Adjustments to the clutch and gearchange operations on a hydraulic gearchange Citroen DS.

Ensure all air is purged before commencing adjustment, by first bleeding the centrifugal regulator at the bleed screws located on the top, marked A and B on illustration (1).

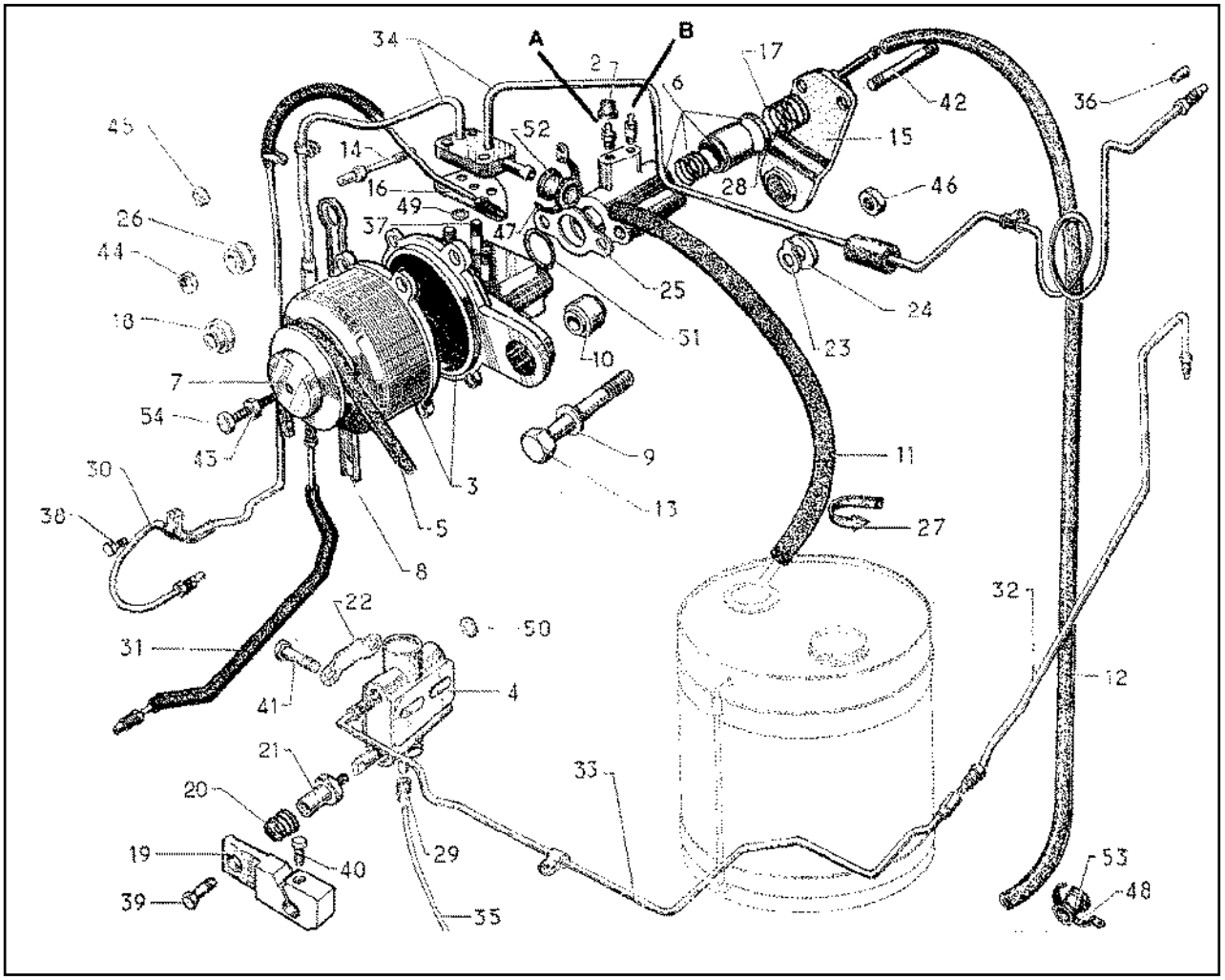

Illustration (1)

The hydraulic gearchange will not work correctly if there is air in the brakes, so also bleed at the carburettor.

