The Idiot's Guide to Appia Front Suspension

For the Appia Consortium
by Simon INGMAN December 2018

Intro

Appia front suspension as found on cars other than the commercial vehicles, is the last incarnation and use of the sliding pillar suspension. Maybe it is the simplest as well.

However it still needs a significant number of special tools to dismantle it correctly. There are a number of machined parts that often have very fine threads that need to be carefully taken apart in order not to damage the pieces

It should not be necessary to use heat to dismantle the suspension unless previous work has damaged threads, over-tightened them or it is excessively corroded. Hammers and Stilsons are best avoided all together – Harry would turn in his grave !

The commercial vehicles use a larger sliding pillar unit as used on Aurelias and different tools are needed

Essentially there are 2 elements to the sliding pillar – the main suspension spring found in the lower section and the damper system above it

They can be worked on independently (sorry for pun), for example, replacing the main spring or repairing damage to the damper unit without need to touch the other part. This can be done either on the car or with the axle removed

I have recently dismantled a number of sliding pillar units and here is a summary of what I learned

Photo 1

Lower guide and spring removal part numbers using following : (TAV 42) ***(TAV 43)***

For the lower guide and main spring it is easier to do this on the car because the weight of the car is used to stabilize and brace the axle. I have dismantled several axles on the bench using special tool 3 bolted to the mounting holes – see below

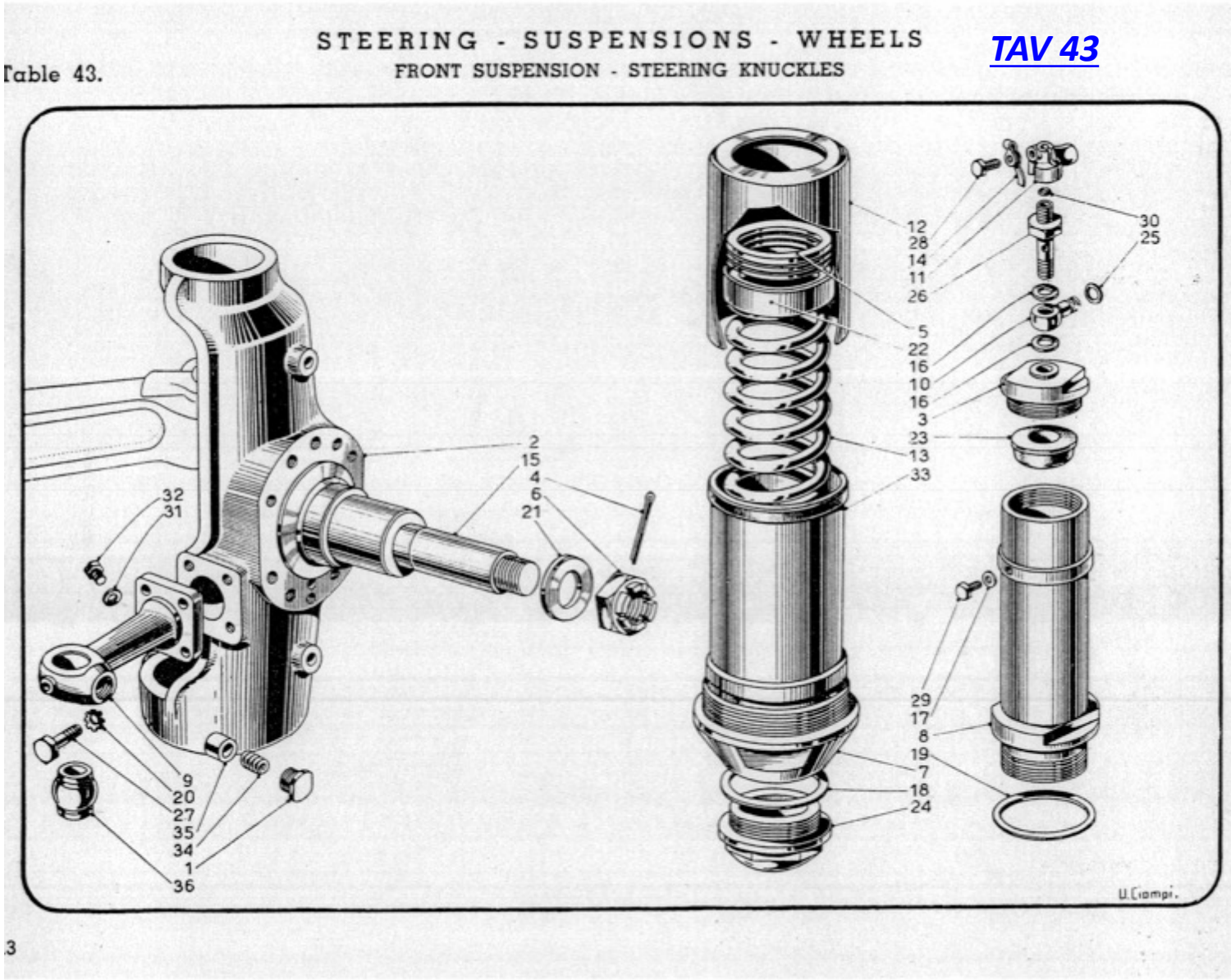
1/With the car on the ground, jack up the front and remove the road wheel on the side to be worked on – it isn't necessary to remove the drum/hub/back-plate/brake assembly, nor the steering arm if it is only the spring or lower guide that are being replaced.

