FIAT DINO

Roadster - Coupe

SPECIFICATIONS AND FEATURES
SERVICING INSTRUCTIONS

SERVICE DEPARTMENT - TURIN

This booklet gives data and main features, as well as general overhaul instructions of FIAT-Dino Model, « Roadster » Version. Differing parts which apply to the « Coupe » Version are outlined on page 93.

ROADSTER

SPECIFICATIONS

IDENTIFICATION DATA

Chassis type	135 AS
Engine type	135 B.000

ENGINE

Position	in front compartment
Cycle	four-stroke
No. of cylinders	6, 65° V
Bore	3.39″ (86 mm)
Stroke	2.24 (57 mm)
Capacity	119.26 cu.in (1,987 cc)
Compression ratio	9 to 1
Max. horsepower, DIN rating	160
Max. horsepower, SAE rating	166
Corresponding speed	7,200 r.p.m.
Max. torque, DIN rating	126.6 ft.lbs (17.5 kgm)
Max. torque, SAE rating	128.7 ft.lbs (17.8 kgm)
Corresponding speed	6,000 r.p.m.
Taxable horsepower (Italy)	23
Cooling	permanent circuit mixture

CLUTCH

Single plate, dry clutch.
Spring- cushioned hub and damper rings.
Diaphragm-type pressure spring.
Hydraulic de-clutching.

TRANSMISSION

Gear ratios:

— first, synchro	3.095 to 1
— second, synchro	1.825 to 1
— third, synchro	1.351 to 1
— fourth, synchro	1 to 1
— fifth, synchro	0.871 to 1
— reverse	2.889 to 1

All synchronizers are of the spring-ring type.
The gearshift lever is situated on floor tunnel.
Oil is pressure-circulated through a gear pump.

PROPELLER SHAFT

Dual, with center pillow block and universal joints; the front section is fitted with a flexible joint at the transmission end.

REAR AXLE

Of the semi-floating type.
Hypoid final drive with spiral bevel gears.
Gear ratio: 4.875 to 1 (8/39).
Differential with spin resistant device.

STEERING

Worm and roller gear with hydraulic damper at idler arm support.
Mid section of steering shaft fitted with two universal joints.

Gear ratio	16.4 to 1
Turning circle	35 ft 1 in (10.7 m)

FRONT SUSPENSION

Independent wheel.
Control arms assisted by coil springs, hydraulic shock absorbers and sway eliminator; reaction struts for lower control arms

Front wheel toe-in (*)	.0787″ to .1575″ (2 to 4 mm)
Camber (*):	
— angle	1° 30′ ± 20′
— at wheel rim	.315″ to .492″ (8 to 12.5 mm)
Caster (*)	3° ± 20′

(*) At load: means two persons plus 44 lbs (20 kg) luggage.

REAR SUSPENSION

Solid axle anchored to body by single-leaf semi-elliptic springs.
Longitudinal reaction struts.
Springs and struts are connected to axle and body by means of resilient bushings.
Two hydraulic telescopic double-acting shock absorbers at each wheel.

BRAKES

Disc brakes on four wheels with two independent circuits acting at front and rear.

Front		
— Disc diameter		10.630″ (270 mm)
— Bore of caliper cylinders	outer	1 1/2″ (38.195 mm)
	inner	2 1/8″ (54 mm)
Rear		
— Disc diameter		10.000″ (254 mm)
— Bore of caliper cylinders	outer	1 3/16″ (30.251 mm)
	inner	1 11/16″ (42.874 mm)
Bore of dual master cylinder		7/8″ (22.225 mm)

Air-hydraulic **brake booster** (Master Vac).
Brake pressure regulator on rear wheel circuit.
Parking brake acting on rear brake discs through a linkage.

ELECTRIC SYSTEM

Voltage	12
Battery (at 20 hrs. discharge rate) capacity	60 A/h
Alternator	A 12 M - 124/12/47
Voltage regulator	RC 1/12 B
Starting motor	FIAT E 100-1,5/12 Var. 4
Dual-breaker distributor	S 125 A

WHEELS AND TIRES

Wheels	14 x 6 1/2"	Tire pressure:	
Tires Michelin X AS with radial carcass		— front	24.2 psi (1.7 kg/cm²)
	185 x 14"	— rear	25.6 psi (1.8 kg/cm²)

WEIGHTS

Curb weight of vehicle (with water, oil, fuel, spare wheel, tools and accessories)	2,535 lbs (1,150 kg)	Gross weight, fully loaded	3,064 lbs (1,390 kg)
No. of seats	2 plus 1 plus 66 lbs (30 kg)	Distribution of gross weight on axles:	
Carrying capacity, max.	529 lbs (240 kg)	— front	1,521 lbs (690 kg)
		— rear	1,543 lbs (700 kg)

PERFORMANCES

Maximum **speed** fully loaded on level road in good condition, engine run-in:

first gear	37 mph (60 kph)
second gear	65 » (105 »)
third gear	90 » (145 »)
fourth gear	121 » (195 »)
fifth gear, abt	130 » (210 »)

Steepest **gradients** climbable with full load, on a road in good condition, engine run-in:

first gear	45 %
second gear	26 %
third gear	17 %
fourth gear	12 %
fifth gear	8.5 %

UNIT IDENTIFICATION DATA

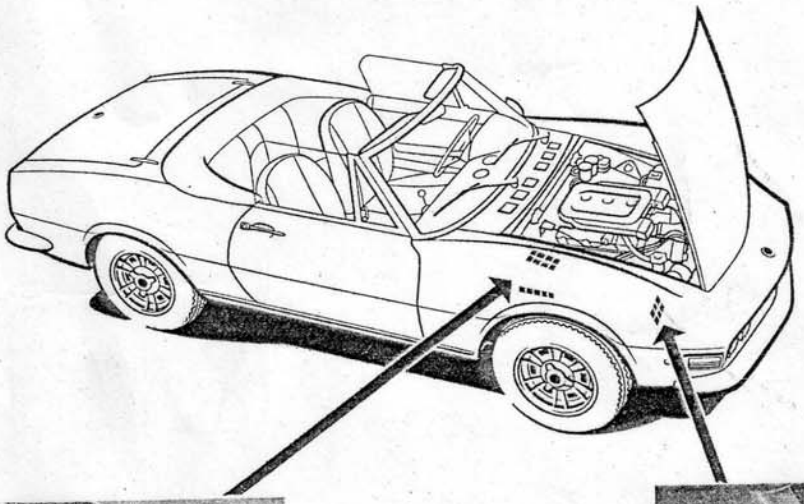
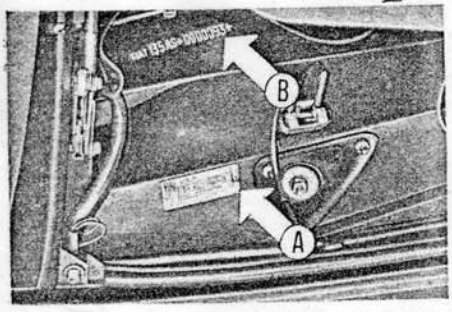
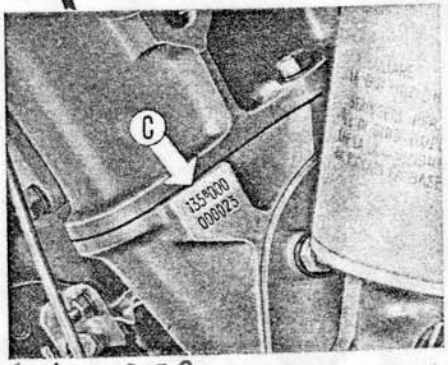


Fig. 1.
Positions of identification data.





A. Unit identification plate: type and serial number of chassis, type of engine and number for ordering spares.

B. Type (135 AS) and serial number of chassis.

C. Type (135 B.000) and serial number of engine.

(B) 135 AC 0003601

PARTS NO. 0003562

(C) 135B000 0005054

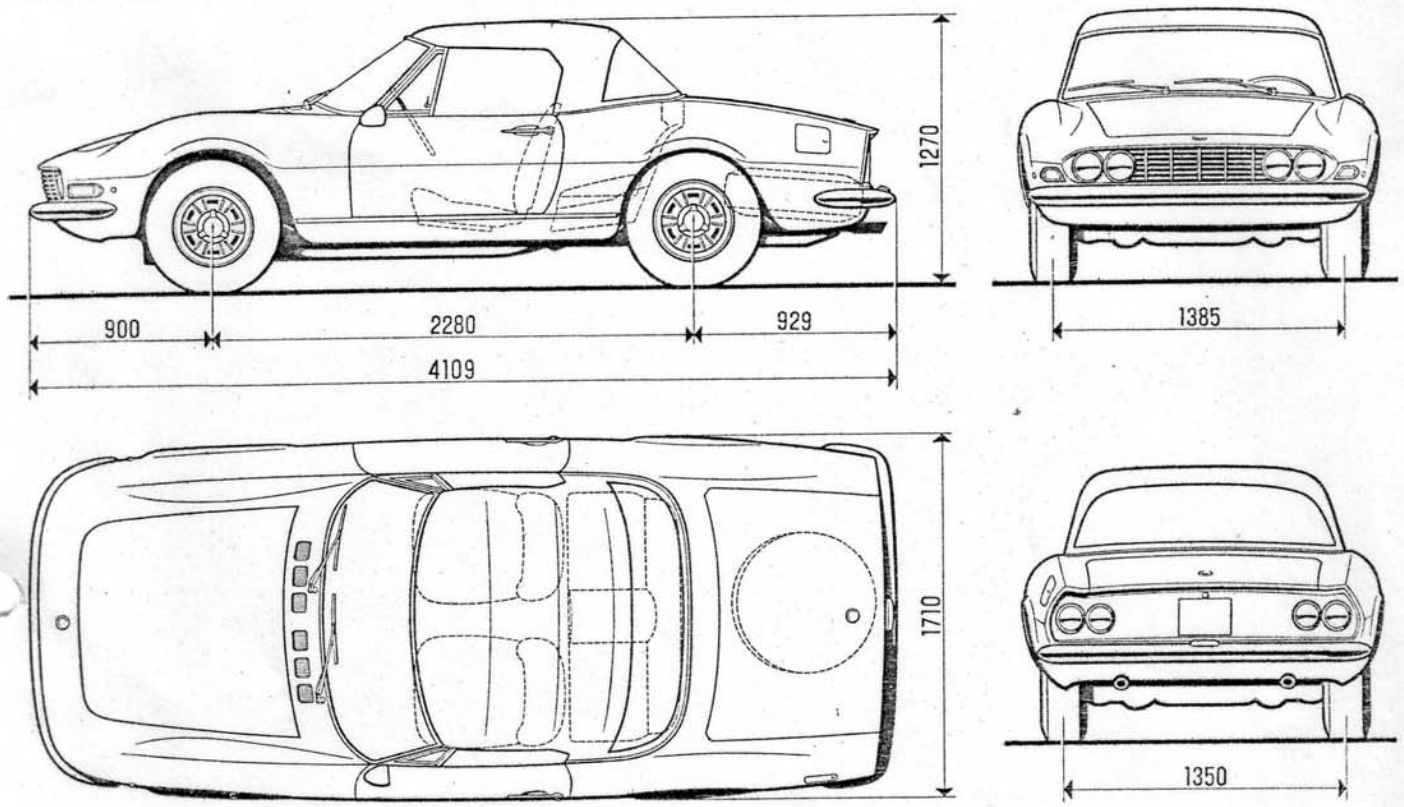


Fig. 2. - Leading dimensions of car (overall height applies to an unloaded vehicle).
For cars equipped with stud-locked wheels the wheelbase is: front 1,371 mm, rear 1,362 mm.

CAPACITIES

UNIT	QUANTITY lt	QUANTITY kg	QUANTITY Imp. Gals	QUANTITY U.S. Gals	REFILL
Fuel tank	66	—	14-4 pts	17-3 pts	Premium gasoline
including a reserve supply of	6 to 9	—	1-3 pts to 2	1-5 pts to 2-3 pts	Premium gasoline
Radiator, engine and heating system	11.5	—	2-4 pts	3	Mixture of water and FIAT « Paraflu » 11 fluid (50 % by volume) (2)
			Imp. pts	U.S. pts	
Oil sump and filter (1)	6.75	6	12	14 1/4	FIAT oil (4)
Transmission	2.30	2.10	4	4-14 ozs	FIAT W 90/M oil (SAE 90 EP)
Steering gear	0.275	0.255	0- 9 1/2 ozs	0- 9 1/4 ozs	FIAT W 90/M oil (SAE 90 EP)
Rear axle	3.30	3	5-16 ozs	7	FIAT W 90/DA oil (SAE 90 EP)
Hydraulic brake circuit, front	0.30	0.30	0-10 1/2 ozs	0-10 ozs	CG brake fluid (special)
Hydraulic brake circuit, rear	0.28	0.28	0-10 ozs	0- 9 1/2 ozs	CG brake fluid (special)
Clutch hydraulic circuit	0.245	0.245	0- 8 1/2 ozs	0- 8 1/4 ozs	CG brake fluid (special)
Front shock absorbers (each)	0.140	0.126	0- 5 ozs	0- 4 3/4 ozs	FIAT S.A.I. fluid
Rear shock absorbers (each)	0.220	0.198	0- 7 3/4 ozs	0- 7 1/2 ozs	FIAT S.A.I. fluid
Windshield washer bag	1	—	1-15 ozs	2- 2 ozs	Water and FIAT DP 1 fluid mixture (concentrated solution)

(1) The total capacity of sump, filter and pipings is 13 3/4 Imp. pts - 16 1/2 U.S. pts (7 kg - 7.8 lt). The quantity shown in the table applies to routine changes of oil and filter, which **should be made every 3,000 miles (5,000 km).**
(2) The mixture is anti-oxide, anti-corrosion, anti-foam, anti-scale and does not freeze down to — 31° F (— 35° C).
(3) In summer, pour a 30 c.c. dose to each liter of water; in winter, use a double dose. For temperatures below 23° F (— 5° C), use exclusively FIAT DP1 fluid, without added water.
(4) Use the following oil grades:
Outdoor temperature below 32° F (0° C) . . . . . **FIAT VS 30 oil (SAE 30)**
Outdoor temperature above 32° F (0° C) . . . . . **FIAT VS 40 oil (SAE 40)**

WARNING - Do not top up with oils of different make or grade; when first using detergent oils on engines other than new, carry out an **accurate flushing** of the lubrication system.

FIAT - DINO ROADSTER

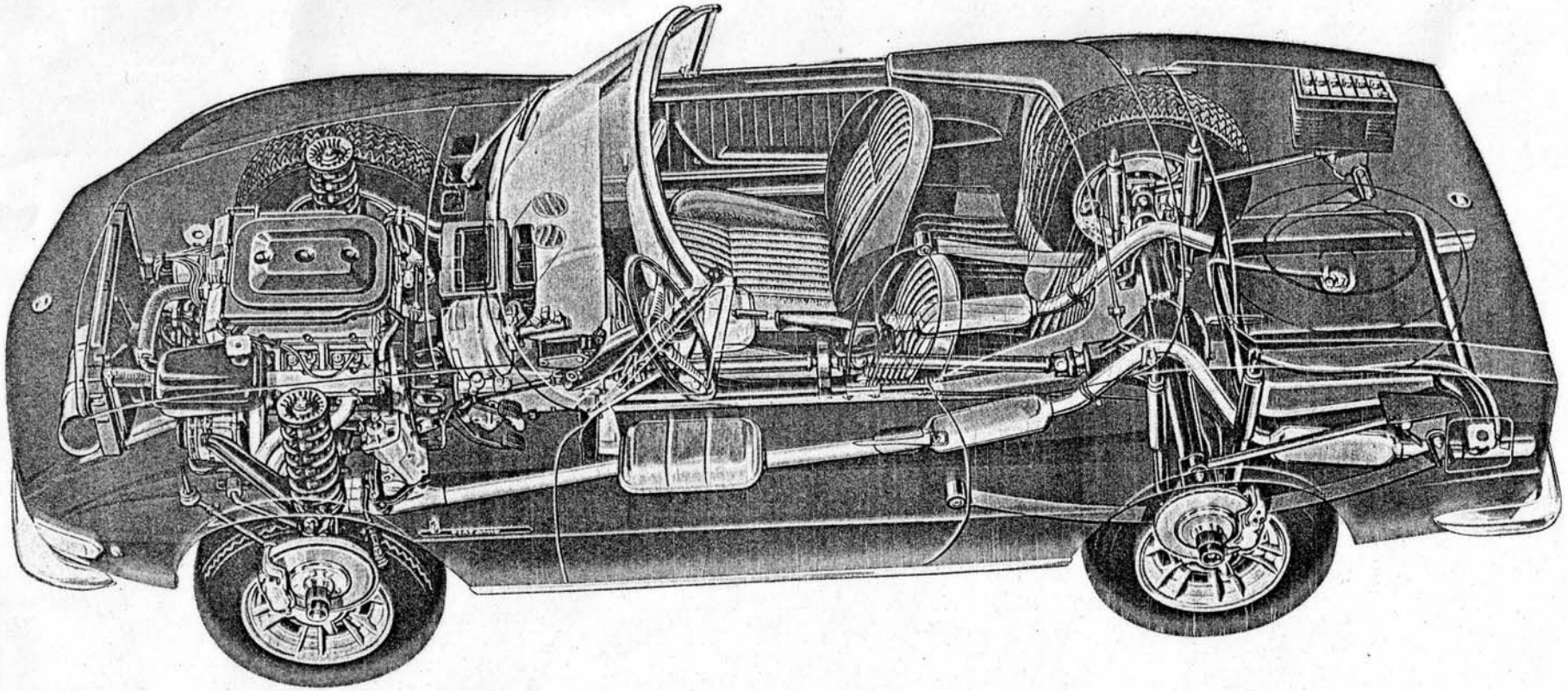


Fig. 3. - Arrangement of running gear units.

LEADING FEATURES

Engine

The four-stroke, gasoline engine is located in front compartment.

The main specifications of this engine are tabulated on foot of page.

Light alloy **cylinder block** in one casting with the crankcase, with « wet » liner inserts.

On the rear bearing are fitted four half-thrust washers for crankshaft.

Twin **cylinder heads** with valve seat inserts.

The four-journal **crankshaft** is supported on babbitt -coated thin-wall type main bearings.

Connecting rod bearings are of the babbitt-coated thin-wall type.

The aluminum-alloy **pistons** are equipped with three **rings**: a compression ring, an oil-wiper ring and an oil-wiper ring with slots.

The **piston pin** is loosely fitted both to the small end and piston bosses.

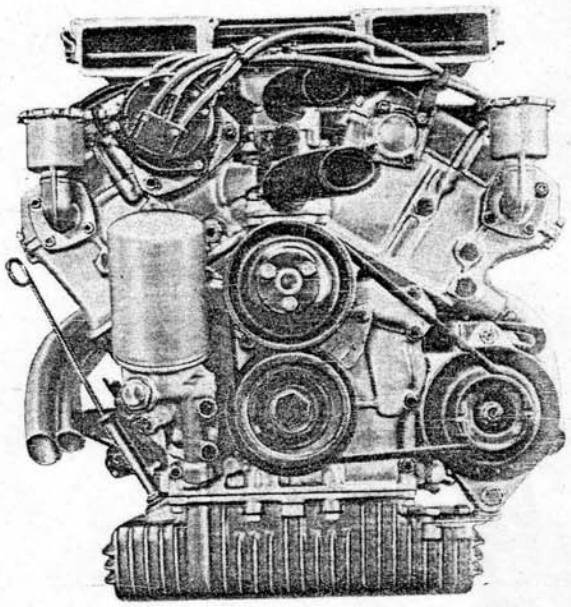


Fig. 4. - Front view of engine assembly.

ENGINE SPECIFICATIONS

Type	135 B.000
Cycle	four-stroke
No. of cylinders, 65° V	6
Bore	3.386″ (86 mm)
Stroke	2.244″ (57 mm)
Displacement	121.26 cu.in (1,987 c.c.)
Compression ratio	9 - 1
Maximum horsepower, DIN rating	160
at	7,200 rpm
Maximum horsepower, SAE rating	166
at	7,200 rpm
Maximum torque, DIN rating	126.6 ft.lbs (17.5 kgm)
at	6,000 rpm
Maximum torque, SAE rating	128.7 ft.lbs (17.8 kgm)
at	6,000 rpm
Taxable horsepower (Italy)	23
N° of carburetors, downdraft, dual-barrel	3
Type of carburetors	WEBER 40 DCN 14

ENGINE ASSEMBLY TYPE 135 B.000

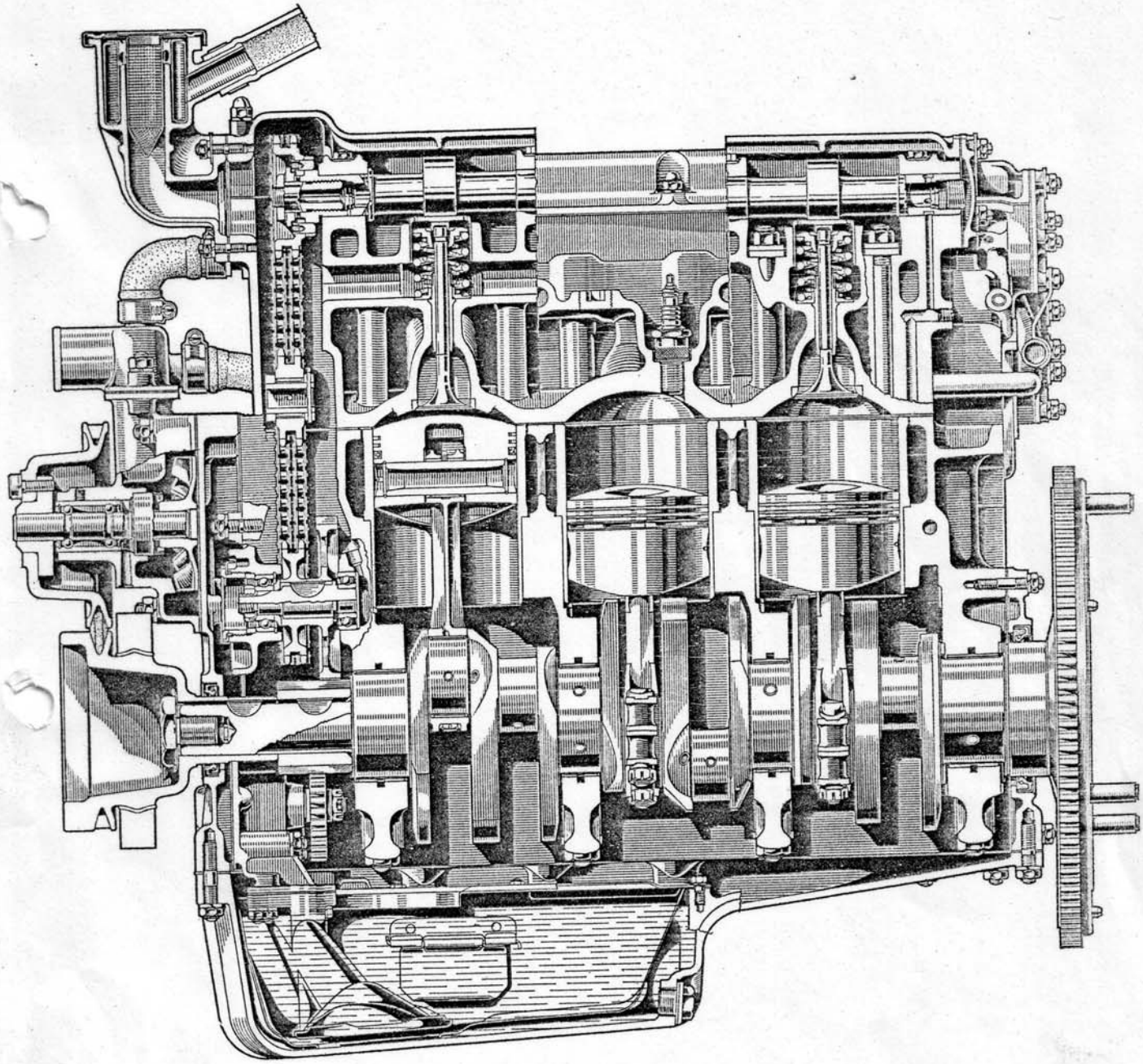


Fig. 5. - Side sectional view of engine through cylinders and one head (intake and exhaust valve), L. H. side.

VALVE TIMING

Timing mechanism: overhead valves operated by four overhead camshafts.

The camshafts are driven by two double chains off the crankshaft, via an idler gear train.

Tappet clearance, **with engine cold:**

— intake . . . . . .006″ to .008″ (0.15 to 0.20 mm)
— exhaust . . . . . .016″ to .018″ (0.40 to 0.45 mm)

Intake	opens B.T.D.C.	40°
	closes A.B.D.C.	52°
Exhaust	opens B.B.D.C.	53°
	closes A.T.D.C.	31°

LUBRICATION

Engine lubrication is of the forced feed type through gear pump driven by the crankshaft.

Full-flow oil filter with pleated paper cartridge.

Oil pressure relief valve in the delivery circuit.

Standard oil pressure at rated speed: 85.3 psi (6 kg/cm²).

NOTE - During routine oil changes (every 3,000 miles - 5,000 km), renew also the oil filter.

FUEL SYSTEM

Three downdraft, dual-barrel carburetors of the Weber type 40 DCN 14.

The fuel is fed through an electric pump (fig. 6) arranged under the rear floor.

Fuel filter with pressure valves.

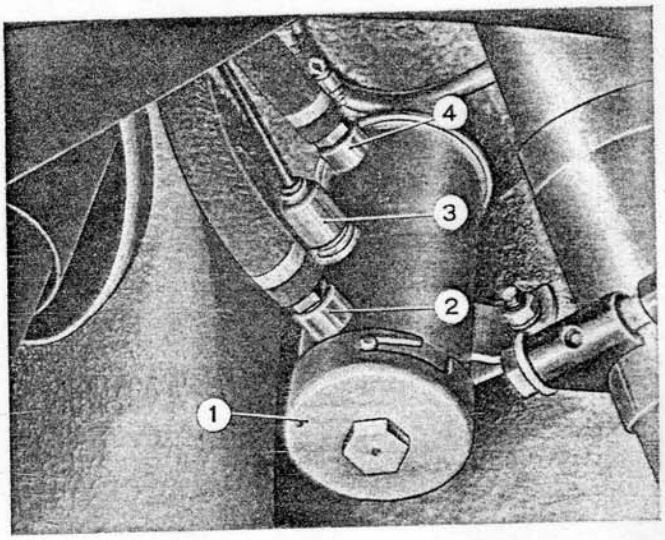


Fig. 6. Electric fuel pump fitted to the car.
1. Fuel pump - 2. Fuel inlet connector - 3. Electric junction - 4. Fuel outlet connector.

A switch fitted on the R.H. side of crankcase cuts off the fuel pump in case of drop in oil pressure.

The fuel pump is operated regularly during the cold starting of engine, though there is no oil pressure, through the ignition switch.

STARTING

By a starting motor. The pinion is driven through a solenoid operated from the ignition switch which is located to the right of the steering column.

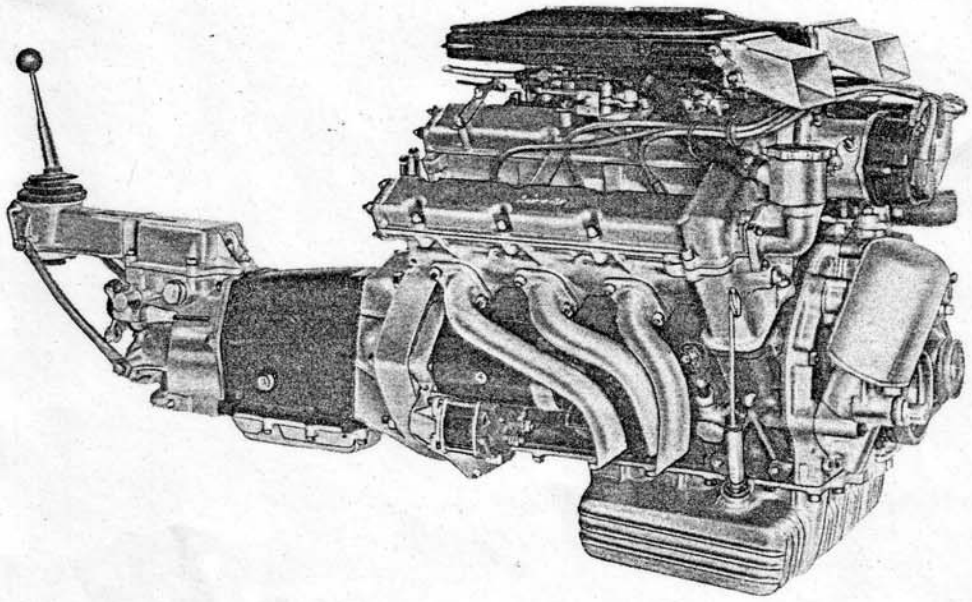


Fig. 7. - Right-side view of power plant unit.

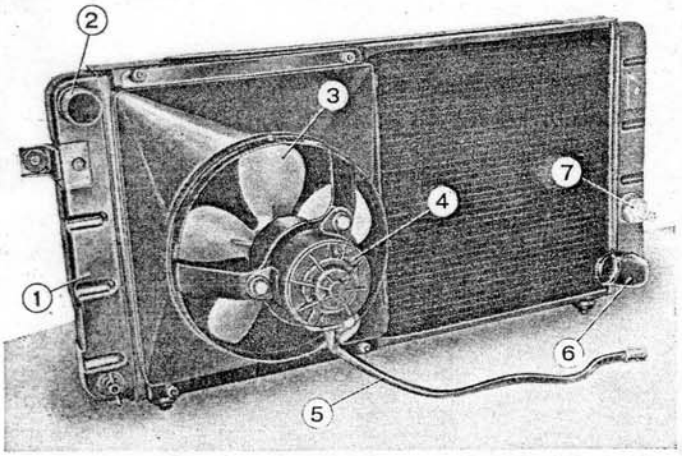


Fig. 8. - Radiator and electro-fan.

1. Radiator - 2. Radiator neck to expansion tank - 3. Fan - 4. Electro-fan motor - 5. Motor cable to thermal switch - 6. Radiator inlet neck - 7. Fan-clutch thermal switch.

IGNITION

Battery ignition, with distributor driven by a joint off the camshaft to which it is attached through a flange.

The distributor has two breakers set at 180°.

Firing order	1-4-2-5-3-6
Static advance	10°
Automatic advance	30° ± 2°
Breaker point gap	.0126" to .0150" (0.32 to 0.38 mm)

Spark plugs:

— Champion	N 60 Y
Gap	.020" to .024" (0.5 to 0.6 mm)

COOLING

The coolant mixture is circulated by means of a centrifugal pump situated at front of the cylinder block; the pump is V-belt driven from the crankshaft.

The two cylinder blocks are cooled independently to each other.

A thermostat in the engine outlet duct controls the coolant temperature.

Vertical row tube, single-core type radiator in front of engine.

Sheet metal coolant expansion tank.

Automatic fan-clutch actuated by an electro-magnet off a thermal switch in radiator, dipped in coolant.

Two temperature gauge sending units, one on each cylinder head, are wired with the gauge in instrument panel.

The temperature gauge always shows the more intense heat irrespective of the block from which it is emanated.

The two sending units have been designed: one to gradually move the temperature gauge pointer; the other to shift the pointer straight to the red end of the scale in case the coolant temperature reaches a dangerous level.

ENGINE MOUNTINGS

The power plant (engine-clutch-transmission unit) is supported on a pair of resilient pads being placed laterally to the crankcase, and on a cushioned cross member which is attached to the transmission extension.

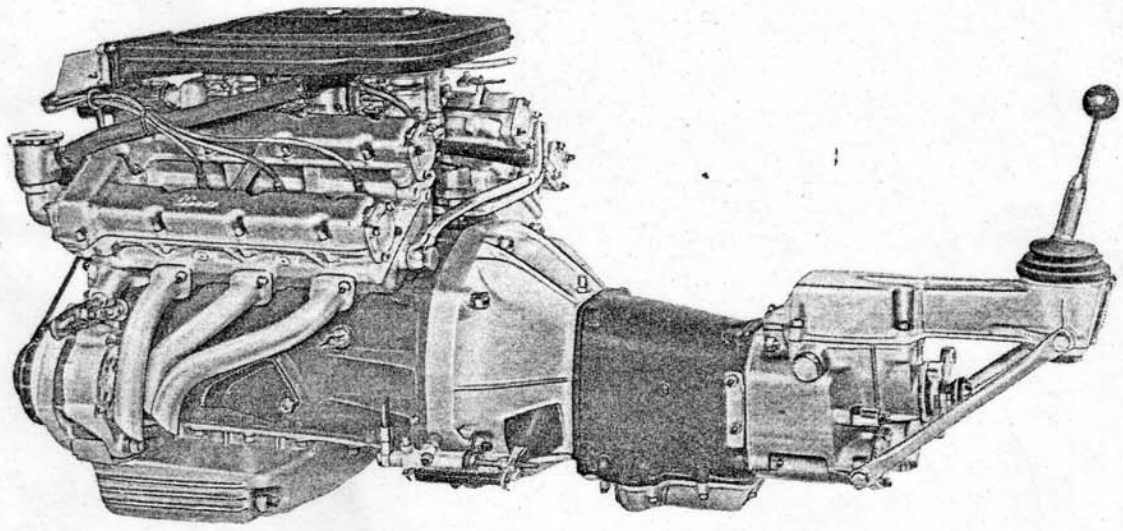


Fig. 9. - L. H. side view of power plant unit.

Chassis

CLUTCH

The clutch is of the single plate, dry type with spring-cushioned hub and diaphragm pressure spring.

The clutch control is hydraulic.

— Driven plate diameter . . . . . 8.464″ (215 mm)
— Pedal free travel . . . . . 1″ (25 mm)

TRANSMISSION

The transmission provides five forward gears (all synchromesh) and one reverse. Back-up light switch.

The helical teeth of five forward gears are constant meshed.

The gear synchronizers are of the spring-ring type.

The rear end of the countershaft drives a gear oil pump which has been designed to promote pressure lubrication of 1st, 2nd, 3rd and 5th gears of mainshaft.

Gear ratios are as follows:

— first	3.095-1
— second	1.825-1
— third	1.351-1
— fourth	1-1
— fifth	0.871-1
— reverse	2.889-1

PROPELLER SHAFT

The power drive to the rear axle is by a propeller shaft in two sections.

The front section is connected to the transmission by means of a flexible joint and to the rear section through a universal joint.

The front length of shaft has, at the rear end, a pillow with ball bearing attached to a body-fastened cross rail.

REAR AXLE

The rear axle is of the semi-floating type.
Axle housing of pressed steel sheet.
Cast differential carrier case.
Hypoid final drive gear ratio: 4.875 to 1 (8/39).
The differential is fitted with a **spin resistant device.**

FRAME

The frame is one unit with the body (integral construction).

FRONT SUSPENSION

Independent wheel front suspension, consisting of control arms, upper and lower, coil springs and hydraulic double-acting telescope shock absorbers.

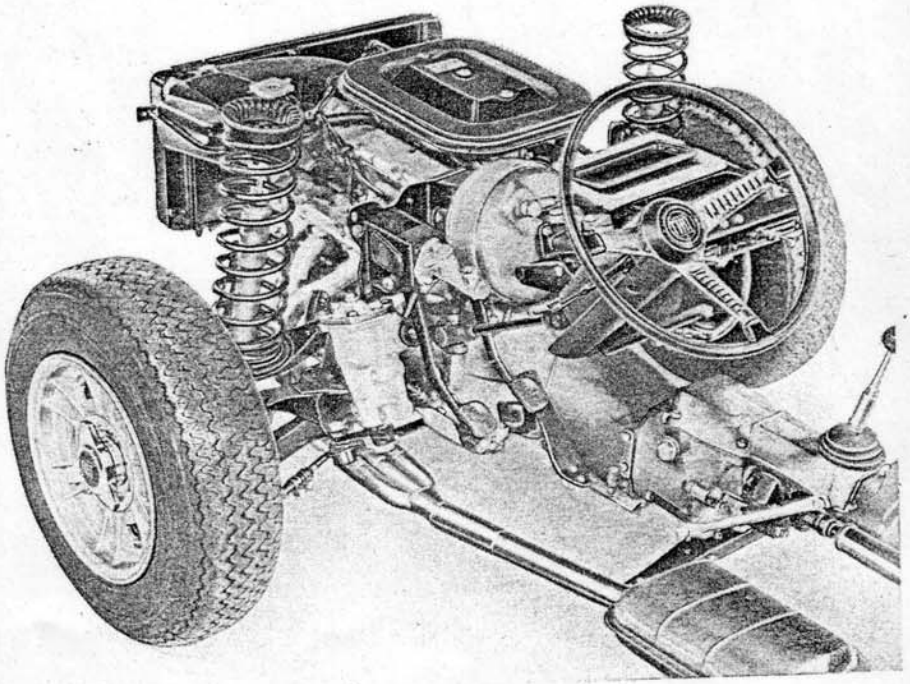


Fig. 10. - Detail of front running gear showing also heater, air-hydraulic brake booster and clutch master cylinder.

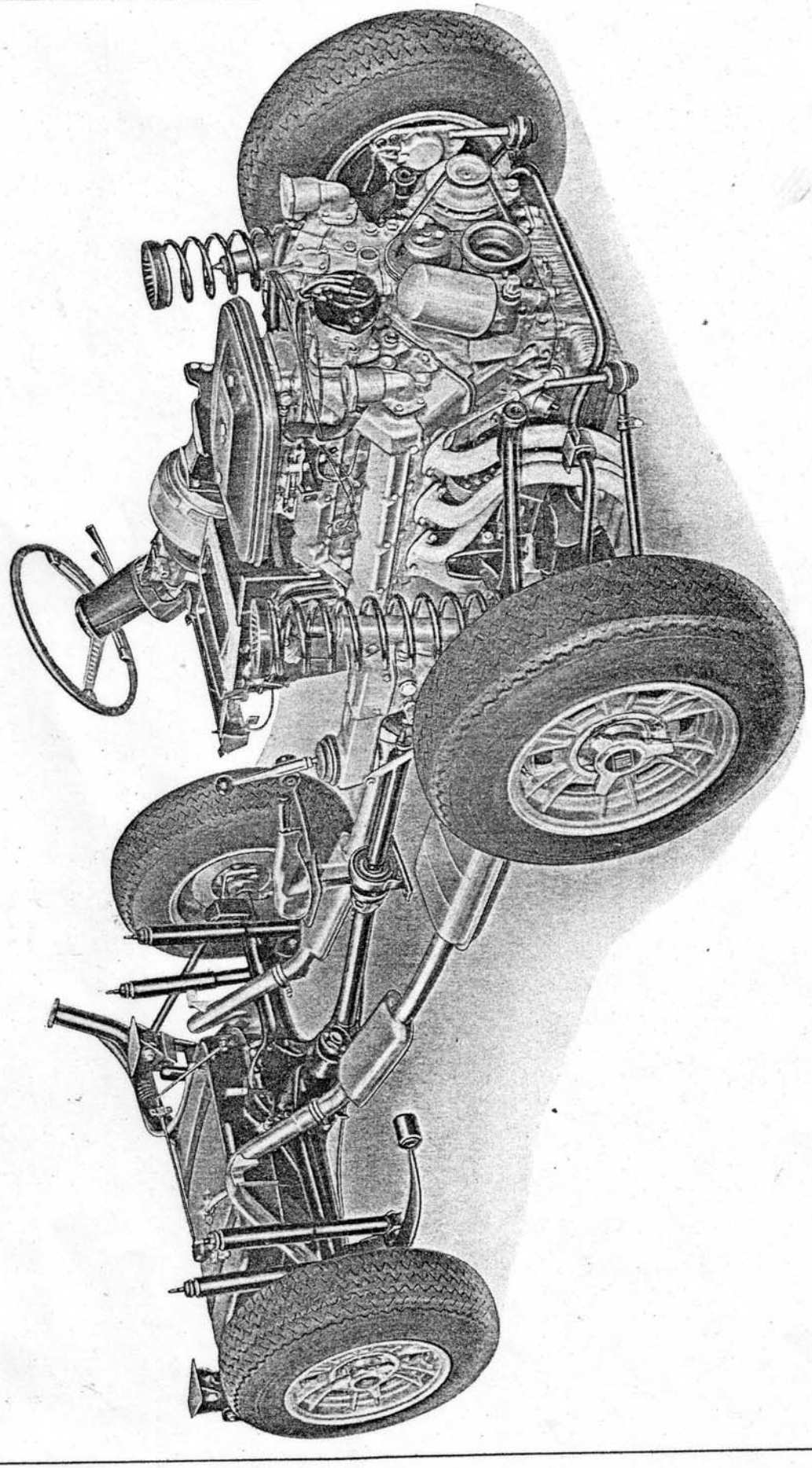


Fig. 11. - Complete running gear of car.

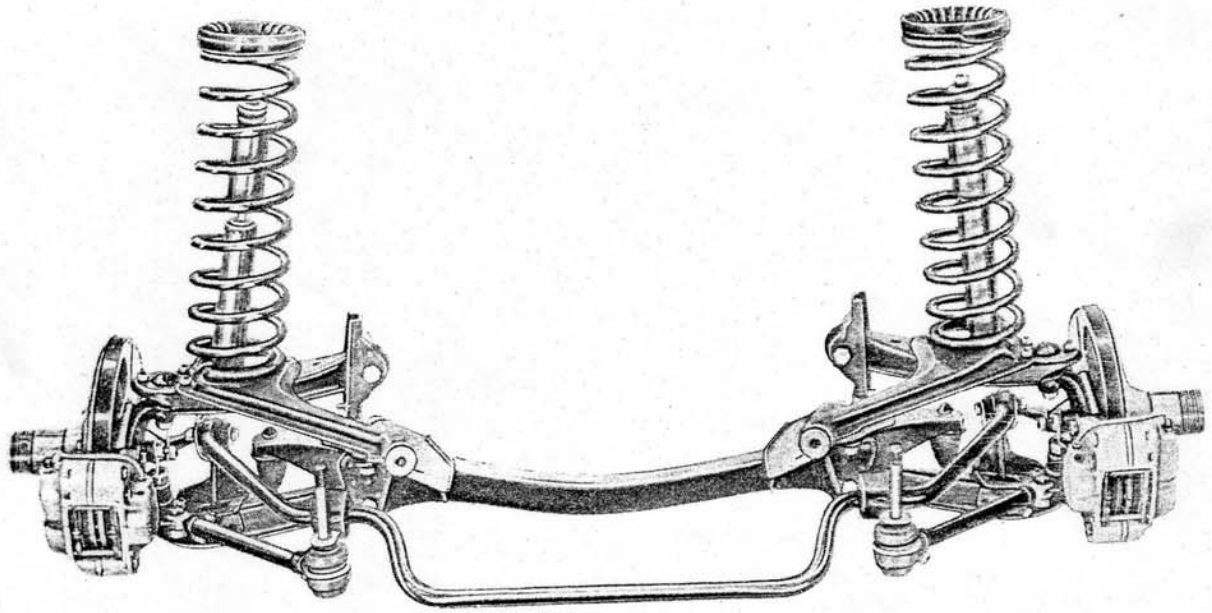


Fig. 12. - Front suspension and brake assembly.

A sway eliminator bar connects the lower control arms to the body.

Two adjustable reaction struts connect lower control arms to the body.

Control arm joints are of the « for life » type and need not be lubricated.

— Toe-in at wheel rims (*) .0787" to .1575" (2 to 4 mm)
— Camber (*)
  — angle . . . . . $1^{o}\ 30' \pm 20'$
  — at wheel rim . . . . . .315" to .492" (8 to 12.5 mm)
— Caster (*) . . . . . $3^{o} \pm 20'$
— Kingpin inclination . . . . . $7^{o}\ 30'$

(*) With vehicle at load (2 persons plus 44 lbs - 20 kg).

REAR SUSPENSION

The rear suspension features a solid axle anchored to the body by means of single-leaf semi-elliptic springs, and a pair of longitudinal reaction struts working on resilient bushings.

Semi-elliptic springs are carried in resilient bushings.

Two rubber buffers, fitted to the body, check excessive bouncing of suspension.

Four hydraulic double-acting shock absorbers are secured to brackets welded to axle housing ends and body floor.

STEERING

The steering gear is of the worm and roller type, with track rods symmetrical and independent to each wheel; an idler arm relays the steering movement.

A hydraulic damper is fitted on idler arm support.

— Gear ratio . . . . . 16.4 to 1
— Turning circle . . . . . 35 ft 1 in (10.7 m)
— Steering angles:
  — inner wheel . . . . . $33^{o} \pm 1^{o}\ 30'$
  — outer wheel . . . . . 26^{o}

BRAKES

The hydraulic service brakes, pedal controlled, are of the disc type on the four wheels with friction pads; the mechanical parking brake, manually controlled, operates on the disc of the rear brakes through individual friction pads.

There are two independent hydraulic circuits for the front and rear brakes, respectively, fed by a single master cylinder and two fluid reservoirs.

An air-hydraulic brake booster acting on four wheels relieves the driver's effort on pedal for brake application.

A pressure regulator on rear circuit controls the braking action according to the load and coast of the car.

Brake discs are operated, at each wheel, by three hydraulic cylinders, one inboard and two outboard, acting on friction pads.

Diameter of front brake discs . . 10.630" (270 mm)
Diameter of rear brake discs . . . 10.000" (254 mm)
Master cylinder bore . . . . . 7/8"

TRANSMISSION ASSEMBLY

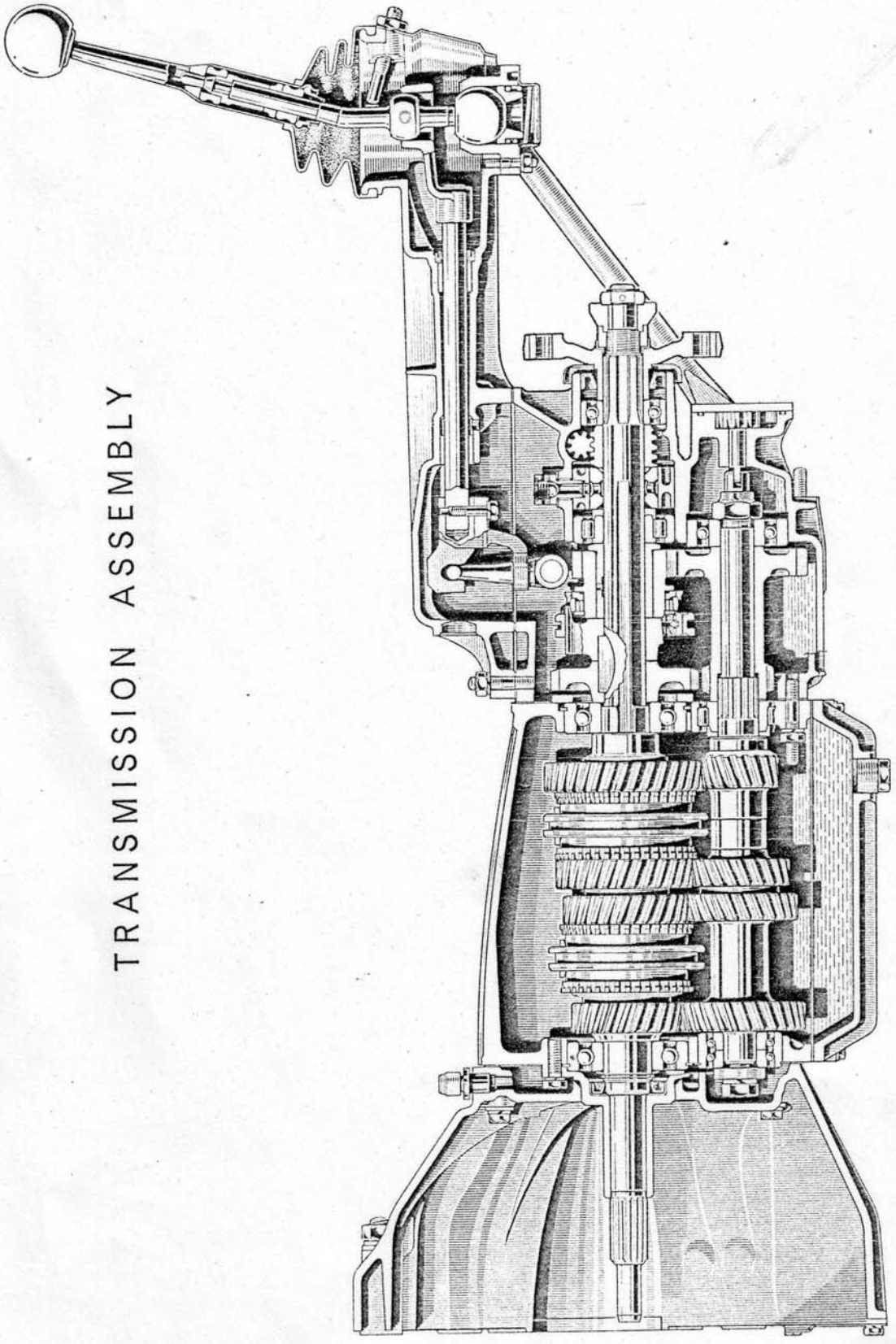


Fig. 13. - Side section view of transmission.

