

DOROTHY FIXX – ADVICE TO THE VEHICULARLY DISTRAUGHT – ADJUSTING D-SERIES HYDRAULIC TRANSMISSIONS – ONE METHOD

I have now received two queries from members regarding the adjustment of the hydraulic transmission on their D-series cars", writes Dorothy Fixx. "I have always used the method that is shown in this article. I first found it in an edition of 'The Citroënian', the magazine of the Citroën Car Club of Great Britain. I suppose it was

This was invented years ago by Citroën. The transmission was not fully automatic, but could have been if they had wanted it. It is what we now call an automatic stickshift or semi-automatic transmission. Citroën called it "Citromatic", and it is more wondrous than their famous hydropneumatic suspension.

Check the simple things first! If your Citromatic sounds like it has marbles in it, bleed the centrifugal regulator at the bleed screws provided at the top [see drawing]. The Citromatic will not work correctly if there is air in the brakes, so bleed at the carb, too.

If the gears grind, check to be sure that the clutch release lever is moving forward far enough. If it is, and the gears still grind, there is obviously something wrong with the clutch and pressure plate. NOT THE CITROMATIC! The gears would grind, even with a standard shift.

Many people get confused about Citromatic equipped cars especially if they have never had any previous experience with type of shift. Most owners who have driven them for years do not understand the workings of this hydraulic marvel. When I think of it, it must be as close and effortless as you can get to a fully automatic transmission without the undesirable aspects of the fully automatic transmission such as loss of power, loss of control, flexibility, economy, etc.

The Citromatic is quick, positive, safe, economical, effortless...IF...all units are working and are adjusted properly. No four speed shifts faster or more accurately than a DS with Citromatic. No declutching manually,

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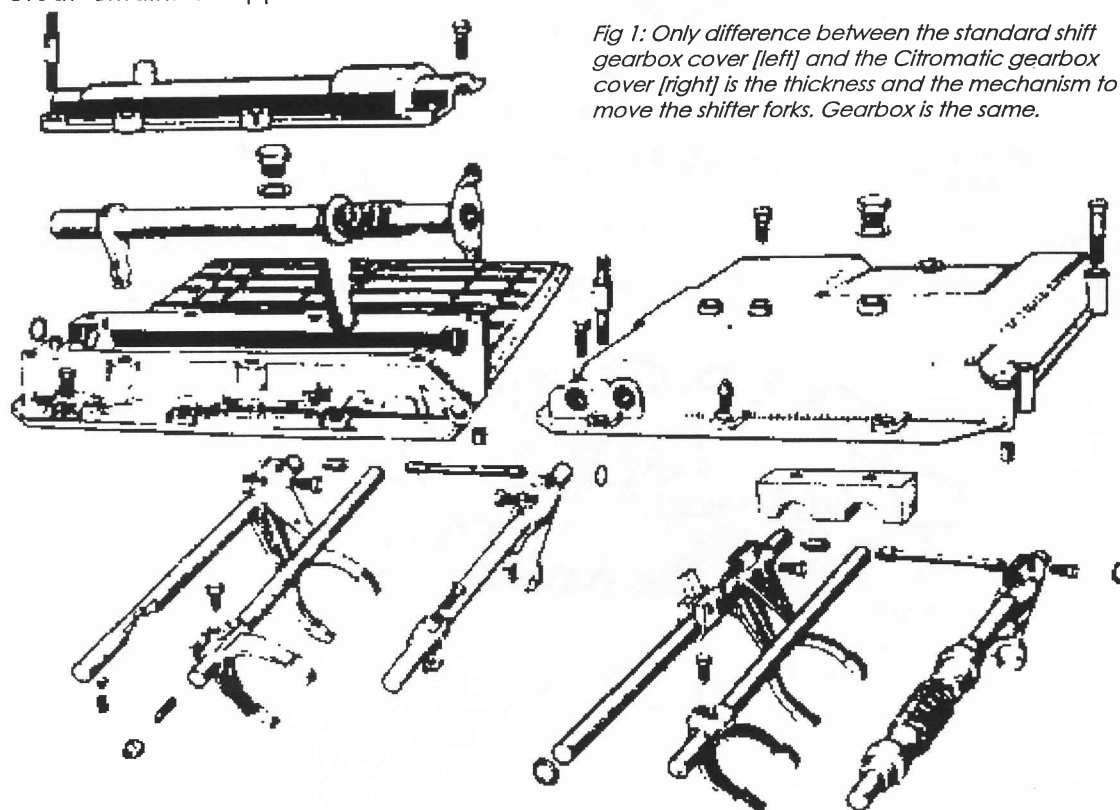