Although if the unit is to be dismantled fully, the steering arm can be removed along with everything else. The back plate and brake assembly can be unbolted from the stub-axle carrier ***(2)*** and suspended away from the axle (photo 1), thus avoiding the need to touch the brakes.

2/Ensure the car is safely supported with axle stands or equivalent

3/With a jack under the sliding pillar , use it to trap the cup-spanner (photo 2) and also to support the lower guide

4/Using the cup-spanner (special tool 1) or 44mm open-ended spanner, undo the bottom cap ***(24)***. This cap is used to drain the oil out of the lower guide and can be very tight. It doesn't need to be removed in order to dismantle the lower suspension and can be freed later on the bench



Lower guide continued:

5/ Using the very large spanner (72mm spanner – special tool 2) undo the lower guide ***(7)***. This is very tight and will again need to be supported by the jack below the guide. I used a 5ft long scaffold pole as an extension. It usually goes with a "crack" and is then easy (photo 2)

6/Gradually lower the jack as you undo the lower guide and once the threads have dis-engaged (approx. ½") the jack can be lowered fully allowing the lower guide (complete with sleeve) , spring ***(13)*** , bearing carrier ***(22)*** , 3-piece upper bearing ***(5)*** , and upper sleeve ***(12)*** to drop out

This is all that needs to be done to replace a broken or flattened spring (see spring data below)

It is also possible to replace the lower guide and lower bearing (9) if there is too much wear. I have come across 2 types of lower bearing - a single piece as shown on TAV 42 and another where the bearing was a separate ring held in place by part 28 (RH piece, photo 3)

7/Push off the rubber bump-stop (14) nb 2 lengths depending on part 42

8/Using special tools 8 & 9 parts 9 and 28 can be removed, or in some cases a 32 mm open ended spanner is used on part 28

