

# AR HARLEY & SONS LTD



INFORMATION FILE  
FOR THE OWNERS OF  
**FOURNALES**  
SHOCK-ABSORBERS

December 2004

This document is made for the people who bought motorbike, ATV, quad, MTB or truck equipped with FOURNALES shock-absorbers.

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Your motorbike is equipped with hydropneumatic FOURNALES shock-absorbers, and we want to give you some information that will allow you a full and longer use of it or them. The FOURNALES SUSPENSION company has been created in 1978, it conceives, manufactures, and commercialises hydropneumatic “spring shock absorber” devices. Its size is 18 persons, and since the 1st of January 2001, it became a Limited Company. The application spheres are multiple : motorbikes, cars, bikes, small planes, Ultra Light Aircraft, cable cars. The society manufactures and commercialises also the pumps that are needed to set the pressure of the shock absorbers. Since its creation, it is implicated in many automobile competition domains (rally-raid, cross-car, ice race,...) and motorbike (speed, endurance, trial).

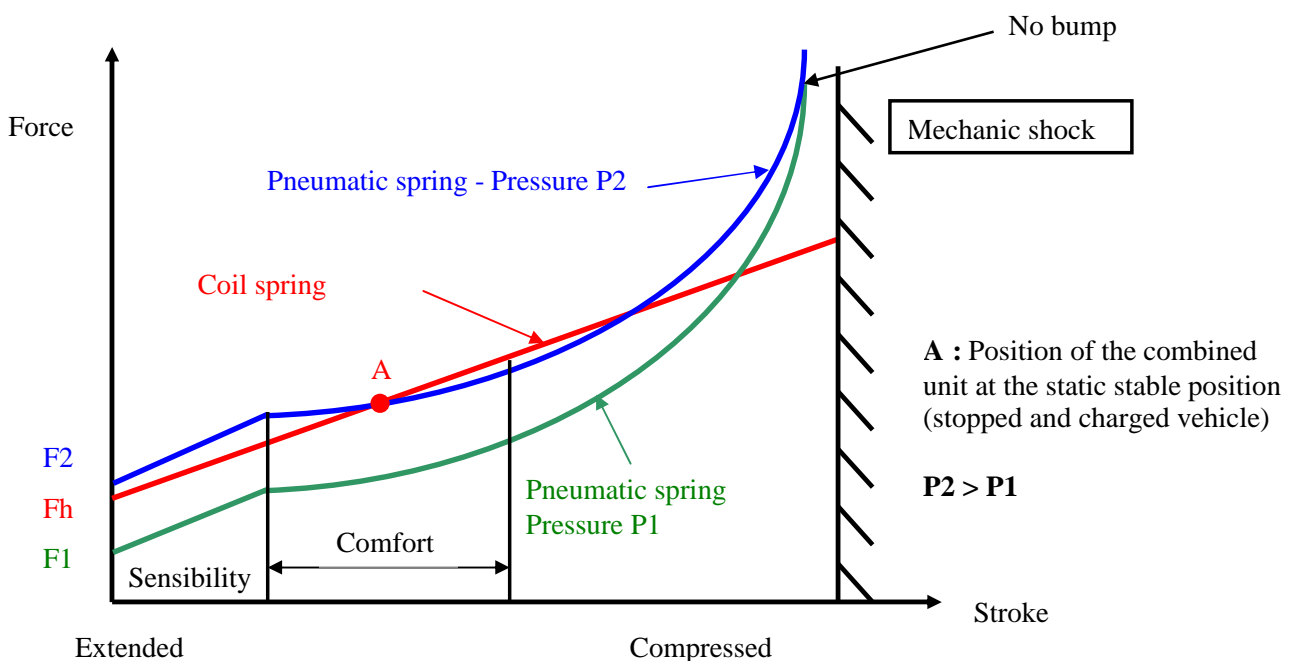
## GENERALITIES :

Every vehicle can be isolated from the surface on which it displaces by an elastic suspension (coil spring, leaf spring, torsion bars or compressible gas strut) that carries the weight and a shock-absorber that controls and limits the movements of the hanging mass. The FOURNALES combined unit uses a pneumatic suspension associated with a hydraulic shock-absorber, it belongs to the category of the hydropneumatic shock-absorbers.

## OLEO-PNEUMATIC COMBINED UNITS :

The qualities of a suspension shock absorber combined unit are fundamentally linked with the utilisation of a pneumatic suspension, which main feature is “variable flexibility”. There are many advantages.

Comparison of the stiffness between coil spring and pneumatic spring



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**The comparison of the different graphs shows the evident advantages of the pneumatic spring :**

- 1) Great flexibility with small deflections (great variation in movements for a low variation in corresponding forces).
- 2) Bottoming impossible with heavy bumps. On nearing the maximum stroke, the driving in force becomes extremely strong which eliminates all mechanical bottoming.