Fig 1: Only difference between the standard shift gearbox cover [left] and the Citromatic gearbox cover [right] is the thickness and the mechanism to move the shifter forks. Gearbox is the same.

about ten years ago that it was published, and given the reference in the article to 'Citromatic' I believe they may have derived the article from an American journal, but I am not certain. Anyway I must thank CCOCA member Stuart Pekin for introducing me to this article. I hope members find it useful."

Operation and Adjustment of the Citromatic Transmission.

An automatic transmission that gets the same fuel mileage as a standard shift has been the dream of many automakers for years. The trick is to eliminate the clutch, but retain a direct drive with no slippage.

As with most problems that owners have with their Citroëns, 99% of the problems that develop come from simple and avoidable causes. The single biggest problem with Citroëns is caused by mechanics working on the car when they do not understand how it works! They never fail to put the entire car out of adjustment and cause more damage than years of normal wear could cause.

The following article will help you put your Citromatic back in adjustment, no matter how screwed-up some previous owner has made it. Follow the instructions, step by step.

Please remember one thing:

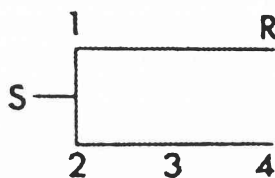
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no wait for synchronisation, no foot slipping from the clutch pedal, no clutch slip [riding the clutch], no left leg cramps in traffic, quick shift from 4th to 3rd are just a few of this transmission's good points. One of the transmission's great points is ease of shifting even in hard cornering when extra power is needed. In a normal four-speed equipped car you must remove one hand from the steering wheel, de-clutch with the left foot, move gear lever with right hand, release accelerator, etc. Valuable time is lost in these motions! The control of the car may be lost by split second timing in an emergency cornering situation. Citro-matic is INSTANTANEOUS and when adjusted properly the shifting is precise.

Most people are not patient enough to take time to understand Citro-matic. Most mechanics do not understand it, therefore cannot adjust it properly. Most Citro-matic clutches are so improperly adjusted that they have overheated and warped which causes clutch chatter and give erratic operation. Once all of the components of the Citro-matic are adjusted properly the only slippage the driver will get is if the car is started off in a gear higher than it should be [2nd or 3rd when it should be in 1st]. Have you ever observed the shift pattern closely?

Typical Citroën engineering! The transmission must be in neutral to start for safety [the shift block can only be in neutral of the starter will not turn]. First and reverse are directly across from each other, this is ease of parking [minimum movement of the lever]. A properly adjusted DS will idle into a parallel spot just by touching the brake pedal and shifting from 1st to reverse to 1st again. By the way, the brake pedal on the DS is to operated by the right foot only — NO LEFT FOOT ON THE BRAKE PEDAL AND RIGHT FOOT ON THE ACCELERA-



TOR like an American auto > this will DEFEAT ALL ADJUSTMENTS. The *champignon* or mushroom foot brake rubber sphere is designed for a minimum of travel its entire life and is lower than the accelerator pedal for a special reason — quick reaction time from the accelerator to the brake with the right foot, your foot only has to pivot on the heel to depress the brake and pivot to the right for the accelerator. If this is not so in ant Citroën D model the accelerator linkage needs adjustment. This is all leading to proper driving of the DS Citro-matic.

When all the adjustments are carried out properly to the driver's satisfaction, from this time on, normal maintenance should be a clutch adjustment e v e r y 10,000 miles [5,000 mile if the car is used primarily for stop and go driving]. EXCEPTION: when any of the components in this circuit are replaced, then adjustment of that component is necessary.

