# TECHNOTES



## JAGUARS AND THERMOSTATS

In Technotes, SCI, August '57, you published some tips on cooling off hot-running Jags which I followed to the letter. Despite all this, my '56 roadster still ran as high as 90° Centigrade in town last summer (it was pretty hot up here). I was told that a solid expansion type thermostat would pass more water than a bellows type, having a smaller core. I tried the Dole DV-1 and found that the water temp seldom went over 85° C. even on the hottest days.

G. W. Hunt
Sudbury, Ontario

*Your choice of a pellet or solid expansion type 'stat was a good one, but not because of the smaller core. Bellows type 'stats should never be used in high-pressure cooling systems (Jaguars run at 4 psi, American cars run as high as 10 psi) because, as the temperature rises, the pressure increases, forcing the bellows partially closed and restricting the flow of water. There is an exception to this rule: all cars of Chrysler manufacture are arranged so that the cooling system develops no pressure until the boiling point is reached and bellows 'stats are by then well open.*

*Too many owners worry excessively about 90° or 95° C. water temp in summertime city driving. After all, water won't boil until 100° C. in open air, and the 4 psi pressure cap will raise this to at least 105° C. (221° F.). Up to a point, the hotter your engine runs, the more efficiently it runs (and that point is well over 105° C.). The service manager of Jaguar North America runs his Jag all winter long at 95° C. by using a radiator blind, without any difficulties at all (and with plenty of cockpit heat).*

*My primary concern in 'stat selection for a Jaguar would be in winter driving where quick warm-ups are the problem. Certain pellet type (including the Dole) and all bellows type 'stats can be forced open by water pump pressure, thereby increasing warm-up time. The Thomson, Gabriel, HaDees, and Tru-Temp pellet type 'stats have a reverse action valve so that the higher the water pump pressure, the tighter the valve is pressed on its seat. For 'stats which start to open at 71° C. and are fully open at 83° C. the appropriate numbers for a Jag are 54, G105, H105, and 642. For 'stats which start to open at 82° C. and are wide open at 94° C. the numbers are 154, G105H, H105HT, and 642HT.*

## BRAKES ON THE M-B 190SL

One of our readers, experiencing difficulties with grabbing brakes as mentioned in our April 1957 road test, received the following letter from the factory:

*In order to correct the brake system we suggest that you have the following work performed:*

1) *The respective brake drum should be checked for eccentricity and if necessary should be re-finished on the interior diameter.*
2) *It should be made certain that the brake lining touches the brake drum correctly.*
3) *Check whether the washers of the automatic brake adjustment device on the brake shoe are worn. If this is the case, have them replaced with new ones. If these washers are not available, the old ones should be reconditioned, i.e. made plane with emery cloth. When doing so, attention should be paid that the washers are of equal thickness, which is expected to be 2.5 — 0.1 mm (0.100 — 0.001 in.). When adjusting the bleeding clearance, please note that this amounts to 0.8 mm (0.032 in.). The bleeding clearance is the clearance between the stud and the adjustment sleeve.*
4) *See to it that the brake shoes are operating properly and that they return completely after the brakes have been applied.*

*We recommend that you have this adjustment work done by one of our authorized service stations. Mr. Roy B. Bender,*

*General Service Manager, Studebaker Packard Corp. South Bend, Indiana will be glad to let you know which is the nearest service station in your vicinity, as our Service System has been taken over by the Studebaker Packard Corp.*

*Hoping that your car soon will be in a satisfactory condition, we remain*

*Yours truly*

*Daimler-Benz Aktiengesellschaft*

### VW WORKSHOP MANUALS

Is there a shop manual for the VW available in English? I don't mean a warmed over version of the Owner's Manual but the real thing.

George J. Oremus
Pasadena, Calif.

