

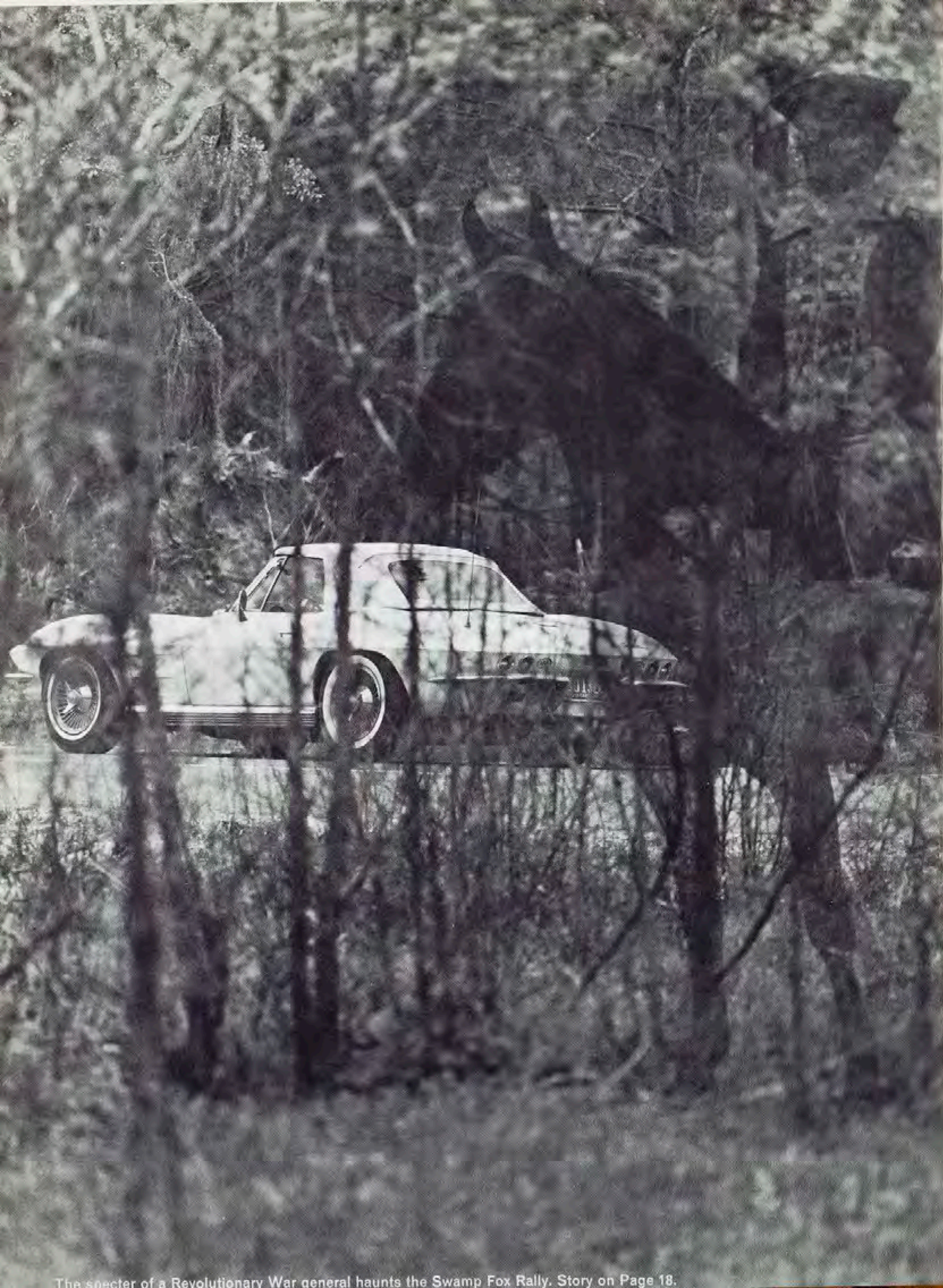
# CORVETTE

VOL. 9  
NO. 5

# NEWS

FOR CORVETTE ENTHUSIASTS





# CORVETTE NEWS

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VOLUME 9 NUMBER 5



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**COVER**—Roger Penske's class-winning Corvette at Sebring. Photo by Dave Gibson.

CORVETTES  
SHOW THEIR  
TROPHY STYLE IN  
GT WIN AT  
**SEBRING**  
1966

Roger Penske's streaking dark blue Sting Ray #9, paced perfectly by drivers Ben Moore and George Wintersteen, came on strong from 28th starting position to capture ninth overall in the tough 12-hour Sebring endurance race. And in doing so took Sebring's Grand Touring Championship Trophy by winning first in class and first in all seven other GT classes in the same group category. This victory, on the heels of Penske's Corvette GT win at Daytona in January, was especially significant. A special SCCA Grand Touring Trophy is to be awarded this year to high-point winner of three U.S. World Championship events as listed on the F.I.A. calendar: Daytona and Sebring, plus the Bridgehampton 500 in September. Toward the trophy, Corvettes have a total of 32.4 points out of a possible 41.4. These are the Corvette win highlights, but there's more about Sebring '66 and about another game Sting Ray contender.

No matter how many times you make the trek to Sebring the same old excitement takes over . . . almost from the moment you enter the city limits. But alas, so do the same old frustrations, like getting to the track, for one. It was even worse this spring, but small wonder.

Fifty-one weeks out of the year, Sebring is a serene little resort city of some 7,000 souls . . . diversely known among the tourists for its championship golf courses, Highland Hammock State Park, cypress swamp (with alligators), orange groves, picturesque lake and luxury hotels. But one week out of the year all of this charm gives way to a greater glamor. Suddenly, Sebring is a famous name on the international car racing scene . . . a name headlined in print and broadcast media all over the world . . . a name that conjures legendary sports car magic.

This year, a record 50,000 of the faithful descended on the Sebring scene. And, according to educated guesses, over 95 percent of them came by car. License plates showed up for almost every star in the flag, with a goodly share from Canada as well. Cars of every vintage and description: from a mint 1920-something Rolls Royce to a wild Batman-type custom-built.

The narrow road from Sebring town to Sebring track winds a scant six miles mid trim orange groves. But veteran Sebring-goers have learned to start early—some at dawn. Even then the road becomes a solid vehicle parade, with patience as short as the distance between bumpers. Late starters can make better time walking.

For Corvette owners, one of the first and most welcome sights, after the eight-lane turnstiles, was, undoubtedly, the Corvette Corral. Scads of fenced-in special parking for Corvette owners. Right in the high rent district, too—just a short walk from the starting area and with a wide open view of the U-turn just opposite the corral fence. Only the press and track officials get closer to the action. Better than 400 Corvette owners found accommodations and camaraderie in the corral this year. And, due to thoughtful Corvette drivers, they managed their parking chores in orderly fashion, gaining maximum use of available space.



Penske's Corvette GT wheeled on the starting grid ready for the 12-hour trip.

# SEBRING 1966



1. Drivers have just reached their cars; the race is on.  
2. Harold Whims' 11th finishing Sting Ray heading toward the hairpin turn. 3. Gondola ride (in background), overlooking the track, provided a good temporary seat. 4. Sports Prototype class Sting Ray entered by Penske retired early. 5. Rare "light-traffic" moment on the start/finish stretch.

Ten a.m., starting time for the 12-hour stint, has to be the most tension-filled moment of the day. Certainly it's the most colorful sight, as the green flag drops and drivers make a dash for their cars in a Le Mans start. Congratulations to those who saw it. This is another annual frustration. There just isn't room enough in the bleachers, box seats, pit alley, on the bridges or along the fence for everybody. Fans were even clinging to telephone poles, climbing pit walls and jamming the gondola rides for a look. However, the majority of people who missed the start probably made up for it by claiming squatters' rights on good fence-watching really for the rest of the race.

A favorite first lap spot is along the fence that parallels the final straightaway before the grandstand stretch. Here, the track looks as deserted as the old airfield runway it used to be. But not for long. In less than three minutes this becomes one of the busiest pieces of highway in the country.

Just to see the cars go by the first time is worth the admission. The sound is ear-splitting but it's music to an enthusiast. The sight is fulfilling, too . . . bright blurs of color and numbers. This brings up another familiar problem.

As the faster cars begin to lap the slower machinery, scoring becomes confusing. The lighted scoreboard over the pits shows only the first four car positions. A guy rooting for a Class 13 growler in the Grand Touring category doesn't know when to cheer or sulk. First-time Sebring visitors figure the best way to keep up with whose in first and what's in second—on up to ten—is to listen to one of the loud speakers. But this is what they probably hear: "At ten laps, positions of the top ten are . . . car number . . . (var-r-r-oom . . . a-zoom . . . zap . . . kapowie) . . . and the next standings will be given in exactly 30 minutes." What'd he say?

Sebring old-timers use a better system. They look for press-pass wearers. You can find an army of them around if you know what badge numbers to look for. This year, numbers 00, 99 and 33 identified the fourth estate. Nevertheless, these gentlemen—and ladies—have access to race bulletins printed every half hour. These sheets list complete current provisional standings, pit stops, service required, stop time, driver changes, lap times, troubles on the course—in other words, everything that's going on. It could be these bulletins

are posted for the admission-paying public's benefit somewhere around the track, but if they were it was a well-kept secret.

Just to give our readers an idea how helpful these bulletins can be, here are a few cryptic lines picked at random:

NEW FASTEST LAP CAR NO. 2 LAP 18 TWO MINUTES FIFTY-FOUR POINT 8 SECONDS

FORMER WORLD CHAMPION PHIL HILL NOW AT WHEEL OF NO. 11 CHAPARRAL

FASTEST LAP RACE SO FAR THREE MINUTES FLAT BY CAR NO. 2 (GURNEY) IN HIS TWELFTH LAP

CAR NO. 8 STING RAY RIGHT REAR TIRE IS FLAT AS YESTERDAY'S BEER

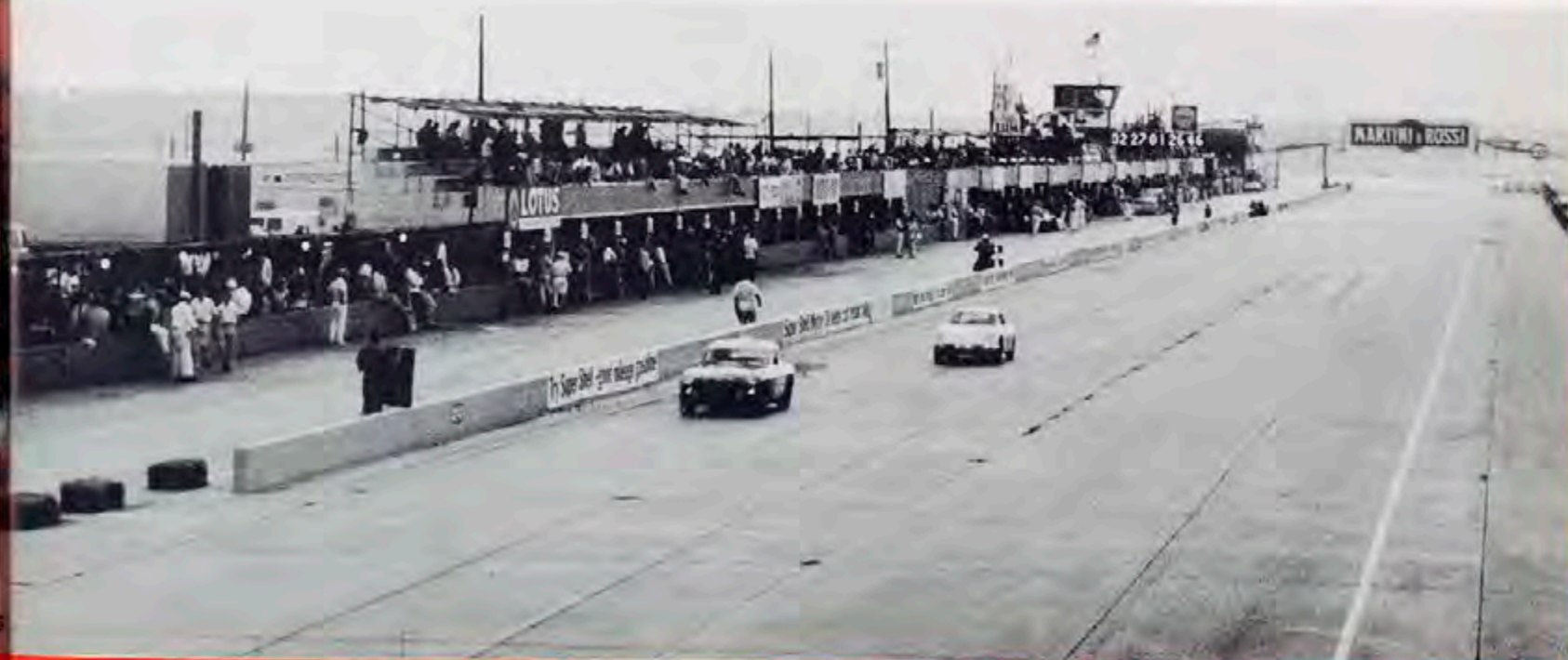
POSITIONS AT 20 LAPS 27. 1. 2. 24. 26. 3. 11. 25. 4. 46

