BUILD-IT-YOURSELF STUDEBAKER

Our Man Booth Takes A Sabbatical With South Bend Local 5

STUDEBAKER PHOTOS BY PIUS SKARICH

A MORE INTREPID lot than auto editors and writers would be hard to find. Sometimes they can be observed popping wheel covers as they push cars through a corner too fast. Other times they try their hand at the wheel of a Daytona stock car (see page 26), or even worse, a showroom stock car which isn't quite up to the stresses and strains of 10/10ths driving. No challenge is so great, they feel, as to prevent their readers from being served. And as knowledgeable, calculating men with an engineer's grasp of automotive realism (so they are convinced), they are supremely confident when it comes to dealing with any aspect of the automotive scene.

Then one of the editors was challenged to build a car which was wanted for a road test. Just how the gauntlet originally was flung cannot be recalled —the mind, it seems, has a blissful capability of quickly obscuring all such bad memories—but the manful acceptance of this test of skill has been indelibly stamped into that part of the brain reserved for nightmares.

All problems proved surmountable. Studebaker had an excellent working relationship with United Auto Workers Local 5, and, though it had been feared that union membership would present the greatest difficulty, Local President W. A. Frick saw to it that our man was immediately made an honorary member of the local. The editor, in fact, later reported that this consideration was most useful when he had to insist on the wash-up time and coffee breaks guaranteed under the Local 5 contract.

So it was that on a chill autumn Monday, our man found himself in South Bend donning a pair of Studebaker blue and orange coveralls at 7 A.M., ready to report to the foundry. The job of building an enthusiast's car—a 2-door Daytona hardtop with 4-speed manual transmission and the new dual 4-barreled R-4 engine—would begin with the pouring of a block.

The dust and din of a foundry could have been unnerving, like a dark and noisy sort of hell, but Studebaker's operation is cleaner than most. After learning how the six blast furnace cupolas were charged with scrap iron, coke and melting stock, our man made a test draw of the molten iron he was to pour. A long-handled dipper was used to pour a sample into a wedge-shaped mold. The red hot iron sliver is water-chilled and then smashed in half on an anvil; the depth of texture and coloring from the pointed edge indicates degree of hardness. The sample was right on, but only because the usual operator had tossed a brown grocery sack of chromate (for hardness; silicon is added for softening) into the pot as it was being filled from the pouring ladle, as a result of a check he had made moments before.

In the core making areas, where large coreblowers pound a special sand mixture into core molds (different mixtures for different types of molds), this editor managed to help transfer some finished cores to the drying oven elevator without damage. At the other end of the ovens, where the dried and hardened cores were sealed, he transferred them to the conveyor chain racks taking them to the proper set-up area. Fitting together the 3-dimensional jigsaw puzzles which the various cores represent was where our man's 10 thumbs became apparent, but disaster was forestalled by the special jigs and experienced foundrymen helping him along.

Once the cores were assembled into the black sand pouring box, its upper and lower halves were clamped together and the boxes moved on small dollies to the pouring area. An overhead trolley crane moved into place and lowered the pouring ladle of molten iron over the boxes. The trolley operator keeps the ladle as closely aligned with the pouring box as possible, but muscle is still needed to keep the molten stream heading from the heavy bucket into the pour hole as the dolly moves along. Studebaker officials who accompanied our man stood aghast as the liquid iron splattered over the floor perilously close to the novice's feet. Somehow, however, the mold was filled and the dolly continued along to cool. At the point where it had cooled to about 500°, the block was yanked from the sand mold by a chain hoist and was transferred to a cooling conveyor which ultimately took it to the sand shaker—an automatic bouncing machine that cleared out the remaining bits of core sand.

Pouring the cylinder heads was a similar operation, although done on a slightly smaller scale. Then, too, the smaller pouring ladle was timed along its overhead track at the same speed as the mold dolly, keeping the spigot and the pour hole aligned anyway. The shakeout is also similar and the cast pieces (including manifolds and clutch housings, etc.) are conveyed to the chipping room where the rough edges are air-hammered off and ground down.

