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TUNING THE STOCK CORVETTE

BY JAMES VEDENOFF

THE STOCK Corvette is one of the nicest pieces of automotive equipment ever offered to the American public. Even in its mass-produced form, it introduces to the buyer a revolutionary new world of driving pleasure, and as each driver becomes accustomed to the machine, he discovers that age-old American habit of tinkering—especially so if he takes the car out to his local drag strip.

Racing on the drag strips will result in the discovery of some rather interesting facts. The owner will find that his machine may accelerate faster to higher speeds than other indentical models, but he will inevitably run up against one or two other Corvettes—also identical to his model—that can turn the quarter-mile two seconds quicker and at top speeds higher by as much as 12 to 14 mph. At that time he will

Corvette #283, tuned by Jimmy Vedenoff and driven by Andy Porterfield, finds its usual position at the head of the pack just after the start of a 1959 race.

A familiar sight on West Coast tracks—Andy Porterfield taking a victory lap

realize that his beautifully finished machine is but raw material, that is, if he hopes to establish marks in competition. To achieve the ultimate in performance from his car, he will have to tune it properly and maintain it in well-tuned condition.

There is absolutely no reason why the average 290 model Corvette should not attain top speeds of around 105 mph in the quarter-mile, and cover the entire quarter-mile in elapsed times of around 13½ seconds; that is, after all the faults of mass-production assembly methods have been corrected. These faults—though they might just as easily be termed "production variances" rather than faults—will seldom be noticed by the average non-competition driver; it is not until the car is entered into comparative tests through competition that they become evident.

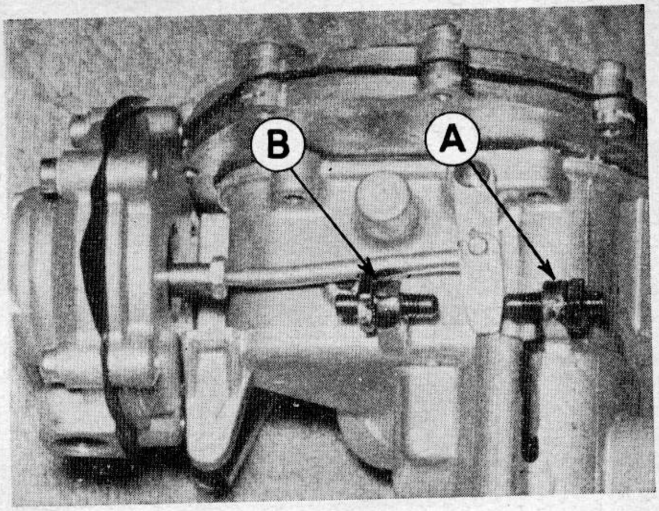
Most of them can be cured, however, by basic adjustments in the otherwise perfected group of components that govern the effective horsepower output of the fabulous Corvette 283-cu. in. engine. A few necessary tuning exercises can turn the average Corvette into a record breaker. Extensive experimentation in our own shops at Harry Mann Chevrolet Company in Los Angeles has taught us many useful modifications and adjustments, all of which have been judged as legal by the national and regional racing organizations where production class regulations and limitations are enforced.

There are many modifications that can be made to the chassis for better handling in competition driving and we will discuss these after showing what adjustments and modifications should be made under the hood. So, beginning with the engine, let's see what it takes to turn the average street Corvette into a high-performance machine.

FUEL INJECTION

One of the most perfect and least understood carburetion systems in use today is the Rochester Fuel Injection unit used on Corvette engines (also available for installation on any of the Chevrolet 265- and 283-cu. in. engines). The reason for the lack of understanding of this unit probably stems from its rather mysterious and complicated appearance. After a good look at it, most enthusiasts decide to keep their hands off, except for the simple idle adjustments, and after reading in the factory

Mixture control stop screws are preset at factory and must not be adjusted without use of Calibrator. Stop "A" is "Power Stop" and stop "B" is "Economy Stop." These adjustments are contained on the fuel meter and control movement of diaphragm control rod.



manual's warning that certain components are preset at the factory and cannot be adjusted without expensive machinery and equipment, the average tinkerer will say, "Well, sounds like it's running pretty good now. Guess I'll just leave it alone."