The transmission differential, clutch pressure plate, clutch disc and release

bearing are identical to the manual cars except for the internal shift rods and forks and the operation of the clutch. Instead of a mechanical clutch cable and rod there is a clutch slave cylinder and fitted to the transmission top covers are five servos or pistons [one each for 1st, 2nd, 3rd, 4th and reverse]. Lines leading from the hydraulic gear selector [shift block] to the transmission connect these servos and are tied together in one bundle. Like any hydraulic clutch slave cylinder it has one function — to engage or release pressure on the clutch release fork to operate the clutch mechanism. This lengthy description is necessary because the manually shifted car clutch free travel is also adjusted by feel of distance or clearance, which can be checked quickly with thumb and finger, but NOT the Citro-matic.

he Citro-matic clutch is adjusted so that at 650-800 rpm the clutch components are just about ready the connect to each
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other. Disc, pressure plate and flywheel. Putting it more simply, the clutch release or throw-out bearing is depressing the fingers on the pressure plate to the point where the clutch is just about to engage slightly but is still disengaged. For comparison on a manual shift car, the point reached when you are in 1st gear and have eased out on the clutch pedal to the point where 9 inch would cause the car to start to creep away on the level. MANUAL SHIFT AND CITROMATIC CLUTCHES ARE ADJUSTED DIFFERENTLY.

The manual clutch is adjusted without the engine running and the clutch pedal out [clutch engaged position] by pressing with your right thumb against the adjusting bracket [clutch fork] toward the radiator. Turning the adjusting screw clockwise reduces the clearance, anti-clockwise increases it. That's for the manual shift car owners, but for you poor drivers of the Citro-matic, let me continue as we are going to the meat and potatoes of it.

CITROMATIC CLUTCH ADJUSTMENT

Start the engine and bring to normal temperature. If the front of your car has been wrecked and the crank extension will not fit through the air duct without binding you must either remove the duct or make-up a tool from ¼ or 5/16th rod [obtained from a hardware store] and weld about two inches of 14mm or 9/16th inch allen key to the three foot long rod. We use an old army surplus rifle cleaning rod that has a "T" handle that revolves. This must take the place of the crank extension piece and is inserted in the front of the transmission and must be pushed in approximately one inch. This makes contact with the transmission main clutch shaft which passes through the clutch disc and is supported by the pilot bearing in the flywheel. Now, back to the adjustment procedure: engine at normal op-

erating temperature; turn the large air screw [brass] located at the front bottom left of the carburettor clockwise until seated and slightly tight, this should slow engine speed; check and adjust engine idle and mixture screws to obtain a smooth idle of 650-800 rpm [check tachometer]; this is the speed the engine will be idling at when you stop for any reason in driving — so at this speed we want the clutch disengaged [primary idle].

Since the clutch disc is connected to the transmission main shaft and our crank dog is *pushed in* with the crank or our home-made tool, by changing the adjustment we can adjust the DS clutch properly. Turn the adjustment bolt anti-clockwise [with the engine running] [WARNING: *watch fingers in moving pieces — belts, fan etc.*] until the tool [or crank extension] starts to rotate, this will mean that the clutch is starting to engage. Then, turn the adjustment bolt clockwise until the tool just stops turning [clutch just disengaged] then continue to turn the bolt one turn clockwise. You are now finished with the clutch adjustment. Note: If the shaft will not stop turning even after turning in the adjustment bolt all the way, then the pressure plate is broken and a new clutch is necessary. This is a fairly *common occurrence* even with manual shift on high mileage cars. If you try to adjust any other components of the system and you have a faulty pressure plate or clutch you will not be successful at all.

ENGINE IDLE

The next step [provided the clutch adjustment was successful and the clutch/pressure plate mechanism is working properly] is to adjust the engine idle. I prefer 1,000 rpm secondary idle. To adjust unscrew the large brass screw you previously screwed in, back out [anticlockwise] to obtain 1,000 rpm. Now, step on the foot brake and the engine speed

should drop to 750-800 rpm [primary idle]. When you let go of the brake the engine idle should rise to 1,000 rpm [secondary idle]. You are now finished adjusting idle. Note: Remember 1,000 rpm minus 750 rpm equals 250 rpm [for future reference].

