Dear friends,

Some of you will know that about a year and a half ago a I was infected with a serious disease called Tractionitis Oleopneumatitis. The plain Traction virus is bad enough (I must have picked it up even before I was born and never got rid of it ever since); the Oleopneumatic variant is a lot worse. The symptoms really become apparent when the pressure in the system rises and the rear end of the car responds accordingly. Let me explain a bit of the background.

For details of how I embarked on my 15-Hydraulique project I kindly refer to my website www.btwsk.nl/citroen. In short: I acquired two 15-H's in one deal, one a wreck but in original an close to complete condition, the other a nicely restored but unfinished and above all far from complete car. The latter (grey) one is being finished, using the missing parts of the former. The assumption that the grey car "just" needed finishing was quite euphemistic: a lot of work still needed to be done. After I took the gearbox apart to correct a number of errors that had been made at reassembly, I undertook to bring the brakes and the hydraulic system back in working order. The brakes had been renewed but had sat idle for at least six years. Besides, some essential parts were still missing. The hydraulic components were only partly there; several had to be borrowed from the wreck. I decided to have all the hydraulic components refurbished by a specialist firm who deal mainly with DS stuff. There they also gave me the solution to finish the brakes job, a puzzle the previous owner had not managed to complete.

Rear Brakes

The brakes of the Traction 15-H are of the conventional type with the usual network of hydraulic lines and flexible hose pipes, like on any Traction. However, the greater flexibility and the design of the rear suspension must have triggered the people at the Bureau d'Etudes to invent a different method of linking the rear brakes to the rest of the system. Instead of using two short flexible hoses like the other Tractions have, the 15-H has fixed lines on the suspension arms that end up in a swivel mounted exactly in the centre of rotation of the rear arms. The swivels are small hollow tubes with a slot in them, fixed onto the rear arms; the incoming brake lines from the car are connected to the swivels by means of "banjo" type fittings and rubber o-rings. As the rear arms swing, the swivels rotate back and forth inside the "banjo" of the fixed brake lines. This arrangement –which was copied onto the later DS