Unfortunately, many service mechanics also rely on this bit of printed warning to avoid having to disclose the fact that they also know very little about the various interior adjustments of the unit. Furthermore, few of them have the proper equipment to adjust the units for better performance or for competition uses.

There is, however, a solution, and it will be greeted by owners of Rochester Fuel Injected Corvettes with great enthusiasm. I refer to a new tool manufactured by the Kent-Moore Organization for release to service mechanics. Listed in their tool catalogue as J-7090—Fuel Injection Calibrator, this handy piece of equipment lists for only $37.50. Now, the interesting news is just this: Using the calibrator an enthusiast can install larger fuel nozzles in the morning before a drag race meet and in less than 30 minutes have the system adjusted for best power performance. That night, in the same amount of time, he can reset the system for economy operation on the street. Also, for the average non-competition driver, this equipment makes it possible to tailor the adjustments and economy settings to best fit his own needs.

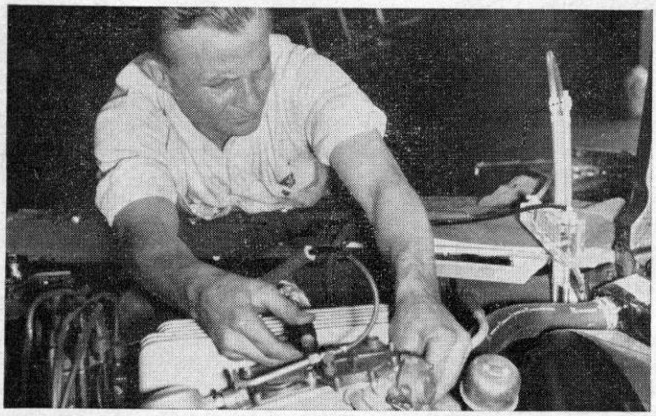
The Fuel Injection Calibrator consists of a mercury and water manometer combined into a single unit, a fuel trap and fittings required for installation to the nozzle and nozzle fuel line, and plastic lines for connection to the mercury and water manometer, plus a length of larger hose for attachment to the main control diaphragm vent tube. Using this tool, calibration tests are simple to perform and require only a few minutes of time.

Once the manometer has been installed (complete, explicit instructions are enclosed with it) adjustments will be made in the fuel meter only. To simple adjustments control the ECONOMY STOP and the POWER STOP; both are contained on the enrichment diaghragm control rod. After preliminary tests are conducted to establish just how lean or how rich the mixture is, the method of adjustment is simple. If the mixture is too lean, one loosens the ECONOMY STOP screw jam nut and turns the stop screw a couple turns toward the POWER STOP. The test is then run again and new readings will ascertain the amount of correction made. If the mixture is too rich, the adjustment is made by turning the stop screw away from the POWER STOP.

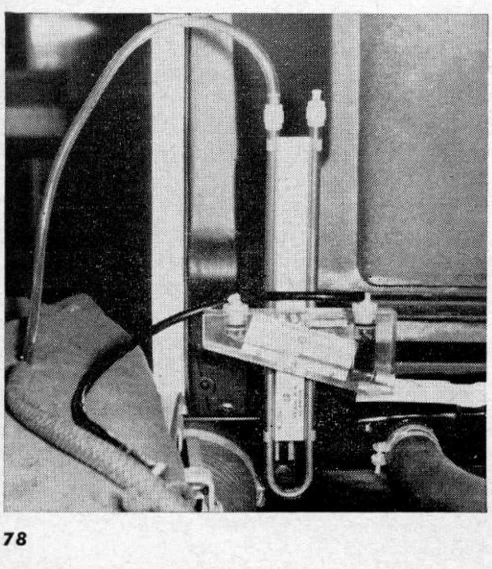
Without this calibrator it is impossible to set the mixture accurately, excepting with similar factory equipment at the manufacturer's plant (and even when using it one must pay strict attention to what the proper settings must be). Enclosed with the instructions accompanying the manometer is a complete listing of all Rochester Fuel Injection model numbers and recommended settings for each. Alternate settings are also furnished for engines equipped with any of the optional camshafts. These settings are based on normal usage demands by the average engine in the hands of the average driver. No rec-

1 (left) *Vedenoff assembles the Calibrator in preparation for installing it on the Corvette.*

2 (opposite page) *After installation, and with engine running, throttle stop is adjusted until water manometer reads .50 at about 3000 engine rpm.*