DAN GURNEY IN CAR NO. 2 HAS JUST TAKEN LEAD FROM NO. 27 MIKE PARKES

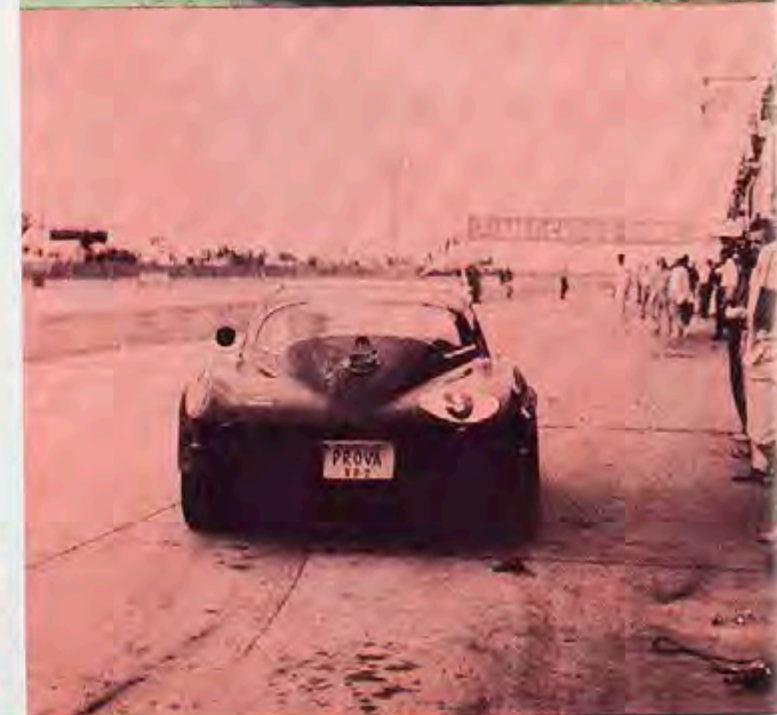
Dan Gurney, great all-around driver from Costa Mesa, California, played a leading role in these bulletin reports from start to finish of the race. A bad start and a worse finish, but in between he was the star of the show. Of 64 starters, Gurney was 63rd away. A two-minute eternity elapsed before he could get his Ford MK II off the mark. Ironically he had earned number one grid position by virtue of a record qualifying time of 2 minutes 54 seconds.

Dan overcame his handicap in about one hour and fifteen minutes. "Gurney in the lead" headlined the rest of the bulletins all day and evening up to the fateful last 60 seconds. Something broke—reportedly, the timing chain—within a quarter-mile of the checkered flag. Undaunted, albeit unthinkingly, Gurney got out and pushed his car across the finish line to no avail. He was disqualified. Beaten by a rule, not a competitor. And a rule Gurney himself was responsible for after his victory in the first Continental at Daytona five years ago.

Then, too, Gurney was leading with less than two minutes to go when his engine conked out just 200 yards short of the finish line and he coasted up to within a skip and a jump of the



# SEBRING 1966



(Top to bottom) Quick pit stops like this helped #9 Sting Ray to win. Sequence shows driver change, oil check and car leaving pit alley all in 60 seconds. (Far right) Roger Penske's #10 takes a corner just prior to leaving race.

line. There he waited for the 3-hour finish signal, then squeaked across on his battery-powered starter.

Under the recent rule, pushing a car across the finish line is not permitted. Nor is it necessary. Had Gurney left his car where it stopped he would have been awarded second place, having completed a greater number of laps than the second place finisher. For his gallant effort, however, Dan received the vote of race stewards to receive the Hayden Williams Memorial Trophy, an award of considerable distinction among drivers.

The Chaparrals had a bad day, too. Both were out by one o'clock. Many had hoped to see the defending Sebring champs repeat their previous year's winning performance. Their early demise was no surprise, however, to owners and drivers Jim Hall and Hap Sharp. Pesky little problems had beset their charges ever since their arrival from home base in Midland, Texas. Prophetically, Sharp was quoted before the race as saying: "It doesn't look like our year. We're here but not in good shape. We are about a month behind in our development."

It was a successful day for the handicappers, though. Pre-race odds favored the more plentiful Ford Sports Prototypes and Sports class cars. And for the first time in 10 years, the Ferraris played the role of underdog. Not only were they outnumbered 17 to 7, only two of the Ferraris were factory entries. With the Chaparrals plagued with problems all week, that left only a quintet of Porsche 2-liter Carrera 6s capable of a serious challenge. Of course, any one of these tenacious Teutons could have outlasted the rabbits for a win, and one almost did just that.

As you know, the odds-makers were quite accurate. It was an American sweep. For the book, Ken Miles and Lloyd Ruby piloted Ford MK II (roadster version, designated GTX-1) to overall first, the Alitalia Trophy and Sports Prototype Championship of Sebring. Another Ford Prototype finished second. And in third, Ford GT 40, driven by Peter Revson and Skip Scott, captured the Sports Car category championship.

The Ferraris could do no better than fifth, three laps behind a fourth-finishing Porsche. Just two years ago the first three finishers were Ferraris. One wonders if this is *finito* for Modena. But don't bet on it.

Corvette devotees at the track had their chance to cheer when the GT race turned out to be a private Sting Ray battle. Their contest involved a neat bit of behind-the-scenes drama well worth recounting. The situation went like this: Penske's Sting Ray #9 held a seemingly comfortable six-lap edge over Whims' Sting Ray #8 with less than three hours to go. But he faced a problem and a decision. The problem was brakes. Drivers Moore and Wintersteen had been forced to slow the pace. They couldn't brake into the turns. Meanwhile, Whims had relinquished his driving turns to veterans Yenko and Morgan who had been picking up better than 8 seconds per lap on brakeless #9. Penske's decision was: should he take pit time to replace the brakes? This could use up ten minutes or more . . . possibly three laps. Or, should he gamble and keep going? Well, gamble is the name of the game. This one paid off. Penske's #9 Sting

Ray took the checkered flag for an excellent ninth place overall—first in all eight GT classes—and new Grand Touring champion of Sebring. Gaining, but still lagging by 4 laps, #8 came on to clinch a respectable 11th position overall and third in the GT race. The three Ford Cobras entered, GT winners at Sebring for the past two years, had to settle for 10th, 15th and 22nd finish positions overall. Cobras had been elevated to the Sports Car class this year, so even had they beaten the Sting Rays they would not have been eligible for a GT win.

Sixty-four cars started the 12-hour epoch. Only 30 finished and the only two Sting Rays entered (GT class) finished ninth and eleventh. That's class at Sebring where they consider it an honor just to finish.

Sebring '66 is now history. The town has no doubt returned to serenity and sanity. But wait 'til next March. That traditional Sebring excitement will be waiting for you—a brand new race, new cars, new faces . . . and the same old frustrations.



# MR. SEBRING... ALEC ULMANN

THE MAN WHO BROUGHT INTERNATIONAL  
ROAD RACING BACK TO AMERICA



Without Alec Ulmann there would be no Sebring. He conceived the road race idea, was key organizer and through sheer promotive genius has steered it to the highest plane in the automotive racing world. And yet, the average racing fan knows little about Ulmann the man.

His travels span the continents as do his far-flung enterprises. It is difficult to reconstruct his varied activities, ventures and versatility. His trail of achievement, like so many leaders in industry, conforms to no conventional pattern. He is: entrepreneur, inventor, engineer, researcher, importer, exporter, race driver, antique car enthusiast, pilot, salesman, manufacturer, corporation president, director—where do you hang the sobriquet on a multi-talent like that?

Fortunately for the racing world his involvement with motor cars always has been a dominant factor in his life. Alec says he was hooked at the tender age of six. It all began in Russia.

Alexander Edward Ulmann was born in St. Petersburg (now Leningrad) the same year the Mensheviks split with the Bolsheviks (so if you're really interested in his age, dust off your history book). Six years later, Alec saw a sight that struck a permanent fire in his heart. It was a mammoth high-wheeled, brass-bright 14-liter Blitzen-Benz. He watched in awe as it roared mightily to a speed of 216 k.p.h. (134 mph) on a special straightaway near Krasnoe Selo in a St. Petersburg-Moscow road race.

From this point on, gasoline started filtering into his blood. And he contrived his first selling job, that of inveigling the Ulmann family chauffeur, one Vasili by name, to teach him the art of shifting through a four-speed box and otherwise mastering a motor vehicle.

It was in 1915 that a gleaming Cadillac V8 arrived in St. Petersburg, replete with electric lighting, electric starting and other "modern" goodies from America. America indeed. Getting there became Alec's dream, one that soon materialized.

The Bolsheviks began playing rough and the Ulmann family left Russia. Alec spent a couple of years at prep school in Switzerland. Then U.S.A. at last. Six years at M.I.T. (plus Harvard) and Alec had an engineering degree and a couple more to spare.

It was in engineering work that Alec launched his career in 1927 with Goodyear Tire and Rubber Company, first in

domestic problems, later in export. Next, he joined Cessna & Aeronca, a concern shipping light aircraft to Europe. These planes were assembled in England and flown by Alec to customers all over Europe. The pilot license he earned in 1930 is still valid after having logged over 3,000 hours of flying.

Whenever time permitted he was off on hops to famous European circuits like Nurburgring, Monza, Reims, Monaco and others. Perhaps even then the dream of a Sebring was taking embryonic form. The European style road race fascinated Alec then as it does now. As he recalls, "Drivers drove not for money but for pure enjoyment and thrill of the sport. Car builders and sportsmen poured money into their racing machines for the same reason and, admittedly, the residual prestige that went with it. Road racing simulated normal driving conditions but extended to the outer limits of endurance by car and driver. Much could be learned about both—driving skill and automobile performance. Technical sterility was incompatible with the sport. Many safety and reliability car features were born on the twisting tracks. In fact," and Alec says this today, "Road racing is the only type of racing that improves the breed of cars. In my opinion, all other banked oval types of racing, including Indianapolis, are spectacles promoted primarily for the purpose of making money."

With these strong convictions about road racing it wasn't long before Alec took positive action. Road racing had blossomed briefly in America at such famous circuits as Vanderbilt, Roosevelt and Ascot. But those great days now lived only in misty memories. Could the sport be revived? Alec thought so.

Together with a group of friends, attempts were made to restart road racing in the U.S.A. under the guidance of the Automobile Racing Club of America. By 1939 several events had been held . . . at Alexandria Bay, Montauk Point, the World's Fair and other venues.

In 1939 another much more important event in Alec's life took place. In this one, the starting line was the altar, for Alec had met, wooed and won a lovely English bride. Now, instead of one enthusiast in the family there were two, for Mrs. Ulmann was no stranger to racing.

Among her accomplishments, Mrs. Ulmann (nee Mary Foote) once organized the famous Schneider Cup Seaplane Races. Her flair for organization remains a key factor in the success of Sebring.