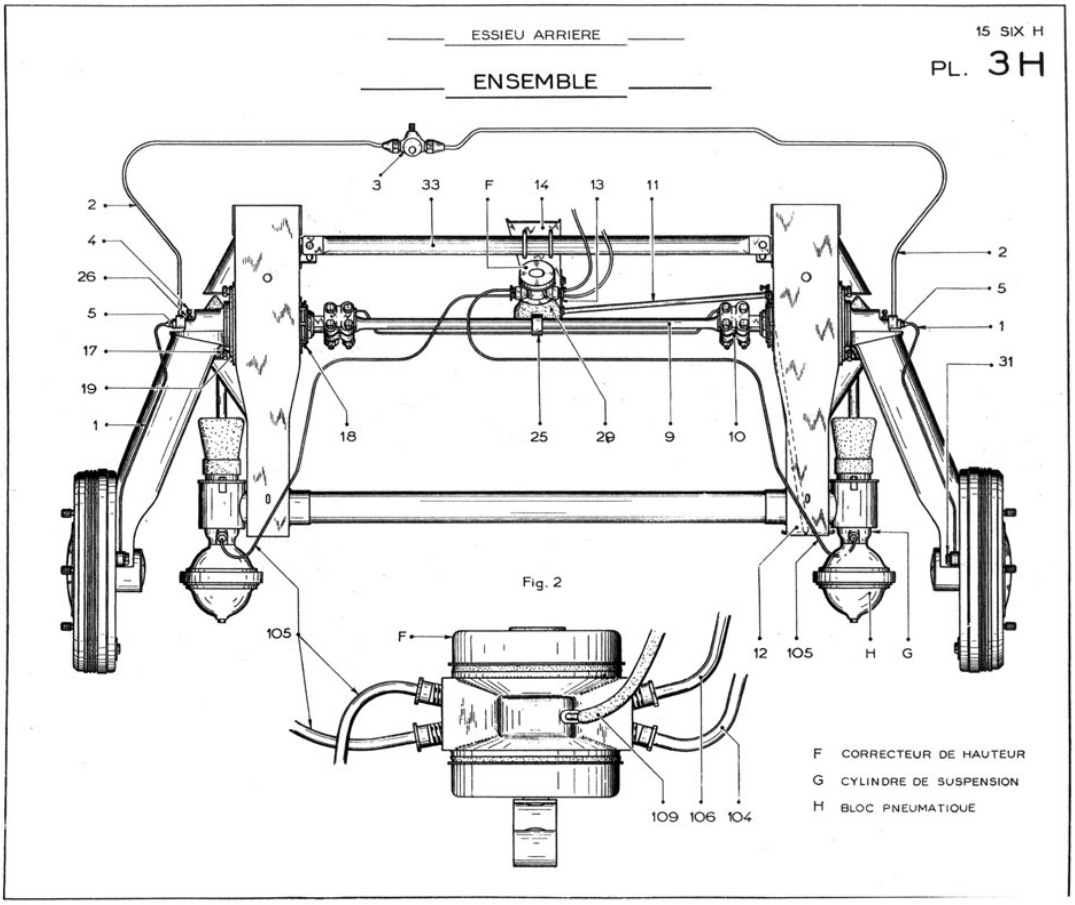
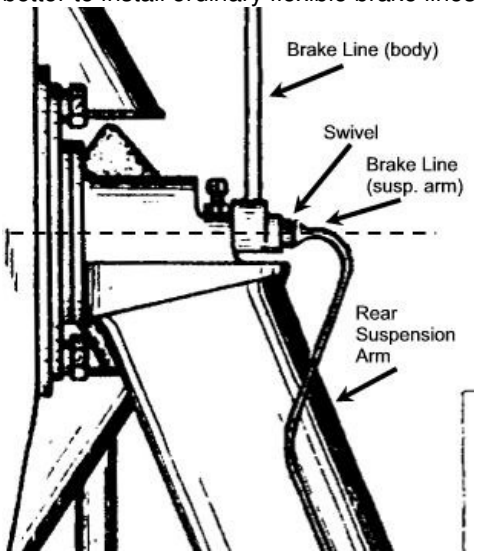
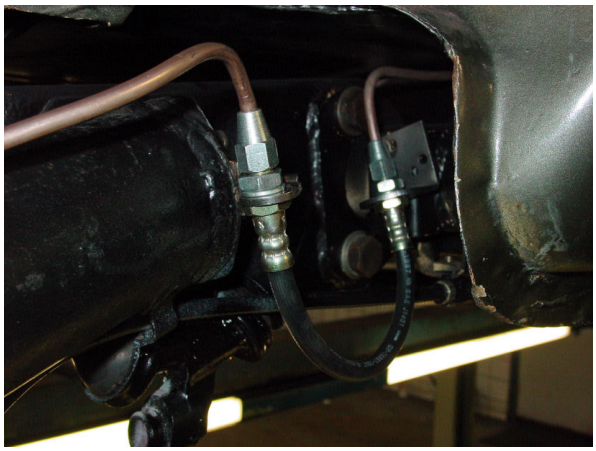


Fig. 2

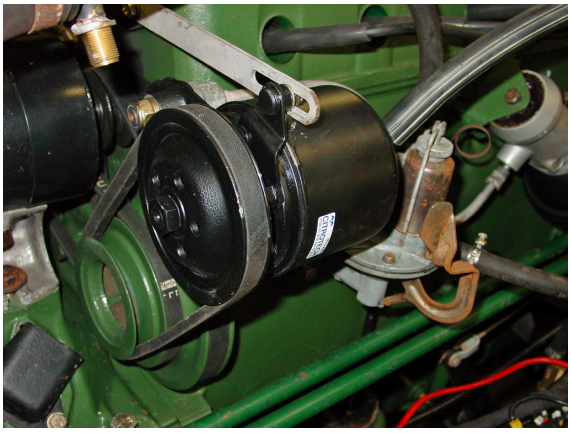
unchanged- is most ingenious but said to be sensitive to leakage; reason why the experts believe it is better to install ordinary flexible brake lines instead. Citrotech –the name of the specialist shop, based in Oldebroek, the Netherlands- offer conversion kits that do the job, but as always quite a bit of tailoring is needed to make everything fit nicely. The drawings show the original lay-out of the system and the picture demonstrates what it looks like after the modification. It included bending and flaring new brake lines, both on the fixed part of the car and on the rear suspension arms. But… it works! I still find the flexible brake lines a bit too long, but that is merely cosmetic.

