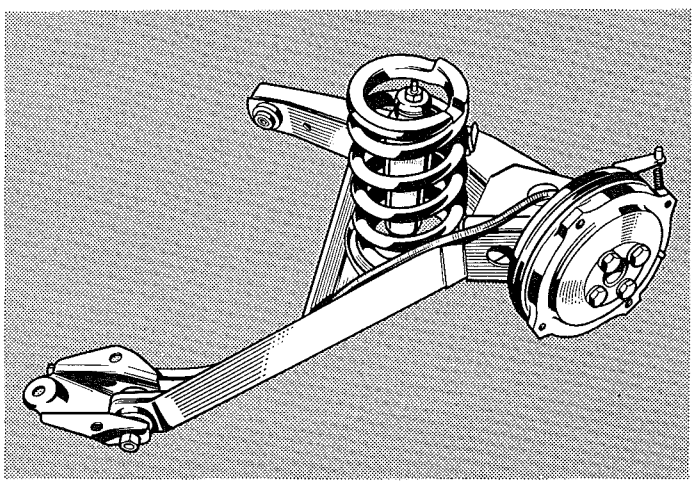
# Section 6

# REAR SUSPENSION AND WHEELS SHOCK ABSORBERS







**NOTE** - Nuts securing swinging arm to front and rear supports must be tightened with wheel set vertically.

This will prevent « estendblocks » being stress-twisted during operation.

To set wheel plane vertical, use fixture A. 66062.

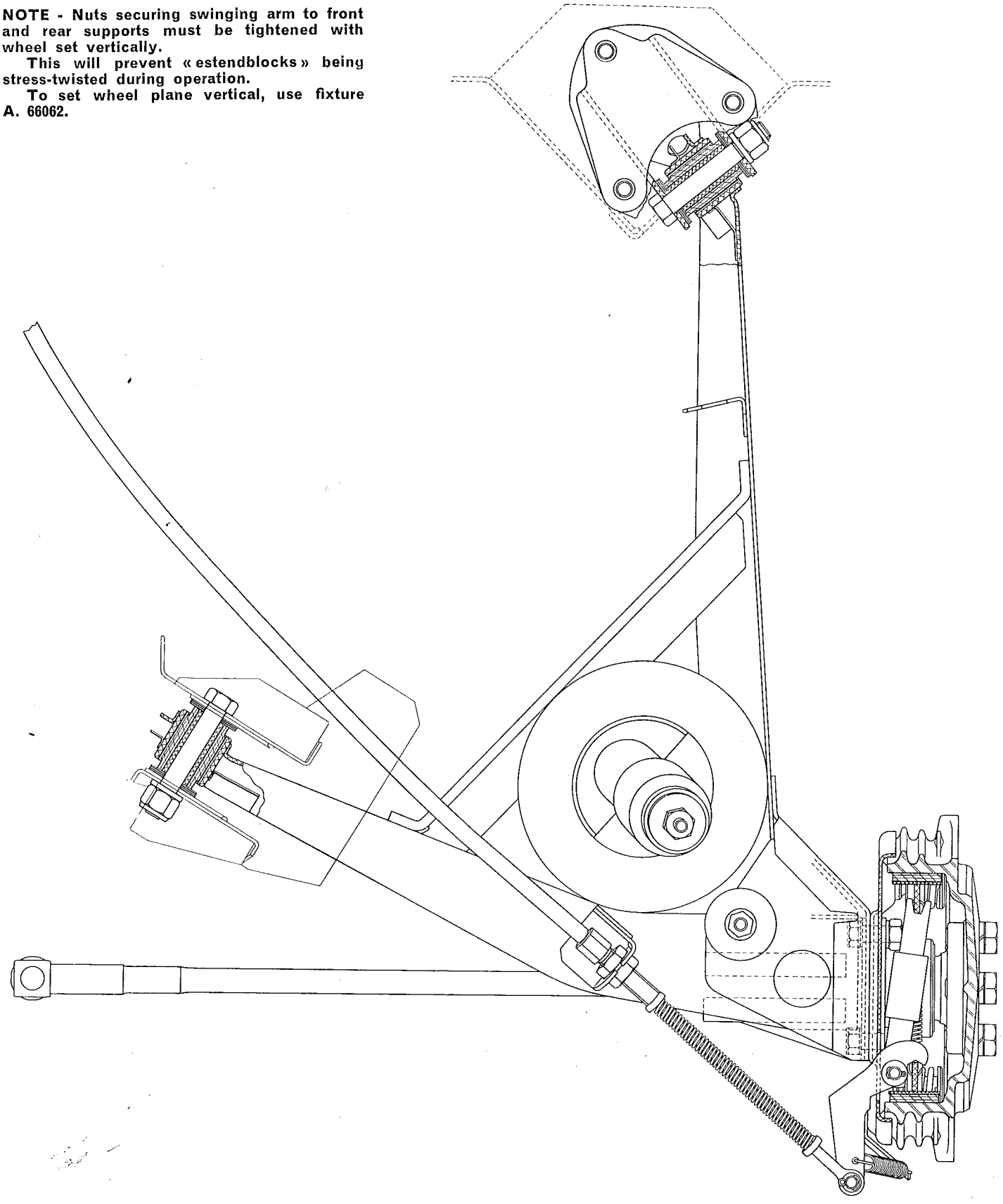


Fig. 248 - Right rear suspension assembly, sectioned through brake drum and arm mountings.

# REAR SUSPENSION AND WHEELS



## Description.

Rear wheels are independently sprung, with swinging arms, coil springs and telescopic, double acting, hydraulic shock absorbers.

Swinging arms are mounted on floor by « estend-blocks ».

Coil springs are provided at both ends with insulator rings.

Shock absorbers are of the same type as for front suspension.

At its vertex, the swinging arm carries the bearing housing secured by nuts (which also performs as a hub for wheel drive shaft) and the brake housing flange.

Externally, wheel shaft carries the brake drum; at the inner end, it is coupled to axle shaft through a splined flexible joint.

## Removal of Rear Suspension Assembly.

Raise car on stands and take off wheel on side of suspension to be removed.

Support swinging arm by placing a hydraulic jack underneath.

Inside car, remove rear wheelhousing linings and unscrew the shock absorber mounting nut on floor.

Unhook the parking brake shoe control lever return spring.

Undo the three screws of sleeve coupling the flexible joint to differential shaft, pull back sleeve and take off inner spring.

Remove brake fluid reservoir cap, take out filtering screen, blank delivery hole as specified on page 180, and then disconnect brake line at connection on body floor. Disconnect parking brake control tie rod as follows:

— remove cotter pin and disinsert wire eye from pin on shoe control lever;

— undo wire adjustment nuts and free wire from fairlead on swinging arm.

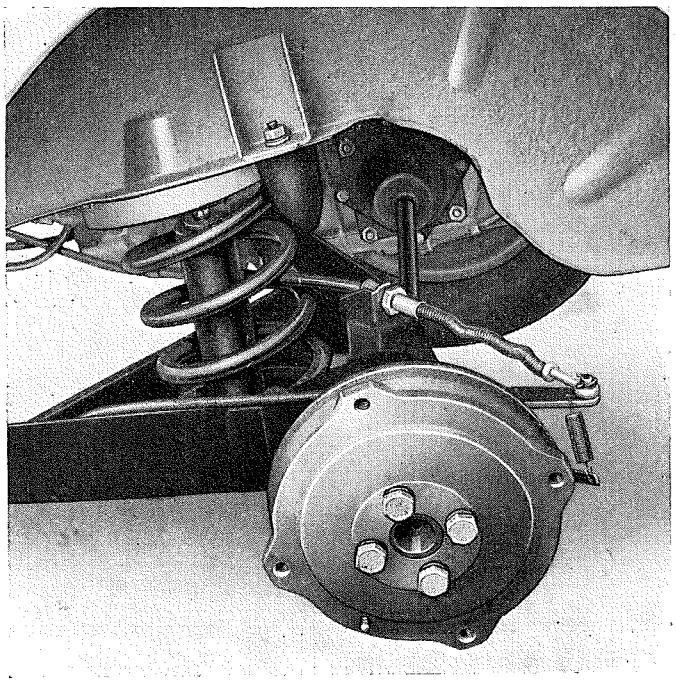


Fig. 249 - Left rear suspension detail.