3 (left) *Adjusting "Power Stop" with left hand and throttle with right hand, Vedenoff watches mercury manometer for proper reading.*

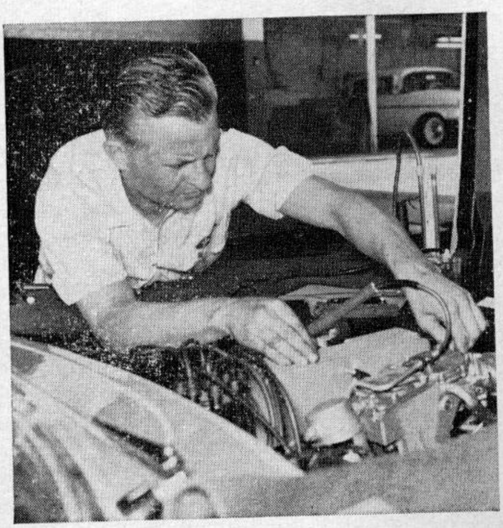


4 (left) *Adjustment of "Power Stop" is completed when the water manometer remains constant at .50 and desired reading on mercury manometer of 2.5 is achieved (on model 7017300 Injector, 1959).*

5 (opposite page) *After proper readings are achieved, stops are locked by tightening jam nuts. One final run is made after locking stops.*

ommendations for competition settings are furnished, but the average enrichment adjustment for road racing and drag strip racing will demand manometer readings of three points increase in the ECONOMY STOP and four points increase in the POWER STOP. Let us use a popular model to further explain these competition settings.

The 1958 Corvette with a 290 engine and Dontov Cam is one of the most popular on the drag strips today. It is also a popular model on most closed course sports car races. The model number for the injector unit used on this car is 7014900R (model numbers are stamped on a small plate that is attached to the left forward side of every Rochester air intake manifold). Settings for this unit will be listed in the manometer instructions to read as follows:



FUEL INJECTION
MODEL NUMBER
7014900R
(Special Cam)

ECONOMY STOP
FUEL PRESSURE
@ ½″ H_2O
0.7

POWER STOP
FUEL PRESSURE
@ ½″ H_2O
1.6

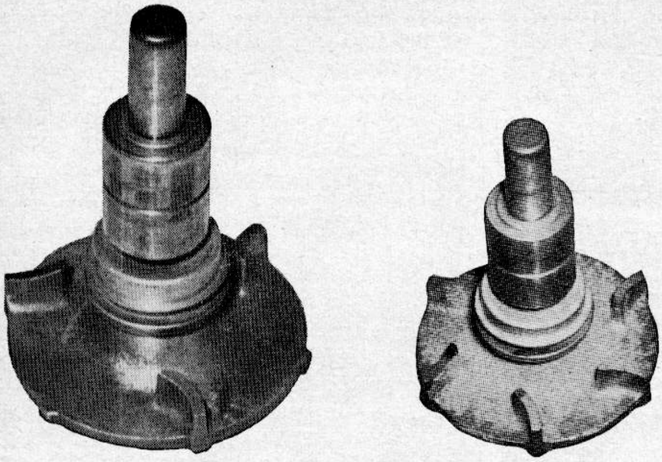
These are the manometer readings that must be achieved to set the injector at proper mixture for normal driving. Now we raise the readings by three points for the ECONOMY STOP, or to 1.0, and make the aforementioned adjustment to the stop screw. It only takes a couple of minutes to run another test with the manometer, and if an accurate reading of 1.0 has not been achieved, make additional adjustments until that reading is accomplished. Adjustment to the POWER STOP are made in the same manner, testing with the manometer until the proper competition setting of 2.0 is achieved (2.0 being four points higher than the recommended normal setting of 1.6). Using this method one can make up a chart to show both normal and competition settings for all model Rochester injectors. Such a chart might be made up to read as follows:

FUEL INJECTION
MODEL NUMBER
7014900R
(Special Cam)

ECONOMY STOP
FUEL PRESSURE
@ ½″ H_2O
Normal—Competition
0.7 1.0

POWER STOP
FUEL PRESSURE
@ ½″ H_2O
Normal—Competition
1.6 .20

Recent tests with a stock 290 model Corvette on the drag strip showed a gain from 91.3 mph in the quarter-mile to 100.7 mph after use of the manometer to correct the factory "preset" injection system. Comparable gains can be achieved with every unit that does not meet the actual fuel supply requirements placed on it by each individual engine.