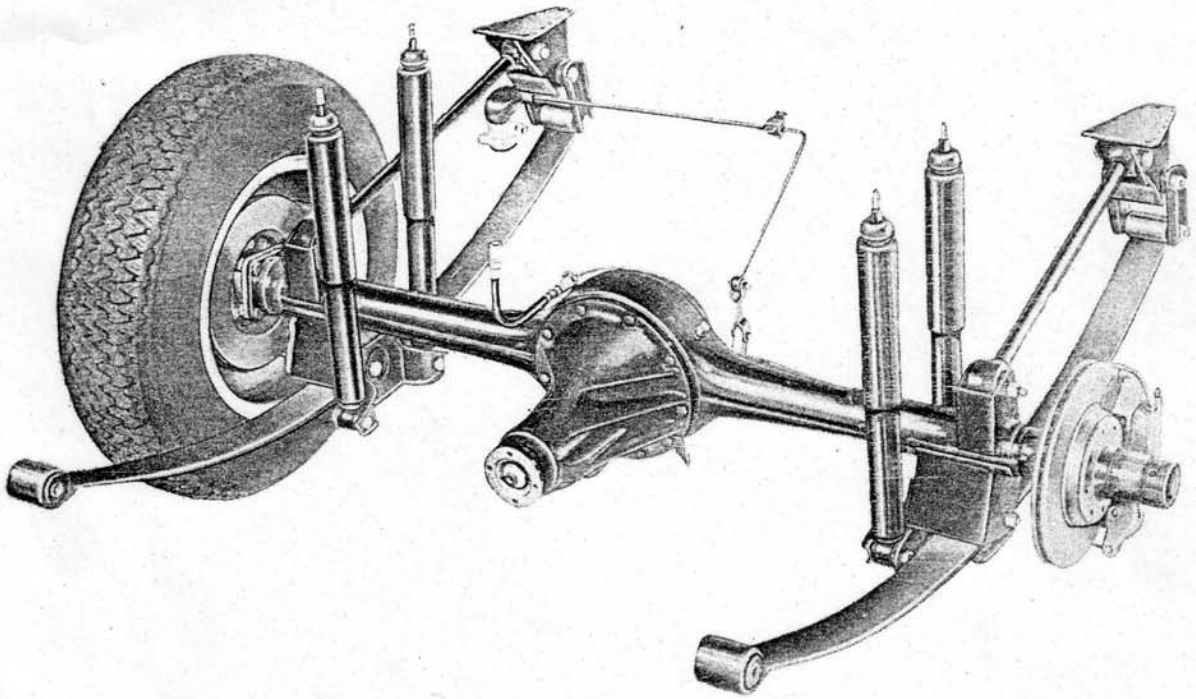


Fig. 14. - Rear suspension, axle and brake assembly.

Bore of front outboard caliper cylinders	$1\,^1/_2''$	(38.195 mm)
Bore of front inboard caliper cylinder	$2\,^1/_8''$	(54 mm)
Bore of rear outboard caliper cylinders	$1\,^3/_{16}''$	(30.251 mm)
Bore of rear inboard caliper cylinder	$1\,^{11}/_{16}''$	(42.874 mm)

WHEELS AND TIRES

Wheels	14 x $6\,^1/_2''$
Tires Michelin X AS with radial carcass	185 x 14"

Tire pressure:

— front	24.2 psi (1.7 kg/cm²)
— rear	25.6 psi (1.8 kg/cm²)

CAR HEATING AND VENTILATION SYSTEM

Fresh air circulation, heating in car interior and windshield defrosting are obtained by means of a system comprising: air scoops on cowl, a two-speed electro-fan in air distributor, a horizontal-row tube radiator in the cooling system, situated in car interior.

Two adjustable air diffusers in the instrument panel have been designed to defrost the windshield or to blow cool air up into the passenger compartment.

Two additional adjustable air diffusers in front side panels allow of boosting air circulation down in passenger compartment.

The air scoops for above diffusers are arranged with a trim grille at the front of car; two levers on opposite sides of the instrument panel control the air scoops.

SPARE PARTS

When ordering spare parts specify:

— Car Model (commercial name); FIAT DINO (COUPE)
— Chassis type and number; 135 AC 000 3601
— Engine type and number; 135 B 000 0005054
— Number for spares; 0003562
— Part No. of spare or spares (as given in the spare parts catalogue) against which order will be processed.

CAR KEYS

Each car is equipped with two keys in duplicate:
— one key for the ignition switch;
— another key for car doors, trunk compartment lid and glove compartment lid.

A code number is stamped on one face of key bow: just quote this number to obtain additional keys from FIAT Organization.

Electric System

Voltage of electric system: 12.

Battery, capacity 60 Amp/h (20 hours discharge rate).

Alternator FIAT A 12 M-124/12/47 with voltage regulator and charge indicator relay.

Maximum output 42 A (at rated speed and 13 V).

Starting motor FIAT E 100-1.5/12 Var. 4.

Ignition, battery with distributor and coil. The distributor, of the double breaker type, is keyed straight on to its driving camshaft.

Automatic advance by centrifugal weights.

Lighting system:

- High-beam headlamps (inner pair) of the iodine type.
- Asymmetrical low-beam headlamps (outer pair) also of the iodine type. When the high beams (inner headlamps) are on the low beams (outer headlamps), too, keep lit, through a relay switch.
- Two engine compartment lamps, with jam switch.
- Front parking and direction signal lamps.
- Side direction signal lamps.
- Rear tail and stop lamps with reflector lens.
- Rear direction signal and back-up lamps.
- Dual license plate lamp, on bumper.
- Luggage compartment lamp with jam switch.
- Glove compartment lamp with jam switch.
- Two courtesy lamps under the instrument panel, with an individual switch; the lamps are operated by opening doors.
- Instrument panel lamps.
- Cigar lighter spot lamp.
- Open door warning lamp, fitted to door contour, with control switch turning on the light automatically when the door is opened.

Headlamp selector switch under steering wheel. Flasher.

Direction signals: flasher type, controlled by lever under steering wheel. Automatic cancellation.

Horns: high note for town use and air-electric horns for country use with selector switch in instrument panel; horn control on wheel.

Windshield wiper, double arm, with automatic parking and speed control rheostat.

Fuel gauge tank unit with indication of reserve supply: incorporates the fuel suction pipe and filter.

Electric ventilation and heating fan, two speeds, with three-position switch.

Socket for inspection lamp.

Spark plugs (see page 10).

Thermal switch (on radiator) for control of cooling fan.

Temperature gauge sending unit (resistor and silicon diode for thermometer), fitted to left-hand cylinder head, between camshafts.

Heat indicator thermal switch, fitted to right-hand cylinder head, between camshafts.

Oil gauge sending unit, fitted between cylinder heads.

Low oil pressure indicator switch, fitted to crankcase at oil dip stick.

Fuel pump cut-off switch operating in case of oil pressure drop: is fitted to crankcase at oil dip stick.

Sending unit for sump oil temperature indication, fitted to oil sump.

Fuse box fitted below instrument panel, R.H. side.

Anti-theft switch with key, for ignition, starting and appliances, fitted to R.H. side of steering column support.

Screen washer of the spray type, operated by pedal pump, which also switches on screen wiper.

Panel instruments including: windshield wiper switch, wiper arm speed adjuster knob, panel light switch, horn selector switch, outer light master switch, dual-control rheostat for dimming panel light and parking light indicator, speedometer, trip and total odometer incorporating: high beam indicator (blue), direction signal light indicator (green), parking light indicator (green).

Oil gauge with low pressure indicator; sump oil temperature gauge; water temperature gauge; fuel gauge with reserve supply indicator (red); electronic revolution counter incorporating: no-charge indicator (red), manual brake « on » indicator (red); easy starting device « on » indicator (yellow). Cigar lighter.

An electric clock is fitted to the utility box situated between the instrument panel and floor tunnel.

Body

Monocoque **roadster** type with two front and one rear seats, two doors and two side windows.

Front-hinged **hood**, locked from inside car through a lever.

Windshield in curved safety glass of the laminated type.

Doors hinged at front, with two windows, the front to swing and the rear controlled by a regulator handle. Arm rests with grab attached to door trim panel.

Canvas top, metal framed, folding down into a waterproof fabric case. Transparent plastic rear window zipped over to the top.

Luggage compartment at rear with front-hinged lid and plunger locked by key.

Spare wheel housed in luggage compartment below loading floor.

Bumpers front and rear in chromium plated steel.

Registration plates: front, fitted centrally to the bumper; rear, on body liner.

Front **air scoops** with grille for ventilation of passenger compartment below instrument panel. Air scoops on cowl for car heater.

Map pouch on driver's side. Utility pockets on both rear sides.

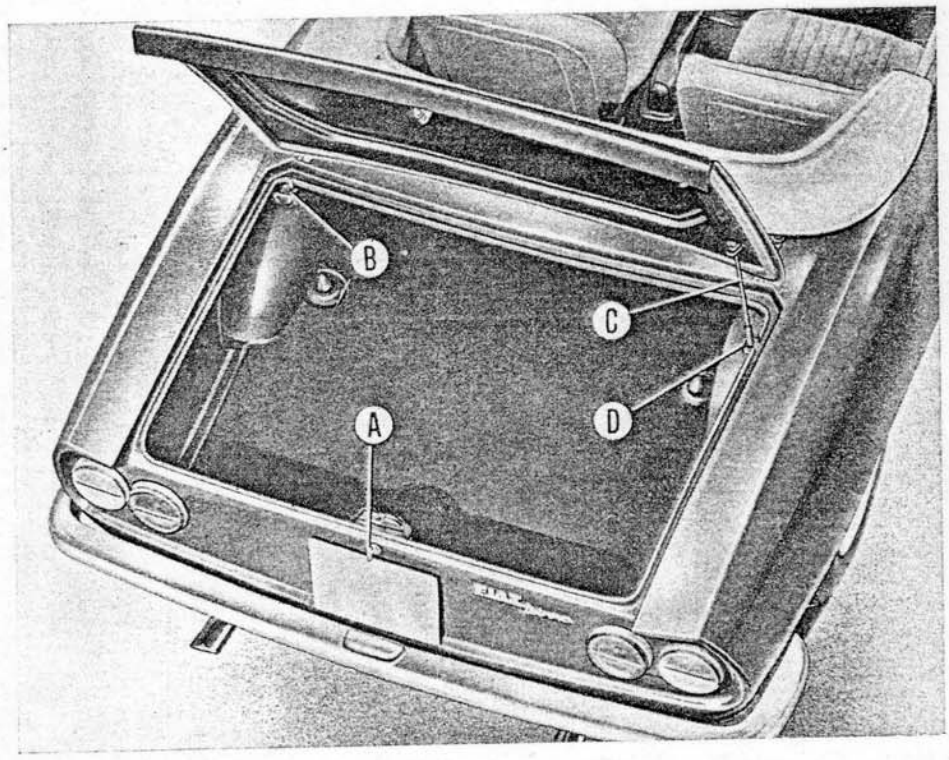


Fig. 15. - View of luggage compartment.

A. Lid lock - B. Luggage compartment light - C. Lid prop - D. Lid prop seat.

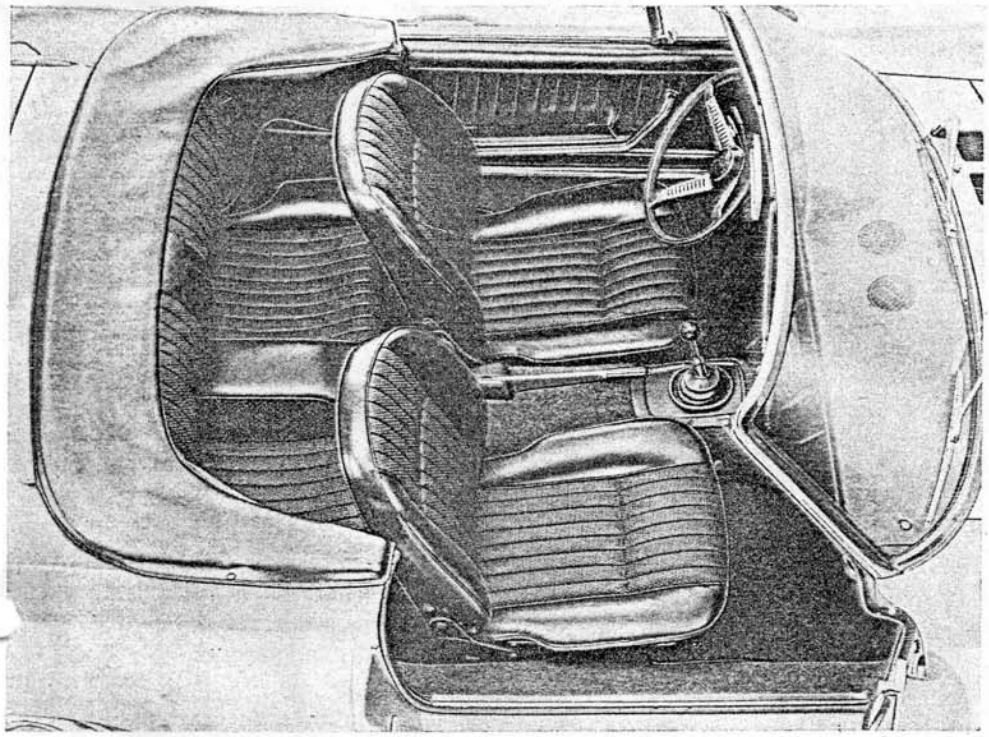


Fig. 16. - Detail of seats and car interior.

Bucket **front seats**, sliding adjustment: adjustable back, folding forward.

Bench type rear seat, non-adjustable.

Glove compartment on instrument panel, passenger's side.

At center, **utility box** with electric clock, ash receiver and space for optional radio set.

Instrument panel in shock-resistant plastic material.

Rubber and moquette **mats** on car floor, rubber mat on luggage compartment.

Air conditioner fitted centrally, below instrument panel.

Sun visors padded and adjustable; vanity mirror in passenger's side sun visor.

Rear view mirrors: inner with non-glare device, and outer with fixed shell and mirror adjustable by thumb-pressure on sides.

Tool kit in luggage compartment.

Provision for installation of safety belts (lap type).

Extra: electric window regulators, hard top, radio receiver.

Fig. 17. - Car viewed from L. H. front side.

SERVICE PROCEDURES AND ASSEMBLY DATA

Engine

REMOVE AND INSTALL

If the engine must be gone over for repair, it is good practice to take down the engine and transmission assembly.

Proceed as follows:

- place the car on a pit or on stands;
- remove the hood;
- drain the cooling system thoroughly; coolant cocks are situated on sides of crankcase and on radiator bottom;
- disconnect the battery cable from plus terminal;
- remove the air cleaner;
- disconnect the accelerator control cable and the bracket on dash;
- disconnect the primary cable and H.T. cable at coil;
- disconnect temperature gauge and oil gauge sending unit cables;
- slide off the inlet hose from carburetors;
- detach inlet and outlet hoses of radiator and expansion tank from engine;
- detach inlet and outlet hoses from heater radiator;
- disconnect cables from the switch on radiator;
- disconnect brake booster vacuum intake tube at carburetor;
- remove the expansion tank;
- disconnect the radiator fan-clutch cable junction;
- remove the radiator (fig. 18);
- disconnect cables from sending units on R.H. side of crankcase;
- remove the exhaust manifolds using wrench **A.50125**; it is good practice to mark the position of manifolds for subsequent installation in the same order;
- working from car interior slide off the transmission control lever; to do so, remove the lever boot and plastic retainer;

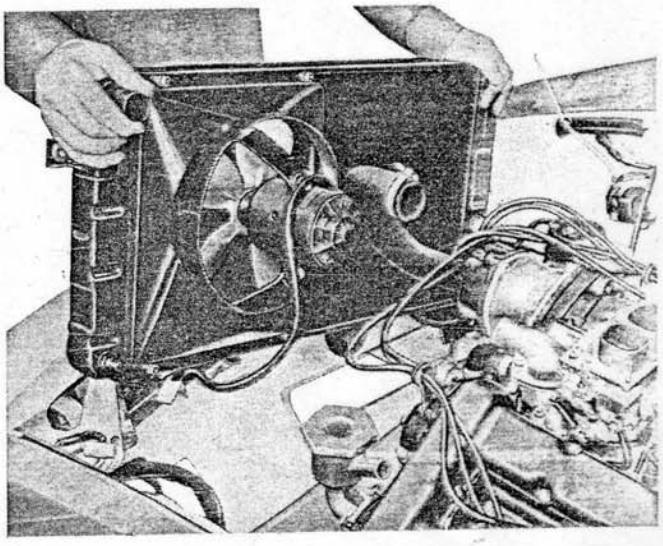


Fig. 18. - Lifting out radiator from engine compartment.

- fit band **A.70153** to the flexible joint (fig. 19) and disconnect the prop shaft from transmission;

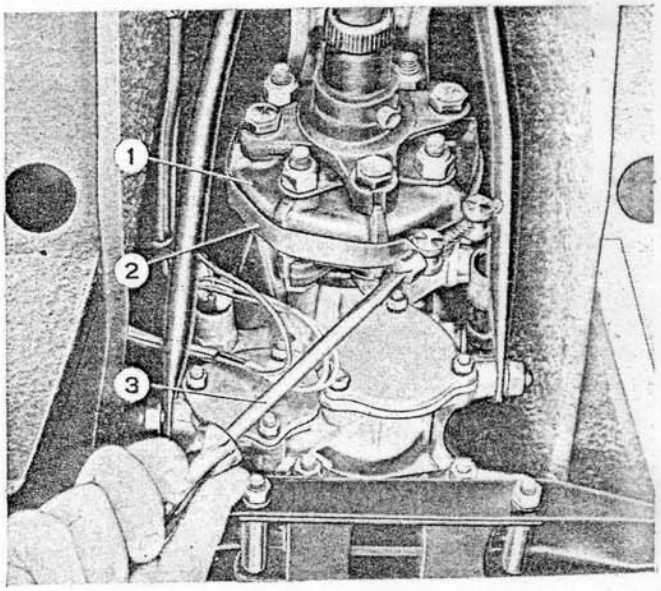


Fig. 19. - Fitting flexible joint band.
1. Flexible joint - 2. Band A. 70153 - 3. Screwdriver, locking band.

135B.000 ENGINE ASSEMBLY

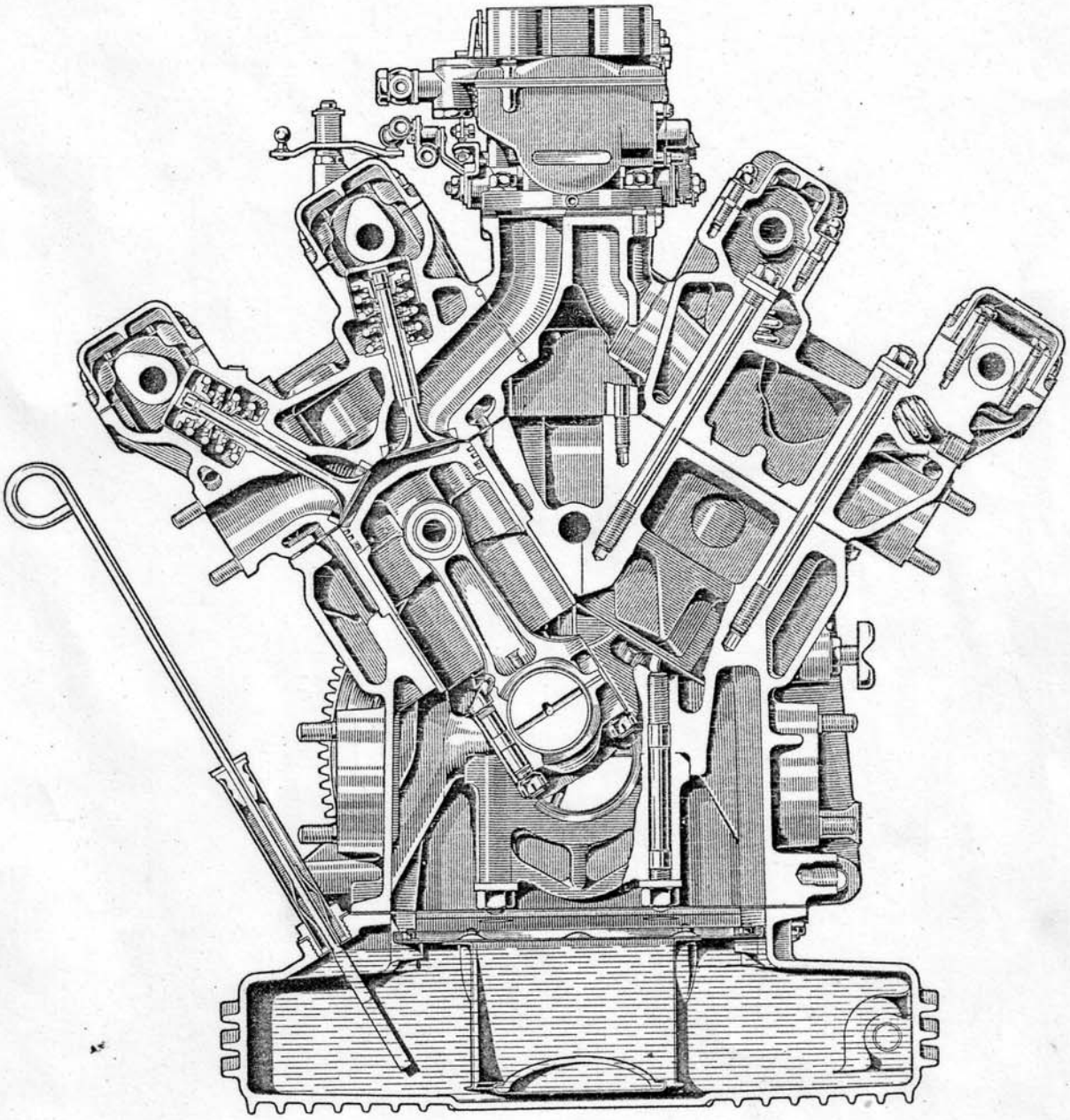


Fig. 20. - End section of engine through cylinders.

— remove the clutch master cylinder;
— remove the transmission cross member and disconnect the speedo cable at transmission;
— disconnect the engine ground cable and back-up light switch wires;
— finally remove front sway bar center bearings;
— support the engine using tool **A.60544** on a chain hoist; remove the engine side mounting nuts and lift out the engine-transmission assembly.

For engine installation just reverse the removal procedure.

VALVE TIMING

Timing system: overhead valves operated by four camshafts in head.

Camshafts are driven by two double chains off the crankshaft, via an idler gear train.

Effective tappet clearance, with **engine cold:**

— intake . . . . . .006" to .008" (0.15 to 0.20 mm)
— exhaust . . . . . .016" to .018" (0.40 to 0.45 mm)

Tappet clearance, to check timing:

— intake and exhaust . . . . . .020" (0.50 mm)

Intake	opens B.T.D.C.	40°
	closes A.B.D.C.	52°
Exhaust	opens B.B.D.C.	53°
	closes A.T.D.C.	31°

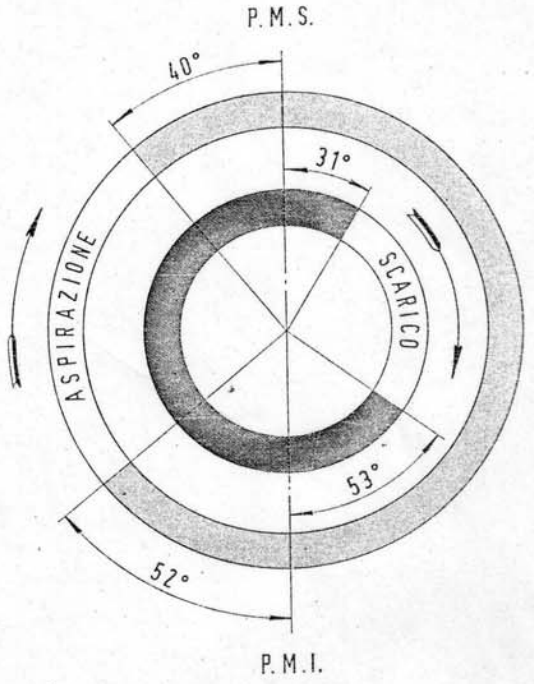


Fig. 21. - Valve timing diagram for an increased tappet clearance of .020" (0.5 mm).
P.M.S. = T.D.C. — P.M.I. = B.D.C.
ASPIRAZIONE = INTAKE — SCARICO = EXHAUST

Correct tappet clearance is specified to be as follows:

— intake . . . . . .006" to .008" (0.15 to 0.20 mm)
— exhaust . . . . . .016" to .018" (0.40 to 0.45 mm)

Adjustment of tappet clearance can be obtained by varying the thickness of cap plates between valve stems and tappets.

Checking Tappet Clearance and Valve Timing.

To check valve tappet clearance proceed as follows.

Disconnect H.T. cables at spark plugs.

Loosen the nuts fixing front and rear camshaft covers.

Disconnect the accelerator cable and remove the relay lever at timing cover.

Remove the camshaft covers.

Rotate the crankshaft until the valves of cylinder N° 4 are just off their seats, that is the induction stroke is about to begin in this cylinder.

Check the tappet clearance at cylinder N° 3 both valves of which are closed as it is at the end of the compression stroke (fig. 22).

Next to the cylinder N° 3, check the clearance between cams and valves at remaining cylinders, recalling that: with the valves of cylinder N° 5 just off their seats the check must be made at cylinder N° 1, with the valves of cylinder N° 6 in that position the check must be made at cylinder N° 2, and vice versa.

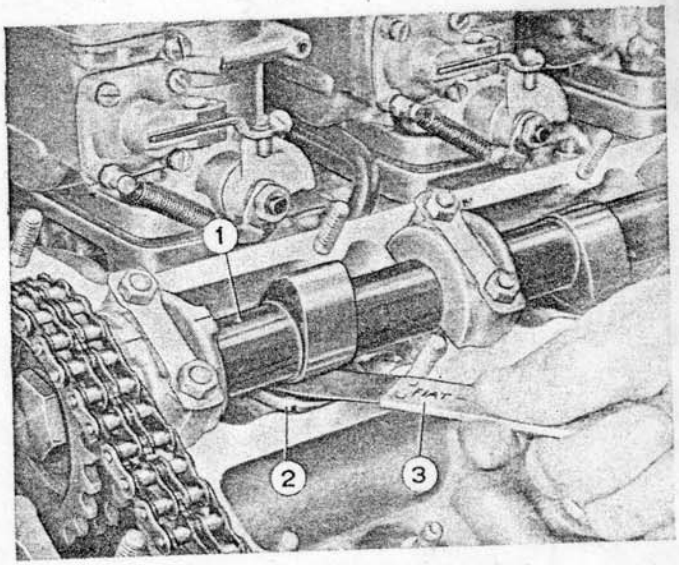


Fig. 22. - Checking tappet clearance.
1. Camshaft - 2. Tappet - 3. Feeler gauge.

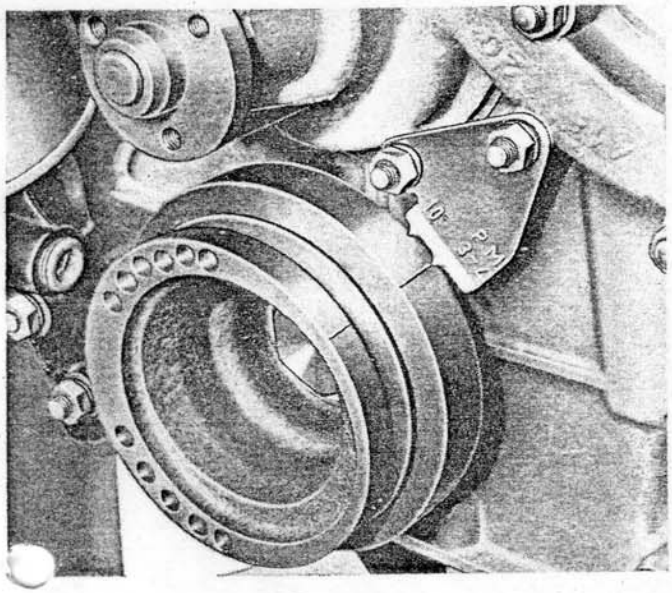


Fig. 23. - Positioning the crankshaft pulley for valve timing check.
PM 3-4 = T.D.C. of cylinders 3 and 4.

Check valve timing as follows.

Position the crankshaft pulley with the reference mark in line with the pointer 3-4 embossed on the tag in the crankcase (fig. 23).

Without disturbing the above adjustment, check that the marks stamped on camshafts, front bearing caps and gears, are indexed.

Compliance with such condition will ensure that valve timing is correct.

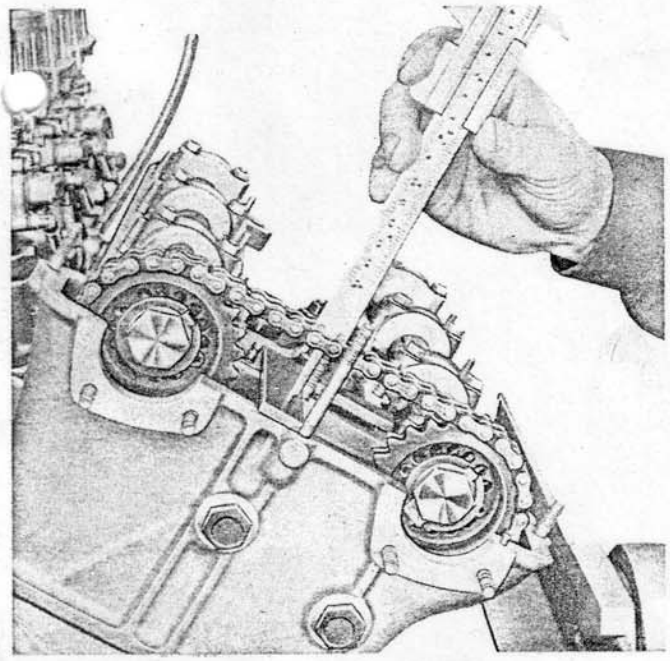


Fig. 24. - Checking the distance of the timing chain from the base of graduated square.

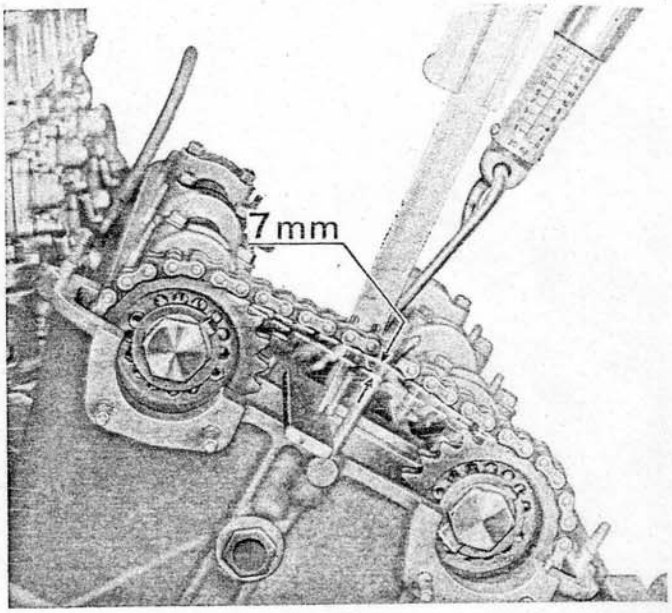


Fig. 25. - Using spring balance to check deflection of timing chain. 7 mm = 9/32".

Adjusting Tension of Timing Chains.

In case of noises at the timing gear, check the timing chains for a slack condition as follows.

Remove camshaft covers.

Position the reference mark on crankshaft pulley in line with the pointer 3-4 embossed on the tag in crankcase.

In this condition, deflection check should be made at the slackest point of chains.

Using an accurate gauge, measure the distance of the chain from the base of a graduated square (fig. 24).

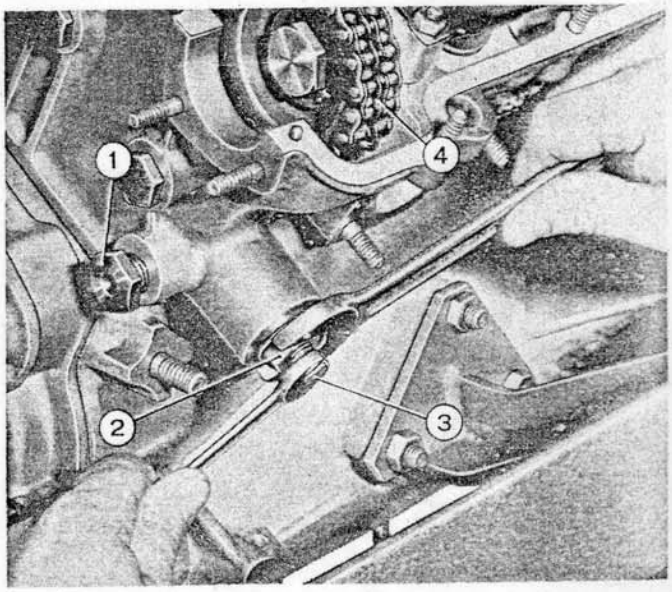


Fig. 26. - Adjusting timing chains.
1. Stretcher screw - 2. Stretcher spindle lock nut - 3. Stretcher spindle - 4. Timing chain.

Affix spring balance **A. 95698** to the chain at the gauge and pull the balance with a load of 44 lbs (20 kg); the chain **should undergo a deflection of 9/32" (7 mm),** measured with the gauge (fig. 25).

Adjust tension of chains as outlined hereafter:

— loosen the stretcher screw (1, fig. 26);
— loosen the stretcher spindle nut (2);
— working on the spindle (3), spread the chain correctly;
— lock the spindle in position with the nut (2).

Next, tighten the screw (1) well home to secure the stretcher.

Repeat above steps at the other cylinder head.

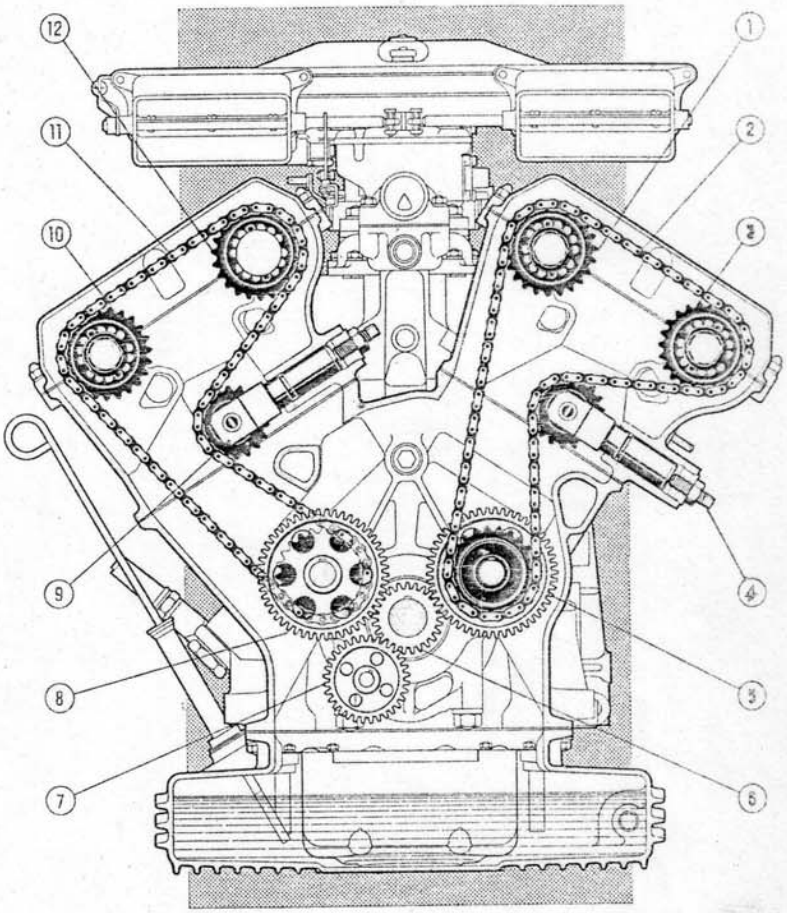


Fig. 27. - Diagram of timing gear.

1. Camshaft sprocket driving intake valves of cylinders 4, 5 and 6 - 2. Timing chain driving sprockets 1 and 3 - 3. Camshaft sprocket driving exhaust valves of cylinders 4, 5 and 6 - 4. Chain stretcher - 5. Dual sprocket, idler, chain drive - 6. Straight toothed gear, keyed to crankshaft, driving sprockets 5, 7 and 8 - 7. Oil pump drive gear - 8. Dual sprocket, idler, driving chain 11 - 9. Chain stretcher - 10. Camshaft sprocket driving exhaust valves of cylinders 1, 2 and 3 - 11. Timing chain driving sprockets 10 and 12 - 12. Camshaft sprocket driving intake valves of cylinders 1, 2 and 3.

Fuel System

WEBER CARBURETORS

TYPE 40 DCN 14

Weber **40 DCN 14** carburetors, downdraft, consist of two separate barrels, bore 1.575" (40 mm), while throttle valves are controlled by a single spindle connected to the accelerator cable.

These carburetors are fitted with:

— accelerator pump;
— « fast idling » device, consisting of a special adjustable lever, hand controlled, which allows of opening carburetor throttles partially.

Description and Operation.

NORMAL RUNNING (fig. 29)

The fuel, through needle valve (12), flows to bowl (8) where float (9), articulated on pivot pin (10), controls the opening of needle (11) for a steady level of fuel in bowl.

From bowl (8), via main jets (7), fuel reaches wells (6); mixed with air from the orifices of emulsion tubes (5) off air corrector jets (1), fuel from spray tubes (2) reaches the carburetion cone consisting of auxiliary Venturis (3) and primary Venturis (4).

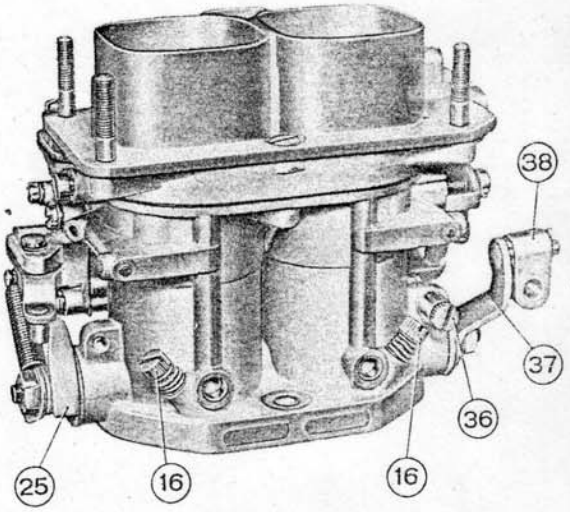


Fig. 28. - Weber 40 DCN 14 carburetor, viewed from volume control screws side.

16. Idle volume control screws - 25. Accelerator pump lobe - 36. Throttle stop screw - 37. Throttles control lever - 38. Lever control rod clamp.

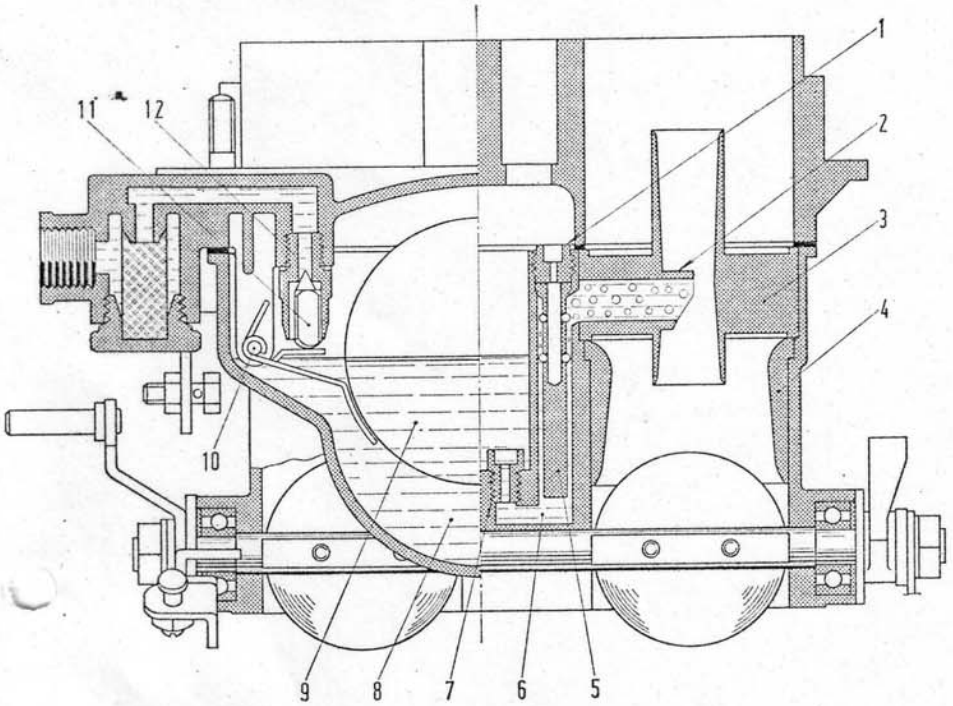


Fig. 29. - Operation diagram of Weber 40 DCN 14 carburetor in normal running.

1. Main air jet - 2. Spray tube - 3. Auxiliary Venturi - 4. Primary Venturi - 5. Emulsion tube - 6. Well - 7. Main jet - 8. Fuel bowl - 9. Float - 10. Float pivot - 11. Needle - 12. Needle valve.

IDLING AND TRANSFER (figs. 30 and 31)

Fuel streams from wells (6) to idle jets (19), through passages (18).

Then it is emulsified by the air from calibrated bushings (20) and conveyed past passages (17) and idle orifices (15), adjustable by screws (16), to carburetor throats downstream of throttles (14).

When throttles (14) are opened gradually from the idle speed, the fuel mixture also reaches carburetor throats through idle transfer orifices (13), thus ensuring a regular increase in angular speed of engine.

POWER RUNNING (fig. 32)

When throttles (14) are closed, lever (26) releases the diaphragm (28) which, under the action of spring (24), draws fuel from bowl (8) past ball valve (30). When the throttles are opened, the lobe (25) and the lever (26) operate the diaphragm (28) which injects fuel into carburetor throats via passage (23), delivery valve (22) and the spray tubes of pump jet (21).

The spring (27) is designed to cushion a sudden opening of throttle valves and extend fuel delivery. Excess fuel supplied by the accelerator pump is discharged into the bowl (8), along with vapours in pump chamber, through the calibrated orifice (29).

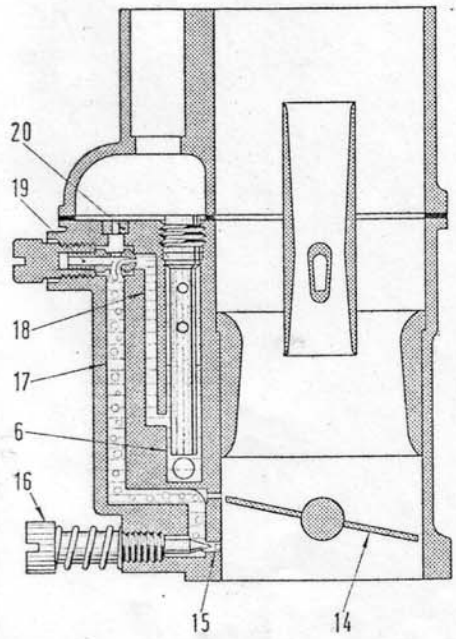
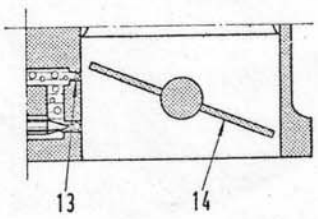


Fig. 30. - Operation diagram of Weber 40 DCN 14 carburetor in idle and transfer running.

6. Well - 13. Idle transfer orifice - 14. Throttle valve - 15. Idle feed orifice - 16. Volume control screw - 17. Idle mixture passage - 18. Idle feed passage - 19. Idle jet - 20. Idle air calibrated bushing.

Fig. 31. - Detail of throttle valve and idle transfer orifice.