TAV 42

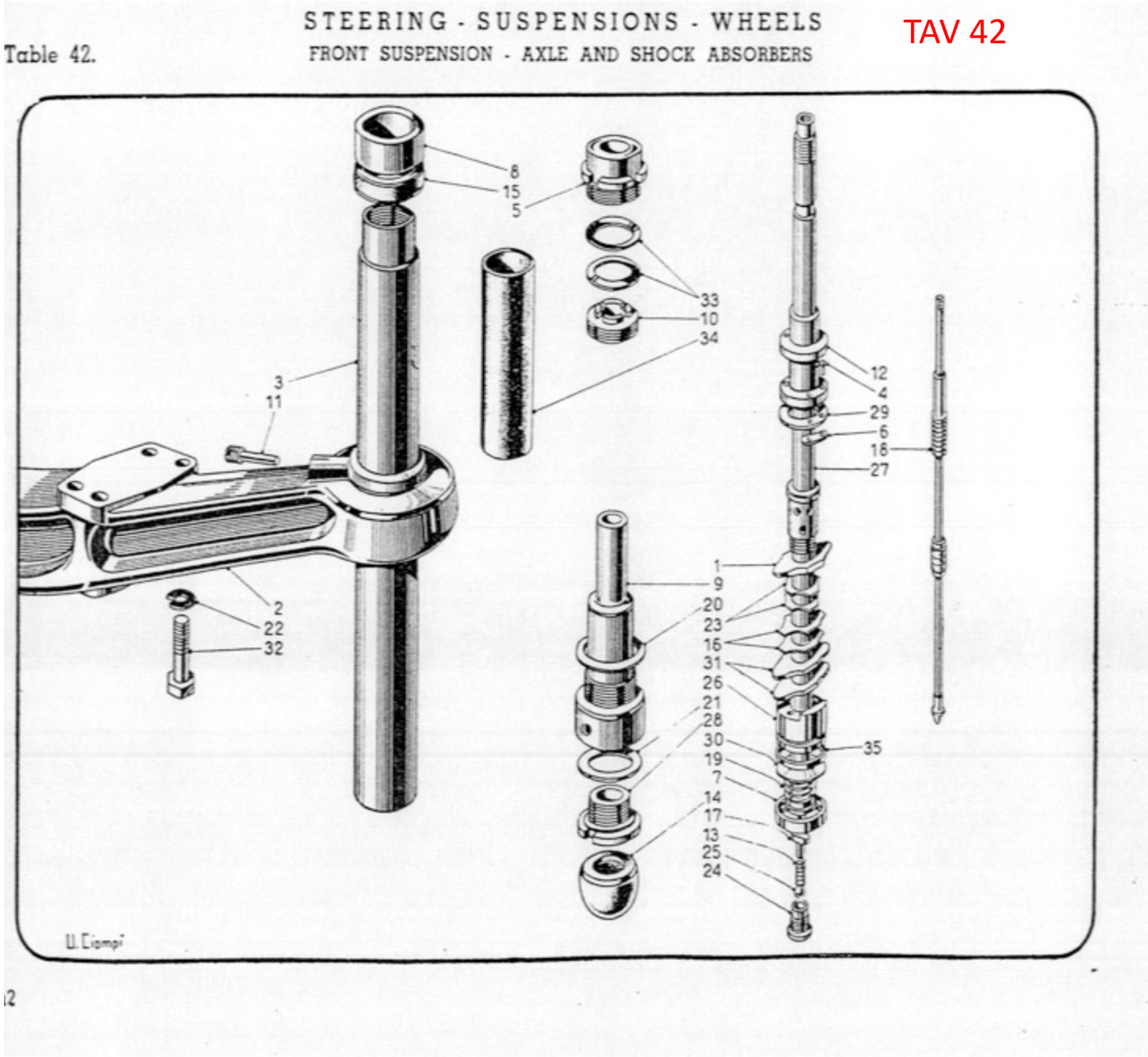


Photo 2

Photo 3

Lower guide and spring removal – off the car

1/with the axle firmly held in a vice, bolt special tool 3 to the 4 axle mounting holes – the plate is marked with an arrow towards the back of the car

2/Using the cap (special tool 4) tighten the long bolt onto the bottom of the lower guide

3/Dismantle as above, gradually slackening off the bolt to allow the guide to undo (photo 4)