Stock water pump impeller, with six blades, forces water through radiator too fast for efficient cooling during high-speed operation. Removal of alternate blades produces a three-bladed impeller to reduce water pressures at high rpm yet still cool during city driving.

The Fuel Injection Calibrator should become a standard working tool for every owner. It costs much less than many other engine modifications and can be responsible for a gain in horsepower equal to that of any other combination of modifications.

IGNITION

The first change to make in the ignition system is to remove the stock carbon-nylon spark-plug leads and replace them with any good grade steel or copper wires. (Packard 440 wiring is still one of the best materials to use for this modification.) The carbon-nylon material is used in all Corvettes to insure good radio reception, but it represents a loss in spark efficiency of around 5 per cent at top speeds. At least 1 mph top speed in the quarter-mile will be gained through this modification, and on longer runs, such as Bonneville, from 3 to 5 mph can be gained.

This modification does not necessarily mean that the radio in the car cannot be used. For normal street driving, there are several makes of resistor-type spark plugs that will allow excellent radio reception while using metal spark plug wires.

Another important point is to separate all spark-plug wires so they do not touch other wires. Dynamometer tests have shown losses of from three to ten horsepower where some spark plug wires made contact with others.

SPARK ADVANCE CURVE

One full second can be knocked off the elapsed time of the average Corvette in the quarter-mile by altering the spark advance curve in the distributor. The advance curve in the stock distributor was designed to allow smooth engine operation with all types of fuel, including medium- and low-grade gasolines, and the curve is a bit slow. In fact, the stock distributor does not achieve full advance until the engine is turning 5800 rpm. A much shorter curve, achieving full advance between 3800 and 4000 rpm, can be accomplished by removing the stock centrifugal-weight return springs and replacing them with part #1882595 springs. (These are the stock counterparts used in six cylinder ignition distributors.) With a shorter curve, more advance at lower speeds will assist in acceleration, and full advance will be reached long before each gearshift is made, resulting not only in quicker elapsed times but also in the possibility of higher top speeds at the end of the time trap.

INTAKE MANIFOLD PORTS

Intake manifolds for the Corvette engines, like many other mass-produced and mass-assembled automotive items, lack a great deal in final assembly. The ports in the two-piece aluminum manifolds used with the fuel injection system are mismatched in some cases by as much as a full quarter-inch.

Mismatched ports create turbulence in the flow of the fuel mixture, this turbulence in the ports reduces the amount of fuel charge to the cylinders, thus limiting the amount of available horsepower. The upper section of the manifold should be matched to the lower section by grinding away the excess material, then the ports in the lower section should be matched to the ports in the cylinder head in the same manner. The lower section may require additional grinding to remove any irregularities formed on the walls of its ports due to grinding metal away from both upper and lower surfaces.

OVERHEATING

The Corvette radiator is designed to handle cooling of the engine during endless hours of competition running. However, the water pump impeller was designed to handle the needs of the average driver at relatively slower speeds. At high speeds, this impeller forces the water through the radiator too fast to allow it to be cooled. In some cases the pressure within the radiator has been great enough to open the seams in the upper tank. The solution for this problem, and the modifications necessary, are very simple.

Remove the water pump impeller from the pump and grind off three of the alternate blades. The flow will be reduced at high speeds to a point where it can be cooled in the radiator. Thus, pressure damage to the radiator will be eliminated and the flow will not be reduced enough to have harmful effect of cooling needs during normal street driving.