While the rough castings were en route to the machine shop, our man moved to the press rooms—but not the kind to which he was accustomed. Here he started stamping out sheet-metal pieces for the Daytona. After feeding a sheet of steel to the huge 750-ton press to make the first fender stamp, he followed it along the conveyor belt to a series of 500-ton presses where edge crimps, hole punches and further forming were performed. Four of these banks of presses vary their output of fenders, body panels, door panels, etc., as necessary to keep abreast of the production schedule. Our man quickly picked up the dexterity (survival of the fittest, or something) to insure that only the metal panel, and not his fingers, was underneath the press when the button was pushed.

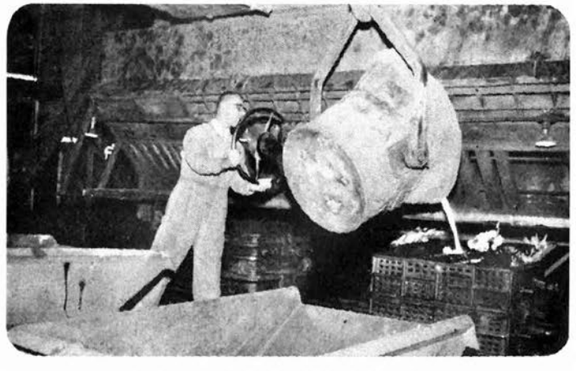
All the stampings, hung on an overhead conveyor, passed an inspector who checked the pieces with a well-trained eye and a gloved hand. Imperfections invisible to the untrained, such as a thread from some worker's glove stuck to the surface, are caught and marked by this man. Then the spot is ground down by metal finishers before the panel goes any farther. Jim Cartwright, quality control director who escorted our editor, pointed out that numerous inspections are made at every step of the operation. "If they catch the blemish here, and correct it immediately, it won't tie up production at some later stage in the assembly," he explained.

In the medium stamping room, where 275 somewhat smaller pieces are produced, our man tried his hand at an oil pan—one of the most difficult pieces because of the deep "draw" necessary on the sheet steel. Then on to the small press shop, where hundreds of items such as hinges and brackets are produced, our man aligned and reamed the trunk lid hinge for his car and watched as an automatic machine spot welded nuts and square plates from two separate bins into seat belt ▶

WHEN YOU BUILD your own car, the place to start is in the foundry where you draw a sample of the molten iron to test for hardness by molding a small sliver.

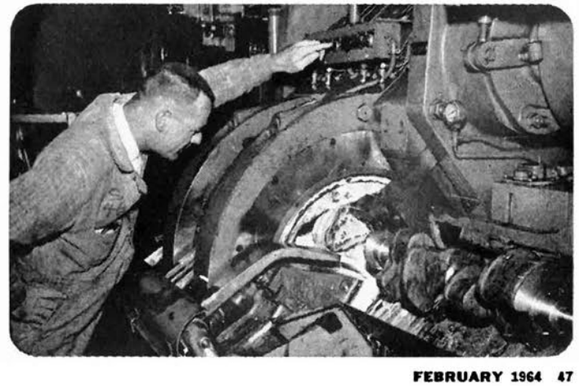
SAND CORES, baked and coated, are fitted together in 3-D jigsaw puzzle. Here Associate Editor Gene Booth works on 6-cyl. molds.

MORE MUSCLE is needed to manhandle heavy pouring ladle than to pound a typewriter, but our man managed to pour a block.



COOLED AND cleaned up, new blocks get the roughest edges chipped off and ground down before they move to the machine shop.

PUSHING BUTTON to start automatic 5-wheel grinder for crankshaft main bearing journals appears within our man's ability.



AMIDST HUGE presses, sheets of steel are bent into body parts with crimps, cuts and bolt holes automatically made.

PRESS SHOP supervisor shows the novice how to detect flaws in finished stamping by rubbing gloved hand over surface.

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anchors. Part of the latter area is the automatic press shop, where automation is more evident than at most other areas. Here, the skilled operators make their own set-ups for their machines and maintain their own quality checks. It was here that the novice operated a punch press (keeping a foot pedal depressed) which stamped D-shaped pieces from a strip of steel, punched a hole in them and beveled the area around the holes. These, it turned out, were the bearing surface for the rear view mirror's mounting rod.

Among the stamped metal pieces, high levels of hand work are maintained at Studebaker. All draw marks and creases (from the presses) have to be removed so a smooth, unbroken surface is presented at the paint shop. The forward curves of the front fenders, for instance, all undergo a grinding down and hand finish, as do the welded joints where the "earmuffs" (rear roof support panels) join the roof panel. The roof panel and the floor pan, incidentally, are the only body stampings supplied by an outside vendor, because of their size.