If the gears grind, check to ensure that the clutch release lever is moving forward far enough. If it is and th gears still grind, there is probably something wrong with the clutch and/or pressure plate.

The hydraulic gearchange is faultless if all items are working and properly adjusted. No manual gearbox changes gear faster or better than a DS with hydraulic gearchange. Hydraulic gearchange should be quick and precise; if not, then adjustments are called for.

After all adjustments are properly set, normal maintenance needs to be no more than clutch adjustment every 5,000 miles.

The differential, clutch pressure plate, clutch disc, and release bearing are identical to the manual change 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 (one each fo

1st, 2nd, 3rd, 4th and reverse gears). Lines leading from the hydraulic gear selector on the bulkhead to the gearbo connect to these servos. Similar to a hydraulic clutch slave cylinder on an 'ordinary' car, the DS clutch slave cylinder has a single function; to engage or release pressure on the clutch release fork, to operate the clutch mechanism.

The DS clutch must be adjusted, so that at 700-800 rpm the clutch friction plate is just about to 'grab' the pressure plate. At this point the clutch release bearing is depressing the fingers on the pressure plate, to the point where the clutch is just about to engage.

Quick system check

There are two tests to check for correct operation.

First test: Accelerate to 20 mph in first gear. Release the accelerator completely and shift into second as for a normal gear change; do not touch the accelerator following the gear change.

Second test: Maintain about 50 mph in top gear on a straight and level road. With the throttle set for maintaining that speed (neither accelerating nor decelerating) select third gear *without moving your foot from the accelerator*.

Assess the way the clutch re-engages following the gear change in both tests. If engagement is jerky or abrupt, turn the screw on the clutch re-engagement control (CRC) anti- clockwise; if the clutch seems to slip or is sluggish on re-engagement, turn the screw clockwise. In both cases the clutch should engage smoothly and positively, without undue slipping. If not, the CRC needs adjustment.

Sequence of adjustments which must be adhered to

1. Start the engine, bring to operating temperature and leave idling.

2. Remove the rubber bung from the front of the undertray and insert the long rod (located in the spare whee tray) that the starting handle connects to. Push in until it makes contact with the main transmission shaft and will probably begin to turn.

3. Turn the large brass air screw (located at the front bottom left of the carburettor) clockwise, until just seated, this will slow engine speed. Turn the secondary butterfly stop screw on the carburettor (Upper of 2 on opposite side to the brass idling screw) until a speed of 550rpm is obtained. Obtain this speed by adjusting the mixture screw (angled upwards halfway along the left-hand base of the carburettor) and either the secondary throttle butterfly stop screw (facing left, on rear of the carburettor.) or, if this is locknutted, use the other mixture screw angled upwards on the side of the carburettor. facing the rocker cover.)

The use of a gas analyser is the only reliable way to set the mixture accurately, even though the idling spe may seem acceptable.

The original figures are: CO - 2 to 3.6%; CO2 - above 8%.

Do not attempt to adjust the throttle butterfly stop screws where these are locknutted, as on later cars. If th hydraulic pump cuts in during adjustment, wait for it to cut out before taking readings. The rpm should be checke with a multimeter with a rpm function, connected to the distributor. If running is erratic slowly readjust the mixtu screw. This engine speed is known as 'primary idle'.

4. Unscrew the brass carburettor idle screw to obtain a smooth idle of 875 - 1000 rpm. This engine speed is known as 'accelerated' idling. Now step on the foot brake and the engine speed should drop back to 550 - 600 rpm

(primary idle). When you lift off from the brake mushroom pedal, the engine idle should climb back to 875 - 100 rpm (accelerated idle).