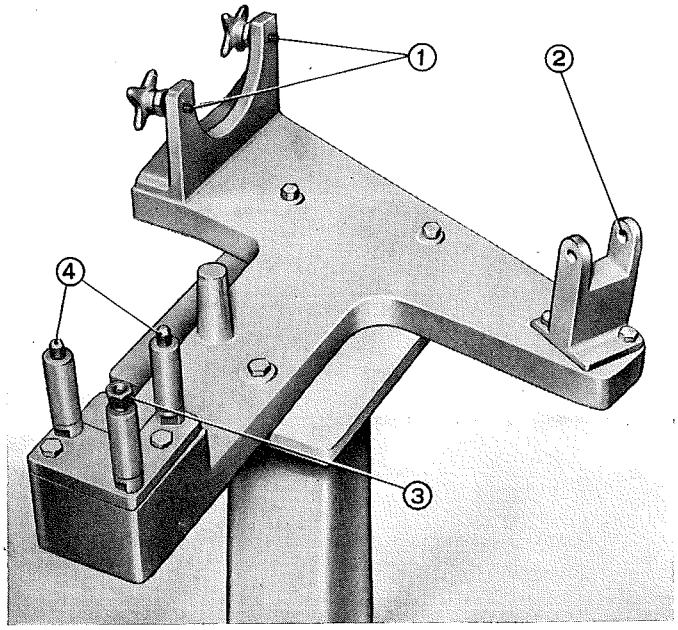



**Fig. 250 - Fixture A. 66064, for swinging arm inspection and adjustment.**

1. Clamp screws, securing wheel shaft on fixture. - 2. Alignment bracket, swinging arm member check-up. - 3. Swinging arm external support centering pins. - 4. Nut, to secure swinging arm external support on fixture stud.

With hydraulic jack, lower the swinging arm, press in shock absorber by telescoping-in the outer cylinder and pull out coil spring together with its mounting rubber rings.

Back out the self-locking nut securing swinging arm to internal support welded on floor. Disinsert mounting pin, and note the number and arrangement of «estendblock» side shims.

Next, remove the three swinging arm external support fixing screws and take off swinging arm.

Between support and floor there is a rubber pad.

## SWINGING ARMS

### Disassembly, Inspection and Repair.

After disconnecting the shock absorber, install swinging arm on fixture **A. 66064.**

If swinging arm has not been distorted, its installation on fixture should be easily carried out by proceeding as follows:

— Tighten the clamp screws (1, fig. 250) on wheel drum.

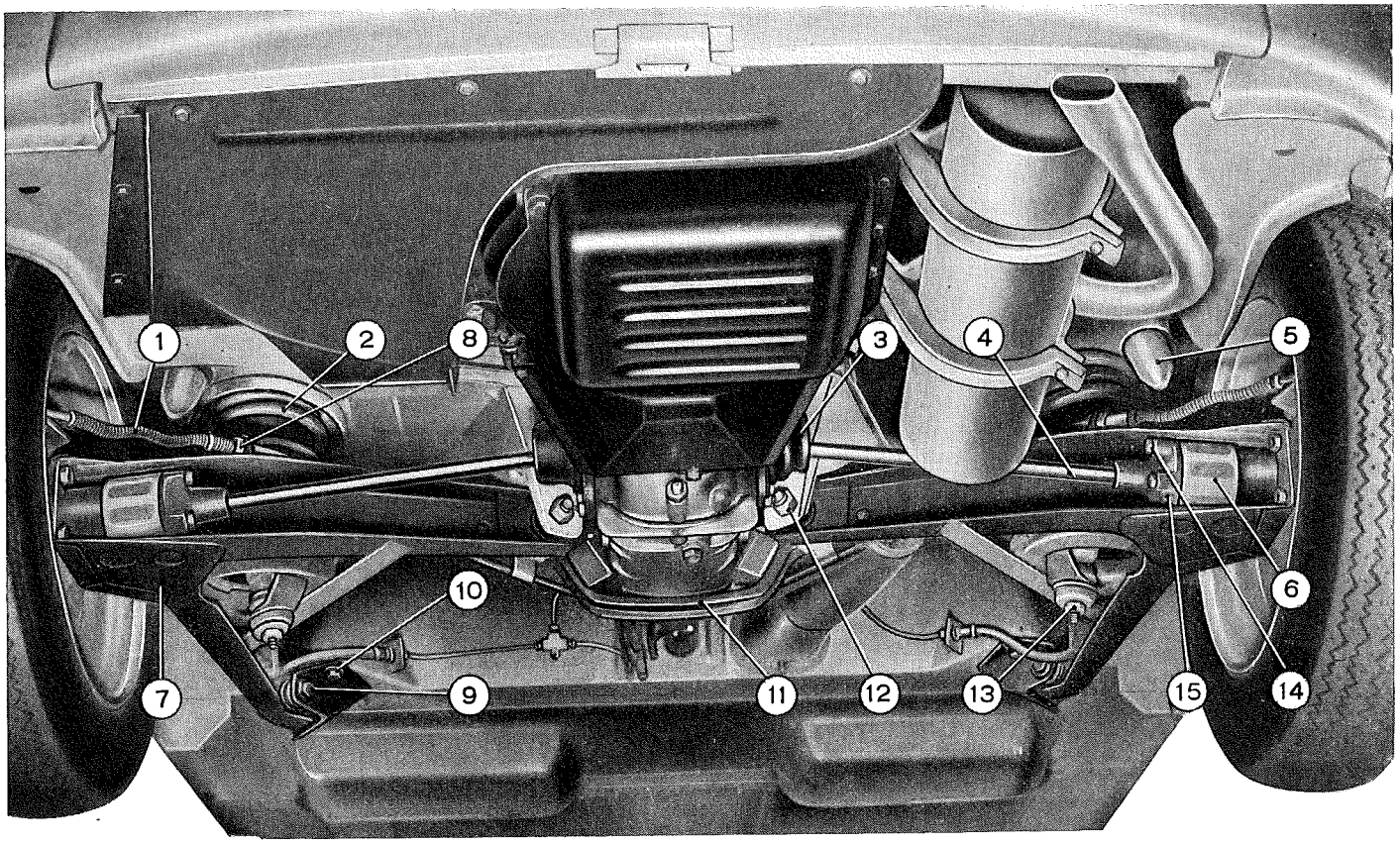



**Fig. 251 - Rear suspension assembly.**

1. Brake shoe control cable and sheath. - 2. Coil spring. - 3. Oil boot. - 4. Axle shaft. - 5. Bumper. - 6. Flexible joint. - 7. Swinging arm. - 8. Cable adjusting nut. - 9. Swinging arm-to-front bracket mounting pin. - 10. Swinging arm front bracket-to-underbody mounting screw. - 11. Engine front support cross member. - 12. Swinging arm rear self-locking nut. - 13. Shock absorber-to-swinging arm lower nut. - 14. Sleeve screws. - 15. Axle shaft-to-flexible joint sleeve.

— Couple swinging arm inner member to seat (2, fig. 250) on fixture.

— Fit swinging arm external support holes on fixture pins (3, fig. 250).

If somehow these three operations cannot be performed, the swinging arm needs straightening at distortion point.

**NOTE - Replace fixture pins (3, fig. 250) to external support holes and install suspension arm right side up (fig. 253) or upside down (fig. 254), according to whether the right or left hand arm is involved.**

Swinging arm components are disassembled as follows:

— Take off cotter pin and back out nut fixing flexible joint to wheel shaft; disinsert plain washer and joint.

— Pull out wheel shaft and brake drum using universal puller **A. 40005/1/9**, then the two oil seals, both outer and inner bearing inner rings, thrust ring of joint and resilient spacer.

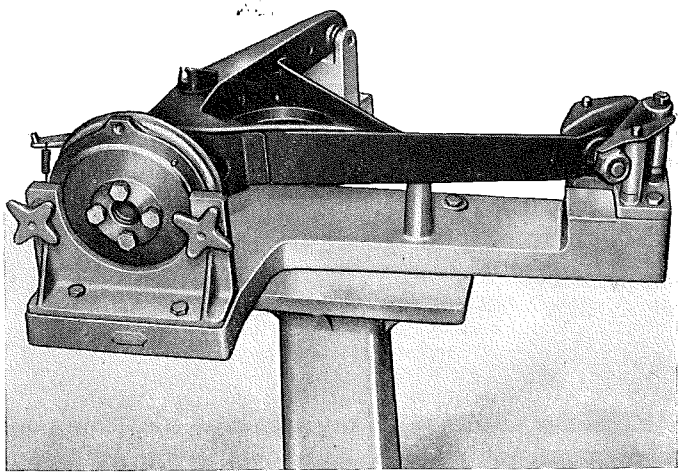


**Fig. 252 - Swinging arm assembly, on adjustment fixture A. 66064.**

— Remove the two bearing outer rings using puller **A. 6511** (fig. 255).

If necessary, remove swinging arm external support, disconnect brake line at wheel cylinder, then the bearing housing and brake housing flange.