Our man learned to operate (with a partner) the huge welding jig which slices a floor pan in half, then automatically spot welds a 4-in. sheet at the cut plus all seat belt anchors and a few extra brackets (for the 4-door models). Then he moved to the beginning of the body framing line, where the floor pan is mounted on a framing dolly. This moves along to take the trunk interior structure from an overhead crane and the trunk pan, bonded to the floor pan by two swinging spot welders that look like huge C clamps. The dolly moves to the welding jigs (there are six, to speed up production) where crews swarm over the fast-shaping vehicle attaching side rails and roof panels in a shower of spot-welder sparks.

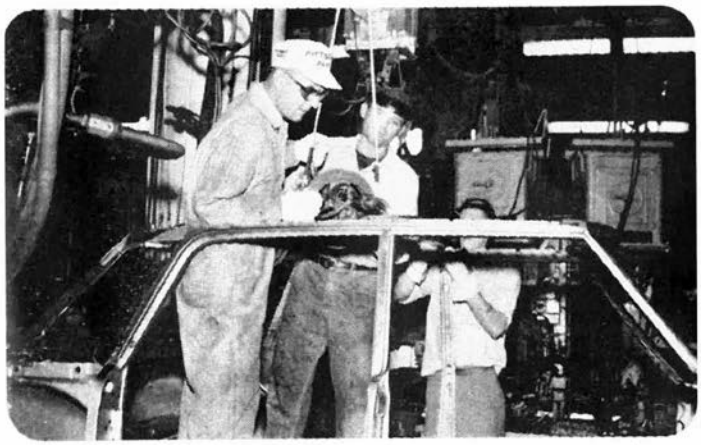
From there, the dolly moves by elevator upstairs (there are six floors in Studebaker's body assembly plant) to where it is marked for color coding. Here it gets its first "identity" from the order which the dealer would have sent in. An 8 and a 5 were chalked onto the firewall (for the Burgundy red exterior and matching red interior colors, specified in the order code) and our test car now was a specific 2-door hardtop rolling along on its framing dolly. Sealer was applied over a few of the interior weld joints and it went through the first of several paint booths to get a coat of red on the door's interior panels. Once through there, a battery of body sanders and primers got in their licks —aided by our editor—to insure that the "body in white" was ready for the main paint booth. Inside the booth, spray operators moved with the grace of ballet dancers to successively coat the car with its ruddy skin tone.

Studebaker, it might be noted, still spray paints its cars and hand spreads joint-sealers. This is done, according to Dr. N. A. Lamberti, operations vice president, not because the company is behind the times, but because the much-touted body dips have been found to fail in protecting the body where it should be protected—in the hard-to-reach joints.

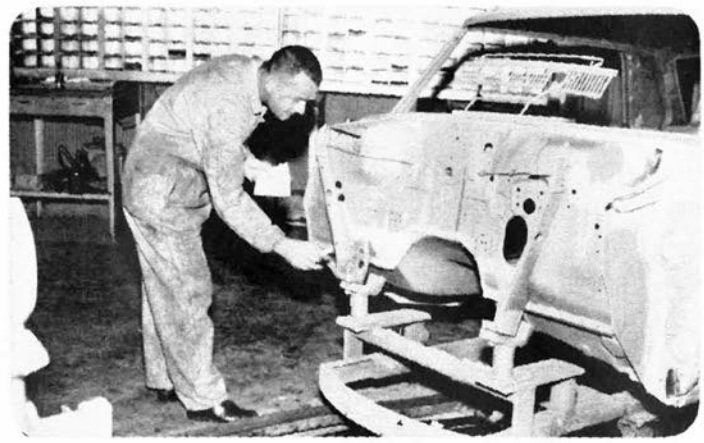
From the drying ovens, the painted body moves to the first trim line, where side windows and some of the exterior trim is fitted. And here is where our man started to goof—tightening one of the trunk lid trim strips too much resulted in a bent strip which had to be replaced; trying to work as fast as the line was moving caused our inexperienced worker to strip threads off some window trim strip screws. But, as was true throughout the project, depart-

AFTER PAINT is sprayed and baked, first of the trim strips starts going into place. Deep concentration makes better job.