During the war years most of Alec's time was devoted to Aviation Equipment and Export, Inc. (now AviQUIPO), a company he had formed earlier. His work involved high priority assignments for the Army Air Force and close engineering liaison work with other companies contributing to the war effort.

With the war's end, Alec's interest in racing again came into focus. It seemed unlikely that the A.R.C.A. would resume activities so Alec joined the newly formed Sports Car Club of America (S.C.C.A.) and was responsible for formulating the original book of rules and regulations. His services to S.C.C.A. carried him to presidency of the organization in 1949.

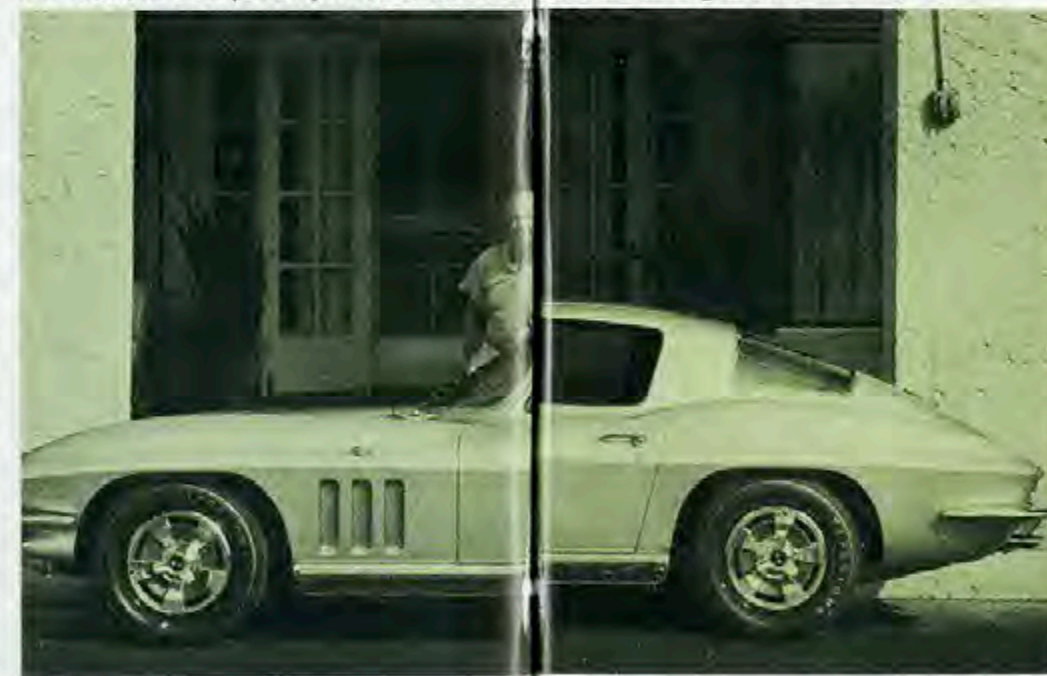
All of the original Watkins Glen, Bridgehampton, Westhampton and Floyd Bennett Field events were organized by Ulmann, but it is as the man behind Sebring that he is known internationally. Uniquely, Sebring came about quite by chance mixed with some of the Ulmann foresight.

Although always on the lookout for a good place to race cars, the day Sebring came to light Alec was actually searching for warehouse space for his fledgling aircraft parts business. It was on such a quest in a flight over Florida that Alec noticed the flat expanse of Hendricks Field, a deactivated B-17 bomber base . . . complete with warehouses. But he saw more than warehouses . . . a perfect place for auto races. Long, wide runways, ideal for starting and finishing points, all neatly tied in with service roads, pretzel-like with their curves, twists and bends. All the ingredients for a road course that could challenge for the European and American driving elite.

The rest is history, but not without its struggle. Late in 1949 Sam and Miles Collier, Florida sportsmen and developers, joined forces with Ulmann to plan their first race a year hence. Unfortunately, in the fall of 1950, Sam Collier lost his life driving at Watkins Glen. Ulmann was ready to abandon the Sebring project, but a few weeks later Miles urged a continuance of the plans and suggested the race be run as a memorial



Alec Ulmann and Sebring memorabilia. (Right) Ulmann with Tony Webner of Goodyear Tire and Rubber Co. (Below) Alec at entrance American Racing Club of Florida.



to his brother. Thus, on December 31, 1950, the first race was run. It was called the Sam Collier Memorial Grand Prix of Endurance, a six-hour race attracting 28 entries and some 3,000 persons.

Looking ahead toward his long cherished goal of establishing an American road racing classic, Alec believed that Sebring should be re-scheduled for twelve hours and should seek international status. Only this way could they attract the cream of the racing world's



cars and drivers. S.C.C.A. did not share this view and as a result no race was staged at all in 1951. Ulmann and his supporters had no alternative but to break away from S.C.C.A.

His courage and determination paid off. By fall he had accomplished the impossible: sanction from Federation International de l'Automobile, Paris (F.I.A.). On the racing scene this agency is czar of all sanctioning bodies.

Support wasn't long in coming in the

form of a new sponsor, Sebring Firemen, Inc. As a result, the Automobile Club of Florida was formed. By 1952, F.I.A. listed Sebring as one of its events, awarding points toward World's Manufacturing Championship. Sebring was on its way. David E. Davis, editor and publisher of *CAR and DRIVER* magazine, nailed it all down neatly: "Way back in the early fifties, when American races were being won by mom's MG-TC, there was an enthusiastic entrepreneur named Alec Ulmann who took the long view of road racing and knew that its success or failure rested with professionals, not amateurs—regardless of their well-bred enthusiasm for races run in the rarified atmosphere of country clubs and upper-class accents. Road racing in this country has assumed the proportions of a big-time spectator sport and Sebring is where it all began. Other courses and other races share in the nostalgia and the tradition, but Sebring was five years, no ten years, ahead of its time."

While the cars are running at Sebring, Alec's main business enterprises are busy opening new markets in Europe. Despite the great contribution Ulmann has made and continues to make at Sebring to American road racing, racing must remain an avocation. In his position as president of Allied which includes A. E. Ulmann Associates, Ltd., Mr. Ulmann's services both at home and abroad are in constant demand.

How does he hold up running two successful careers at once on different tracks? Well, to meet Alec at the entrance to the ultra-exclusive A.R.C.F. tent on a hot Sebring day, you'd guess he'd just arrived for tea at Buckingham Palace—tanned, smiling and impeccably attired. A trim medium-height man with alert greenish-blue eyes, he speaks with a noticeable British accent.

And he's never forgotten the thrill of watching the old Blitzen-Benz. In fact, he still cherishes the old high-wheelers and has owned such vintage high-borns as a 1915 Stutz, a '26 Hispano Suiza, a '23 Avion Voisin, a '29 Bugatti and '18 and '24 Mercedes.

For that matter, one of his greatest thrills was at the wheel of his 1912 Mercer Race-about. It was back in 1948 at Langhorn, Pennsylvania, in a special vintage event race. "Except," says Alec,

"I had the only real vintage car in the race. When I lined up with these other more modern and more powerful cars, I'm sure the crowd wondered what I was doing there. But, then, looks are deceiving. My Mercer, built in Trenton, New Jersey, was a rare piece of machinery, one of the great power-sliders with plenty of guts. I was only in the race for the fun of it, but away we went and speeds started going up. Somehow, winning suddenly seemed important. First thing I know I'm hitting 70 and 75 miles an hour on the straights with the wind trying to blow me off the seat. I had one car to overtake and one lap to go. How that old Mercer and I hung onto that last turn I'll never know—and I should have known better—but we did and not only caught the other car but the checkered flag, too. It was a great thrill and I'll never forget it."

Mrs. Ulmann won't let him forget it either. Following a similar winning event in his Mercer at Bridgehampton, New York, in 1953—only this time with nine-year old son Eddie along—Mary put her foot down. "No more," she said, and Alec wisely agreed.

As you might have guessed, Alec's hobbies include collecting and restoring vintage cars and motorcycles. He now has two older cars and two rare vintage motorcycles. He also likes to delve into historical research in aircraft, automotive design and racing history. And in his spare time (whew) he reads non-fiction history, automotive history, contemporary automotive-aviation history and writes a quarterly column for the Veterans Car Club magazine, *BULB HORN*, called "Nothing New under the Sun."

But the career Alec enjoys most and wishes he had more time for is that of being a devoted husband and father. The Ulmann's reside on Park Avenue in New York City. They have two sons, Edward Foote, 23, and Alec, Jr., 15. And Mary has just about as busy a schedule as her husband. Alec continually marvels that she not only can look after the two boys, organize the entire household, look after the financial affairs as treasurer of A. E. Ulmann and Associates, be here, there and everywhere during the race, but also live in the same house with him.

That's Ulmann.

# engines



like to be warm...  
part I



### Editor's Note:

This is the first part of a two-part article taken from an SAE paper by Joseph C. Brabetz and Donald S. Pile of Chevrolet and GM, respectively. Presented at the SAE National West Coast Meeting in San Francisco, August, 1964, the paper reported the findings of extensive testing and research on engine wear and economy relative to engine operating temperatures. Much of the data was gathered in tests on Corvette engines. These findings will help to show owners why proper operating temperatures are so important; plus the causes and effects of engine sludging. This paper also shows, in chart form, the relationship of engine wear with various operating temperatures.

There has been some misunderstanding about correct operating temperatures of engines. Many owners do not understand the reasons for seeing to it that they operate the engine only at the correct temperature—not too hot, not too cold.

We have come upon instances where an owner thought the purpose of the thermostat was to raise the temperature of the coolant solely to provide heat for the occupants of the vehicle during cold weather.

It might come as a surprise to many to learn that the engine cooling system not only prevents the engine from overheating, but ensures maintaining the temperature at the ideal level.

We have conducted many types of tests to determine the best temperatures for engine operation. Such tests include studies in our Engineering Laboratory, at the General Motors proving grounds at Milford, Michigan, and Mesa, Arizona, and on extensive road trips.

Operating an engine too cold presents a number of problems, including:

1. Decreased fuel economy.
2. Increased oil dilution.
3. Increased tendency to form sludge.
4. Increased tendency to form rust.
5. Increased piston ring and bore wear.

On the other hand, engines should not be operated at too high a temperature. To run an engine too hot will:

1. Increase oil oxidation and varnish.
2. Increase piston ring and hydraulic lifter plunger sticking.
3. Increase oil consumption.
4. Result in loss of engine power.
5. Increase tendency toward detonation, abnormal combustion and pre-ignition, with possible engine damage.

One of the primary considerations of many owners is reasonable fuel economy. Figure 1 shows the percent gain in fuel economy in relation to the water temperature as it leaves the cylinder block. Fuel economy is significantly affected by engine temperature, with economy increasing as much as 3% at 30 mph when jacket temperature is increased from 120 to 190° F.

There are two reasons for this gain. Increased jacket temperature raises the oil temperature which, in turn, decreases viscosity of the oil, thus reducing engine friction. Also, engine operating temperature has a marked influence on the temperature of the incoming air-fuel mixture, which determines the degree of fuel vaporization and mixture conditioning for efficient combustion.

With water temperature of 155° F and vehicle speed of 30 mph, a gain of 1.8% in economy is realized, and the gain rises to 3% with 190° F water. At higher speeds, such as shown by

the 70 mph curve, little gain is obtained below 155° F, but about 1.7% improvement is shown at 190° F.

Engine temperature likewise has an important influence on dilution of lubricating oil by raw fuel. Fuel dilution of the oil is high at low cylinder jacket temperatures. The curves in Figure 2 were plotted from a series of laboratory tests of engines run at idle speeds for 48 hours at various controlled crankcase temperatures. As shown, when the oil temperature was maintained at 125° F, fuel dilution was approximately five times greater with an 83° F jacket inlet temperature than with 180° F jacket temperature. With the oil temperature raised to 160° F fuel dilution was one-third of that experienced at 125° F, and at 200° F, fuel dilution is insignificant.