Check that:

a) « estendblocks » are a tight fit in their respective seats in swinging arm and mounting pins slide in freely without any appreciable play: if « estendblocks » must be replaced, use tool **A. 66056** which is suitable for their installation and removal;

b) inner and outer bearing outer rings have no play in their seats and that rollers and cages are not broken or worn;

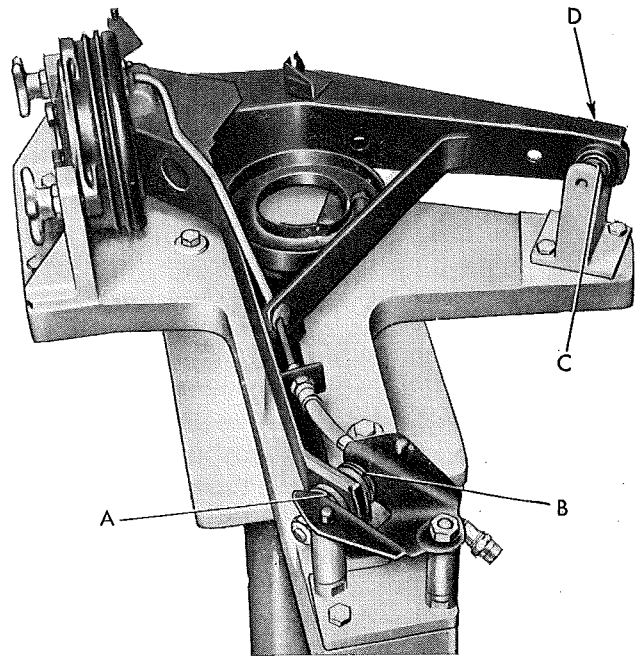



**Fig. 253 - Adjusting right rear suspension swinging arm on fixture A. 66064.**

A and B. Swinging arm external support adjustment shims. - C and D. Swinging arm internal support adjustment shims.

c) oil seals fit snugly on wheel shaft, on joint spacer or shoulder ring and on hub seats;

d) resilient spacer is not permanently distorted;

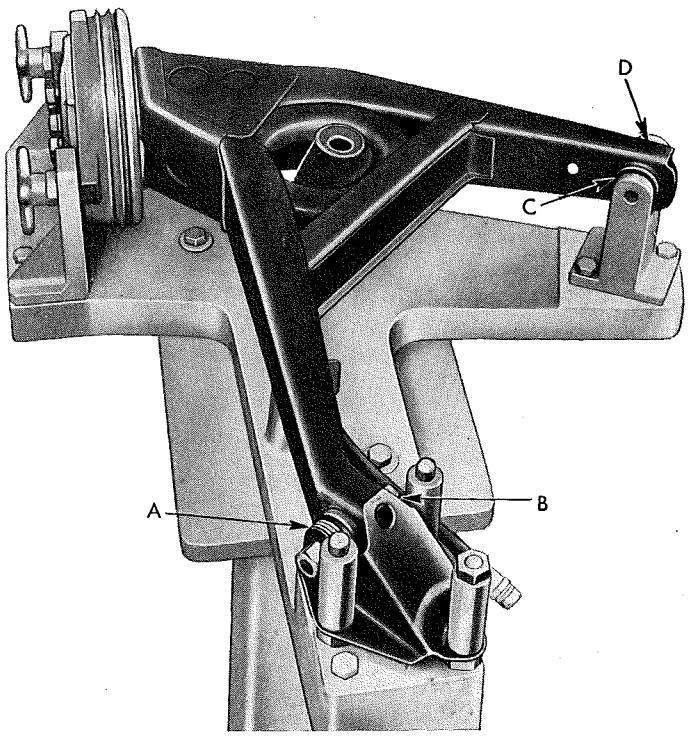



**Fig. 254 - Adjusting left rear suspension swinging arm on fixture A. 66064.**

A and B. Swinging arm external support adjustment shims. - C and D. Swinging arm internal support adjustment shims.

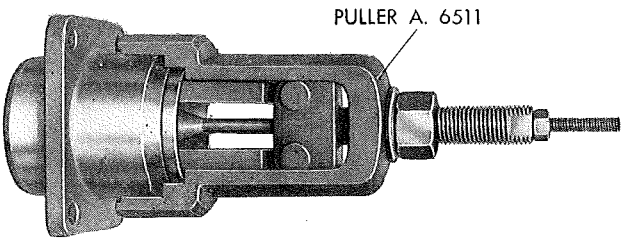



**Fig. 255 - Rear wheel outer bearing outer ring removal.**

whenever new bearings or bearing housings are fitted, always install a new spacer;

e) the mating surface of bearing inner rings on wheel shaft is perfectly smooth; shaft splines-to-flexible joint splines lash must never exceed .0059" (0,15 mm);

f) flexible joint is not damaged to the point where metal-to-rubber bonding is compromised.

## Assembly.

To assemble swinging arm, reverse the disassembly operations with the following provisions:

— Use tool **A. 66056** to install « estendblock » on swinging arm.

— The bearing housing and brake housing flange mounting nuts must be tightened with a torque wrench to 21.7 ft.lbs (3000 kgmm).

— During assembly, pack bearings with FIAT Jota 3 grease.

— Preload the bearings and adjust the swinging arm as directed on opposite column.

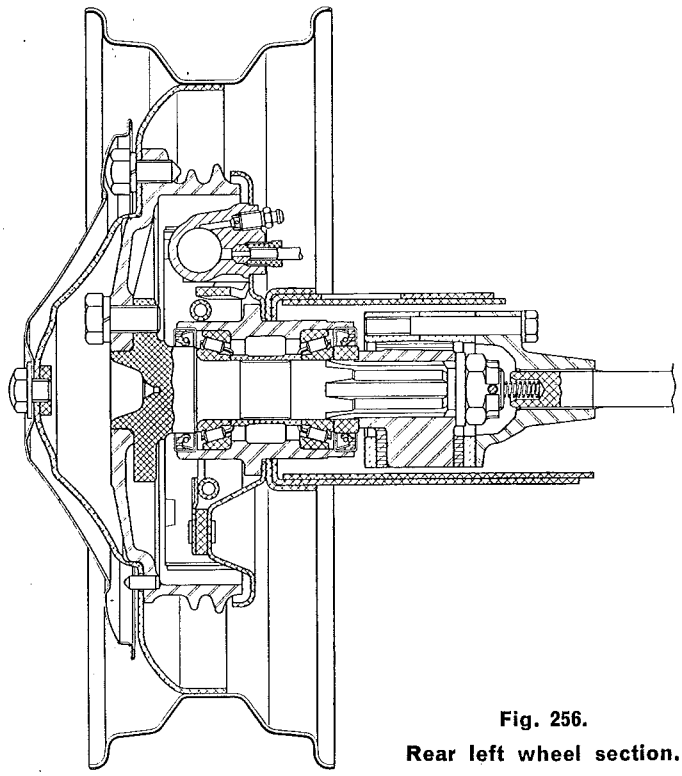


**Fig. 256.**
**Rear left wheel section.**

**NOTE - If the axle shaft-to-flexible joint tie sleeve has been removed, coat the mating splines with FIAT B 2 G grease on reinstallation.**

## Wheel Bearing Adjustment.

To assure steady bearing adjustment and taper down sagging danger on operation, wheel bearings should be preloaded.

Tighten wheel shaft nut gradually, so that rotation torque will not exceed .36 ft.lbs (50 kgmm).

To check the rotation torque, proceed as follows.

Install support **A. 95697/2** on wheel drum. Insert the shank (2, fig. 257) of dynamometer **A. 95697** in support and grasp lever (3).

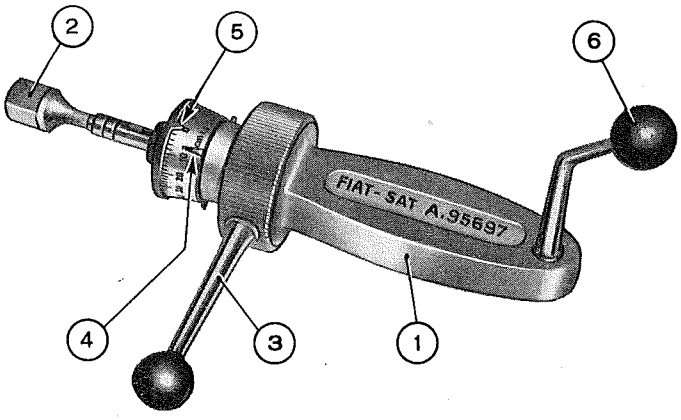



**Fig. 257 - Bearing rotation torque dynamometer.**

1. Dynamometer A. 95697. - 2. Dynamometer shank to insert in item A. 95697/2, fitted to wheel drum. - 3. Dynamometer grip lever. 4. Rotation torque setting index. - 5. Adjustable needle. - 6. Dynamometer operating lever.

Move the needle (5) to register .36 ft.lbs (50 kgmm) on dynamometer scale, as shown in fig. 257 and, using the lever (6), rotate the dynamometer and the wheel shaft some turns, clockwise.

