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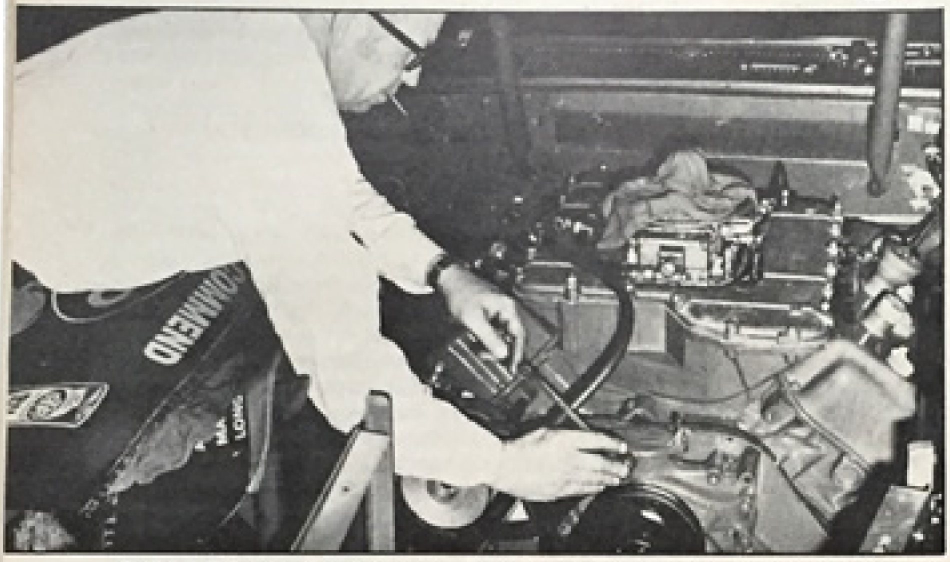

THE BEAT GOES ON—Cotton Owens, a very respected name in NASCAR racing over the years, does most of the work on his engines himself. He subscribes to the philosophy that constant checking and inspection, at all stages, is necessary in building a competitive car.

THE FOLLOWING EXCERPT is from the revised edition of THE COMPLETE BOOK OF NASCAR STOCK CAR RACING by Lyle Kenyon Engel, to be published this spring by Four Winds Press, 50 West 44th Street, New York, New York 10036. Excerpt used by permission of the publisher.

The excerpt is an interview with Cotton Owens, who drove to a world record (143 mph) in qualifying for the first Daytona 500 on the new Daytona International Speedway in 1959. Then, in 1960, he averaged 149.6 mph to set a new qualifying record for the Southern 500 at Darlington, S.C. He was second in tha Atlanta 500 in 1961, and owned and built the Pontiac Bobby Johns drove to victory in the same race. Since 1963 Owens has been operating a stable of Dodges on the NASCAR circuit under the sponsorship of Carolina Dodge Dealers Association. In this year's World 600, one of Cotton's Dodges was piloted by sports car standout Peter Gregg.

WITH THE GROWTH OF INTEREST in stock car racing have come a million and one questions. One of the most important of these is: "Who wins races—the driver or the mechanic?"

"It's a hard question to answer," says Cotton Owens. "Drivers get the glory and most of the pay check, deservedly, too. After all—they take the major risks. But real satisfaction goes to the mechanic. Having spent more than seventeen years as both mechanic and driver, I feel qualified to say that most races are won in the garages."

"Before a driver can get the checkered flag he must have a car that is not only fast, but stout and, most important, safe," Owens says. "With that in mind I try to stress safety and strength in setting up race cars. When I feel that I have covered every possible cause of trouble, then I begin concentrating on making the car fast.

"It would be quite simple to build a superfast car without regard to safety. In some types of competition, fiberglass bodies, aluminum bumpers and firewalls and cast-aluminum roll bars are allowed. Thankfully, we have rules to protect us from ourselves.

"In NASCAR we have stringent rules with inspections at every track. NASCAR is, I guess, the largest auto racing organization in the world, with more than fifteen thousand active members. Bill Taylor, chief technical inspector for NASCAR, is one of the fairest men I know."

"In building several Dodge race cars, I keep testing myself on each phase of the work. 'Will the inspectors okay this?' If the answer is yes, then I know I'm doing a good and safe job. With the exception of a few engine refinements, the only changes that are allowed are those which make the cars safe to drive. It is NASCAR's adamant stand on safety which makes it the safest racing circuit."

All ornaments and extras which could vibrate loose must be removed. All parts which will be subjected to more strain than normal highway driving must be reinforced or replaced with heavier, stronger equipment.

"I always try to strip the car of all excess weight and then put back only what is necessary to make it safe. NASCAR rules decree it must weigh 9.36 pounds per cubic inch of engine displacement. A Dodge we just completed tipped the scales at 3,992 pounds with a 426 engine. If we run a 405-cubic-inch engine we can remove weight to meet the lower specifications."