At idling speed, high rates of raw fuel appear in blowby gases when jacket temperatures are below 120° F. This fuel blowby does not evaporate, but accumulates in the lubricating oil until the oil reaches a temperature sufficient to cause evaporation of the fuel.

Examples of low temperature sludge formation are shown in the valve rocker chamber, rocker cover, timing chain cover and oil pump in Figure 3. Sludge also forms in the oil pan, and any place oil is circulated.

Although the commonly used term "low temperature sludge" implies that contamination sludge is mainly a winter problem, "low temperature" in this connection refers to engine operating temperatures, and not to the weather. Of course, cold weather aggravates the problem.

Our interest is in the prevention of sludge deposits, and the two most important factors to that end are adequate cooling system temperatures and ventilation of the crankcase. The type of driving most conducive to the formation of sludge is short trip driving when the engine does not have enough running time to warm up.

The tendency to form sludge under cold engine operating conditions was clearly brought out on our "Intermittent Service—Short Trip" test at the proving ground.

In this particular test, which simulates the type of driving done by "Aunt Minnie," the driving consists of a series of one-, two-, three- and four-mile trips, followed by from ten minutes to four hours of parking, until a total of 900 miles has been covered. This is followed in one test by 100 miles at 70 mph, simulating a short vacation trip, and in another test by a 2000-mile vacation-type trip. Under slow speed, short trip conditions, sludge can form in as little as 600 miles of operation.

Corvettes come from the factory with thermostats that begin to open in the 177-183° F range, are full open at 212° F. This maximum temperature is still well below boiling because of the pressurized cooling system (to be discussed in Part II). How-

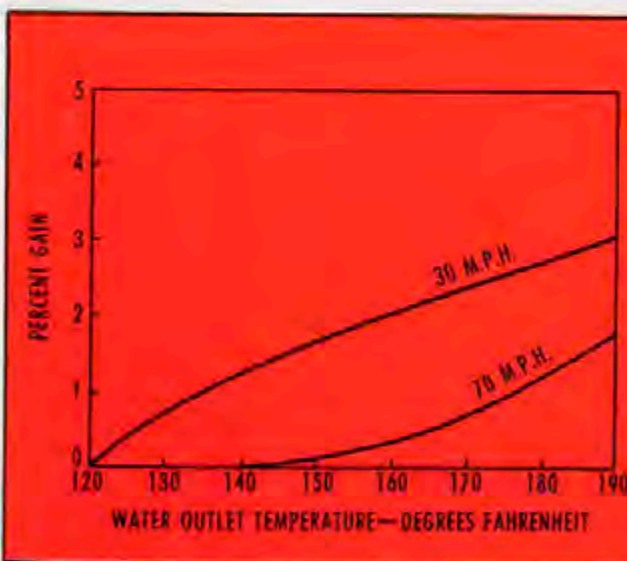


Figure 1. Percent fuel economy gain versus water outlet temperature.

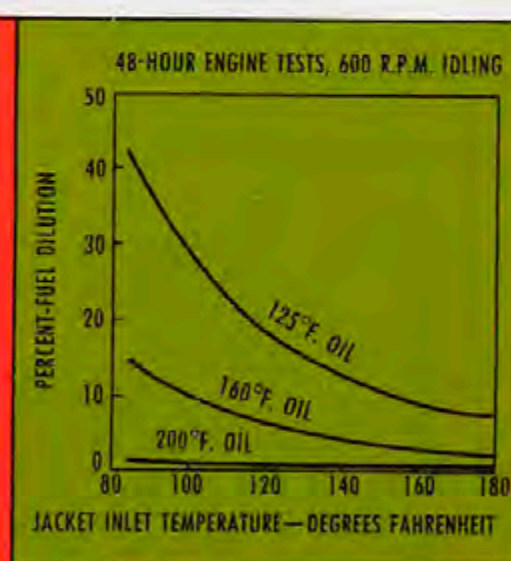


Figure 2. Crankcase oil drain analysis—48-hour engine tests, 600 rpm idling.

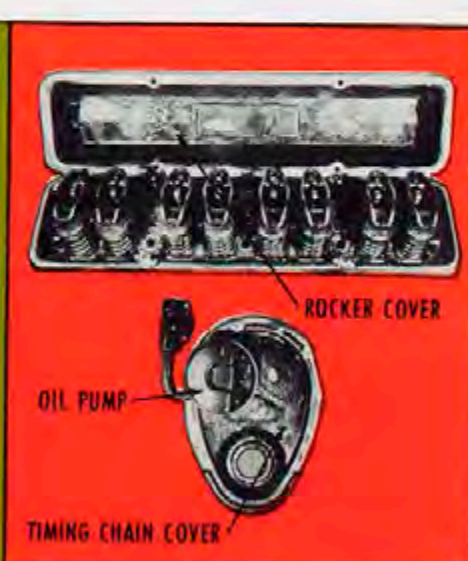


Figure 3. Low-temperature sludge formation.



# engines

like to be warm...  
part I

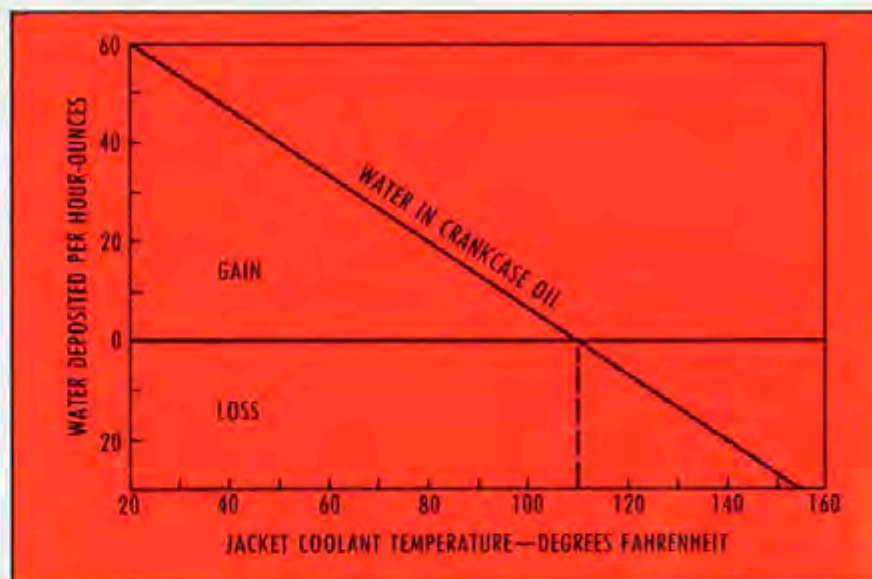


Figure 4. Rate of deposits of water on cylinder walls of average-size engine at varying temperatures.

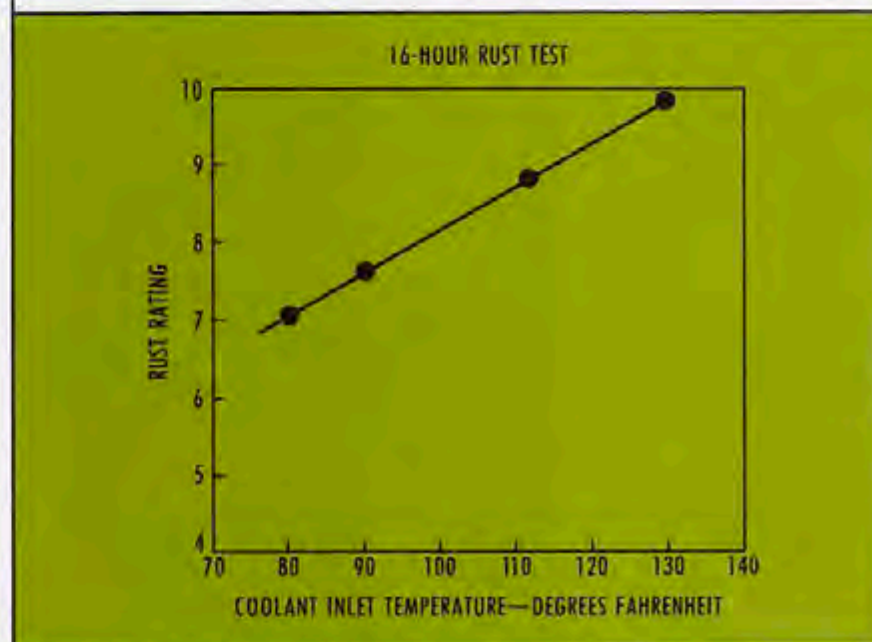


Figure 5. Effect of engine coolant temperature on rust formation—16-hour rust test.

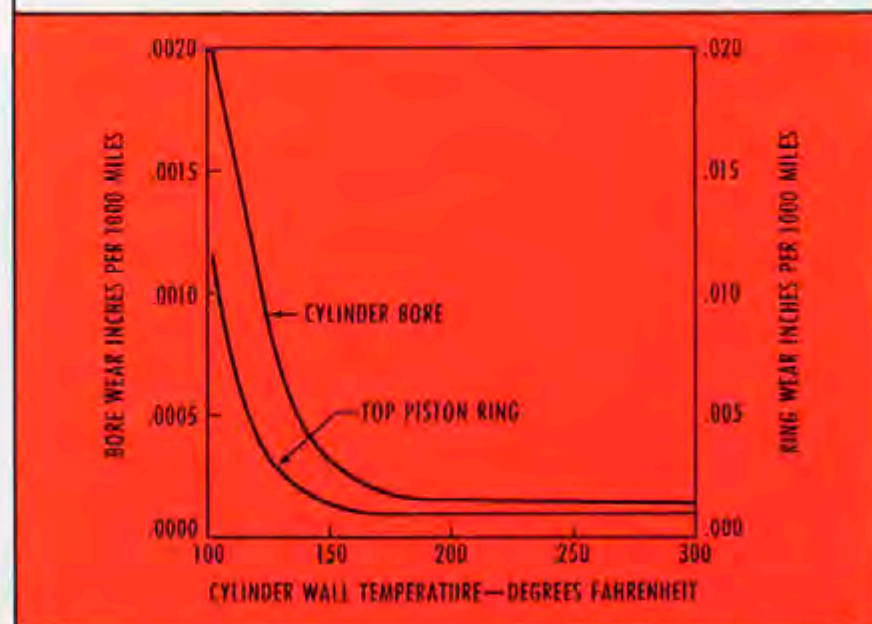


Figure 6. Relation of cylinder wall temperature to wear.

ever, some owners, through obvious misinformation, remove the thermostat from the vehicle, allowing the engine temperature to drop far below that which is required to minimize oil dilution and sludge formation. With the thermostat removed, engine coolant temperatures may run as low as 20-50° F above ambient.

Low engine-operating temperatures have a very significant effect on the formation of rust on engine parts. Figure 4 shows the rate at which water is deposited on the cylinder walls of an engine at varying coolant temperatures. Data obtained on the effect of coolant temperatures show that the lower the temperature, the greater the amount of water condensed in the oil, and the greater the amount of rust formed.

Note that as the coolant temperature is lowered to below 110° F, shown to the left of the broken line, water accumulates in the oil. Raising the temperature to more than 110° F tends to evaporate the water.

This water dilution, plus the corrosive contaminants in the combustion gases, is the cause of rust formation on engine parts. As the coolant inlet temperature is increased from 80 to 130° F, rust rating goes from moderate to none, or from 7 to 10. The higher the rust rating, the cleaner the engine; 10 is free from rust.

The four points shown in Figure 5 are taken from four 16-hour tests conducted at various inlet water temperatures. Note that the rust test at a controlled coolant temperature of 80° F gives a rust rating of 7. Increasing the coolant to 90° F raises the rating to 7½, at 110° F to 8½, and at 130° F to almost 10.

It is quite evident from this data that coolant inlet temperatures below 130° F greatly accelerate rust formation in the engine. And rust can really damage hydraulic valve lifters. The two lifters at the right in Figure 7 are rusted and have lost their ability to function because of increased leak-down rate, while the lifters at the left are in good operating condition, unaffected by rust or corrosion.

