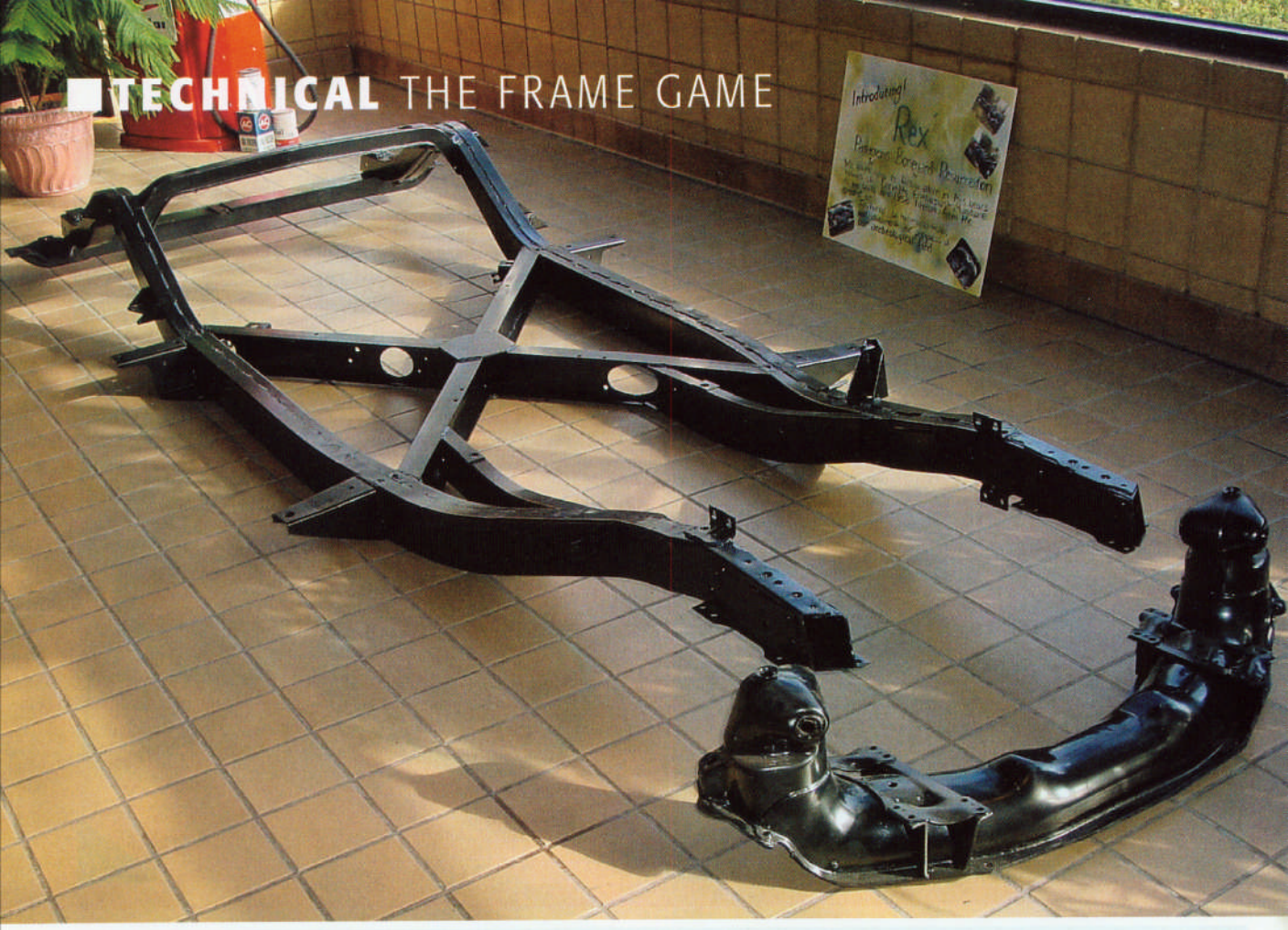


The Frame Game

A BRAND-NEW BACKBONE FOR YOUR VINTAGE CORVETTE

BY JOHN HINCKLEY

One of the great things about our Corvettes is that the body is made of fiberglass, and doesn't rust, so we don't have to replace rusted-out floorpans, trunk floors, rockers, quarters, and other major body panels. However, the frame—the basic foundation of the car—is steel, and rust can really eat it up over 40 years. There are Corvettes out there where the body is all that is holding the frame together!

