

CARE AND RACE PREPARATION

The Corvette

Article by Donald F. Yenko. Illustrations by Don Datz.



Photo by Larry Tomaras

Don is a graduate of Pennsylvania State University in Business Administration, and has been in the automobile business for the past ten years. He has operated an exclusive Corvette Service Center for the past three years, and has already serviced and prepared 20 SCCA Corvettes for active competition. He is now entering a team of Corvettes in National races.

In 1953 a fiberglass two-seater roadster was shown at the General Motors Motorama. So great was its acceptance by the spectators that Chevrolet decided to produce this vehicle on a small-scale basis. Starting from scratch, it took four years of crash engineering and development to strengthen the breed into a full-fledged competition sports car. Since that time (1957), the Corvette has racked up four National class championships and has almost completely dominated the B Production group. This vehicle lends a partial paradox to the term "Detroit Iron", and should instill a bit of pride into

every American who drives one.

Before delving into the preparation of the Corvette for racing, let us consider the equipment available for this automobile. I will state bluntly that without the following options the Corvette cannot seriously be raced. While it is true, I have heard, that some people compete without all of these options, I feel that they are wasting their time and perhaps endangering their lives.

Mandatory Options:

Positraction rear axle— #675	\$ 43.05
Heavy-duty brakes (with special steering)—#678 .	333.60
315 hp fuel-injection engine —#354	484.20
4-speed transmission—#685	188.30
Wide-base wheels—#276 ..	no chg.
Straight-through mufflers ..	no chg.

For your information, the manufacturer's suggested retail price for the basic car is \$3,934, plus freight. (For example, the Western Pennsylvania

freight charge is approximately \$50.)

It is hypothetically possible to fit racing tires and a roll bar to the above equipment and "go racin'". However, as in most sports cars, careful preparation goes a long way in changing a good competitor into a trophy winner. (Don't tell your wife about this until after you have purchased the car!)

I. Making It Go

A. Fuel Injection: The Rochester fuel injection is one of the most delicately balanced and precise operating units of its type in the world. Many mechanics find it superior to the more expensive, so-called "controlled leak" variety. It naturally follows that a carefully calibrated injection adds to the performance, but this type of operation can only be done by an expert with proper equipment. Nevertheless, there are a few things which the individual owner can perform in his own garage.

Unless the course is extremely sandy, I would recommend the removal of the air cleaner. A fine mesh screen of about screen-door consistency should be installed at the entrance to the tube. It would be advisable to remove the nozzles and the nozzle block vent line (which serves as pressure equalizer for the nozzles) after practice is over, and clean them thoroughly. This will preclude the possibility of a clogged nozzle.

If you have any doubts about your fuel injection, bench testing may offer a method of trouble shooting. A powered drill can be connected to the drive cable which is, in turn, connected to the fuel meter pump. The unit should be blocked up over a pan. Next, fill the fuel meter with fuel. Running the injector with the drill will graphically illustrate the fuel flow. The streams of fuel from the nozzle should be almost perfectly aligned with each other, and of equal volume. (See Figure #1.) If they are not, check the following: (1) Kinked nozzle fuel lines; (2) Partial blockage of the fuel distributor outlets;

Fig. 1—Bench testing—fuel injection.