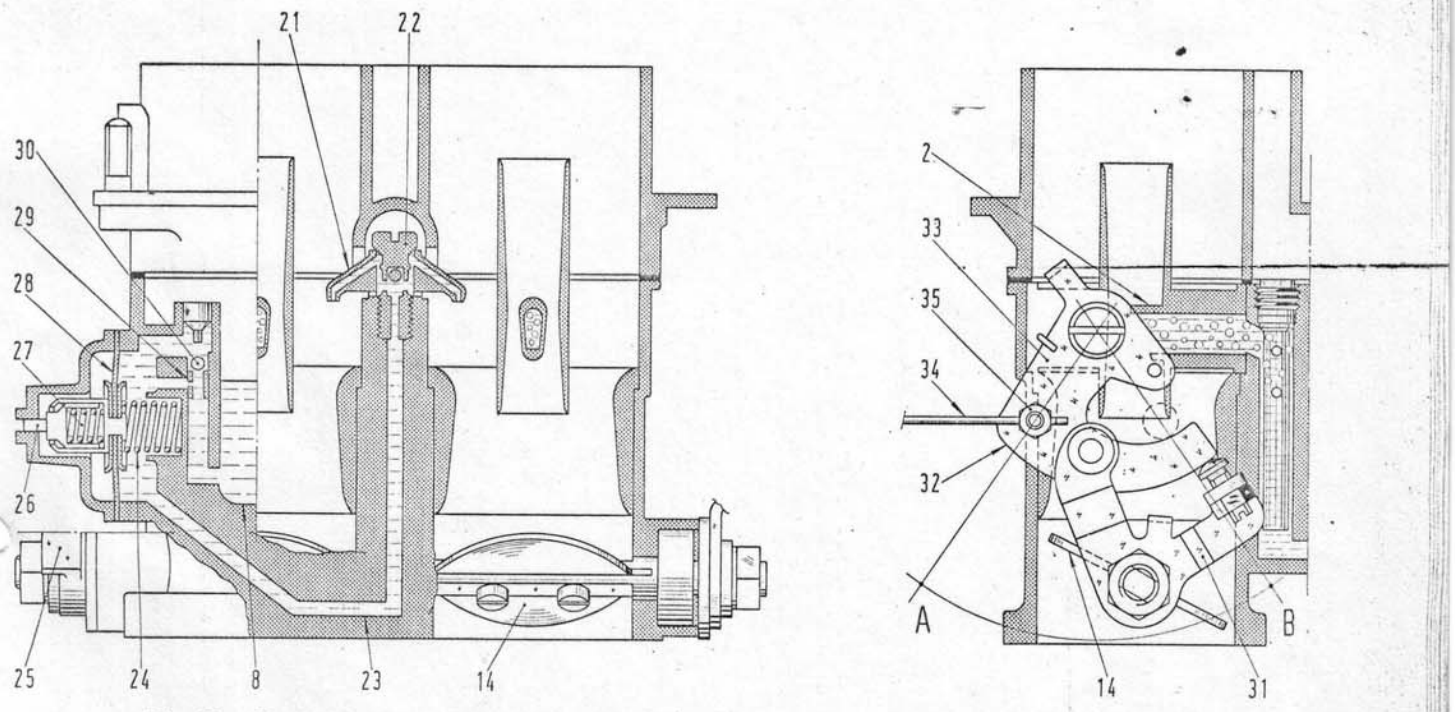


Fig. 32. - Operation diagram of Weber 40 DCN 14 carburetor in power running and easy starting.

2. Spray tube - 8. Fuel bowl - 14. Throttle valve - 21. Accelerator pump jets - 22. Delivery valve - 23. Delivery valve passage - 24. Accelerator pump diaphragm control spring - 25. Pump actuating lobe - 26. Pump control lever - 27. Pump diaphragm reaction spring - 28. Pump diaphragm - 29. Calibrated orifice - 30. Ball valve - 31. Choke throttle valve actuating lever - 32-33. Choke control lobe and lever - 34. Cable, actuating lever 33 - 35. Cable clamp - A. Easy-starting device engaged - B. Easy-starting device disengaged.

EASY STARTING DEVICE (fig. 32)

With the lever (33) set at « A » by lobe (32) and lever (31), throttles (14) are partly opened.

The cable (34) held by clamp (35), controls, besides the lobe (32), the choking throttles at air cleaner intakes (fig. 4) in closed position.

As a result, the spray tubes (2) give a rich mixture for easy starting.

As the engine is warming up, the choke should be gradually released.

When normal running temperature has been reached, the choke must be released completely (lever 33 at « B »).

In case adjustment of easy starting device is required, proceed as follows:

— take down carburetors;

— set the lobe (32, fig. 33) as shown in figure;

— work on screw (46) and bring it in touch of lobe (32), then secure the screw by the nut (45);

— without releasing the lobe, insert feeler gauge (44) between the carburetor body and the throttle: a clearance of .0039″ (0.10 mm) should be found. Otherwise, the screw (46) must be adjusted.

NOTE - For cold starting of engine, provision has been made of two choking throttles at air cleaner intakes.

By tapering down air delivery to carburetors to a remarkable extent, these throttles allow of supplying the engine with a richer mixture, so that easy starting of the engine is obtained.

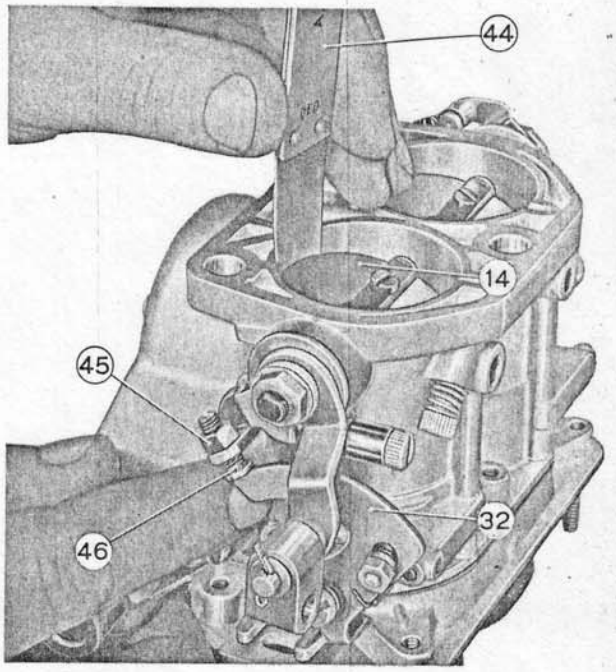


Fig. 33. - Adjusting « fast idle » device.

14. Throttle valve - 32 Lobe - 44. Feeler gauge - 45. Lobe travel adjusting screw nut - 46. Throttle valve actuating lever adjusting screw.

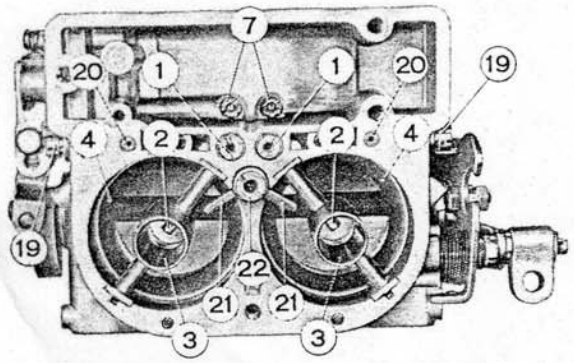


Fig. 34. - Weber 40 DCN 14 carburetor without cover.

1. Main air jets - 2. Spray tubes - 3. Auxiliary Venturis - 4. Primary Venturis - 7. Main jets - 19. Idle jets - 20. Idle air calibrated bushings - 21. Pump jets - 22. Delivery valve.

Rules for Use of Easy Starting Device.

To obtain the best results from the progressive easy starting device, the following rules should be observed.

STARTING

— Starting a cold engine: pull the control knob of the easy starting device right out; after starting, push the knob part way in.

— Starting a lukewarm engine: pull the control knob of the device part way out.

WARMING UP

While the engine is warming up, even if the vehicle is in motion, the easy starting device must be gradually released, thus ensuring that the mixture supplied to the cylinders is never in excess of engine's actual requirements.

NORMAL RUNNING

As soon as the engine has reached normal running temperature, the easy starting device must be fully released.

Setting Float Level.

Check the float for a correct level as follows:

— take down the air cleaner and the carburetor cover;

— rest square **A. 95130** to the inner face of carburetor cover (see fig. 35);

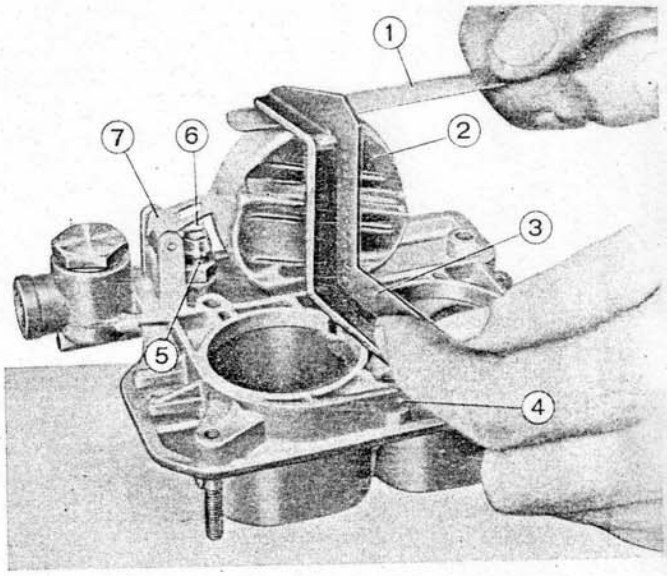


Fig. 35. - Checking float level.

1. Feeler gauge - 2. Float - 3. Square A.95130 - 4. Carburetor cover - 5. Needle valve - 6. Needle valve lug - 7. Float travel adjusting lug.

SETTING DATA OF CARBURETORS

SPECIFICATION	Primary and Secondary Barrel	
	in	mm
Venturi diam	1.260	32
Main jet diam.	.051	1.30
Main air jet diam.	.071	1.80
Idle jet diam.	.022	0.55
Pump jet diam.	.016	0.40
Seat of « cushioned » needle	.069	1.75
Pump delivery valve	.039	1.00
Float level	1.870 ± .020 (*)	47.5 ± 0.5 (*)
Easy starting device	throttle valve	

(*) For setting, see covering paragraph.

— check for a clearance of .020″ (0.5 mm) between the square and the upper edge of float; the measurement must be taken without cover gasket.

The distance between the cover face and the upper edge of float should be 1.870″ ± 0.20″ (47.5 ± 0.5 mm).

Then check the float (2) for a travel of .345″ (9 mm) and reposition the end of lug (7), if necessary.

Should the level of float be incorrect, bend the float lug (7) as required, using care that lug (6) is at right angle to the needle valve (5).

At last check that the float can turn freely on its pivot pin.

Tuning Throttle Valves and Idle Adjustment.

For correct adjustment of idle in three carburetors and synchronous operation of their throttle valves, proceed as follows.

Run the engine to normal operating temperature.

Remove the air cleaner and disconnect the rod (41, fig. 37) from relay lever at bracket (42).

Loosen throttle stop screws (36, fig. 37) of carburetors 1 and 2. Take the thermostat end carburetor as N° 1.

Working on throttle stop screw (36, fig. 37) of carburetor N° 3 with the engine running, set the idle speed 850 to 900 rpm.

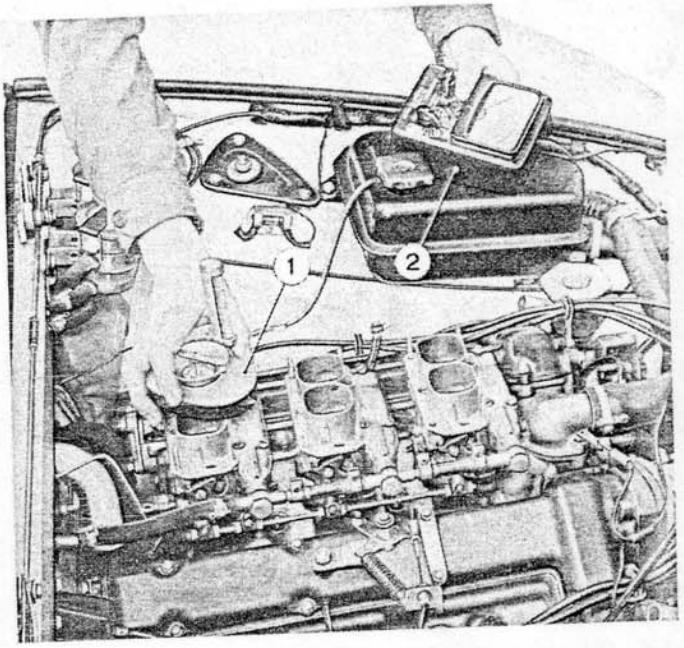


Fig. 36. - Tuning carburetor throttles for idling adjustment. 1. Device A.95718 for tuning carburetor throttles - 2. Electric revolution counter Ap. 5059.

Idle speed can be checked by connecting revolution counter **Ap. 5059** to the coil and ground on engine (fig. 36).

Place device **A. 95718** on either air intake in carburetor No. 3 (fig. 36).

Turn the adjuster nut (1, fig. 38) of device in or out until the float (4) comes to buoy at the center mark in the glass tube.

Shift device **A. 95718** to an air intake of remaining carburetors and make sure the float buoys in the same

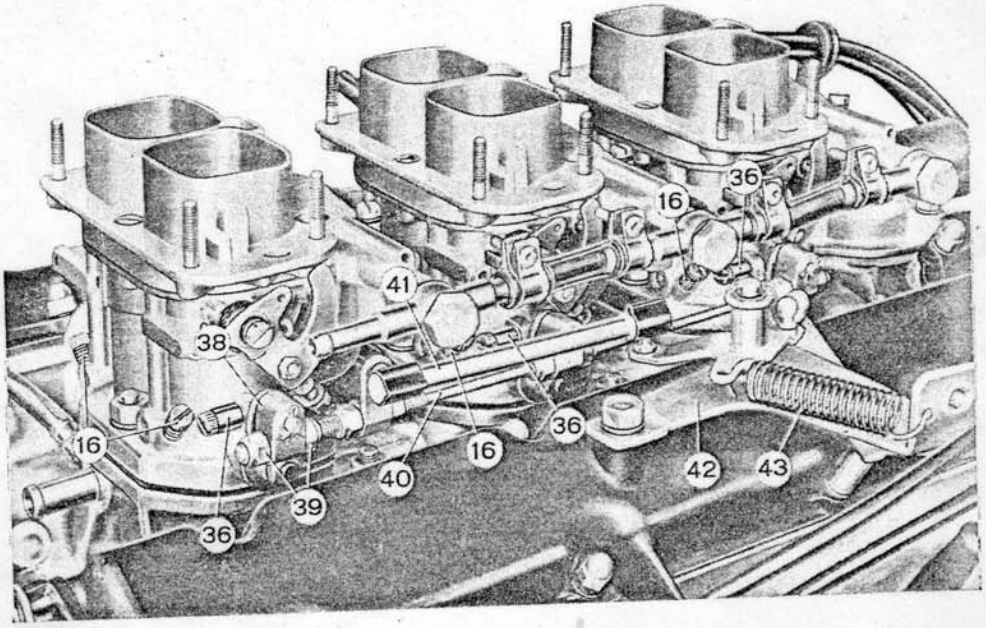
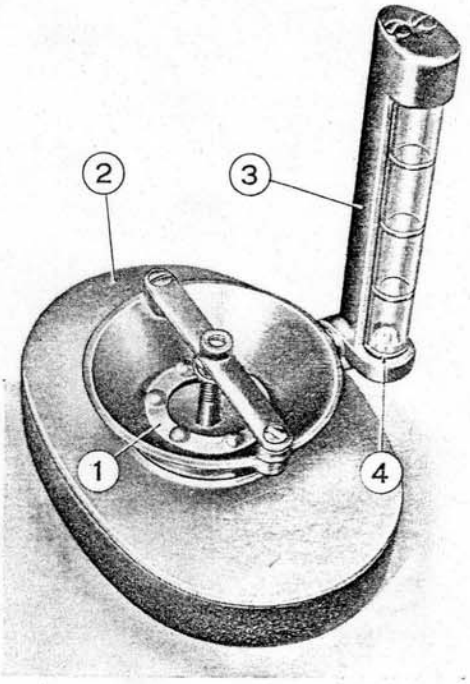


Fig. 37. - Weber 40 DCN 14 carburetors fitted to engine.

16. Volume control screws - 36. Throttle stop screws - 38. Block, throttles control lever - 39. Nuts, throttles control lever clamps - 40. Throttles control rod - 41. Accelerator control rod - 42. Bracket and lever, rod relay - 43. Relay lever return spring.



position. Any differences in float level should be within upper and lower marks in the glass tube.

If not so, work on nuts (39, fig. 37) and reposition the junction block (hence the throttle spindle is turned about) until the correct leveling of float is obtained.

Then lock the junction block with nuts (39).

Using relevant junction blocks move the screws (36, fig. 37) of remaining carburetors toward their stops.

To regulate the delivery of mixture use the three pair of screws (16, fig. 37), so that regular running of engine is obtained.

Fig. 38. - Device A.95718 for tuning carburetor throttles.
1. Device adjuster nut - 2. Body - 3. Glass tube - 4. Float.

Cooling

The engine is cooled by a permanent mixture which is circulated by a centrifugal pump.

The cooling system includes, in addition to the pump:

— a horizontal-tube radiator to cool the mixture;

— a thermostat fitted in the coolant outlet funnel from heads;

— a four-blade electric fan to cool the radiator, to which it is directly mounted. Fan operation is controlled by a thermal switch on radiator;

— an expansion tank connected to radiator and thermostat by hose.

Thermostat valve begins opening for coolant flow in radiator at a temperature of 180° to 183° F (82° to 84° C).

Coolant outlet funnel from cylinder heads is connected to the expansion tank (fig. 39) and the tank to radiator, through hoses. The expansion tank makes up for volume and pressure variations of coolant due to engine heating.

NOTE - A premise for perfect engine operation is the thermostat working at specified temperatures. As a matter of fact, if the thermostat valve opens at a lower temperature than it was set for, the engine will hardly reach its rated running temperature; conversely the thermostat valve opening above the setting temperature, causes poor cooling of engine and therefore a dangerous overheating of moving parts.

COOLING MIXTURE

The coolant in the cooling system is of the permanent type, its replacement being envisaged to be made only **every other year or 36,000 miles** (60,000 km) of running.

The coolant consists of a 50-50 mixture of magnesium free water and FIAT **Paraflu 11** fluid with .07 to .10 oz (2-3 grams) of Arexons sealing powder added, having a freezing point of about —30° F (—35° C).

Directions for Use.

Periodically check coolant level in expansion tank, **with a cold engine: it must always** be at the lower brim of the tank neck. With very hot engine the level will rise remarkably, and this may also occur immediately after stopping the engine.

Should it be found that the coolant has dropped below the prescribed level, the system shall be closely inspected and topped up.

Only in emergency (severe and sudden coolant losses) refill can be made with tap water as follows:

— allow the engine to cool down;

— remove the expansion tank cap;

— pour water into expansion tank until correct level is obtained.

As soon as possible fix the fault and refill with coolant as directed hereafter.

Directions for Service.

The system must be refilled exclusively with a 50-50 mixture of magnesium free water and FIAT Paraflu 11 liquid, with no sealing powder added.

Proceed as follows:

— shift the lever (H, fig. 138) to the right to open the coolant delivery cock to heater radiator;

— pour coolant into the expansion tank until level reaches the lower brim of the tank neck.

In case the engine radiator or the heater radiator have been taken down for service, refill the circuit with the old liquid after flushing the radiator thoroughly with a 2.5 % solution of acetic acid.

On cars circulating in or for export to hot weather countries, the long lasting liquid can be safely replaced (as a result of repair jobs or after 36,000 miles - 60,000 km or two years use) by tap water with addition of bichromate base rust inibitors.

Recommended rust inhibitors:

— potassium bi-chromate (2 to 3 °/₀₀ by weight);

— Ferroxan (Bayer);

— Nalco 38 (Nalco Co.).

NOTE - In this event **do not** add sealing powder.

Prior to filling with inhibited water, **flush** the cooling system thoroughly to remove all particle of anti-freeze and sealing powder, inasmuch as the bi-chromate is incompatible with any organic body.

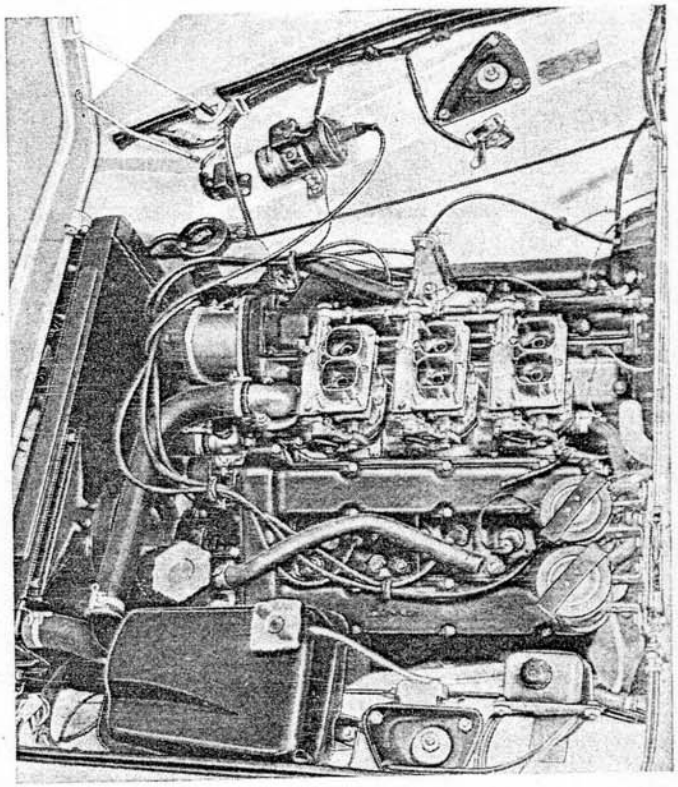


Fig. 39. - Engine compartment.

The coolant expansion tank can be seen in the figure.

Checking Rate of « Paraflu 11 ».

Should water have been added to the cooling mixture in emergency, it will be necessary to determine the rate of « **Paraflu 11** » in the circuit in order to restore coolant characteristics.

Use device **A. 95858** for this check, as follows.

Make sure that temperature of mixture ranges between 50° and 158° F (10° to 70° C) and coolant level in radiator is correct. Top up with tap water, if necessary.

Suck up enough fluid into the device to raise the float and read on device tube the letter corresponding to mixture level.

For example:

— the float is at letter F;

— observe the table on bottom of device and read the actual rate of « Paraflu 11 » present in the circuit; this rate is the number (say « 35 ») on column F lined up with the temperature reading of device thermometer;

— from the chart « amounts to be added » on top of device it may be seen that for Model FIAT-DINO number « 35 » corresponds to a quantity of 2.65 liters of straight « Paraflu 11 »; so the recommended fluid rate of 50 % by volume can be restored.

NOTE - If plunger rises beyond letter « A », the percentage of « Paraflu 11 » in coolant will be negligible or none at all.

WATER PUMP

The water pump bearing (6, fig. 40) is integral with the impeller shaft (7) and is metal boxed at ends.

The bearing pocket is packed with grease in production and therefore no further lubrication is required during car service.

A retaining screw (3, fig. 40) secures the bearing to the pump housing.

If the bearing needs replacement for any reason, the bearing-shaft assembly must be replaced. Recall that the impeller (4) and the pump drive driven pulley hub (1) are driven on to the shaft using a small press. Specified drag: 18.1 ft.lbs (2.5 kgm).

When installing the pump make sure that between impeller vanes and pump housing there is a clearance of .0197" to .0394" (0.5 to 1 mm) (see fig. 40).

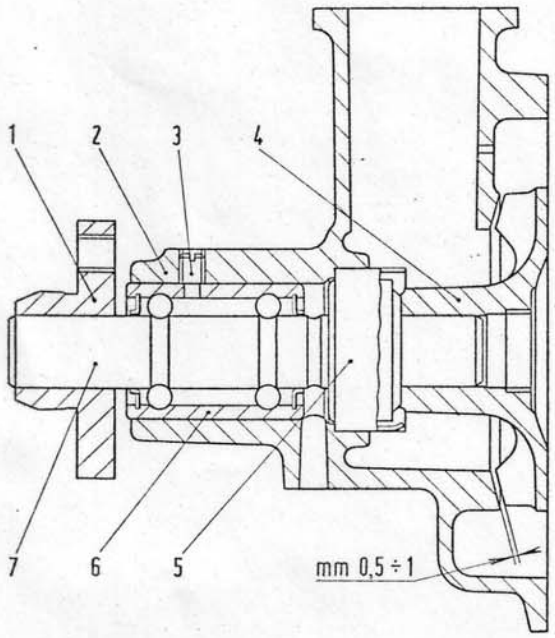


Fig. 40. - Side section view of water pump.

1. Fan drive pulley hub - 2. Pump housing - 3. Bearing lock screw - 4. Impeller - 5. Seal - 6. Bearing - 7. Shaft.

0,5 ÷ 1 mm = .0197" to .0394"

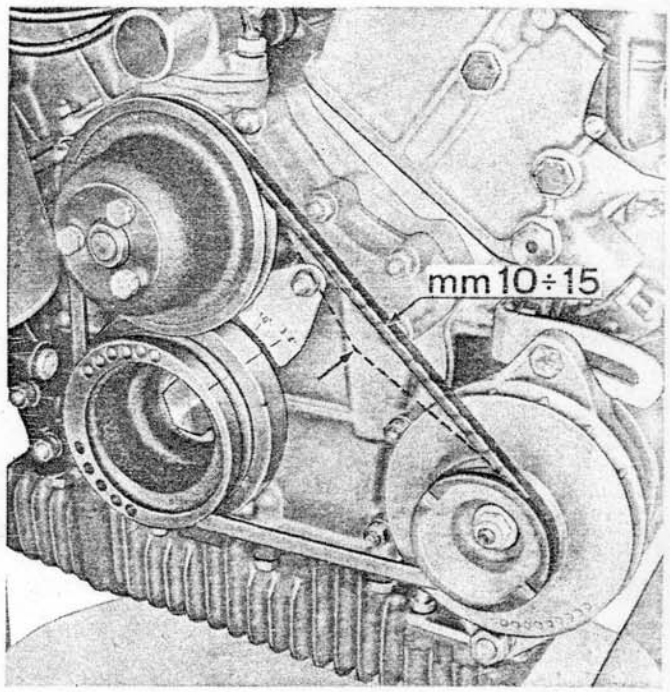


Fig. 41. - Deflection of alternator and water pump drive belt with a pressure of 22 lbs (10 kg).

mm 10 ÷ 15 = .394" to .591"

Alternator and Water Pump Drive Belt Adjustment.

The water pump and alternator are driven by pulleys from a belt which is actuated by the pulley on front end of crankshaft.

Correct tension of fan belt is an important factor for satisfactory operation of engine. Actually if belt is slack it slips on pulleys endangering:

— engine overheating due to a reduced speed of water pump;

— low alternator charging rate (flat battery), also because of low revolutions.

If belt is abnormally stretched it will cause an excessive strain in water pump and alternator bearings, which wear out rapidly.

To adjust belt tension proceed as follows:

— loosen upper and lower nuts of alternator pivot screws;

— move the alternator outward so as to stretch the belt;

— lock the alternator in the new position by tightening up the pivot screw nuts;

— now check that with a pressure of 22 lbs (10 kg) the belt shows a deflection of .394" to .591" (10 to 15 mm) (fig. 41).

Clutch

Single plate, dry clutch, with diaphragm pressure spring.

This type of clutch differs from the conventional clutch design because the pressure coil springs and all throwout mechanism components (release levers, eyebolts, struts, etc.) have been replaced by a single diaphragm spring.

Inspection.

Dismantle the clutch assembly, after marking ist position to the flywheel for balance purposes, and check as follows.

Position the clutch cover assembly on a base plate in the place of the flywheel, with a ring gauge (S, fig. 43) .323″ (8.2 mm) thick between cover and plate. Work the clutch mechanism through four full throwout strokes by applying a load on release flange, as shown by arrow (F, fig. 43).

In this condition, check that:

— with a withdrawal travel of .315″ (8 mm) (D, fig. 43), the pressure plate is .055″ (1.4 mm) away;

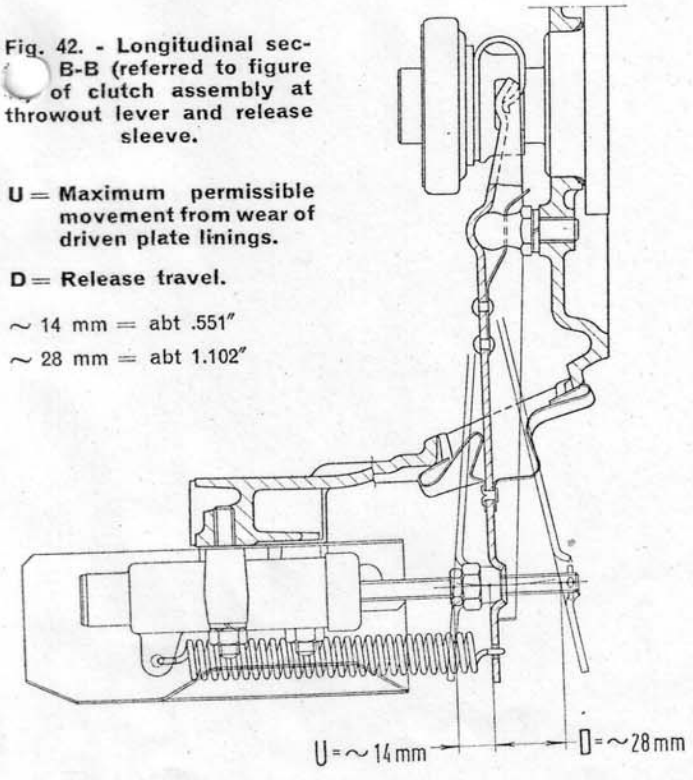


Fig. 42. - Longitudinal section B-B (referred to figure 1) of clutch assembly at throwout lever and release sleeve.

U = Maximum permissible movement from wear of driven plate linings.

D = Release travel.

~ 14 mm = abt .551″

~ 28 mm = abt 1.102″

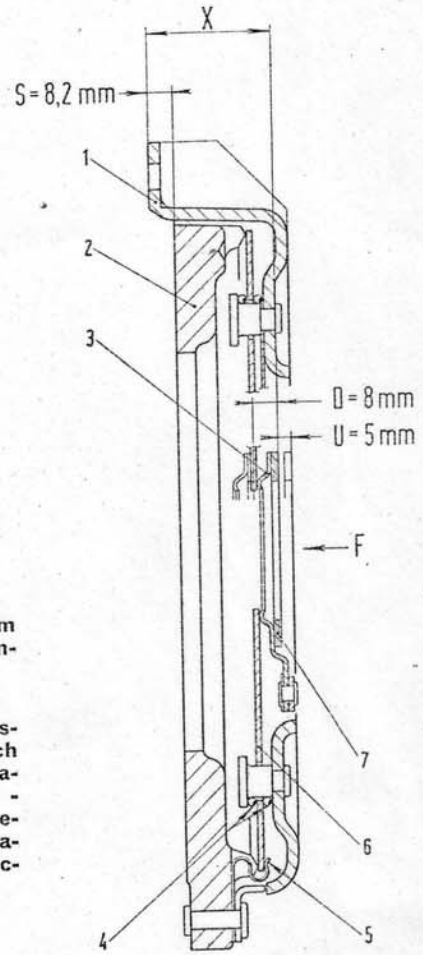


Fig. 43. - Check diagram for clutch cover assembly.

1. Clutch cover - 2. Pressure plate - 3. Clutch release flange - 4. Diaphragm spring rings - 5. Diaphragm spring retainer plate - 6. Diaphragm spring - 7. Friction ring.

S = .323″ (8.2 mm): thickness of the base plate ring gauge for clutch check.

X = 1.602″ ± .059″ (40.7 ± 1.5 mm): distance specified for clutch check.

D = .315″ (8 mm): release travel.

U = .197″ (5 mm): maximum allowance for driven plate lining wear.

F = direction of clutch release flange movement.

— the distance X (fig. 43) is 1.602″ ± .059″ (40.7 ± 1.5 mm) (for this step, allow for possible wear of the friction ring (7, fig. 43), the thickness of which is, in a new condition, .075″ to .079″ - 1.9 to 2 mm).

If distance is not within above values, replace the clutch cover assembly by a new one.

The face of the release flange ring should be free from scores.

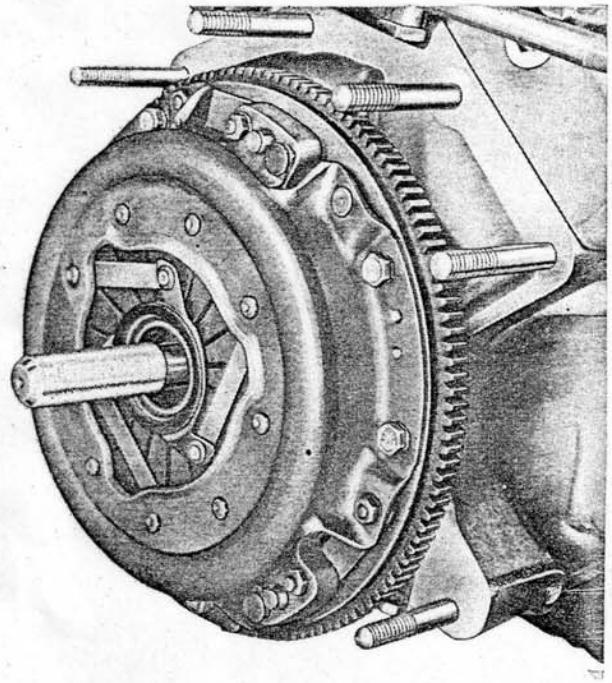


Fig. 44. - Using tool A.70081 to install clutch assembly.

INSTALLING CLUTCH ON FLYWHEEL

Before installing the clutch check the condition of the clutch shaft pilot bearing.

The pilot bearing must be lubricated with KG 15 grease.

On installation, position the driven plate with the raised path of hub toward the transmission.

Fit the clutch assembly using care that the balance marks made on removal are indexing.

Prior to tightening clutch mounting screws on flywheel, align the driven plate by means of tool **A. 70081** (fig. 44). Recommended torque of clutch mounting screws: 18.1 ft.lbs (2.5 kgm).

NOTE - While handling the clutch for service or carriage, avoid grasping at the release flange which might be damaged.

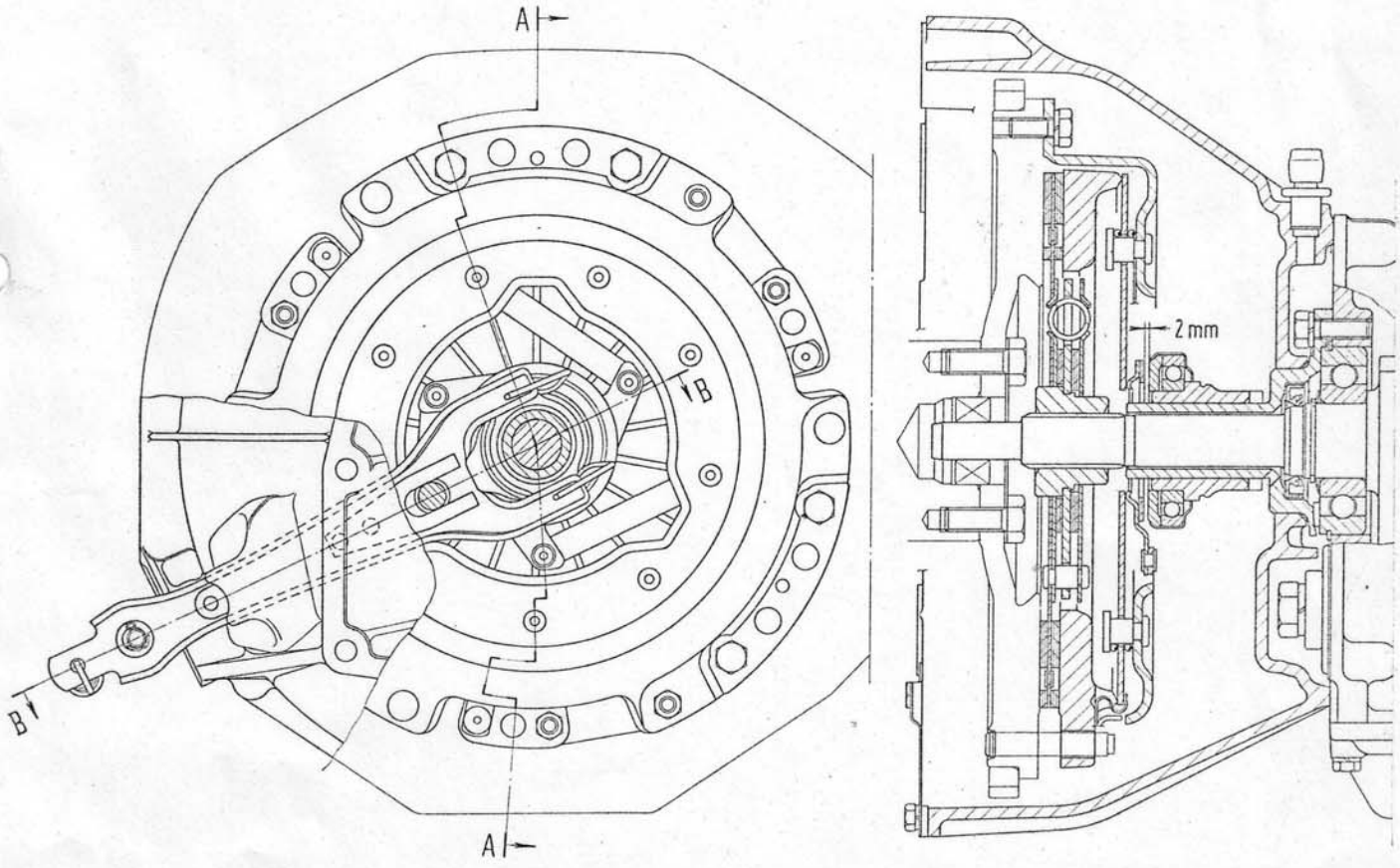


Fig. 45. - Clutch assembly viewed from throwout lever end and clutch side section A-A.

2 mm = .079"

ADJUSTING PEDAL TRAVEL

The free travel of clutch pedal is about 1″ (25 mm), corresponding to a clearance of .079″ (2 mm) (fig. 45), between the throwout sleeve and release flange friction ring.

Should pedal free travel be less than specified as a result of the wear of the driven plate, restore the original operating conditions (.079″ - 2 mm clearance) by working on the adjustable pull-rod (5, fig. 46) of clutch master cylinder.

WARNING

When removing the transmission avoid supporting the clutch shaft on, or striking it against, the clutch release flange, lest the flange holding plates may be cocked or else the flange friction ring cracked.

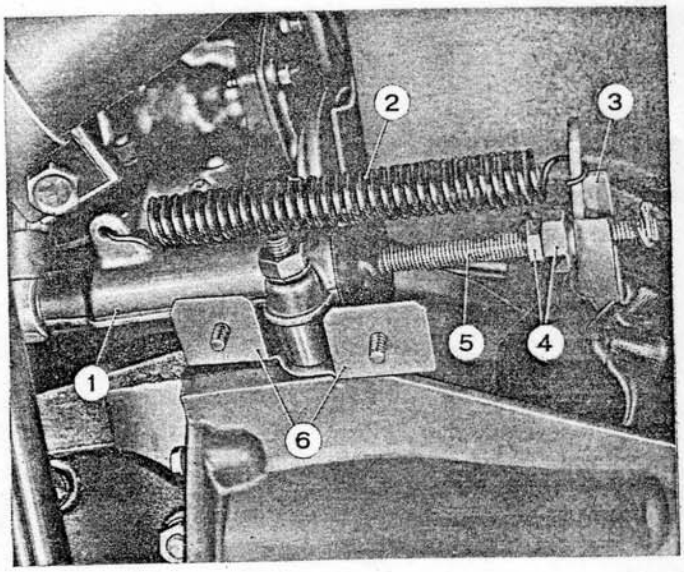


Fig. 46. - Detail of clutch master cylinder.

1. Master cylinder for clutch release control - 2. Throwout lever return spring - 3. Throwout lever - 4. Pull-rod adjusting nut and lock nut - 5. Master cylinder pull-rod - 6. Brackets and studs, master cylinder shield.

CLUTCH SPECIFICATIONS

Type	dry, single - plate
Engaging and throwout mechanism	diaphragm spring
Control	hydraulic
Driven plate	with friction linings
O. D. of linings	8.464″ (215 mm)
I. D. of linings	5.709″ (145 mm)
Runout of driven plate edges	.006″ (0.15 mm)
Free travel of pedal with .079″ (2 mm) clearance between friction ring and throwout sleeve, abt	1″ (25 mm)
Travel of release flange for a clearance of .055″ (1.4 mm) from the pressure plate	.315″ (8 mm)

TRANSMISSION ASSEMBLY

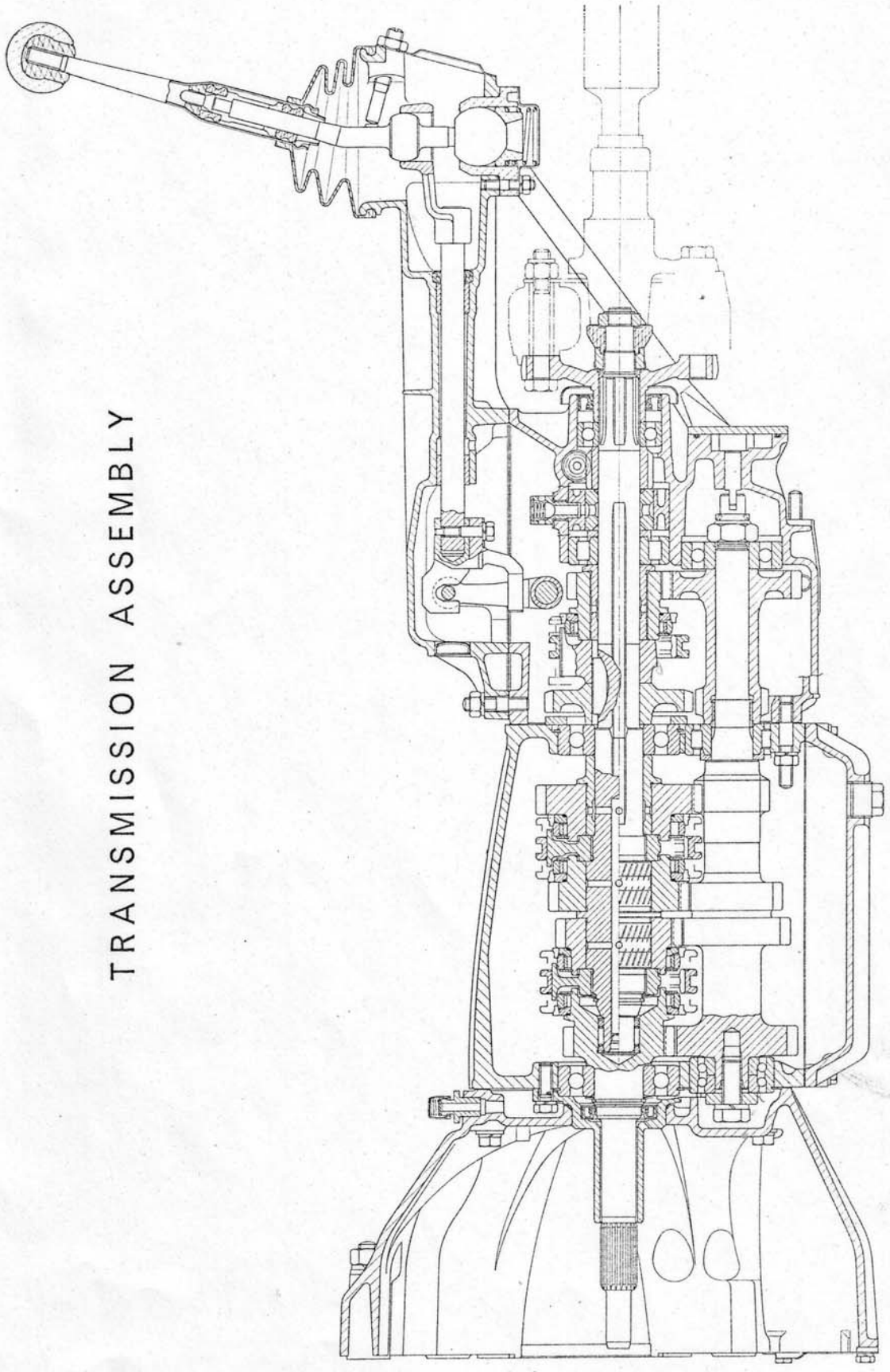


Fig. 47. - Side section view of transmission assembly.

Transmission

There are five forward gears and one reverse (fig. 47).

All forward gears are synchromesh.

Gear synchronizers are of the spring-ring type (fig. 54).

All forward gears are constant-mesh, with helical teeth to reduce noise to a minimum.

The reverse is engaged by sliding a spur idler gear into mesh with a gear on countershaft and another on mainshaft, thus reversing the drive.

The transmission is in four detachable parts, the bell housing, the maincase, the extension and the gear-shift lever support.

The bell housing is bolted to the crankcase and houses the clutch and throwout sleeve with its thrust bearing.

The maincase is bolted to the bell housing and carries the first, second, third and fourth gears.

The extension is bolted to the maincase and houses the fifth gear, the shifter shafts, the reverse gear, the speedo drive gear splined sleeve and the oil pump.

The upper part of extension carries the gearshift lever support with gear selector and actuating dogs (fig. 60).

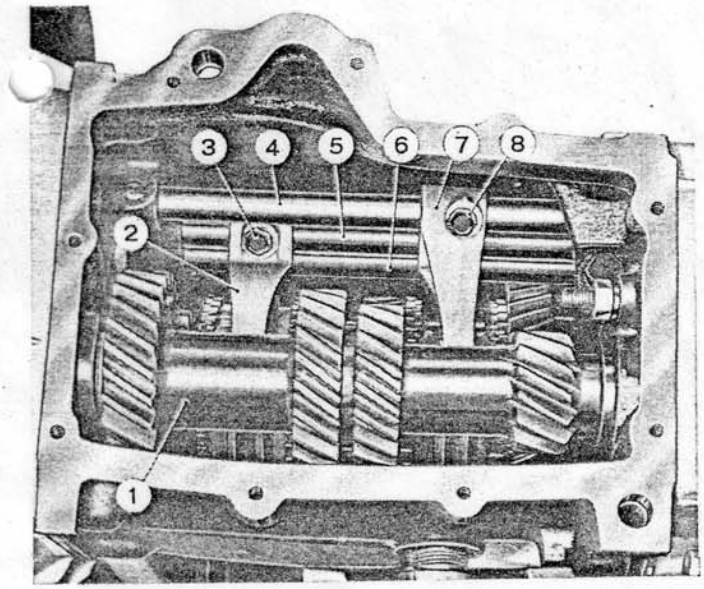


Fig. 48. - Detail of transmission maincase, without cover.

1. Countershaft - 2. Third and fourth shifter fork - 3. Shifter fork screw - 4. First and second shifter shaft - 5. Third and fourth shifter shaft - 6. Fifth and reverse shifter shaft - 7. First and second shifter fork - 8. Shifter fork screw.

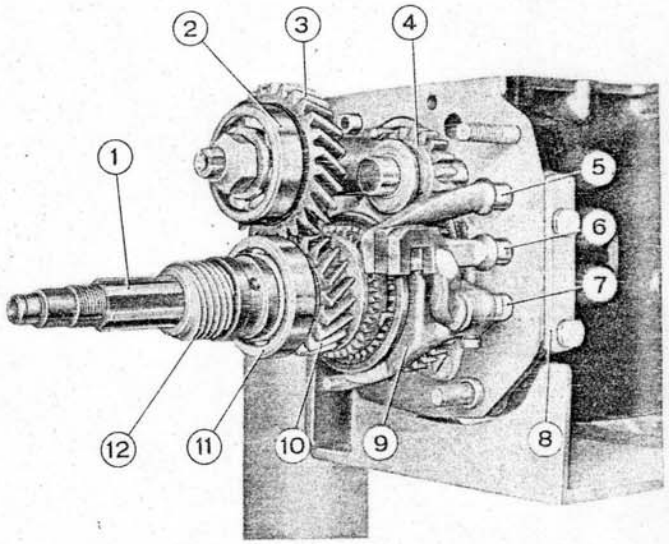


Fig. 49. - Transmission extension gears.

