

Tech Session – March 20, 2004
1959 Jaguar XK-150 DHC with automatic Borg Warner transmission – Carb tuneup

Club members present:

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Carb tuning is only performed after assurance that engine condition is good, correct sparkplugs are installed, timing has been checked and the engine has been brought up to normal operating temperature.

Starting Carb:

The small black starting carb sits between the two running carbs and is connected to the front running carb (on a two carb system) float bowl via a capillary tube. Gas is constantly present in the tube. Gas flow from the front carb float bowl through the tube into the starting carb is controlled by a long needle valve. The top end of the needle valve sticks up on the right side of the starting carb (it can be depressed manually against an internal spring) and is adjusted by loosening one of the slotted screws beside the needle valve, swinging the locking tab out of the way, adjusting the nut surrounding the needle valve, then relocating the locking tab and re-tightening the slotted screw. Gas flow is enriched by rotating the adjusting nut counter clockwise and leaned by rotating it clockwise. Electric power is applied through the green wire to the solenoid in the starting carb when the ignition key is turned on. The circuit is completed and the solenoid is activated when an “otter” switch in the water jacket near the front of the engine is grounded. This occurs when the engine is cold. The otter switch breaks contact and deactivates the solenoid when water flowing through the jacket warms up (usually after 60-90 seconds of engine running). Activation of the solenoid pulls open a valve in the starting carb and allows fuel to flow into the carbs. This briefly produces the rich mixture needed for starting in cold temperatures. Correct adjustment has been achieved with the engine running, the starting carb solenoid manually grounded to activate the solenoid and black smoke is emitted from the exhaust pipes (or when unburned gas can be smelled coming from the exhaust pipes). Note: there should be a small tin shield covering the holes in the top right side of the starting carb and retained by the slotted screw retaining the needle valve adjusting nut locking tab and the slotted screw on the side opposite the one retaining the locking tab. This shield varies on different cars from fully covering the three top holes in the starting carb to some that only cover the center hole. The shield is missing on some XKs but should be replaced in order to prevent gas from blowing up all over a hot motor in the event of a backfire.

Running carbs:

Pinch bolts:

Bolts securing the pinch clamps on each side of the carbs should be loosened in order for each carb to be checked without influence from the other/s.

Slow idle slotted screws:

Once the pinch clamps are free, rotate the top slotted screw on one carb clockwise to allow more fuel to flow and raise the idle speed or rotate it counter clockwise to decrease fuel flow and lower idle speed. The carbs need to be synchronized to draw the same amount of air as well as bringing idle speed to the correct rpms.

Synchronization:

Two common methods are used to achieve synchronization:

First is the stethoscope type method of using a plastic hose. Remove the air cleaners, stick one end of the hose in the mouth of one carb and place the other end to your ear. Listen for the sound of the air flowing into the carb. Move the end of the hose to the other carb and listen. Adjust the top slotted screw (mentioned earlier) on each carb in turn until the sound of the airflow is the same in each carb. At that point readjust each top slotted screw a similar amount to bring the engine back to the recommended number of rpms.

Second is the use of the Uni-syn tool. This tool fits against the mouth of the carb after the air cleaner is removed and registers airflow through the carb by a ball that floats up in a glass tube. It can be placed over one carb, note the position of the floating ball, then placed over the other carb and again note the position of the ball. The top slotted screw on each carb is then adjusted (see above) to synchronize airflow in each carb and then to bring engine speed back to the correct rpms.

In either method above, the purpose is first to synchronize airflow in each carb and then to bring engine speed to the correct rpms. Use of the tube requires the user to be able to identify the subtle sound of airflow in each carb and know when they are the same. Use of the Uni-syn tool requires the user to assure the tool is placed securely over the mouth of the carb in the same way each time in order to produce accurate results.

Mixture control:

Gas/air mixture is controlled by a slotted screw down very low on each carb. Moving the slotted screw clockwise presses down on a "teeter totter" lever and raises the jet in the pot to reduce gas flow in relation to air flow and lean out the mixture. Conversely, counterclockwise movement of the slotted screw lowers the jet to allow more gas flow and enrich the mixture. Check to see which tailpipe carries vapors from each carb. Even with a crossover pipe the majority of vapor will flow from the carb opposite the exhaust manifold connection to which the exhaust pipe is connected. It is important to determine which pipe carries vapor for a particular carb for the following reason. Turn the mixture screw counterclockwise to lean out the mixture or clockwise to enrich the mixture by half turns. When the screw allows a mixture that is rich, the engine will begin rough running. When the screw allows a mixture that is lean, the engine will begin to stall. Once the screw is adjusted for best running on one carb, adjust the screw by the same process on the other carb/s. Finally, hold your hand close to the end of each exhaust pipe and note the temperature of each. Enrich the carb for a temperature that is cooler than the other. Best mixture is achieved when both pipes are emitting very hot exhaust temperatures that are the same. Cool exhaust indicates passage of unburned gas that tends to cool the exhaust vapors and reduces engine efficiency.

Finally adjust carb shaft and linkage in order to assure the stub lever on each carb attached to the internal butterfly valve achieves full travel up for totally closed butterfly with no pressure on the accelerator pedal and stub lever resting down on its stop when the accelerator pedal is fully depressed. Adjustment is achieved through one or a combination of the following methods: Assure the accelerator pedal is in full up position (no pressure on it) and check to be sure the carb shaft on each carb allows the butterfly stub lever to travel up to a fully closed position. Tighten all carb shaft pinch bolts. Depress the accelerator pedal fully to assure that the butterfly stub lever is resting down on its stop for fully open throttle. Loosen and adjust pinch bolts, nut at the top of the spring loaded accelerator linkage near the fire wall, position of the bracket attached to the firewall to which the accelerator linkage is attached and/or even by bending the long lever to which the accelerator pedal is attached if necessary. Fatigue may have caused some relaxing of this lever over the years. When normal adjustment above will not bring the butterfly stub fully down on its stop with fully depressed accelerator pedal, bending of the long accelerator lever may be necessary.

Once all adjustments are completed, apply a light weight oil to all carb linkage including one on each side of the front of the transmission tunnel where the accelerator pedal is secured as it passes through on the way through the firewall and to the carbs. Oiling once a year will greatly enhance free movement of the linkage. Slowly depress and release the accelerator pedal to assure it does not bind in a down position when normal driving is resumed. If binding occurs, recheck all linkage and relieve binding by adjusting the offending linkage to avoid unexpected engine racing on first driving (especially with automatic transmission).