Photo 4

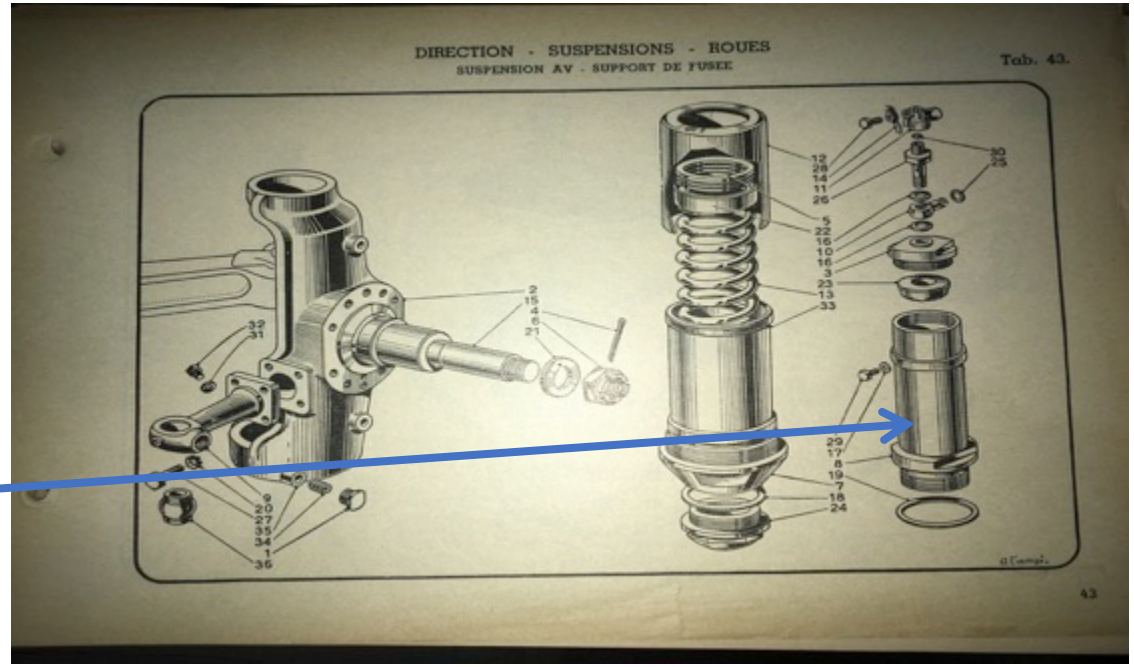
Upper guide and bearing dismantling

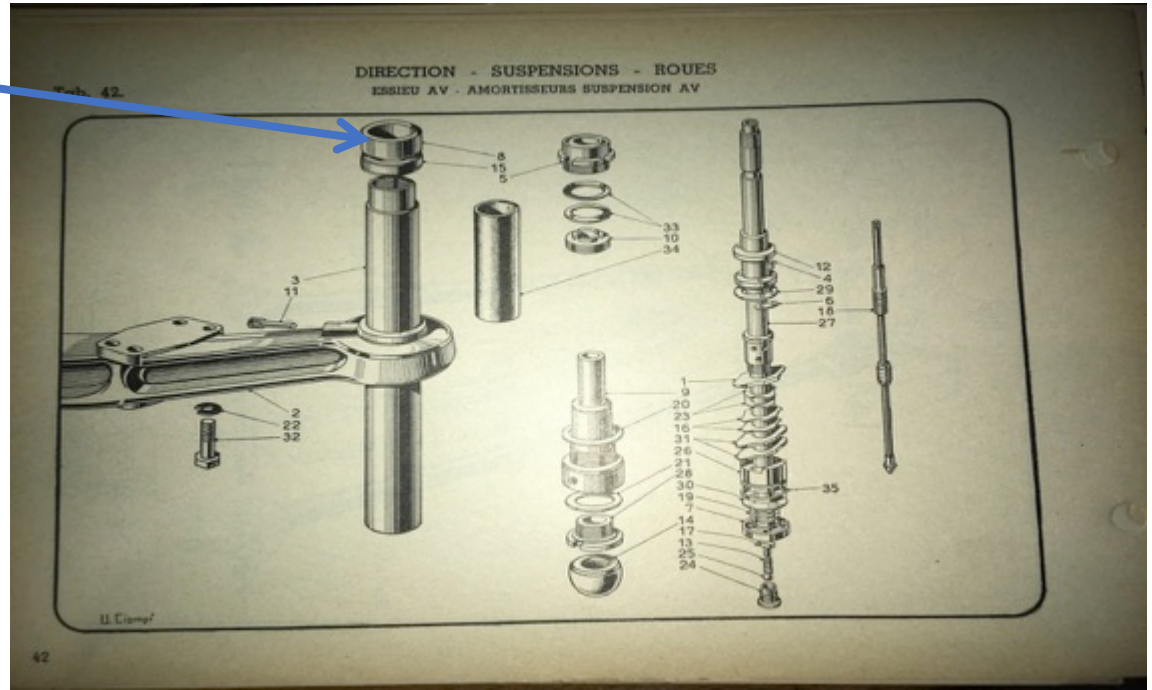
Once the top of the damper unit has been removed – see later, the upper bearing and guide can be removed as outlined below