CENTRIFUGAL REGULATOR

The next unit we will adjust will be the centrifugal regulator, located above the high pressure pump and driven by a small belt from the pump. This belt must not be overtightened or the result will be premature bearing failure in the centrifugal regulator. The centrifugal regulator has one purpose only. That is to start discharging fluid from the clutch slave cylinder between 800 to 1,000 rpm of the engine [a very slight amount]. When the engine speed increases from primary to secondary idle speed, just enough fluid is released from the clutch slave cylinder to make the clutch start to engage. When the clutch starts to engage just slightly the car starts to 'creep' or move slightly in first or reverse. Therefore the operation of the regulator is as follows: When in first or reverse gear and your foot is on the brake pedal the engine is at primary idle and the regulator has clutch disengaged and the car stays still; when you remove your foot from the brake pedal the engine speeds up [approx 250 rpm] to secondary idle which in turn causes the weights in the regulator to signal to the clutch to start to engage and the car begins to creep. It is only normal to have your foot on the brake when stopped at stop-lights or signals or for reversing. This is why it is important to use the right foot only for braking — so that the regulator is released and the primary and secondary idles work properly.

If the car will not creep when the foot brake is released in first gear it will need adjustment. Shot off the engine. The adjustment is an

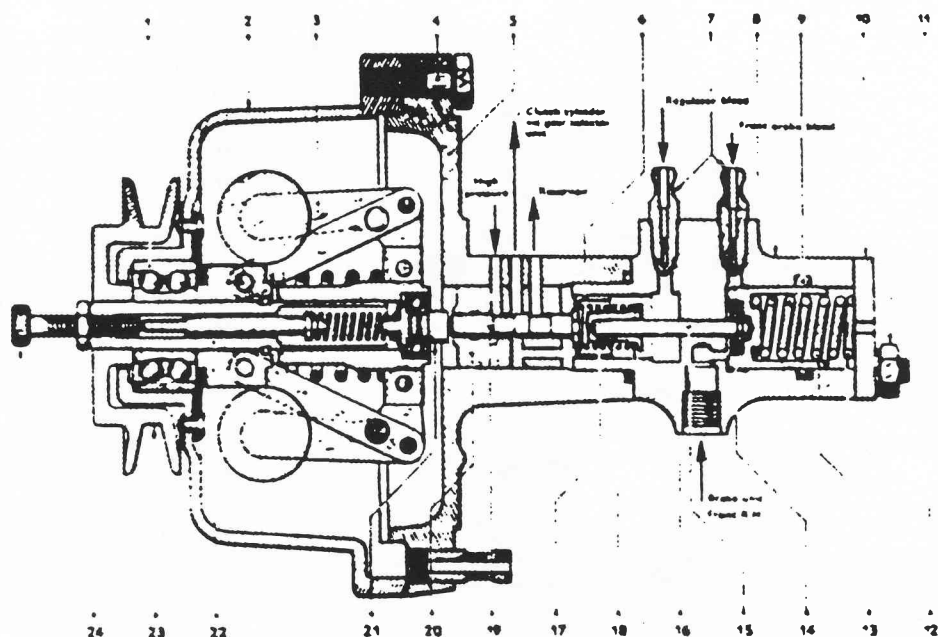
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8 mm headed bolt which goes through the centre of the centrifugal regulator pulley and is locked in place with an 8 mm nut. Unlock the nut and turn the bolt out [anticlockwise] one turn. Lock nut up, then start engine and check creep again. Continue this adjustment [anticlockwise to increase the creep, clockwise to decrease the creep] until the car is set to creep at a speed you are comfortable with. [If the car stalls on selection of first gear — screw in the adjustment screw until you achieve the desired creep.] This is fine adjustment and should be undertaken in increments of one turn, or less, at a time. If the car stalls every time on starting out or coming to a stop usually the seals on the piston inside the regulator are swollen and hard, causing the piston to stick in the bore. This is a simple unit and consists of a set of centrifugal weights and springs acting on a sliding piston controlled by the adjustment screw. Its only purpose is to activate between the difference in speed of primary and secondary idle to release a minute amount of fluid from the clutch slave cylinder.