SPARK PLUGS

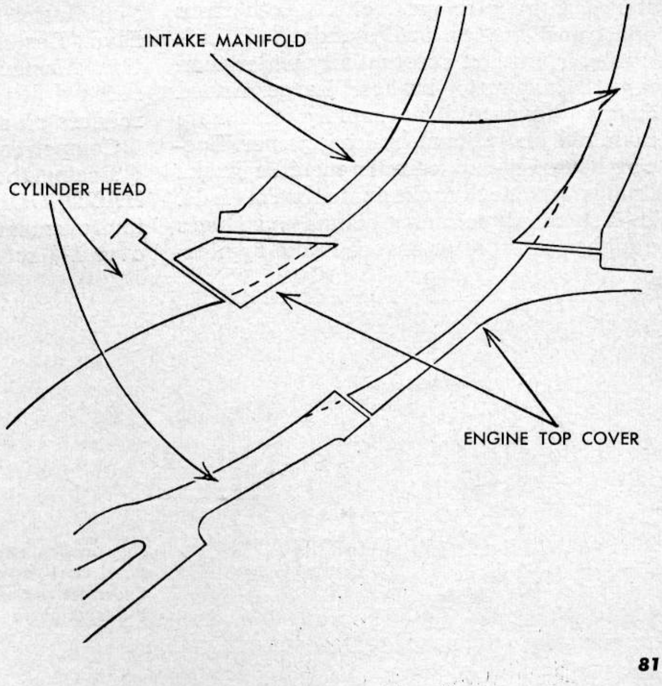
Normal street plugs will be too hot for use during drag racing or road racing. Chevrolet parts shelves stock a plug designed expressly for competition use and it works very well on the drag strip, on the road course and for longer runs such as at Bonneville. This plug—the AC C42-1—should be set at .025 and should be installed at the place of competition. Being a rather cold-range plug, it will foul quite easily if used on the street in traffic driving.

Champion and Lodge both manufacture a complete line of racing plugs, and many enthusiasts use them for competition.

EXHAUST SYSTEM

The Corvette exhaust manifolds have been designed for competition. To improve on them would require the removal or alteration of other components in the engine compartment, such as the steering, battery, etc. And inasmuch as these modifications would eliminate the machine from established production classes of competition, they hardly seem justifiable. Dynamometer tests comparing the stock exhaust system with production-built exhaust headers have shown the stock system better by as much as five horsepower.

One good alteration that is accepted by all racing organizations is the addition of an open pipe ahead of the muffler or one that cuts into the exhaust header and bypasses the muffler.



Mismatched intake ports create turbulence in the ports and reduce amount of fuel available to cylinder. Condition is corrected by grinding excess material out to broken lines.

HEAVY SPRINGS

Stiffer coils are availale from the parts shelves for installation in the front end. These units can be subjected to more abuse and stress, will allow better cornering control and improve the over-all handling.

Special rear leaf springs are also available and can be interchanged with the stock rear springs. These are much stiffer and will contribute to positive handling and stability on road courses and on the drag strip.

STABILIZER BAR

A heavy-duty stablilizer bar is available for interchange with the smaller stock unit. The heavy bar will assist in eliminating excessive lean or sway during high-speed cornering by equalizing front end stresses.

SHOCK ABSORBERS

Larger and stiffer-valved shock absorbers that have been engineered specifically for heavy duty are also available from the parts shelves. These shocks will result in the very firm ride that is necessary for competition, yet is actually not too rough for normal street driving.

HEAVY-DUTY BRAKES

Corvette's special brake system is engineered to the specific requirements of sports cars, with many features not included in regular production. Both front and rear brakes are standard 11-inch diameter, but are substantially wider than regular Corvette brakes. Large finned drums dissipate heat rapidly and help maintain exceptional braking power. Special heat-resistant ceramic-metallic brake linings practically eliminate brake fade. In fact, this type facing actually produces a higher pedal after severe brake application and requires greater initial clearance than conventional lining.

For ordinary driving between meets, it is possible to substitute conventional linings and shoes that have less pedal effort, are smoother acting, and quieter in normal traffic. For front brakes, use Oldsmobile brake shoes (part #566060) and on the rear use Chevrolet brake shoes (part #3752920). These substitute linings replace the ceramic-metallic lininigs without any special modification. For special events, the ceramic-metallic linings can be quickly installed.

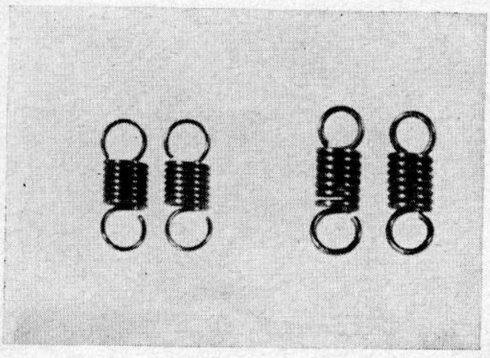
STEERING LINKAGE

The stock steering gear ratio for the Corvette is a bit slow, requiring too many turns from lock to lock to make it favorable for competition driving. The stock ratio is 21 to 1. By adding an idler extension (available from parts shelves), the ratio can be speeded up to 16.3 to 1. Steering response is much faster with this unit, and many enthusiasts have found it to be a definite improvement for normal city driving.