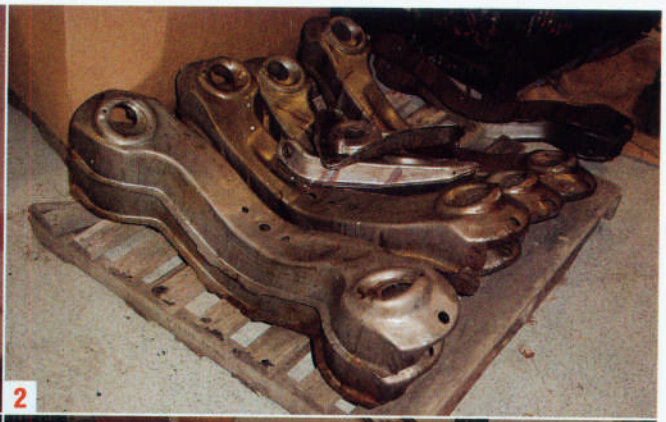
Major repairs to a rusted-out frame can be extremely difficult and expensive, and rust in other areas of the frame isn't always apparent and can sneak up on you; as the old adage goes, "rust never sleeps." Many Corvettes have become "parts cars" just because the frame was too far gone to repair.

When rust damage is too extensive to repair economically, the only other option used to be finding a used frame somewhere in better condition, applying preservation techniques to extend its life, and replacing the frame.

THERE'S A BETTER SOLUTION: How about a brand-new frame, made from the original GM dies to the original GM drawings and absolutely identical to the original 1953-1982 frame in all respects. Neal Porter and his crew at Vette Products of Michigan have been producing these GM-licensed new reproduction frames, in all their many variations, for the last ten years.

We spent a snowy February afternoon with Neal and his crew as they took us through the history and manufacturing process for the frames. Although a complete frame is the largest single item Vette Products makes, they manufacture over 900 Corvette parts, sell to nearly all of the Corvette restoration parts suppliers, and have the largest inventory of new, used, and reproduction Corvette parts on the planet.

BACKGROUND: When Neal worked for GM in the '60s and '70s, he was part of a project to set up a high-volume frame manufacturing plant from scratch. Neal



1 Typical Corvette frame rust-out perforation adjacent to the #3 body mount; if it's bad here, it's bad elsewhere too. Time to replace it.

2 Several varieties of '63-'82 front crossmember upper shells ready for installation in the final assembly fixture.

3 Inner and outer frame side rails in storage, awaiting subassembly.

4 Rear kickup rail sections, ready for the subassembly fixture.

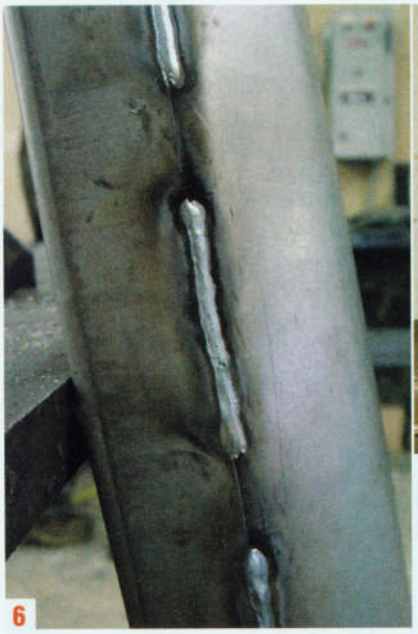
5 Welding together the upper and lower shells of the #3 crossmember and differential support bracket; note the clamps and locating pins.

gained a great deal of experience and knowledge of the entire process—from the dies to stamp the parts to design of the assembly and welding fixtures—to consistently produce quality frames.

