**How to replace spheres, change the LHM, and bleed brakes.**

*Acknowledgements to CitroJim (Jim Eastment) and others*

**Prerequisites**

**Tools and sundries:**
- Sphere removal tool. Either the genuine Pleiades item or a "Xac Special" tool is essential. A really strong chain filter wrench (strap wrenches have too much 'give') and a long breaker bar may work.
- Ramps and/or axle stands.
- 8mm ring spanner (very good, slim) for the calliper bleed nipples,
- 8mm good quality hexagon (not bi-hexagon) socket for the calliper bleed nipples if they're really tight,
- 9mm - for the anti-sink sphere pipe: either a high quality flare-nut spanner, or a pro quality open-ender for (un-)tightening plus a cheap ring spanner converted into a flare-nut spanner with an angle-grinder,
- 12mm ring spanner for the bleed valve on the pressure regulator,
- Good-sized side (wire) cutters or pincers is what the professionals use on those hose clips,
- Small screwdriver or similar to prise open the clip when compressed,
- Plastic drink bottle (clean 330ml) with a hole through the cap for a length of plastic pipe that is a snug fit on the bleed nipples. This makes a safe, secure 'bleed bottle'. A 'jam' jar is easily knocked over.
- A plastic (HDPE) drinks bottle of clean petrol,
- Cut the bottom 5" or so off 2 or 3 2L 'fizzy' bottles to catch LHM spills and to drain old spheres into,
- Small polythene bowl or similar to wash LHM filters in petrol,
- ½" paint brush and a soft tooth-brush for cleaning the LHM filters,
- A cheap plastic kitchen jug (½L) or a new oil jug to fill the reservoir without spilling LHM everywhere.
- A broom or similar to wedge upside down between the drivers seat and the brake pedal,
- Lint-free rag or paper towel,
- Plus-Gas or similar penetrating fluid.

**Parts:**
- Replacement Spheres
- A 4.5mm hydraulic seal for the Anti-Sink Sphere
- 5L container of LHM

**Preparation**

Several hours (at least) in advance, squirt 'Plus-Gas' on the joints of: the rear spheres, the pipe union on, and mounting of, the Anti-sink sphere, the Accumulator sphere and each brake nipple (not on the pads!).

**CAUTIONS**

Whenever fitting new spheres, change the LHM unless has been changed within the last year - it's pretty pointless contaminating new spheres with dirty old fluid.

If a rear suspension spheres is removed, it's vital to bleed the brakes. Even small amounts of air in a Xantia's brakes results not in spongy brakes, but in a potentially fatal hesitation in the brakes responding.

When changing the LHM, it's essential to bleed the brakes to remove the old LHM tapped in the 'dead-end' of the braking system that otherwise stays there for ever.

All the rear spheres will be tight and corroded in place as will the anti-sink flare nut - without an overnight soak with PlusGas or similar the job will be very much harder, if not impossible.

To change any sphere, the hydraulic system must be de-pressurised as explained under Rear Spheres.

When you remove spheres, some LHM spillage is inevitable; a 'blown' sphere may contain a considerable amount of 'fizzy' LHM (½L or more) under just enough residual pressure to spray it all over the place.
SAFETY FIRST
When washing the LHM filters with PETROL there is a RISK OF FIRE & EXPLOSION.
The car MUST be very firmly supported AT ALL TIMES when working underneath so that if the suspension suddenly sinks, you are not crushed by the car! This sounds unlikely, but it only takes your clothing to snag on part of the height control mechanism.

Rear Spheres
Start with the most difficult, the rear corner spheres. These are often very tight and MUST FIRST be loosened with the suspension on high and under full load to avoid stop the suspension cylinders turning and wrecking the pipes. Load the back with about 100Kg or so, raise the suspension to the highest (Service) position and put axle stands in place to 'catch' the car at the rear but not actually taking the weight. With the engine running, apply the sphere tool of choice and "crack-off" each rear sphere by about an eighth of a turn (i.e. just get them started). It's important to only turn the sphere enough to 'start' it, otherwise LHM under high pressure (around 50 bar - 700 psi!) will escape at high velocity! Once you have moved, put the suspension on the lowest setting and allow to settle fully.

With the engine still running, de-pressurise the hydraulic system by opening the bleed screw by no more than 1½ turns. This is the only 12mm 'bolt' head on the pressure regulator (what the accumulator sphere on the engine fits onto). Wait for a minute or two for the system to de-pressurise, then stop the engine.

The rear spheres can now be un-screwed fully. Be prepared for LHM spillage. Clean up, recover the old sphere seals if they got left behind in the groove on the sphere housing. Dip the new sphere seals in clean LHM and place them in the groove; NOT on the sphere as they will not seat properly and may get cut. Screw new spheres on hand-tight only.

Anti-Sink sphere
This is the one in the middle at the rear. Be prepared for LHM spillage. Before you can unscrew it, the small hydraulic pipe (photo 1) going into the front of it must be freed-off. For this you need the 9mm Flare Nut spanner. The union may be tight - take care not to round it off, hence the good spanner. Once the flare nut is turning easily, you can leave the spanner in place while you unscrew the sphere from the bracket so it undoes the flare nut at the same time. The sphere may be tight and the bracket is not that strong (and gets corroded).

When it's free, pull the hydraulic pipe out of the sphere and and remove the hydraulic seal from the pipe. If it stayed in the old sphere you can leave it there.