During rotation, check that the needle (5) does not exceed the setting index (4).

If the rotation torque proves to be over .36 ft.lbs (50 kgmm), which indicates high bearing preload, remove the wheel shaft and replace the resilient spacer by a new one.

Next repeat the rotation torque test.

## Swinging Arm Adjustment.

To adjust the swinging arm, use fixture **A. 66064** (fig. 253).

At points A and B (fig. 253), between the « estendblock » and the swinging arm-to-body front mounting bracket, fit six shims, three on each side. For shim centering use alignment bar **A. 66057**; next, while

removing the alignment bar, slip in the mounting pin and screw in the nut. After rear wheel geometry adjustment this nut shall be tightened with 43.4 to 50.6 ft.lbs (6000 to 7000 kgmm) of torque.

Then, at points C and D (fig. 253), insert the number of shims required to fill in the gap between the « estendblock » and the two fixture shoulders.

The number of shims, so determined - both at C and D - must later be fitted between the « estendblock » and the shoulders on the swinging arm-to-body mounting bracket.

## COIL SPRINGS

Spring specifications:

— wire diameter .5315″±.0019″ (13,5±0,05 mm)
— working coils . . . . . 4 ¼
— free height . . . . . 8.70″ (221 mm)
— height under a load of 904±44 lbs (410±20 kg) 5.94″ (151 mm)
— height under a load of 1268±64 lbs (575±29 kg) 4.24″ (123 mm)
— solid height . . . . . 3.67″ (93 mm)
— flexibility . .3034″ in/100 lbs (17 mm/100 kg)

### Inspection.

Inspect springs carefully to check on their efficiency. If any cracks are found, replace springs.

Check condition of insulator rings: replace, if damaged.

## INSTALLATION OF REAR SUSPENSION ASSEMBLY

Proceed as follows:

Insert swinging arm inner end in the mounting bracket welded on body floor; place between the « estendblock » and bracket the number of adjustment shims determined previously on fixture **A. 66064**. Then, insert the alignment bar **A. 66057** through « estendblock » and shims, aligning them with holes in mounting bracket. Next, holding firmly the entire assembly, while removing the alignment bar, slip in the mounting pin.

Screw in nut which, after checking rear wheel geometry, must be tightened to 43.4 to 50.6 ft.lbs (6000 to 7000 kgmm) with a torque wrench.

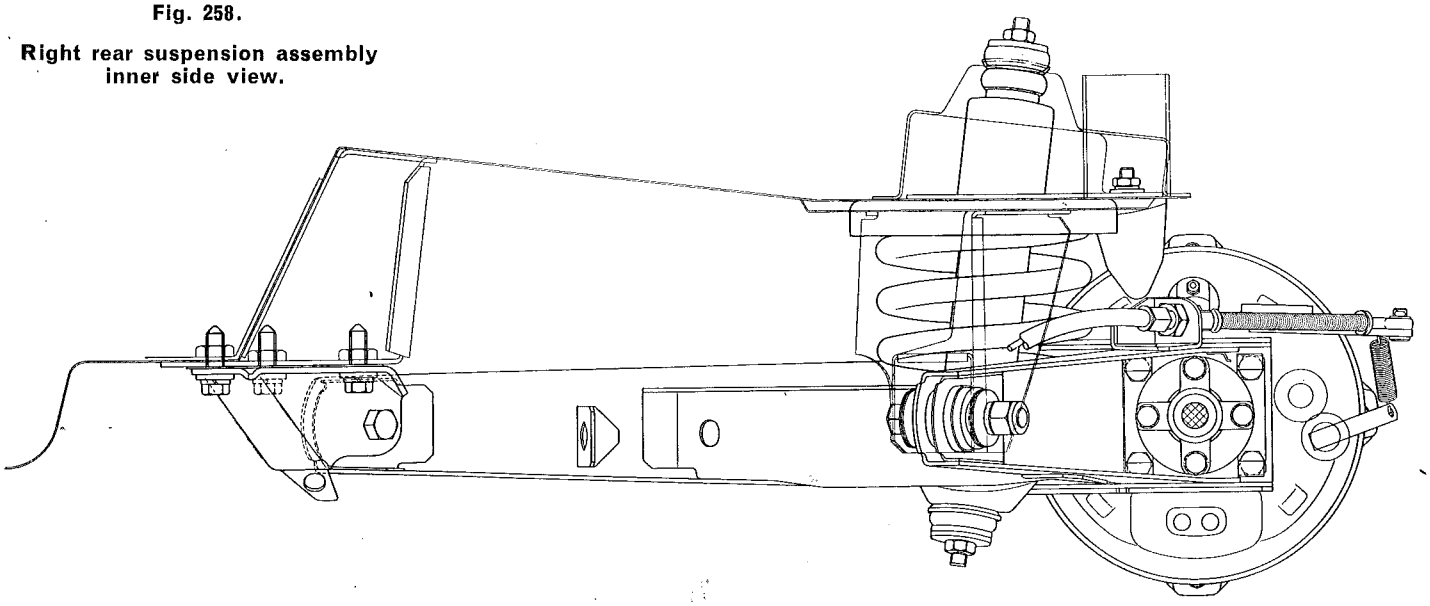
Screw in - without tightening - the three swinging arm external bracket-to-body floor mounting screws, plain and spring washers; screws will have to be tightened to specified torque, or 28.9 to 36.2 ft.lbs (4000 to 5000 kgmm) only after having adjusted rear wheel geometry.

Seat properly, on swinging arm, the coil spring lower insulator ring; insert spring on shock absorber (previously secured to arm) and position spring in its seat on arm.

Place the upper insulator ring on spring. Raise suspension assembly by means of a hydraulic jack or fixture **A. 66062** and insert spring in its seat under body floor.

Make sure shock absorber-to-floor rubber ring has been fitted, then extend shock absorber until its upper mounting pin protrudes into car through the hump in floor, and secure shock absorber by its mounting nut and lock washer after having inter-

**Fig. 258.**
**Right rear suspension assembly inner side view.**



posed rubber ring and plain washer. Use wrench **A. 56030** to secure shock absorber.

Refit the rear wheelhousing lining in place.

Connect brake line to the connection on body floor.

Remove the wooden peg from brake fluid reservoir.

Bleed brake system.

Between axle shaft and wheel shaft, insert the inner spring; then couple the splined sleeve to the joint and tighten the screws to 21.7 to 25.3 ft.lbs (3000 to 3500 kgmm).

Connect parking brake tie rod and adjust tension by the two stretchers.

Install wheels and draw up mounting screws with 32.5 to 39.8 ft.lbs (4500 to 5500 kgmm) of torque.