QUALITY CONTROL director and union representative confer with our man when goofs happen. Their verdict: Inexperience.



SPOT WELDER dangling from overhead is used at body form jig to tack roof cross brace into place, with some expert help.



CLEANED AND primed, "body in white" gets its first "identity" as order code is chalked on firewall from build order.

mental supervisors were hovering nearby to correct such incompetence the moment it appeared (a factor that not incidentally maintained Studebaker's standards of quality on this particular car).

Moving to Floors 5 and 6, more equipment and fittings were attached to the bodies, and our man still hadn't learned. The heater hose was the wrong length (grabbed from the wrong box), he installed a 120- rather than a 160-mph speedometer in the instrument panel (the latter called for by the R-4 engine specification), screwing an armrest to the door panel was almost too much (the line had moved the car almost beyond the reach of the pneumatic screwdriver before he made it). In every case, however, inspectors checking the car at several stations for work that had just been performed, caught and corrected the embarrassing errors of our editor.

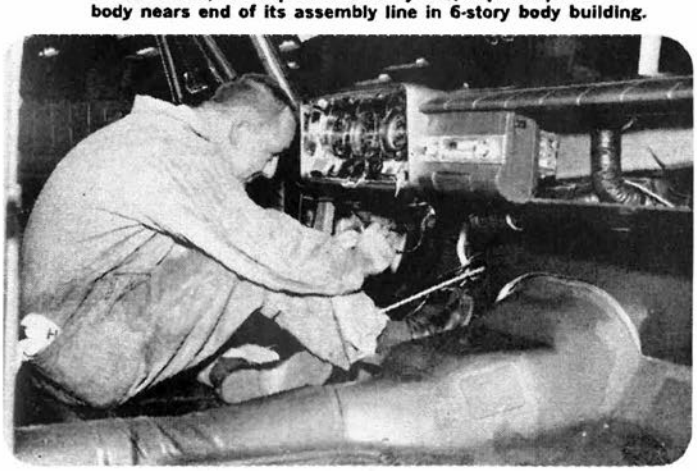
At the end of the line on the sixth floor, the body now had a complete dashboard, interior side panels, taillights, glass and cowl-attached accessories installed. Into a water spray booth it went (a spot selection check, rather than standard procedure for every body) where two small leaks were found—one at the V-8 insignia on the earmuff, the second at the rear window mounting. These were sealed and the body started on the monorail to the final assembly building, but before it started this last 2-hour journey, a teletype message alerted the chassis and engine line to begin making up those parts of the car.

Receipt of this message caused the proper frame to be selected by a fork lift operator from an outside storage yard and transported to the chassis line via conveyor. There it was placed bottom up on the moving belt and suspension components, rear axle, disc brakes, mufflers and fuel tank were attached. At the end of this line, the completed chassis moved through a sealer spray booth and swung down to the start of the final assembly line. The engine, which gets final components (ignition, fan, etc.) at the final engine line, swings into place on an overhead conveyor and is dropped onto the chassis. Proper hookups are made as the thus-completed power train comes to the body-drop hole, where a crane operator has the body ready to lower from the second floor.