TRACTION MASTERS

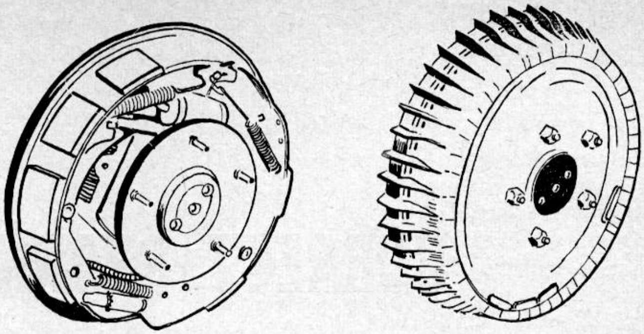
The only way to eliminate the problem of rear wheel hop during moments of severe braking and acceleration is to install a device to absorb the rear axle torsional loads that create spring wrap-up. Such a device is available from the Traction Master Company at 2917 W. Olympic Blvd., Los Angeles, California. The Traction Master unit has been used very successfully for the last five years by hot rodders on all different make chassis.

Competition tests with a 1958 Corvette ("Racing the Corvette"—*1958 HOT ROD HANDBOOK*) showed an elapsed time improvement in the quarter-mile of just over 1½ seconds.



The smaller centrifugal weight return springs (pictured here actual size) are stock for six-cylinder Chevrolet engines and are used to replace the stock V-8 springs in order to shorten advance curve to peak at 3800-4000 rpm.

Deep-finned cast-iron drums and segmented ceramic-metallic linings offer virtually fade-free braking for the most competitive events.



Actually, installation of Traction Masters on the Corvette tends to improve the all-around performance of the vehicle, eliminating almost entirely that skittish feeling of the over-sensitive rear end during sharp turns and slides. The factory, realizing the need for a similar installation, came out in 1959 with what they term the radius rod rear suspension. Actually, it is almost a direct copy of the Traction Master unit with the exception that stock unit is mounted on top of the axle and is much shorter than the copied unit. Many owners of '59's are replacing the stock units with regular Traction Masters because of the ability of the latter to perform the same operation smoother and without the creaking and squeaking that accompanies the stock unit during use. If the stock unit was as long as the Traction Master arm, perhaps it too would work as well.

TIRES

Normal passenger car tires prove most unsatisfactory on both the drag strip and road racing course. The tread surfaces are much too narrow and the consistency of the rubber is usually too hard for good traction. These factors, in conjunction with the Corvette's relatively lightweight rear end, make it almost mandatory that better tires be used. Some drag strips do not allow drag racing slicks to be used in the production sports car classes, nor do they allow the use of special racing tires (reasoning behind these rules being that special racing equipment should not be allowed in competition against cars that are equipped for normal street use).

The only solution lies in the use of recap tires and a very good street tread recap is available in a variation of tread widths from Inglewood Tire Sales at 1101 E. Redondo Blvd., Inglewood, California. With these tires, it becomes possible to utilize nearly all of the Corvette's power at the starting line without undue wheelspin. This special tread—designated "RX" —has also proved very successful on closed course racing where it seems to get a better bite (at least for Corvettes) and shows longer life and greater racing mileage than some of the more expensive racing tires.

SUMMARY

Looking back on the tips for better performance we have discussed, we can see that the average Corvette may be good for from eight to fifteen more miles per hour in the quarter-mile and a total reduction in elapsed times of from three to five seconds (depending naturally on the ultimate speed for each particular car in its present state of tune). Some will, due to the variables in mass-production assembly, be closer to the ultimate speed than others, and fewer adjustments and adjustments of lesser degrees will be necessary to bring these up to the top. Others, however, will be far below the average and owners of these machines will find the tuning tips in this chapter of great value.

My full time throughout the year is devoted to tuning and working on Corvettes, and I am always happy to hear from Corvette owners around the country who have developed problems with their machines. Feel free to write or call me at the following address:

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