1. Output shaft - 2. Ball bearing - 3. Fifth gear driven gear - 4. Reverse gear - 5. First and second shifter shaft - 6. Third and fourth shifter shaft - 7. Fifth and reverse shifter shaft - 8. Shifter shaft detent ball cover - 9. Fifth and reverse shifter fork - 10. Fifth drive gear - 11. Roller bearing - 12. Speedo drive gear splined sleeve.

The oil pump (3, fig. 50), of the gear type, is driven by the countershaft to lubricate the maincase gears forcibly.

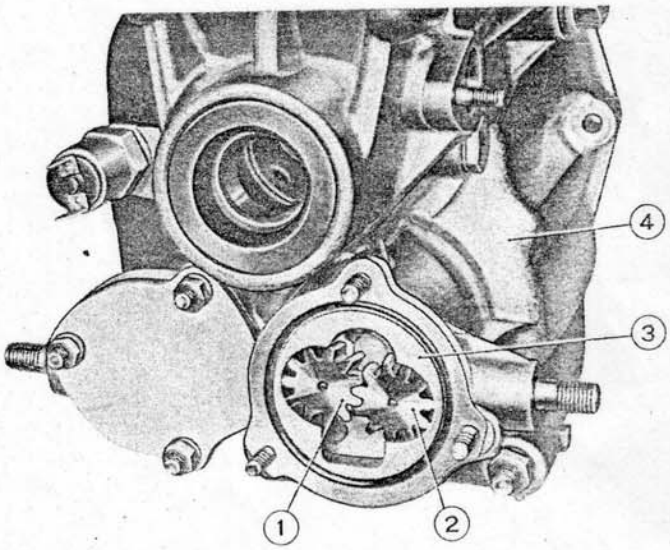


Fig. 50. Detail of transmission at oil pump.

1. Oil pump drive gear - 2. Oil pump driven gear - 3. Oil pump housing - 4. Transmission extension.

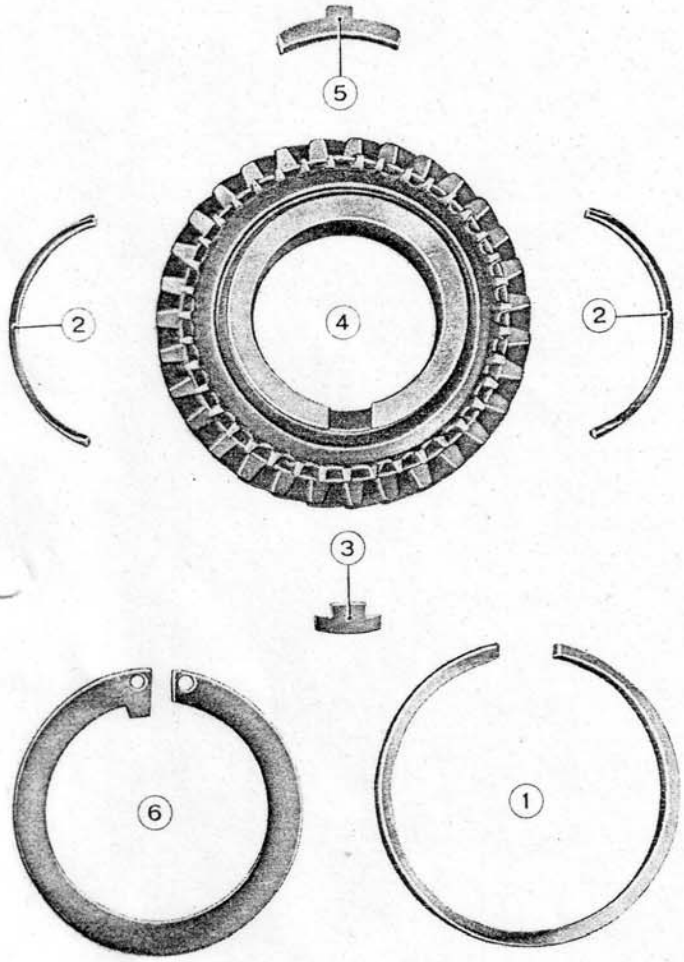


Fig. 51. - Third speed gear and synchronizer components.
1. Synchromesh ring - 2. Synchronizer spreader springs - 3. Stop plate - 4. Third speed gear - 5. Thrust plate - 6. Snap ring.

Engagement of 2nd, 3rd, 4th and 5th Gears.

Synchromesh of 2nd, 3rd, 4th and 5th gears is obtained thanks to the use of the items shown in figures 51 and 52.

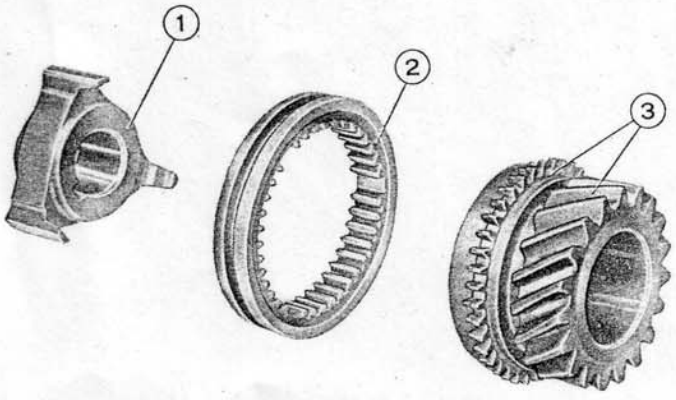


Fig. 52. - Transmission synchromesh gears.
1. Slip sleeve hub - 2. Third and fourth slip sleeve - 3. Third speed gear with synchronizer.

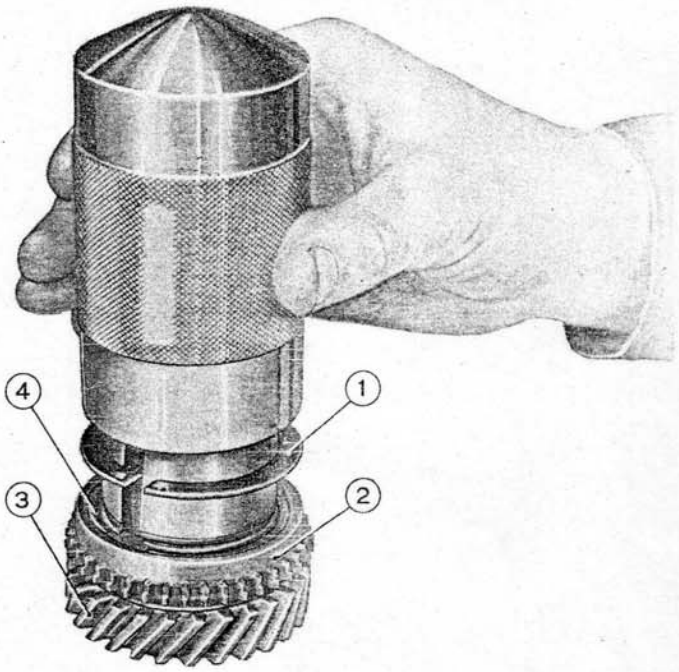


Fig. 53. - Using tool A. 70161 to install the synchronizer snap ring.
1. Snap ring - 2. Synchromesh ring - 3. Third speed gear - 4. Spreader spring.

The slip sleeve (2, fig. 52) is serrated internally for proper mesh with the toothed crown of the gear (3), turning idle on the mainshaft. In this way the gear will be rigidly locked with the driving hub.

As the slip sleeve is moving on, the synchromesh ring (1, fig. 51) gradually equalizes rotation speeds.

Under the action of the slip sleeve, the synchromesh ring (1, fig. 51) is dragged to abut with one end, both on acceleration and deceleration, against the thrust plate (5, fig. 51), which causes such a wrapping effect as a quick mesh is obtained.

For a better adherence of the synchromesh ring against the slip sleeve, two spreader springs (2, fig. 51) have been designed to work one on override and the other on underride.

As a matter of fact the speader spring is compressed between the thrust plate (5, fig. 51) and the stop plate (3), so that it spreads out against the synchromesh ring.

Thus the synchronizing action resulting of the tension of the ring itself is boosted gradually from the end pressure exercised by the spreader spring.

The task of the synchronizer will stop as soon as the slip sleeve and the gear affected are brought to spin at the same speed; the spreader spring relaxes and the synchromesh ring retracts.

NOTE - The synchromesh device shown in figs. 51 and 52 applies to the 2nd, 3rd, 4th and 5th gears, being just identical, whereas the device for the 1st gear differs in design (fig. 54).

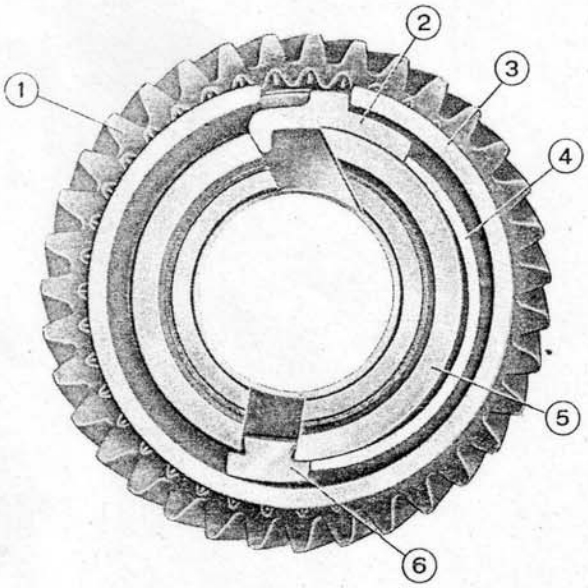


Fig. 54. - First gear synchronizer fitted on gear.
1. Gear - 2. Thrust plate - 3. Synchromesh ring - 4. Ring spreader spring - 5. Gear sleeve - 6. Stop plate.

This condition corresponds to the final step of the tripping movement of the slip sleeve, so that it comes into mesh with the mating teeth of the gear with minimum strain.

When sleeve and gear teeth are in full mesh, the synchro ring settles down inside the slip sleeve, which makes for the solid engagement of the gear attached.

Engagement of 1st Gear.

With a view to relieving to a great extent the driver of the effort involved with the engagement of the 1st gear when starting at standstill, a synchromesh device has been provided which has one spreader spring (4, fig. 54) operating solely in the downshift from second to first gear.

Moreover, the thrust plate (2, fig. 54) of the 1st gear synchronizer has an end lug jutting in into a slit in the gear.

An end of the synchromesh ring (3) abuts against the thrust plate, while the plate lug sets in touch with the gear hub in the slit; thus the thrust plate is raised to increase the end thrust applied by the synchromesh ring.

On setout the engine turns at low speed and therefore it will be just sufficient to control inertia of the driven plate.

For the downshift from second to first, the synchromesh of gears is obtained the same way as for the downshift from fourth to third.

SERVICE NOTES

When overhauling the transmission, the general rules for checking the components of this assembly current for earlier models must be observed.

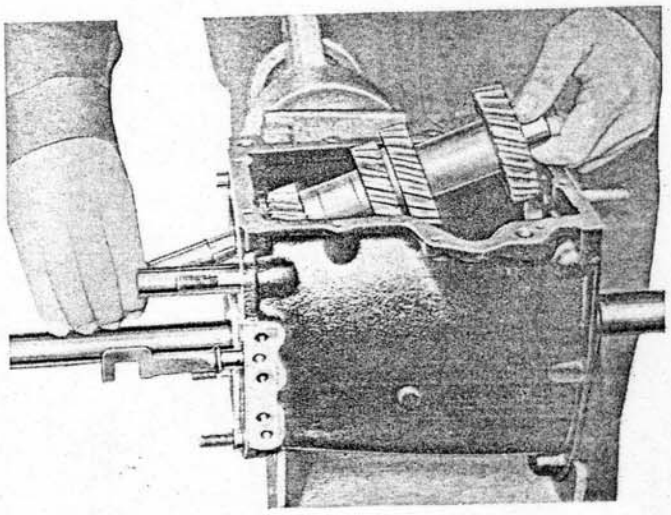


Fig. 55. - Removing countershaft from transmission maincase.

Figures 55, 56, 57 and 58 illustrating the transmission disassembly in progress, are self-explanatory and no further comment is required.

Some procedures particular to this transmission are outlined herafter in detail.

The joint nut on output shaft must be backed out using adapter **A. 55050**.

The constant mesh shaft must be removed (fig. 57) after the mainshaft with its gear cluster has been taken down (fig. 56).

Use wrench **A. 56113** to remove the extension mounting bolt (2, fig. 58).

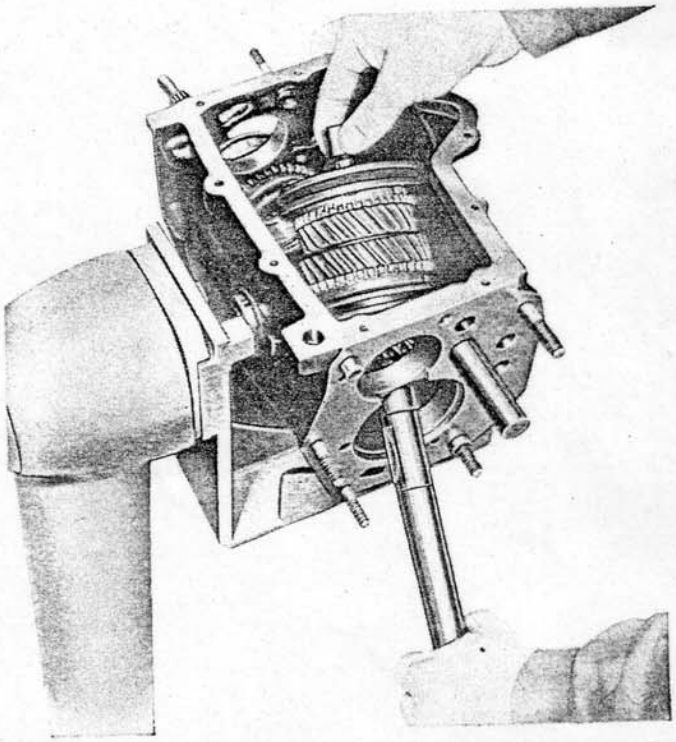


Fig. 56. Removing mainshaft and its gear cluster from transmission maincase.

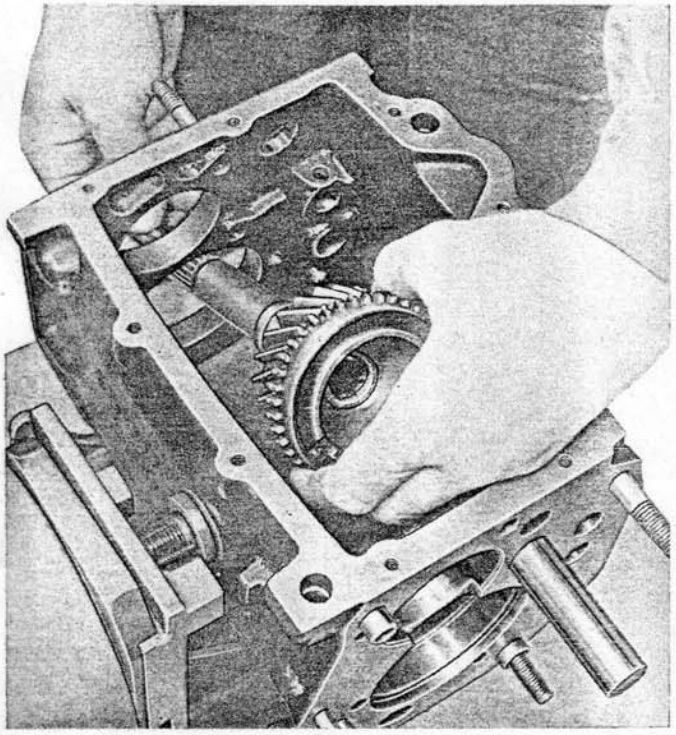


Fig. 57. - Removing the constant mesh shaft from transmission maincase.

To disassemble the mainshaft gear cluster proceed as follows.

Position the mainshaft on an arbor press as shown in fig. 59.

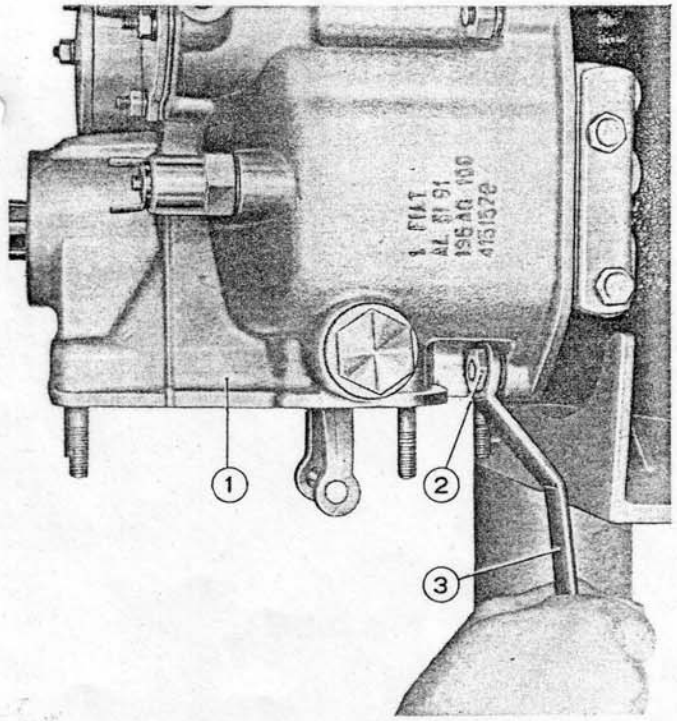


Fig. 58. - Backing out the transmission extension upper screw.

1. Extension - 2. Extension mounting screw - 3. Wrench A. 56113.

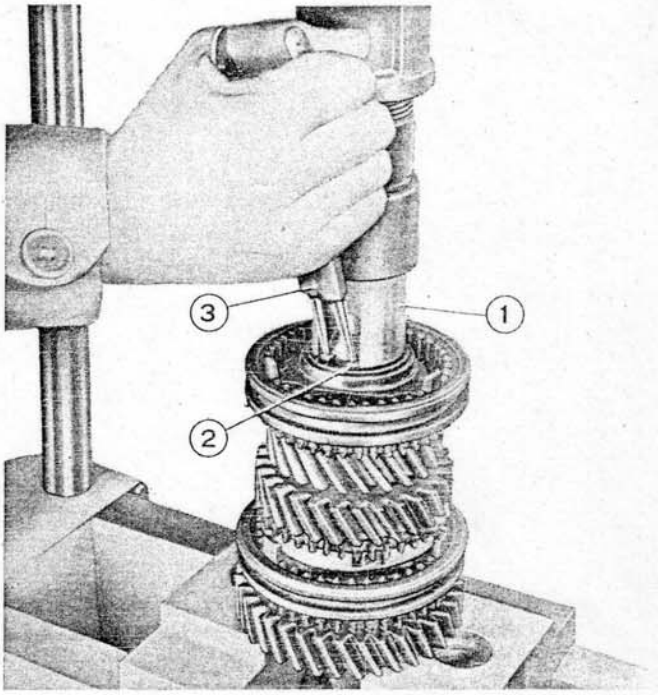


Fig. 59. - Disassembling the mainshaft gear cluster.

1. Adapter A. 47033 - 2. Gear snap ring - 3. Pliers A. 81101 for removal of snap ring.

Fit the pressure item (adapter) **A. 47033** (1, fig. 59) and, using pliers **A. 81101**, spread out the snap ring (2).

Just reverse the above steps to assemble the gear cluster. As the washer is depressed with adapter **A. 47033**, the snap ring enters freely into place.

The same procedure applies for the removal and installation of clutch shaft bearing washer and snap ring.

When fitting the extension, it is good practice to move the countershaft for ease in seating the oil pump drive shaft.

The bearing nut for fifth gear and reverse must be staked with pliers **A. 74126**.

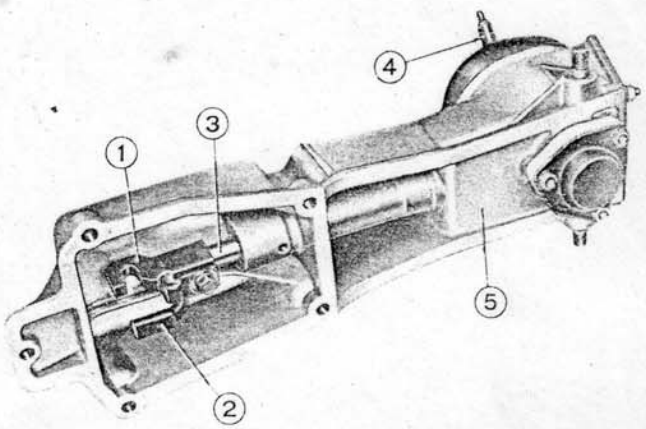


Fig. 60. - Gear selector and actuating rod with support.

1. Dog, gear actuating - 2. Dog, gear selector - 3. Rod, gear selector and actuating - 4. Gearshift lever - 5. Support.

GEARSHIFT MECHANISM

The transmission control is by a gearshift lever on floor tunnel. A jacket is mounted on the pivot lever (4, fig. 61) which is fitted on upside of transmission case.

Before taking down the transmission from car, remove the gearshift lever jacket as follows.

Push down the rubber boot (6, fig. 61), so to clear the jacket (2).

Depress the jacket (2, fig. 61) and using a screwdriver or another pronged tool, pry out the snap ring (5) from its groove (8) on jacket.

Thus the jacket can be slid off from the pivot lever (4).

On assembly, fit into the jacket (2) in this order: the first resilient bushing (9), the spacer (3), the second resilient bushing (9) and the snap ring (5), then slide the jacket (2) on to the lever (4) pressing down till the snap ring (5) engages its groove on bottom of jacket.

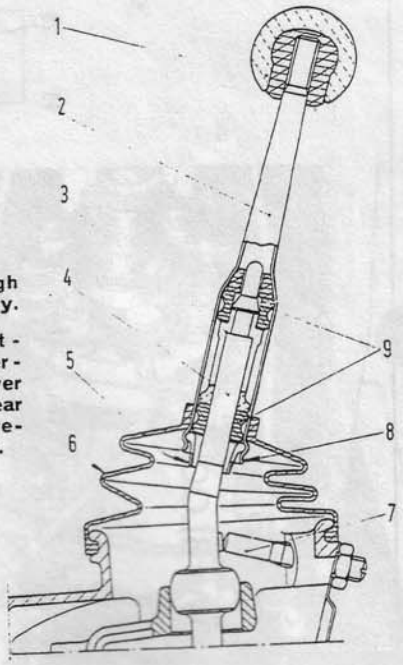


Fig. 61. - Section through gearshift lever assembly.

1. Grip - 2. Lever jacket - 3. Spacer - 4. Pivot lever - 5. Snap ring - 6. Lever boot - 7. Screw, fifth gear stop - 8. Snap ring groove - 9. Resilient bushings.

TRANSMISSION SPECIFICATIONS

Gears	five forward and reverse
Gear type: 1st, 2nd, 3rd, 4th and 5th	constant - mesh, helical spur gear
reverse	
Synchronizers, spring ring	1st, 2nd, 3rd, 4th, 5th gears
Gear ratios: first	$\frac{26 \times 35}{21 \times 14} = 3.095$ to 1
second	$\frac{26 \times 28}{21 \times 19} = 1.825$ to 1
third	$\frac{26 \times 24}{21 \times 22} = 1.351$ to 1
fourth	= 1 to 1
fifth	$\frac{26 \times 19}{21 \times 27} = 0.871$ to 1
reverse	$\frac{26 \times 35}{21 \times 15} = 2.889$ to 1
Gear backlash	.0039" (0.1 mm)
Side clearance of ball bearings	max. .0020" (0.05 mm)
End float of ball bearings	max. .0197" (0.5 mm)
Max. misalignment of shafts	.0010" (0.025 mm)
Oil pump for pressure-lubrication of gears	gear type
Lube oil: -- grade	FIAT W 90/M (SAE 90 EP)
— capacity	4 G.B. pts - 4 U.S. pts 14 (2.30 lt)

LONGITUDINAL SECTION THROUGH FRONT PROP SHAFT JOINTS AND PILLOW BLOCK

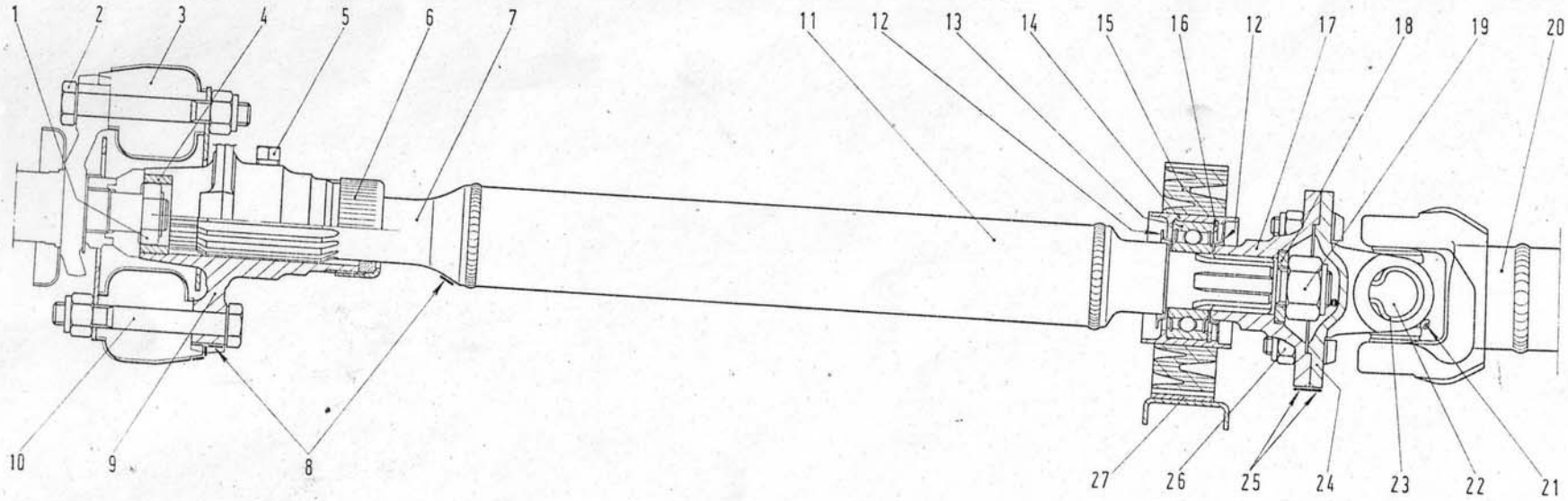


Fig. 62. - Longitudinal section through front prop shaft joints and pillow block.

1. Dowel ring - 2. Screw, flexible joint to transmission - 3. Flexible joint - 4. Locating bushing - 5. Lubrication fitting plug - 6. Slip sleeve ring - 7. Splined end - 8. Positioning marks - 9. Slip sleeve - 10. Screw, front prop shaft joint to slip sleeve - 11. Front propeller shaft - 12. Bearing shields - 13. Ball bearing - 14. Bearing housing - 15. Pad - 16. Bearing snap ring - 17. Flanged sleeve, rear prop shaft - 18. Plain washer - 19. Nut, flanged sleeve - 20. Rear propeller shaft - 21. Lubrication fitting - 22. Needle roller bearing - 23. Snap ring - 24. Universal joint yoke - 25. Positioning marks - 26. Nut, universal joint yoke to sleeve screw - 27. Pillow block.

Propeller Shaft and Joints

GENERAL

The drive from the power plant to rear axle is transmitted by means of a dual propeller shaft which connects the slip sleeve on mainshaft to the final drive bevel pinion.

The front prop shaft, tubular shaped, is connected to the transmission through a flexible joint which is secured on ends, respectively, to the transmission and shaft with the intermediate of two sleeves: a sleeve is fi[illegible] to the end of mainshaft and the other is keyed on to the splined shank of front prop shaft. The flexible joint has been designed to cushion torque stresses, while the splined sleeve allows for minor variations in length of the front prop shaft so to compensate against axial movements of the drive line.

On the rear end of the front prop shaft is fitted a pillow block housing a ball bearing.

The pillow block is mounted on a cross rail fastened to the body.

The rear prop shaft is tied to the front one and to the final drive bevel pinion through universal joints.

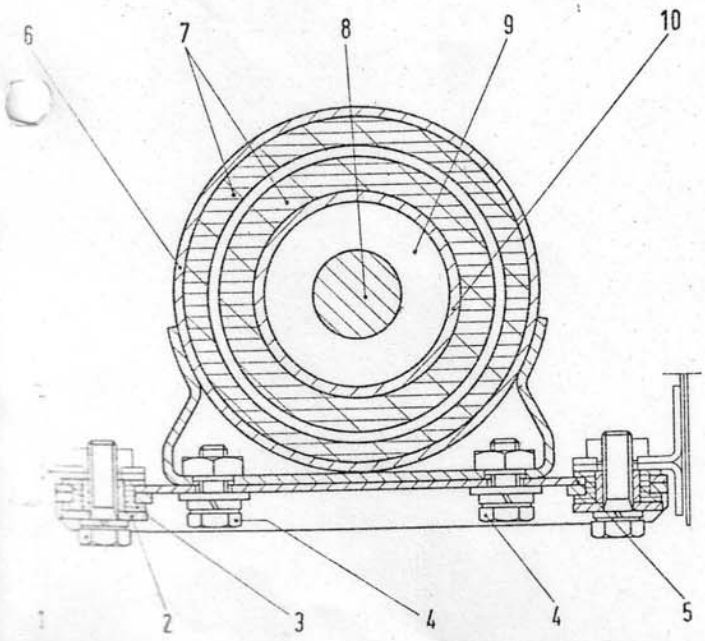


Fig. 63. - Section view of center pillow block.

1. Screw, cross rail to body - 2. Plain washer - 3. Insulator rings - 4. Screws, pillow block to cross rail - 5. Cross rail - 6. Pillow case - 7. Pillow pad - 8. Prop shaft shank - 9. Ball bearing - 10. Bearing housing.

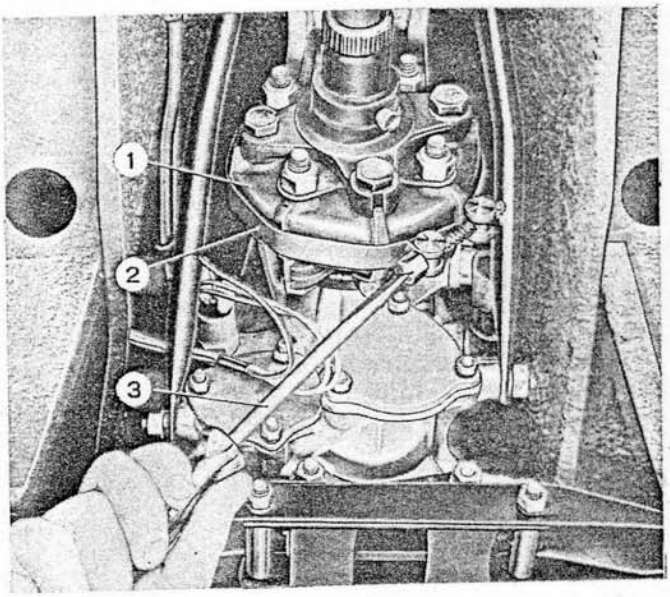


Fig. 64. - Removing front prop shaft.

1. Flexible joint - 2. Band A. 70153 - 3. Screwdriver.

INSPECTION AND REPAIR

For correct positioning of propeller shafts to their sleeves indexes (8 and 25, fig. 62) should register.

Front and rear prop shafts must be checked separately using fixture **Ap. 5052/1.**

Use the kit adapter to install the shafts on fixture.

Straightening must be made using exclusively an arbor press.

If the weigh distribution is not uniform in the shafts to their axis of rotation, stick as much putty as required to correct unbalance.

Next, weigh the putty and apply an equal amount of tin where the putty was located.

During overhaul, check the spline lash between shanks and sleeves: wear limit .012" (0.3 mm).

Check the pillow block bearing for absence of play to the shaft shank and for no such end float as the shaft operation is adversely affected.

NOTE - For removal and installation of the drive line flexible joint use band A. 70153 (fig. 64).

Rear Axle

The rear axle is of the semi-floating type with hypoid final drive gears. The bevel gear ratio is 4.875 to 1 (8/39).

AXLE SHAFTS

Removal and Installation.

Take down the axle shafts as follows.

Jack up the car and remove the wheel, then slide off the cotter pin and back out the hub and axle shaft lock nut.

For more ease in this step apply the brakes to lock the wheel pub.

Insert tool **A. 47048** as shown in fig. 65, setting a washer between the axle end and the reaction screw of tool.

Depress the brake pedal and at the same time work on the reaction screw of tool till the hub starts out.

Remove the brake caliper by backing out its mounting screws from carrier plate.

Withdraw the wheel hub as shown in fig. 66.

Remove the caliper carrier plate-to-rear axle screws.

Pull the axle shaft using puller **A. 47017** equipped with item /3.

Install the axle shafts in reverse order to removal and tighten the lock nut with 43.4 ft.lbs (6 kgm) of torque.

The caliper carrier plate mounting screws to rear axle must be drawn up with 43.4 ft.lbs (6 kgm) of torque and the caliper mounting screws to carrier plate must be torqued to 72.3 ft.lbs (10 kgm).

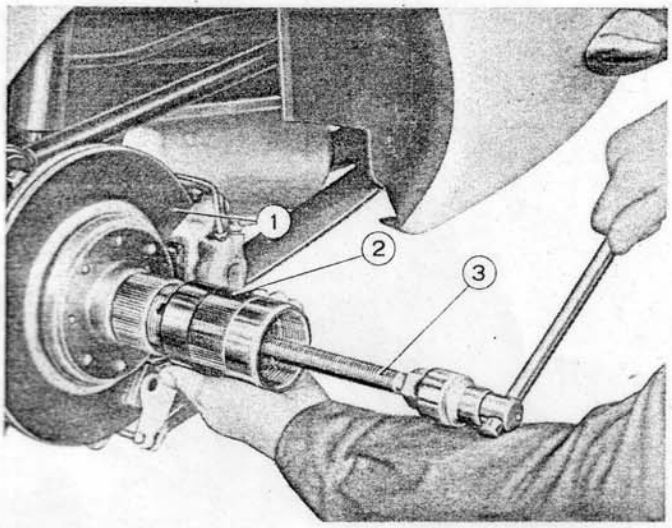


Fig. 65. - Pulling the rear wheel hub.
1. Wheel hub and brake disc - 2. Tool A. 47048 - 3. Tool reaction screw.

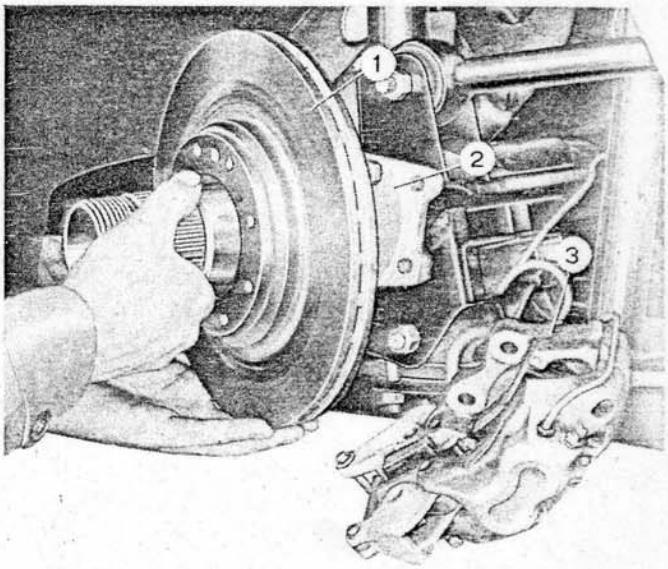


Fig. 66. - Removing rear wheel hub.
1. Wheel hub and brake disc - 2. Axle shaft bearing and brake caliper carrier plate - 3. Brake caliper.

NOTE - The axle shaft bearing is raised from its housing in rear axle and, when fitted in place, the bearing should show a clearance of .0000" to .0047" (0 to 0.12 mm) to its shoulder face on housing (fig. 68). Correct clearance is obtained with a shim (5, fig. 68) situated between bearing and caliper carrier plate.

This shim comes in the following thicknesses: .0591"-.0598"-.0606"-.0614"-.0622"-.0630"-.0638"-.0646"-.0653"-.0661"-.0669" (1.50-1.52-1.54-1.56-1.58-1.60-1.62-1.64-1.66-1.68-1.70 mm).

Inspection and Repair.

Check the ball bearing for soundness and no excessive side or end play, otherwise noisiness may result.

Using a feeler gauge, check that both the ball bearing (7, fig. 68) and the lock nut (2) have not slid out of place on axle shaft. The ball bearing should closely adhere to the raised stop on shaft and the lock nut should shoulder the bearing.

The bearing is installed on the arbor press as well as the lock nut, which must be pre-heated.

In view of above conditions, removal and installation of axle shaft assemblies must be made only if recommended tool equipment is available.

Therefore, should any component of axle shaft assembly need replacement, apply to a FIAT service workshop equipped with specific facilities or renew the whole assembly.

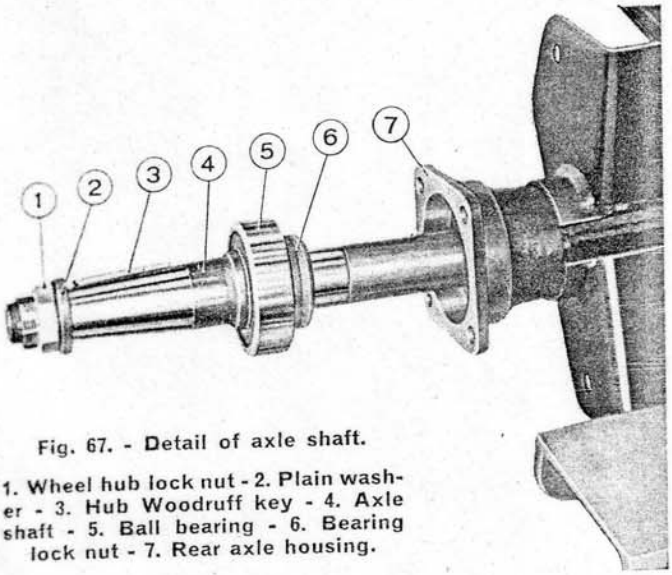


Fig. 67. - Detail of axle shaft.

1. Wheel hub lock nut - 2. Plain washer - 3. Hub Woodruff key - 4. Axle shaft - 5. Ball bearing - 6. Bearing lock nut - 7. Rear axle housing.

To check on the tightness of axle shaft lock nut, place the assembly on fixture **A. 95601** and fasten the nut with the fixture clamp.

Touch a dial indicator to the end of axle shaft and set it at zero.

With a torque wrench, apply a torque of 57.9 to 61.5 ft.lbs (8 to 8.5 kgm).

No clearance must be found, in such conditions, between the lock ring and bearing cone.

Relieve the shaft and check that the indicator needle has shifted back to zero to be sure that the lock nut has not spinned about the shaft.

Should the indicator needle fail to return to zero, this is an indication that the lock nut has moved out of place on the shaft and replacement of the assembly is required.

Removal and Installation of Rear Axle.

To remove the rear axle proceed as follows:

- jack up the car at rear and remove wheels;
- disconnect the manual brake cable from brake calipers;
- remove reaction struts and shock absorbers from rear axle;
- disconnect the propeller shaft from bevel pinion flanged sleeve;
- disconnect the pressure regulator link at joint on rear axle;
- disconnect the brake fluid hose from « T » connector on rear axle and plug up the hose to avoid fluid losses;
- remove the semi-elliptic spring mounting bracket nuts to rear axle;
- disconnect the semi-elliptic spring at front from body mounting bracket and remove the rear axle assembly.

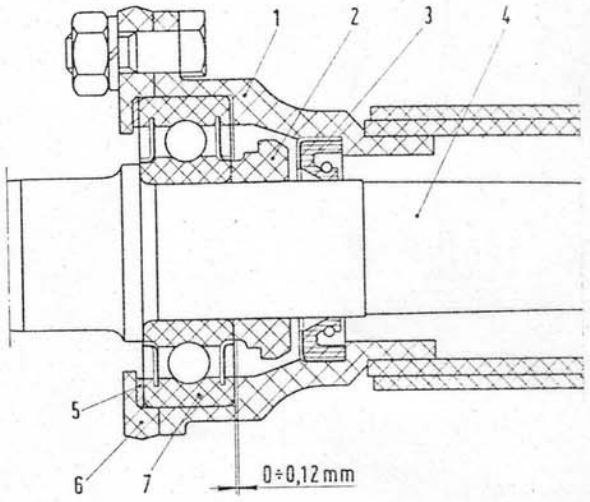


Fig. 68. - Scrap view of rear axle housing and axle shaft bearing side section.

1. Axle housing - 2. Bearing lock nut - 3. Oil seal - 4. Axle shaft - 5. Shoulder ring - 6. Bearing and brake caliper carrier plate - 7. Ball bearing.

$0 \div 0{,}12 = 0''$ to $.0047''$

For installation, reverse the removal procedure recalling that the hydraulic lines should be bled as the ultimate operation.

DIFFERENTIAL UNIT

The FIAT-Dino differential is of the **spin resistant** type.

This differential, in addition to showing the advantages of the conventional type, incorporates a device which, with any car speed or road condition, chooses the best drive torque to be distributed to the wheels.

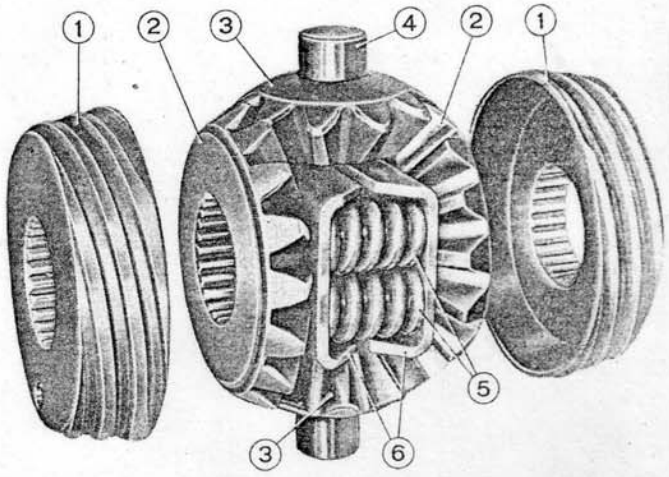


Fig. 69. - Differential cage gears.

1. Friction cones - 2. Side gears - 3. Pinion gears - 4. Pinion shaft - 5. Friction cone pre-load springs - 6. Spring seating plates.

The spin-resistant device consists (figs. 69 and 71) of a pair of friction cones loaded by four springs and housed in the differential cage outside side gears.

Friction cones in differential cage generate an opposing force to the action of differential, so to ensure an adequate traction power when either driving wheel shows an extremely low traction strength.

It means that, when a torque is applied to the axle, the initial load of springs on friction cones is boosted by inherent forces due to the separation of side gears from pinion gears, with the result that the resistance in differential augments gradually.

This is an automatic device and therefore there will be a greater counteraction to differential as the drive torque increases.

In other words, when either driving wheel shows no torque in a conventional differential, the traction power, too, will be nil. Conversely, with the **spin-resistant** differential, if no drive torque is applied to one wheel, the other wheel, thanks to the action of locking device, will show a torque amounting to 25 % of maximum effective torque and a quarter of traction force is thus available to drive the car.

In the following text are outlined some conditions in which outstanding advantages are obtained from **spin-resistant** differential.

On bad roads it may happen that one driving wheel rebounds clear of the ground; hence it will revolve faster than the other wheel footing on surface.

In the **spin-resistant** differential the speed at both wheels is the same, thus doing away with any bounces and skids of the car; also the shocks on axle are reduced extensively.

Braking a car with the driving wheels on an uneven surface may endanger the steering control of the driver.

In such conditions the **spin-resistant** differential prevents skidding inasmuch as no wheel can be locked before the other and a remarkable improvement in the braking is thus obtained.

When cornering at high speed, load transfer toward the outer wheel entails lesser hold for the inner wheel with consequent loss of power for both driving wheels.

The **spin-resistant** differential corrects this condition by delivering more power to the outer wheel than the inner wheel so that car stability is improved.

The breakage of an axle shaft usually strands over the car.

Thanks to the **spin-resistant** differential, all the engine torque is directed to the active wheel and the car can be safely driven to the nearest service workshop.

Checking the Spin-Resistant Device.

To check on the efficiency of the differential spin-resistant device proceed as follows.

With transmission in neutral, jack-up either rear wheel and take it down.

Fit a torque wrench to the hub nut and have the

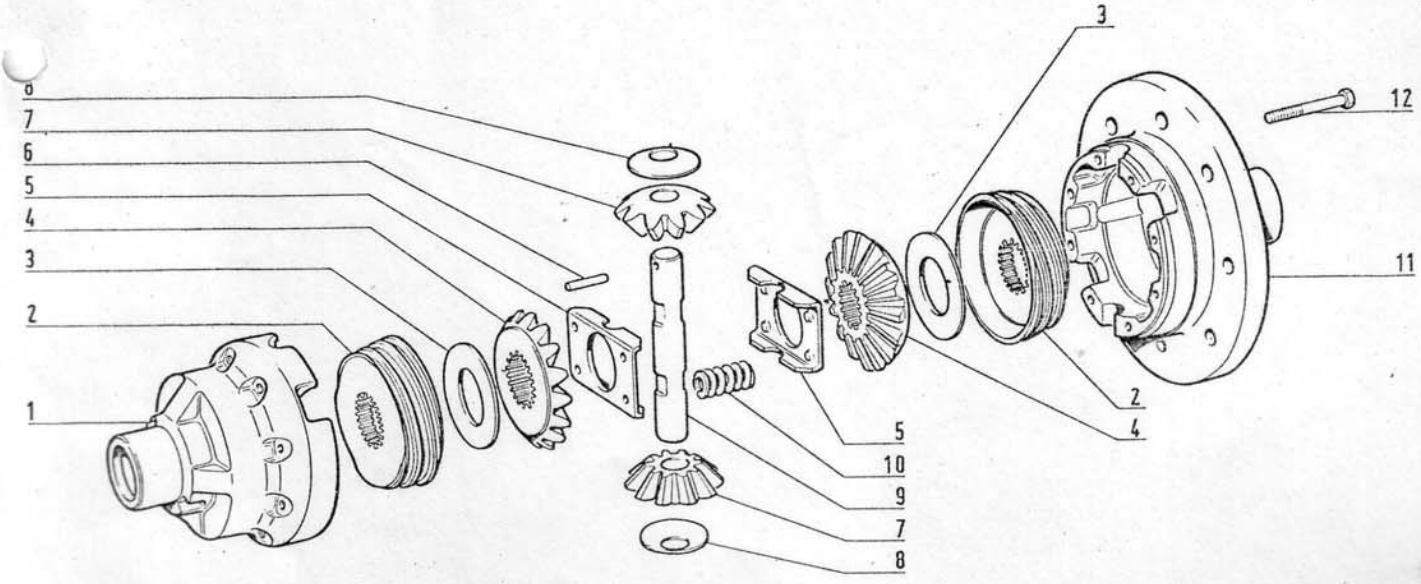


Fig. 70. - Exploded view of differential cage assembly.