*The Workshop Manual published by the factory is pretty much for dealers only, although Autobooks of Burbank, Calif. has a few. A thoroughly satisfactory substitute is Floyd Clymer's* Volkswagen Owner's Handbook, *available for only $2.00 from any of our bookstore advertisers. It is, in effect, a (door) pocket-sized expurgated edition of the factory's manual. The only omissions we noticed concern those jobs which require the most expensive special VW tools. The correct adjustment of the ring and pinion gears is an example which comes readily to mind; the necessary gauges for this job run to about $100. Any job which the earnest owner could possibly tackle on his own is described in words and pictures taken directly from the Workshop Manual. In some places, the factory's awkward English has been improved upon noticeably. The necessary tools may be purchased from VW dealers or any of our advertisers who advertise Metric tools.*

*This VW Owner's Handbook is not to be confused with the collector's item that Clymer also sells, an owner's manual for a very early (1951?) VW.*

### ROLL STIFFNESS vs. WEIGHT TRANSFER

I would like to take issue with Mr. Ludvigsen's statement in Consistent Champion, Part II (SCI, Oct. '57) that "The more roll stiffness, the lower the overall weight transfer, and the better the car's sheer traction." This is one of those statements that gets talked about a lot, while the more important but less obvious factors are not even mentioned.

The mass center or c.g. does move sideways a little bit with body roll (in an arc about the roll axis), and this really is *weight* transfer. In addition, however, there is the much larger item of *load* transfer due to the *height* of the mass center above the ground. Both weight and load transfer are bad because the traction available (as a percentage of the vertical load) decreases as the load goes up, and the outside tire loses more than the inside one gains. As used here, traction means the vector sum of side load and driving thrust.

Now, the relation between c.g. height and front and rear load transfer is best analyzed in two stages, one above and one

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below the roll axis. (The roll axis is that elusive line about which the body rolls when the car is subjected to a side load; it is a line connecting the front and rear roll centers. The roll center of a suspension is established by its geometry and is unrelated to its spring rates or damping. Unfortunately for those of us who wish to make simple analyses, the roll centers of many suspensions move about as the springs deflect and the geometry changes, and therefore so does the roll axis. The following discussion, like most of this kind ignores this complication, but that needn't distract us from the essentials presented here.)

The effect of a side (centrifugal for instance) force acting at the c.g. is equivalent to an equal force acting at the roll axis directly below the c.g. plus a "couple" about the roll axis equal to that force times the height of the c.g. above the roll axis. The side force at the roll axis goes to the front and rear tires as side loads in proportion to the car's fore and aft weight distribution. Multiply each part by the height above ground of that end's roll center and divide by its tread; the result is load transfer, an increase in the load on the outside or downhill tire and an equal decrease on the inside tire.

The couple about the roll axis causes the body to roll; the amount of roll is indeed controlled by the total of front and rear roll stiffness, but the load transfer required to balance this roll couple is determined solely by the height of the c.g. above the roll axis. How it is distributed to the front and rear is established by the relation of front and rear roll stiffness. Summing up, the total load transfer (left vs. right) is established by the height of the c.g. above the ground, but its distribution to the front and rear wheels is controlled in the first part by suspension and in the second by the *ratio* of front and rear roll stiffness.

Since it's the set of tires (front or rear) with the poorest traction that limits cornering speeds, Jano designed the D50 to get one set no worse than the other. In other words, neutral steer at the limit. Colin Chapman uses the same philosophy in the Lotus.

In the D50, the rear roll stiffness (and damping, too, which controls the transient) was reduced to favor rear-end traction, thus permitting the use of power and still achieving neutral steer. With too much power, the rear end would slide; with too little, the rear would stick and the front would plow. Remember the pictures of Fangio at Silverstone in 1956? It's no wonder the drivers didn't like this, as it requires such a well-educated right foot, but it's still a darned good theory and it may yet come through as a definite winner.

Al Fonda
Buffalo, N. Y.

*Letters of this sort are always most welcome, but the Technical Editor would like permission to amend them where it seems desirable, as he has done above.*