The relation of cylinder wall temperature to wear of the cylinder bore and top piston ring is shown in Figure 6. Wear of both the rings and bore is greatly accelerated at temperatures of 150° F and lower, but at higher operating temperatures wear is practically nil.

Actually, wear of engine components may result from the three basic causes:

1. Corrosion, which is the chemical attack of metal surfaces by corrosive constituents and moisture originating from the combustion processes.
2. Abrasion, which is wear caused by dust, dirt, and solid particles introduced into the engine in the intake air through the induction and ventilation systems.

3. Metal-to-metal contact because of inadequate lubrication. The chief cause of engine wear is now generally recognized as corrosion or chemical attack by moisture and acidic constituents originating as byproducts of combustion.

For every gallon of fuel burned in an engine, approximately one gallon of water is formed within the combustion chambers. The combustion of fuels also results in formation of carbon dioxide, small amounts of sulfur oxides, traces of nitrogen oxides and small amounts of bromine or chlorine compounds.

All of these combustion byproducts, upon condensing or reacting with water, form acidic and potentially corrosive materials, such as carbonic acid, sulfuric acids, nitric acids and hydrobromic or hydrochloric acids.

In engines with low cylinder wall temperatures, the moisture and acidic products may readily condense and collect to promote corrosive attack of the cylinder wall and piston ring surfaces, and to work past the pistons to accumulate in the crankcase oil.

Temperatures of 150° F or lower are below the condensing temperature of moisture and corrosives in combustion gases. The cylinder walls then act as condensers to attract and accumulate the corroding materials, and to prevent their exit through the exhaust.

#### Editor's Summary:

Efficiency of the cooling system is most important in maintaining proper engine temperatures. However, there are other factors involved in engine cleanliness and durability. Some of these include how faithfully the crankcase ventilation valve is serviced, composition and types of oil and fuel used and oil-change intervals. Corvette owners should follow the recommendations in the **Corvette Owner's Guide**. And it should be kept in mind that recommendations are only for **ideal** driving conditions—conditions seldom found in normal operation. For example, frequent cold-start, cold-engine driving in the dead of winter would call for oil changes more often. And it is not uncommon in the cold climes for the really fastidious owner to change oil according to a two- or three-week calendar and ignore odometer readings. Another way to prevent excessive cold-engine wear is to let it reach operating temperature in normal traffic (possibly in a lower gear) before hitting the turnpike or freeway on a cold day.

The role of the cooling system in maintaining engine temperatures will be the subject of Part II in keeping engines warm. Operation of the pressurized system, radiator cap, water pump and the various by-pass systems will be covered.

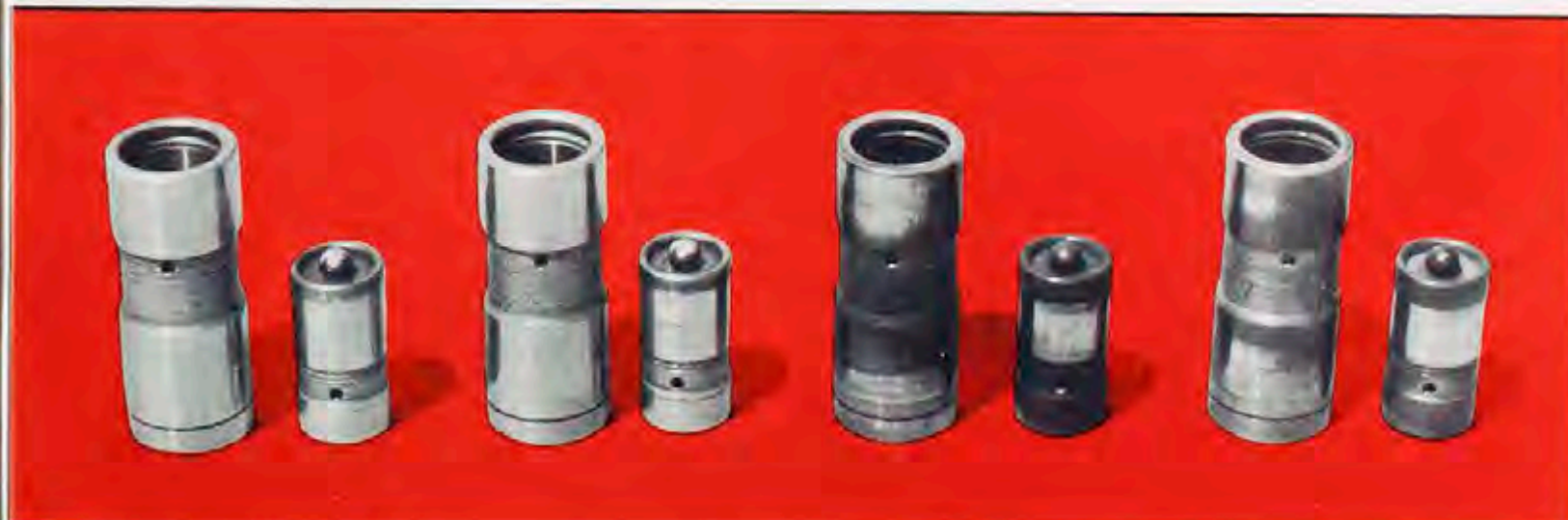
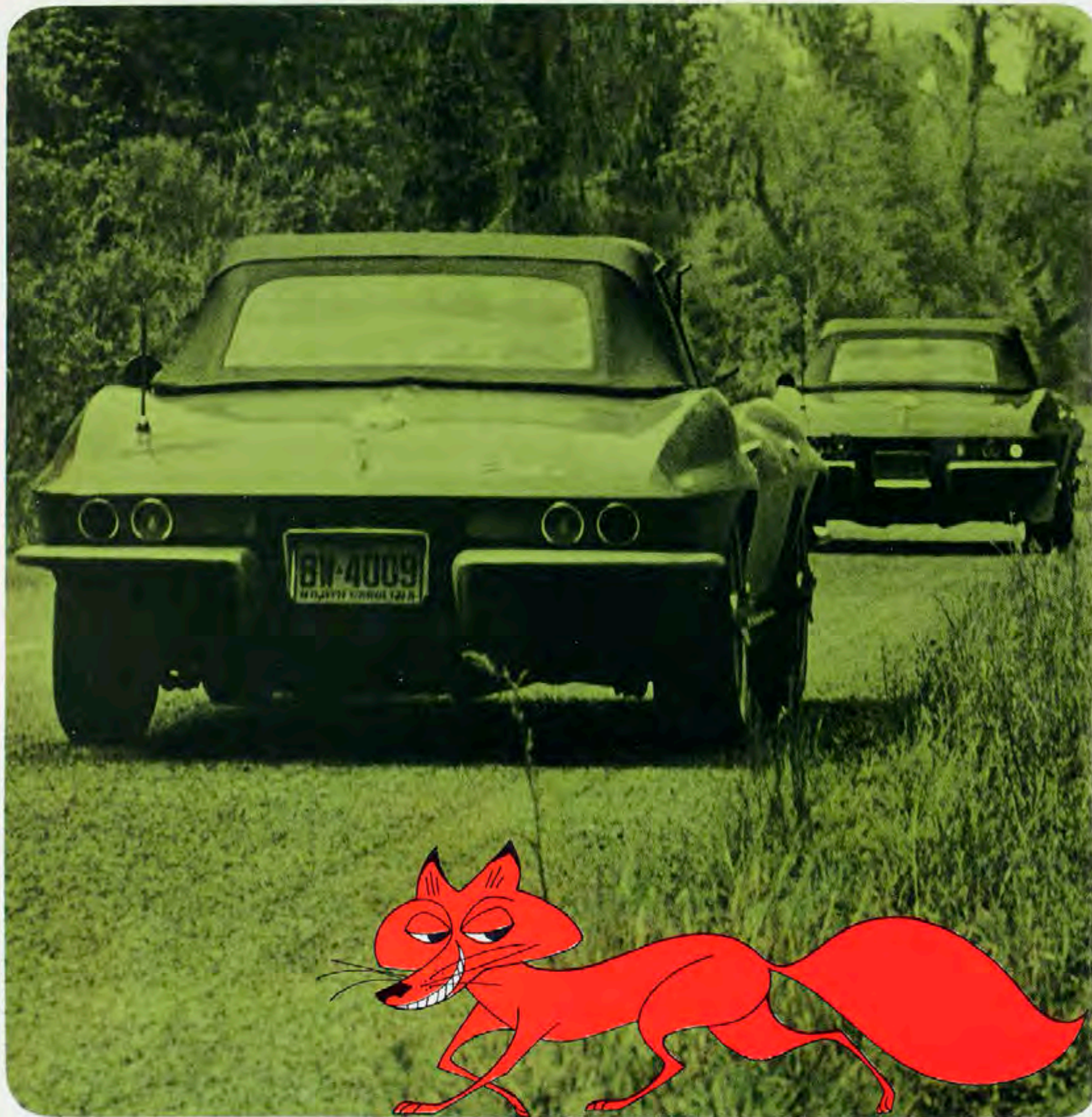


Figure 7. Hydraulic valve lifters—affected by rust on right, in good condition on left.



"Sneaky!"—"Underhanded blighter!"—"Cheeky bloke!"

These are a few names the British called Francis Marion, an American general, during the Revolutionary War. The British were unhappy with Marion because he didn't fight fair according to the rules of the day. Marion's small, but merry, band of troops prided themselves in skulduggery, chicanery, deceit and other nasties to defeat the numerically superior British forces in South Carolina. Marion was so enterprising at harassing the

## BEWARE THE WILY (SWAMP) FOX

British in the woodsy, marshy, mossy and mucky lowlands that he became known as The Swamp Fox.

One of Marion's typical pranks (contemporary Defense Department publicity men would call them "daring exploits") took place in March, 1781, on the Black River near Kingstree, S.C. A strong British force, led by Major John James, was marching toward Williamsburg, bent on capturing that thriving metropolis. They came to the Black River and found that Marion and his men had violated a well-

established rule and burned the bridge behind them. The British marched in proper formation directly to the nearest fording point and began wading—in formation—across the river. But, alas, that miserable Marion had concealed his men on the far bank. They opened fire deviously and devastatingly from ambush. The surviving British decided Williamsburg wasn't such a hot town anyhow and fled.

This little event has become known in the annals of history as The Battle of Lower Bridge. (No one seems to know if there also was a Battle of Upper Bridge, or, for that matter, if there even was an Upper Bridge.) Like so many of Marion's deeds, the battle has been immortalized with an historical marker on South Carolina Route #377, near Kingstree, and helps explain why Marion's name appears on hotels, motels, parks, schools, gas stations and frozen custard stands in the area.