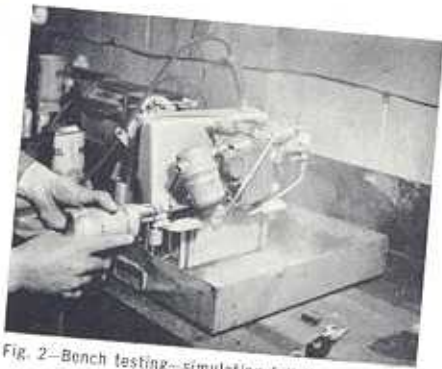
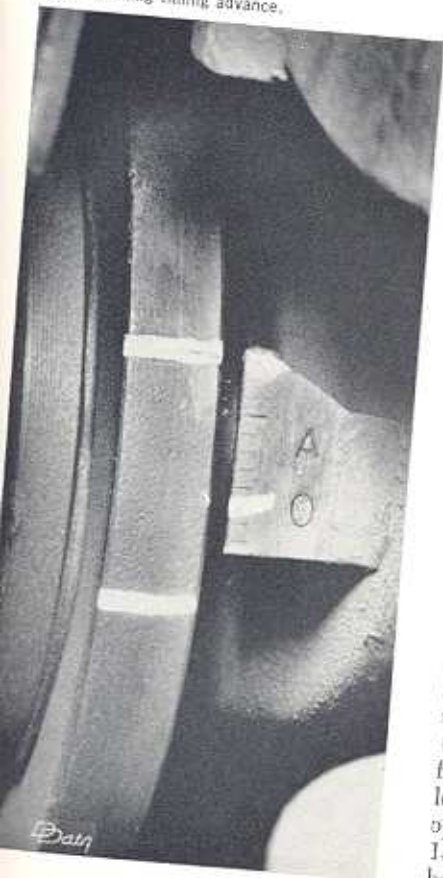


Fig. 2—Bench testing—simulating full throttle.

(3) Partial blockage of the affected nozzles; (4) Mismatched nozzles (check code on side of nozzle). By pulling a vacuum on the fuel enrichment diaphragm line (the tee on top of the fuel meter), you can duplicate the injector running at full throttle. (See Figure #2.)

The use of an exhaust analyzer or "smoke box" is the easiest way to check for the proper fuel mixture. The ideal mixture at 4,000 rpm's will usually be between 11.5-1 and 12-1. Mixture adjustments can be made by turning the idle or low-speed enrichment stops, which are controlled by a small movable lever located on the left front side of the fuel meter. For a richer mixture, adjust the enrichment diaphragm

Fig. 3—Marking timing advance.



lever to a position closer to the engine. Be sure when adjusting this stop to compensate for it by making an equal adjustment in the same direction of the maximum enrichment stop (the one closer to the engine). Mixture ratios that are leaner may result in slight engine performance increases, but almost invariably can be depended upon to put holes in your pistons.

B. Timing: Since all Corvette distributors do not have precisely the same rate of advance, it is impossible to categorically state a correct spark advance for every engine when it is static or idling. Unless a distributor stroboscope is available, the best method is to mark 2" (38°) in advance of the existing mark along the circumference of the vibration damper. Looking at the timing tab, your 2" mark will go toward the left front fender (See Figure #3). With the timing light installed on the #1 wire on the distributor cap (make sure it's #1), run the engine to 5,000 and line up your new mark with zero on the scale. Of course, timing is accomplished by loosening the distributor and rotating it. For the sake of precaution, the timing should be checked just once at 6,000 to make sure the distributor is not advancing too much at engine speeds of over 5,000 rpm's. An advance of not more than two or three degrees can be considered normal. Be sure to run a check on your timing after practice. New rubbing blocks wear quickly.

C. Exhaust: Much can be gained by removing the present exhaust pipes and substituting a straight pipe design. The stock system on the 1961 Corvette somewhat resembles a pretzel. Arrange your system to travel just inside the frame rails on either side, and exhaust just forward of the rear wheels where the frame starts to loop over the wheels. If you wish to keep your Corvette a dual-purpose car, suspend straight pipes to the rear of the car and install clamp-on silencers. (See Figures #4-5). "Racket busters" seem to do the job well.

D. Balance: Engine balance a la factory is quite satisfactory and is best left alone. Naturally, if at some time a crankshaft is replaced a balancing job is required.

E. Tires: I do not like to be placed in the position of giving tire testimonials (especially since I have received no financial remuneration!)—thus the following statements are my *personal* opinion only. The Michelin "X" 6.70x15 is an excellent all-purpose tire. It has exceptional wearing qualities and,



Fig. 4—Dual-purpose exhaust system.