1. L. H. cage - 2. Friction cones - 3. Friction cone washers (if any) - 4. Side gears - 5. Spring seating plates - 6. Pinion shaft lock pin - 7. Pinion gears - 8. Pinion gear backing washers - 9. Pinion shaft - 10. Friction cone pre-load spring - 11. R. H. cage - 12. Cage retaining screw.

axle shaft turn in the direction of running: the starting torque should not be less than 43.4 to 65.3 (6 to 9 kgm).

Any operation noises in the differential assembly are most probably caused by an improper grade of the oil in the case.

It is therefore imperative that the rear axle oil used is of the recommended grade: FIAT W 90/DA (SAE 90 EP).

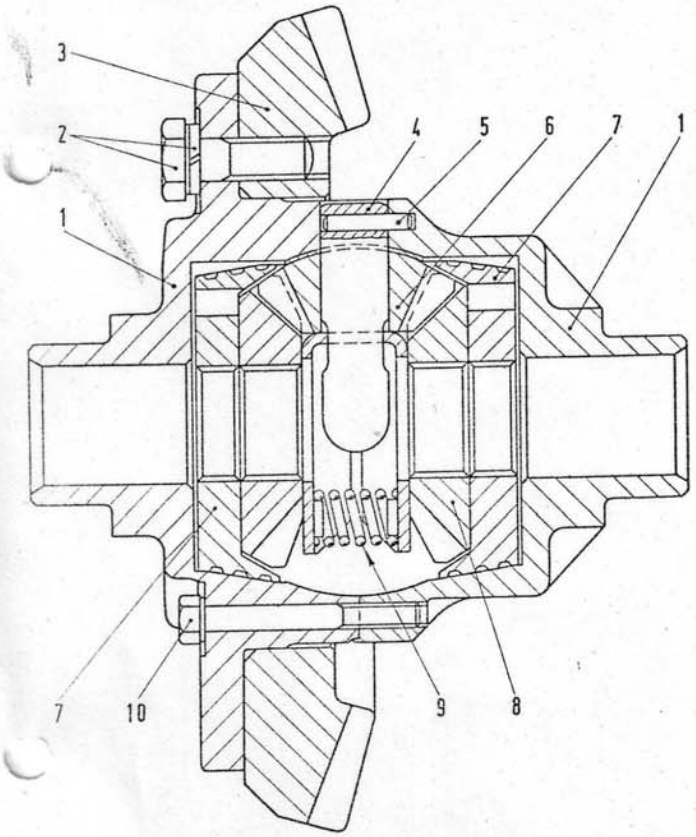


Fig. 71. - Section through differential cage assembly.

1. Cage halves - 2. Ring gear screw and washer - 3. Ring gear - 4. Pinion shaft - 5. Pinion shaft lock pin - 6. Pinion gear - 7. Friction cones - 8. Side gear - 9. Friction cone pre-load spring - 10. Differential cage retaining screw.

If the oil grade is correct, noise can be diagnosed as in conventional differentials.

Checking and Servicing the Differential Cage.

Disassemble the differential cage and chalk up the friction cones and shimming washers (if any), because irregular operation of the assembly may be experienced if these items are upset on reassembly.

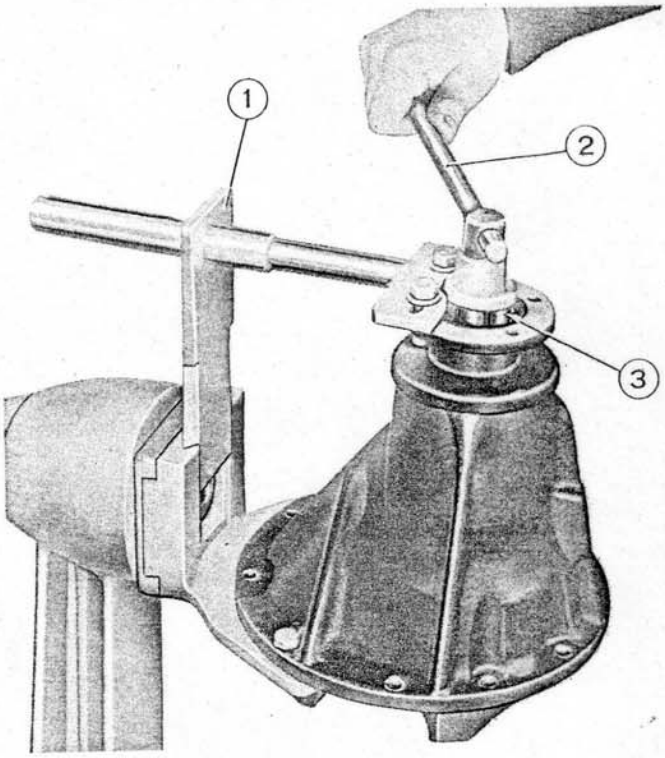


Fig. 72. - Removing bevel pinion nut.

1. Tool Arr. 22206/4 A - 2. Pinion nut wrench - 4. Bevel pinion nut.

Check as follows:

— friction cone seats in cage should be thoroughly smooth and free of deep notches; light scores can be tolerated;

— contact faces of helical splines in cones should be in the same condition as the faces in cage;

— in case damage or excessive wear are found in above faces, renew both parts recalling that cage halves are supplied for replacement in matched sets with friction cones and shimming washers; also, exchange of cones is not permitted.

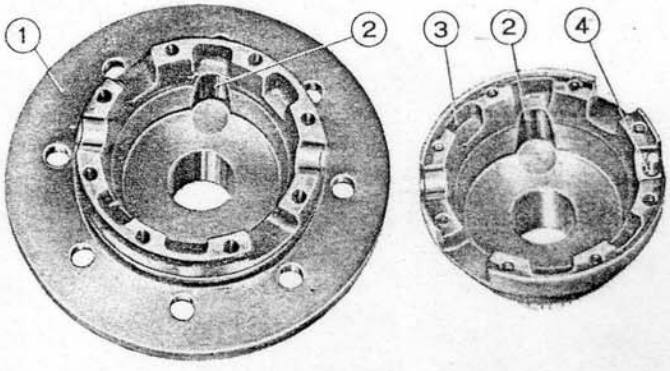


Fig. 73. - Differential cage halves.

1. R. H. cage half - 2. Gear oil wells - 3. L. H. cage half - 4. Pinion shaft lockpin.

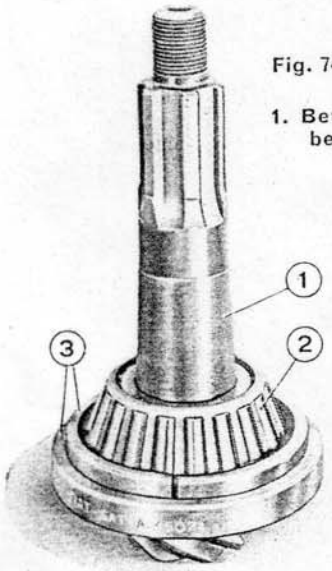


Fig. 74. - Bevel pinion bearing remover in position.
1. Bevel pinion and shaft - 2. Roller bearing - 3. Remover A. 45024.

Assembly.

For a correct assembly of differential cage clamp either tool in the set **A. 70156** (4, fig. 75) in a vise and slide in the components of the cage.

Prior to locking the cage retainer screws, place the other tool so that the splines of the side gears and friction cones are lined up.

This will avoid undue strain on spring shoulders from axle shafts being driven in forcibly.

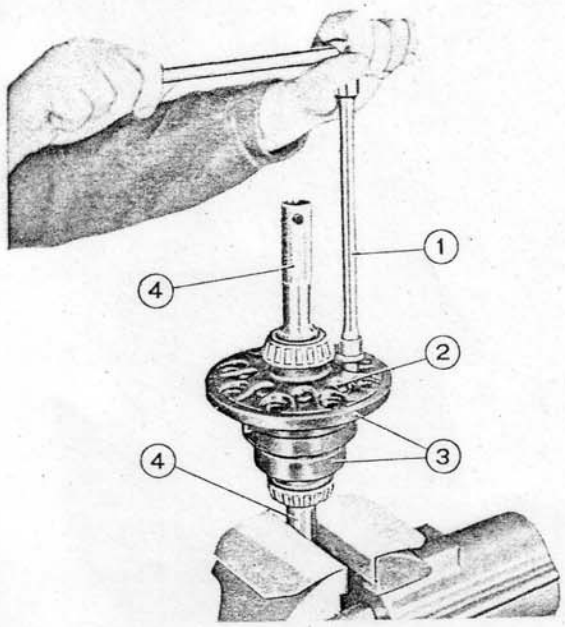


Fig. 75. - Assembling the differential cage.
1. Wrench, differential cage retainer screws - 2. Differential cage retainer screw - 3. Differential cage halves - 4. Pair of tools A. 70156, positioning side gears and friction cones.

NOTE - After the differential assembly has been fitted to the axle housing, on no account an axle shaft should be turned about until both shafts have been set in the correct position. The rotation of an axle shaft in the absence of the other misplaces the splined paths and prevents the latter from being fitted.

BEVEL GEAR SET

The bevel gear does not call for particular recommendations as far as disassembly is concerned. For differential assembly and adjustment, adhere to the following procedures:

1) Determining the thickness of drive pinion thrust washer.

Gauge the thickness of the drive pinion thrust washer by installing dummy pinion **A. 70154**, to which a dial indicator is affixed.

Touch the indicator plunger to the cup seat of both differential cage bearings.

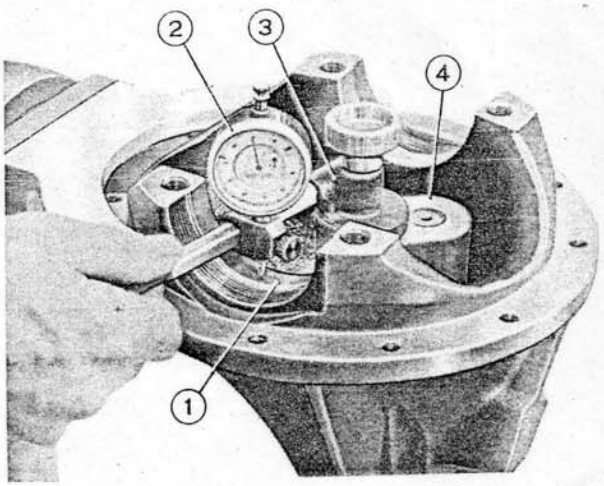


Fig. 76. - Determining the thickness of bevel pinion thrust washer.
1. Differential cage bearing bore - 2. Dial indicator - 3. Indicator holder - 4. Dummy pinion A. 70154.

The average resulting value corresponds to the difference between the theoretical and the actual distance of the differential cage bearing bore centerline to the pinion rear bearing cone shoulder face. Add to or subtract from such amount, the value (in hundredths of a mm) scribed electrically on drive pinion:

— if the number stamped on drive pinion is preceded by the « plus sign », the thickness of the thrust

washer is obtained by « subtracting » this figure from the indicator reading;

— conversely, if the number stamped on drive pinion is preceded by the « minus sign » the thickness of the thrust washer is obtained by « adding » this figure to the indicator reading.

NOTE - Rear roller bearing thrust washers are supplied for service in the following thicknesses: .1240"-.1260"-.1280"-.1299"-.1319"-.1339"-.1358"-.1378"-.1398"-.1417"-.1437"-.1457"-.1476"-.1496"-.1516"-.1535"-.1555"-.1575"-.1594" (3.15 - 3.20 - 3.25 - 3.30 - 3.35 - 3.40 - 3.45 - 3.50 - 3.55 - 3.60 - 3.65 - 3.70 - 3.75 - 3.80 - 3.85 - 3.90 - 3.95 - 4.00 - 4.05 mm).

2) Drive pinion bearing pre-load.

To preload drive pinion bearings lock the pinion in place and, using a torque wrench, tighten the pinion nut to a torque ranging between 108.5 and 180.8 ft.lbs (15 to 25 kgm).

The correct rolling torque reading, on preload check, should be from 1.0 to 1.2 ft.lbs (0.14 to 0.16 kgm).

3) Preloading differential cage bearings and adjusting ring gear-to-pinion backlash.

These operations must be carried out at the same time, using fixture **A. 95688** (fig. 77) and wrench **A. 55016**.

The fixture **A. 95688** is secured to the differential carrier by means of a screw and by tightening holder stud (8, fig. 77).

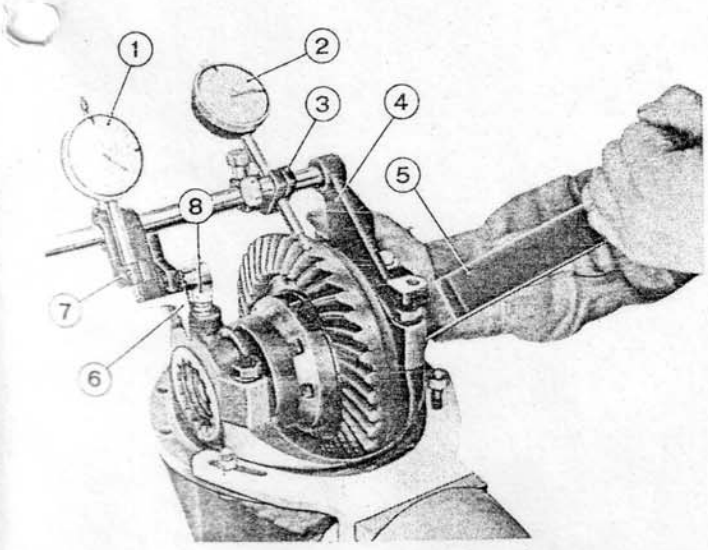


Fig. 77. Using fixture A. 95688 to adjust differential cage bearing preload.

1. Dial indicator for preload check - 2. Dial indicator for backlash check in final drive gear - 3. Dial indicator holder - 4. Fixture holder - 5. Wrench A. 55016 for bearing adjusters - 6. Cranked lever - 7. Dial indicator holder - 8. Fixture holder stud.

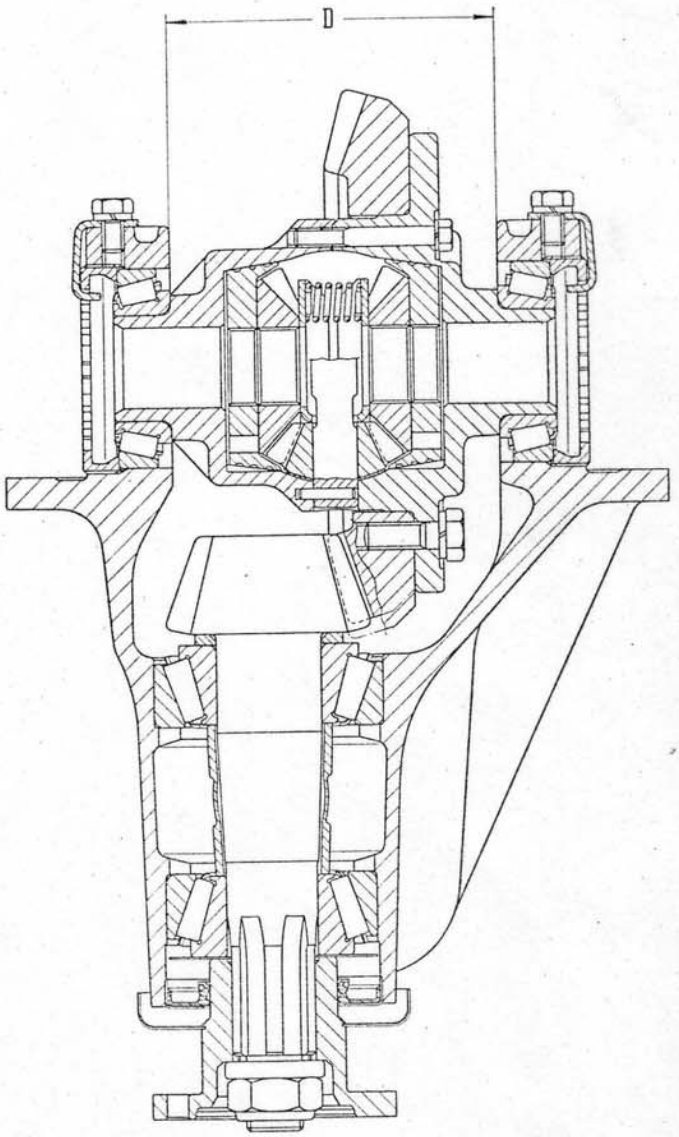


Fig. 78. - Differential cage roller bearing preloading diagram.

D. Distance between differential carrier caps: tighten adjusters until distance " D " is increased by .0039" to .0047" (0.10 to 0.12 mm).

Move holder (7) until cranked lever (6) contacts the cap and tighten knob (8); then, slacken knobs and adjust holder (3) until plunger of gauge (2) rests against one of the ring gear teeth; next, tighten the knobs.

Note that fixture **A. 95688** must be fitted with bearing adjusters slightly in contact with bearings, that is without preload.

Using wrench **A. 55016** tighten one of the two adjusters: in so doing, the differential carrier pedestals are slightly spread (distance D, fig. 78) and this is shown on dial gauge (1, fig. 77) via cranked lever (6).

The adjuster must be tightened until distance D is increased by .0039" to .0047" (0.10 to 0.12 mm).

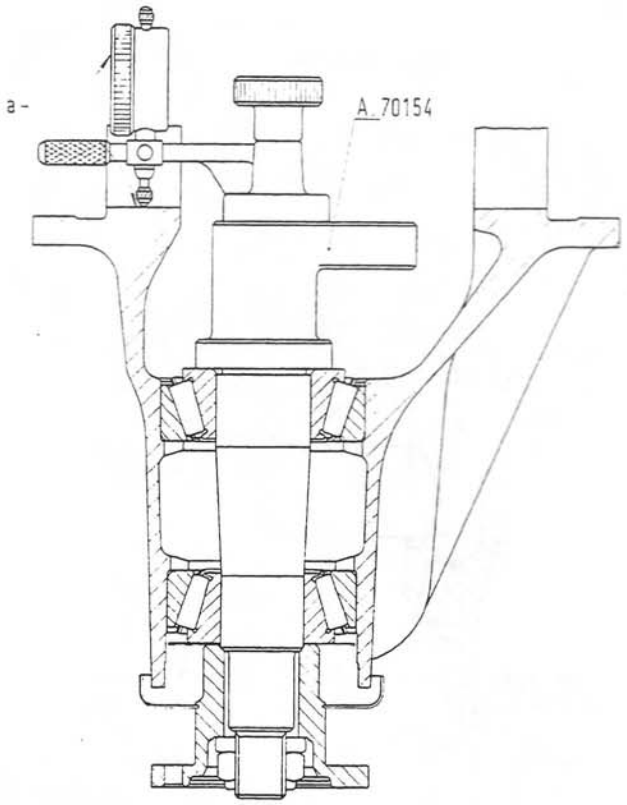


Fig. 79. - Diagrammatic view showing how dummy pinion A. 70154 and dial indicator should be fitted to determine drive pinion rear bearing thrust washer thickness.

a = Dial indicator reading, from which figure stamped on bevel pinion should be subtracted.

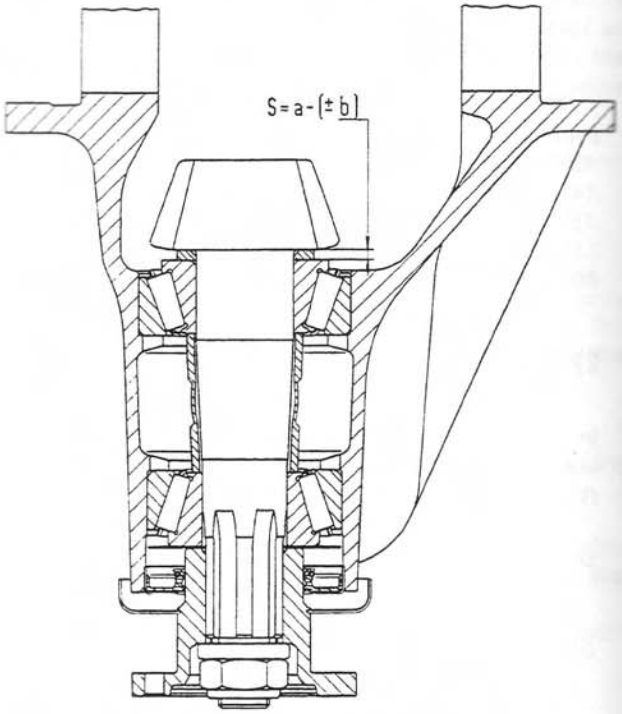


Fig. 80. - Diagram of bevel pinion assembly.

Where: S = thickness of rear bearing thrust washer;
a = dial indicator reading (fig. 79);
b = number stamped on bevel pinion.

HOW TO FIGURE THE THICKNESS OF BEVEL PINION REAR BEARING THRUST WASHER

If « **a** » is the reading on dial indicator (fig. 79), and « **b** » the value stamped on pinion, thickness « **S** » of thrust washer to be fitted is obtained as follows:

$$\mathbf{S} = \mathbf{a} - (+\,\mathbf{b}) = \mathbf{a} - \mathbf{b}$$
$$\text{or } \mathbf{S} = \mathbf{a} - (-\,\mathbf{b}) = \mathbf{a} + \mathbf{b}$$

In other words:

— if number on pinion is preceded by **plus** (—) **sign**, the thickness of thrust washer is obtained by **subtracting** the number from dial indicator reading;

— if number on pinion is preceded by **minus** (—) **sign**, the thickness of thrust washer is obtained by **adding** the number to dial indicator reading.

Example:

take **a** = 3.90 mm (indicator reading), and
b = — 5 (centesimal value on pinion)
then **S** = a — (— b)
S = 3.90 — (— 0.05)
S = 3.90 + 0.05
S = 3.95

Hence, in a case like this, a thrust washer 3.95 mm thick should be fitted.

NOTE - Every time the differential carrier is taken down from axle, a new gasket must be fitted before carrier is reinstalled.

After thus obtaining the specified preload of inner case bearings, **check also ring gear-to-pinion backlash, which must range from .0039" to .0059" (0.10 to 0.15 mm),** as follows:

- lock the drive pinion with tool **Arr. 22206/4** (fig. 72);
- move the ring gear in a way to contact pinion;
- set to zero the pointer of dial indicator (2, fig. 81) whose plunger must contact the flank of a ring gear tooth, as previously adjusted;
- then move the ring gear the other way and check on indicator (2) the amount of lash, which should be from .0039" to .0059" (0.10 to 0.15 mm).

If the backlash is out of specification, loosen one adjuster and tighten the opposite an equal amount, to move the ring gear away from or toward the pinion.

To prevent any alteration of the preload previously applied, it is essential to turn one adjuster the same amount as the other, but in opposite directions.

For setting operations other than above, covering data are tabulated hereafter.

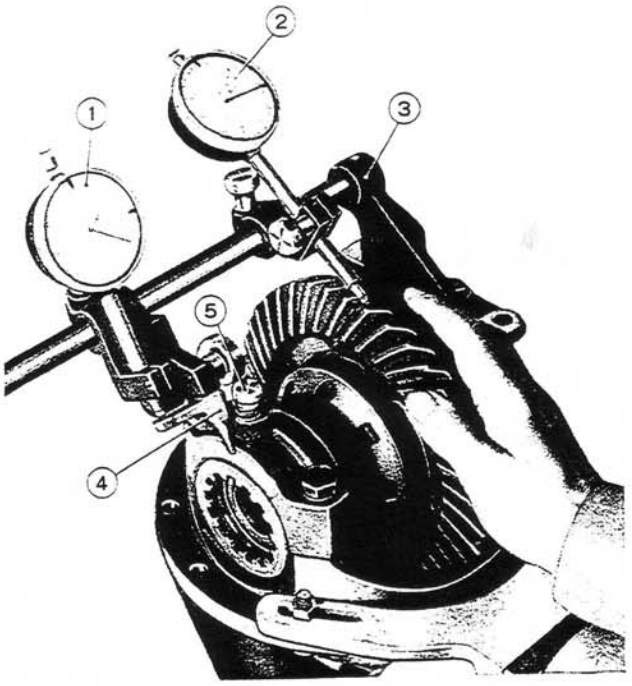


Fig. 81. - Checking backlash between pinion and ring gear. 1. Dial indicator for checking bearing pre-load - 2. Dial indicator for checking pinion-ring gear tooth backlash - 3. Holder for fixture A. 95688 - 4. Relay lever - 5. Fixture fixing stud.

REAR AXLE SPECIFICATIONS

Type	semi-floating
Differential	spin resistant
Final drive set	hypoid
Gear ratio	4.875 to 1 (8/39)
Bevel pinion bearings	two
Bearing type	taper roller
Bearing preload setting	by collapsible spacer and tightening pinion shaft nut with torque wrench
Pinion bearing preload (pinion shaft nut torque)	108.5 to 180.8 ft.lbs (15 to 25 kgm)
Pinion bearing rolling torque	1 to 1.2 ft.lbs (0.14 to 0.16 kgm)
Differential case bearings	two
Bearing type	taper roller
Adjustment	threaded rings
Bearing preload: differential carrier pedestal spread	.0039" to 47.00" (0.10 to 0.12 mm)
Ring gear and pinion	matched set
Ring gear-to-pinion backlash	.0039" to .0059" (0.10 to 0.15 mm)
Axle shaft bearing type	ball
Rear tread	53.15" (1,350 mm) (*)
Lube oil grade	FIAT W 90/DA (SAE 90 EP)
Lube oil capacity	4 G.B. gals - 4 U.S. gals 14 (3.3 lt - 3.0 kg)

(*) The rear tread for cars fitted with wheel studs is 53.62" (1,362 mm).

FRONT SUSPENSION ASSEMBLY

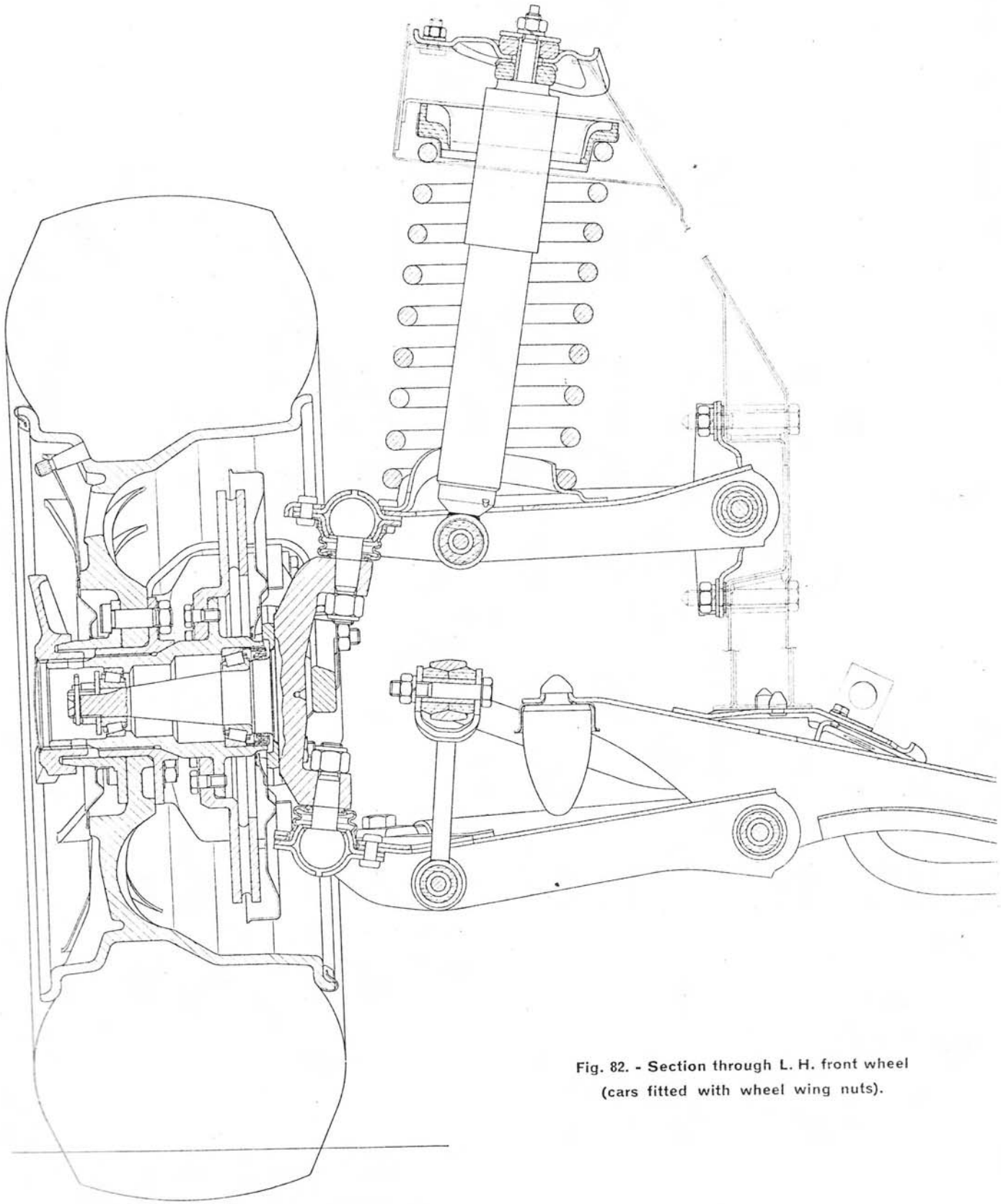


Fig. 82. - Section through L. H. front wheel (cars fitted with wheel wing nuts).

Front Suspension

GENERAL

The front suspension features control arms operating in conjunction with coil springs, hydraulic telescopic shock absorbers, reaction struts and a sway eliminator.

Upper and lower control arms are tied to the steering knuckle through ball joints (fig. 82). Both ball joints are boxed and riveted to arms.

Lower control arms are fitted with resilient bushings and pivoted to a mounting cross member attached to the body.

The cross member is fitted with rubber buffers (fig. 83) checking the bounces of lower control arms, and with two engine side mountings.

Front reaction struts (3, fig. 83) are attached to lower control arms. Upper control arms are connected to the body by means of pivot bars and resilient bushings.

Camber is adjusted by varying the number of shims set between the upper control arm mounting bracket and the body shell (fig. 90).

Caster is adjusted by varying the length of front reaction struts and the number of shims set between the body shell and the front end of upper control arms (fig. 89).

Coil springs are located between the upper control arm and underbody; a rubber seating ring protects them on top side.

Front reaction struts are to cushion the bounces of suspension and prevent the lower control arm from moving longitudinally; they consist of a sleeve with two adjustable ends and a pair of locking clamps.

The front ends of struts are articulated to the body with ball joints and the rear ends, yoked, are connected to lower control arm by screw and nut.

The sway eliminator has been designed for better car stability especially on turns. The bar is mounted on body through rubber cushions and on lower control arms with the intermediate of rubber bushed fork links.

Hydraulic shock absorbers are of the telescoping, double-acting type. An eyebolt on shock absorber bottom provides attachment to the upper control arm and a top threaded end secures the shock absorber to the underbody.

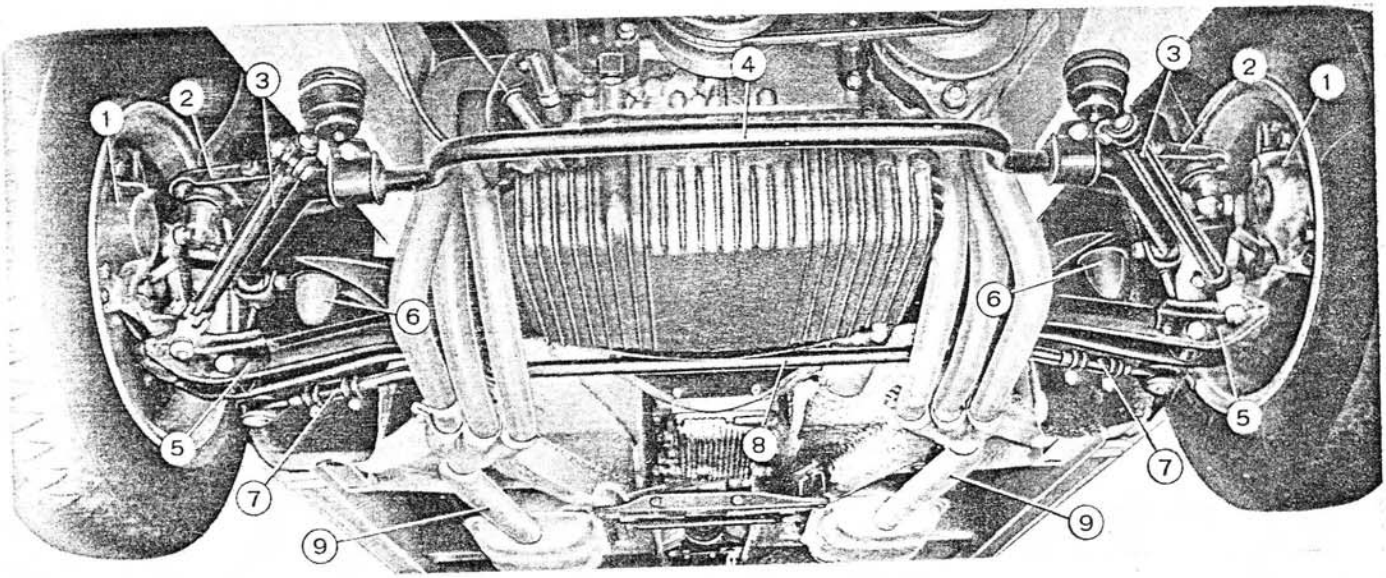


Fig. 83. - Bottom view of front end.

1. Brake calipers - 2. Upper control arms - 3. Reaction struts - 4. Sway bar - 5. Lower control arms - 6. Buffers - 7. Track rods - 8. Idler arm rod - 9. Exhaust manifolds and pipes.

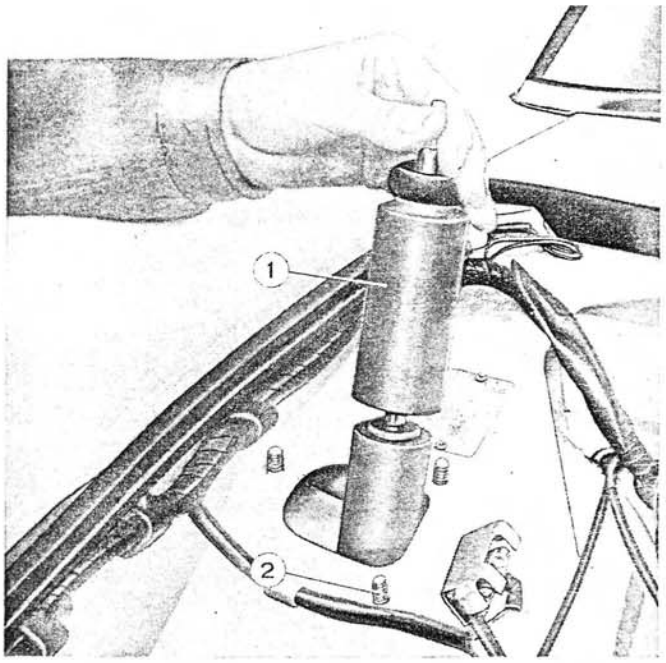


Fig. 84. Removing R.H. front shock absorber.
1. Hydraulic shock absorber - 2. Studs, shock absorber mounting bracket.

Removing Front Suspension.

Proceed as follows.

Jack up the car at front and remove the wheels.

Using wrench **A. 57020** firmly hold the shock absorber at the top end and remove the upper lock nut and the lower screw.

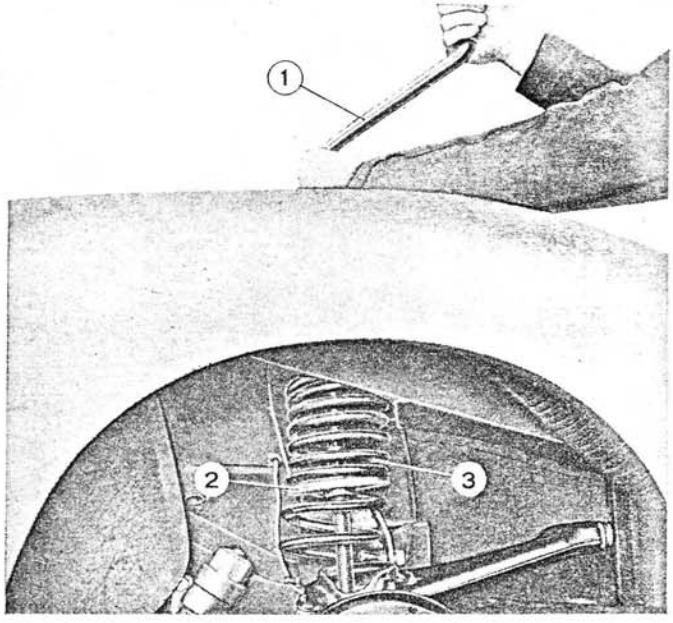


Fig. 85. - Compressing front coil spring.
1. Coil spring compressor A. 74112 - 2. Compressor plate - 3. Coil spring.

Remove the shock absorber mounting bracket to body and lift out the shock absorber from the upside (fig. 84).

Affix tool **A. 74112** with plate, as shown in fig. 85.

Operate the tool so to compress spring.

Using puller **A. 47035** (fig. 101), disconnect track rods from knuckle arms.

Tie off reaction struts from lower control arms by removing their locking screw and nut as well as any shims present.

Disconnect the sway bar articulation from lower control arm.

Detach the hydraulic brake hose from its connector to brake piping.

Remove: upper control arm bracket nuts from body and upper control arm front screws. In both cases, note the number of shims fitted (I and P, fig. 89).

Support the suspension, remove lower control arm mounting screw and take down the suspension assembly.

Operate tool **A. 74112** and relieve the coil spring gradually; remove tool and coil spring.

INSPECTION AND REPAIR

Control Arms.

a) To check upper and lower control arms for distortion place them on fixture **A. 95700** (figs. 86-87).

Minor distortions are corrected by straightening the arm; in all other cases the arm assembly must be renewed.

b) Ball joints should be snugly seated in their arm bores with absence of play.

If ball joints to not warrant a firm hold on control arms or they are worn, replace the arm assembly.

c) Check the condition of resilient bushings in control arms:

— the inner face of bushings should show no indication of binding against the pivot bar;

— the rubber tube of bushings should not be worn and it should not have lost elasticity.

Otherwise, replace bushings by new ones.

Steering Knuckle.

Check the steering knuckle on fixture **A. 96007** and replace it if distortion is evident.

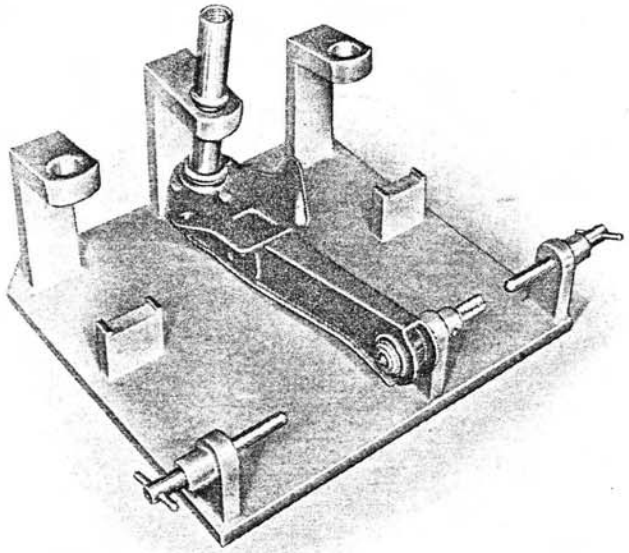


Fig. 86. - Checking lower control arm on gauge A. 95700.

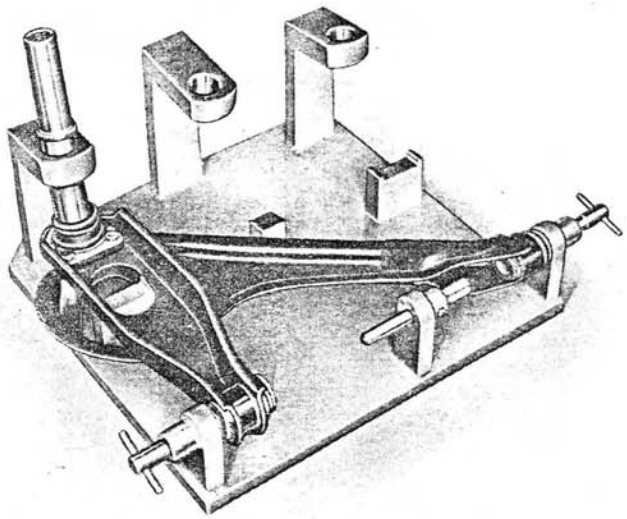


Fig. 87. - Checking upper control arm on gauge A. 95700.

Coil Springs.

Make a visual inspection of coil springs which should show no crack or twist; spring characteristics are tabulated hereafter.

COIL SPRING SPECIFICATIONS

Wire diameter	.524″ (13.3 mm)
Inner diameter	3.976″ (101 mm)
No. of active turns	8 1/4
Direction of winding	clockwise
Testing load	1.345 lbs (610 kg)
Free length, abt	16.063″ (408 mm)
Length of spring under 970 ± 22 lbs (440 ± 10 kg) of load	9.094″ (231 mm) (*)
Length of spring under 1,250 lbs (567 kg) of load	7.086″ (180 mm)

(*) Spring more then 9.094″ (31 mm) in length are identified with a yellow daub, springs 9.094″ (31 mm) long or less are identified with a green daub. Install springs showing the same colour mark.

Sway Bar.

Check the sway bar for distortion. See if bar ends are lined up: maximum out-of-true allowance is ± .059″ (1.5 mm). If distortion is negligible straighten the bar, otherwise replace the assembly.

Visually examine rubber cushions at bar mountings to underbody and resilient bushings at lower control arms. Replace damaged parts.

ASSEMBLING SWINGING UNITS

After control arms, upper and lower, and the steering knuckle have been checked up and serviced as previously outlined, assemble them as directed hereafter.

Working on a separate bench the whole unit must be assembled including the brake disk, caliper, wheel hub and pitman arm.

For tightening torques, see the general table on page 77.

SUSPENSION ASSEMBLY TO CAR

If the cross member (A, fig. 89) was removed, install it on body; locate dowel pins (B) in their seats and tighten home on mounting screws (C and D).

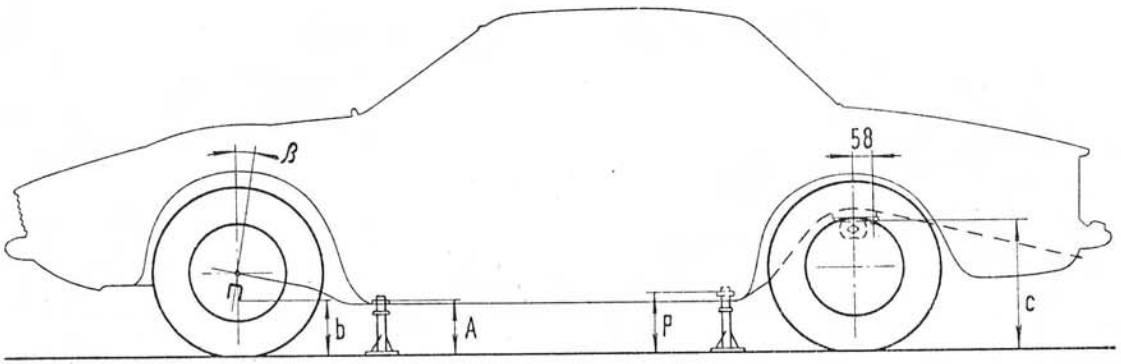
Connect swinging units to the cross member (A) by means of pivot bars (E) and to body by means of pins (F, G, H) which should not be locked; at pins F and G, fit the same number of shims P as found on disassembly.

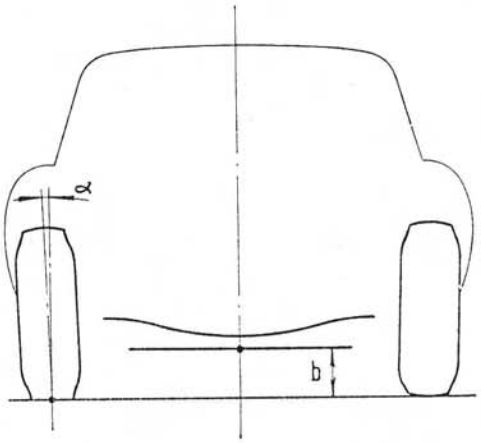
When the pin (H) is installed, set shims (I) between the arm bushing and the arm mounting face on body so to take up all clearance.

Then install coil springs and shock absorbers using tool **A. 74112**

Complete the assembly of suspension referring to the removal procedure in reverse order.

Units must be locked definitely to the body with the car « loaded » (2 persons plus 44 lbs or 20 kg), otherwise resilient bushings may be unduly stressed.





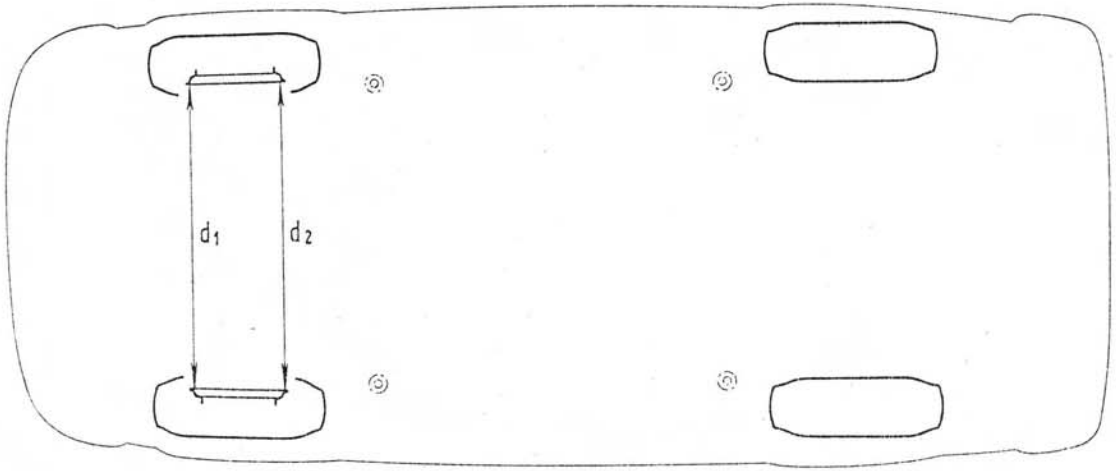


Fig. 88. - Diagram showing the position of spacing gauges A. 74144/1 for check of car load condition, for tightening front and rear suspension bushings, for check and adjustment of front end geometry.