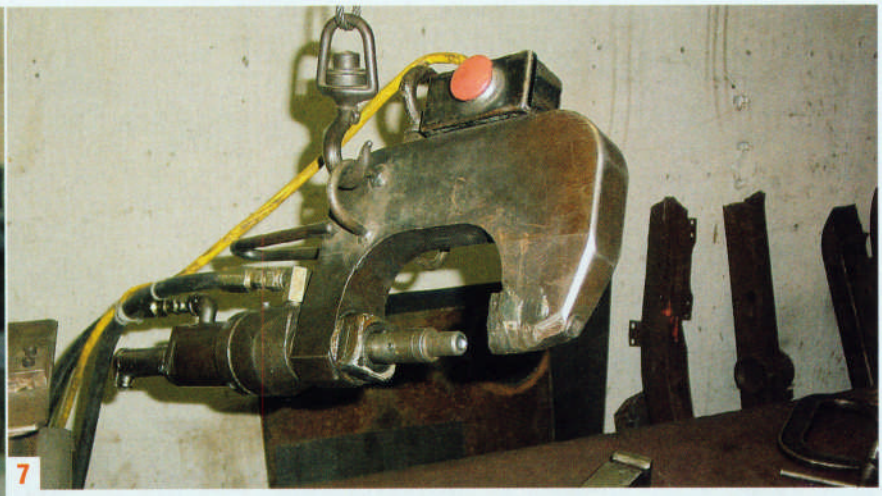
After starting Vette Products of Michigan nearly 30 years ago, Neal noted an increasing demand for used and replacement repair parts for rust-damaged Corvette frames, and decided to take advantage of his background and go into the frame business. After negotiating an agreement with GM, Neil purchased all of the GM-owned stamping dies located at the A.O. Smith frame plant in Milwaukee, Wisconsin, and arranged for a fleet of eighteen 40-foot flatbed semitrucks to haul the huge sets of stamping dies back to the Detroit area. Many of these die sets weighed up to 60,000 pounds, requiring huge bridge cranes just to move them, much less setting them up in multiple 1,000-ton toggle presses to stamp the heavy-gauge parts through the draw, trim, flange, and pierce dies.

A.O. Smith made C1 Corvette frames at their Milwaukee plant, C2 frames at their Granite City, Illinois plant, and moved that tooling back to Milwaukee in 1968 to manufacture C3 frames.

He then made arrangements with New Center Stamping in Detroit (a former Fisher Body stamping plant) to lease the plant for press time to stamp parts and space to store the



6 Typical welds on the #3 crossmember; MIG-welding is much cleaner than the original A.O. Smith stick-welds.



7 Hydraulic riveters are used wherever rivets are required, similar to those used on Chevrolet truck frames; similar tooling is used to rivet upper and lower control arm ball joints.

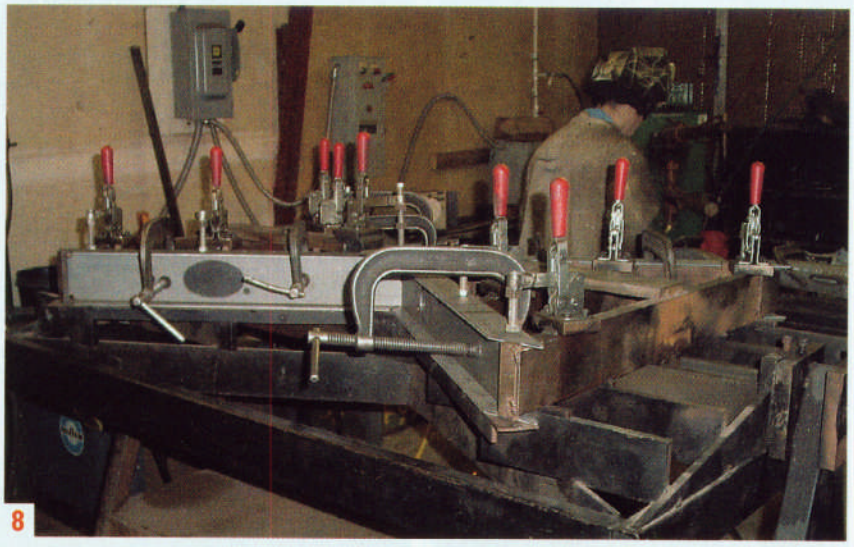
dies. Additionally, he secured an adjacent warehouse for finished parts and the rest of the dies. That got the dies in place, but the assembly tooling remained to be dealt with. Using the original GM drawings for the complete frame assemblies and for every individual detail part, they designed all the assembly and welding fixtures for low-volume production. This included innovations like two-sided rotisserie-type weld fixtures for the side rails that have the left side fixture on one side and the right side on the other, and final assembly weld fixtures that ensured precise dimensional accuracy and consistency from one frame to the next.