5. With engine running at accelerated idle, adjust the screw on the clutch fork (to the left of the crankshaft pulley) until the starting handle extension just begins to turn, but can be stopped by hand. Unscrewing speeds clutch action; screwing in slows the action. Then tighten the adjustment bolt two complete turns. Note: If the shaf will not stop turning even after turning in the adjustment bolt all the way, then a replacement clutch is probably called for.

6. Check the clutch adjustment you have just made, by releasing the pressure in the clutch circuit by operatir the clutch auxiliary control (under the dash pod). The clutch fork should now be 'free'. If not repeat steps 1-5 above.

7. Adjusting clutch drag. Before attempting this, it is good practice to first bleed the centrifugal regulator; especially if any hydraulic pipework has been disturbed.

To do this, fit a plastic pipe to the bleed nipple on top of the regulator that is nearest to the drive pulley (A in illustration (1)). Insert the other end of the pipe into the main hydraulic reservoir on the car. The other bleed nipple (B in illustration (1)) bleeds a front brake; the other front brake is bled at the hydraulic assembly at the carburettor.

Ensure that both bleed screws on the regulator are tight, together with the main bleed nipple on the pressu regulator, situated on the nearside of the engine block.

Start the engine and run at a very fast tickover (2000 rpm) by unscrewing the brass accelerated idling scre on the carburettor. Then:

(a) Slacken the regulator bleed screw on which the plastic pipe has been fitted.

(b) Very slowly, adjust the brass accelerated idling screw on the carburettor to bring the idle down to 550 600 rpm. Let the engine idle very slowly in this condition for two minutes and then with engine still running, tighten the bleed screw.

(c) Remove the plastic pipe, refit dust cap and readjust engine idle as step 4 above.

8. Clutch drag is controlled by the centrifugal regulator as shown in Illustration (1), which is located above the high pressure pump and driven by a small belt from the pump. This belt must not be overtightened or the resu will be premature bearing failure. Note, that if this belt fails, the car will not move unless the manual clutch contr located under the dashboard pod is operated.

The purpose of the regulator, is to start discharging fluid from the clutch slave cylinder between 875 - 100 rpm (accelerated idle). When the engine speed rises from primary to accelerated idle, just enough fluid is released from the clutch slave cylinder to make the clutch start to engage. As the clutch starts to engage, the car starts to "creep" slowly forward or back.

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 disengaged the clutch and the car is stationary. When the brake pedal is released, the engine speeds up to accelerated idle, which in turn causes the centrifugal weights in the regulator to move outwards and release hydraulic pressure from the clutch slave cylinder. The clutch then starts to ‘bite’ and the car begins to creep. It is therefore essential when in gear and stopped, to hold the footbrake ON, otherwise the car will creep.

If the car does not creep when the footbrake is released in first or reverse gear, the centrifugal regulator needs adjustment as follows. Adjustments must be made with the engine hot and the car standing on a flat horizontal surface.

Screw the brass accelerated idling screw on the carburettor right in; but do not overtighten. Start the engin with an electronic tachometer connected to the distributor. Engage first gear and accelerate very slowly. Clutch d should commence between 700 rpm and 750 rpm. If it does not, proceed as follows:

Stop the engine. Referring to Illustration (1), on the regulator pulley is a 8mm M5 bolt (54) which goes through the centre of the pulley and is locked in place with another M5 nut (43). Unlock the nut. If the clutch drags at a speed of less than 700 rpm, tighten the screw. Unscrew if clutch drag begins at a speed greater than 750 rpm. Tighten the locknut. This is a fine adjustment and should be adjusted in increments of one turn or less, at a time. If the car stalls every time on pulling away, or coming to a stop, then it is probable that the seals on the pist inside the regulator are swollen and hard, causing the piston to stick in the bore and may need replacing.

When finally adjusted, readjust the accelerated idling as in Para (4) above.

Note: if the centrifugal regulator drive belt fails, then the car will not move. The emergency get-you-home method, is to drive using the clutch re-engagement control located under the dash pod, as you would a normal clutch. Pushing the control forward with your thumb, is the same action as pushing a clutch pedal down with your foot. Releasing your thumb, releases the clutch.