A-P. Heights with spacing gauges in position - b. Ground clearance of car measured at 12.52″ (318 mm) apart from center of cross member - c. Ground clearance of car measured at bottom of buffer plate at 2.28″ (58 mm) apart from wheel center - d_1. Distance of wheel rims at front edge - d_2. Distance of wheel rims at rear edge - α. Camber - β. Caster.

b = 7.32″ ± .20″ (186 ± 5 mm)
c = 18.43″ ± .20″ (468 ± 5 mm)
d_2-d_1 = .118″ ± .039″ (3 ± 1 mm)
α = 1° 30′ ± 20′
β = 3° 20′

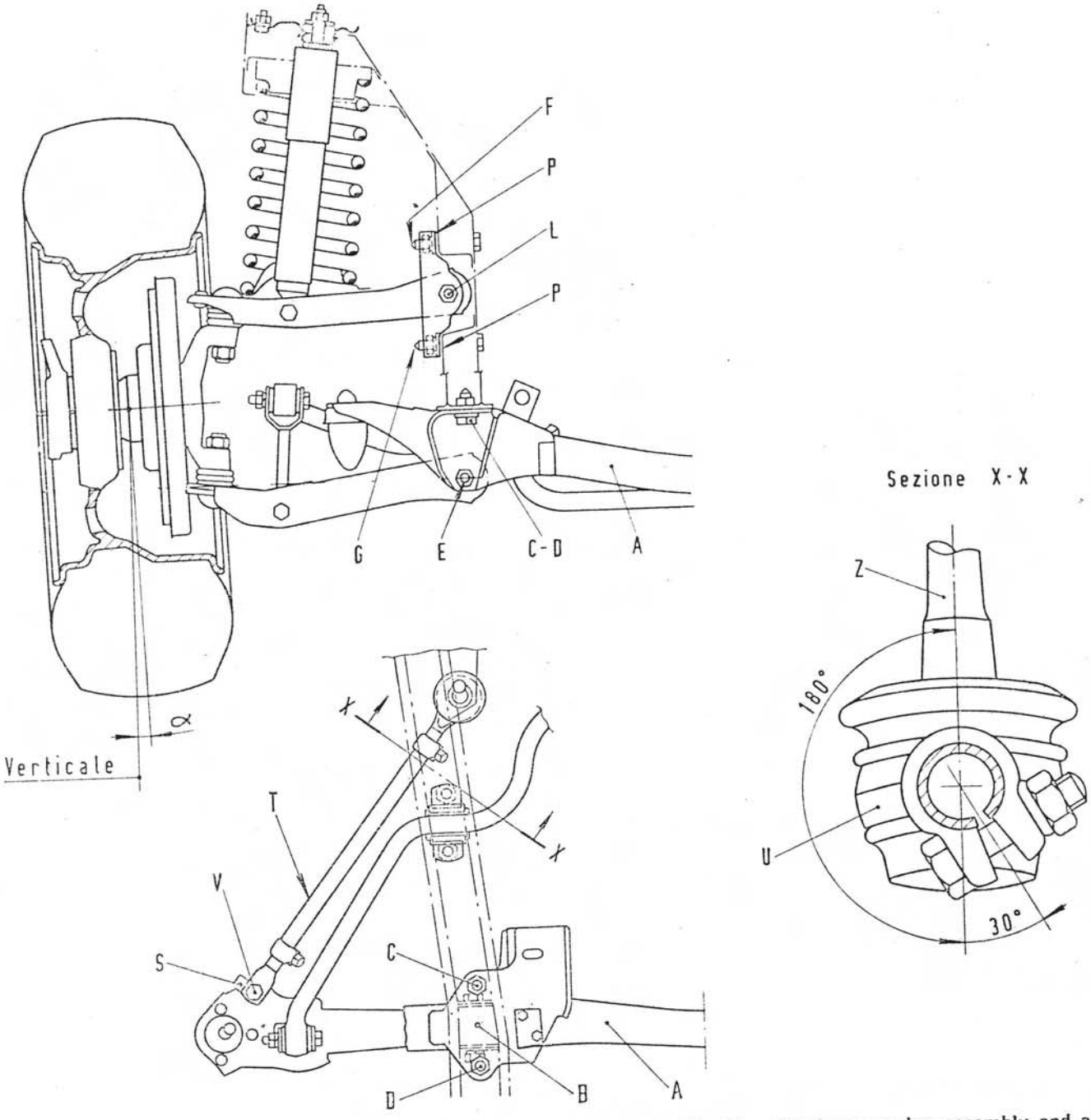
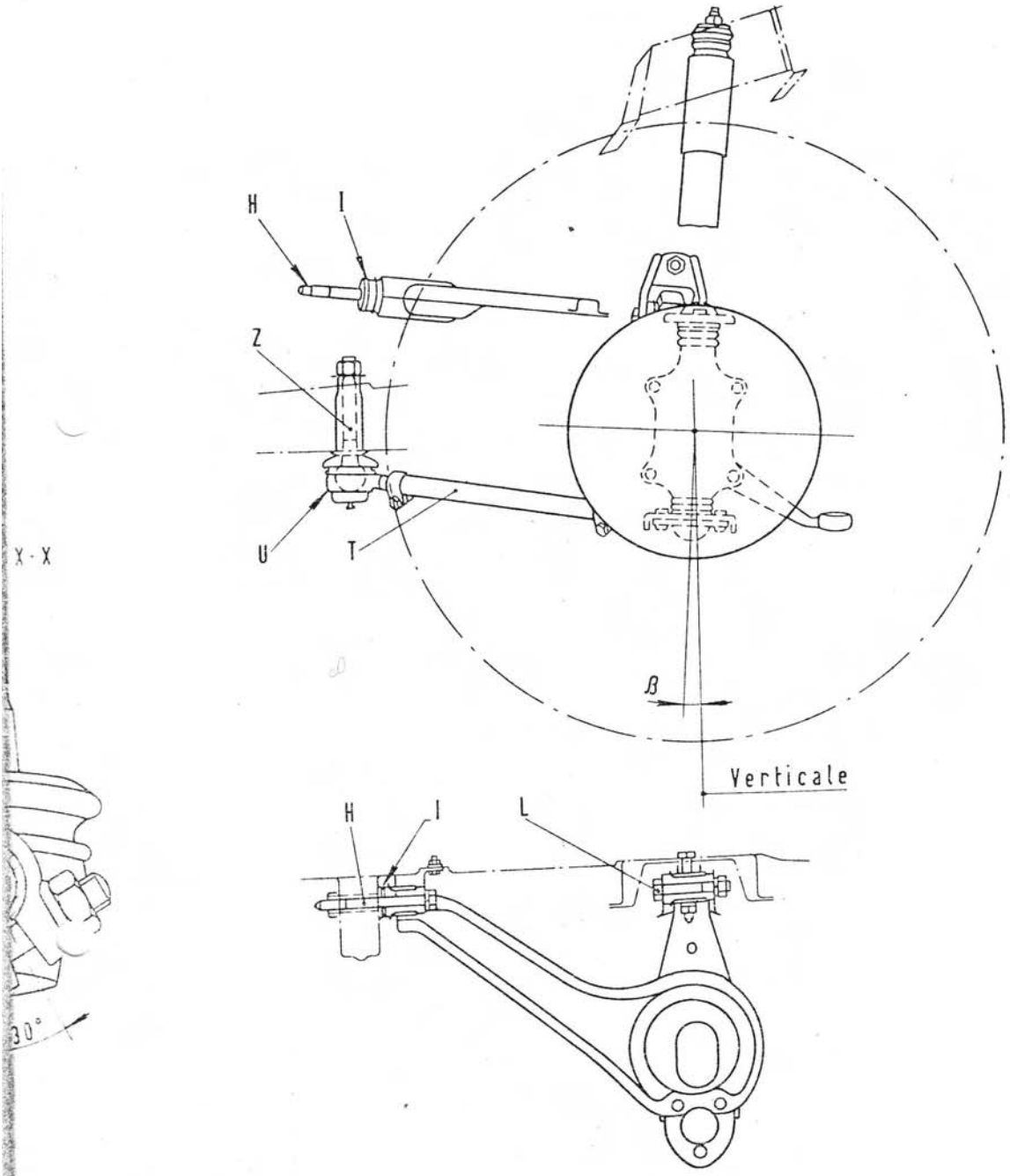


Fig. 89. - Front suspension assembly and adjustm

A. Center cross member mounting lower control arm - B. Cross member dowel pi
E. Pivot bar, lower control arm - F-G. Pins, upper control arm mounting - H. Pin,
upper control arm pivot bar - P. Shims, camber adjustment - S. Shims, front re
U. Reaction struct end - V. Screw, front reaction strut fork - Z. Fr

- α. Camber angle (1° 30′ ± 20′) - β. Caster angle

Sezione = Section
Verticale = Vertical



nbly and adjustment diagram.

member dowel pin - C-D. Screws, cross member to body - nounting - H. Pin, front, upper control arm - I. Shims - L. Nut, S. Shims, front reaction strut fork - T. Front reaction strut - strut fork - Z. Front reaction strut ball joint.

- β. Caster angle ($3° \pm 20'$).

Section
Vertical

To obtain load condition spacing gauges **A. 74144/1** with items **/5** have been designed, as outlined hereafter.

Set the car on a level surface with wheels parallel to car C/L and inflate tires to recommended pressure.

Position spacing gauges as shown in fig. 88 and insert gauge lock pins.

Load the car so that the underbody is just in touch of upper ends of gauges.

Now, lock the nuts of pins and pivot bars (E, H, L, fig. 89) of resilient bushings and fit the reaction strut (T) as follows.

The reaction strut (T) must be installed with the ball joint (Z) at right angle to strut end (U) and the strut clamps must be positioned and locked as shown in fig. 89 (section XX).

NOTE

In case spacing gauges are not available, load the car gradually until the following ground clearances are obtained:

- **front,** 7.32″ ± .20″ (186 ± 5 mm) at 12.52″ (318 mm) apart from center of cross member (fig. 88);
- rear, 18.43″ ± .20″ (468 ± 5 mm) at 2.28″ (58 mm) apart from wheel center at rear buffer plate (fig. 88).

WHEEL BEARINGS

For cars fitted with wheel wing nuts, the installation and adjustment of front wheel bearings is as follows.

On installation:

- the inner chamber between either bearing cup in the wheel hub must not be filled up with grease, the recommended amount of which (2 1/2 ozs - 70 gr) should be spread over the outskirts of the recess;
- the space between the bearing cage and cone must be filled with grease;
- the amount of grease specified for the outer chamber of the outer bearing is .7 ozs (20 grams); use FIAT MR grease.

Mount the wheel hub as follows:

- draw up the hub nut with 14 1/2 ft.lbs (2 kgm) of torque while rocking the hub 2 or 3 times to guarantee proper setting of bearings; loosen the nut and tighten with a torque of 5.1 ft.lbs (0.7 kgm);
- rock the wheel hub, then back out the hub nut 10° and insert the cotter pin, recalling that the undoing angle of the nut **must be closest to 10° und never in excess of 40°.**

End float, in a new condition, must range between .0000″ and .0059″ (0.00 to 0.15 mm) (*).

In case adjustment only is required, proceed as outlined above.

Bearings should be adjusted when end float exceeds .0071″ (0.18 mm).

For cars fitted with wheel studs comply with above directions, recalling that:

- the amount of grease in the recess between either bearing must be 1.94 ozs (55 grams) and in the hub cap .88 ozs (25 grams);
- the nut should be backed out 30° and then locked by staking its collar into both grooves cut at knuckle end using pliers **A. 74126.**
- the end float of hub should range between .001″ and .004″ (0.025 to 0.10 mm) (*).

It is also possible to ckeck the wheel hub play with the wheel installed as follows;

- remove the wheel cover and the hub cap;
- back out a wheel stud;
- using above stud affix fixture **A. 74029;**
- push the wheel all the way toward car interior;
- fit on fixture a dial indicator with magnetic holder;
- touch the indicator plunger to knuckle pivot and set the dial needle at zero;
- pull the wheel outward;
- the resulting movement of the dial needle corresponds to the actual end float of wheel hub.

Adjustment of hubs is required when the end float exceeds .0051″ (0.13 mm).

WARNING - If adjustment of hubs only must be made, first remove and renew the nut, then adjust as directed above.

(*) NOTE - In conjunction with the second free service of car, check and adjust end float of bearings which should not be greater than .004″ (0.10 mm).

CHECKING AND ADJUSTING FRONT END GEOMETRY

The front end geometry must be ckecked and adjusted with the car « at load » as previously specified.

Check for the following angles:

— **camber:** $\alpha = 1^{\circ}30' \pm 20'$;

— **caster:** $\beta = 3^{\circ} \pm 20'$.

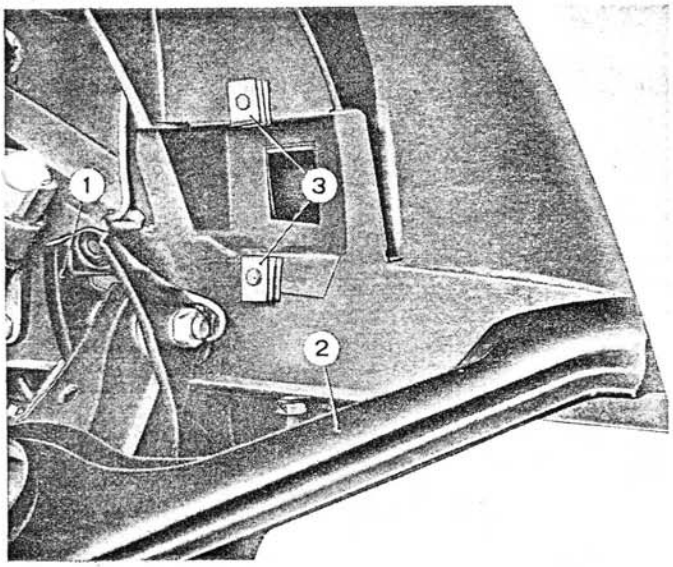


Fig. 90. - Fitting shims for camber adjustment.
1. Upper control arm bracket - 2. Upper control arm - 3. Shims.

In case different values are found adjust as directed hereafter.

To correct camber remove nuts from pins (F-G, fig. 89) and vary the number of shims (3, fig. 90):

— **to increase camber angle,** add the same amount of shims at both pins;

— **to diminish camber angle,** remove the same amount of shims from both pins.

To correct caster action on the front reaction strut (T, fig. 89) must be made:

— **to increase caster angle,** reduce the length of strut;

— **to diminish caster angle,** increase the length of strut.

NOTE - For minor adjustments of caster angle, just shorten or lengthen the front reaction strut as outlined above; in case an important correction of caster should be required, the length of strut at the same time as the number of shims (I, fig. 89) must varied. If so, next to adjustment, tighten the pin (H) to the prescribed torque with the car « at load ».

Finally, check toe-in as directed on page 65.

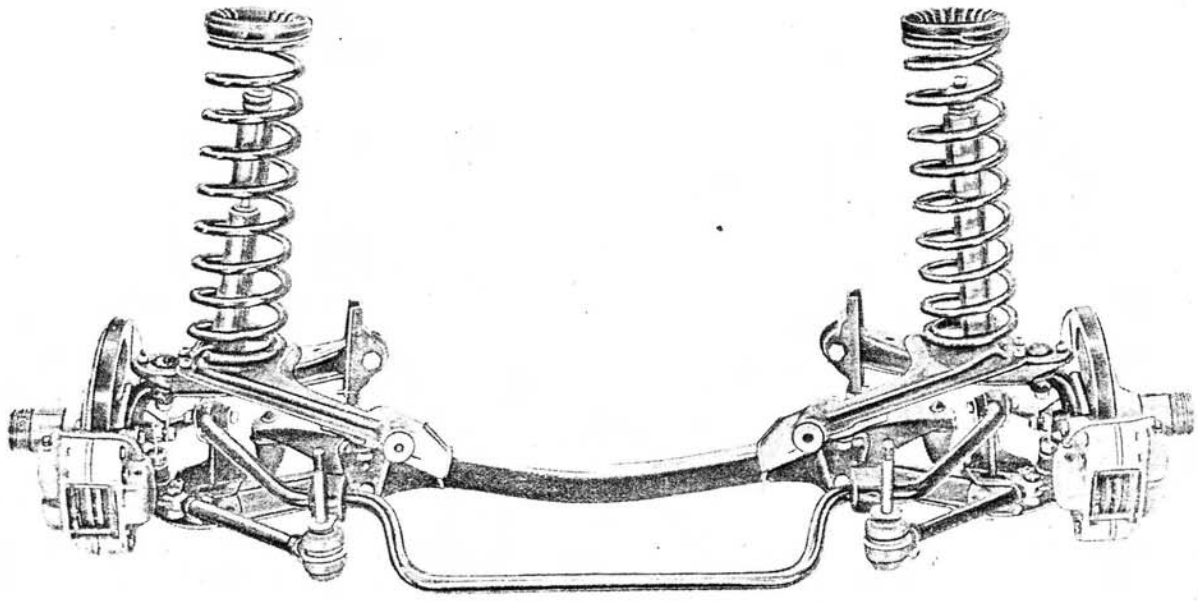


Fig. 91. - Front suspension and brake assembly.

FRONT SUSPENSION SPECIFICATIONS

Type	independent wheel with hydraulic shock absorbers and coil springs
Sway eliminator	cross bar mounted on resilient bushings
Tread, front (on ground)	54.527″ (1,385 mm) (**)
Upper control arms:	
attachment to body	pins and resilient bushings
attachment to steering knuckle	ball joints
Lower control arms:	
attachment to center cross member	pins and resilient bushings
attachment to steering knuckle	ball joints
Steering knuckles:	
Kingpin inclination	7° 30′
Caster (*)	3° ± 20′
Caster adjustment	shims and length variation of reaction struts
Wheels:	
Camber (*)	1° 30′ ± 20′
Camber adjustment	shims
Toe-in (*)	.079″ to .157″ (2 to 4 mm)
Toe-in adjustment	threaded sleeves at track rod ends
Bearing lubrication	FIAT MR grease
Car setting (loaded):	
Ground clearance, measured (see fig. 88):	
— front, at 12.52″ (318 mm) apart from center of cross member	7.32″ ± 20″ (186 ± 5 mm)
— rear, at 2.28″ (58 mm) apart from wheel center, at bottom of buffer plate	18.43″ ± .20″ (468 ± 5 mm)

(*) With car at load.

(**) Cars fitted with wheel studs: front tread = 53.976″ (1,371 mm).

Rear Suspension

GENERAL

The rear suspension is by two single-leaf semi-elliptic springs operating in conjunction with four hydraulic double-acting shock absorbers.

Two side reaction struts connect the rear axle to as many brackets mounted on body; reaction struts are articulated on resilient bushings (fig. 14).

The semi-elliptic spring is attached at front to a body-welded bracket, while at rear it is secured to the reaction strut mounting bracket through a shackle.

Shock absorbers are mounted on underbody at top and on brackets welded to rear axle at bottom.

A pair of rubber buffers on floor at axle extensions check suspension bounces.

INSPECTION AND REPAIR

During overhaul of rear suspension check:

— the semi-elliptic spring and replace it if cracked or broken;

— the semi-elliptic spring against specifications tabulated on page 59 and given in figs. 93-94.

— the resilient bushings fitted in end eyes of spring for signs of deterioration; any noises or squeaks developed by these bushings con be noticed with the spring fitted to the vehicle; renew bushings, if necessary;

— the reaction struts for distorsion and their resilient bushings for wear; straighten struts or alternatively, renew them along with any bushings found worn.

ASSEMBLY

To assemble the rear suspension proceed as follows:

— secure reaction strut brackets complete with leaf spring shackles to body;

— connect reaction struts to brackets and tighten pin nuts just lightly;

— install shock absorbers and secure them at top to body;

— secure rear axle to leaf spring drawing up mounting bracket nuts with 36.2 ft.lbs (5 kgm) of torque; then screw the spring center mounting screw nut part way in only;

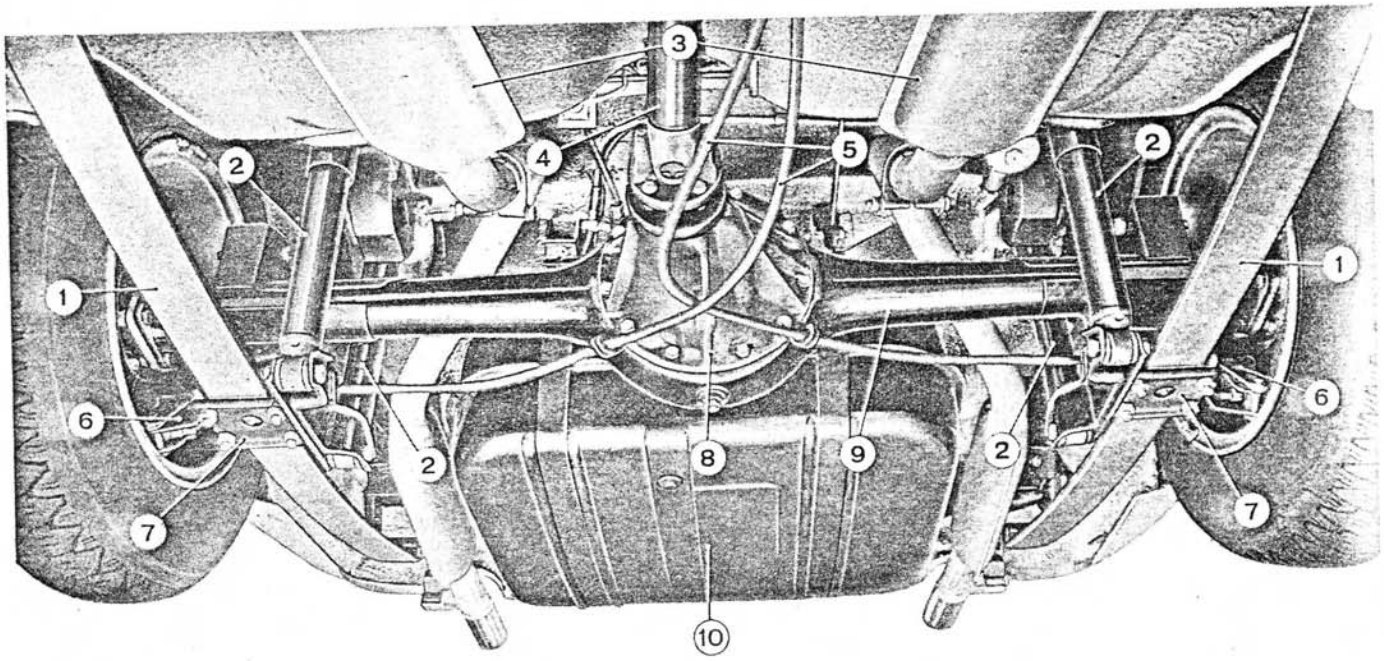


Fig. 92. - Running gear units of car seen from below.

1. Semi-elliptic springs - 2. Shock absorbers - 3. Mufflers - 4. Rear prop shaft - 5. Parking brake cable - 6. Parking brake calipers - 7. Plates fastening rear axle to leaf springs - 8. Differential carrier - 9. Rear axle - 10. Fuel tank.

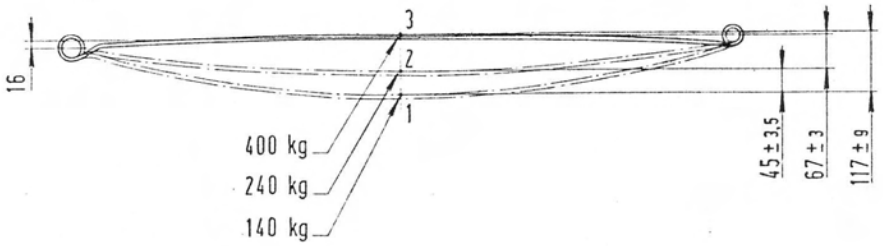


Fig. 93. - Rear semi-elliptic spring oscillation diagram.

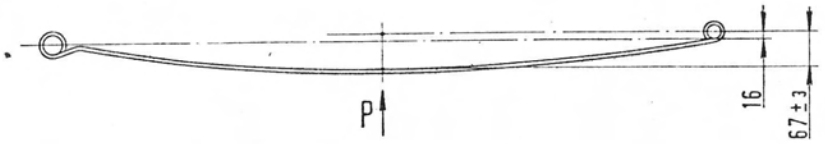


Fig. 94. - Diagram of semi-elliptic spring as fitted to car.

P = Spring camber.

— connect the rear axle-semi-elliptic spring assembly to body but do not fasten the springs to brackets and shackles;

— connect the prop shaft to bevel pinion flange sleeve;

— connect rear axle to reaction struts without locking pin nuts;

— tie shock absorbers at bottom to rear axle brackets;

— connect: the hydraulic brake line to the « T » connector secured to rear axle and the parking brake cable;

— secure the brake pressure regulator to its rear axle joint (see page 73).

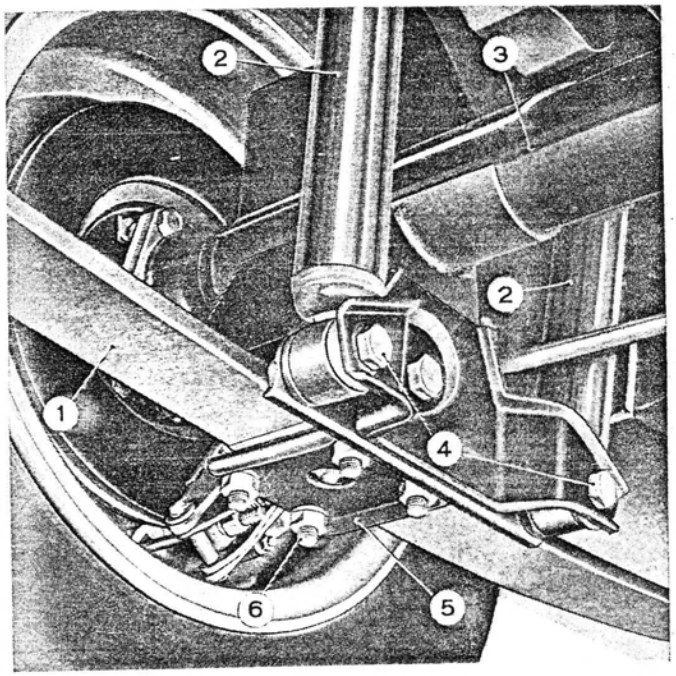


Fig. 95. - Detail of rear suspension fitted to car.

1. Semi-elliptic spring - 2. Shock absorbers - 3. Rear axle - 4. Shock absorber mounting screws - 5-6. Plate and screws fastening rear axle to leaf spring.

SEMI-ELLIPTIC SPRING TESTING DATA

POSITION.	Load		Camber		Camber in 2nd and 3rd positions		Deflection rate	
	lbs	kg	in	mm	in	mm	in % lbs	mm % kg
1 Initial load for checking deflection rate	370	140	—	—	—	—	.803 ± .062	45 ± 3.5
2 Static load	634	240	2.638 ± .118	67 ± 3	1.772 ± .138	45 ± 3.5		
3 Settled load	1057	400	—	—	4.606 ± .354	117 ± 9		

Spring is identified with a daub of brown paint.

— bleed the brake hydraulic lines and, if necessary, adjust the parking brake cable;

— finally install the complete wheels.

Set the car under load as outlined on page 55 and secure the following parts:

— the reaction struts at their brackets by tightening lock nuts to 68.7 ft.lbs (9.5 kgm);

— the semi-elliptic springs at front brackets and reaction strut bracket shackles by tightening lock nuts and screws to 68.7 ft.lbs (9.5 kgm);

— semi-elliptic spring center mounting screws which must by torqued to 68.7 lbs (9.5 kgm).

Unload the car and remove spacers.

Proceeding as above pivot bushings will not be likely to undergo abnormal stresses.

REAR SUSPENSION SPECIFICATIONS

Struts	two, side
Connection to rear axle and body	by screws and resilient bushings
Semi-elliptic springs	two
Composition	single leaf
Body hinging bushings	resilient
Camber under a load of 529 lbs (240 kg)	2.638″ ± .118″ (67 ± 3 mm)
Deflection rate	.803 ± .062 in % lbs (45 ± 3.5 mm % kg)
Rear tread	53.149″ (1350 mm) (*)

(*) For cars fitted with wheel studs the rear tread is 53.621″ (1362 mm).

Hydraulic Shock Absorbers

SHOCK ABSORBER SPECIFICATIONS

	Front	Rear
Pressure cylinder bore	1.063″ (27 mm)	1.063″ (27 mm)
Length (between lower mounting center and upper face of dust shield):		
— retracted (abutting begins)	9.311″ (236.5 mm)	12.972″ (329.5 mm)
— extended (abutting begins)	13.740″ (349 mm)	21.831″ (554.5 mm)
— extended (max. expansion (*))	14.134″ (359 mm)	
Stroke (abutting begins)	4.429″ (112.5 mm)	8.859″ (225 mm)
Compression	.157″ ± .039″ (4 ± 1 mm)	.138″ ± .039″ (3.5 ± 1 mm)
Rebound	.551″ ± .059″ (14 ± 1.5 mm)	.335″ ± .059″ (8.5 ± 1.5 mm)
Fluid capacity	5 G.B. fl. ozs - 4 3/4 U.S.fl. ozs (0.14 lt)	7 3/4 G.B. fl. ozs - 7 1/2 U.S. fl. ozs (0.22 lt)
Fluid quality	FIAT S.A.I.	FIAT S.A.I.

(*) With the inner buffer being crushed under an axial load of some 661 lbs (300 kg).

These shock absorbers, which equip both the front and rear suspension, of the telescopic, double-acting type, are also termed « direct working », since their dampening action takes place directly on suspension without the intermediary of levers.

They are fitted with thermostatic valves, thanks to which the dampening action is not affected appreciably even under heavy temperature variations.

The front shock absorbers are also provided with a rubber buffer (17, fig. 96) pressed on the rod over the suction valve check plate.

During a rebound the buffer comes in contact with the piston rod guide bushing and thus limits the stroke of the absorber, preventing the front wheels returning too far when running over very rough ground.

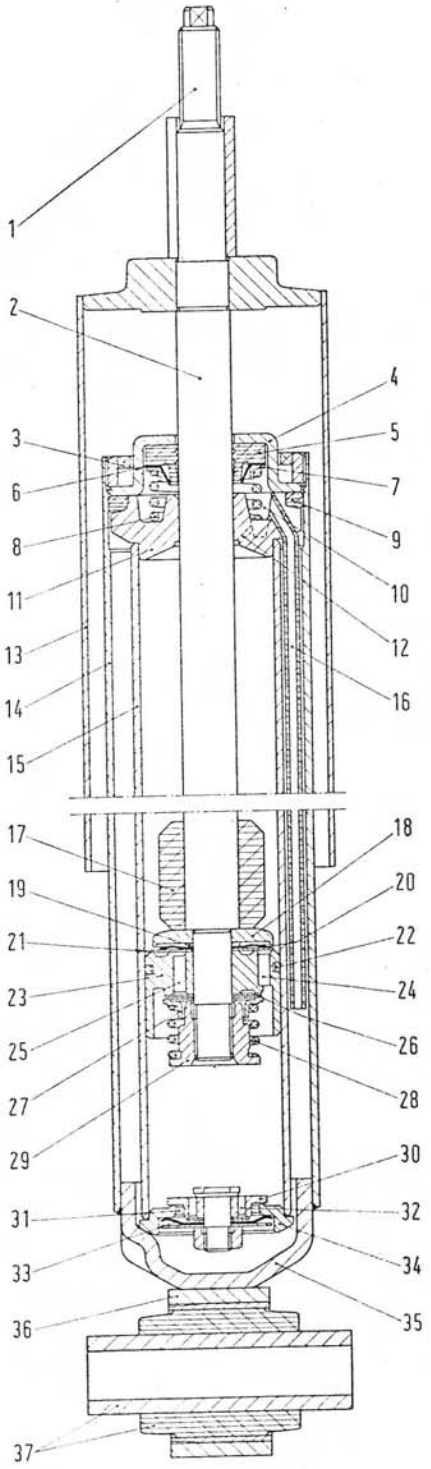
Shock absorbers, both front and rear, are provided ith a vapour pocket bleeder from cylinder interior.

The bleeder device consists of a capillary hole (12, fig. 96) interconnecting the working 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.

So, a rational and efficient bleeding of the hydraulic lines is obtained with this device which isolates the circuit from air in the reservoir.

FRONT SHOCK ABSORBER



1. Threaded shank, upper 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 bushing - 12. Vapour pocket drain capillary hole - 13. Dust shield - 14. Casing - 15. Working cylinder - 16. Vapour pocket drain passage - 17. Rubber buffer - 18. Valve lift limiting disc - 19. Valve lift adjustment washer - 20. Valve star-shaped spring - 21. Inlet valve - 22. Compression ring - 23. Piston - 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. Lower mounting eye - 37. Pin and bushing, lower mounting eye.

Fig. 96. - Sectional view of front shock absorber.

Steering

STEERING GEAR

The steering gear is of the worm and roller type with a ratio of 16.4 to 1.

The steering gear is mounted to the left in the engine compartment.

NOTE - Before adjusting worm and roller, make sure that there is nothing wrong with the steering linkage.

Removing and Installing Steering Gear.

Remove the steering gear as follows.

Working in car interior, remove steering column and front universal joint mounting covers. Then remove the intermediate section of the steering column by backing out universal joint sleeve fixing screws (5, fig. 99).

Using tool **A. 47035** disconnect the pitman arm from the idler arm rod articulation.

Remove the steering gear mounting screws (2, fig. 98) from the body and take down the steering gear.

For installation of steering gear just reverse the removal procedure.

Inspection and Adjustment of Steering Gear.

Mount the steering gear on fixture **A. 74076/1/2**.

Pitman arm (14, fig. 97) must not be detached from roller spindle (6).

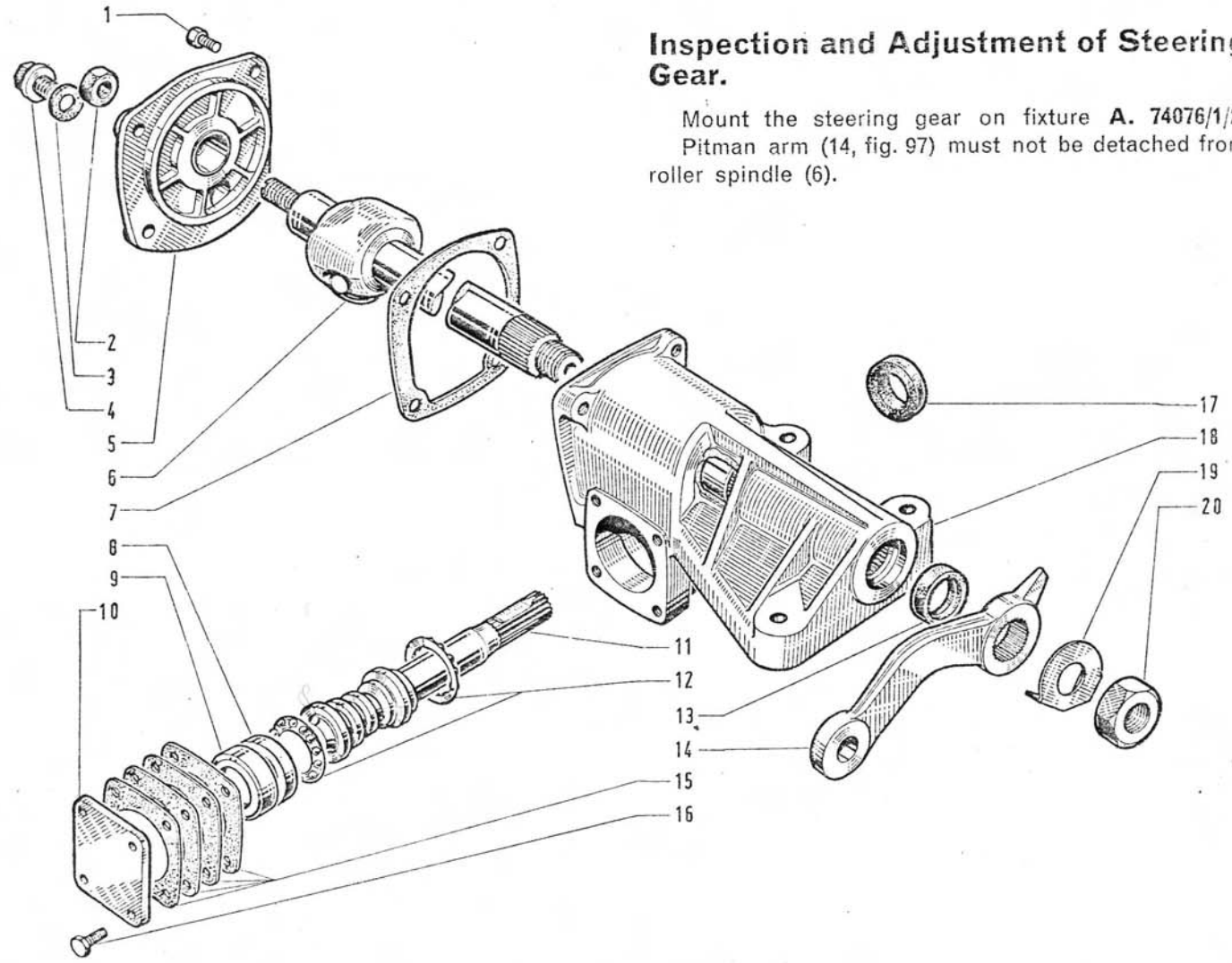


Fig. 97. - Exploded view of the steering gear.

1. Cover fixing screw - 2. Adjusting screw locknut - 3. Gasket - 4. Oil filler plug and washer - 5. Steering housing cover - 6. Roller spindle - 7. Gasket - 8. Bearing cup - 9. Retaining ring - 10. Worm thrust bearing cover - 11. Steering column and globoidal worm - 12. Ball bearings - 13. Seal - 14. Pitman arm - 15. Shims - 16. Screw - 17. Seal - 18. Steering gear housing (with upper ball bearing cup and roller spindle needle bearing cages) - 19. Lock plate - 20. Pitman arm fixing nut.

a) Rotate the fixture with the steering gear so that the steering column (11) and roller spindle (6) above it are in a horizontal position.

b) Centre the steering. To do this, turn the steering to full lock in one direction and then back to full lock in the opposite direction: count the number of revolutions of the steering column and divide by two: this will give the number of revolutions required to bring the steering back to centre position.

c) Now rotate steering column (11) to the right, in successive quarter-turns and, in each position, check if there is any play in the pitman arm (holding the latter lightly). When any play is found, note the position and then repeat the operation turning the steering to the left.

The movement for the initial clearance on either side should not differ more than 2/4 of a turn.

d) If play is found to exist in the straight-ahead position proceed as follows, (using screw driver and wrench):

— hold the adjusting screw with the screw driver and unscrew locknut (2, fig. 97);

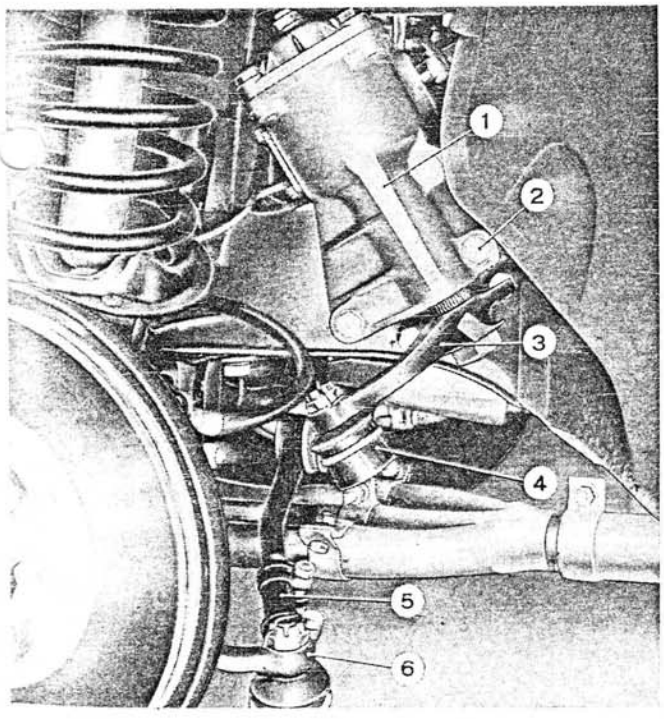


Fig. 98. Detail of steering gear and linkage fitted to the vehicle.

1. Steering gear - 2. Steering gear mounting screws - 3. Pitman arm - 4. Idler arm rod end - 5. Track rod - 6. Knuckle arm.

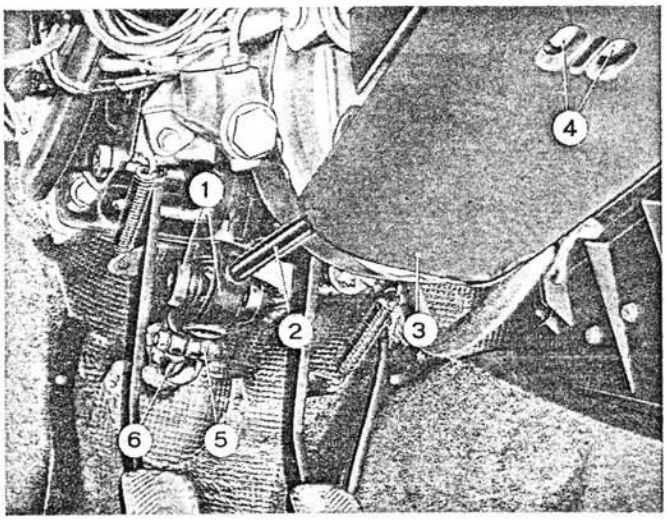


Fig. 99. - Steering column fitted to the vehicle.

1. Lower universal joint - 2. Intermediate steering column - 3. Steering column mounting cover - 4. Cover fixing screws - 5. Universal joint sleeve fixing screw - 6. Lower steering column.

— rotate the worm clockwise one-quarter turn and lock it with locknut (2);

— check again position at which play begins.

After making the adjustment, tighten up locknut (2) again.

Dismantling Steering Gear.

Drain off the oil from the housing by removing plug (4, fig. 97).

Remove pitman arm fixing nut (20) and take down pitman arm (14).

ROLLER SPINDLE

Take out the cover fixing screws (1, fig. 97) and locknut (2).

Screw in the adjusting screw and remove cover (5).

Extract roller spindle (6).

GLOBOIDAL WORM

Remove cover (10). The thin paper gaskets must be changed at every dismantling operation.

Remove retaining ring (9), the bearing cup (8) and lower ball bearing (12), steering column (11) and finally upper ball bearing.

The cup of the upper ball bearing is a force-fit in the steering housing and must not be removed.

With a mallet, knock out seals (13 and 17).

NOTE - If the cup of the upper ball bearing of the globoidal worm and the roller spindle needle-bearing cages require replacement, the whole steering gear must be changed: the gear is supplied as a spare complete with these parts.

Assembling Steering Gear.

Fit new seals (12 and 17, fig. 100).

GLOBOIDAL WORM

Fit steering column (16, fig. 100) with ball bearings (11), cup (7) of rear bearing and retaining ring (8) into steering housing.

Fit shims (14), applying a coat of sealing compound to those on the ouside of the shim pack.

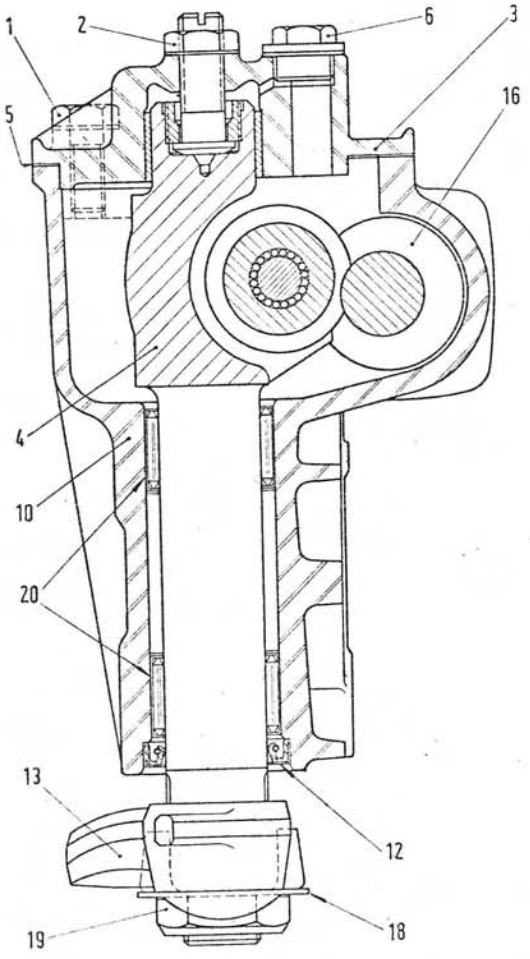
Fit cover (9) and tighten screws (15) with a torque of 14.5 to 18.1 ft.lbs (2 to 2.5 kgm).

NOTE - If one or more of the parts in this assembly have to be changed, the preloading of the steering column must be checked again. To adjust this, vary the number of shims (14) so that, when screws (15) are tightened up with a torque of 14.5 to 18.1 ft.lbs (2 to 2.5 kgm), column (16) in a horizontal position and fitted with its own steering wheel, can be turned by a force of 3.5 ozs to 9 ozs (100 to 250 gr) applied to the rim of the wheel.

ROLLER SPINDLE

Fit gasket (5, fig. 100), coated with sealing compound, to cover (3).

Screw cover (3) onto roller spindle adjusting screw (4) and insert the assembly into the steering box taking care not to damage seal (12) when passing it over the splined part of the steering column.



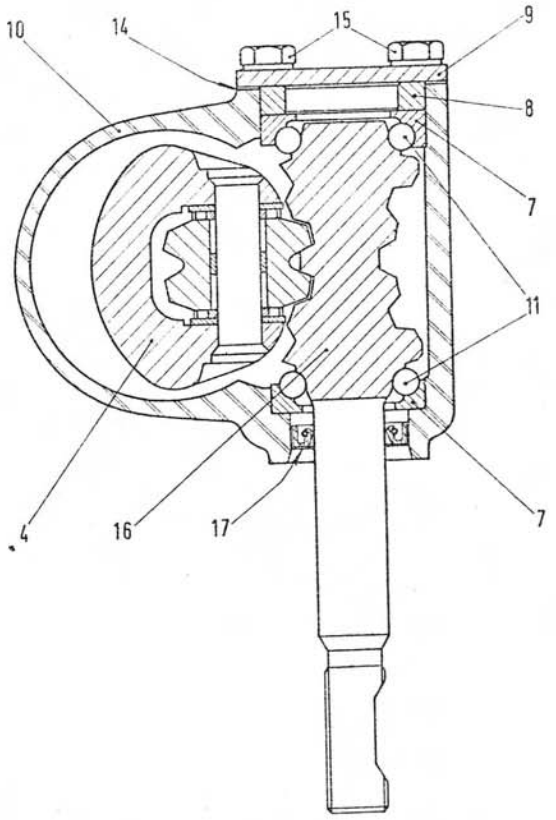


Fig. 100. - Section of steering gear through roller spindle and worm.

1. Cover fixing screw - 2. Adjusting screw locknut - 3. Cover - 4. Roller spindle - 5. Gasket - 6. Oil filler plug - 7. Bearing cups - 8. Bearing retaining ring - 9. Cover - 10. Steering housing - 11. Ball bearings - 12. Seal - 13. Pitman arm - 14. Shim - 15. Cover fixing screws - 16. Steering column - 17. Seal - 18. Tab washer - 19. Pitman arm locknut - 20. Needle bearing.

Tighten cover fixing screws (1) with a torque of 14.5 to 18.1 ft.lbs (2 to 2.5 kgm).

Screw on locknut (2) but do not tighten it yet.

Adjust the beginning of play on the roller spindle as explained on page 63.

After making the adjustment, hold the screw and tighten up the locknut (12) with a torque of 14.5 to 18.5 ft.lbs (2 to 2.5 kgm).

Refill the steering housing with FIAT W 90/M oil (see table, page 66) and replace filling plug (6).

Fit pitman arm (13) and fix it with nut and tab washer (18 and 19).