Fig. 5—Dual-purpose exhaust system.



Fig. 6—Typical tire wear pattern.

as a rain tire, can't be beaten. When using them in the dry, inflation should be 48 to 50 pounds. When the course is wet, lower pressure to 30 psi or less. Caution: if speeds of over 110 mph are encountered, raise "wet" pressure to at least 35 psi.

If you can afford two sets of tires



Fig. 7—Example of properly matched ports.

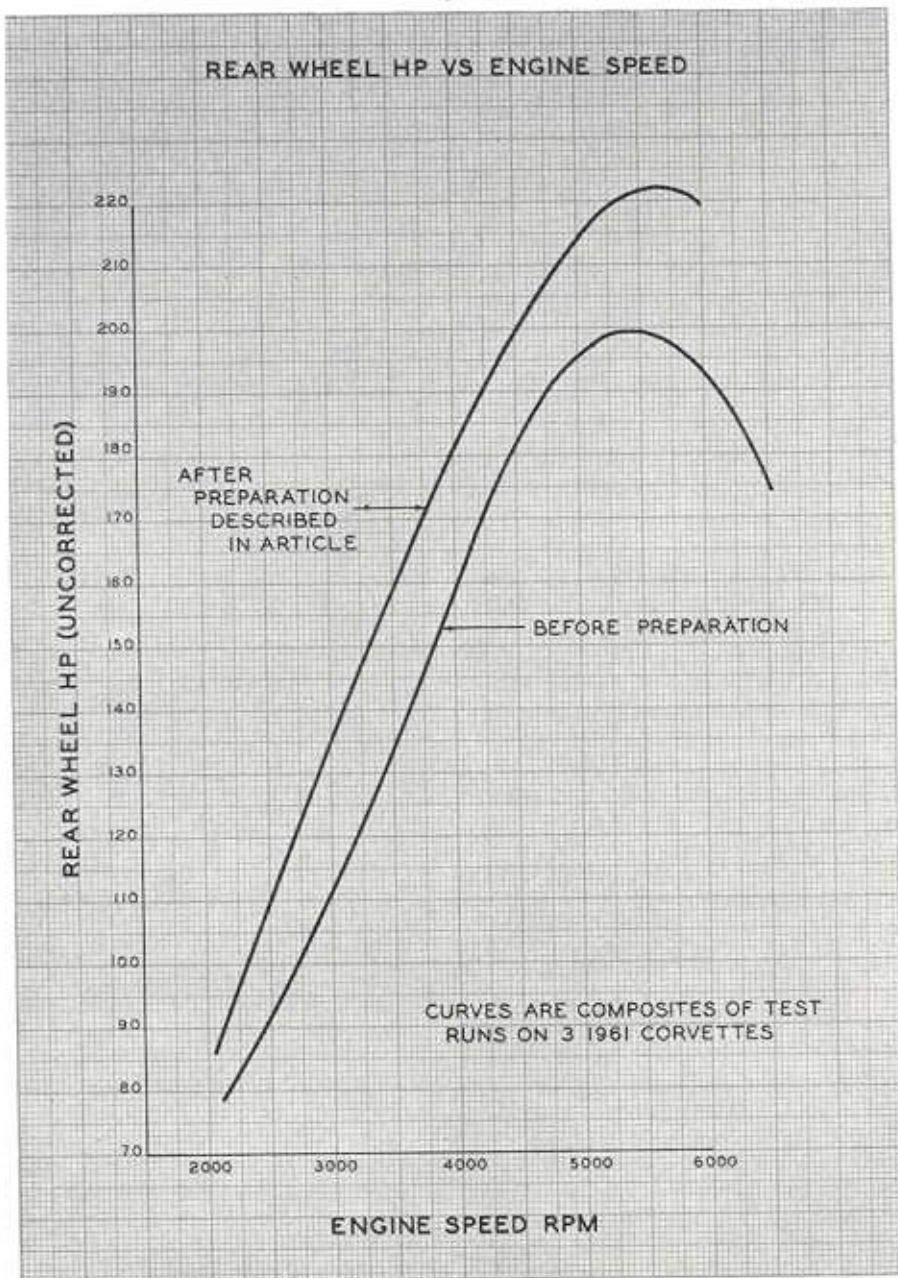


Fig. 8—Cylinder head before polishing.