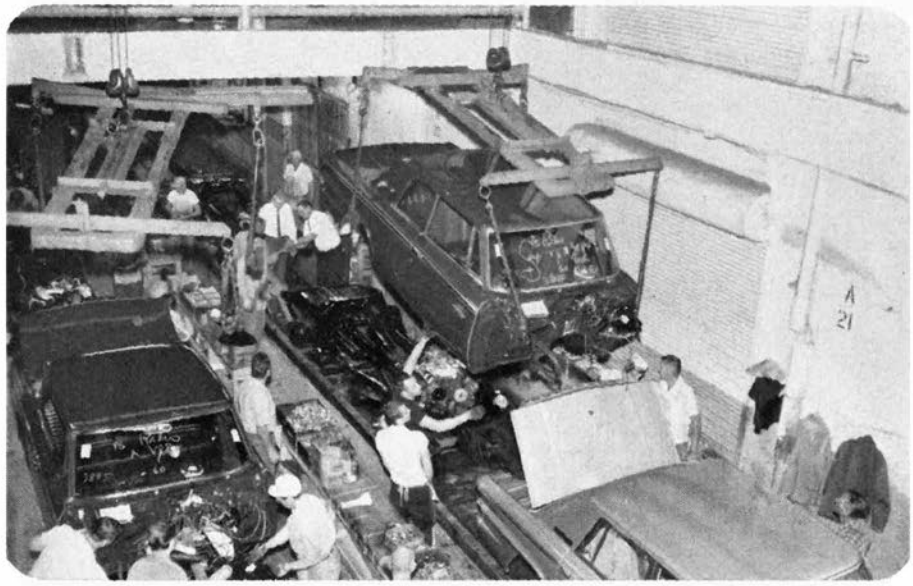
The body, after it emerged from the covered monorail, got its rear seats installed along with other trim items and got another check for complete assembly. At the same time, front fenders, grille, radiator and related components were being assembled on a smaller assembly line at the rear of the building. The body reaches the body-drop hole just as its chassis moves into place, while the front end assembly is completed minutes later to go down a second drop hole as the car moves under that position. All the moving lines, from the color code position to the end of the final assembly, are synchronized so that all the proper subassemblies arrive in place at the proper time.

On the final line, the instrument and control hookups were made, the steering wheel installed and the front seats fitted. Floor mats were thrown into the trunk for installation on the final doll-up line and the bumpers were attached. A multitude of inspections were made as the wheels were attached with 5-headed air wrenches and fuel and water were pumped into the car. Here, the tachometer cable presented some problem in hooking up, but Studebaker's experts finally saved what would have been a botched job. Then, with wiper blades installed and horn button inserted with a "beep," the car was ready to start and drive to the doll-up line. ▶

DASHBOARD, built up on subsidiary line, is put in place as body nears end of its assembly line in 6-story body building.



RED AND chrome R-4 engine is dropped in place onto heavy-duty chassis, which had been built up on another synchronized line.



AT BODY DROP, completed shell from second floor meets up with chassis and engine on ground floor for final assembly. Front section is readied for drop moments later.

READY TO roll off the end of the line, but there seems to be a bit of difficulty: no amount of starter grinding or accelerator pumping can seem to bring the spark of life.

BACK TO THE drawing boards, son. Inspectors begin checking over the Daytona at repair post to find malfunction. Our man looks for nearest exit after forgetting to install transistors.

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It refused to start. Grinding away on the starter and pumping furiously on the accelerator failed to produce fire. The car behind bumped it off the ramp and three husky workmen pushed our car off to the side, to the repair post.

Immediately, a swarm of expert inspectors began probing the engine compartment as a much-chagrined editor stood sheepishly by. The reason was quickly determined: insufficient spark. But it took a bit of time to discover the cause: the R-4, designed for transistor ignition and fitted with a distributor minus condenser, had had a conventional coil installed. When this was corrected, it was discovered that the clutch would not disengage. A tug pushed our enthusiast's Daytona, somewhat ingloriously, off to the repair garage for a clutch job and our editor, somewhat dismayed, retired to the showers.

Once the clutch was operating, the car then went through the final doll-up line where headlights were adjusted, floor mats installed, trim perfectly aligned and, had it needed it, a whole body panel section could have been repainted to remove a single scratch. Workmen manhandled the doors to insure perfect fit and trunk and hood lids were bent and pried to seat perfectly.

By now, our quite humbled editor had performed a great many of the 157,000 separate operations required to assemble a car and had walked across what seemed like most of the 5.7 million square feet of floor space utilized by Studebaker for manufacturing cars. He had installed more than half of the 20,000 numbered parts making up a 1964 Daytona hardtop and it all had been done in three days.

Because the R-4 engine was installed (ours was the first to go down the assembly line), the car was delivered to Studebaker engineers for 500 miles of running on a chassis dynamometer. This is standard procedure with all R-3 and R-4 engined cars, since the high-output engines are not warranted in the normal manner. These engines are assembled by Studebaker's Paxton Products division in Santa Monica and shipped ready-to-install to South Bend.

But the editor had discovered, in trying to keep up with the company's production schedule of 60 cars per hour, or slightly under 500 per day, that building a car is a job best left to the real experts—the men who man the assembly lines day after day. Only Studebaker's rigid quality control requirements and efforts were responsible for the car being able to undergo the road test which follows. ■