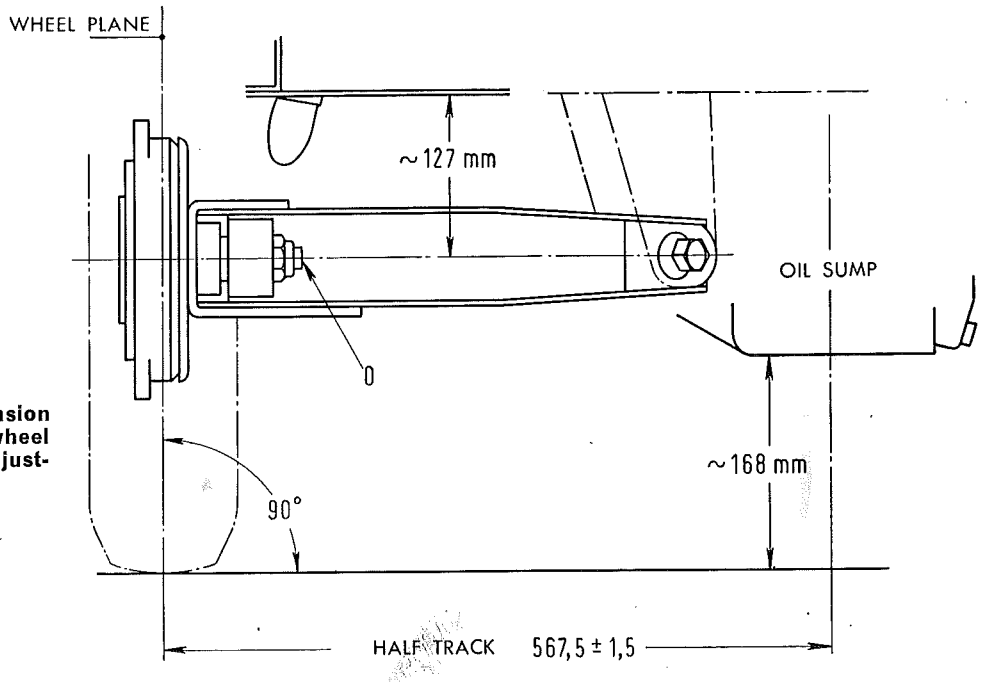



**Fig. 259.**

**Position of rear suspension components for rear wheel toe-in inspection and adjustment.**

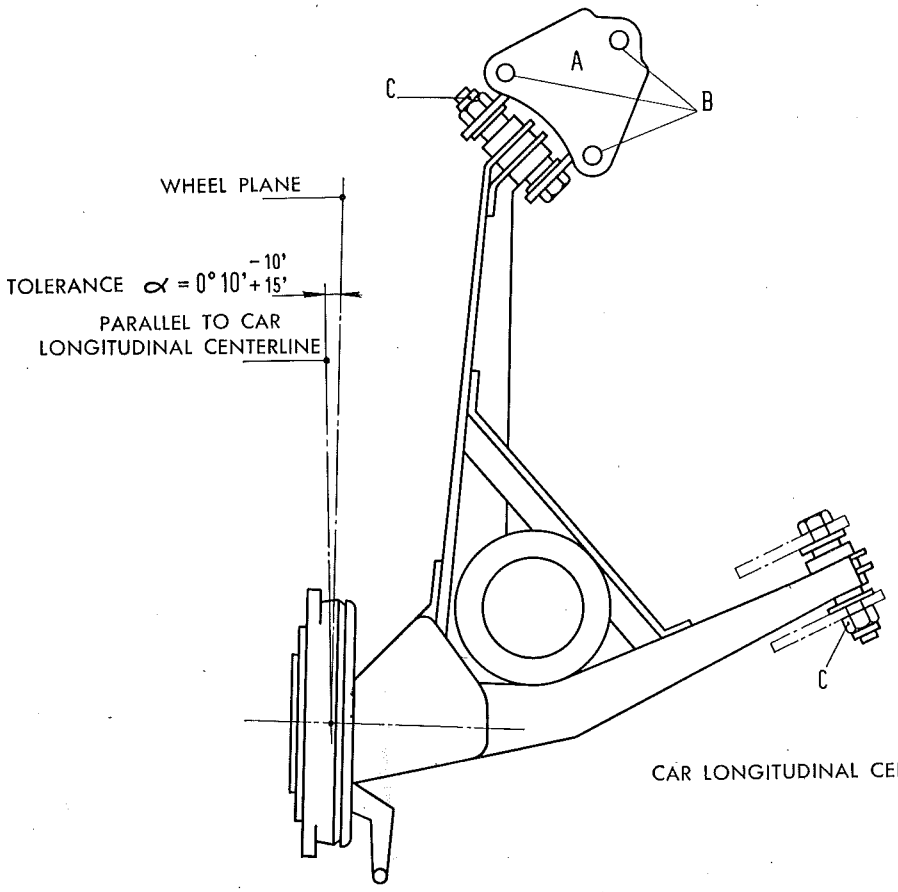



**Fig. 260.**

**Adjusting rear wheel toe-in angle.**

Rear wheel plane must be perpendicular to ground and parallel to car longitudinal centerline with a tolerance of $0^{o}\,10' \,^{+15'}_{-10'}$ toe-in.

FORWARD DRIVE DIRECTION

To adjust rear wheel geometry, move suitably the swinging arm outer support. Slight movements are permitted by the play existing between the support holes A and the mounting screws. Screws B must be tightened to 28.9 to 36.2 ft.lbs (4000 to 5000 kgmm). Nuts C must be tightened to 43.4 to 50.6 ft.lbs (6000 to 7000 kgmm), after adjustment has been carried out.

# CHECKING AND ADJUSTING REAR WHEEL TOE-IN

After the rear suspension has been installed, check and adjust the rear wheel toe-in.

To do so, the rear wheels must be set with their plane:

— perpendicular to ground;

— tilted to car longitudinal centerline by an angle of 0° 10′ ($\alpha$, fig. 260) toeing-in at front;

— 22.342″ ± .059″ (567,5 ± 1,5 mm) apart from car longitudinal centerline (half track, fig. 259).

To adjust rear wheel geometry, move suitably the swinging arm outer support.

Slight movements are permitted by the play existing between the support holes (A, fig. 260) and the mounting screws (B).

It should be noted that to a toe-in angle variation of 0° 10′ ($\alpha$, fig. 260) corresponds a displacement of about .216″ (5,5 mm) measured at 72.441″ (1,84 m) from wheel center (distance equal to car wheelbase).

To check and adjust rear wheel geometry:

a) Place the car on stands and remove front and rear wheels.

b) Install fixtures **A. 66062** for spring compression and wheel retainment in vertical position (figure 261).

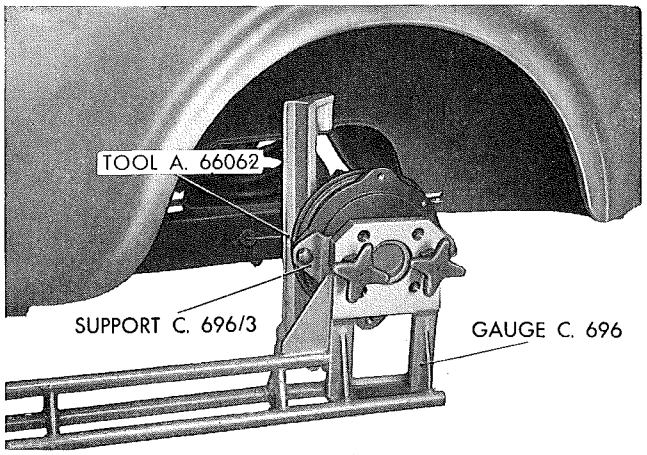



**Fig. 261 - Checking left rear wheel toe-in by gauge and tools shown in the figure.**

Toe-in is checked after setting wheel plane perpendicular to floor by means of tool A. 66062.

c) Lift rear suspensions by compressing the coil springs and shock absorbers. Screw on the fixture lower shank until the index registers with the mark « Nuova 500 » stamped on bracket. In this position the wheel plane is vertical and the center (0, fig. 259) of wheel shaft results at 5.00″ (127 mm) from buffer stop bracket.

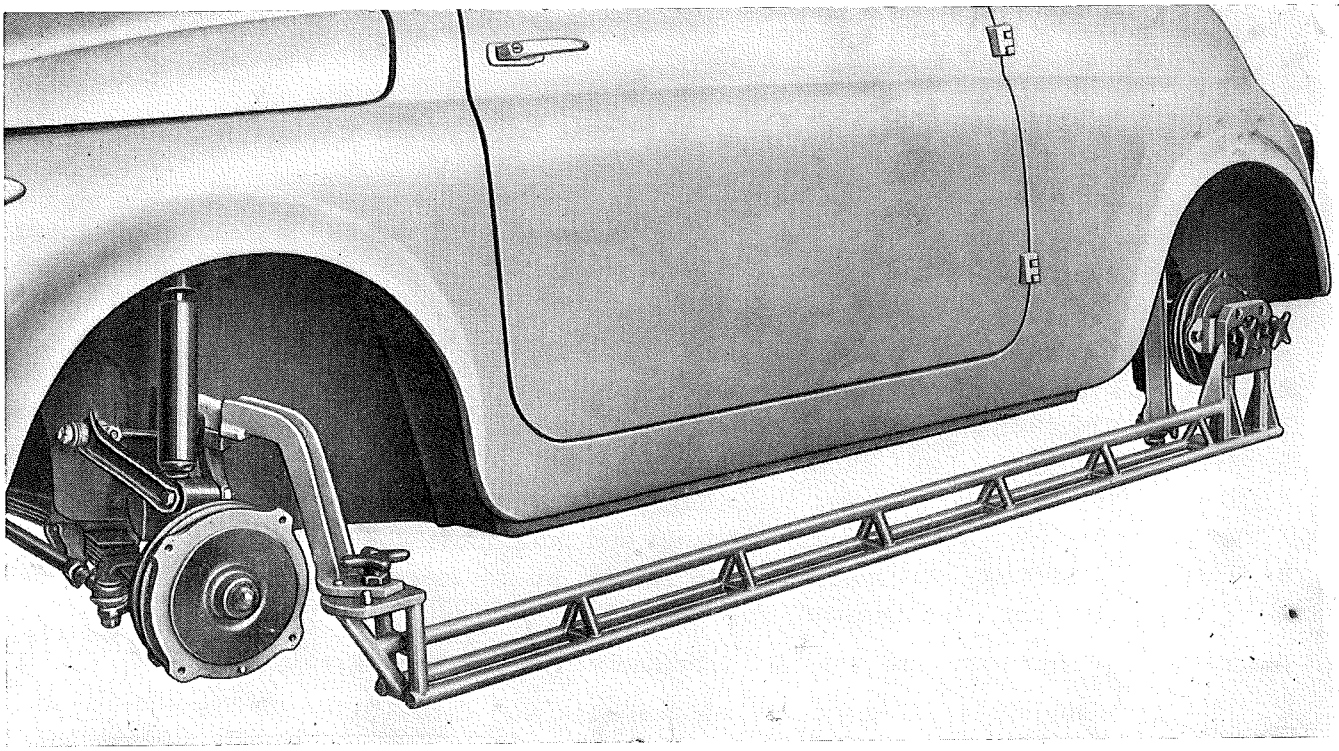


**Fig. 262 - Checking left rear wheel toe-in by gauge C. 696, bracket and support C. 696/3 and tool A. 66062**

(see also figs. 261 and 263).