and wheels—i.e., dry tires and rain tires—then mount up a set of Good-year Sports Car Specials. This tire holds a corner commensurate with the Michelin, but its real advantage lies in the fact that recoveries can be made from almost impossible slides and skids, otherwise known as “over-enthusiastic drifting”. Control is almost never lost. It lends itself well to the type of driv-

ing I am usually identified with—“goose loose”. I like the feel of it inflated to 30 psi. If it starts raining you’re headed for the boondocks anyway! Dropping pressure helps a little, but the Sports Car Special is no rain tire. Unfortunately, the tire is no great shakes for wear either. I can’t seem to make a set last more than two races. (See Figure #6.)

Fig. 9



I cannot form a valid opinion on the Firestone Super Sports tire, having had very little experience with it, but I am sure that it and many other tires, both foreign and domestic, are well worth your consideration as they are used by many competent drivers.

F. Suspension: The Corvette optional competition suspension for 1957 thru 1959 differs from the newer models in that it is very stiff and unyielding. It takes a strong “constitution” to ride these models over the local railroad crossing without loosening one’s upper plate. The package consists of heavy-duty shock absorbers all around, heavy-duty front coil springs, heavy-duty rear semi-elliptical springs, and a larger front stabilizer.

The 1960 to 1961 models do not offer an optional competition suspension but, rather, feature a compromise type for both street and race. This suspension is much softer and offers a good road feel. However, it is just a little “squishy” for the course. A set of four Koni adjustable shock absorbers adjusted about three turns from minimum seems to do the trick. There is still quite a bit of “lean” to this type suspension, but for the long wide-open courses like Elkhart and VIR it would have an advantage over the older type suspension; conversely, the older suspension would have an edge at Marlboro, Vineland, or other tight courses. Unfortunately, Chevrolet did not see fit to release the third sway bar for production. Under FIA rules we used it at Sebring, and were ecstatic about the handling qualities it added.

G. Clutch: For those of you who prefer a fast clutch coupled with a stiffer pedal, the shop manual covers the changing of the clutch bell crank to very easily achieve this effect. I do not care for the change since it becomes quite tiresome to me (okay, so I’m weak).

H. Front-End Geometry: For short courses: Toe-in— $\frac{1}{8}$ ”; Camber— $\frac{1}{4}$ ” to $\frac{1}{2}$ ”; Casters— 1° . For wide-open courses with long straights: Toe-in—0; Camber— $\frac{1}{4}$ ” to $\frac{1}{2}$ ”; Caster— 2° .

We are now reaching a plateau in the law of diminishing returns. Categories “I” and “J” are only for the “well-heeled” driver who wants even those last four or five horsepower for much, much work.

I. Matching Ports: We have found in extreme cases that cylinder head ports have been as much as 1/16 of an inch out of alignment with the fuel injector adapter plate. Matching the ports in a case like the above will be very cheap

horsepower. Remove the heads, of course, before you start your grinding. Do your cutting on the heads only. Do not enlarge the ports. Not only is this illegal, it's unnecessary. Remember to cut the intake manifold gaskets according to your matched ports. (See Figure #7.)

J. Cylinder Heads: Since you have the heads off, look at them. There is *nothing* smooth about the inside passages (See Figure #8). Get a 20,000 rpm grinder with a polishing head, and go to work. You should be done in a mere two or three days! If you are really "gung ho", don't forget the exhaust manifold, fuel injection adapter plate, and the fuel injection air chambers. (See Figure #9.)