1/Using special tool 13 (or 50mm open ended spanner), undo the upper guide ***(8)***, this can be very tight ! and slide up and off the central pillar

2/The upper bearing (8)can be tapped off with a drift, gently moving around the circumference. This then allows the dust seal and sleeve (15 & 34) to be removed

Only when both upper and lower guides have been removed, can the stub-axle carrier ***(2)*** be lifted off





Damper dismantling

The following procedure is the same on or off the car and before or after the upper guide is removed

1/Clamp the rubber oil feed hose, if still on the car, and remove the tube from oil feed union ***(10)***

2/Unscrew the damper adjuster ***(11)***, lifting the damper needle (18) with it. Once unthreaded, undo the small screw or bolt ***(28)*** and lift off the adjuster

3/Undo the hollow bolt ***(26)*** with a 14mm spanner, then the oil feed union and washers

4/Carefully remove the damper needle (18) – this may need a gentle, vertical, tug (can be done later)

5/Using special tool 5 (or a 41mm open-ended spanner) remove the top nut ***(3)*** – this will remain attached to the main damper rod (27)

6/Slide the rod/nut up about 2" and use an 11mm spanner to hold the 2 flats just below the nut – undo the nut from the rod.

7/Allow the rod to drop down

8/Undo the castellated nut (5) using special tool 6. Lift out the 2 opposing cupped washers (33) – the top one should be curve down, lower one curve up

9/Undo the lower, castellated nut (10) with special tool 7. Both these nuts should be little more than finger tight and have very fine threads

10/The main damper rod can be removed , complete with shuttle/flap valve (4 etc), piston (26 etc) and valve leaves (1,23,16,31) – this can be dismantled later

Photo 5

Photo 6

Damper rod dismantling

1/Slide off the upper damper guide (12) complete with flap-valve (29) – photo 7

2/Thread the top nut back onto the rod and clamp in a vice, rod pointing up

3/Using the 11mm spanner to prevent the rod turning, use special tool 10 to undo the piston retaining nut (7) . The spring (19), washer-valve (30) and piston assembly (26 & 35) can be removed – photo 8

NB on re-assembly ensure that the lower hole in the piston lines up with that on the rod – photo 10

4/The delicate leaf-valves can now be removed, noting their order – the number of leaves will be dictated by the chassis number – later cars having more leaves – photo 9

5/The non return valve (24,25,13,17) can be removed using special tool 11 – some later non-return valves are removed using an 8mm open-ended spanner


Photo 7


Photo 8


Photo 9

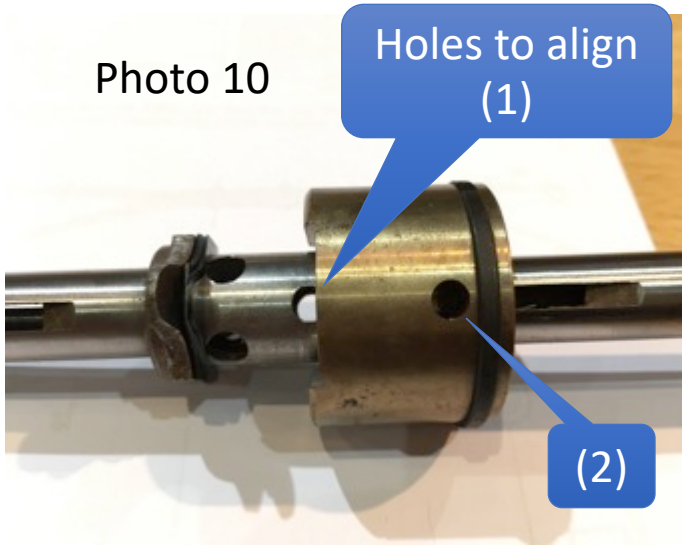


Photo 10

Re-Assembly – A few pointers

Quoting from the workshop manual, “Reassemble following backwards the disassembling procedure” !

