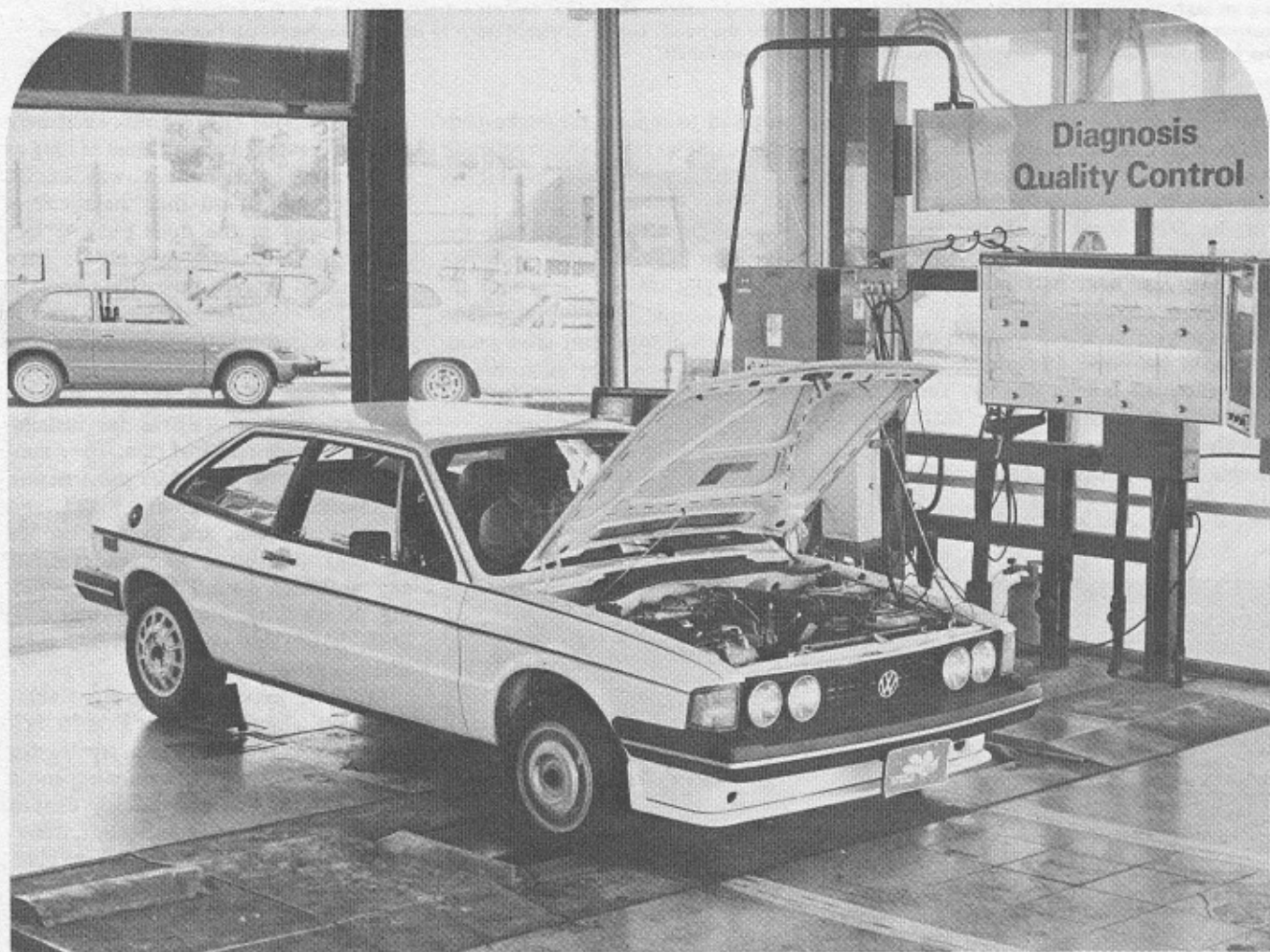


# Super Street Scirocco

WARMING UP THE WATER-COOLED VW ENGINE



BY JERE ALHADEFF

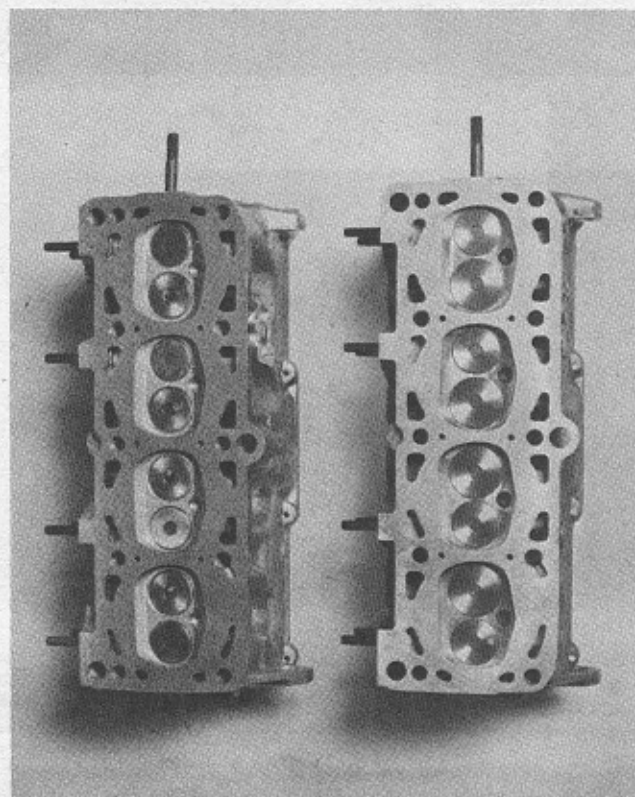
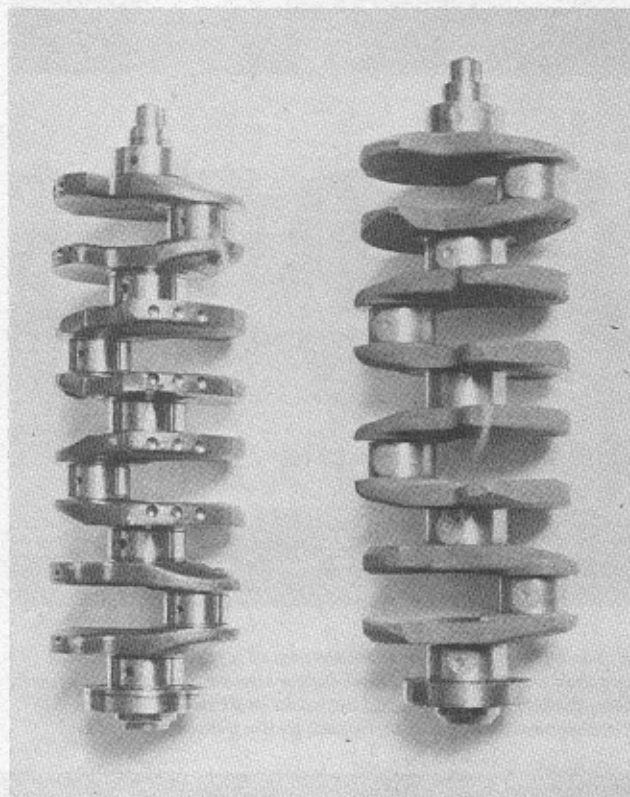
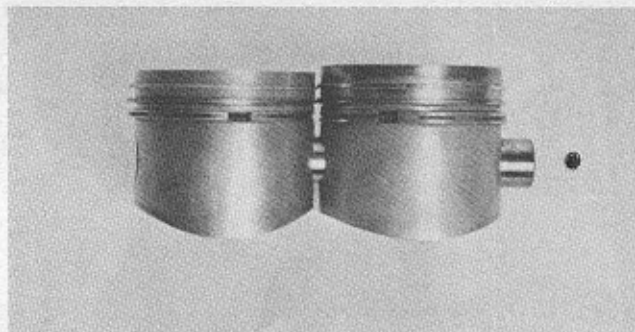
Besides Super Vee racing, performance work on the second generation water-cooled VW powerplant has been slow getting off the ground. This is, of course, partially due to emissions laws and controls. Tampering with a vehicle's emissions is considered contributing to its delinquency, and is therefore a punishable offense. Never the less, we've all seen performance articles on "49-state" models which do not feature a catalytic converter, nor operate on unleaded fuel. Curiously, most of these "49-state" performance packages are produced in California! Rather than go along with this trend, we were lucky enough to be involved in a project to

build a performance engine that met all the stiff California requirements for vehicle emissions. The parts installed in this performance engine can also be used on the "49-state" model Rabbit and Scirocco engine.