II. Making It "Whoa"

It is utterly remarkable to see how well these fast 3,300-pound monsters can get to 100 miles an hour and back. Can you imagine the forces that Corvette brakes must handle? Nevertheless, Corvette has had little brake trouble in its brief history. Our biggest trouble has been getting them past the "all-important" brake test. The inspectors still seem to harbor that archaic distrust of those "Detroit animals".

There are two roads between which we may choose at this juncture: *cerrametallix versus sintered iron linings*. The former option was offered from 1957 to 1959, the latter from thence on. The 1960 sintered iron linings were much harder in texture; consequently, wore well but proved (like the clutch adaptation) to be very tiring. They are no longer available. The 1961 sintered iron linings, being softer in texture, are quite effective but wear faster. The 1957-59 cerrametallix is very erratic when cold, becomes very effective for about 20 or 30 minutes, then enters another erratic period where the car pulls either left or right upon application. Wear is not so good as the 1960 sintered iron, but is comparable to the 1961 brakes. The 1961 sintered iron brakes will stop evenly almost indefinitely, and will outstop the cerrametallix after 20 or 30 minutes (previous to that, cerrametallix have an edge). Confusing? Name your poison — both available. Adjust your cerrametallix 25 to 30 clicks off lock-up; sintered iron,



Fig. 10—Corvette brakes, illustrating air screens.

15 to 20 clicks. Make sure that you have approximately one-half brake pedal before entering race.

Back to inspection. Don't let the technical official talk you into filling up your brake master cylinder; it must be at least three-quarters of an inch from the cap (it's usually easier to syringe it out than to argue with him—okay, so I'm a coward).

Replace your wheel cylinders and lines and rebuild your master cylinder at least once a year, whether they need it or not. This is akin to the Saturday bath in that they'll surely need it. Most brake troubles are in the wheel cylinders—when in doubt, replace.

Clean the air screens on the brakes with a stiff wire brush. (See Figure #10). Only the very best brake fluid should be employed. Delco Super 11, Puritan 60 or Castrol are suitable types.

III. Peculiarities of the Beast

At some time in the life of your Corvette, the gear-shift pin at the bottom end of the shift lever will break—probably when you are in the lead on the last lap of "Les Six Heures de Marlborough". This is okay if you're in the right gear, because that's where it will stay. After the checkered flag, replace the stock pin with one of the case-hardened variety and safety it in. In fact, if you adopt the adage "when in doubt, safety" in all cases with any sports car, you'll be money ahead (it works at home, too). Safety with airplane lock nuts, cotter keys, or gang safety wiring. The most critical areas for this are the entire clutch linkage, the water pump, front suspension and rear engine transmission support.

IV. Three Biggest Problems

Through the years the chronic plight of DNF's seems to remain unchanged.

It centers around: (1) Water pump leaking; (2) Fan belts coming off; (3) Spark plug wires burning or falling off. Since the water pump also supports the front of the engine, it has a tendency to work loose. The safetying as recommended previously should preclude this difficulty. The other two problems seem to defy solution. For some reason I have not encountered the fan belt problem (my left knuckles are beating on the table bottom), but almost every sports car crony of mine has been plagued by it. The solution seems to be just to line up the generator as carefully as possible with a square or, as I have seen, a homemade tool designed like a square that fits over the generator with its long leg projecting down the belt. After you are sure things are aligned, tighten the belt as much as possible (I'll admit this sounds screwy, but it seems to work—still knocking on wood). After all these preparations, buy yourself one of those "modern" ammeters which translate the discharge segment of the ammeter to a red lamp, and mount it where you will see it during a race. It won't stop the belt from coming off, but it might keep you from frying an engine if it does.

Fig. 11—Replacement ignition wiring.





Fig. 12—Example of custom gauge installation.