Other advantages are as follows :

- 3) Efficiency in absorbing energy brought into play by unevenness of ground greater than for a mechanical suspension of the coil spring type.
- 4) Adjustment of stiffness of the pneumatic spring possible by mere inflation : seating of the vehicle maintained whatever its loading.

## THE FOURNALES COMBINED UNIT :

**The FOURNALES combined unit adds to the preceding qualities, common to oleo-pneumatic combined units, the following characteristics :**

- 1) Sensibility at the beginning of driving in due to the use of a release spring which, while balancing the thrust of the pneumatic spring, reduces the force at the beginning of driving in of the combined unit to a very low value : adherence.
- 2) Remarkably long life due to extra high wear resistant seals and special treatment of the materials used.
- 3) Operating stability, temperature-wise and time-wise, with a special hydraulic oil with anti-wear, extreme pressure and anti emulsion properties.
- 4) Greater safety on account of the extremely high pressures (300 bars, or 4300 PSI) that the seals can withstand, the adoption of a flexible distortion thrust bearing for the throttling valves which prevents them from being damaged when experiencing heavy bumps and conserves their elasticity over time.
- 5) A simplicity in conception which is the sign of reliability, sturdiness and facility of adjustment.

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These two cross sections show the functioning of the FOURNALES shock-absorbers, in the compression phase, and in the expansion phase.



It is the passage of the oil through small orifices in the throttling\* piece that absorbs the movements of the device. These apertures are not the same in extension and in compression.

\* :frictional forces and load losses due to the forced passage of a viscous hydraulic oil through small pores.



On these 2 schemas, we can distinguish the intern pieces that realise the throttling of the oil.

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## TECHNICAL DETAILS ON THE PRODUCTS :

### 1) Raw materials :

⇒ Aeronautic aluminium alloying : AU4G (2017) and AU4Pb (2024).

### 2) Constitutive pieces :

- ⇒ The constitutive pieces are machined by sub-contractors who work for the aero-spatial sector
- ⇒ The tubes receive a surface treatment : a hard chroming for the sliding tube, or a Nickel-Chrome treatment for the inferior tube,
- ⇒ The polyurethane are manufactured by Freudenberg, their maximal use pressure is 300 bars (4300 PSI), but the functioning pressure fluctuates between 40 and 80 bars (570 and 1140 PSI),
- ⇒ The valves are High Pressure Schrader valves,
- ⇒ The hydraulic oils are specially adapted to this application.

## OPERATING INSTRUCTIONS :

### 1) Assembly :

The absorbers are delivered ready to be assembled. The combined unit must never be subjected to lateral parasite forces (motorbike frame touching the combined unit body, or forceful lateral assembly of the top yoke.

### 2) Method for determining pressure adjustment :

Shock absorbers are delivered inflated at the nominal pressure for a normal use of the application, so it is necessary to adjust the pressure only if you have to ride with more charge than usually. But before trying to inflate the combined unit, be sure your pump can attain the pressure needed.

### 3) Inflation method :

Inflation is carried out with a pump fitted with a pressure gauge and provided with a quick-fitting adapter. If the shock absorbers are already assembled on the frame., they must be expanded, in other words, weight taken off the wheel. Push the adapter on as far as possible and if the fit is not perfectly airtight, screw up by a quarter of turn. Inflate up to the desired pressure read of on the pressure gauge. If the pump has a modulable leak, this pressure can be exceeded and the unit slowly deflated until the correct pressure is attained. When the needle of the pressure gauge remains stable on the chosen graduation, remove the adapter with a snap. Any air expanding on removal of the adapter is the air contained in the pumping hose, it, in no way, alters the pressure inside the shock-absorber. Any vaporisation of oil occurring at that moment is quite normal.

***Do not reconnect the pump to check the pressure.***

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### 3) Hydraulic damping :

Adjustments to throttling, specific to each use and to each type of machine, are set in the production works. The best efficiency is obtained with special hydraulic oil HVP 10 originally used in the combined unit.

### REMARKS :

A running period is necessary for the seals to enable the absorber to attain its optimum efficiency. The black grease ring which forms on the sliding tube corresponds to the gradual elimination of the assembly grease. Just wipe it off until it disappears completely. The hard chromium-plated sliding tube withstands the high pressure dynamic airtight sealing, so it must be therefore be kept clean, without any shock or stripes.

### MAINTENANCE OF THE COMBINED UNIT :

Our products profit of a remarkable reliability, but in order to guaranty the quality and the safety of our shock absorber a minimal maintenance is necessary. First of all, it's important to keep the shock absorbers quite clean, the sliding tube supports the high pressure airtight so it has to be not stripped or dirty. You also have to verify that the shock-absorbers haven't received important impacts.

In the case where an accident would be caused by a FOURNALES shock absorber, the responsibility of the company could be engaged only if you can prove the respect of the basics use and maintenance rules, explained in this document.

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