The first products offered were the "rear 48-inch section" and the "cowl-back section," as the rear half of the Corvette frame always rusted out first.

The front half of the frame lasted much longer due to the presence of the engine and its miscellaneous oil leaks.

THE ASSEMBLY PROCESS: Roger Steeley, retired from GM after 34 years of welding experience, manages the frame operation and walked us through the assembly process from start to finish.

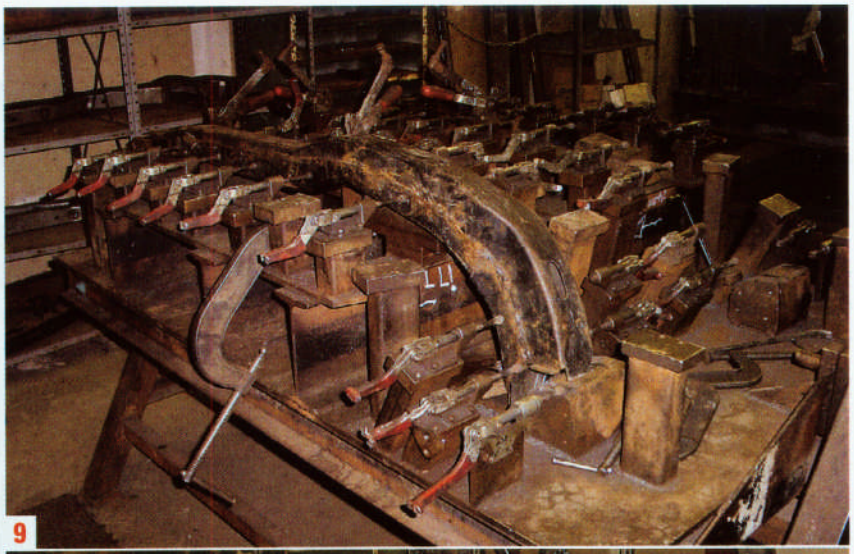
Due to the product changes from year to year, and some within a given model year, there are many different variations, not only in detail stamped parts, but also in the subassemblies, and in the finished frame as it leaves the final assembly fixture.



8 Subassembling the center "X" member for a C1 frame; it will join the main frame rails later in the final assembly fixture.

Once the individual parts are stamped and details are added like interior weld nuts, spacers at through-bolt areas, local reinforcements and brackets for brake hoses, rebound straps, radius rod anchors and sway bar links, the various subassemblies like the '53-'62 center "X" section and inner and outer panels for crossmembers, side rails, and rear kickup rails are welded together separately to produce closed box-section members. These subassemblies are then set aside, ready to be loaded in the final assembly fixture.

Due to the product changes from year to year, and some within a given model year, there are many different variations, not only in detail stamped parts, but also in the subassemblies, and in the finished frame as it leaves the final assembly fixture. Although they may look similar,



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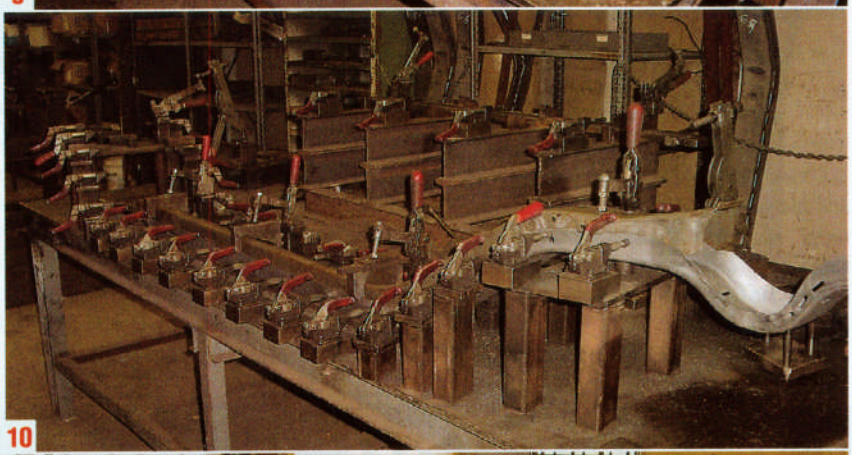