Note, that on a semi-automatic DS, the clutch is disengaged whenever the car is not being driven, and remains so even when parked, unless the car has been left a considerable time and the whole hydraulic system has de-pressurised.

9. ***Adjustment of the clutch lock.***

Generally speaking this unit rarely gives any trouble and almost never gets out of adjustment. Adjust only if it is removed for any reason.

The clutch lock is located on the right hand side of the gearbox; as viewed from the bulkhead. Its function is to guarantee that a gear is engaged before the clutch can engage - by stopping fluid return from the clutch slave cylinder, if a gear is not fully engaged.

Adjustment procedure is as follows: Hydraulic pressure up, engine stopped, gear selector in neutral; loose two M7 bolts (41 Illustration (1)) which holds control to the gearbox, pull unit toward front of gearbox, stop and push backwards slowly until the unit snaps rearwards (this is the neutral position), retighten the two bolts.

10. ***Adjustment of the clutch re-engagement control.***

This control is located on the front of the carburettor. All adjustments should be made on the road with the engine hot. If you've fitted a replacement clutch you'll need to adjust this. The adjuster has a very fine thread, so adjustment is very progressive.

The clutch re-engagement 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 gea changes and how fast the clutch re-engages when changing gears on the move.

How the clutch re-engagement control (or de-clutching guarantee) works.

Unlike a manual clutch control where there is a specified clearance at the top of the pedal (ensuring that th release bearing is clear of the pressure plate), in the DS the concern is at the bottom of the "pedal", that is, we mu

be certain the clutch is fully disengaged when the cylinder is pressurised (equivalent to the pedal being depressed on a normal car).

With the system fully pressurised and the car in neutral (ensured by the engine idling) the clutch should be fully disengaged. The easiest way to adjust and ensure this condition is met, is as follows. Remove the rubber bur from the front undertray that conceals the starting handle hole. Insert the starting handle extension into this hole; this extension is normally housed in clips on the tray underneath the spare wheel. With the engine idling in neutra it should be possible to push the starting handle extension into engagement with the dog, without the crank extension turning. To adjust - using a 14mm spanner, unscrew the bolt on the clutch fork very slowly (with the engine running in neutral) until the crank extension begins to rotate. If you go back and forth with the adjustment you should be able to find the exact point when the engine begins to drive the clutch disc and turn the crank extension. You've now found the point of clutch engagement. Next is to provide some guarantee that the clutch is definitely disengaged to allow for wear of the clutch disk and temperature variables. The general rule is to screw the bolt back into the clutch fork (clockwise) by two turns. You can make changing gear lightning-fast with minimal declutching guarantee, but it's possible you'll damage the synchromesh, and you'll need to readjust the guarantee fairly often.

If the crank extension tends to turn all the time, there's crud on the clutch components, the clutch disc is warped, or the pilot bearing is dragging.

Further information on the Clutch Re-engagement Control (CRC) fitted to 5-main-bearing engined cars only (1967 DS 21 etc). Earlier correctors are substantially different.

The CRC is a fairly simple control. Its job is to modulate the release of pressure from the clutch cylinder a a function of throttle position. Hydraulic fluid is released more slowly when the accelerator is released (throttle closed) and more quickly the more the accelerator is applied (throttle open).

There is a secondary function of the CRC which was not present on earlier models. During gearchange, that is, when the clutch is disengaged and the clutch cylinder is pressurised, the CRC closes the throttle. Even if th accelerator is fully depressed, the throttle will be partially closed by the CRC. This is designed to avoid overspeeding the engine when changing gear.

When the CRC is installed the relationship between the throttle and the CRC must be established. This is done by setting the throttle at idle, with the choke out of action. On the front of the CRC is a small hole plugged with a rubber stopper. New units are despatched with a 3mm wire clip in this hole. The clip passes through a slot in a disc inside the CRC locking it in the idle position. It's a good idea before removing a CRC to install a wire in the hole to lock the mechanism - the wire will only pass through the disc in one place. Turn the shaft until the wir enters the slot and the CRC will then be locked in the correct position for fitting to the inlet manifold.