The engine was being assembled by Darrell Vittone to be installed in a 1978 Champagne Edition Scirocco (with factory air conditioning) for his father, Joe. The name Vittone has been almost synonymous with VW high performance since the idea began. Joe Vittone was the founder of EMPI, the first VW performance product manufacturer in the United States, and Darrell has been involved in VW performance almost since his hands were large enough to

hold a wrench (metric of course). During a long drag racing career, Darrell drove and maintained the famed EMPI "Inch-Pincher" VW sedans and then campaigned his own Race Shop VW powered Fiat 850 convertible that, to our knowledge, still holds the low e.t. and top speed marks for a full bodied, VW powered drag racer (10.30-130mph) and these marks were set almost three years ago. So, as you can see, the Vittone's take more than a casual interest in VW performance.

The idea at first was to obtain an engine from a wrecking yard and have it assembled, ready to drop into the new Scirocco to save time, plus leave the new Scirocco's stock engine available



**OPPOSITE PAGE**, the Vittone Scirocco received chassis dyno testing both before and after. The car showed a 20 horsepower increase to the driving wheels. Low lead fuel was used and the emission levels were maintained. **THIS PAGE TOP LEFT**, the Kolbenschmidt piston features a deeper dish than the stock piston on the right. **THIS PAGE TOP RIGHT**, the new piston is the same bore size as the stock piston on the right. The longer stroke of the new crank requires the shorter skirt and different pin location. **BOTTOM LEFT**, the new forged Okrasa crankshaft is on the right and features a stroke of 90.44mm. **BOTTOM RIGHT**, a stock head is on the left while the big valved Fukaya head is on the right. Quite a difference, isn't there?

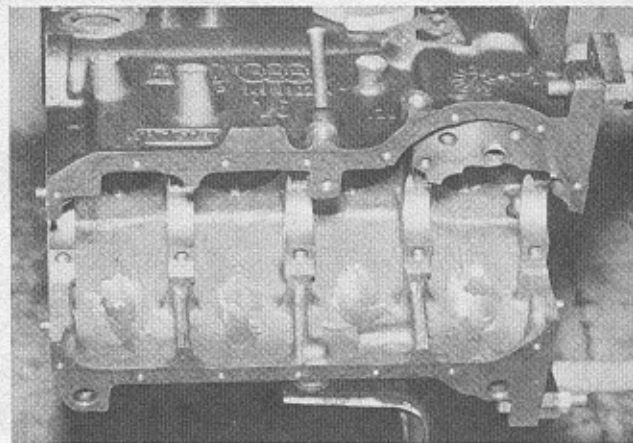
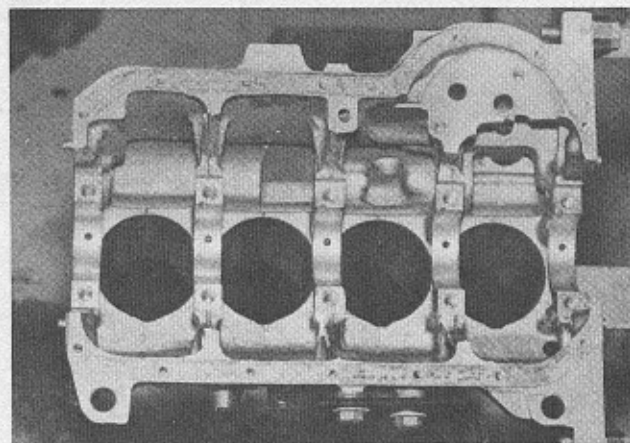
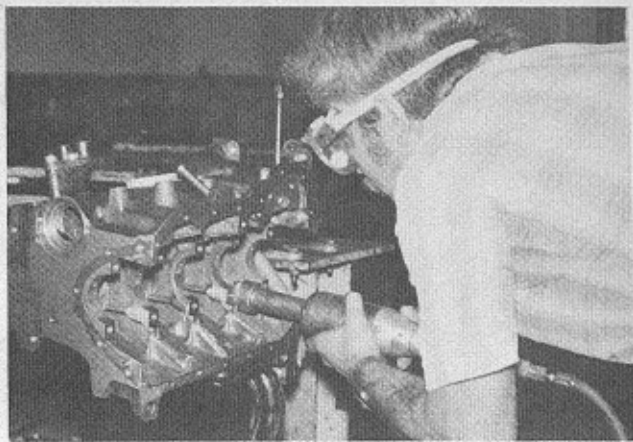
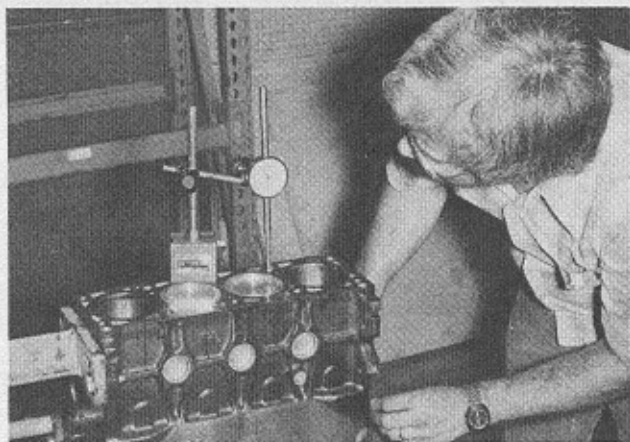
for reinstallation if it was ever needed. Prior to the 1978 model, the Rabbit and Scirocco were 1588cc displacement and featured a fully counterweighted crankshaft. On 1978 models, the displacement was reduced to 1457cc by changing to a crankshaft with 6.6mm less stroke (73.4mm) and featuring only four counterweights. Except for the crankshaft and pistons to match, the engines were identical. That is, until recently.