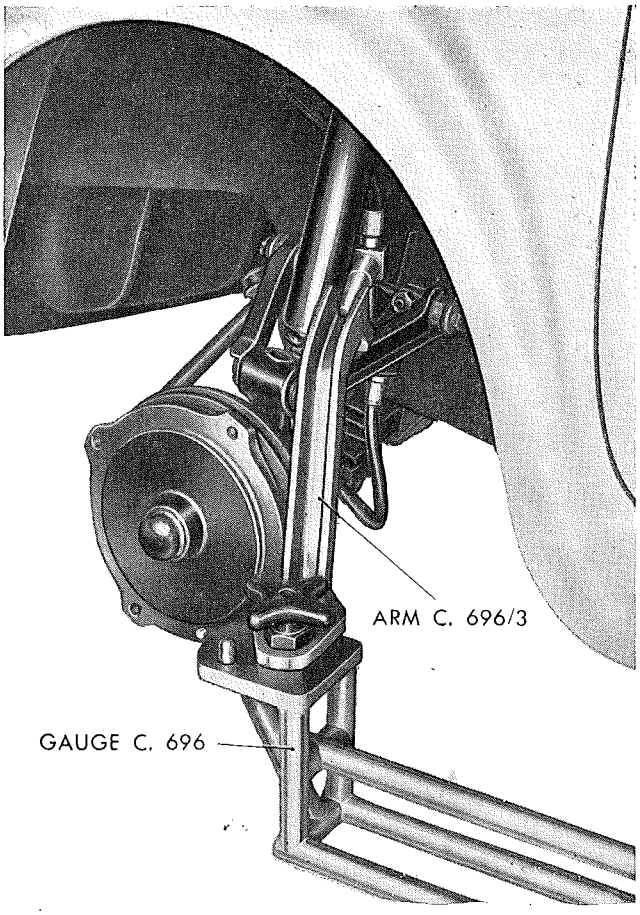



**Fig. 263 - Checking left rear wheel toe-in.**

With the pin of bracket C. 696/3 .216″ (5,5 mm) from the swinging arm pin, rear wheel plane is parallel to car longitudinal centerline. Instead, when the pin of bracket C. 696/3 is in slight contact with the swinging arm pin, rear wheel plane is tilted to car longitudinal centerline by an angle of 0° 10′ toeing-in at front.

d) Secure support **C. 696/3** to wheel drum and connect gauge **C. 696** to the support, then tightening the two clamping screws (fig. 261).

e) Apply, at front of gauge **C. 696**, bracket **C. 696/3** (fig. 263).

f) Check that the pin mounted on front end of bracket **C. 696/3** is in touch with front suspension swinging arm pin (fig. 263). If this condition is not complied with, operate as outlined in g).

As already said, a $\frac{-10'}{+15'}$ tolerance is permitted, provided such value is the same also for the other rear wheel.

**Rear wheels, in fact, must be both in perfect straightahead position or toed-in of the same angle.**

When wheel is parallel to car centerline, the pin of bracket **C. 696/3** will be .216″ (5,5 mm) apart from the pin of front suspension swinging arm.

g) Back out the swinging arm outer support-to-body mounting screws and position arm in such a way as to obtain the condition described in point f).

After adjustment, tighten the outer support mounting screws to 28.9 to 36.2 ft.lbs (4000 to 5000 kgmm) using a torque wrench. Tighten also the two swinging arm pin nuts (C, fig. 260) to 43.4 to 50.6 ft.lbs (6000 to 7000 kgmm).

Take off gauge **C. 696** with bracket and support **C. 696/3**; repeat the check and adjustment operations on the other wheel, minding that bracket **C. 696/3** must be located in the other position specified.

## REAR SUSPENSION AND WHEEL SERVICE EQUIPMENT

| | |
|---|---|
| A. 8279 | Wrench - wheel shaft nut. |
| A. 40005/1/9 | Puller - wheel drums. |
| A. 56024 | Wrench - shock absorber plug. |
| A. 56030 | Wrench - hydraulic shock absorber removal and installation. |
| A. 66056 | Tool - swinging arm « estendblock » removal and installation. |
| A. 66057 | Alignment bar - shims on swinging arm. |
| A. 66062 | Fixture - coil spring compression and wheel retainment in vertical position. |
| A. 66064 | Fixture - swinging arm check-up and adjustment. |
| A. 95697 | Dynamometer - wheel bearing rotation torque measurement. |
| A. 95697/2 | Support - dynamometer A. 95697. |
| Arr. 2072 | Crossbeam - car rear end lifting with hydraulic jack Arr. 2027. |
| C. 696 | Gauge - wheel alignment checking (use with C. 696/3). |
| C. 696/3 | Bracket and support - wheel alignment check gauge (use with C. 696). |

## REAR SUSPENSION AND WHEEL TIGHTENING REFERENCE

| ITEM | Drwg. or Std. Part No. | Thread | Material | Tightening Torque |
|---|---|---|---|---|
| Swinging arm pin-to-floor nut . . . | 1/25747/11 | 12 MB (x1,5) | R 50 (Pin C 40 Bon) | 43.4 to 50.6 ft.lbs (6.000 to 7.000 kgmm) |
| Swinging arm support-to-floor screw | 1/09232/20 | 10 x 1,25 M | R 80 | 28.9 to 36.2 ft.lbs (4.000 to 5.000 kgmm) |
| Hub and brake housing flange-to-swinging arm nut . . . . . | 1/17016/11 | 8 MA (x1,25) | R 50 (Screw R 80) | 21.7 to 25.3 ft.lbs (3.000 to 3.500 kgmm) |
| Differential shaft sleeve-to-flexible joint screw . . . . . | 1.45.579/ 996303 | 8 MA (x1,25) | R 80 | 21.7 to 25.3 ft.lbs (3.000 to 3.500 kgmm) |
| Wheel-to-hub screw . . . . . | 1.49.012/ 990166 | 12 MB (x1,5) | C 35 R (Bon) | 32.5 to 39.8 ft.lbs (4.500 to 5.500 kgmm) |
| Rear wheel bearing rotation torque, below . . . . . | | | | 0.36 ft.lbs (50 kgmm) |

## REAR SUSPENSION AND WHEEL SPECIFICATIONS

| | |
|---|---|
| **Swinging Arms.** | |
| Connection to body . . . . . | by « estendblocks » |
| Adjustment . . . . . | shims |
| Position of arm for tightening of nuts to mounting pins on body . . . . . | wheels vertical |
| **Coil Spring.** | |
| Free height . . . . . | 8.70″ (221 mm) |
| Height under a 904±44 lbs (410±20 kg) load . . | 5.94″ (151 mm) |
| Height under a 1268±64 lbs (575±29 kg) load . . | 4.24″ (123 mm) |
| Solid height . . . . . | 3.67″ ( 93 mm) |
| Flexibility . . . . . | .3034″ in/100 lbs (17 mm/100 kg) |
| **Wheels.** | |
| Roller bearing adjustment . . . . . | by resilient spacer |
| Bearing rotation torque, below . . . . . | .36 ft.lbs (50 kgmm) |
| Wheel alignment: toed-in (identical for both rear wheels) . . . . . | $0^{o}\ 10' \begin{matrix} - 10' \\ + 15' \end{matrix}$ |
| Bearing lubrication . . . . . | FIAT Jota 3 grease |
| **Shock Absorbers.** . . . . . | two |
| Type . . . . . | hydraulic, telescopic |
| Diameter (inner cylinder) . . . . . | 1.063″ (27 mm) |
| Fluid grade . . . . . | FIAT S. A. I. oil |
| Capacity . . . . . | .088 Imp. qts. - .104 U. S. qts. (100 cc ± 5 - 0,090 kg) |

# HYDRAULIC SHOCK ABSORBERS



## Description.

Front and rear shock absorbers are of the telescopic, double-acting type.