As for problem number three, there are as many solutions as there are cars. If you have a Corvette with radio shielding, *take it off*. It eventually cuts through the wire near the fire wall. While you are at it, on *any* Corvette, remove the "radio" wiring and carefully destroy it (otherwise, some poor soul may use it again). Any good ignition wiring will serve as a suitable replacement. (See Figure #11.) It's imperative that the wires be kept away from the exhaust manifold. We like to run the wires to a clamp on the side pan and thence to the spark plug. Here is another touchy location. Since there is no splash pan under the engine, a stone can knock off one of the wires,

leaving you running *sans* one cylinder—quite an exasperating experience, and harder to detect than you might think. Ye Local Hot Rod Shoppe should be able to furnish you with spark plug connectors. I use the Porsche-type myself (please don't protest me, Bruce).

If you haven't replaced the seals correctly between the fuel injection adapter plate and the block, the Corvette has a unique way of admonishing you. Watch for oil leaking fore and aft around these seals. If you don't it may cost you an engine.

While we are grateful that Detroit saw fit to give us honest-to-goodness gauges instead of winking red and green Christmas lights (don't sneer, I've seen them on some foreign machinery), there is one panel change worth making. A quick-acting Stewart-Warner or other dial-type temperature gauge should be installed. The present gauge is "pegged" at 220°. While a Corvette can run safely at 220° (and must at times), it is unwise to run it at 230° plus. This you cannot differentiate on the standard gauge (See Figure #12).

By the way, if you haven't already, get rid of the antifreeze.

Remove the distributor and check



Fig. 13—Illustration of soldered-on timing stop.

the advance mechanism. If the advance stop has a neoprene collar around it, remove it and replace with a metal equivalent soldered to the stop. The factory's collar is okay until it falls off and lets your timing advance to over 50°—oops, there goes another piston! (See Figure #13.)

Spark plug choice is another matter of individual preference, but the main consideration is using sufficiently "cold" plugs. I prefer AC 42's, but many people are using Champion J 6's or J 5's. Factory recommendations on points and plugs are fine.

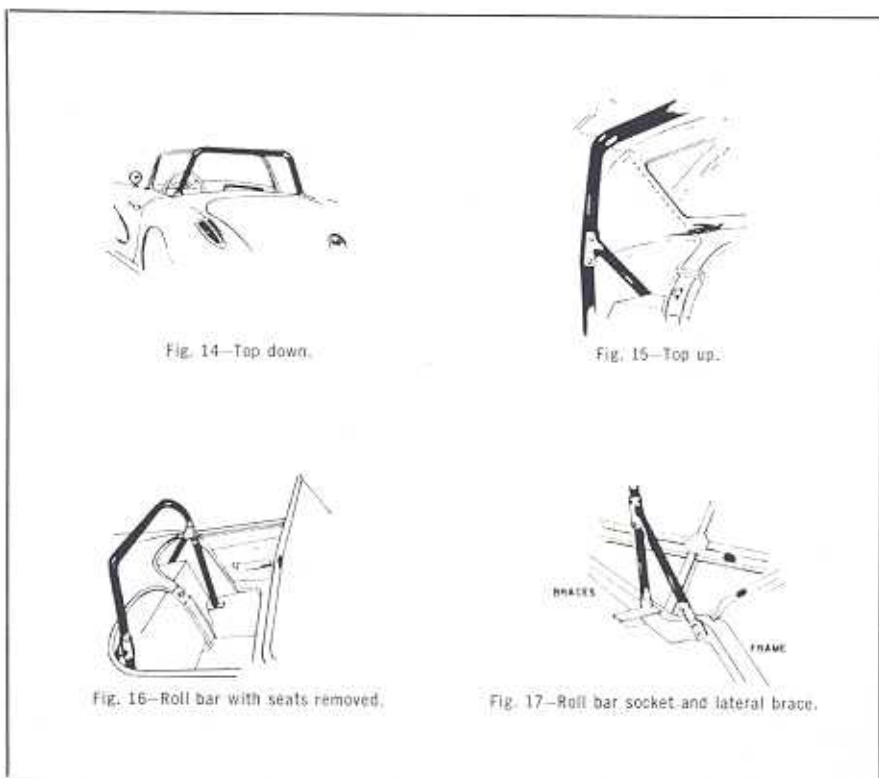
A heavier rear-end grease will kill a little power but may save you costly replacements. I use 140W SCL.