NOTE - It will take a certain amount of running to run-in the mating parts, after which the adjustment should be checked again. A good rule is to do this after the first 1,300 to 3,000 miles (2000 to 5000 km).

After this last operation the play in the steering gear tends to become stable and further adjustment will not be needed.

STEERING LINKAGE

Pitman arm fixed to the roller spindle acts through a rod (6, fig. 101) which is coupled at its other end to idler arm.

Track rods are connected at their outer ends to the knuckle arms and at their inner ends to idler arm rod.

Hydraulic damper (5, fig. 101) fixed on the opposite end to the steering gear cushions vibrations which might cause serious damage to the steering system.

At full lock the inside wheel turns through an angle of 33° ± 1° 30′ and the outer through 26°.

The turning circle is 35′ 1″ (10.7 m).

The two track rods have adjusting sleeves (7, fig. 83) for setting the wheel toe-in.

Inspection and Repair.

Make a careful check of the rod ball-ends, after disconnecting the track rods from pitman, idler, and knuckle arms.

Rubber boots for track rod ball joints should be checked periodically.

Any entry of water or dust from poor sealing of boots is apt to bring about damage or premature wear of ball joints.

If, on inspection, rubber boots turn out **not to be thoroughly dry** for the presence of grease having seeped out from the joint, renew the latter immediately.

If there is too much play in the ball-joints or if the shank of the ball stud is damaged, the rod end must be changed.

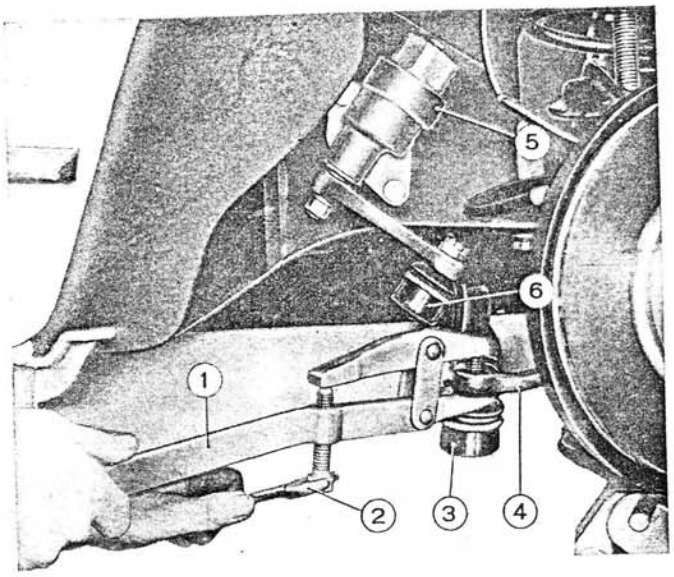


Fig. 101. - Removing track rod.

1. Tool A. 47035 for removing track rod end - 2. Tool actuating wrench - 3. Track rod end - 4. Knuckle arm - 5. Idler arm bracket with damper - 6. Idler arm rod end.

FRONT WHEEL TOE-IN

Toe-in must be checked with the car in the following conditions:

— wheels set for straight ahead drive, that is parallel to car centerline;

— car « at load » (2 persons plus 44 lbs - 20 kg);

— tires at the correct inflating pressure:

— front . . . . . 24.2 p.s.i. (1.7 kg/cm²)

— rear . . . . . 25.6 p.s.i. (1.8 kg/cm²)

Using gauge Ap. 5107, check that toe-in is within the following values:

— **.118″ ± .039″ (3 ± 1 mm).**

Otherwise, loosen the four clamps of track rod adjusting sleeves both sides and turn sleeves evenly in opposite directions; thus sleeves are screwed in or out in end joints, varying the length of track rods.

Once the correct toe-in has been obtained, tighten the sleeve clamps; with clamp nuts locked, a gap should be felt at clamp ends.

Also, the gap in sleeves and clamps should be flush and on the same side.

STEERING SYSTEM SPECIFICATIONS

Steering gear type	worm and roller
Gear ratio	16.4 to 1
Roller spindle bearings	two, needle
Wormshaft bearings	two, ball
Worm-to-roller lash adjustment	by adjusting screw after loosening the nut
Turning circle	35 ft 1 in (10.70 m)
Linkage	Track rads symmetrical and independent to each wheel, with intermediate rod and idler arm
Side track rods	with adjustable end joints
Intermediate idler arm rod	with non-adjustable end joints
Turning angle — inner wheel	$33^{\circ} \pm 1^{\circ}\ 30'$
Turning angle — outer wheel	26°
Front wheel toe-in (at load of 2 persons plus 44 lbs - 20 kg)	.118" ± .039" (3 ± 1 mm)
Steering gear oil — grade	FIAT W 90/M (SAE 90 EP)
Steering gear oil — capacity	$9\frac{1}{2}$ G.B. fl. ozs - $9\frac{1}{4}$ U.S. fl. ozs (0.275 lt - 0.255 kg)

Brakes

The braking system comprises:

- Double circuit (front and rear).
- Hydraulic service brakes, pedal controlled, of the disc type on all four wheels.
- Mechanical emergency and parking brake, controlled by a ratchet lever situated between front seats, acting on rear brake calipers.
- Air-hydraulic brake booster to relieve the driver's effort on brake pedal.
- Dual floating-valve master cylinder.

DISC BRAKES

This brake type consists basically of a disc slotted radially to activate cooling and a caliper.

The brake disc, which is attached to and rotates with the hub, is straddled by the caliper being integrated to the steering knuckle and rear axle through a plate.

The caliper is fitted with three cylinders: one cylinder on caliper inboard half and two cylinders on caliper outboard half (fig. 103). The brake fluid line from master cylinder is connected with the caliper inner half and circuited to relevant cylinder. The two cylinders of the

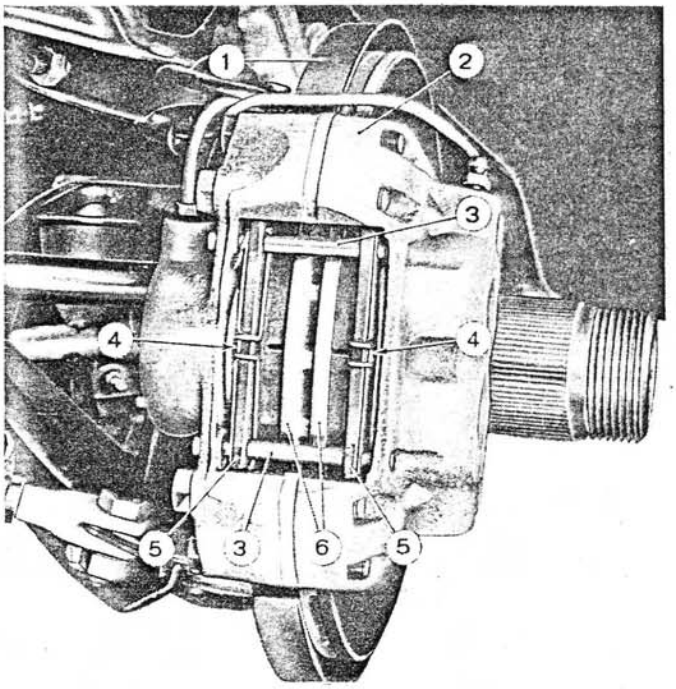


Fig. 103. - Brake caliper at L.H. front wheel.

1. Brake disc shield - 2. Brake caliper - 3. Lining pad retaining pins - 4. Lining pad fasteners - 5. Lining pads - 6. Brake disc with cooling slots.

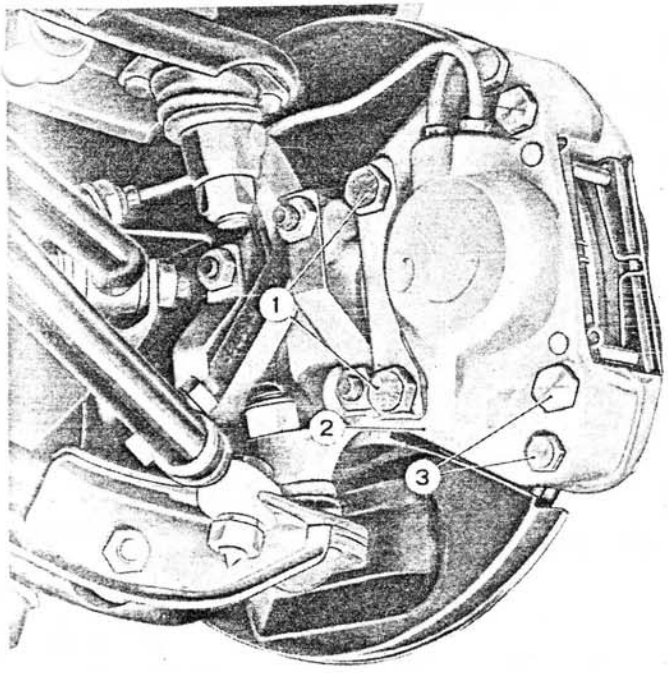


Fig. 102. - Showing front brake caliper mounting.

1. Screws, mounting brake caliper to caliper carrier plate - 2. Brake caliper - 3. Caliper interconnecting screws.

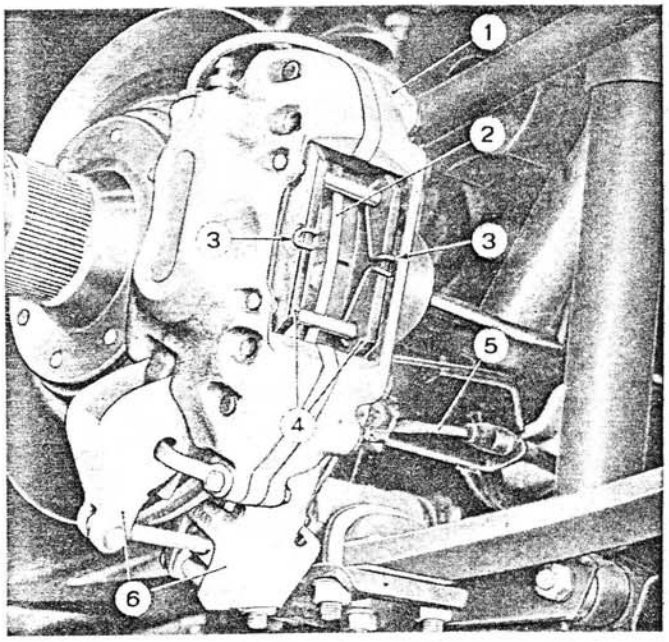


Fig. 104. - Brake caliper at L.H. rear wheel.

1. Brake caliper - 2. Brake disc with cooling slots - 3. Brake lining fasteners - 4. Lining pads - 5. Parking brake control cable - 6. Parking brake caliper.

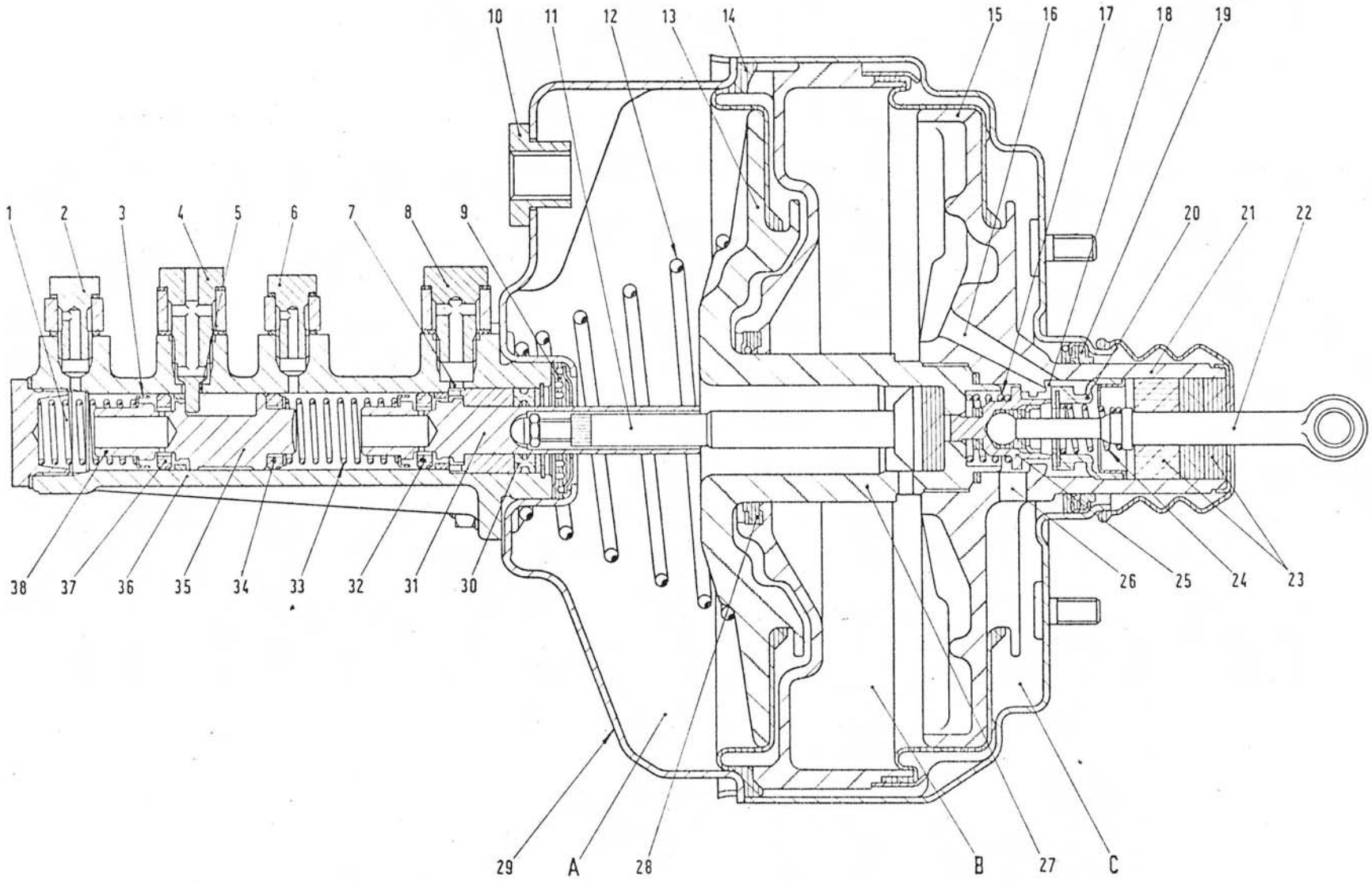


Fig. 105. - Section through Master-Vac brake booster and double-circuit master cylinder.

1. Rear brake circuit piston return spring - 2. Connector for rear brake line - 3. Spring backing cup - 4. Connector for inlet line from rear circuit fluid reservoir - 5. Compensating orifice - 6. Connector for front brake line - 7. Fluid inlet orifice - 8. Connector for inlet line from front circuit fluid reservoir - 9. Front seal - 10. Vacuum line connector seat - 11. Piston rod - 12. Piston return spring - 13. Front actuating piston - 14. Diaphragm - 15. Rear actuating piston - 16. Vacuum passage - 17. Retaining valve return spring - 18. Vacuum passage port - 19. Rear seal - 20. Retaining valve - 21. Actuating piston guide tube - 22. Valve control rod - 23. Filter element - 24. Piston-valve return spring - 25. Piston-valve - 26. Vacuum and air passage - 27. Hydraulic piston control rod guide tube - 28. Front actuating piston seal - 29. Brake booster front body - 30. Hydraulic piston seal - 31. Front brake circuit hydraulic piston - 32. Floating ring-valve - 33. Front brake circuit piston return spring - 34. Seal ring - 35. Rear brake circuit hydraulic piston - 36. Master cylinder body - 37. Seal ring - 38. Piston end - A. Front chamber - B. Rear chamber.

caliper outer half are circuited to the inner half cylinder through a line. Friction lining pads are fitted between pistons and the brake disc and retained in calipers by means of pins, fasteners and cotters.

Two dust shields are fitted between the lining pads and caliper cylinders.

The braking action is developed by the lining pads on both sides of the rotary disc; in stationary position lining pads are just in touch with the disc, ready for the next braking action.

Provision is made for automatic take-up of clearance from wear; therefore no manual adjustment is required.

A manual linkage fitted to the rear calipers operates the brake disc through separate friction pads.

Prior to carrying out any maintenance job to the braking system, take care to clean the system using **exclusively warm water with FIAT LD detergent:** dry immediately with an air blast. Follow this procedure whenever the vehicle is cleaned.

Manual Brake Mechanism on Rear Discs.

When the ratchet lever (39, fig. 135) is pulled, it displaces the adjustment rod and cable at whose ends are fixed the pull yokes operating the manual brake mechanism; for clearance adjustment between lining pads and disc proceed as directed on page 74.

Replacing Lining Pads.

Lining pads can be inspected from outside the caliper, after removing the road wheel; replace the lining pads if damaged or worn to .118" (3 mm) in thickness.

Withdraw lining pads as follows: remove fasteners (4, fig. 103), slide off retaining pins and remove dust shields (3, fig. 107) and plates (1, fig. 106) which carry the lining pads. Push in pistons in cylinder bores, using care not to ruin cylinder rubber seals in doing so.

Insert the plates with a new set of lining pads and install dust shields, retaining pins, cotter pins and fasteners.

Before driving away the car after lining pad replacement, the brake pedal should be pumped until a solid resistance is felt: this will re-set the pistons in position.

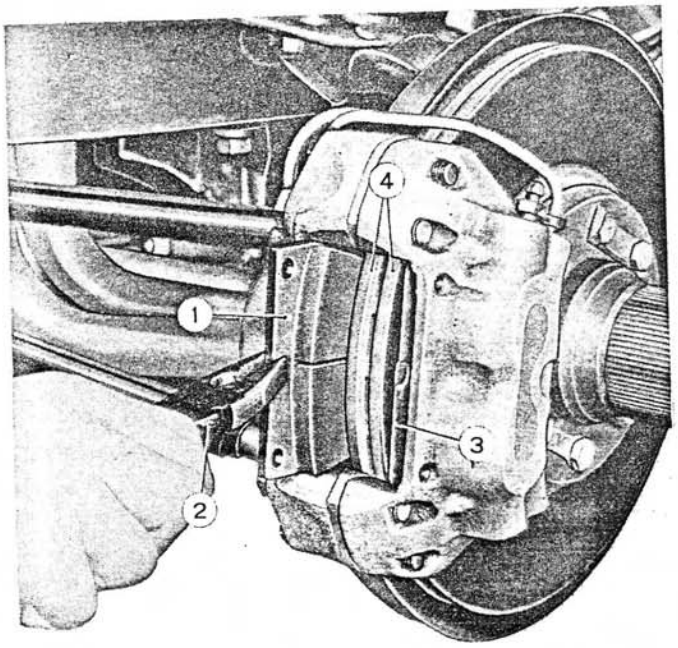


Fig. 106. - Removing lining pads.
1. Plate and lining pad - 2. All-purpose pliers - 3. Dust shield - 4. Brake disc.

SERVICE PROCEDURES

Inspection and Assembly.

When the braking system has heen overhauled, before fitting the various units proceed as follows.

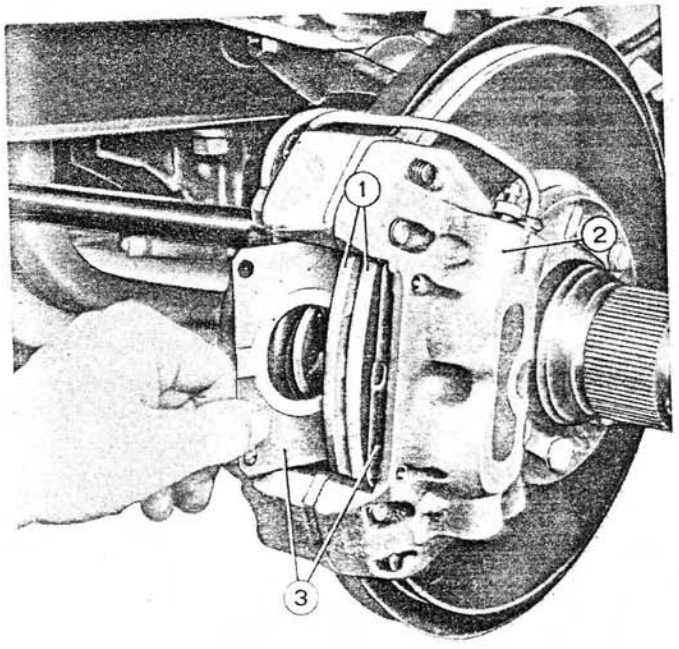


Fig. 107. - Removing brake caliper piston dust shields.
1. Brake disc - 2. Brake caliper - 3. Dust shields.

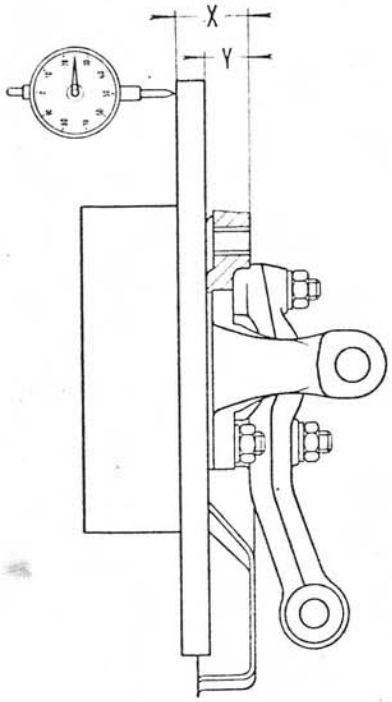
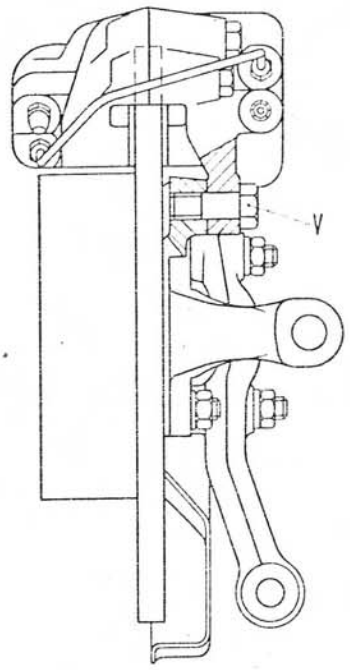
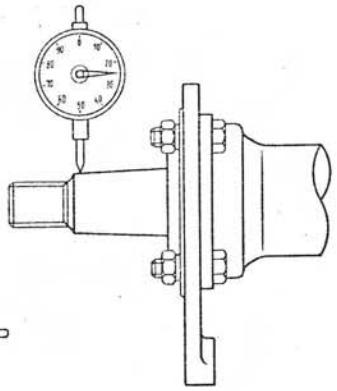


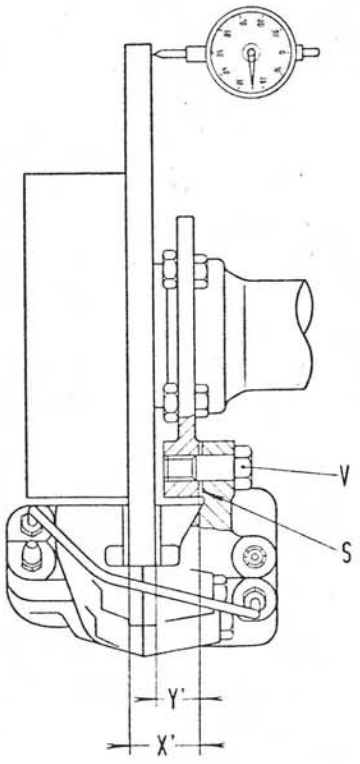
Fig. 108. - Diagram for checking and assembling front and rear brake disc and caliper.

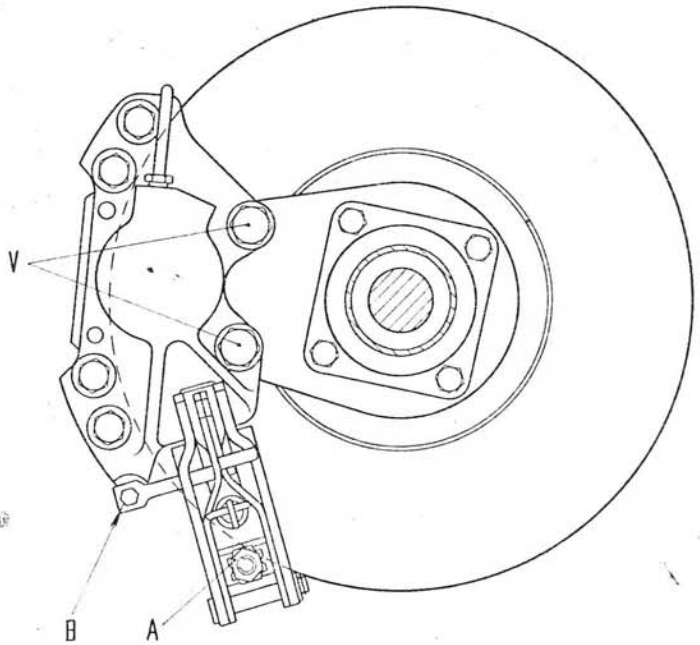
A. Parking brake caliper adjusting nut.
B. Parking brake caliper bracket lock pin nut.
S. Shims.
V. Screws, brake caliper to caliper carrier plate.
X. not below 1.531″ (38.9 mm).
Y. not above 0.866″ (22 mm).
X′. not below 1.524″ (38.7 mm).
Y′. not above 0.850″ (21.6 mm).



On cars with wheel studs, shims **S** for rear brake caliper carrier plate are not fitted.







Check the caliper pistons and their cylinders for any indication of binding or scoring; replace damaged parts by new ones.

NOTE - Whenever caliper pistons are taken down for service, use care to always renew the seals in caliper cylinder seats, as tightness is an essential condition for a satisfactory operation of the system.

Check that the front brake disc is square to the rotation axis (fig. 108). Maximum runout shown by the indicator dial should not exceed .004" (0.10 mm); otherwise painstakingly check the disc mounting on steering knuckle. Renew the brake disc if runout cannot be revved.

Distances X and Y (fig. 108) between disc working faces and the caliper mounting face on plate should be as follows: X, not below 1.531" (38.9 mm) - Y, not above 0.866" (22 mm).

If above limits are exceeded, renew the brake disc and the caliper carrier plate, too, if necessary.

Install the front brake caliper and tighten the mounting screws with 72.3 ft.lbs (10 kgm) of torque.

For a correct assembly of rear brakes, further inspection is required, as follows.

The axle shaft should be perfectly lined up with no runout in excess of .0012" (0.03 mm).

After fitting the brake disc to the axle shaft, check that the disc is square to the rotation axis (fig. 108). Maximum runout, as shown by the indicator dial, should be lesser than .006" (0.15 mm).

In some cases runout can be taken up by repositioning the brake disc on axle shaft; if this is of no practical result renew the brake disc.

Check the distance (Y', fig. 108) between the inner working face of the disc and the caliper mounting face on carrier plate: it should be 0.780" to 0.813" (19.81 to 20.65 mm).

This distance must be increased to 0.819" to 0.850" (20.8 to 21.6 mm) by adding shims (S, fig. 108) .008" (0.2 mm) thick on installation of caliper.

Then fit the brake caliper setting as many shims as required to obtain the specified assembly clearance between carrier plate and caliper.

For cars with wheel studs, install the brake disc on axle shaft, then check that:

- maximum runout is lesser than .004" (0.10 mm);
- distances X' and Y' (fig. 108) are: X', not below 1.524" (38.7 mm) - Y', not above 0.850" (21.6 mm).

If not so, replace the brake disc and the rear axle housing, too, if necessary.

Next, tighten the mounting screws to 72.3 ft.lbs (10 kgm) of torque.

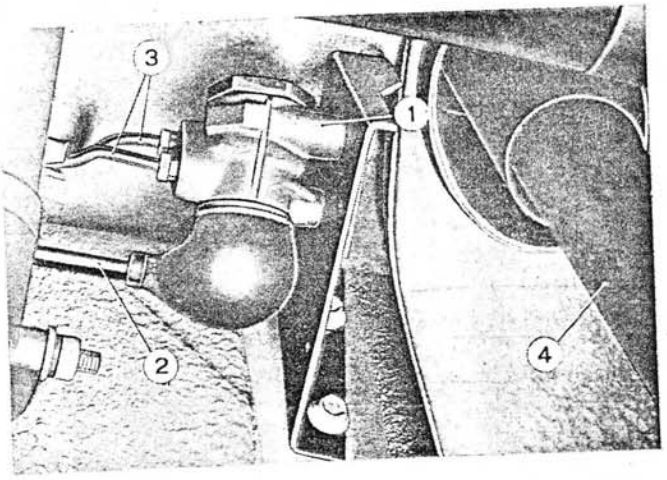


Fig. 109. - Detail of pressure regulator fitted to car.

1. Brake pressure regulator - 2. Link - 3. Fluid inlet and outlet lines - 4. Shock absorber.

Check the brake pressure regulator for leakage between body and piston; during the overhaul of regulator, **always** renew the seal.

For adjustment of pressure regulator linkage, follow the directions given under covering heading.

Bleeding Hydraulic Lines.

The hydraulic lines must be bled in the usual way, recalling that the disc brake bleeder screws are fitted to the upper cylinder of the ouboard caliper half (figs. 106 and 107).

For top up of brake fluid in reservoirs use **exclusively CG** special brake fluid.

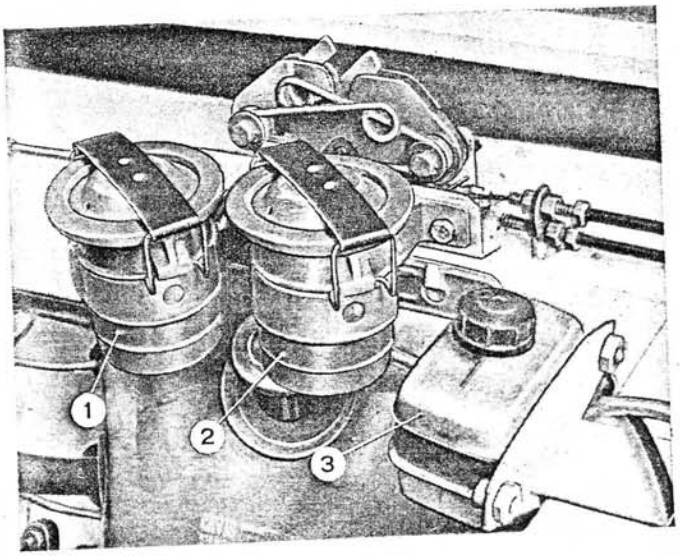


Fig. 110. - Clutch and brake fluid reservoirs.

1. Rear brake fluid reservoir - 2. Front brake fluid reservoir - 3. Clutch hydraulic fluid reservoir.

REAR BRAKE PRESSURE REGULATOR

Description.

The rear brake pressure regulator consists of a cylinder (3, fig. 111), fastened to the body, which is used to differentiate the amount of force exerted on rear brakes in respect of front brakes.

The piston (2) is controlled by a torsion bar (1) which at one end acts on the piston (2) and at the other end is connected to the rear axle.

Piston (2) has a stem of diam a and slides in ring (7) the diameter of which is b.

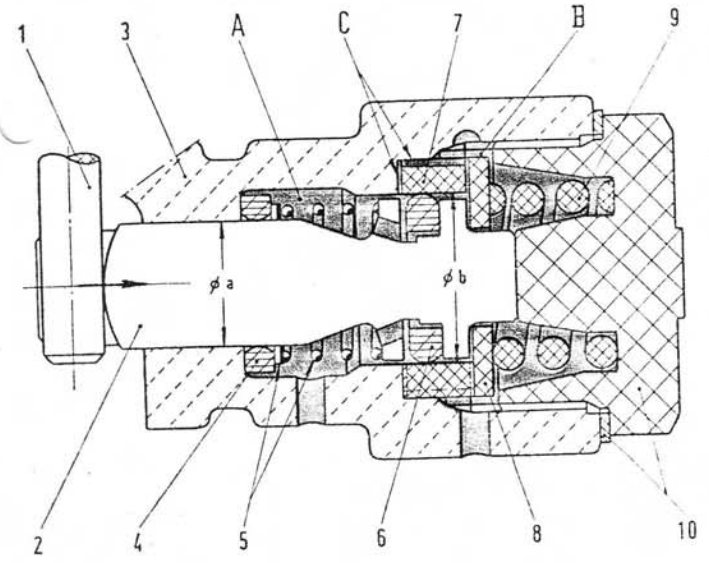


Fig. 111. - Pressure regulator, rest position.

1. Torsion bar - 2. Piston - 3. Pressure regulator body - 4. Seal - 5. Rest ring and spring for seal - 6. Seal - 7. Slotted ring - 8. Washer - 9. Piston spring - 10. Plug with washer.

A. Normal pressure chamber - B. Chamber for pressure regulation - C. Slots in ring (7), for passage of fluid between the chambers.

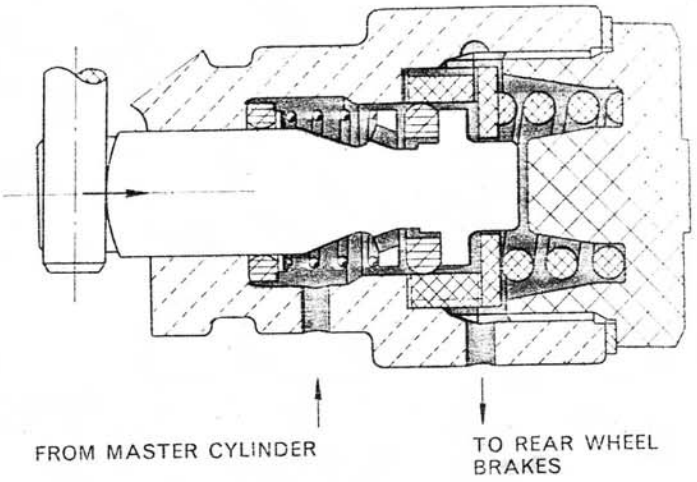


Fig. 112. - Pressure regulator, cut in position.

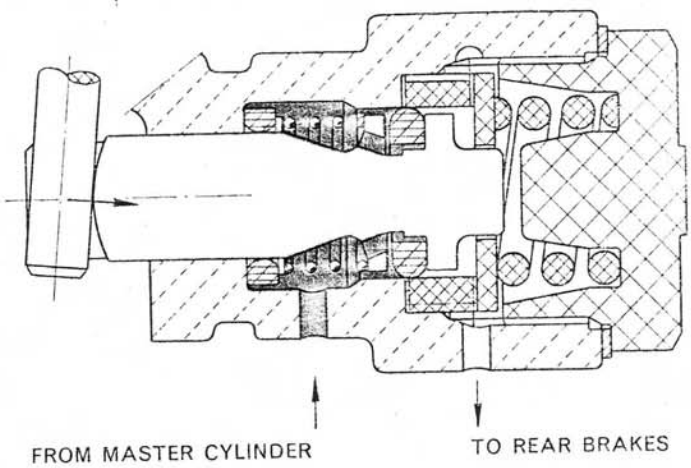


Fig. 113. - Pressure regulator, in operation.

Operation.

The pressure regulator ratio is 0.46 to 1.

The fluid arrives from the master cylinder to chamber « A » (fig. 111); from chamber « B » flows out the fluid controlling the brake cylinders on the rear wheels.

When the pressure regulator is not in operation, an equal pressure is exerted in the two chambers, as well as in any point of the system.

When the pressure regulator cuts in, chamber A is under the pressure as supplied by the master cylinder to the front wheel cylinders. Chamber B and the rear wheel circuit are under a lower pressure determined by the balance position of the piston, which is subject to the action of both pressures p_a and p_b as well as of load P exerted by the torsion bar.

Ring (7), forced on the pressure regulator body, is slotted (C), thereby allowing communication between the two chambers.

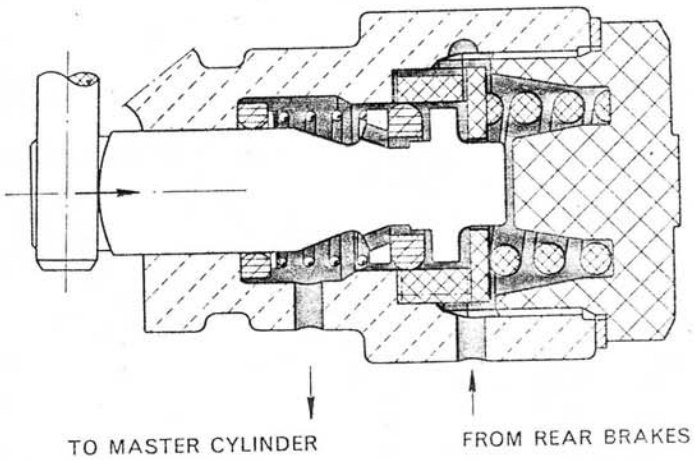


Fig. 114. - Pressure regulator, in return position.

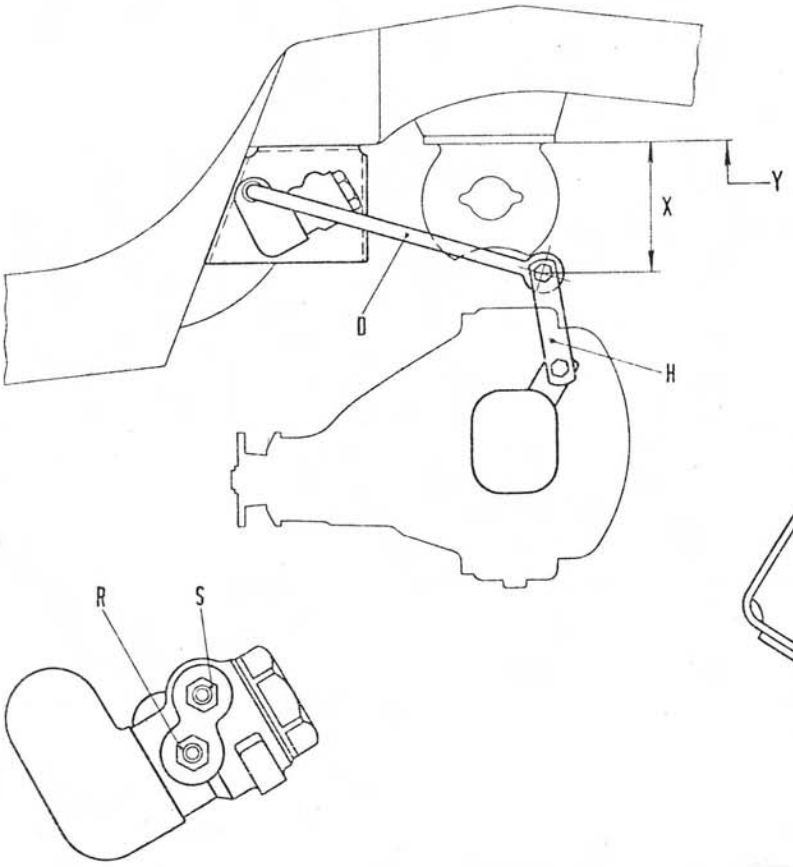
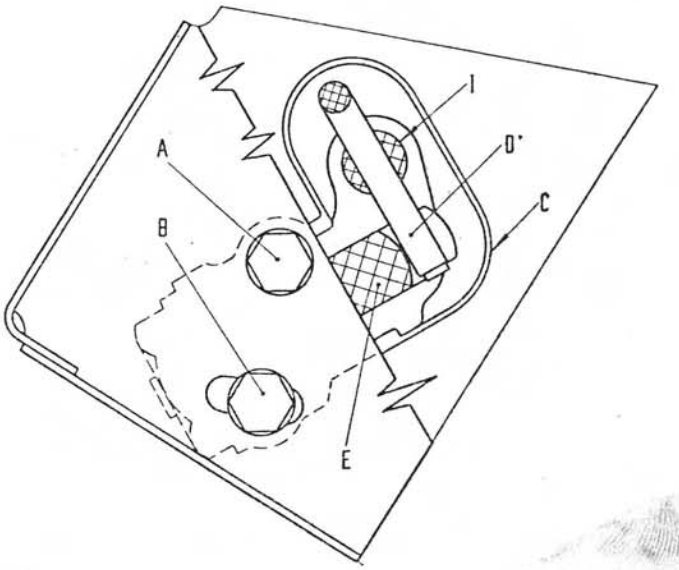


Fig. 115. - Brake pressure regulator adjusting diagram.

A-B. Regulator mounting screws - C. Boot - D. Regulator torsion bar - D'. End of regulator torsion bar - E. Piston - H. Shackle - I. Pin - R. Fluid inlet line connector - S. Fluid outlet line connector - X. Torsion bar adjusting distance (Roadster, $2.756'' \pm \frac{0.197''}{0}$ - $70 \pm \frac{5}{0}$ mm) - Y. Lower face of buffer plate.



In rest position, the piston is held against the threaded plug (10), screwed on the pressure regulator body; in this position the seal (6) allows the fluid to flow freely past the slots (C).

When the brakes are operated, the piston is displaced, overcoming the thrust of the torsion bar, and the seal (6) blanks the slots (C) thus regulating the fluid flow in such a way that a drop of pressure is created in the rear circuit.

Fitting and Adjusting the Pressure Regulator.

The following operations should be carried out before connecting the pressure regulator to the hydraulic system lines.

FITTING

Secure the pressure regulator to support bracket by means of mounting screws (A and B) (see fig. 115) which must be tightened part way in only to allow adjustment as outlined here below.

Secure bar (D) to body by means of its bracket.

ADJUSTMENT

Bring end of bar (D) to $2.756'' \pm \frac{197''}{0}$ ($70 \pm \frac{5}{0}$ mm) from buffer plate then lift protection boot (C) and turn the pressure regulator on screw (A) until the piston end (E) contacts the end (D') of torsion bar lightly.

Holding the pressure regulator in this position, lock screws (A) and (B), and smear a thin coat of « Rubber Lube » grease on the contact area of bar (D') on piston (E), as well as on articulation of pin (I); eventually fit boot (C) in place.

Fit the shackle (4) and secure it to the end of regulator bar (D) and to the mounting jut on axle casing.

After the above operations have been made, connect the lines of the hydraulic system to the couplings on the pressure regulator; the end of the line, supplying fluid from the master cylinder, must be connected to the lower coupling (R), whilst the end of the line which leads the fluid to the rear wheel calipers, must be connected to the upper coupling (S).

NOTE - For fitting and adjustment of pressure regulator use tool A. 72244.

BRAKE BOOSTER

The brake booster (Bonaldi's Master-Vac) (fig. 105) working in conjunction with the master cylinder, is an air-hydraulic device which utilizes the vacuum in the intake manifold to boost the driver's force applied on brake pedal.

The master cylinder is of the dual floating valve to control a double hydraulic brake circuit acting on the front and rear brakes independently.

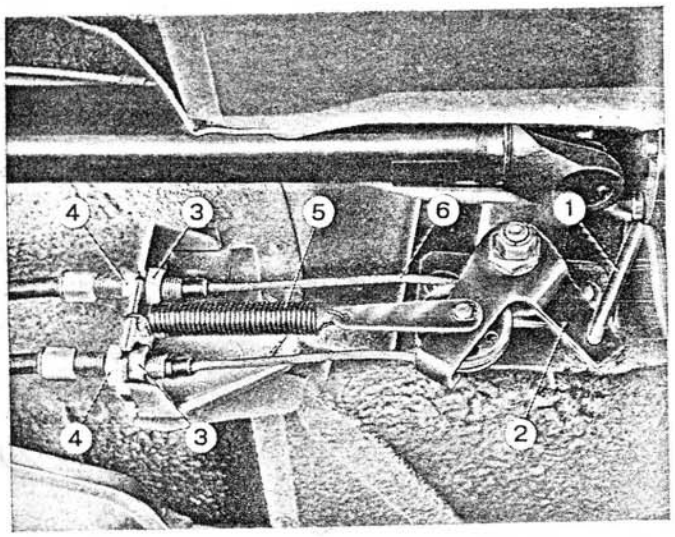


Fig. 116. - Detail showing manual brake linkage.

1. Cable pull rod - 2. Cable control lever - 3. Cable adjusting nuts - 4. Counternuts - 5. Lever return spring - 6. Manual brake control cable.

EMERGENCY AND PARKING BRAKE

Should clearance between brake disc and manual brake lining pads be in excess of .01" (0.25 mm), adjust as follows.

Set the manual brake ratchet lever in rest position.

Lock lining pads against brake discs by means of the adjuster nut (A, fig. 108).

Operate nuts (3-4, fig. 116) and stretch the manual brake control cable.

Loosen the adjuster nut (A, fig. 108) so to again bring the clearance between each lining pad and brake disc to .01" (0.25 mm).

Pull and release the ratchet lever in succession several times, then check that the lining pad-to-brake disc clearance in still .01" (0.25 mm) and that the brake mechanism is lined up with the disc.

Lubricate the manual brake joints sparingly, using care that the grease does not contact either lining pads or brake disc.

Finally tighten down the nut (A) and make sure that the nut (B, fig. 108) is locked securely.