Main data:

— Working cylinder diameter:
front . . . . . 1.063" (27 mm)
rear . . . . . 1.063" (27 mm)

— Length (between rubber ring shoulders):
front:
telescoped-in 8.3464"±.0787" (212±2 mm)
telescoped-out 13.1890"±.0787" (335±2 mm)
stroke . . . . . 4.8425" (123 mm)
rear:
telescoped-in 7.0865"±.0787" (180±2 mm)
telescoped-out 10.6693"±.0787" (271±2 mm)
stroke . . . . . 3.5826" (91 mm)

— Fluid capacity:
front . . . . . .137 U.S. qts - .112 Imp. qts (130±5 cm³ - 0,120 kg)
rear . . . . . .104 U.S. qts - .088 Imp. qts (100±5 cm³ - 0,090 kg)

These shock absorbers are also termed « direct acting », since their dampening action takes place directly on suspension without the intermediary of levers.

They are fitted with thermostatic valves ensuring steady dampening action regardless of temperature variations.

Essentially, a shock absorber of this type consists of a cylindrical body formed by two coaxial tubes (14) and (15) (fig. 264), of which the inner one acts as a working cylinder and the outer one as a casing.

The annular interstice between these two elements performs as a fluid reservoir.

A third outer cylinder (13) shields rod (2) from mud and stones.

On top, cylinder body is closed by bush (11), oil seals (5) and (9), and housing (4).

Rod (2) slides through seal (5): its upper end is fixed to body floor and its lower end carries piston (22) on which rebound (26) and inlet (21) valves are arranged.

At bottom, the shock absorber is closed by plug (35) with threaded shank (36) for shock absorber mounting on suspensions.

At cylinder (15), carrier plug (32) is mounted with compression (33) and compensating (30) valves.

Two concentric rows of orifices are provided in piston.

The internal row is blanked underneath by the rebound valve which opens downwards. The external row is blanked by inlet valve which opens upwards.

Hydraulic shock absorbers, both front and rear, (starting from vehicles manufactured in the month of March 1959) are provided with a vapour pocket bleeder from cylinder interior.

The bleeder device consists of a capillary hole (12, fig. 264) interconnecting the inner cylinder (15) with the upper chamber (10), and of a passage tube (16) from upper chamber to fluid reservoir.

Any vapour pockets in pressure cylinder are evacuated past the capillary hole (12) into the chamber (10), whence they flow down, during shock absorber operation, through passage (16) in a light fluid stream and up to top reservoir with the reservoir fluid.

This system definitely does away with any vapour lock in shock absorber hydraulic circuit, which is isolated from air contained in fluid reservoir.

## Operation.

The shock absorber described above may be considered as divided in three sections:

— top portion of cylinder above piston (always full of fluid);

— bottom portion of cylinder below piston (always full of fluid);

— fluid reservoir, i. e., the annular interstice between cylinders (14) and (15) (never completely full).

### REBOUND PHASE

This is the phase in which shock absorber extends. The fluid above piston finds the external row of orifices (24) closed and is forced through

the internal row (25), thus acting on rebound valve (26) and passing to cylinder lower portion.

During its upward travel the piston produces a vacuum which draws fluid from the reservoir through annular passage (31) of carrier plug (32) and compensating valve (30). The amount of fluid passing from reservoir to cylinder will be volumetrically equal to the portion of piston rod that has slid out.

Therefore in this phase only the rebound and compensating valves are active while the compression and inlet valves are inactive.

### COMPRESSION PHASE.

In this phase shock absorber telescopes in and the piston travels downwards.

The fluid in the lower chamber lifts inlet valve (21) and part of it passes into cylinder upper portion.

Some of the fluid, instead, rams compression valve (33), and through its orifices (34), passes into the reserve.

The dampening effect in this phase is the result of the displacement of an amount of fluid volumetrically equal to the portion of rod entering the cylinder.

During this phase both the compensating (30) and rebound (26) valves remain closed and only the compression (33) and inlet (21) valves are operative.

## Disassembly, Inspection, Reassembly.

Wash outer casing with warm water or kerosene.

Clamp lower shank in a vise and telescope-up outer casing.

Using wrench **A. 56024**, unscrew upper threaded ring (3).

Remove from vise and take out inner cylinder (15); by a screwdriver inserted in cylinder bottom chamfer, remove lower plug (32) carrying compression and compensating valves.

Push rod into cylinder (15), and clamp upper shank in a vise, unscrew plug (29), remove piston (22) with inlet and rebound valves.

Withdraw rod (2) from cylinder (15) and remove seal gasket, housing, threaded ring, etc.

Wash all components in kerosene or gasoline and then inspect parts carefully to see that:

a) inlet, rebound and compensating valve discs are not deformed;

b) the sliding sufraces of piston, seal ring and compression valve are smooth and are fluid-tight;

c) rebound and compression valve springs and upper spring for seal gasket are not weakened or broken;

d) the two seal gaskets are not worn or damaged; it is advisable to replace them in any case;

SECTIONAL VIEW OF SHOCK ABSORBER

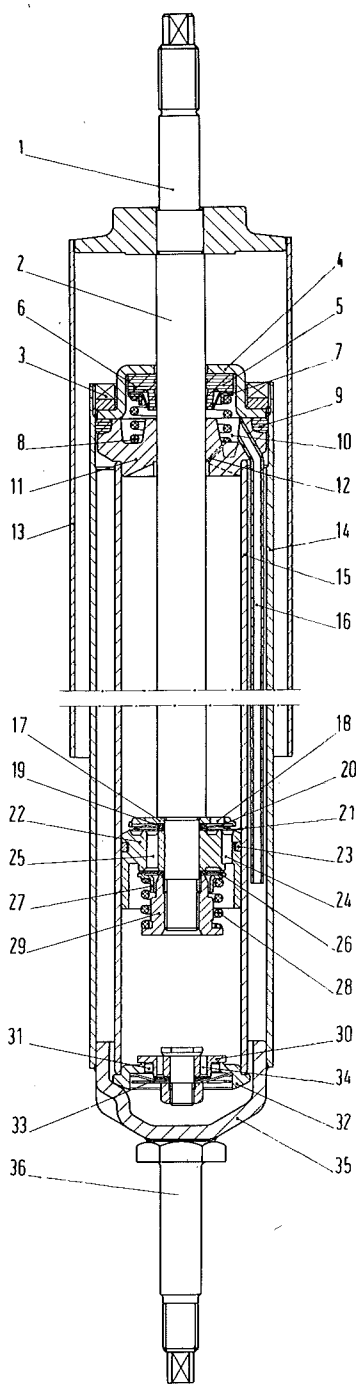



**Fig. 264 - Sectional view of shock absorber.**

1. Threaded shank, floor mounting. - 2. Rod. - 3. Cylinder upper blanking threaded ring. - 4. Seal housing. - 5. Rod seal. - 6. Tab spring. - 7. Spring cup. - 8. Gasket packing spring. - 9. Casing gasket. - 10. Vapour pocket drain chamber. - 11. Rod guide bush. - 12. Vapour pocket drain capillary hole. - 13. Dust shield. - 14. Casing. - 15. Working cylinder. - 16. Vapour pocket drain passage. - 17. Valve lift limiting disc. - 18. Fluid passage orifice. - 19. Valve lift adjustment washer. - 20. Valve star-shaped spring. - 21. Inlet valve. - 22. Piston. - 23. Compression ring. - 24. Inlet valve holes in piston. - 25. Rebound valve holes in piston. - 26. Rebound valve. - 27. Valve guide cup. - 28. Rebound valve spring. - 29. Piston mounting plug. - 30. Compensating valve. - 31. Compensating valve annular passage. - 32. Compensating-and-compression valve carrier plug. - 33. Compression valve. - 34. Compression valve orifices. - 35. Lower plug. 36. Threaded shank, lower mounting.

e) rod and cylinders are not deformed;

f) air pocket evacuating passage is not plugged. Take care not to kink the passage during disassembly and assembly operations. Replace passage, if damaged;

g) capillary hole (12, fig. 264) is not plugged.

Replace all damaged parts.

To reassemble shock absorber, reverse order of disassembly operations.

Special care shall be taken in refilling the shock absorber.

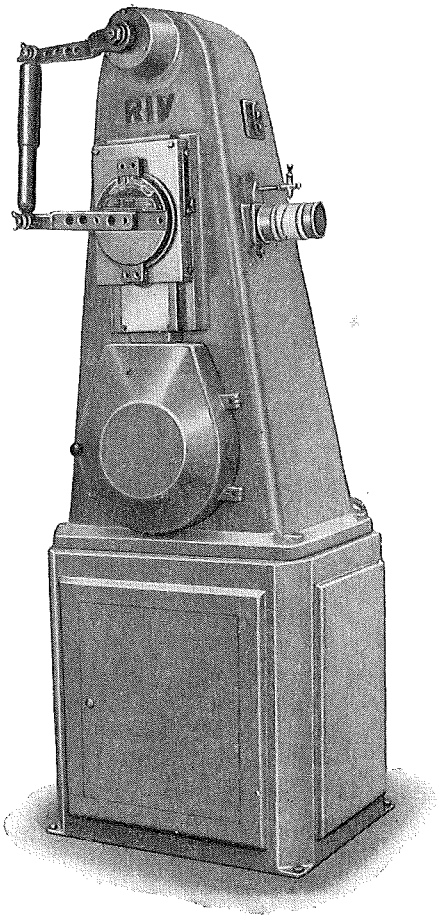



**Fig. 265 - Shock absorber tester A. 76003.**

In a graduated cylinder, measure:

— .112 Imp. qts. - .137 U. S. qts. ($130 \pm 5$ cm$^3$) - front shock absorbers, or

— .088 Imp. qts. - .104 U. S. qts. ($100 \pm 5$ cm$^3$) - rear shock absorbers

of FIAT-SAI oil.