The CRC is coupled to the throttle shaft by means of a plastic disc and two steel blade-like devices which enter slots in the plastic disc. The blades are clamped to the shafts of the throttle and the CRC. With the throttle closed and the wire locking the CRC, the blades should engage in the plastic disc without force; the blades should be clamped to their shafts in this position.

There are two adjustments on the CRC; refer to Illustration 2.

(a) On the side of the CRC facing toward the driver's side of the car: a straight slotted screw (**C**) situated on a round shoulder protrudes approximately 8 mm. On the round shoulder at (D) there is a locking grub screw. Unscrew the grub screw and adjust by turning (**D**). If the speed of the clutch re-engagement between gears is too

slow, turn (**D**) in (clockwise) until you are satisfied with the clutch re-engagement speed. If the re-engagement of the clutch is too fast, unscrew it (counter-clockwise) until it suits you.

This screw will not unscrew and fall out; however if you unscrew it by more than 17 turns or so, it will unhook itself from the mechanism within. Normally, the adjustment needed on this screw is no more than one tur Which is why the screw is fitted with a collar locked by a grub screw. The idea is, that under normal service conditions, the CRC may be fine tuned by turning the collar/screw by hand, without need of the small right angle specialised screwdriver that is needed on RHD cars. However, after fitting a new clutch or a new CRC, the contro may need several turns until it comes within 'range'. After getting the adjustment set, lock with the grub screw. Tl should be installed straight up, which will give approx. 175 degrees of fine adjustment in either direction.

(b) Be aware that it is possible that someone in the past may have removed the carburettor and did not fasten the unit on the idle position; consequently the shaft adjustment in relation to the carburettor idle may have been moved. There is a small hole (usually plugged with a white plastic plug) just above and to the rear of the sha centreline (towards front of car). This is an adjustment/alignment hole. Normally with the throttle closed a 2.5mn (.100 inch.) 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 the control unit shaft with thin nosed mole grips near the body of the control, to prevent the shaft fro turning. Loosen the M5 bolt in the clamp between the control and the carburettor shaft, push a 2.5mm wire into th hole in the housing and turning the shaft against spring tension, guide the wire into the hole in the shaft, whereby will stop the unit from turning. Release the mole grips, align shaft coupling and tighten the M5 bolt. After realignment of the control, readjust the unit if necessary. Road test the car after adjusting the unit. Drive at approximately 50 mph in top gear on a level road - move the gear change control to 3rd gear without releasing the throttle. The gear change should be smooth and almost unnoticeable . . . if not stop and further fine adjust via the collar.

Hydraulic gear selector unit.

This bulkhead mounted unit almost never gives trouble, provided the filter and fluid in the main hydraulic reservoir is kept clean. A hissing noise from the selector unit is usually caused by a sticking piston; this can be remedied by adjustment, or removal of the unit and thorough cleaning.

There is only one adjustment on the gear selector unit itself and it seldom, if ever, needs readjustment, unless the gear selector unit has been removed from the car.

Adjustment procedure is as follows:

Reach under and to the rear of the gear selector unit, there you will find a rubber plug with the largest part about 11mm in diameter. After removing this plug you will have access to a 4 mm hole. When first gear is selecte with the gear lever, a steel pin slightly less than 4mm in diameter, will slide into the line-up hole for approximate 30 mm and will lock first gear in position in the unit - a small 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 about, in order to line th hole up in the gear selector unit, so that the pin can be inserted.

Once you have the pin inserted into the gear selector unit properly, then you must adjust the gear change lever to the corresponding first gear position.

To do this; remove the dust plugs from the metal cowl to the rear of the gear selector unit (under the bonnet). These plugs are about 45mm in diameter and are made of rubber. They expose two M5 bolts which tighten a clamp between the gear change lever and the gear selector unit.

To adjust, loosen the lower M5 bolt and align the gear change lever to the 1st speed detent; it will pop into place. Then tighten the lock bolt. Remove the alignment pin and reinstall the rubber plugs.