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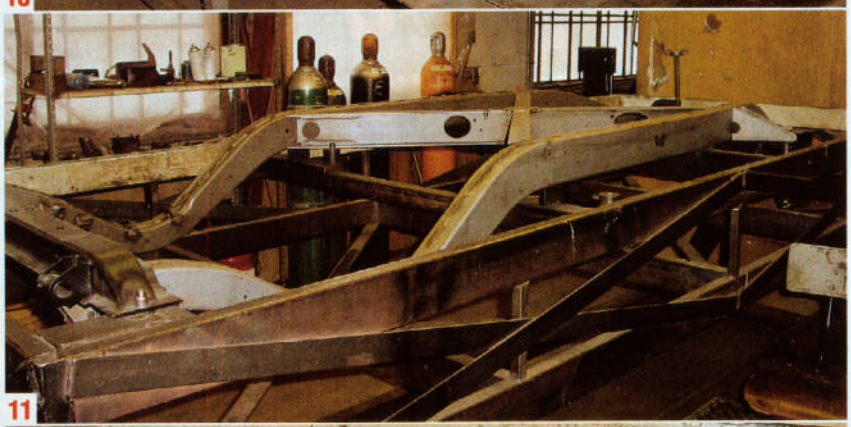

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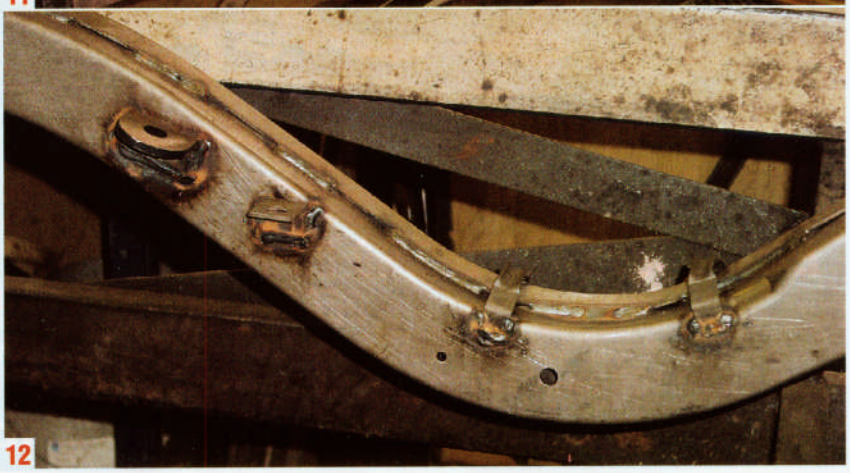

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there are about eight variations of the '53-'62 frames, about six different variations of the '63-'67 frames, and about seven different '68-'82 frames. Vette Products manages this complexity in-house to produce frames precisely to customer order, so all the customer needs to do is drill the screw holes for the gas and brake line clips—no welding is required by the user.

The completed subassemblies are then loaded into the final assembly fixture, which precisely locates all the parts with pins in holes, and the final welding takes place to complete the finished frame. Special needs can also be accommodated—a C3 frame had just come off the fixture that was destined for use in a restored race car, and the customer had requested that the side rails be fully welded per the instructions in the Chevrolet Power Manual instead of the production stitch-welding.

SUMMARY: A badly rusted frame is no longer a reason to "part-out" a Corvette, nor is it cause for a frustrating search for a used frame that may or may not be as good on the inside as it looks on the outside once you get it blasted and cleaned up.

If you call Vette Products and talk to Neal or to Sales Manager Mike Mahowski, they can fix you up with a brand-new GM-licensed replacement frame that's exactly the same as yours was when it went down the line at St. Louis. C1 frames run about $4,300, C2's about $4,600, and C3's from $3,100-$4,400 depending on the year and transmission. They can also supply you with just about any other Corvette part you need, including front control arms made off the original GM dies, air cleaners, shifter assemblies, and

9 The upper and lower rear kickup area rails and trailing arm pocket reinforcements, for '63-'82 frames, are welded together in this fixture.

10 The inner and outer side rails and rear kickup rail assembly for '63-'82 frames are joined in this fixture; note all the clamps and locator details.

11 A 1962 frame, located upside-down in the final assembly weld fixture. Note the center "X" member from a previous subassembly operation.

12 The inboard side of the C1 rear kickup rail. Note the sway bar link bolt and brake hose brackets, and the two rebound strap anchor plates. Axle jounce bumper and radius rod brackets are on the outboard side.