Then proceed as follows:

Mount piston on rod, insert rod and piston assembly into cylinder (15, fig. 264).

Push piston against bush (11), then, pour fluid up to about 1/2 inch from the edge.

Press fit plug (32) and pour the remaining fluid in the casing (14).

Finally, insert cylinder (15) in casing (14) and tighten upper threaded ring (3).

**It is good practice to use tool A. 10228 for shock absorber assembly and disassembly operations.**

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**IMPORTANT - The amount of FIAT-SAI oil introduced in shock absorbers, must always correspond exactly to recommendations.**

**A too high level would not allow the shock absorber to telescope in completely and would cause irreparable damages, while a too low level would reduce the dampening effect and might cause noisy operation.**

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## Checking Dampening Diagrams.

Before disassembling the shock absorber for overhaul, it will be advisable to check its operation on shock absorber tester **A. 76003** (fig. 265) to determine dampening efficiency.

Set up tester for the type of shock absorber to be checked.

To this purpose, and in accordance with the tester instruction book, proceed as follows:

a) Adjust reaction arm length at 9.843" (250 mm) (fig. 266).

b) Adjust test stroke at 3.937" (100 mm), for front shock absorber, and at 3.150" (80 mm), for rear shock absorber (fig. 267).

c) Adjust distance between shock absorber mounting pins by bringing the two indexes in line with the reference marks on plate fitted on tester

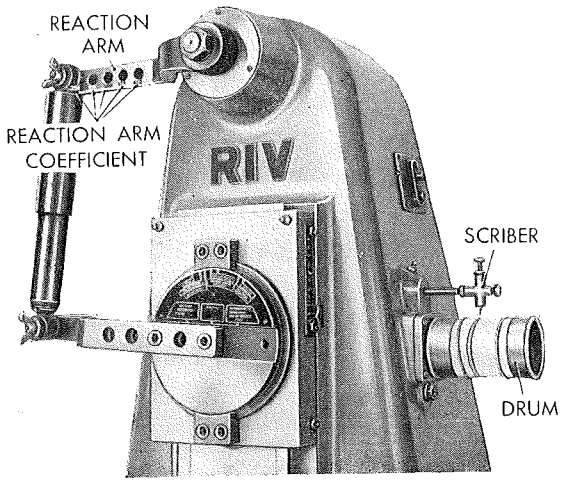


**Fig. 266 - Detail of the A. 76003 shock absorber tester head.**

slide side (fig. 266) relevant to shock absorber under test.

d) Wind the sheet of paper on the drum and scribe the base line by running the tester unloaded.

Install shock absorber on the tester, making sure that articulations are free. Test must be carried out at room temperature, since the ordinates on the master diagram have been computed according to this test condition.

Let shock absorber complete four or five cycles before tracing the dampening diagram by lowering the scriber to contact the paper sheet rolled on the drum (fig. 266).

Remove the traced paper from drum and place it under the plexiglass master diagram and check shock absorber diagram.

### DIAGRAM INTERPRETATION.

a) The values of the rebound and compression reactions are referred to the maximum ordinates of the corresponding diagrams.

b) The peak of the curve must be included between the master diagram ordinates.

c) The diagram must be regular and, in the inversion point, must in no spot be parallel to the base line.

After checking operation, disassemble shock absorber, inspect and replace parts as required.

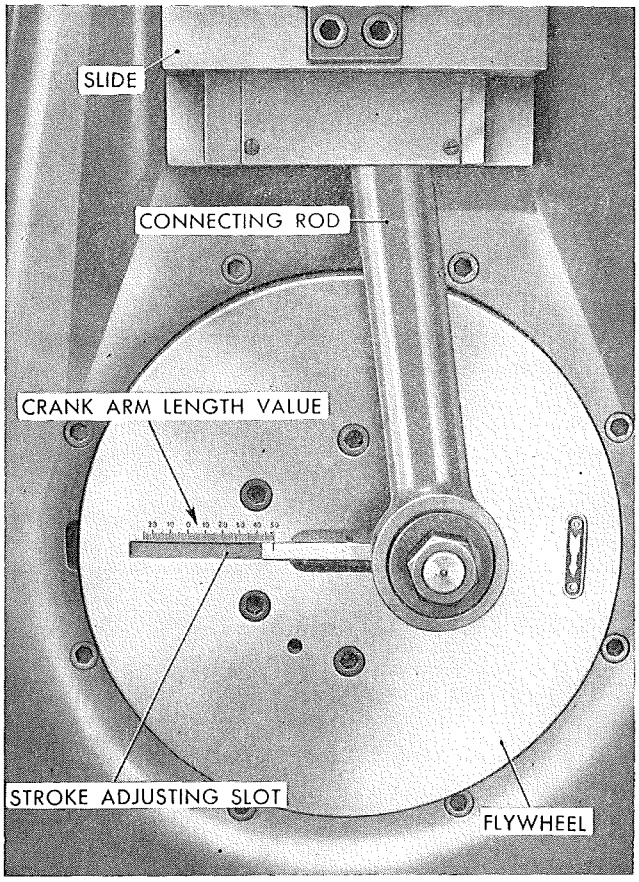


**Fig. 267 - Detail of the shock absorber operation tester A. 76003.**

In the figure the tester is set for a stroke of 3.937″ (100 mm), suitable for checking front shock absorbers.

# TROUBLE DIAGNOSIS AND CORRECTIONS REAR SUSPENSION AND WHEELS

## Irregular or Abnormal Tire Wear.

| POSSIBLE CAUSES | REMEDIES |
|---|---|
| 1) Incorrect tire pressure. | 1) Tires should be inflated, front and rear, to recommended pressure. Pressure specifications are given on page 187. |
| 2) Wheels out of balance. | 2) Inspect and fix as directed on page 187. |
| 3) Wheels off center. | 3) Inspect and fix as directed on page 187. |
| 4) Misadjusted brakes. | 4) Adjust brakes as outlined on page 178. |
| 5) Weak or broken coil springs. | 5) Check spring rise under load and replace spring if not within specifications (page 149), or broken. |
| 6) Excessive load. | 6) See load specifications, page 299. |
| 7) Incorrect wheel alignment. | 7) Check and adjust rear wheel toe-in as outlined on page 151. |

## Sag at One Wheel.

| POSSIBLE CAUSES | REMEDIES |
|---|---|
| 1) Incorrect tire pressure. | 1) Check pressure of tires and inflate as specified on page 187. |
| 2) Weak or broken coil spring. | 2) Check spring rise under load and replace spring if not within specifications (page 149), or broken. |
| 3) Wear of shock absorber causes poor dampening action. | 3) Overhaul shock absorber and replace worn parts. |

## Squeaks, Thumps, or Rattles.

| POSSIBLE CAUSES | REMEDIES |
|---|---|
| 1) Wheels out of balance. | 1) Inspect and fix as directed on page 187. |
| 2) Wheels off center. | 2) Inspect and fix as directed on page 187. |
| 3) Misadjusted brakes. | 3) Adjust brakes as outlined on page 178. |
| 4) Weak or broken coil springs or spring seats dislodged. | 4) Check spring rise under load and replace spring if not within specifications (page 149), or broken. Replace upper and lower rubber seats, if damaged. |
| 5) Wear of shock absorbers causes poor dampening action. | 5) Overhaul shock absorbers and replace worn parts. |
| 6) Worn rubber bushings in control arms. | 6) Replace bushings by new ones. |
| 7) Poor lubrication of wheel bearings. | 7) Proceed as directed on page 148 and under « Maintenance ». |

## Pull to One Side.

| POSSIBLE CAUSES | REMEDIES |
|---|---|
| 1) Incorrect tire pressure. | 1) Check pressure of tires and inflate as prescribed on page 187. |
| 2) Misadjusted brakes. | 2) Adjust brakes as directed on page 178. |
| 3) Distorted suspension arm. | 3) Remove, check on test equipment (see page 146), straighten arm, if possible, and set correctly on installation. |