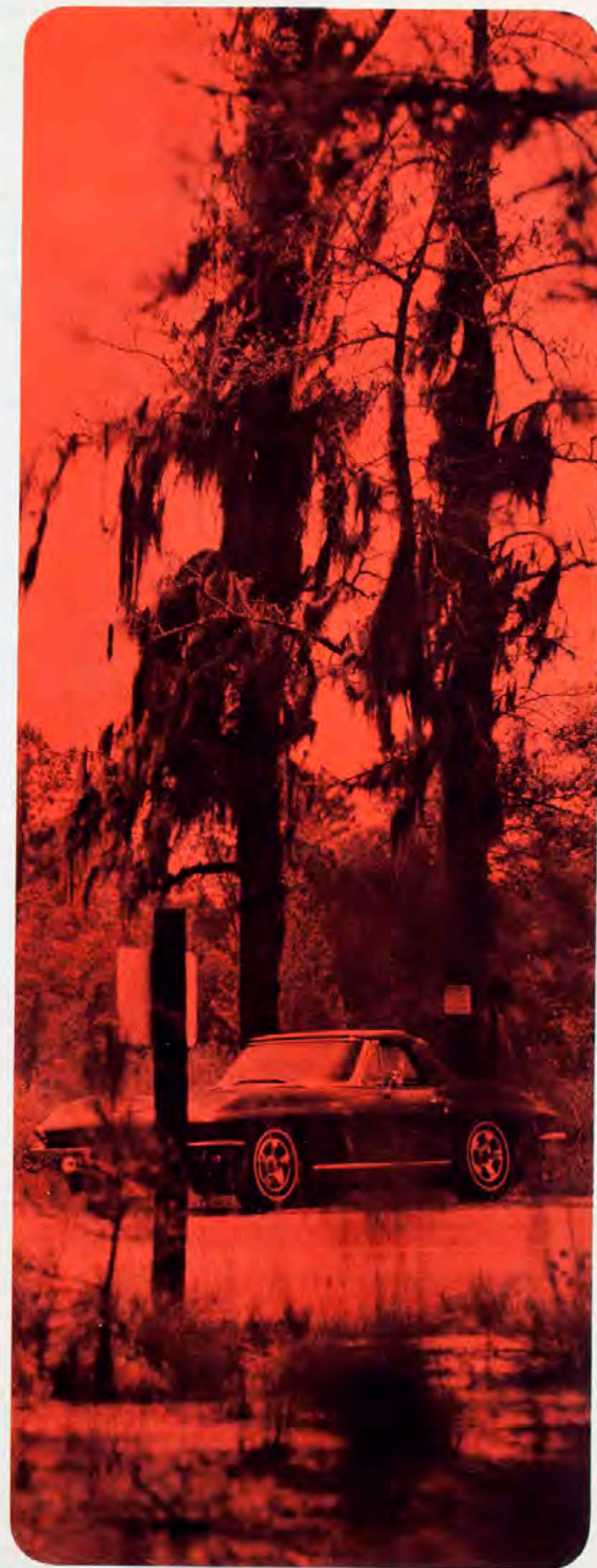
Out of a similar reverence for the wily general—and a love of rallying, the Charleston, S.C., chapter of the Sports Car Club of America annually conducts a memorial ritual called (what else?) The Swamp Fox Rally. Held April 16 and 17 this year, it has become a major event on the rally calendar.

Twenty-five cars, including four Corvettes, were on hand for the start. And just as in the Revolutionary War, Gen. Marion kept cropping up everywhere unexpectedly. Rallymaster Bob Jonte, a Greeleyville, S.C., banker, set the tenor for the event when he billed himself as The Swamp Fox on his name tag at registration. Jonte further saw to it that Marion was remembered by including several historical markers, such as the aforementioned Battle of Lower Bridge, in the route instructions. He even borrowed some pages from Marion's manual and devised a tricky 500-mile route, decorated with cardboard fox emblems, that had the contestants feeling like British survivors of an ambush.

Marion might have dismissed complaints about his tactics by saying "that's war." But Jonte proved himself even more callous and dismissed anguished cries of frustrated rallyists by saying, "If they wanted it easy, they should have stayed home and driven around the block."

The rally started both days in old Charleston at The Battery and returned to the city at night. The Battery is a beautiful harbor-side park littered with Civil War howitzers, a Gatling gun and gnarled trees. On the first day, contestants wound their way through narrow old streets rimmed with buildings reeking of history. They drove by the only French Huguenot Church remaining in America (built in 1844), the grave of John C. Calhoun, The Powder Magazine (used as an ammo dump in the Revolutionary War), the first fireproof building in America (erected in 1822), the Old Slave Market and St. Michael's Protestant Church, where Washington and Lafayette worshipped when in Charleston.

As the rallyists discovered, the Charleston area has much to recommend it to tourists. The old section of the city is unbelievably picturesque and historical, yet unspoiled by commercialism. It is a New Orleans with an underactive thyroid. Narrow lanes stop, start and jog all over the place. Some are too small to admit cars, others retain their century-old pavement. Brightly painted frame, brick and stucco antique houses and buildings feature wrought iron gates, stained glass windows and window





**TOP LEFT:** The action gets hectic for a checkpoint team perched precariously at swampside.

**CENTER LEFT:** A Corvette rally team stops by one of the easier-to-find checkpoints.

**BOTTOM LEFT:** Contestants go through some rapid preventive maintenance maneuvers at a rest stop.

**BELOW:** Rally committee member Bill Cox waiting at the finish line.



boxes dripping flowers. All are generally well kept, thanks to the citizenry and the Historic Charleston Foundation.

Now, there are historical harbors and historical harbors but Charleston appears to take first prize. Jutting up out of the water near the Atlantic Ocean is Ft. Sumter, site of the official opening of the Civil War. On the mainland directly opposite is Ft. Johnson, which Confederate troops used as a gun position to bombard Sumter. Near Sumter in the harbor is Castle Pinckney, a smallish island fortress which was the first Union-held territory captured by the Rebs. Further out along the shore is Ft. Moultrie, which holds another "first." It was the site of the first decisive victory by American troops over the British.

History aside, the rallyists found many other features that made their trip to Charleston enjoyable. The city has good accommodations and restaurants, and is handy to the famed sweeping Carolina beaches with good swimming, fishing and surfing (it was a little too cold for the water sports). Sea food gourmets know Charleston as the home of "She-Crab Soup." Similar in taste to fish or clam chowder, the soup is made with female crabs. Since the females are smaller, they were once considered only as a last resort for soup. William Deas, the chef at Everett's Restaurant in Charleston, found he could doctor up "She-crab soup" to taste better than "He-crab soup" (the crab roe does it). Deas and his soup became

local luminaries. (Interested gourmets will find the recipe at the end of this article.)

Back on the rally road, as the sun peaked in the east on the first day, the contestants departed beautiful downtown Charleston for the hinterlands of South Carolina. From then on, it was a guts-a-go-go rally. There were such distractions as a long freight train, a loop-the-loop that sent the casual rallyist through a checkpoint the wrong way, the elusive historical marker on The Battle of Lower Bridge (tucked away at a 'Y' in the road) and an all-but-impossible-to-find lunch stop at Moose Lodge near Kingstree (which some missed).

From about 1:30 pm on, things went along fine until the rallyists came to an instruction that said, "Turn left 4.85 miles after Broad Branch." Broad Branch was a little stream and it seemed easy to go 4.85 miles past it and turn left. Only, upon reaching the 4.85 mile mark, the rallyists met situations where they could turn left, then go right; go left then straight; go left then straight, then left. The right way was to go left, then right. Many went left, then wrong. Anyway, there was a checkpoint there that some never made and others passed four times seeking the right way to go left.

At the end of the first day's run, the rallyists returned to Charleston. There was a good deal of muttering about "disappearing" checkpoint stations and misspelled signs. One navigator made what was supposed to be a joking attempt at strangling rallymaster Jonte (spectators at the incident differ as to how much "joking" was involved but Jonte seemed amused).

The contestants arose the second day at dawn and again started from The Battery on Charleston Harbor. This time, there was no tour of historic buildings. The rally convoy drove straight to the South Carolina swamp country. Nary a mud puddle had been sighted the first day. And if Marion roamed that area as "The Swamp Fox," he didn't even get his paws damp. However, the second day's run went through some no-kidding swamps with brackish water and moss-hung trees. You could almost hear the British splashing around looking for the elusive Colonials. It was much easier than the calculator buster of the first day and the rallyists appeared to enjoy the ride.

Winners of the rally were Jim and Barbara Bickham of Upper Sandusky, O., in a Mustang (she drove, he navigated). Finishing second in a Barracuda were Dennis and Sally Anne Koelmel of Huntington Valley, Pa., the 1965 S.C.C.A. national champions. Third place went to James and Grace Neinast of Charlotte, N.C., in a Corvair.

The highest placed Corvette team furthered the cause of matrimony and rallying. Jack and Joyce Ladd of Middleport, N.Y., in a 1966 Corvette, finished eighth and were cited as highest place husband and wife team after the leaders. Another Corvette duo, David and Lois Russell of Orchard Park, N.Y., who finished 13th, were given recognition for making the longest journey to participate in the rally.

The awards—and a very suitable souvenir Swamp Fox Rally medallion in the shape, naturally, of a fox—were presented at a victory banquet at the end of Sunday's run. No real threats were made on Jonte's life and many vowed another try at The Swamp Fox next year.



### **SHE-CRAB SOUP**

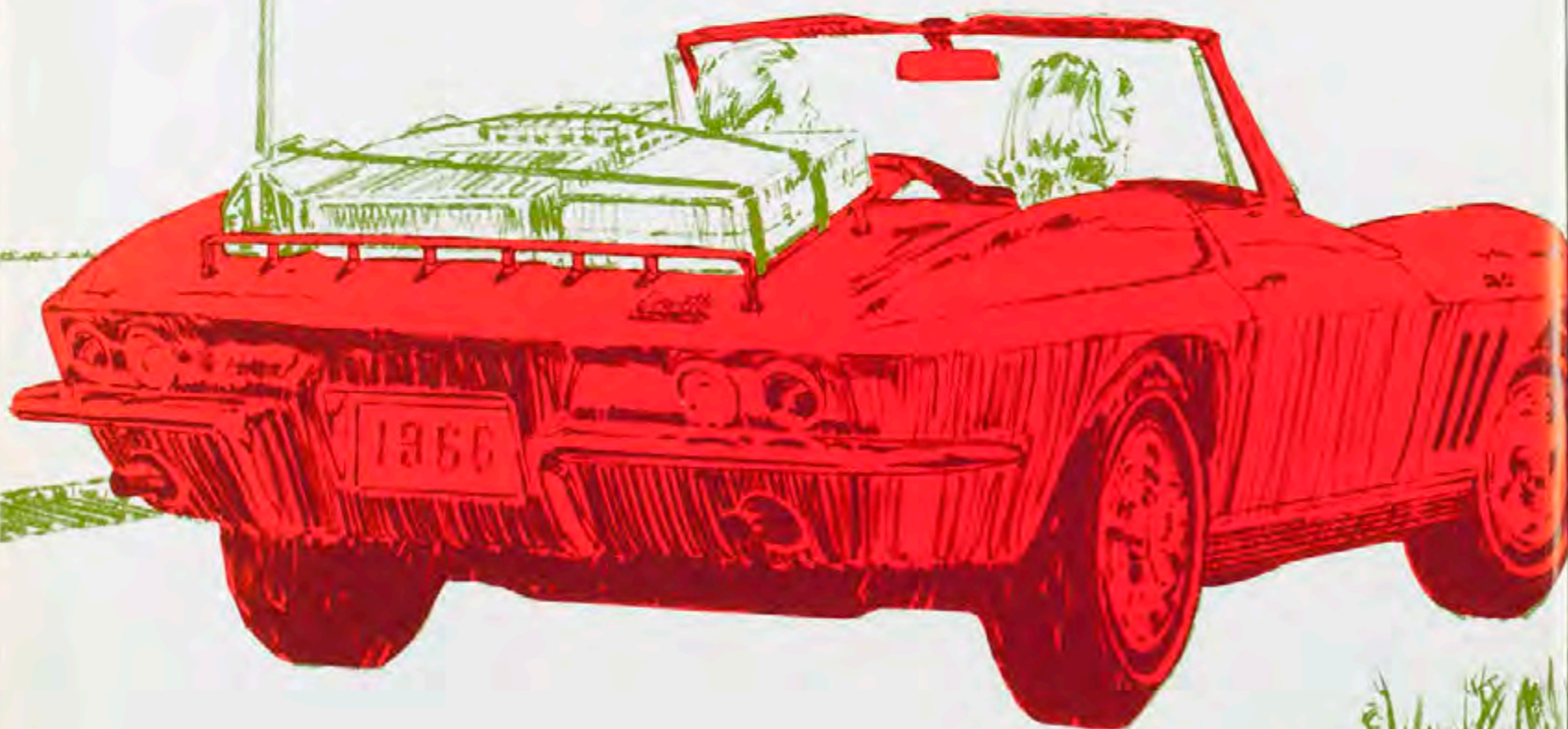
- 1 medium onion—chopped
- 1 lb. white crab meat
- 2 1/2 pints of milk
- 1/2 lb. of butter
- Worcestershire sauce (to taste)
- Salt (to taste)
- 1 teaspoon of cornstarch
- 1/4 lb. crab roe—chopped
- 1/2 cup sherry wine

*Saute onion over low heat in half of the butter until soft but not brown. Add crab meat. Heat—but don't boil—milk in top of double boiler. Add crab meat mixture and rest of butter to milk. Add Worcestershire sauce and salt. Stir cornstarch into an additional 1/2 cup of cold milk and add to soup. Add crab roe and sherry wine. Serve hot.*

## things to remember this July...

swimming suit  
dancing shoes  
sunglasses  
cash  
aspirin  
camera  
smile  
loud shirt  
antacid pills  
Corvette

## two swinging Corvette Conventions



This somewhat random list of convention goodies is just a reminder to the well-equipped Corvette enthusiast of things to bring when setting out for one of the two Corvette Conventions taking place come July. When mapping plans for a summer vacation, give thought to attending one of these Vette get-togethers... both with plenty of appeal and excitement. *Corvette News* will be on hand to cover each of them so we'll be seeing you there.