- First ensure that everything is spotlessly clean, especially the threads
- Particular care should be taken refitting the fine threads because there is a high risk of cross-threading them, so avoid any tools until they have been started by hand
- The bottom guide can be fiddly. Before fitting the spring, trial fit the guide.
- Fill lower guide with SAE 90 – up to top of the holes
- With the guide & spring compressed by the jack, and the threads just touching, wiggle the stub axle carrier ***(2)*** backwards and forwards and screw in the lower guide by hand, compressing the spring further if necessary
- Make sure the bottom guide is very tight – use the long bar again
- Top up the lower guide with oil . Remove screw ***(32)*** in the stub-axle carrier and fill using a syringe – photo 11

Photo 11

Re-Assembly – Damper unit

- Push the damper needle down the rod until it stops, approx 1½" protruding
- Dry-fit the complete damper rod, piston, needle & upper guide – check it slides up & down & rotates freely, then remove
- ¾ Fill the central pillar with 20/50 oil
- Re-fit the rod unit (without upper guide) and push down forcing the oil past the non-return valve & piston
- Re-fit the upper guide, holding the flap valve open with a rod (or special tool 12) so that any air is purged (photo 12)
- Fit the upper castellated nuts and washers and top up with oil
- Fit top nut, oil feed etc

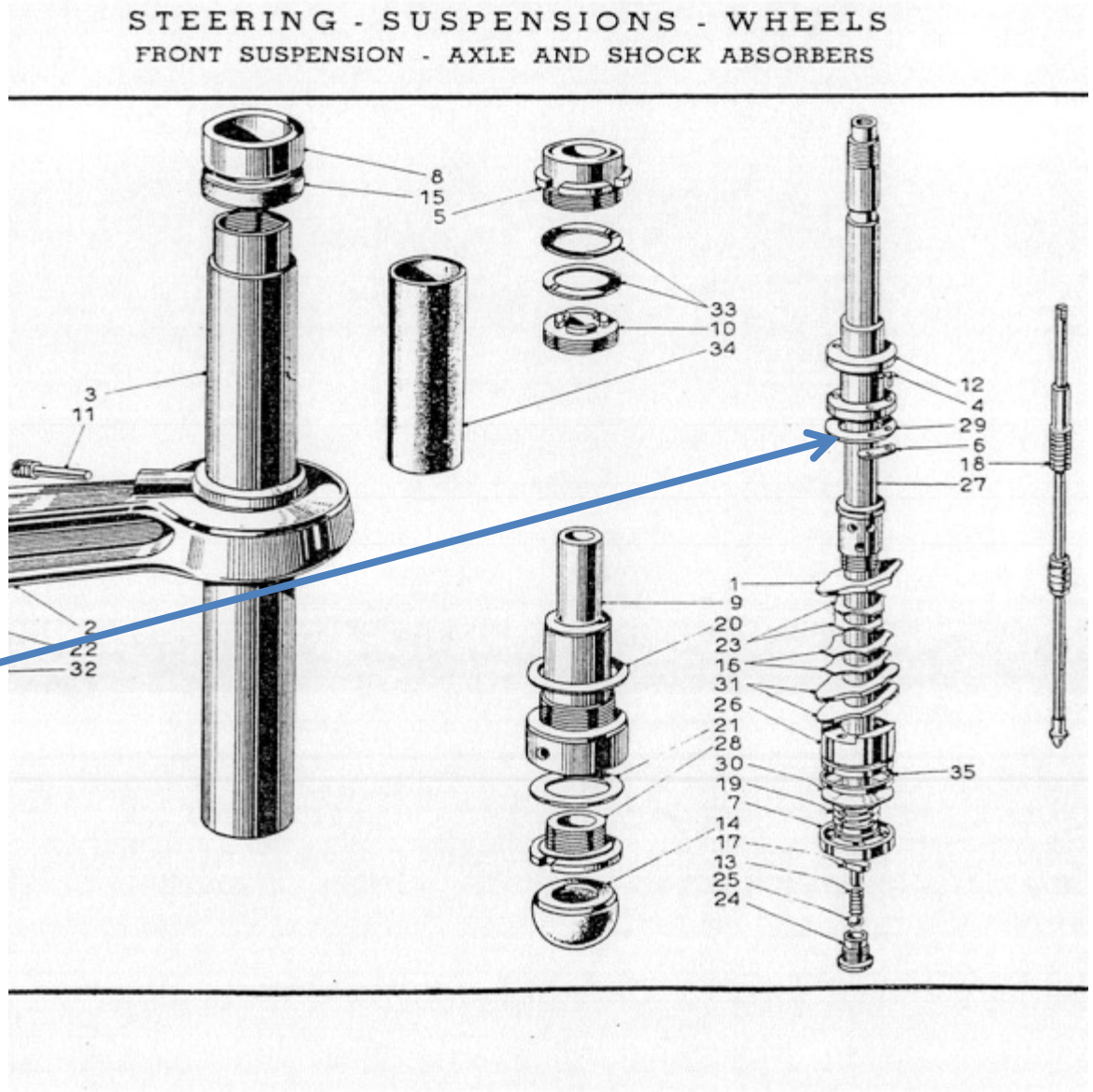


Photo 12

Damper Adjustment

- Initial setting – fit the brass adjuster to the needle.
- Screw in all the way and ensure that the needle is fully down (loosen small screw and push needle down, then re-tighten)
- Unscrew the adjuster 1½ turns for summer setting or 2½ turns for winter setting
- You may want to set the dampers harder or softer than these initial settings, in which case:
    - Harder = screw in (clockwise)
    - Softer = screw out (anti-clockwise)

Special Tools

- Available for loan - Appia Consortium members only
- 30 day loan
- Deposit required
- Insured delivery/return – to be paid by the AC member

- Please contact Simon Ingman via email: simon.juliet@minervewines.fr

Oils

- Damper unit – 20w50
- Lower guide – SAE 90

Special Tools

Problems and Possible causes (taken from workshop manual)

Suspension knocks :

- Oil level in lower guides too high
- Water mixed with oil or air pockets
- Broken piston compression valve or broken lower valve spring

Suspension noise:

- Suspension sleeve ends and upper and lower guides worn
- Air escaping from lubricator valve

Stiff suspension:

- Weak or broken spring
- Binding caused by distorted shock absorber stem
- Defective shock absorber adjuster