You MUST use a new pipe seal when fitting new anti-sink sphere. It doesn't need a ring seal but fitting an old one will make it easier to get the sphere off next time. Start the new sphere's thread into into the bracket, dip the new pipe hydraulic seal in LHM and push it over the end of the pipe until it just past the flare on the pipe. Push the pipe into the sphere and get the thread well started. You can then repeat the trick of screwing both up together. The sphere should be hand-tight. The flare nut will be about right when it is as far into the new sphere as it was in the old, as indicated by where the rust begins on the union threads. On re-pressurised, check for leaks and if there is a weep, just nip the union up a touch until the leak stops.

Front Spheres
The front corners are easy. De-pressurise the system, then just undo them having prepared for spillage, clean up, dip the new seal in LHM, place it in the groove on the strut body (NOT the sphere) and screw the new sphere in hand-tight.

Accumulator
This is the sphere on the front of the engine. Access is poor and it's often very tight. You really need the front end on ramps or stands for access and to get a good swing on the removal tool. Mind the radiator! It's worth gaffer-taping a sheet of stout cardboard to the face of the radiator. Clean up, dip the new seal in
clean LHM and place in the groove of the regulator body (NOT the the sphere!) before screwing in the new sphere hand-tight.

**LHM Change**

De-pressurise hydraulics. On 1.9TD and 2.0i engines, remove the air duct from the air cleaner to the throttle body (2.0i) or the inlet manifold (1.9TD). Photo 2 shows my '95 1.9TD.

Disconnect all the rubber pipes from the filter head in the top of the LHM reservoir. If the original clips are in place, carefully prise them apart with a scriber or small screwdriver; with care they can be reused. When moving the pipes beware of LHM spillage.

Unclip the pipe retainer from the side of the reservoir and move the pipes to one side. Undo the two 10mm nuts holding the reservoir. There's a locating spigot moulded into the base of the reservoir that can stick - gently lever the reservoir upwards to free it. Carefully lift out the reservoir full of old LHM with the filter head in place.

Release the spring clip across the top, lift out the filter head and place it in a clean receptacle to drain. I use the bottom of a plastic 4 pint milk container. Tip out the old LHM into a suitable (5L) container. Old LHM (and Hydraflush for that matter) should be properly disposed of as waste oil.

Clean out the LHM reservoir with clean, lint-free rag or cheap kitchen roll. Remove the two filters from the filter head and clean them in petrol. One is clipped on and is secured with a small "S" shaped wire clip. The other (long and conical), is easily missed up inside the suction tube; it's secured with a bayonet fitting. Wash them with a paint brush in petrol until they are spotless and leave to dry. The filter mesh is delicate so don't be rough with them. **Don't even think of using an air-line!**

Reassemble the LHM reservoir and refit to the car. The clips that hold the pipes on to the reservoir can be reused with care or "Jubilee" clips can be used instead.

Refill the reservoir with either LHM (or Hydraflush). It'll take at least 4 litres.

**Re-Pressurising**

If the LHM is to be changed (if not, why not?), change it before re-pressurising.

Nip up the 12mm bleed valve, start up, allow pressure to come up, set on high, top up the LHM and check for leaks. Bleed the brakes (see below) to remove as much as possible of the remaining old LHM from the system. Then do a really good session of Citarobics. Before driving the car, check the brakes; changing either of the accumulator spheres will have let air into the brake lines (nasty on a Xantia!).

Then check everything that has been disturbed for leaks.

**Bleeding Brakes**

Start with the offside (right) rear calliper.

**General Procedure**

Pop off the protective rubber cap from the calliper nipple, clean up around it, spray it with Plus Gas and carefully crack it open with a good quality 8mm ring spanner; if it's really tight, give the PlusGas a chance to penetrate before using a decent deep(ish) 8mm socket. Nip it up again, leaving the spanner on and place the bleed bottle's plastic pipe on the nipple. Start the engine and apply the brakes by jamming the broom between the seat and brake pedal. Open the bleed nipple and watch LHM run into the bottle.

When free of air and all of the old fluid and dirt is flushed through, nip up the nipple, slip off the pipe, replace the rubber cap. Don't be mean about 'wasting' new LHM on flushing out. Top up the reservoir with as much new LHM as the amount you bled out. Keep an eye on the LHM level and top up as necessary. You will know the level is low as the STOP light will come on. If you let the level drop too low, you'll have to restart the whole job!
Rear callipers
The rear brakes MUST be bled with the suspension set on high and with weight on the back wheels. On cars with alloy wheels it is sometimes possible (depending on the wheels) to get at the nipples without removing the wheels, but usually the wheels have to come off creating a problem of how to keep a load on the back wheels. The best way is to do one wheel at a time and keep the other on the ground and thus loading the suspension. You will need to bleed at least 250ml of fluid out of each rear nipple as the rear brake lines are very long.

Front Callipers
With the front wheels off and the car supported on stands, locate the front calliper bleed nipples. Proceed as per the General Procedure above.

Hydraflush
Hydraflush is a special Citroen hydraulic system cleaning and flushing fluid. If you use Hydraflush to clean out a system that has been contaminated with ordinary oil or particularly old or dirty LHM, leave the Hydraflush in for at least 1500 miles and then change it for LHM by repeating all the above procedure, including cleaning the filters and bleeding the brakes thoroughly. Hydraflush must NOT be left in the system permanently as it doesn't have the preservative and anti-corrosion properties of LHM.