### EAST

The annual National Council of Corvette Clubs Convention, open to any National Council member, will be held in Baltimore, Maryland, July 13-16. If history is any indication, there'll be nothing but fun, fun and more fun—prerequisite for Corvette Conventions. Host club for the NCCC Convention this year is the Corvette Club of Baltimore. And they've prepared a time for everybody... a good one! During the four days, conventioners will pack in three parties, two luncheons, a pleasure trip by bus around Baltimore and a pleasure cruise by boat around Chesapeake Bay, a general membership meeting, a dinner and a concours. Last year more than 300 goers from 22 member clubs attended the NCCC Convention in Cleveland. With even more predicted for this year's doings, it's going to be a festive occasion in Merry-land—Baltimore that is. Plan to attend... put your reservations in early. Write to the Holiday Inn Baltimore-West, 6401 Baltimore National Pike, Baltimore, Maryland 21228.

#### NCCC CONVENTION

July 13—Registration  
Get acquainted party in the evening  
July 14—Registration  
Welcome luncheon  
Pleasure trip in the afternoon (by bus)  
Pleasure cruise in the evening (by boat)  
July 15—10:00-11:30 a.m. Council Governors' meeting  
2:00-4:30 p.m. Concours  
7:00-8:00 p.m. Cocktail party  
8:00-12:00 p.m. Dinner  
(sponsored by Chevrolet Division)  
July 16—10:00-11:30 a.m. General membership meeting  
11:30 a.m.-1:30 p.m. Luncheon & awards  
2:00 p.m. Party at A. D. Anderson estate (sponsoring Chevrolet dealer)

Information:  
Gary A. Cross, NCCC President  
6672 Balsam Dr.  
Reynoldsburg, Ohio 43068  
Phone: 614 866-3396  
John Grove  
1204 Elmridge Ave.  
Baltimore, Maryland 21229

### WEST

For another big July bash... the Western States Corvette Council Convention. This one is being planned and sponsored by the Cornhusker Corvette Club of Omaha, Nebraska, and the Clippinger Corvair-Corvette Club of San Gabriel Valley, California. And it's open to any Corvette owner, club member or not. Officially, the convention will run from July 8-10. But for early arrivals, some great spectator sport—the Pikes Peak Hill Climb takes place on July 4 in Colorado Springs. It's possible to make convention reservations at the Holiday Inn-West in Denver and still take in the Hill Climb in Colorado Springs, only a short drive from Denver. Plus, it's a great chance to enjoy some of the wonderful Western scenery before the convention begins. For reservation details, contact Dale Nelsen, Cornhusker Corvette Club president, or Bob Wingate, chairman of the Corvette Council of Southern California.

#### WESTERN STATES CONVENTION

July 8—Registration  
7:00 p.m. Cocktail party  
July 9—9:00 a.m. Scenic 3½-hour rally  
3:00 p.m. Seminar meeting for all in attendance  
8:30 p.m. Pool party  
July 10—9:00 a.m. Corvette autocross (gymkhana)  
1:00 p.m. Picnic and concours d'elegance  
7:00 p.m. Trophy presentation and banquet

Information:  
Dale P. Nelsen  
1360 S. 75th St.  
Apt. No. 4  
Omaha, Nebraska  
Phone: 402 393-7562  
Bob Wingate  
18731 Nubia St.  
Covina, California 91722  
Phone: 213 339-0798

# BUILDING THE 427

From foundry to shaving cream to boxcar



In manufacturing Corvette's 427-cu.-in. powerplant (along with other Chevrolet Turbo-Jet V8's), old-fashioned know-how and painstaking handwork are blended with some of the most highly sophisticated, electronically oriented equipment in the world. At one point, shaving cream is used—to insure quality. It all takes shape outside of Buffalo, New York, at the Tonawanda Engine Plant. On these pages are some of the scenes and words that describe the meticulous quality manufacture of Corvette's powerful 427.

1. From the foundry facility and rough machining stations, bare blocks with main bearing caps come to the assembly line. Block surfaces have been carefully broached and cylinders honed; main and camshaft bearing bores have been line-bored for precise alignment.

2. In the background can be seen the final cleaning tank, where every nook and cranny of the blocks are subjected to ultra-high-pressure jets of hot cleaning solutions and hot-air blasts for drying. After the blocks are thus made "sterile," the first step of assembly is the installation of the camshaft.

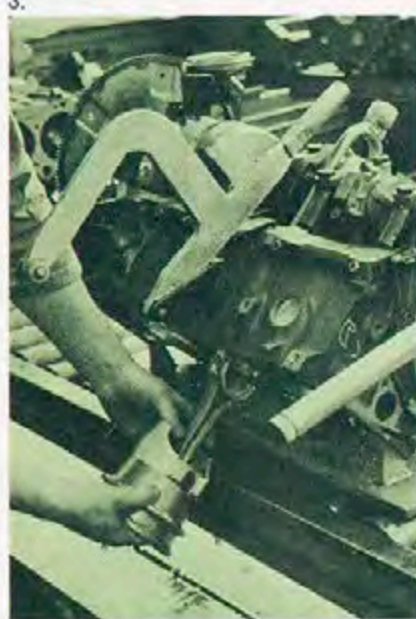
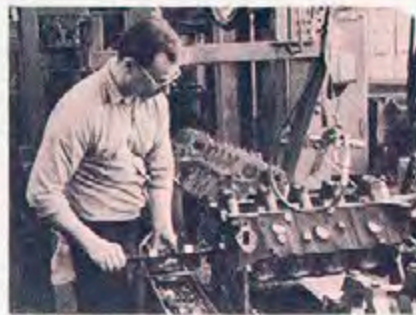
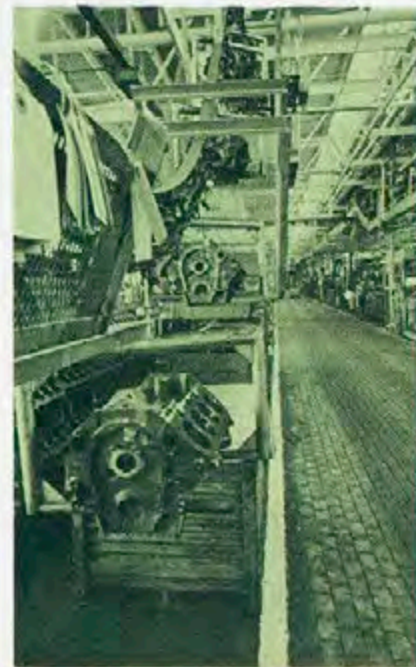
3. All 20 main bearing cap bolts are loosened simultaneously by a multiple-socket air wrench—called a nut-runner. Main bearings are then installed into the caps and lubricated. At this station, the mechanic gently lowers the crankshaft into the block, re-attaches the main bearing caps and rough-tightens them with another 20-socket nut-runner. Each bolt is then torqued by hand.

4. An aluminum alloy and nylon timing gear, timing chain and crankshaft gear are attached as a unit with a special guide-tool. Attaching bolts are installed and rough-tightened. These bolts, too, are tightened with a torque wrench.

5. A usually time-consuming job of installing pistons and connecting rods becomes a few simple steps when you have the proper tools. Piston, ring and rod assembly are slipped into a tapered cylinder-like installation tool. (The block is still upside-down.) A U-shaped hollow tube with a handle, shown in the photo, is slipped around the rod journal, through the cylinder bore and over the ends of the rod bolts. This guides the connecting rod onto the rod journal to prevent the rod bolts from nicking the journal during installation.

6. With the U-tube on the rod bolts and the piston guide in place, the entire assembly is pushed upward as shown in the illustration. Rod nuts are installed and out come the torque wrenches again.

7. After the flywheel and clutch are installed, an operator uses an exotic tool that includes a dial and operating levers. This tool checks alignment, adjustment and smoothness of engagement. It also checks release pressure. Next is oil pump installation (and torquing) and a double-check to make sure crankshaft oil seals are in place.





8. This nut-runner, with its 20-odd sockets, looks (with a bit of imagination) like an upside-down milking machine. It's "loaded" with oil pan cap screws, and as the machine is lowered, the individual sockets start to turn. Next, the self-centering oil pan cap screws thread themselves into the crankcase. When all sockets stop turning, the operator knows all screws have been properly tightened.

9. The next stage finds the complete short block assembly automatically turned over for installation of the cylinder heads. And this is where the shaving cream takes on its role. Even though cylinder heads are cleaned and flushed-out, there is a chance that an occasional particle of core sand might still be in the cooling system passages. Shaving cream is squirted into the passages to keep any particles from falling into the precision-machined parts of the engine as the heads are turned over and installed. (Shaving cream dissolves harmlessly in the coolant.) This operation would hardly qualify as "normal," but it's only one of the reasons Corvette engines enjoy an above normal reputation for quality and durability.

10. A day's use of shaving cream is represented by a barrel full of empty cans. The anonymity of brand "X" is maintained; the labels are removed prior to delivery to the assembly line.

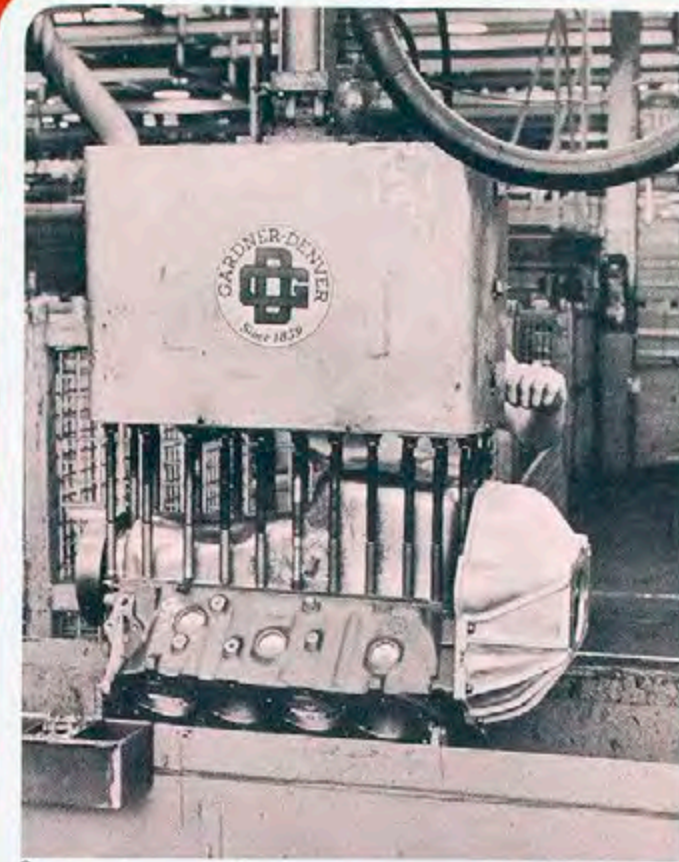
11. Meanwhile, back at the wrench . . . it is each cylinder head bolt that gets personal tightening this time. The quality standards under which this engine is built leave nothing to chance. There is not one nut or bolt that is not double-checked for proper tightness.

12. Initial valve clearance is always adjusted by hand with an "old-fashioned" feeler gauge. Even when hydraulic valve lifters are used, adjustment is still made by hand.