"We start building by tearing down," Owens explains. Here's what's done:

The car is completely dismantled inside and out. All weather stripping is removed. Undercoating is chipped off. Floor mats, seats, upholstery, spare tire, wiring, window garnish moldings and door handles, chrome ornament and dash instruments are cast aside. Then Owens starts to build a race car.

Because of the high speeds these cars travel (up to 180-plus mph), special valved shock absorbers are used to prevent the car from being bouncy and becoming airborne.

Because race cars are subjected to terrific stress, the stock product is beefed up wherever possible. All chassis joints are rewelded. The front frame rails are plated with one-eighth-inch steel and completely rewelded. Fishplates are added on the rear frame. A roll-bar is attached both to the structural sills on the body and to the frame rails. This stiffens the entire chassis, but is designed primarily to protect the driver.

Upper and lower control arms are reinforced. The K-frame is completely rewelded. Standard tie rods are replaced with heavy duty truck steering connections. Because of extra heavy torsion bars, two shock absorbers are installed on each front wheel. A heavy duty sway bar supplements the shock system and keeps the front of the car steady at high speeds.

A special forged steel spindle is installed along with a heavy duty steel hub which carries much larger bearings. The front suspension is the stock item slightly modified. Standard woven brake linings are replaced with heat-treated Cerametalix linings. Whereas the woven linings tend to harden and fade in extreme heat, the Cerametalix linings will improve.

The rear suspension, Owens says, is the heart of the race car since it controls weight balance and therefore handling on the race track. Balance is an objective. However, rear suspension must be set to transfer weight to the left side to offset the natural shift to the right when making that hard left turn on the tracks. To accomplish this, all spring shackles and hangers are removed, and adjustment brackets installed. The brackets have holes drilled at various levels to transfer the weight to the left side, depending on the bank of the track.

On the Dodge race cars Owens uses the standard spring (five leaves) on the left side. The right spring is de-arced, and two extra leaves plus a torque leaf are added.

"We attain better results by using stock parts wherever necessary and modifying them to our own situation," Owens says. "This is especially true in setting up the Dodge because ruggedness is already built into most parts."

The two rear shock absorbers are replaced with four extra-long, heavy duty shocks. Shock brackets are extended into the trunk of the car. A special shock bracket, extending below the axle housing, is necessary to take care of the extra length. Adjustment holes are drilled. During extremely hot weather racing, a differential cooling system is added which enables grease to be pumped through a radiator located in the trunk.

Owens and his crew carry a dozen or more differentials in equipment stock because of extreme differences in tracks encountered during the fifty-odd NASCAR races each season.

"Our goal is to get our horsepower output at 5600 to 5800 rpm," Owens says. "We feel we can keep the engine operating for distance races in that range. Then we must use a gear which will get us the necessary power and speed to be a front runner.

Because a safety hub is not only essential, but required by NASCAR, the width of the axle housing must be cut down. The stock housing is put in a lathe and the ends cut off. New machined ends are pressed in and welded, ready to receive the full-floating axle assembly.

"The full-floater, which I consider one of the best developments for safety and performance in racing in recent years, can be assembled in several ways. All get the same results," Owens says.

The axle shaft is virtually "floating" on tapered bearings and does not support the weight of the car. This weight is transferred to the axle housing. A special adapter is pressed into the housing. Then a large bearing hub is secured to the adapter. The stud hub, carrying extra heavy duty lug bolts, is attached next.

The axle hub flange is inserted over the lug bolts. The wheel, cut out and drilled to fit over this big assembly, is attached to the stud hub instead of the axle, as in non-floating rear ends.

"The weight of the car is actually transferred to the housing through the stud hub," Owens explains. "Should an axle break, the old 'lock-up' problem will not occur, and the car will continue rolling."

The wheels (15 x 8½ inches) are special also, two inches wider and reinforced. Special rubber compounds are used in the production of the wider-tread racing tires. Both Goodyear and Firestone offer a wide variety.

"Now that we have covered the suspension and wheels, let's take a closer look at the body," Owens continues. "We have added weight through the use of bigger parts and additional plating and welds. Now, we must take off weight, and the best place to do it is on the body. Floor mats, headlining and extra seats are removed. Instruments and gauges that we don't use are removed."

NASCAR requires that full windshield and rear window be in good condition. All side-window glass must conform to original size and thickness, and all opening and closing equipment must remain. However, drivers are allowed to race with windows down and/or removed on smaller tracks, and most do.

Interior installations include the roll-bar cage and a bucket seat, angled toward the left side and padded on the right side to hold the driver firmly in place. A steel firewall replaces the rear seat to lessen danger from gasoline tank explosion. A hand fire extinguisher (powder type) is mounted near the driver's right hand. A water thermos is attached behind the driver. The driver sucks the water from a tube. Roll bars must be constructed of steel tubing, not less than 1¾ inches in outside diameter with walls not less than .090 inches thick.