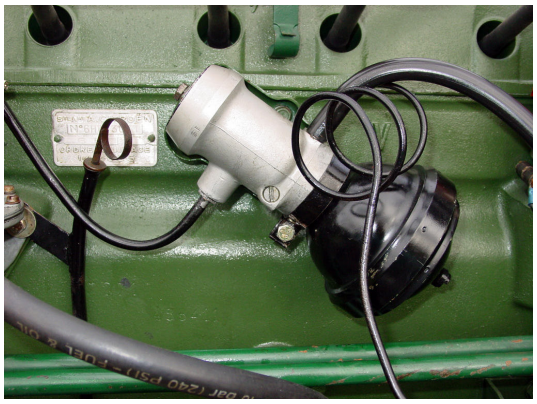




Hydraulic Rear Suspension

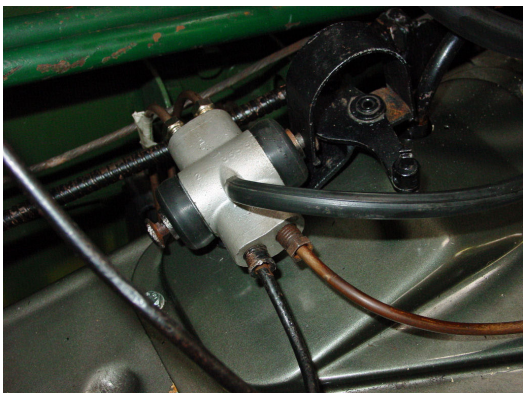
After that it was time for the hydraulic components to be installed onto the car. I wanted to convert the entire system to the more convenient and less corrosive “green” LHM fluid. This meant that all the rubber seals and the diaphragms in the spheres had to be replaced. Since everything had to be overhauled anyway, this was an easy thing to do. Die-hards want to make you believe that you should never do a thing like that since it is not the original, but those who have some experience with Citroën hydraulics and particularly those who want to have a trouble-free system, all strongly recommend to make the change. I have seen 15-H’s on which the conversion was done brutally by replacing most of the components by ones that belong to a CX. Even the later type suspension spheres made out of one piece can be found on 15-H’s. I wanted to keep everything as close as possible to the original, which meant that all the components had to be taken apart, refurbished, reassembled and tested. This is more costly but it will allow you to maintain the original look under the bonnet, the only visible difference being the color of the fluid in the gauge outside the container.





Installing the components is really a piece of cake. The most time was taken up by carefully bending and connecting the new pressure lines, and by installing the leakage lines which –even on a Traction- is rather complex. While under pressure the hydraulic suspension will always lose some fluid along the pistons; other mechanical parts can show minor leakage as well. The design is such that the fluid that leaks away is collected and fed back into the container through a network of interconnected thin flexible lines. Every component, including both suspension cylinders, the level regulator and the famous “Verrou” –unique for the Traction, omitted on

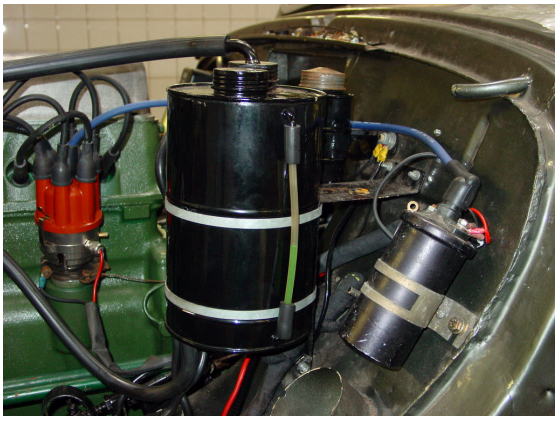
the later DS19- has a connection for a leakage line. The HP regulator has the normal overflow of fluid that is fed back into the container. The only component that does not have a leakage line connection is the HP pump. This does not mean that the pump is not sensitive to leakage, on the contrary! For the HP-pump, however, one has to rely entirely on the tightness of the seals.

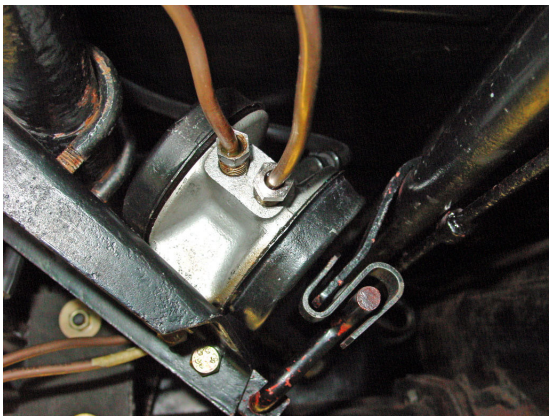


"Verrou" literally means "bolt" in French. The purpose of this locking device is to prevent the car from settling down low soon after the engine is turned off. This is done by stopping the hydraulic fluid from flowing back to the container by simply blocking the channels. The "verrou" is operated by pulling a knob on the dashboard (with the letter V on it). The secondary circuit is now separated from the primary one and the car is supposed to remain at its normal level after the passengers have disembarked. The "verrou" is unlocked by pushing the knob back or by stepping on the clutch pedal, making sure the system is unlocked before the car is set in motion.