Located on the right side of the transmission, its function is to guarantee that the transmission's gear 1st and 2nd are engaged before the clutch can engage [for safety] by stopping fluid return from the clutch slave cylinder if the gears are not fully engaged. Adjustment procedure is as follows: Hydraulic pressure up, engine off, gear selector in neutral; loosen two 11 mm headed bolts which hold control to transmission, pull unit toward front of gearbox, stop and push backwards slowly until the unit snaps rearwards [this is the neutral position], retighten the bolts.



A sectional view of the centrifugal regulator

Key: 1. Governor mechanism 2. Governor weights 3. Governor springs 4. Governor pin 5. Governor pin plate 6. Governor pin plate 7. Governor pin plate 8. Governor pin plate 9. Seal 10. Seal 11. Seal 12. Seal 13. Seal 14. Seal 15. Seal 16. Seal 17. Seal 18. Seal 19. Seal 20. Seal 21. Seal 22. Seal 23. Seal 24. Seal

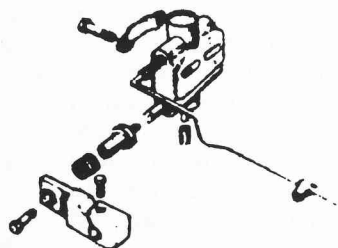
Generally, this unit never gives any trouble and almost never gets out of adjustment. Adjust ONLY if it is removed for repairs.

CLUTCH RE-ENGAGEMENT CONTROL

This control is attached to the intake manifold in front of the carburettor primary throttle shaft. Its function is to control how quickly fluid is discharged from the clutch slave cylinder between gear changes [how fast the clutch re-engages during the shifting from 1st to 2nd, 2nd to 3rd and 3rd to 4th]. There are two adjustments: 1. On the side of the unit facing toward the driver's side of the car, a straight slotted screw protrudes approximately 8 mm, sometimes with a knob fixed by a small

screw. The knob has a small raised post allowing it to be turned only 350°, but by unscrewing the small screw it can be turned without stopping on the small peg. If the speed of the clutch re-engagement between gears is too slow turn the screw in [clockwise] until you are satisfied with the clutch re-engagement speed. If the engagement of the clutch is too fast unscrew it [anticlockwise] until it suits you. This screw will not unscrew and fall out and sometime must be adjusted several turns depending on the condition of the clutch [such as when a new clutch is installed]. After getting the adjustment set you can re-install the small knob with the set screw...install the knob straight up which will give you approximately 175° of fine adjustment in either direction. 2. EXCEPTION: someone may have removed the carburettor and did not fasten the unit on the idle position and the shaft adjustment in relation to the carburettor idle may have been moved. There is a small hole [usually plugged with a

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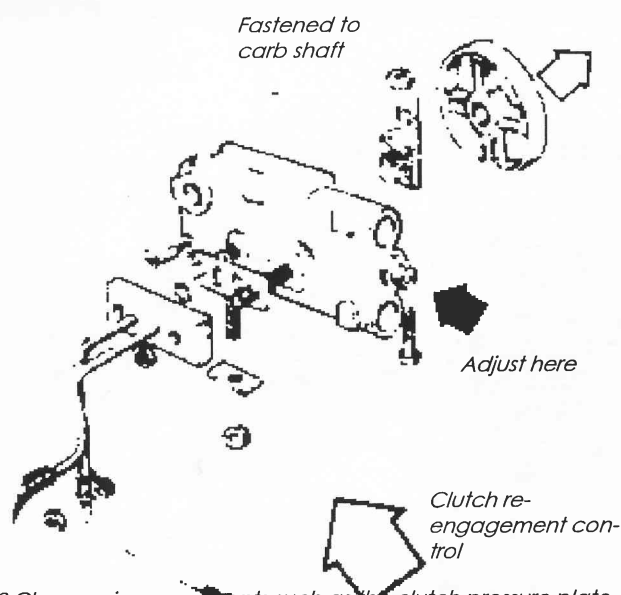


Fig 2: Changes in components such as the clutch pressure plate, or a change in fluid viscosity, can make the need to adjust this imperative!! Some adjustments may require that the adjustment screw be turned several turns. This adjusted has a very fine thread, so adjustment is not too sensitive.