If you really want to be sure about things, completely magnaflux the crankshaft and all connecting rods, and Zyglo all pistons. If you replace any parts remember to use the same weight components, or you'll disturb the original balance.

The Corvette windshield is quite a large piece of glass, and to call it removable is ludicrous. It is quite a job, especially when you consider the mandatory removing of the upright side channels. The weight and wind resistance saving is negligible. The major consideration is how cluttered with windshield-breaking rocks your course is, and whether or not you can afford to replace a windshield now and then. In a race it's tough to drive behind one in the rain and it gets a little warmer in the cockpit with all that frontal area but, on the other hand, mom can drive your car Monday morning to the local psychiatrist without even mussing her hair.

The removal of the bumpers will save you a worthwhile amount of weight, but be sure to leave the grill intact as required by SCCA. No sig-

CORVETTE ROLL BARS



nificant gains can be made by the removal of other items.

V. Safety

No matter how big they get, roll bars never seem adequate. I use a two-inch outside diameter seamless 1013 tubing cold-bent, with lateral bracing and the whole thing welded to the frame. If you design your own make sure you can either remove it or pull the top over it. I agree with Stoddard in that chrome moly's advantages do not warrant the extra cost. (See Figures 14, 15, 16 and 17.) As soon as you get your Corvette, remove the seat belts. You will find they are anchored in the middle to nothing more than fiberglass and wishful thinking. Run a section of frame underneath the body and anchor the belts to it.

The addition of a clutch housing scatter shield is a good life insurance policy in that even the most experienced driver can accidentally overrev

to an extent that clutch parts will be weakened. When a clutch explodes, it's a shrapnel maker.

By all means magnaflux the entire front suspension; all wheels, all lug nuts and wheel studs. It's inexpensive and may pay big dividends.

VI. Miscellaneous

Most adjustments such as valves, engine clearances, etc., are adequately covered in the Corvette owner's manual. Stick to the factory's specifications.

A good grade of SAE 30 or 40 oil can be used, depending on the outside temperatures.

It would be wise to carry among your spares a transmission side plate. The four-speed transmission is rugged and has but one weak spot—the inexpensive, easy-to-replace side plate.

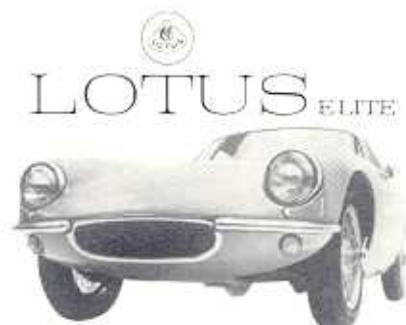
Unless you are contemplating Sebring or another course with straights in excess of 5,000 feet, you should need only two rear axle ratios: 4.56 to

1 and 4.11 to 1. Order your Corvette with one of these, and purchase the other as an assembly (price around \$115). It can be changed in less than two hours, and if you burn one out in practice it can be substituted as an expedient before race day.

VII. Summary

The Corvette, due to its simplicity of design and availability of parts, represents, in my opinion, some of the lowest-priced racing available.

For an exhilarating experience, pick a corner and watch the Corvettes go through. There's little to match the thrill of "busting" into a turn, pitching the beast sideways, then applying throttle to hold her there and broadside the entire corner in a well executed dirt track-type skid! It's sort of like having a tiger by the tail, and when you tramp on the accelerator without the greatest of discretion, it's like twisting the tiger's tail! Try it!



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