After everything had been installed and connected, the moment was there to fill the system with fluid – some 3 litres are needed on a Traction- and see what would happen after starting the engine. The first comforting experience after filling the system was to find that the fluid did not leak from the bottom of the container –where all the connections are. Everything stayed nice and dry. The repair manual prescribes to prime and let the air out of the primary circuit first. This runs from the container via the HD-pump and the pressure regulator back into the container. If the pressure release screw on the regulator is opened by about ¾ of a turn, the pump will prime itself and feed the fluid through the regulator back into the container through the thick return hose. I started the engine and watched how the level of the fluid in the container started to drop, meaning that it was being sucked into the system. As soon as the level remained constant (fluid circulating through the system) I tightened the pressure release screw. Now I could hear that the pump started to "work" and after the storage sphere was pressurized the automatic release valve inside he regulator opened up with the light "click" known from most hydraulically suspended Citroëns. The primary circuit was working correctly.

After that the car had to be lifted on a bridge with the engine running in order to be able to get at and adjust the level regulator, located in the middle between the rear suspension arms. The level regulator is operated by pushing or pulling the small control rod inwards or outwards from the central position. When properly set, the level regulator is operated by a sort of flat "finger" connected to the stabilizer rod between the suspension arms. If the car sits low the finger pulls the regulator control rod outwards, admitting extra fluid from the storage sphere; if the car is at its maximum level the finger pushes the rod slightly inwards, releasing the pressure and bleeding the fluid back into the container. If set properly, the level regulator will allow the car to settle approximately half way the lowest and highest positions.





I had provisionally installed the level regulator in its middle “rest” position with the car sitting low; it would have to be adjusted to achieve a correct driving level. By pulling the control rod out by hand I opened up the system and admitted the pressurised fluid into the rear (secondary) circuit. Next I heard two soft “clonks” indicating that the suspension cylinders were pushed firmly against their ring mountings on the sub-frame. As long as the system is without pressure, the cylinders are slightly loose in their mountings. Next, the car started to rise to its maximum level. Pushing the control rod back in made the car sink rapidly to its lowest level. Repeating these actions a couple of times drove all the air out of the system. By undoing and tightening the pressure release screw a couple of times any remaining air was expelled from the system. By loosening the two bolts and moving the level regulator back and forth on its mounting bracket one can find the correct position to ensure the normal driving level of the car. Citroën prescribes a rather complicated procedure to set the normal driving level. Common sense and feeling the gaps between the lowest and highest rubber stops of the suspension will work just as well. Once the level regulator is set , the functioning of the system should be tested by adding weight to the rear of the car which will make it sink to its lowest position. If the regulator is set properly the system will let the car to rise it to its preset level again. The opposite should happen after the extra weight is taken off the car; at first it will rise to its maximum level but then the level regulator should kick in and bleed off the excess fluid until the car has lowered itself to its normal driving level. The latter is accompanied by the hissing sound that is characteristic for early Citroën hydraulic systems. The easiest way to do these tests is by asking someone of average weight (approx 75-80 Kilos) to sit down on the edge of the opened boot and wait for him to be lifted up by the car. Ask the person to stand up again and the car should respond by first rising and then sinking back to its normal level.

Once the suspension worked properly it was time for some practical testing by carefully moving the car around on the premises under its own power. It should be noted that the car is not yet roadworthy. As with the DS, the rear of the car will go down gently when pulling away and will rise when the brakes are applied. In general the suspension is nice and soft like on the early DS. When backing up, the brakes should be applied carefully, otherwise the rear of the car will rise under the force of the brakes, only to drop drastically the very moment the brakes are released; it demonstrates that the hydraulic suspension is working correctly, but will be most uncomfortable for passengers on the back seat.

The last suspension related item still to install is the mechanism to adjust the level of the car manually. This device is not critical to the functioning of the hydraulic system; it is only meant to facilitate changing a wheel in case of a flat tire. Although the principle and the mechanism are deadly simple, it will require some tailoring to fit the device onto my car.

To be continued…

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April 2007