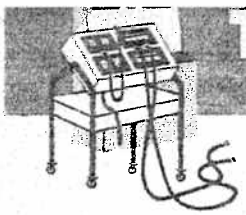

TUNE UP CLINIC

by Bill Corey

ROAD & TRACK, JULY, 1957

NOT SINCE we wrote about modifications to the Austin-Healey have we had such a tremendous response to an article as we had to the one in the April issue regarding tuning the Mercedes 190. Although such service information may be easier to come by now that distribution is to be handled by Studebaker-Packard, more data on the 190 may still be of interest to owners and repairmen.

This month, we will confine our remarks generally to carburetion, as the Solex dual "duals" used seem to be a deep mystery to the uninitiated notwithstanding the fact that their operation is very similar to ordinary Solex types, with the exception of the secondary barrels. The two barrels of each dual have a common housing, and the butterflies of the secondaries have no mechanical connection with the primary butterflies. In all normal driving, the venturi area of the primary throats is adequate for the breathing requirements of the engine and these are operated by the throttle linkage in a conventional manner. For high-speed operation, however, the secondary throats come into action automatically. These butterflies are controlled solely by a vacuum unit, very similar in appearance to that which operates the ordinary distributor vacuum advance mechanism used on many makes of cars. One side of the vacuum unit diaphragm is connected by a passage to the narrowest point in the primary throat venturi, and the other side is exposed to atmospheric pressure. A spring of proper rate also tensions the diaphragm. Attached to the diaphragm is linkage operating the secondary throttle butterflies. Therefore, the operation of the secondary throttles is strictly a function of above-throttle vacuum in the primary throats.

This primary vacuum should cause the secondaries to open at about 3000 rpm under full load, but the beginning of the opening can be varied by a setscrew and locknut located at the vacuum unit operating arm. If the setscrew is turned *in*, the opening combination of engine speed and load required to operate the thottle valves is *increased*; if it is turned *out*, the secondaries will open earlier. A retarding valve of suitable calibrated bore on the atmospheric side of the vacuum unit is balanced with a similar retarder on the vacuum side to prevent too rapid opening and consequent "stumble" upon quick acceleration. (As a matter of record, we find that our chassis dynamometer is of invaluable aid in properly setting the opening of the secondaries and we often wonder how the job can be done successfully otherwise.) Finally, a counterweight attached to

Choking the engine for cold starting is quite conventional, except that the choke butterfly on each carburetor is closed by a coil spring and opened automatically by an intermediate lever. When the valve is closed, the primary throttle is opened about five degrees by a fast idle device through interconnecting linkage. For hot engine starting, an unloader is used, which is also operated from the instrument panel. This opens the secondary throttles mechanically and permits the engine to clean itself of flooding which is sometimes caused by percolation or over-ambitious use of the accelerator pump by drivers used to "pumping" the foot accelerator when an engine refuses to start. When the unloader, or "hot choke" is used, the foot accelerator should also be held wide open until the engine fires.

The idle circuit of the 190's carburetors follows normal Solex practice except for the fact that the secondary idle circuit is normally adjusted for complete shut-off of fuel. In the primary barrels, fuel is supplied by the idle jets and emulsified with air from the idling air jets. The idle mixture adjustment screws enter a passage directly into the throttle bores on the engine side of the butterflies. Screwing them *in* weakens the mixture, *out* enriches it. In common with other Solex models, the idle mixture passage is also connected with accelerating ports on the atmospheric side of the butterfly. These serve to enrich the mixture just off the idle setting and prevent flat spots upon light acceleration from low speed. The secondary idle circuit is normally closed off by screwing the mixture adjustment screws all the way *in*. This circuit (*continued on page 52*)

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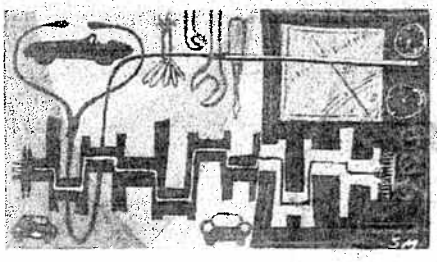
uses a permanent bore. The mixture from this secondary idle circuit enters through two bypass bores and serves only to cushion the shock of the initial opening of the secondary butterfly.

Only the primary barrel uses a venturi tube, but both barrels have what is called a pre-atomizer device. Fuel is led to this from the main jet via the mixing chamber to produce a finely atomized mixture. It is important that the slight vacuum prevailing at the pre-atomizer in the secondary *when the secondary throttle is closed* does not suck fuel into this barrel.

The accelerating pump is mechanically operated by linkage (adjustable) connected to the primary butterfly of each carburetor. It is of the diaphragm type, and a rather unusual feature is that it is also capable of enriching the mixture at high venturi vacuum even though no mechanical movement takes place.