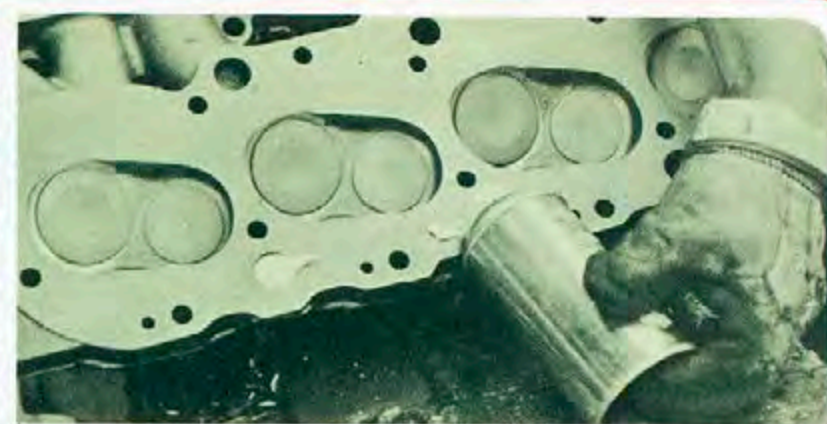
13. After manifolds, water pump and temperature-sending units are installed, quick-connect fittings are attached to the cooling system. High-pressure air is used to check for leaks.

14. With the exception of the carburetor and final installation of engine accessories, the engine is ready to run, and comes off the line for the first time as an assembly. Conveyors then take the engine to the test area.

15. On the test stand, the engine is completely hooked up; oil and water are pumped in and the exhaust system is attached. A hose and fittings pipe liquid petroleum gas into the intake manifold. A permanent starter drive on the stand is used to crank the engine.



8.



9.



10.



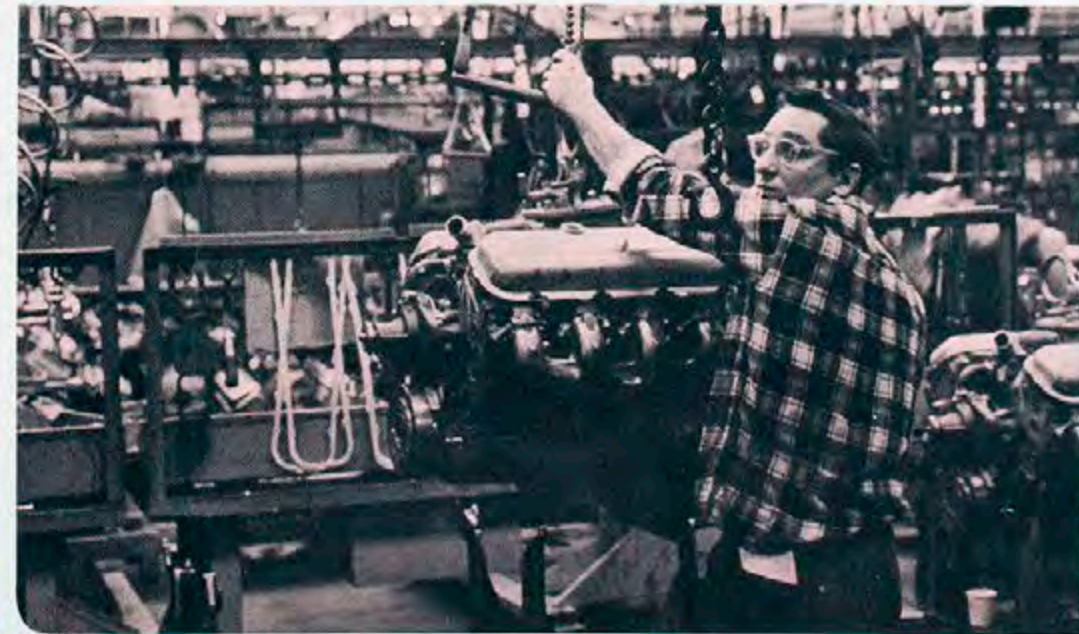
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12.



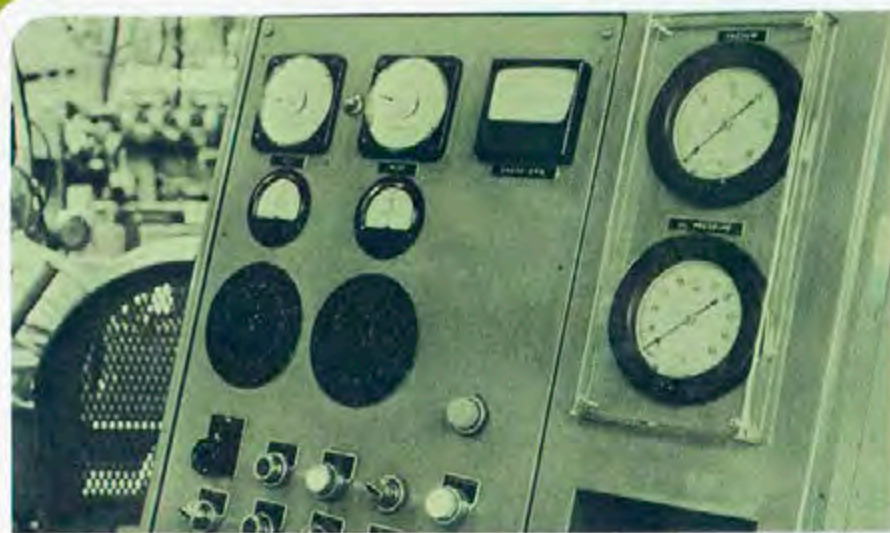
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14.



15.



16.



17.



19.



20.

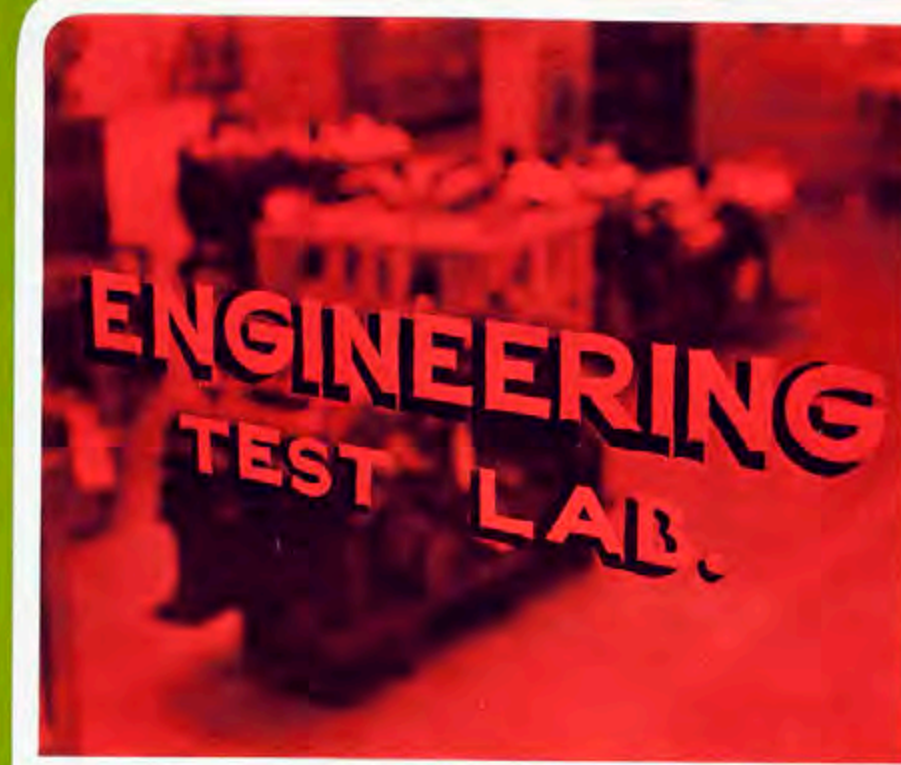
16. A complete instrument board next to the test stand tells the performance of all the components, including an indication of any imbalance.

17. Will it start? After months at such a job, the operator begins to take it for granted that every engine *will*! As the engine catches, the operator immediately studies the instrument board to make sure oil pressure is correct. On this brand-new engine, the pressure should be at least 30 psi at 600 rpm. At 1500 rpm, pressure should be in the range of 35-45 psi. In addition to oil pressure, the operator checks manifold vacuum, adjusts timing, checks for possible oil, water or exhaust leaks. There is no tolerance for *any* leaks. All rotating components have been balanced to within  $\frac{1}{8}$  oz.-in. before assembly, but at this station, the engine is balanced to *zero*! Final balance is achieved by welding on weights or by precise drilling of the harmonic balancer or flywheel. Maximum speed for any test stand operation has been limited to 1900 rpm.

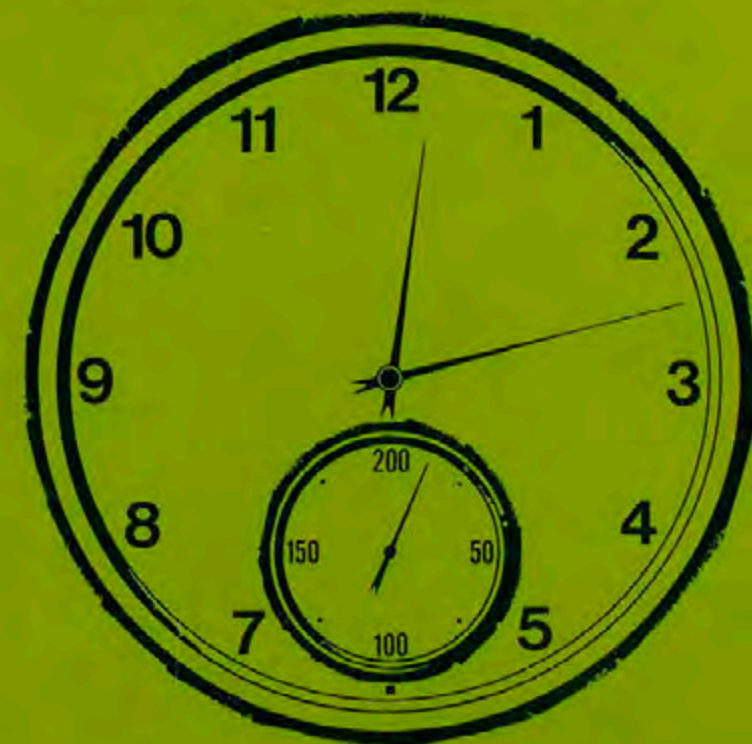
18. Once the engine has passed its first inspection, the operator then uses his "ear-meter" and long stethoscope probe to uncover possible extraneous, unwanted noises.

19. With the myriad of tests completed, the engine is sent to the painting area. Here, pre-formed masks are placed on the engine to shield all components that shouldn't be painted. With a "wall" of water behind and under the engines, they are sprayed with a quick-drying engine enamel.

20. From the paint area, engines are removed from the conveyers and placed in nine-engine shipping racks. A fork-lift truck makes the final transfer to the boxcar. Next stop: the Corvette assembly plant at St. Louis.



## Some engines don't go to the boxcars



Not all Corvette engines end up in Corvettes. In fact, some never leave the plant—except in pieces in the scrap barrels. A number of engines are taken from each day's production and torn down for minute inspection in the Tonawanda Reliability and Warranty Center.

Other engines are taken from each day's production and put on dynamometer test. In what is called a 200-hour durability test, engines are cycled every 30 seconds. In other words, they are accelerated and decelerated in a 500-rpm range for 200 hours straight. In this constant cycling, manifolds get a cherry red and stay that way for the entire time. With this grueling test procedure, a question would naturally come to mind. How often do the engines scatter? On questioning, one dynamometer operator answered (with a twinkle in his eye), "I don't remember one scattering . . . but then, I've only been here a few years."

After this Spartan service on the dynamometer, the engines are not put to rest, but are subjected to the final test of being completely torn apart, analyzed, sawed, filed, measured for wear and inspected to the smallest detail. Once all the quality control checks have been satisfied, the bits and pieces are consigned to the scrap barrel . . . to be melted down at the Chevrolet foundry to perhaps become another red Corvette engine.