plastic plug] just above and to the rear of the shaft centreline [towards the front of the car]. This is an adjustment/alignment hole. Normally with the throttle closed a 2.5mm wire should pass through the hole in the housing and go into the line-up hole in the internal shaft, locking the unit and the throttle shaft tight. If it does, it is all right, if not proceed as follows: Grip control unit shaft with thin vice-grip pliers near body of the control, hold shaft from turning, loosen the 8mm bolt in clamp between the control and the carburettor shaft, push 2.5mm wire in hole in housing and turning shaft against spring tension until the wire falls into the hole in the shaft and locks the unit from turning, release pliers and align shaft coupling and tighten the 8mm bolt. After re-alignment of the control, re-adjust the unit as #1 above, if necessary [it usually is]. Then on your road test after adjusting the unit drive the car at approximately 90 kph [55 mph] in 4th gear on a level road, move the gear change control to 3rd gear without releasing the accelerator pedal. The shift should be smooth and unnoticeable...if not

adjustment procedure is as follows: With left hand reach under and to the rear of the shift block, there you will find a rubber plug with the largest part about 11mm in diameter. After removing the dust cover you will have access to a 3.94mm hole. When 1st gear is selected with the control lever a pin 3.904mm diameter x 50mm length will slide into the line-up hole approximately 30mm and lock 1st gear position in the shift box. If not a mirror will allow you to see the hole. The best method to line-up the hole [if it is not already] is to have someone move the control lever to the left/right/in or out slightly in order to line the hole up in the shift block so that the pin can be inserted. Once you have the pin inserted into the shift block properly then you must adjust the shift control lever to the corresponding 1st gear position. To do this you must first

stop and fine adjust by the knob [or screw if your no longer has the knob on it]...road test and readjust to suit your driving style. Total time involved is about ½ hour.

There is only one adjustment on the shift block itself and it very seldom, if ever, needs adjustment unless the shift block is removed from the car. Ad-

remove a dust cover from the metal cowl to the rear of the shift block [under the hood]. This plug is about 1¼ inches in diameter and is made of rubber. It exposes two 8mm bolts which tighten a clamp between the control lever mechanism and the shift block. To adjust, loosen the lower 8mm bolt and align the shift control lever to the 1st speed detent [pops into place]. Then tighten the lock bolt. Remove the alignment pin and reinstall the dust cover [plugs]. You are finished.

This unit is faithful and almost never gives trouble but is often accused of being the cause of trouble. One exception is when it becomes gummed up and stiff [especially in cold weather]. Then it must be flushed out or removed and cleaned. A hissing noise from the shift block can be caused by misadjustment or a sticking piston which can be remedied by adjustment or removal and cleaning. SERIOUSLY, this unit is like all Citroën hydraulic units and is well engineered and needs little attention. Should service be required never take it apart in place. It is easily removed from the car to be repaired on the bench.

[Dorothy apologises for the quality of these drawings, but they are as good as the originals supplied.]

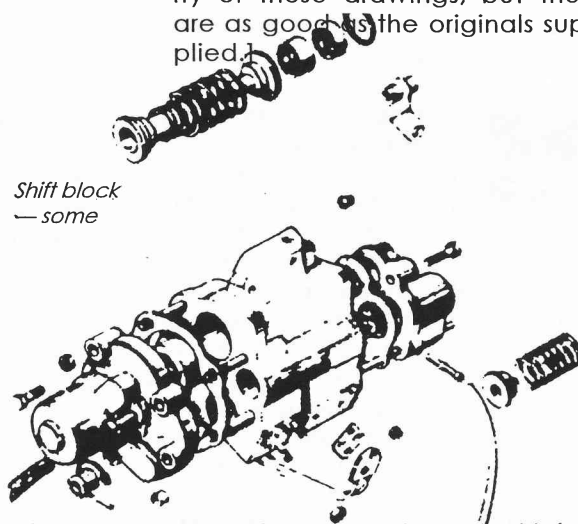


Fig 3. SPECIAL NOTE: Before you look for any trouble in this unit, be sure that you check the belt on the centrifugal regulator. The car will not move if the regulator is not turning. DO NOT OVERTIGHTEN THE BELT! Should the belt break, the car can be driven by using the manual engagement control that is located under the steering column.