Recently VW modified the mounting for their factory air conditioning. The engine block now has mounts for the air conditioning bracket cast into it, so every new engine block can accept factory air. This is the only change in

the engine block, so all blocks would be interchangeable unless you were working with a car featuring the latest VW factory air conditioning. The Scirocco chosen for the engine swap was equipped with this engine block and factory air, so the earlier model engine acquired for the swap could not be used. The Scirocco only had 100 miles on the odometer but the engine had to be completely disassembled so the engine block could be used.

Darrell had all the new engine parts ready when the engine was disassembled, so not much time was wasted. The Scirocco was only out of commission a few days. The major change Darrell made to the engine was installing a

90.4mm Okrasa forged crankshaft. This single change accounted for an increase in engine displacement to 1795cc. This was the first water-cooled VW engine Darrell has modified and it was immediately apparent to him that it is a little more difficult clearancing a cast iron engine block than the lighter cast alloy engine case from the air-cooled VW. To clear the Okrasa crankshaft used with the stock connecting rods, each cylinder needed a small notch at the bottom, and the block needed to be massaged on one side. On the other side of the block, near the oil pump shaft bushing, a notch must be cut for #4 rod. It is important to point out at this time that the VW engine block can-



**TOP LEFT**, the new crankshaft and piston configuration brought about a much closer deck height, but the thickness of a factory headgasket made the new height acceptable. Compression is now 8.3:1. **TOP RIGHT**, the cast iron engine block required clearancing for the crank in several areas. Darrell used an air grinder for this purpose. **BOTTOM LEFT**, from this view, the clearancing near the oil pump shaft bushing (top right) and the notch at the bottom of each cylinder is evident. **BOTTOM RIGHT**, additional clearancing was performed to the side of the block.

not be submerged into a hot tank for cleaning, as the tank will ruin the bearings for the intermediate shaft that controls the oil pump and the distributor. These intermediate shaft bearings are not replaceable at this time so the engine block could no longer be used. The best thing to do is to steam clean the engine block and immediately apply W/D 40 to all surfaced areas as rust sets in very quickly.