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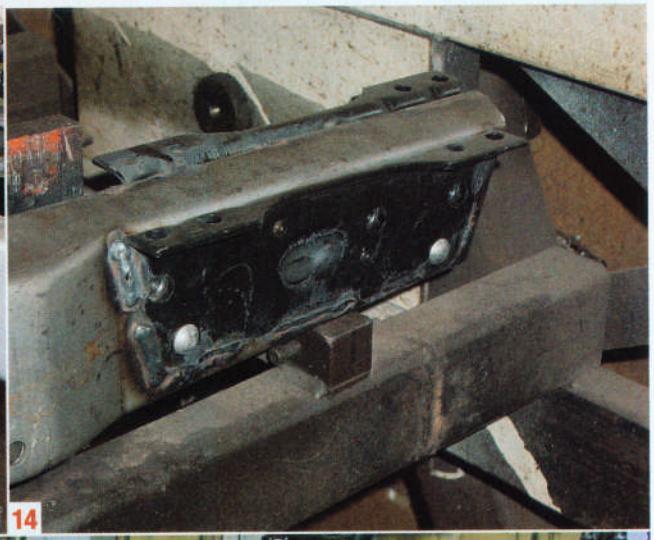

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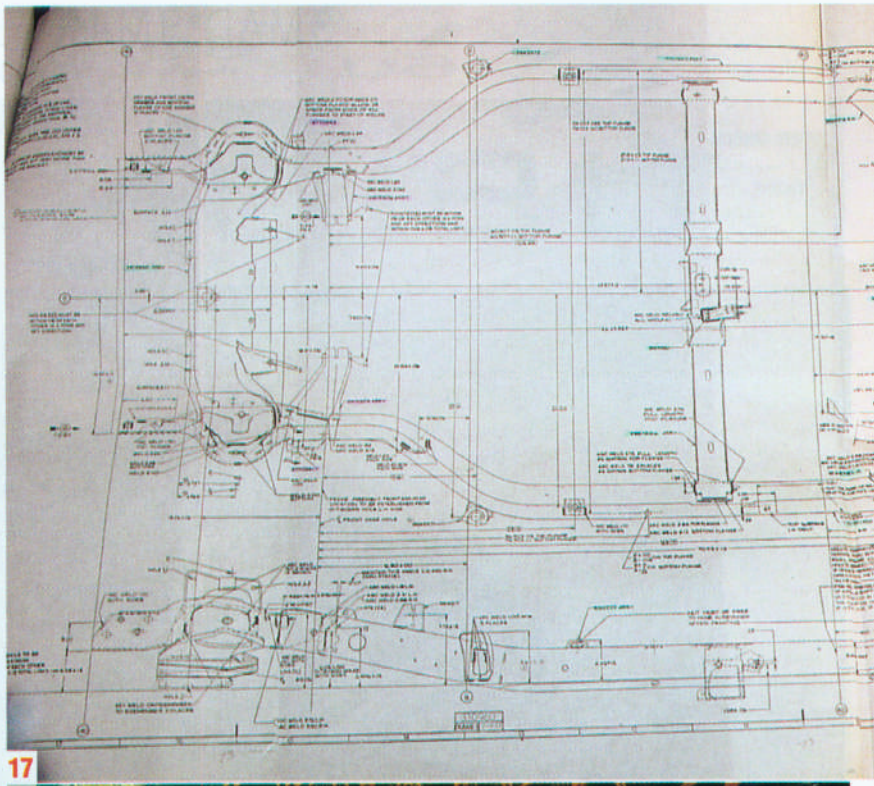
13 The forward body mount outrigger bracket in position for welding; note the locator pin in the body bolt hole.

14 Front suspension crossmember attaching brackets in place at the front frame horns; note the weld nuts for the bumper brackets visible inside the frame rail.

15 The final assembly weld fixture for '63-'82 frames; note all the pedestals, pins and locators.

16 A completed late-C3 frame; note the large holes in the rear crossmember for the bumper energy-absorber units.



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17 The complete GM C3 frame assembly drawing—just one of hundreds of original GM drawings on file that Neal used to design and build the assembly tooling.

18 A C3 frame, fresh out of the final assembly fixture, being prepared for shipment to the customer.

19 A "Rear 48" repair section ready for shipment; this was one of Vette Products' first offerings ten years ago, and its popularity continues today.