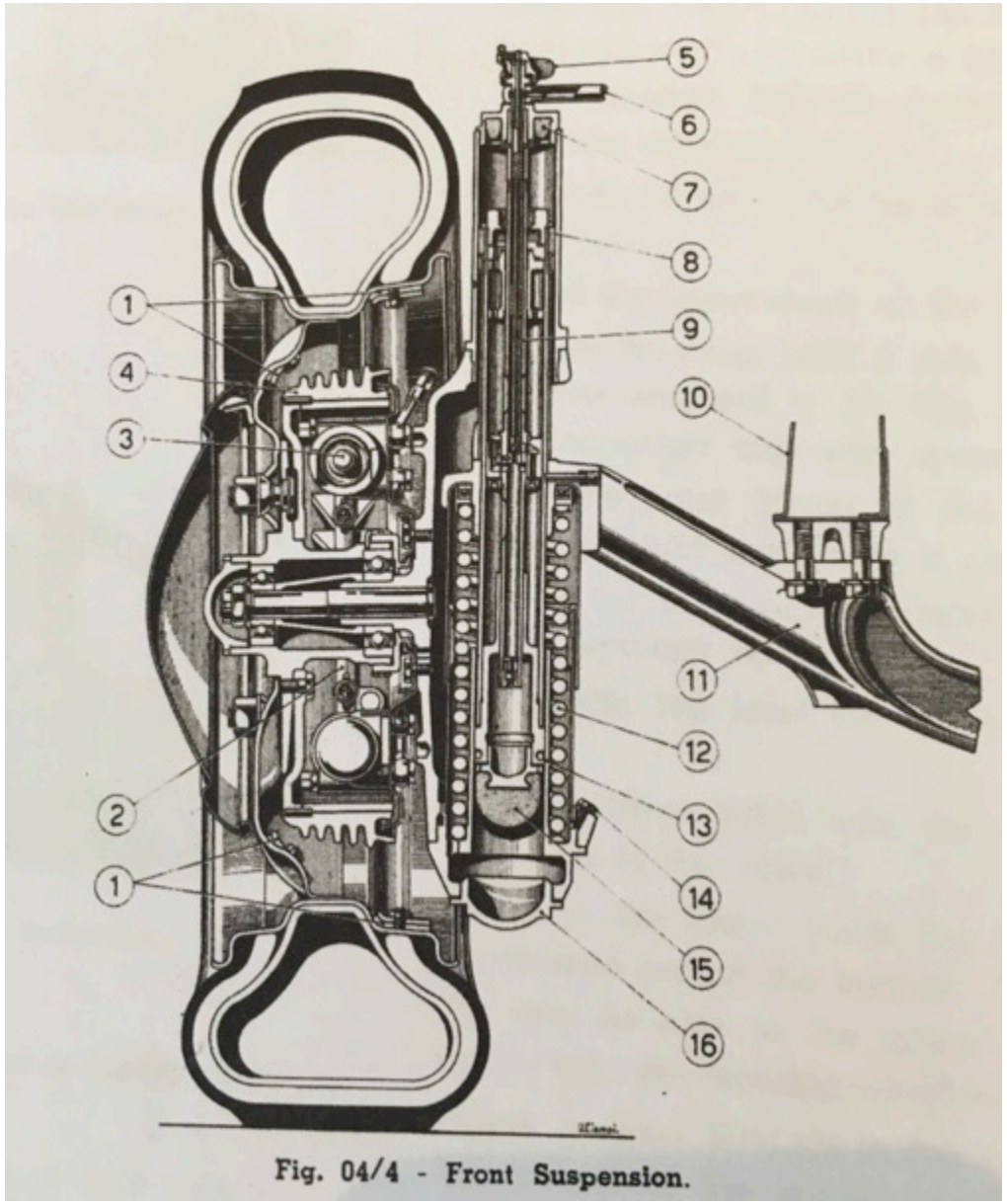


Fig. 04/4 - Front Suspension.

Spring data

- Part number C10-72501A :
- free length 291 mm +/- 5mm
- loaded (220kg) 194mm +/- 10mm

List of parts likely to wear/break

- Spring
- Lower guide & bearing
- Upper guide & bearing
- Damper valve leaves
- Guide/bearing clearances , new : 4-6/000 ’’ (ref Clive Beattie)
- I can find no published wear data
- At the time of writing, all the above parts are available from Cavalitto
- Other specialists may be able to re-chrome and/or re-machine parts

References

- Lancia & Co, Lancia Appia – Parts Catalogue, 1960
- Lancia & Co, Lancia Appia 3rd Ser – parts catalogue supplement, 1966
- Lancia & Co , APPIA Repair Shop Manual , approx. 1960
- Clive Beattie ,55 Years of Dirty Hands, 2005

Disclaimer - the boring bit

- This guide is meant to be just that - a guide. I have tried to share my experiences and show how I did it. It isn't exhaustive nor necessarily the only way to do it.
- Please take care and only carry out the work if you are confident and competant to do so.
- I cannot accept any responsibility for work undertaken by others
- Above all, please ensure that everything that you do is done carefully, following all reasonable precautions