Once the engine block was clearanced and cleaned, the short block was reassembled. Darrel suggests using hand tools when tightening the main bearing caps. The main caps are a tight fit in the block, and using hand tools to slowly tighten the bolts helps avoid pulling material loose on the side which could possibly be caught below the cap as it is tightened. The cast Kolben-schmitt pistons Darrell chose are the same bore size as stock (79.5mm) but feature a shorter skirt and a different pin height. The shorter skirt is to clear

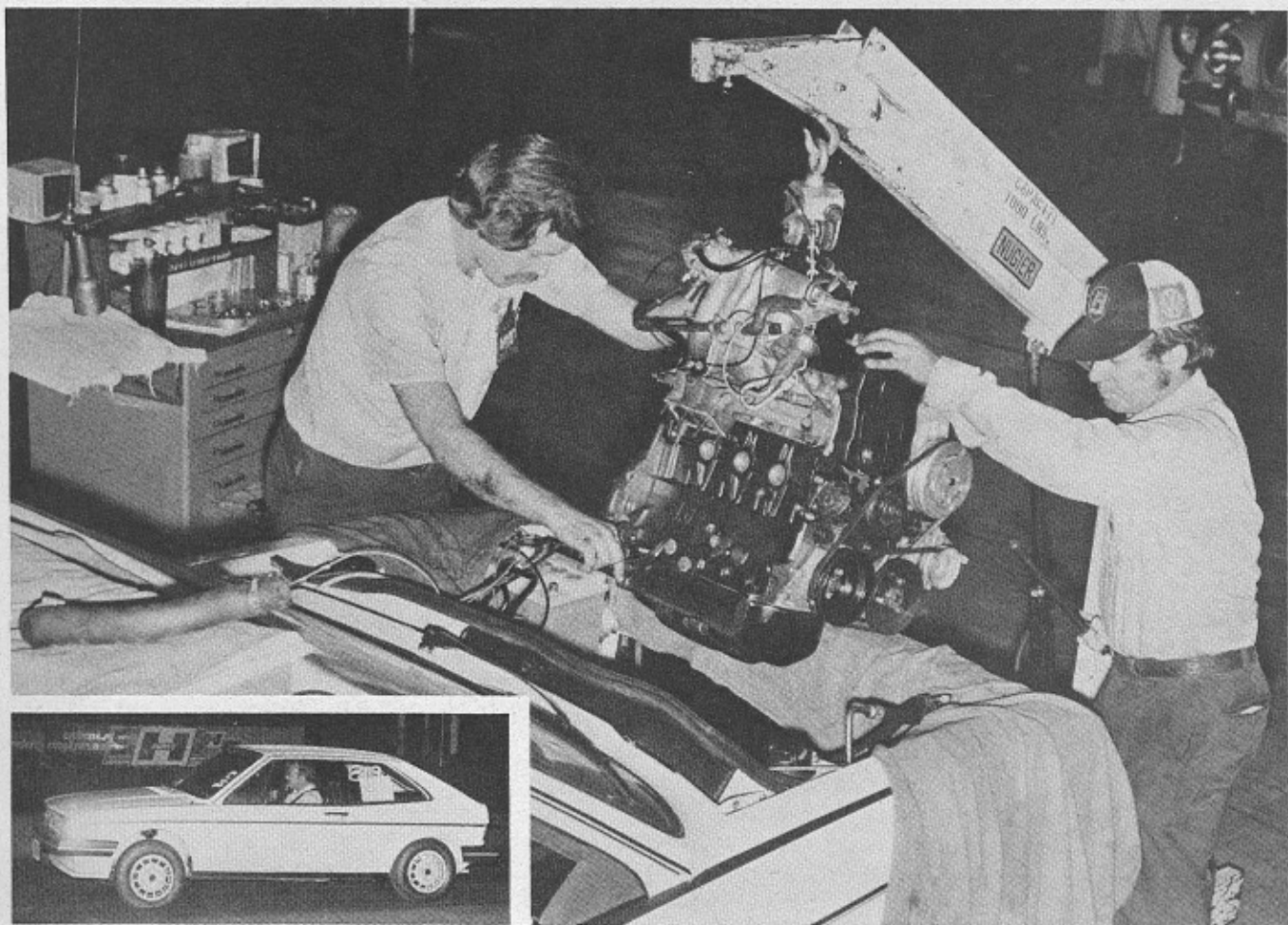
the crankshaft and the different pin height is to accommodate the longer stroke. The pistons also feature a dished top to reduce the compression increase created by the longer stroke. The deck height was found to be .002-in. average. The stock deck height is .091-in. which is quite a bit more clearance. A crushed factory head gasket was found to be .070-in. and Darrell felt the .072-in. deck height combination of the two was more than adequate.