A heavy duty safety belt with an aviation-type shoulder harness (another NASCAR requirement) is installed. The steering wheel hub is also heavily padded. The stock instrument cluster is replaced with a tachometer. A water temperature guage showing up to 250 degrees is installed. An oil pressure gauge showing 0 to 100 pounds and a 100- to 325-degree oil temperature gauge are installed. A 0- to 10-pound gauge showing fuel pressure at the point of entrance to carburetor is also a necessity.

The glove compartment is sealed and doors are locked shut from the inside with special brackets and bolts. Wide strips of asbestos tape cover window frames when the glass is not rolled up. This prevents shattered glass from spewing into the car in the event the door is sideswiped.

The exterior body is only slightly altered. Headlights are removed and the openings covered with aluminum. All chrome and ornaments are removed and replaced with chrome tape. Positive fasteners are installed on the hood and trunk lid. Holes drilled into the hood and deck lid in line with pins fastened to the body are reinforced, top and bottom, with steel collar shields. Large safety clips, attached to the body with steel cable, fit through the pin eyes and secure the hood and deck lid.

NASCAR rules limit fuel tanks to 22 gallons capacity. However, they can be modified for both safety and practical racing conditions. The stock 22-gallon tank has a fuel cell that prevents the tank from bursting open in case of accident. During competition, centrifugal force pushes the fuel to the outside of the tank. The fuel pickup line is relocated on the right side. The breather vent is enlarged to one inch and moved from the spout to the top of the tank. A rubber hose is attached there, inside the trunk, and extends out to a spot higher than the filler neck. The filler neck must be stock in diameter (2¼ inches) but may be lengthened to facilitate fast fueling. A conventional cap is used. It is attached to the car with a cable to prevent it from being dropped or from falling off during the race.

While the engine compartment must remain stock, there are some changes necessary—always for safety. The K-frame is removed and completely rewelded. The motor mounts are also reinforced by approved NASCAR methods. There are two cooling systems, one for the engine itself and one for oil. The latter is an added option brought about by the high speeds the stock cars attain on the larger NASCAR tracks.

The radiator core has a greater capacity than the factory version and is reinforced to guard against vibration and designed to combat dirt clogging. Circular fan guards are added. The oil cooler, a miniature radiator, is also located in the grille section.

"The engine is stock," Owens emphasizes. "NASCAR officials conduct a thorough technical inspection before each race and then seal the engine. Lift a hood in the garage or pit areas and you have at least one technical official looking over your shoulder. When they say stock—they mean stock."

The engine is the single four-barrel, 426 Dodge Hemi-Charger. It is designed for supervised competition both on the speedways and drag strips. It is rated at 425 horsepower, but when blueprinted, "a Cotton Owens Hemi-Charger engine pulls 550 horsepower," he says.

"NASCAR's rules limit us to the use of just one four-barrel carburetor," Owens explains. "Without giving away any secrets to my competition, I can say briefly that this loss of horsepower is offset by NASCAR's approval of the use of high performance camshafts. By tearing the engine down and balancing all parts perfectly, we are able to solve some problems before they occur. We measure the combustion and valve chambers to make sure they are exactly equal."

The standard Hemi-Charger engine has high strength, forged aluminum pistons with 11 to 1 compression ratio. Cylinder heads have larger ports, streamlined intake valves and larger exhaust valves. No polishing is allowed. The high lift camshaft is designed for speeds in excess of 6000 rpm. The valve gear has dual high load springs and heavy duty retainers. The ignition system has a special distributor cam and dual breaker points.

"Because of heat problems we are allowed to enlarge our oil pan. The stock pan has a five-quart capacity," says Owens. "We enlarge ours to hold eight quarts in the pan itself and a total capacity of ten for pan and engine, going two over to allow for the cooler. This larger oil pan is also baffled to keep the oil from being forced to the right side."

High capacity, cast, streamlined exhaust headers are fitted to straight exhaust pipes—not more than four inches inside diameter. The powerful Hemi-Charger engine is linked to the running gear with a standard, four-speed, synchromesh transmission. There is a heavy duty Hurst floor shift.

"They say a race car is never complete, and I agree," Owens says. "When you've finished building your car and think you have it ready for the track, close inspection will always turn up ways and means to make it safer, more durable and faster."

"A piece of metal can puncture a fuel tank and put you out of a race. In addition to covering the bottom of the tank with a heavy asbestos padding, we box it in with a metal shield and attach it tight to the body with four metal straps. Protective shields must also be added to the oil pan, flywheel housing and, when it is used, the differential cooler."

"Maintaining a race car requires not only a lot of old elbow grease, but a modern garage with modern equipment. A good pit crew is vital to success. We have a great crew. Tire change, gas fill and a clean windshield have to be done in less than twenty-five seconds.

"I have found it costs about $20,000 to build a good stock race car, including the cost of the car. It costs a lot more to make a consistent winner. But the cleaner and safer the equipment—the better your chances. At least those are the odds I try to carry with me to the race tracks."