

FERRARI MARKET LETTER
TECH TIPS VOLUME 1 (1980-1991)
Compiled by Dyke Ridgley

CARBURETOR ADJUSTMENT – PARTS 1,2 & 3

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MAINTENANCE TIPS & TUNING TECHNIQUES

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CARBURETOR ADJUSTMENT - PART 1

by Dyke Ridgley & Jim Riff

There are many various methods used to adjust the carburetion on Ferraris. Some are good, and some are not so good. The different types of carburetor set-ups on various Ferraris require different approaches to synchronization. Here we will discuss the method to be used on a three carburetor V-12, equipped with DCF, DCL, DCS, or DCZ carburetors. Much of what we say also applies to DFI carbs, but there are differences in the carb setting procedure.

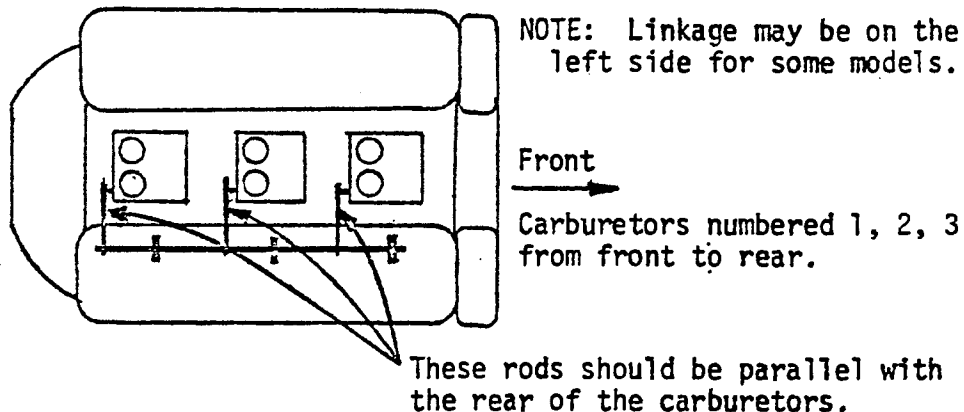
There are two factors to be considered here. One: Setting the linkage correctly is equally as important as the synchronization of the carburetors themselves. Two: All the carburetor work in the world will do you no good if the rest of the engine is not correctly tuned. In this article, we will address the correct method of setting the linkage, as well as setting the carbs themselves. Always make the adjustment of the carburetion system the last step in doing a major tune-up on any car. Be sure the valve clearances and the entire ignition system are set correctly before attempting to do anything to the carburetors.

There are twelve major items to be covered in adjusting the carburetors, and we will deal with them one at a time, in the order in which the operations should be performed.

1. Check carburetor bases for tightness. Prior to doing any work on the carbs themselves, make sure they are securely attached to the manifolds. They tend to work loose as gaskets get old and compress, so snug all the nuts securely with the appropriate wrench, and recheck the torque again when the engine is hot.

2. Check carburetor control rods for alignment errors. The premise here is that each of the three rods that connect the carbs to the linkage on the cam cover should be perfectly parallel with the rear of the carburetors. In some instances this is difficult to achieve because the lever on the cam cover may be placed against one of the bearings on the linkage, prohibiting exact alignment. In any case, set the levers on the cam cover rod so the rods which connect to the carbs are as nearly parallel with the rear of the carb body as possible (see Figure 1).

FIGURE 1



3. Check that No. 1 carburetor and cam cover levers are parallel. The design of the linkage on these engines is based on the relationships of angles. The lever at the rear of the carburetor must move through the same relative arc as the lever on the cam cover to assure proper opening sequence. If you view the linkage of one carb from the rear, a parallelogram effect will be noticed, consisting of the two levers, the link rod, and an imaginary line through the pivot points of the two levers (see Figure 2). This parallelogram must exist for each carburetor in order to have all three open the throttles precisely together. In order to establish this effect, do the following:

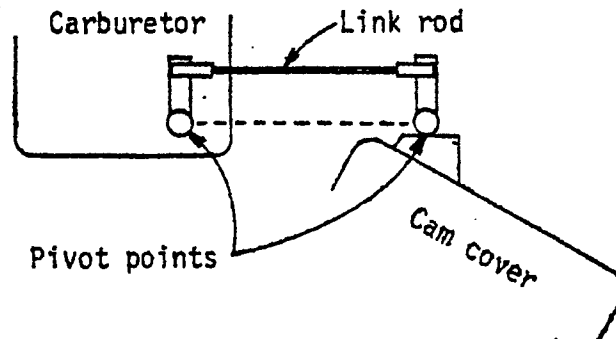
With the link rod connected to the front (or No. 1) carburetor, open the throttle so the lever at the carb is vertical (about 1/2 throttle). Now check the angle of the lever on the

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FIGURE 2



cam cover linkage. It also should be vertical (i.e. parallel to the carb lever). If it is not, adjust the length of the rod connecting the two levers. Slip the clips off the rod and either lengthen or shorten it so that the lever on the cam cover is exactly vertical when the lever on the carb is vertical. With this done, you have created the desired parallelogram, with the imaginary line connecting the lower pivots on the carb lever and the cam cover lever being the fourth side of the parallelogram. With this done on carb No. 1, you can proceed to step No. 4.

4. Set control rod lengths equal. Using the rod from carb No. 1 as the master, adjust the lengths of the other two control rods to the same length. Do not measure overall length or the length between the lock nuts, but instead measure the length between the sockets that go over the balls on the carb and cam cover levers.

When the rods for carbs No. 2 and No. 3 are reinstalled, you may have to loosen the lever on the cam cover with an 8mm wrench and move it slightly to allow for the changed length of the rod. Install the rod for No. 1 first and then adjust the cam cover levers for Nos. 2 and 3 as necessary. When moving the cam cover levers, do not get them askew (see step 2). Always make sure the balls and sockets of the linkage are greased.

To be continued in the next issue.

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CARBURETOR ADJUSTMENT - PART 2

by Dyke Ridgley & Jim Riff

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5. Set gear lash (linkage disconnected). Now that the basic linkage is set, we can move to the carburetors themselves. On a Ferrari, all carb barrels open simultaneously. There is no progressive linkage. For the purposes of this article, we will consider the barrel closest to the linkage as the primary barrel and the barrel away from the linkage as the secondary barrel, even though they both open together. The secondary barrel is attached to the primary barrel by a sector gear that insures the opening of the secondary barrel. The gear lash on most three-carb Ferraris is adjustable, however on cars equipped with DFI carbs it is not. The adjustment of this lash controls the amount of play between the throttles and therefore the lag in opening between the primary and secondary throttles. This lash should be adjusted so that it is as little as possible, while not being so tight as to create a binding of the gears as the throttle is opened.

The gear lash is adjustable by an eccentric sleeve, which lies between the secondary throttle shaft and the secondary sector gear. This sleeve is turned by applying a wrench to the nut on the end of the sleeve at the rear of the secondary throttle shaft. Prior to turning the eccentric sleeve, you must release the clamp which locks the secondary throttle shaft to the sleeve and sector gear. The sleeve must be turned so that the sector gears mesh snugly at the idle position and operate freely throughout their range. If the mesh of the gears is too loose, the secondary throttle will open behind the primary. If the mesh is too tight, the shafts will bind and all sorts of problems will occur in getting the throttles to open and close properly.

Any time the gear lash is adjusted, be sure to use a screwdriver to tap the secondary throttle closed prior to re-checking the lash. If you turn the eccentric toward the open throttle position, the throttle shaft will be pulled along and will need to be tapped back closed prior to checking the lash.

6. Synchronize all barrels individually. Now it is time to start the engine and synchronize the carbs. After the engine is running, disconnect all the control rods between cam cover and carburetors. Also loosen all the secondary throttle shaft clamps. Set the Uni-Syn on the primary barrel of carburetor no. 1 and adjust the instrument so the ball is floating at a convenient reference point. Then proceed to carburetors nos. 2 and 3, adjusting the primary barrels with the idle speed screw to achieve the same floating position for the Uni-Syn ball.

With all the primary barrels set, proceed to the secondary barrels. Adjust each of these to the same position on the Uni-Syn, using their idle speed screws. At this point, you should have all six barrels reading the same position on the Uni-Syn. Re-check to verify this.