Fumio Fukaya of Riverside, Calif., did the modification work on the cylinder head. The stock 34mm intake and 32mm exhaust valves were replaced with Manley stainless steel 40mm intake and 35mm exhaust valves. Fumio also cleaned up the area around the valve guides and polished the combustion chambers. At this time, the valves were also moved flush with the floor of the combustion chamber, rather than recessed like the stock valves. The valve seats are now flush with the floor of the

chamber rather than the top of the valve, being flush as they are stock. The compression worked out to be 8.3:1 (8.0:1 stock) so unleaded fuel could still be used.

After completion of the engine assembly, the engine was re-installed into the Scirocco. All stock timing and tune-up specifications were used. Once the Scirocco was ready to run, it was brought to the chassis dynamometer for testing. The stock 1457cc air conditioned Scirocco produced 48hp at the front wheels. With the 1795cc engine installed, the Scirocco produced 68hp at the front wheels, a 20hp increase. This converts to a 42% horsepower increase. Since the factory rates the 1457cc engine at 76hp stock, this 42% increase gives us a horsepower figure of roughly 108, and that's using unleaded fuel. On the emissions testing, the engine was identical to the stock specifications for a 1978 model vehicle.

The final two tests we were able to run before the magazine deadline were



**TOP**, the stroker motor is reinstalled in the car. As you can see, we weren't kidding when we said Darrell's car was equipped with air conditioning. The stock ignition and fuel injection were retained and nothing was changed on them. Hey Darrell, aren't you putting that engine in sideways? After all the air-cooled engines Darrell has installed, we bet the installation of a front motored, water-cooled unit gets a bit confusing. **LOWER LEFT**, a trip to Orange County International Raceway provided Darrell with some pretty impressive times.

for gasoline mileage and quarter-mile times at the drag strip. The constant highway mileage worked out to be 38.2 mpg at 3500 rpm. The EPA rates the 1978 Scirocco at 36 mpg, so mileage appears to have increased with the horsepower, while the vehicle emissions stayed within the acceptable 1978 model requirements. Due to our deadline, the drag strip testing was confined to three runs on the same evening. Darrell felt the Scirocco never hooked up in low gear, even though the air pressure in the stock radial tires was cut in half. The best times recorded that evening were 16.68 at 82.79mph. That compares pretty favorably with the other times we've seen. The average times for a stock Scirocco are about 18.5 at 75mph. One "49-states" Scirocco is a U.S. version of the European GTI. The European GTI covers the quarter-mile in 17.5 at 81mph. The only figures we've seen that beat the Vittone Scirocco's quarter-mile

times are for a turbocharged Scirocco (that was tested with more boost than it is sold with). Its quarter-mile times were 16.2 at 88.5mph. Both of the other vehicles used premium fuel, however.

We feel the times recorded for Darrell's Scirocco are extremely impressive considering the car uses unleaded fuel, has a working catalytic converter, and gets over 38 mpg. These times could very well improve too. Darrell wants to try the car at the drag strip again, either with different front tires or with a better combination of tire pressure and engine rpm while leaving the starting line. Darrell was also unable to try varying any of the tune-up or timing specifications, and this might help also. Darrell plans to install a five-speed gearbox as soon as they are available in the 1979 model year. He's also mentioned that with the 8.3:1 compression ratio, the idea of installing the factory turbocharger, if it is avail-

able next year, is a real possibility since the factory turbo will use unleaded fuel to meet the emission standards for California.

To itemize some of the costs of the items used, the complete cylinder head work performed by Fumio Fukaya, including parts was \$400. The Okrasa crankshaft and the Kolbenschmitt pistons were about \$750, for a tab of \$1150, if you can do all the labor yourself. If not, you will need to figure in a labor expense also. The parts used and the work performed are applicable to any Rabbit or Scirocco ever produced. The cost could be reduced by using a reground crankshaft rather than the high dollar Okrasa. Gene Berg as well as other VW performance parts people are beginning to work with the performance aspects of the water-cooled VW power plant. Most of the cost, we must admit was for the crankshaft. Just in case you're interested, the tab was near the \$600 mark.