Due to the difference in inertia between fuel and air, fuel will continue to flow in the main circuit of carburetors when the throttle is suddenly closed. This will cause an engine to load up and stumble at idle for a few moments and is particularly noticeable with dual carburetors where the secondaries are controlled by primary venturi vacuum and not snapped shut by positive foot-controlled linkage. To eliminate this, the 190 uses a device which sucks away the excessive fuel which might accumulate in the secondary throat. This draws excess fuel into the venturi of the primary, thence to a line led outside to drain.

Original models of the 190 were equipped with carburetors using a sand-cast housing, but after engine number 121 921 55 00709, a die-cast housing was used. These carburetors are equal in their function in every respect. There is no advantage whatsoever in replacement of the older type with the later design. There have been, however, some changes in the die-cast models which should be noted here but should not be construed to mean that the older series require the same alterations. After engine number 121 921 55 01823, the No. 42 mixing tube in the primary barrel was replaced by a No. 43 and the fuel supply to the accelerating pump was calibrated to 0.5. Stumble upon low-speed pickup is a symptom that this tube needs changing on the *die-cast* type. The mixing tube carries part number 000 071 09 49 and the calibrating sleeve is part number 000 071 03 40. These parts should only be installed together. Note again, these parts are not used on sand-cast carburetors. It will be noted that adjustment instructions for the idle screws on the secondary barrels originally called for the screws to be completely turned in. Subsequently, bulletins were issued stating that it was permissible to open them slightly if bad flat spots were noticed upon acceleration. If the No. 43 tubes are installed, however, the idle adjustment screws must be closed completely. Speaking of flat spots, it is also important that the cover on die-cast carburetors fit tightly and that the gasket seal properly. The fuel overflow line should not be bent or clogged. (*continued next month*)



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MORE ABOUT THE 190-SL

(continued from last month)

PROPER float level is important: it should be 1.45 to 1.49 in. instead of the 1.53 to 1.57 in. specified on the first sand-cast carburetors. Poor acceleration may also be caused by a gummed or clogged ball check at the vacuum side of the secondary operating diaphragm.

Mercedes instructions for adjustment of the carburetor are as follows:

(1) Before any carburetor adjustment is attempted, the following must be ascertained:
   a. Correct camshaft timing.
   b. Correct ignition timing (static).
   c. Proper valve clearance.
   d. Correct and even compression pressure.
   e. Torque tightening of cylinder head and manifolds.

(2) Unscrew idle adjustment speed screws on both primary barrels to just completely close both butterflies, then screw each in exactly one turn.

(3) The rod which connects the angular lever at the crankcase with the control shaft should be adjusted to $6^{59}/_{64}$ in., measured from the centers of the ball joints.

(4) The push rod for carburetor No. 1 should be adjusted to $4^{31}/_{64}$ in.

(5) Press the push rod of carburetor No. 2 onto the ball joints in such a way (adjustable with right- and left-hand threads) that the butterflies of both carburetors are at the idle stop. When the accelerator pedal is pressed, both primary butterflies must open at the same time.

(6) Press the pedal to full open, and check that the fully open stop rests against the throttle lever of carburetor No. 1.

(7) Screw the primary idle mixture screws on both carburetors lightly to their seats, then back out $1\frac{1}{2}$ turns. The secondary idle screws are turned tightly to their seats and left closed.

(8) Check both choke valves for complete closing when the choke control is pulled out. When the choke button is pushed in, both choke valves should return to the horizontal position.

(9) The adjusting screw at the throttle lever (fast idle) should be set for a clearance of .015 in. between the screw and the intermediate lever and the return spring should press the lever against the cam.

(10) Check that the secondary butterflies return automatically to the closed position. The headless screw on the secondary throttle shaft on each carburetor should be screwed in tightly and the adjusting screw has no clearance when both primary and secondary throttles are completely closed (primaries in previously adjusted idling position). Do not screw in more than enough to eliminate clearance, as otherwise the primary throttles may be forced open.

(11) Warm up engine, re-tighten all manifold and carburetor nuts, bolts and connections.

(12) Set idling speed for 1200 rpm by evenly adjusting both primary idle speed screws (800 rpm if later distributor is installed).

(13) Adjust primary idle mixture screws for best and smoothest idle, then readjust speed for proper rpm. Touch up mixture adjustment. An air/fuel ratio meter will help obtain proper idle cross-over to eliminate "snap throttle" flat spots. We find a 12.9:1 ratio ideal if all other tuning factors are correct.

We read with some amusement a recent article about cleaning up the induction tract of the 190-SL for more performance. Notwithstanding the fact that all except the very first models have exceptionally clean manifolding, it is very doubtful that any concrete results could be obtained by cleaning these massive passages. If there is any one thing the 190 "ain't," it certainly *is not* restricted in the breathing department! If anything, the reverse is true, its one minor fault being ports and carburetors which are so huge in relation to engine size that extremely careful tuning is necessary to eliminate flat spots due to inadequate atomization. I, for one, don't consider that I possess enough smart to second-guess Daimler-Benz and can categorically state that we have never found a problem that did not respond to tuning with proper instrumentation! The man who gets more than the rated hp from *this* engine is going to have to be more than a hot-rodder with a portable grinding wheel and a super zippo cam!