If you have a problem getting the Uni-Syn to sit correctly on the top of the carburetor, make an adaptor with an appropriate diameter piece of radiator hose. Cut the hose squarely to snugly fit the bore diameter. The Uni-Syn does have a choking effect, so check each barrel quickly in order to avoid slowing the engine speed.

7. Tighten clamps and re-check synchronization. Once all six barrels are balanced, tighten the clamps locking the secondary barrels to the gears. Then unscrew the secondary idle speed screws by a full turn. The secondary throttle plates are now controlled in their idle setting by the gears rather than by their idle speed screws. This is desirable because now the engine idle speed can be adjusted by using only the three primary side screws. No longer will it be necessary to try and turn all six screws equally to speed up or slow down the motor.

After locking the clamps and backing-off the three secondary idle speed screws, re-check the synchronization. It is possible that a secondary barrel has changed slightly as its throttle shaft settled back against the gear. If so, turn the speed screw back in the one turn, release the clamp, turn the screw to adjust the level of the ball in the Uni-Syn, then lock the clamp back and unscrew the secondary idle speed screw. The shaft should now settle against the gear at the correct position of synchronization. Now use the three primary screws to set the engine at an 800-900 rpm hot idle and re-check the primary side synchronization.

To be concluded in the next issue.

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CARBURETOR ADJUSTMENT - PART 3

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8. Check idle mixtures. Now we will set the idle mixture on each barrel. Starting with the no. 1 carburetor, turn each idle mixture screw in or out by quarter-turn increments to get the motor to run at the fastest speed possible. After each incremental turn of the screw, wait 5 to 10 seconds to give the engine time to respond to the change. In the same manner, proceed through all six mixture screws. After you have the motor idling as fast as you can get it to by adjusting the mixture screws, turn each mixture screw out an additional eighth of a turn. This slight additional richness will help your Ferrari idle better when hot, and compensates to a degree for worn throttle shafts. Also, exhaust leaks will alter your ability to precisely set the idle mixtures.

9. Re-check synchronization. If necessary, re-set the idle speed to 800-900 rpm with the primary idle speed screws. Re-check the synchronization one more time with the Uni-Syn.

10. Set control rods on carbs. Now it is time to connect the carburetors to the throttle linkage. Connect the control rod to carb no. 1. This will serve as the guide for the rest of the linkage connections. Adjust the levers on the cam cover, by unlocking them and rotating them, so the control rods for carbs no. 2 and no. 3 fit without any interference. Take your time and make sure the rods for no. 2 and no. 3 fit correctly, as the cam cover levers tend to move slightly when they are tightened or loosened.

11. Check main throttle return spring. At this time make sure the throttle return spring is of sufficient tension to correctly close the throttles. If not, adjust it as necessary.

12. Check throttle cable slack. If your engine has a throttle cable, make sure there is some slack in the cable. You should be able to deflect it slightly without causing the throttles to begin to open. Too tight a cable will cause an erratic idle speed. Also at this time check for full throttle opening. With the engine off, of course, have a friend get in the car and floor the throttle pedal. Check the linkage at the carbs to make sure they are being fully opened. If not, adjust the cable or the rods connecting the engine to the pedal assembly.

This is by no means a complete treatise on carb tuning. The above assumes that the carbs are clean, have the correct jets, and the float levels are precisely set. Don't attempt the above operation in fifteen minutes. Plan on spending a couple of hours and taking your time. Once this work is completed, there should be no need to touch the carbs again for years. The Weber carburetors are precision instruments and do not go out of adjustment by themselves. Only you can screw them up!

For a copy of the complete, three part, twelve step, technical tip on carburetor adjustment, send a S.A.S.E. to Ferrari Market Letter, 850 Maxey Hill Court, Stone Mountain, GA 30083-2399

THE FERRARI MARKET LETTER is published and edited by Ferrari enthusiast Gerald Roush. It is totally independent and is not affiliated with any other commercial Ferrari venture or any Ferrari club. It is published biweekly (fortnightly--26 times a year) and dated on alternate Saturdays. Publication began with the 3 January 1976 issue and it has been published biweekly since then, making this the 175th issue.

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