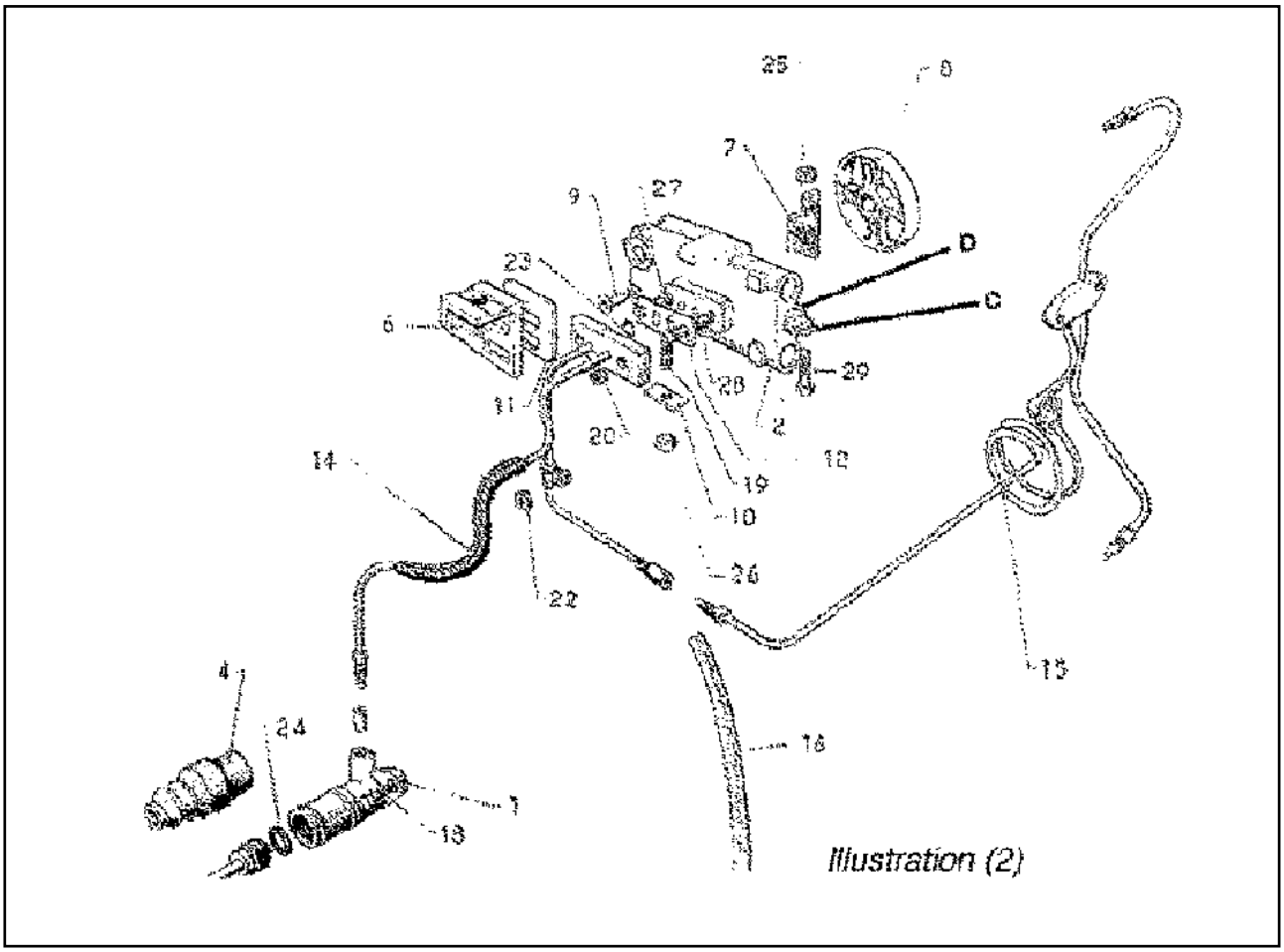

Illustration (2)