BRAKE SPECIFICATIONS

Hydraulic circuit	dual
Front brakes	
Type	disc, with lining pads
Disc diameter	10.630" (270 mm)
Bore of caliper cylinders — outer	1.5037" (38.195 mm)
Bore of caliper cylinders — inner	2.126" (54 mm)
Minimum thickness of lining pads	0.118" (3 mm)
Rear brakes	
Type	disc, with lining pads
Disc diameter	10.000" (254 mm)
Bore of caliper cylinders — outer	1.1910" (30.251 mm)
Bore of caliper cylinders — inner	1.6880" (42.874 mm)
Minimum thickness of lining pads	0.118" (3 mm)
Vacuum brake booster	Bonaldi's Master - Vac, air-hydraulic
Thickness of brake disc — nominal	0.724" to 0.732" (18.4 to 18.6 mm)
Thickness of brake disc — min. acceptable after trueing-up	0.685" to 0.693" (17.4 to 17.6 mm).
Thickness of brake disc — min. acceptable due to wear	0.669" (17 mm)
Master cylinder bore	7/8" (22.225 mm)
Clearance, push rod to master cylinder piston	.000" to .047" (0 to 1.2 mm)
Pressure regulator	rear circuit
Hydraulic circuit fluid — grade	special CG for brakes
Hydraulic circuit fluid — capacity — front	10 1/2 G.B. fl. ozs - 10 U.S. fl. ozs (0.30 lf)
Hydraulic circuit fluid — capacity — rear	10 G.B. fl. ozs - 9 1/2 U.S. fl. ozs (0.28 lt)
Disc brake cleaner	FIAT LDC
Emergency and parking brake	mechanical on rear brake discs

CHASSIS TIGHTENING REFERENCE

DESCRIPTION	Part. No.	Thread	Material	Torque ft.lbs	Torque kgm
CYLINDER HEAD NUTS					7-5
CLUTCH					
Screw, clutch cover	1/38258/21	M 8 x 1.25	R 80 Znt	18.1	2.5
Nut, clutch pedal	1/61015/11	M 12 x 1.25	R 50 Znt (Screw R 80)	18.1	2.5
Screw, master cylinder mounting	1/38260/21	M 8 x 1.25	R 80 Znt	14.5	2
Nut, slave cylinder mounting	1/61008/11	M 8 x 1.25	R 50 Znt (Stud R 80)	14.5	2
TRANSMISSION					
Nut, transmission mounting	1/61015/11	M 12 x 1.25	R 50 Znt (Stud 38 NCD 4)	65.1	9
Screw, maincase to extension	1/60441/21	M 8 x 1.25	R 80 Znt	18.1	2.5
Nut, maincase to extension	1/61008/11	M 8 x 1.25	R 50 Znt (Stud R 80)	18.1	2.5
Nut, rear cover to extension	1/61008/11 1/21647/11	M 8 x 1.25 M 10 x 1.25	R 50 Znt (Stud R 80)	18.1 36.2	2.5 5
Nut, speedo drive gear support	1/58962/11	M 6 x 1	R 50 Znt (Stud R 80)	7.2	1
Nut, gearshift lever mounting	1/61008/11	M 8 x 1.25	R 50 Znt (Stud R 80)	18.1	2.5
Nut, oil pump cover	1/58962/11	M 6 x 1	R 50 Znt (Stud R 80)	7.2	1
Nut, oil filter cover	1/58962/11	M 6 x 1	R 50 Znt (Stud R 80)	7.2	1
Nut, flexible joint sleeve at mainshaft	4126567	M 20 x 1	R 50 Znt (19 CN 5 Carb 5)	57.9	8
Nut, gearshift lever ball socket	1/58962/11	M 6 x 1	R 50 Znt (Stud R 80)	7.2	1
Screw, front cover	1/38260/11	M 8 x 1.25	R 50 Znt	10.8	1.5
Screw, countershaft front bearing	1/55404/21	M 12 x 1.25	R 80 Znt	57.9	8
Screw, shifter fork	813149	M 6 x 1	R 100	7.2	1
Screw, reverse shaft	4065942	M 8 x 1.25	R 80 Bon	18.1	2.5
Nut, countershaft rear bearing	1/40441/71	M 18 x 1.5	C 40 Rct (19 CN 5 Carb 5)	86.8	12
Screw, shifter shaft dog	4142653	M 6 x 1	R 100	7.2	1
Screw, shifting lever to fork	860723	M 6 x 1	R 100	7.2	1
Plug, gear selector stiffening spring	4141746	M 28 x 1.5	R 50	36.2	5

Continued

Continued: **Chassis Tightening Reference.**

DESCRIPTION	Part No.	Thread	Material	Torque ft.lbs	Torque kgm
TRANSMISSION					
Screw, shifter shaft detent spring cover	1/60434/21	M 8 x 1.25	R 80 Znt	18.1	2.5
Switch, back-up light	9.52.670	M 14 x 1.5	Steel	28.9	4
Screw, extension lower cover	1/09026/21	M 6 x 1	R 80 Znt	7.2	1
Plug, oil gauge outlet blanking	1/19032/01	M 12 x 1.25	R 40 Znt	28.9	4
Nut, gearshift lever mounting push rod	1/21647/11	M 10 x 1.25	R 50 Znt (Stud R 80)	36.2	5
PROPELLER SHAFT					
Nut, flexible joint	1/25745/11	M 10 x 1.25	R 50 Znt (Screw R 80)	36.2	5
Nut, front prop shaft rear sleeve	1/25749/11	M 16 x 1.5	R 50 Znt (35 NCD 4 Bon)	144.7	20
Nut, companion flanges	1/61041/11	M 8 x 1.25	R 50 Znt (Screw R 100)	18.1	2.5
Screw, prop shaft pillow block	1/38260/21	M 8 x 1.25	R 80 Znt	14.5	2
Screw, prop shaft supporting cross member	1/60433/21	M 8 x 1.25	R 80 Znt	14.5	2
REAR AXLE					
Screw, differential carrier cap	1/55410/30	M 12 x 1.25	R 100	72.3	10
Nut, bevel pinion flange sleeve	4154496	M 20 x 1.5	R 80 Znt (19 NC 5 Carb 9)	108.5 to 180.8	15 to 25
Screw, ring gear to differential cage	4145198	M 10 x 1.25	40 Ni Cr Mo 2 Bon	75.9	10.5
Screw, differential carrier to axle housing	1/60436/30	M 8 x 1.25	R 100	21.7	3
Nut, caliper carrier plate	1/21647/21	M 10 x 1.25	R 80 Znt (Screw R 100)	43.4	6
Screw, brake caliper to carrier plate	4084893	M 12 x 1.25	R 100	72.3	10
Screw, caliper half interconnecting	4071545	3/8" 24 UNF 2A	35 NC 5 R	43.4	6
Nut, axle shaft	1/07248/11	M 22 x 1.5	R 50 Znt (Shaft 38 NCD 4)	43.4	6
Screw, brake disc to hub	4149836	M 8 x 1.25	R 80 Znt	18.1	2.5
Nut, wheel hub flanges	4162289	M 12 x 1.25	R 100 Cdt (Screw 38 NCD 4)	65.1	9
Stud, wheel	4152211	M 14 x 1.5	C 35 R Bon Cdt	65.1	9
POWER PLANT MOUNTINGS					
Nut, mounting pad to cross member and bracket	1/21647/11	M 10 x 1.25	R 50 Znt (Screw R 80)	23.1	3.2
Nut, mounting pad bracket to engine	1/21647/11	M 10 x 1.25	R 50 Znt (Stud R 80)	34.7	4.8
Screw, rear cross member to frame	1/60434/21	M 8 x 1.25	R 80 Znt	18.1	2.5
Nut, mounting pad to cross member	1/61008/11	M 8 x 1.25	R 50 Znt (Screw R 80)	18.1	2.5
Nut, mounting pad to maincase rear cover	1/61008/11	M 8 x 1.25	R 50 Znt (Stud R 80)	18.1	2.5

Continued

Continued: **Chassis Tightening Reference.**

DESCRIPTION	Part No.	Thread	Material	Torque	
				ft.lbs	kgm
FRONT SUSPENSION					
Screw, front, upper control arm . . .	4060013	M 12 x 1.25	R 80 Znt	50.6	7
Nut, upper control arm bracket . . .	1/21647/11	M 10 x 1.25	R 50 Znt (Screw R 50)	25.3	3.5
Nut, front strut to body	1/25748/11	M 14 x 1.5	R 50 Znt (Screw 35 NC 5 R)	65.1	9
Nut, front strut to lower control arm .	1/61015/11	M 12 x 1.25	R 50 Znt (Screw R 100)	72.3	10
Nut, lower control arm to cross member	1/61015/11	M 12 x 1.25	R 50 Znt (Screw R 80)	65.1	9
Nut, rear, upper control arm	1/61015/11	M 12 x 1.25	R 50 Znt (Screw R 80)	65.1	9
Screw, front cross member	1/61419/21	M 12 x 1.25	R 80 Znt	65.1	9
Screw, sway bar mounting	4045345	M 10 x 1.25	R 80 Cdt	28.9	4
Nut, shock absorber upper bracket . .	1/61008/11	M 8 x 1.25	R 50 Znt (Screw R 50)	10.8	1.5
Nut, upper, shock absorber mounting	1/21647/11	M 10 x 1.25	R 50 Znt (Screw R 50)	25.3	3.5
Nut, lower, shock absorber mounting .	1/21647/21	M 10 x 1.25	R 80 Znt (Screw R 100)	36.2	5
Nut, sway bar link	1/21647/11	M 10 x 1.25	R 50 Znt (Screw R 80)	36.2	5
Nut, steering knuckle ball joint	1/25748/11	M 14 x 1.5	R 50 Znt (40Ni Cr Mo 2 R)	86.8	12
Nut, caliper carrier plate and knuckle arm	1/21647/21	M 10 x 1.25	R 80 Znt (Screw R 100)	43.4	6
Screw, brake caliper to plate	4084893	M 12 x 1.25	R 100	72.3	10
Screw, brake caliper half interconnecting	4071544 4071545	$^{7}/_{16}$"-20UNF2A $^{3}/_{8}$"-20 UNF2A	35 NC 5 R	43.4	6
Nut, wheel hub flanges	4162289	M 12 x 1.25	R 100 Cdt (Screw 38 NCD 4)	65.1	9
Screw, brake disc to hub	4149836	M 8 x 1.25	R 80 Znt	18.1	2.5
Nut, right and left steering knuckle .	1/16380/21 1/07246/21	M 18 x 1.5	R 80 Znt (Screw 38 NCD 4)	See page 55	
Stud, wheel	4152211	M 14 x 1.5	C 35 R Bon Cdt	65.1	9

Continued

Continued: **Chassis Tightening Reference.**

DESCRIPTION	Part No.	Thread	Material	Torque ft.lbs	Torque kgm
REAR SUSPENSION					
Nut, semi-elliptic spring center mounting plate	1/21647/21	M 10 x 1.25	R 80 Znt (Screw 38 CD 4)	36.2	5
Screw, semi-elliptic spring front mounting	1/55416/21	M 12 x 1.25	R 80 Znt	68.7	9.5
Nut, semi-elliptic spring intermediate and rear mounting	1/61050/11	M 12 x 1.25	R 50 Znt (Screw R 80)	68.7	9.5
Nut, mounting bracket for semi-elliptic spring and side strut	1/21647/11	M 10 x 1.15	R 50 Znt (Screw R 50)	23.1	3.2
Nut, shock absorber upper mounting	1/21647/11	M 10 x 1.25	R 50 Znt (Screw R 50)	23.1	3.2
Nut, shock absorber lower mounting	1/21647/11	M 10 x 1.25	R 50 Znt (Screw R 80)	36.2	5
Nut, rear, side strut	1/25748/11	M 14 x 1.5	R 50 Znt (Screw R 80)	68.7	9.5
Nut, side strut to rear axle	1/61050/11	M 12 x 1.25	R 50 Znt (Screw R 80)	68.7	9.5
STEERING					
Nut, steering wheel	1/07914/11	M 16 x 1.5	R 50 Znt (Screw C 30 Norm)	36.2	5
Nut, intermediate steering column	1/61008/11	M 8 x 1.25	R 50 Znt (Screw R 80)	18.1	2.5
Nut, steering column mounting	1/61008/11	M 8 x 1.25	R 50 Znt (Screw R 80)	18.1	2.5
Nut, steering gear mounting	1/25745/11	M 10 x 1.25	R 50 Znt (Screw R 80)	36.2	5
Nut, idler arm bracket	1/25745/11	M 10 x 1.25	R 50 Znt (Screw R 100)	36.2	5
Nut, steering rod end joint	1/07934/11	M 14 x 1.5	R 50 Znt (Stud 12 NC 3)	39.8	5.5
BRAKES					
Nut, brake booster	1/61008/11	M 8 x 1.25	R 80 Znt (Screw R 50)	10.8	1.5
Screw, ratchet lever support	1/38256/21	M 8 x 1.25	R 80 Znt	14.5	2
Nut, pedal pin	1/61015/11	M 12 x 1.25	R 50 Znt (Screw R 80)	18.1	2.5
Screw, master cylinder	1/38260/21	M 8 x 1.25	R 80 Znt	18.1	2.5
Screw, pedal board mounting	1/60433/21	M 8 x 1.25	R 80 Znt	18.1	2.5

Electric System

BATTERY

The battery is located in the luggage compartment, right-hand side (fig. 117).

Cell connectors are sunk in sealing compound. This construction feature improves battery insulation and cuts down intercell and ground current leakage. Moreover cell connector and terminal post corrosion is tapered down remarkably.

Electrolyte Level.

For an easy checking of electrolyte level, battery cell covers are equipped with a « level indicator » which is visible by unscrewing the cell cover.

Such new design feature allows a quicker and easier battery topping up operation.

The cell is correctly filled in when the electrolyte level is flush with the circular hole at the bottom of the well inside the filler neck.

The neck is fitted with vertical slots for vapour vent.

NOTE - Before connecting or disconnecting the positive cable from battery terminal, use care to always disconnect the negative cable.

BATTERY SPECIFICATIONS

Voltage	12
Capacity (at 20 hr discarge rate)	60 Amp/hr
Length	10.236" (260 mm)
Width	6.701" (172 mm)
Height	8.818" (225 mm)
Weight including electrolyte	46 lbs (21 kg)
Weight without electrolyte	35 lbs (16 kg)

RECHARGING SYSTEM

The FIAT A 12 M-120/12/47 alternator is a self-rectifying three-phase current generator consisting of a stationary armature or « stator », a rotating field or « rotor », and of a three-phase rectifying bridge of silicon diodes (fig. 119).

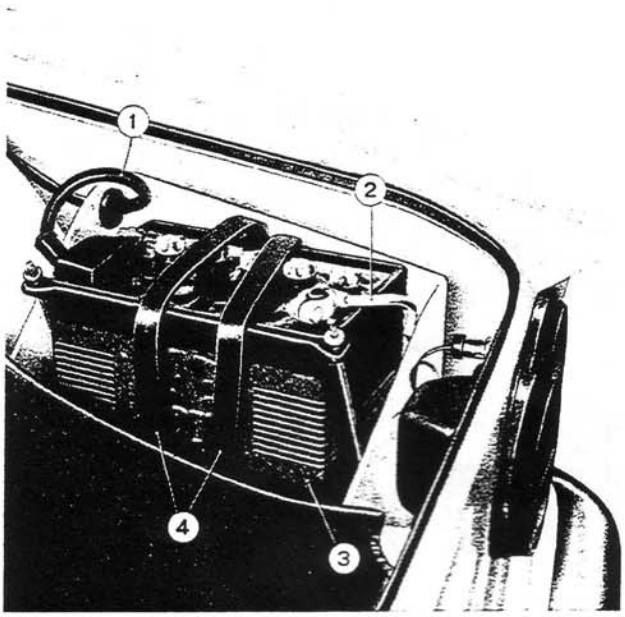


Fig. 117. - Location of battery.

1. Plus cable - 2. Minus cable - 3. Battery - 4. Rubber straps for battery removal.

The RC 1/12 B voltage regulator is of the dual vibrating contact type (see diagram fig. 118).

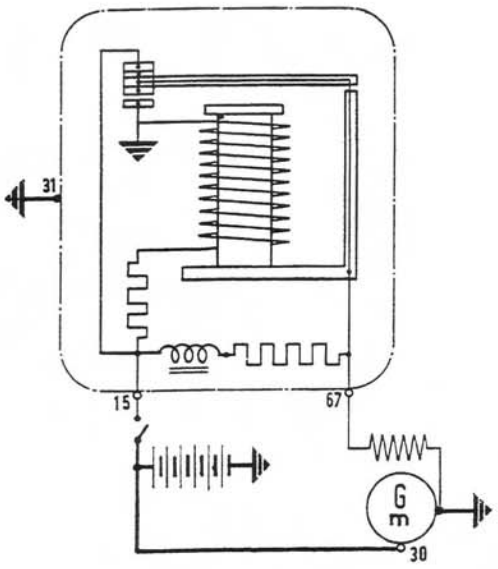
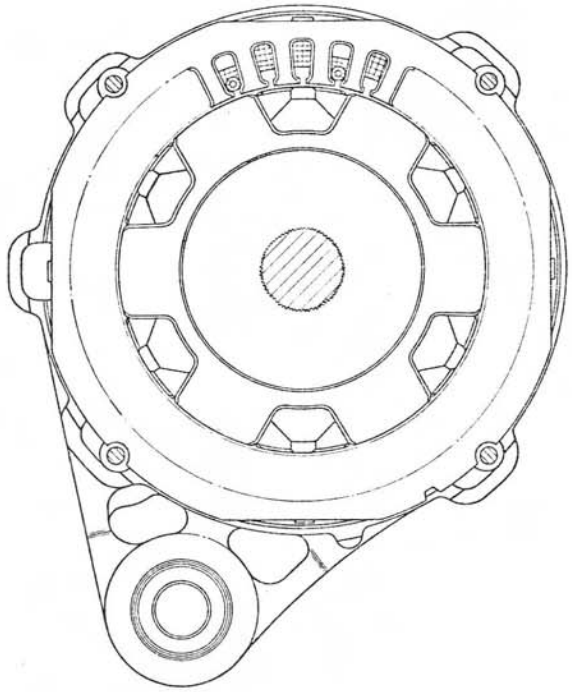
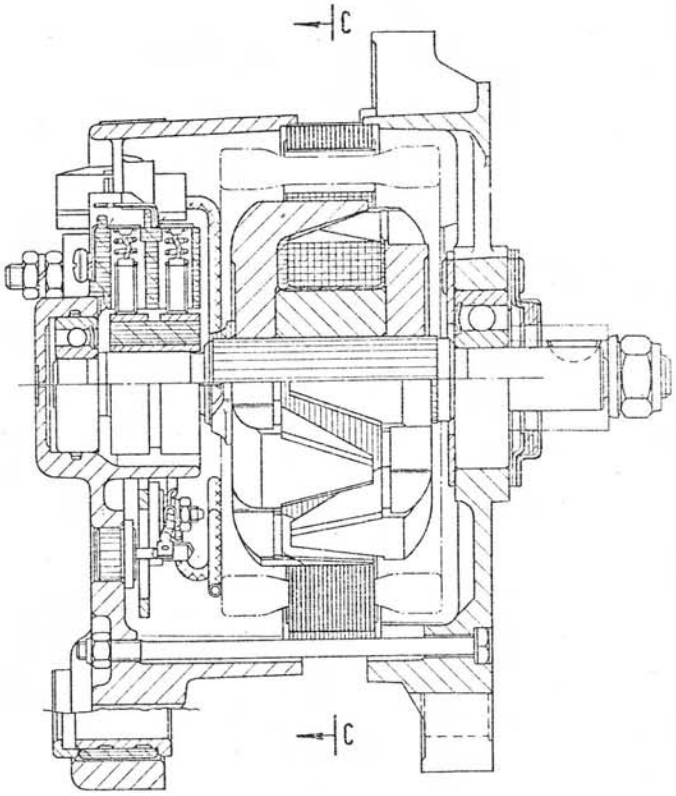


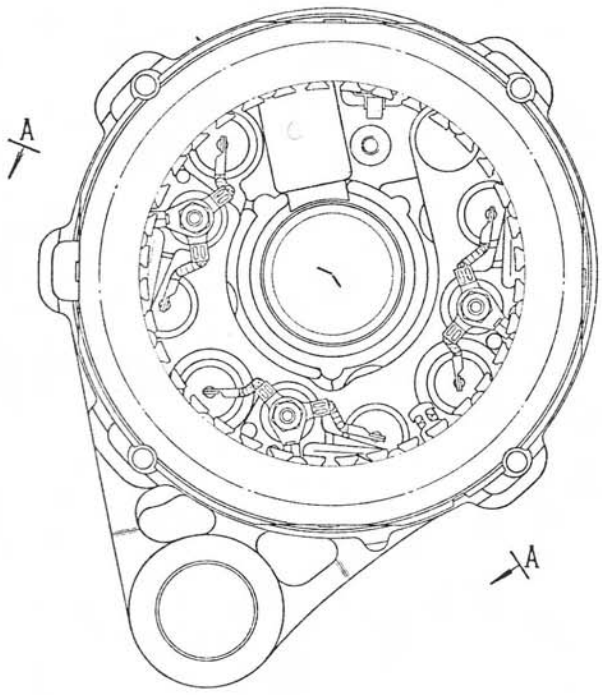
Fig. 118. - Wiring diagram of voltage regulator type RC1/12 B.

FIG. 119 - ALTERNATOR ASSEMBLY A 12 M-124/12/47

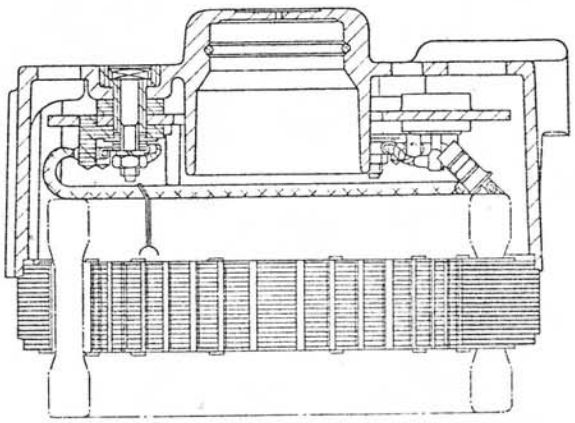
SECTION C-C







SECTION A-A



RECHARGING SYSTEM

Alternator characteristics.	
Type	FIAT A 12 M-124/12/47
Nominal voltage	12 Volts
Alternator output	840 Watts
Charging speed at 12 Volts (20° C - 68° F)	1020 ± 50 r.p.m.
Current at 13 Volts on battery at 5000 r.p.m., at operating temperature, not below	47 Amp.
Maximum current, about	58 Amp.
Maximum speed — steady	13,000 r.p.m.
Maximum speed — temporary (15 min.)	15,000 r.p.m.
Coil winding resistance at 20° C (68° F) — between collector rings	4.5 ± 0.1 Ohms
Coil winding resistance at 20° C (68° F) — between plug 67 and ground at 500 r.p.m.	4.6 $^{+0.2}_{-0.1}$ Ohms
Rotation, drive end	clockwise
Drive, ratio, engine-to-alternator	1.636 to 1
Rectifier diode characteristics.	
Type	4 AF 2
Nominal voltage	12 Volts
Steady forward current output	20 Amp.
Maximum peak reverse voltage	150 Volts
Maximum forward current	25 Amp.
Checking and setting voltage regulator.	
Type	RC 1/12 B
Alternator speed for checking and setting	5,000 r.p.m.
Battery capacity	40 to 50 Amp/hr
Feed voltage for thermal stabilization (15 to 18 minutes)	12.5 to 13 Volts
Current for 2nd stage check	2 to 12 Amp.
Regulating voltage, 2nd stage	14.2 ± 0.3 Volts
Current for 1st stage check	25 to 35 Amp.
1st stage regulating voltage, below 2nd stage reading	0.4 to 0.7 Volts
Resistance between plug 15 and ground (at 77° ± 18° F - 25° ± 10° C)	28.2 ± 2 Ohms
Resistance between plug 15 and plug 67, open contacts	5.5 ± 0.25 Ohms
Air gap, armature-to-core	.0709" ± .0028" (1.9 ± 0.07 mm)
Point gap, 2nd stage	.0157" ± .0020" (0.4 ± 0.05 mm)

STARTING MOTOR FIAT E 100-1,5/12 Var. 4

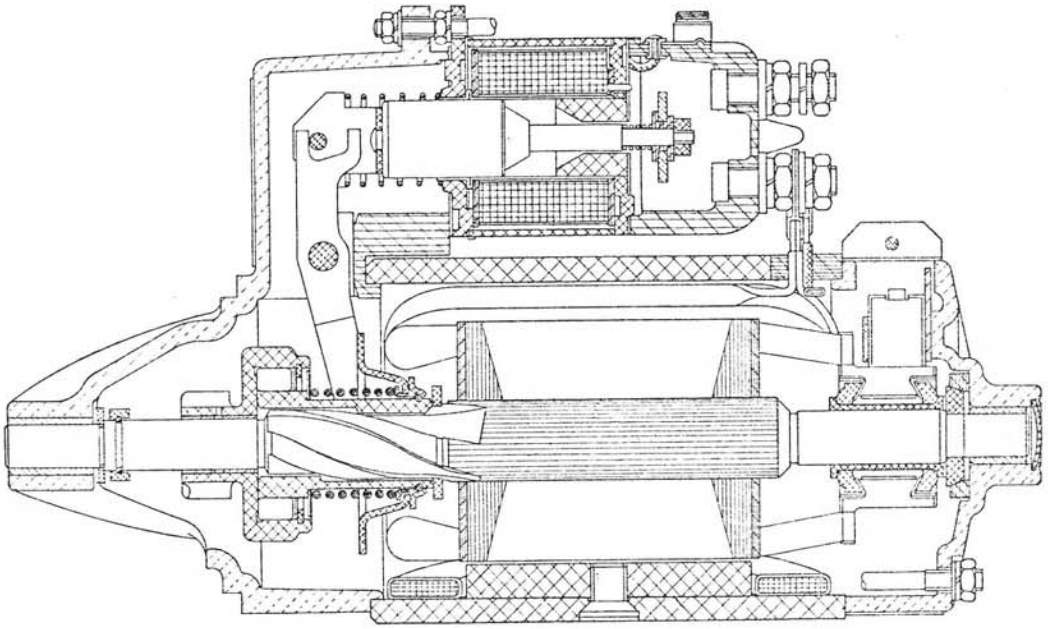


Fig. 120. - Side section view of starting motor.

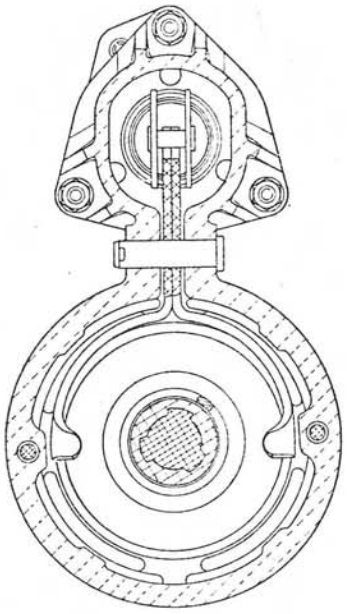


Fig. 121. - End section view through pinion drive.

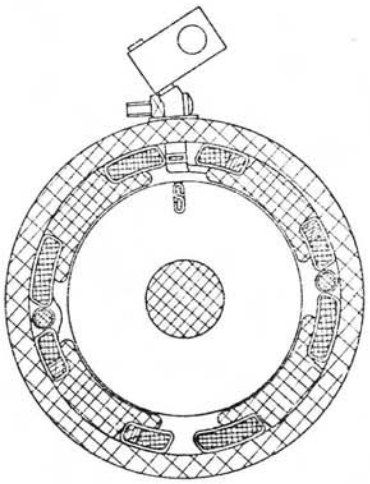


Fig. 122. - End section view through pole shoes and field winding.

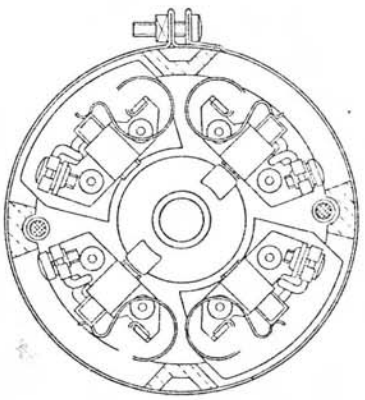


Fig. 123. - Section view through commutator end head, showing brushes.

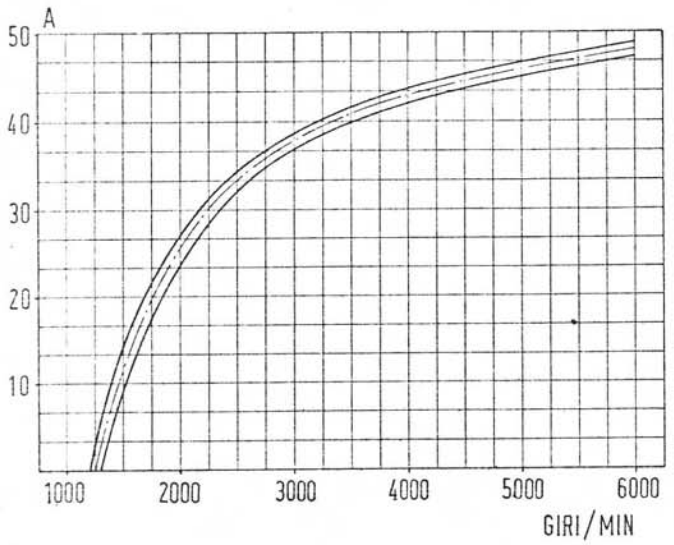


Fig. 124. - Output curve of FIAT ATR A 12 M-124/12/47 alternator, hot.

Steady voltage: 14.

The carge indicator relay warns of any trouble in the alternator or voltage regulator by glowing a red light.

If the relay is faulty, renew it.

STARTING MOTOR

The overrunning clutch starting motor is the type FIAT E 100-1.5/12 Var. 4.

The motor drive is operated by a solenoid controlled from the key-type ignition switch.

The armature revolves on oilless bushings.

The end heads are secured to the field frame by means of two thru-bolts passing between the pole shoes.

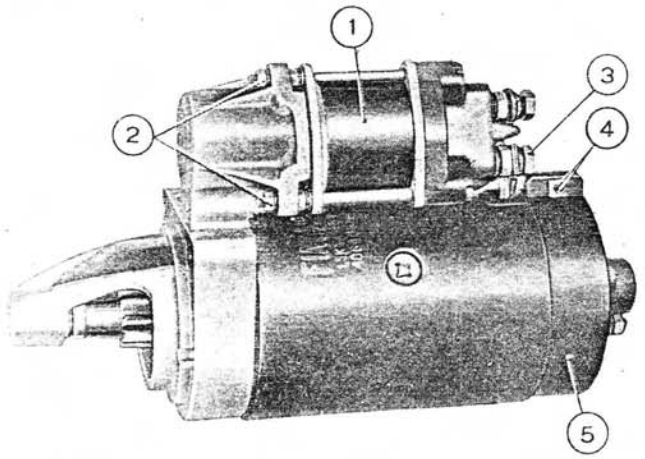


Fig. 125. - Starting motor and solenoid assembly.

1. Solenoid - 2. Solenoid fixing nuts - 3. Motor field winding terminal nut - 4. Cover band fixing screw and nut - 5. Cover band.

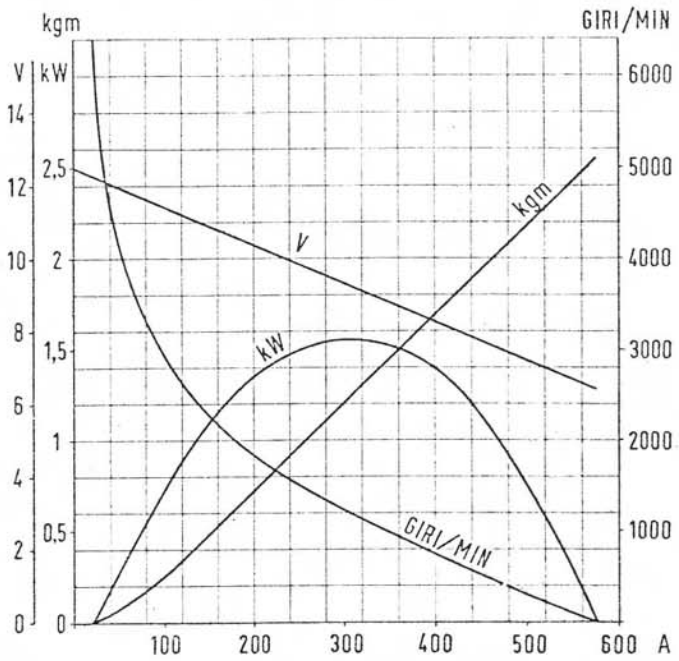


Fig. 126. - Typical curves of FIAT E 100-1,5/12 Var. 4 starting motor.

Battery of 60 Amp/hr (at 20-hr discharge rate), fully loaded - Electrolyte temperature: 68° F (20° C) - Speed, no-load: 6,000 ± 300 rpm - GIRI/MIN = R.P.M.

Access to the commutator and brushes may be obtained by removing the cover band which is held by a screw and nut.

The pinion, rigidly attached to the overunning clutch, is operated by a solenoid via a yoke lever.

The solenoid is located on drive end head.

NOTE - On assembly of field winding, which should be pre-heated up to some 122° F (50° C) to make it slightly flexible for easier seating, tighten down pole shoe retaining screws. This way it will be possible to restore initial air gap between pole shoes and armature.

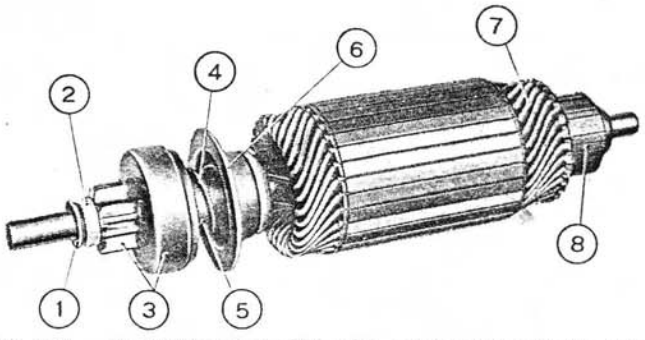


Fig. 127. - Armature assembly with overrunning clutch drive mechanism.

1. Washer - 2. Stop ring - 3. Drive pinion - 4. Sheave spring - 5. Overrunning clutch hub - 6. Drive sheave - 7. Armature winding - 8. Commutator.

STARTING MOTOR SPECIFICATIONS

Type	FIAT E 100-1.5/12 Var. 4
Voltage	12
Nominal power	1.5 kW
Rotation, pinion end	clockwise
Pole shoes	4
Field winding	compound
Drive	overrunning clutch
Pole shoe I.D.	2.6693″ to 2.6760″ (67.80 to 67.97 mm)
Armature O.D.	2.6358″ to 2.6378″ (66.95 to 67.00 mm)
Brushes: part No.	4045771
Starter pinion-to-flywheel ring gear ratio	12 to 1
Control	solenoid
Bench testing data.	
— Operation test (at 68° F - 20° C):	
Amperage	300
Torque developed	8.68 ± .36 ft.lbs (1.2 ± 0.05 kgm)
Speed	1,200 ± 50 r.p.m.
Voltage	9.3
— Stall torque test (at 68° F - 20° C):	
Amperage	575
Voltage	6.4 ± 0.3
Torque developed	18.4 ± .7 ft.lbs (2.55 ± 0.1 kgm)
— No-load test (at 68° F - 20° C):	
Amperage, not above	20
Voltage	12.3
Speed	6,000 ± 300 r.p.m.
— Solenoid coil resistance, at 68° F (20° C)	0.354 to 0.454 Ohms
— Inner resistance, on starting, at 68° F (20° C)	0.009 to 0.01 Ohms
— Shunt field winding resistance, at 68° F (20° C)	8.5 to 8.9 Ohms
— Series field winding resistance, at 68° F (20° C)	0.0037 to 0.0038 Ohms
Data for checking mechanical characteristics.	
— Spring pressure on brushes (not worn)	2.2 ± .22 lbs (1 ± 0.1 kg)
— Armature shaft end play	.0039″ to .0276″ (0.1 to 0.7 mm)
— Mica undercut	.0394″ (1 mm)
— Overrunning clutch efficiency: static torque to draw pinion into slow rotation, not above	.78 in.lbs (0.9 kgcm)
— Solenoid core stroke	.5039″ to .6220″ (12.8 to 15.8 mm)
— Solenoid contact stroke	.4220″ to .5524″ (10.72 to 14.03 mm)
Lubrication.	
— Drive unit inner splines	Oil (SAE 10 W)

IGNITION TIMING

Position the alternator drive pulley with the timing mark lined up with the mark « 10° » stamped on tag, showing the static advance degrees to engine.

Measure the breaker point gap which should be .0126″ to .0150″ (0.32 to 0.38 mm). If not so, adjust the gap through the stationary contact arm screw (3, fig. 128).

Set the rotor toward the red mark on distributor body.

On the distributor body (1, fig. 129), insert the spacer (2) and then the coupling (5).

Temporarily fit the distributor body with coupling in place on engine and position the distributor so that,

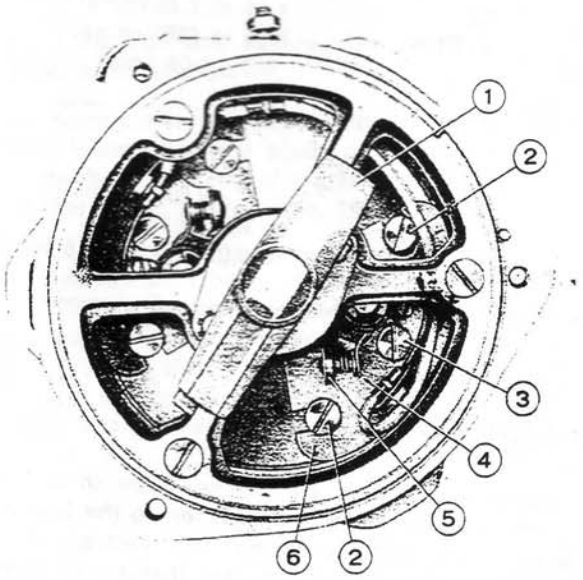


Fig. 128. - Ignition distributor without cover.

1. Rotor - 2. Breaker plate locking screws - 3. Stationary contact arm locking screw - 4. Movable contact - 5. Stationary contact - 6. Breaker plate.

when the cover is fitted, the spark plug cable inserts are up.

Having thus obtained the correct position of coupling (5, fig. 129) on distributor shaft, take down the distributor, remove the coupling and mount it on shaft with its screw (3) and lock plate (4).

Fit the distributor body on to the coupling.

Prior to securing the distributor to its mounting bracket, check that the distributor rotating on elongated holes in body enables the full opening travel of contacts for cylinder No. 4.

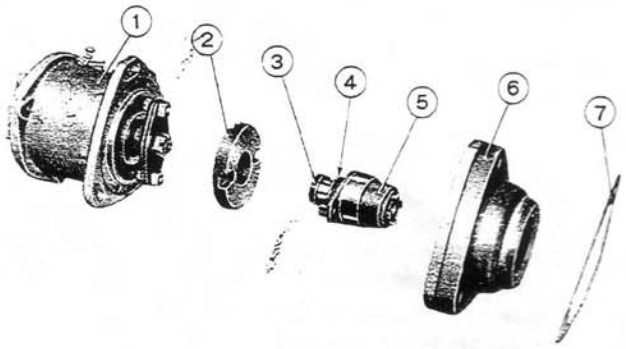


Fig. 129. - Ignition distributor and drive.

1. Ignition distributor - 2. Distributor coupling spacer - 3. Distributor coupling screw - 4. Lock plate - 5. Distributor drive coupling - 6. Distributor mounting bracket - 7. Bracket gasket.

Next secure the distributor to its bracket with the breaker points about to open.

Revolve the flywheel in the running direction a full turn so that the piston of cylinder No. 3 is in the firing stroke and line up the notch on alternator drive pulley with the mark « 10° » on timing tag.

Check that, in this position, points are parting for cylinder No. 3.

In case the points are upset in respect of timing marks, check the distributor on test bench, using fixture **Ap. 5001/2.**

Specifications for distributor bench test:

— sparks to occur every 60° ± 1°;

— opening angle to be 10° ± 2°;

— closing angle to be 50° ± 2°.

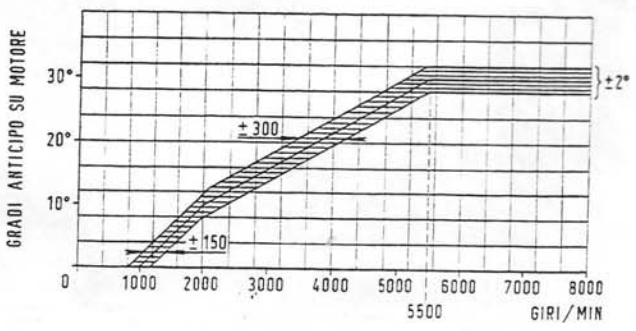


Fig. 130. - Diagram of distributor automatic advance versus engine.

GRADI ANTICIPO SU MOTORE = No. of degrees advance.

GIRI/MIN = r.p.m.

IGNITION SYSTEM SPECIFICATIONS

Ignition distributor	double breaker
Static advance	10°
Automatic advance	30° ± 2°
Breaker contact pressure	35 1/4 to 42 1/4 ozs (1000 to 1200 gr)
Contact opening	.0126" to .0150" (0.32 to 0.38 mm)
Value of capacitor at 50 to 100 c/s	0.20 to 0.25 microfarads
Insulation resistance of capacitor at 212° F (100° C) and 100 V d.c., above	1 megohm/microfarad
Sparking angle	every 60° ± 1°
Contact closing angle	50° ± 2°
Contact opening angle	10° ± 2°
Coil.	
Code	BZR 202A
Ohmic resistance of primary winding at 68° ± 9° F (20° ± 5° C)	1.64 to 1.76 ohms
Ohmic resistance of secondary winding at 68° ± 9° F (20° ± 5° C).	7650 to 9350 ohms
Value of resistor	0.8 ± 0.05 ohms
Plugs	Champion
Type	N 60 Y
Thread	M 14 x 1.25
Gap	0.020" to 0.024" (0.5 to 0.6 mm)

AIMING HEADLIGHTS

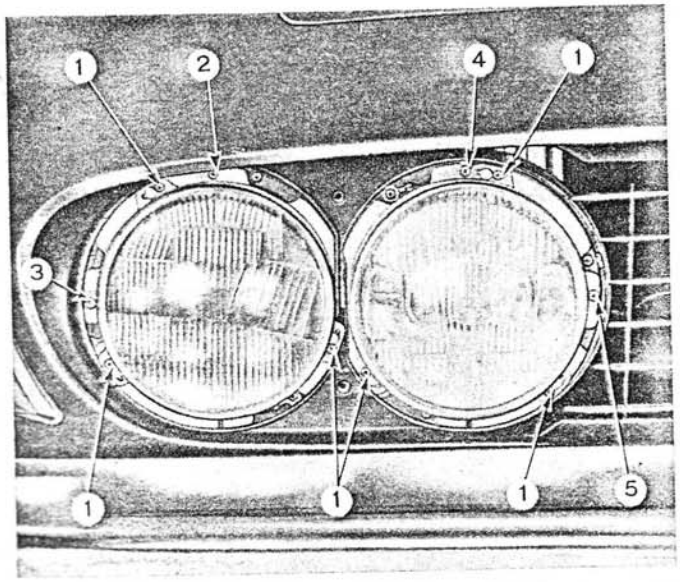


Fig. 131. - L.H. headlamps, without rim.

1. Headlamp unit fixing screws - 2. Beam adjusting screw, vertical direction - 3. Beam adjusting screw, horizontal direction - 4. Beam adjusting screw, vertical direction - 5. Beam adjusting screw, horizontal direction.

Headlight aiming should be made in a no-load condition and referred, **in addition to the low beam, also to the high beam,** as these cars are equipped with two pairs of headlights, **the inside pair of which issues only the high beam,** whereas **the outside pair issues both the high and low beam.**

Make sure that tires are inflated with the specified pressure, as given on page 4.

Locate the car on a level floor, 16' 5" (5 m) apart from an opaque, white screen in the shade and see that the car centerline is square to the screen face.

Jounce the car both sides to set suspensions.

Draw two pairs of vertical lines a-a and a'-a' on the screen (fig. 132). These lines should be equally spaced from the perpendicular to the car C/L and respectively 29" (73.8 cm) and 41.33" (105 cm apart (A and A'), corresponding to the center distance of inside and outside headlights.

Draw two horizontal lines b-b and b'-b' on the screen at the following distances from ground:

— B = C — 2.76″ (7 cm), B′ = C — 1.18″ (3 cm) new vehicles, vehicles with suspension renewed or settled vehicles, where **C corresponds to the ground clearance of headlight center, measured on aiming.**

NOTE - A vehicle is settled in practice when it has run the mileage specified for the first voucher service.

To aim headlights, switch on the low beam **(outside** ps) and work on the screw (2, fig. 131) for vertical adjustment of headlights and on the screw (3) for the horizontal, until:

the horizontal line between the dark and lighted areas is on line b-b;

the demarcation lines which slope upward at about 15° originate from the points of intersection **Pe** (or a little beyond them) of the vertical lines a′-a′ and the horizontal line b-b (fig. 132).

To aim the high beam of **inside headlights**, turn on the country lights and operate the screw (4) for vertical adjustment and the screw (5) for the horizontal until the center of the zone of highest intensity (hot spot) falls on intersection **Pi** between the horizontal line b′-b′ and the two verticals a-a (fig. 132).

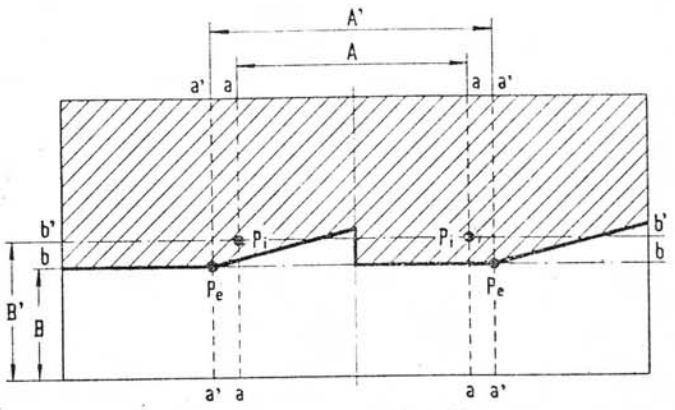


Fig. 132. - Headlamp aiming diagram.

A = 29″ (738 mm) - A′ = 41.33″ (1050 mm) - B = C — 2.76″ (7 cm), new or settled car - B′ = C — 1.18″ (3 cm), new or settled car - C = ground clearance of headlamp center, measured when aiming.

A 10 1/4″ (26 cm) increase in distance A and A′ specification, corresponding to a 3° aggregate beam divergence, is permissible.

NOTE - Recall that the headlight adjustment should be made:

- **for the low beam, by working solely on outside-lamp screws;**
- **for the high beam, by working solely on inside-lamp screws.**

FUSES

The electric system is protected by 10 8-Ampere fuses and 2 16-Amp.

Fuses are contained in a double box arranged to the right below the instrument panel (fig. 133).

To gain access to the fuses just back out both cover fixing knobs.

Circuits protected by single fuses are shown on a label attached to the box cover.

The following circuits **are not protected by fuses:** horn, starting, battery charge (except voltage regulator and charge indicator) and low beam relay.

If a fuse blows, look for the cause before replacing it. Before doing this, follow out the circuit in the diagram (fig. 134) which is protected by the blown fuse.

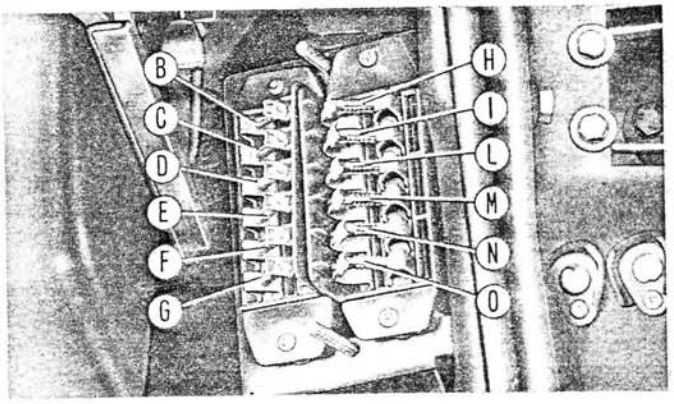


Fig. 133. - Fuses.

B. Fuse 30/3 - C. Fuse 15/54 - D. Fuse 30/2 - E. Fuse 30/1 - F. Fuse 30/4 - G. Fuse 30/5 - H. Fuse 58/2 - I. Fuse 58/1 - L. Fuse 56/b2 - M. Fuse 56/b1 - N. Fuse 56/a2 - O. Fuse 56/a1.

ELECTRICAL SYSTEM - FUSES

Fig. 133	Fuses	CIRCUITS PROTECTED
B	Fuse **30/3** 8-Ampere	— Voltage regulator. — Alternator field winding. — No-charge indicator and sending unit. — Low oil pressure indicator. — Choke « on » indicator. — Parking brake « on » indicator. — Water temperature gauge.
C	Fuse **15/54** 8-Ampere	— Fuel gauge and reserve supply indicator. — Engine tachometer. — Oil temperature gauge. — Oil pressure gauge. — Engine cooling fan motor relay switch field winding. — Electric fuel pump, relay switch and field winding.
D	Fuse **30/2** 16-Ampere	— Engine cooling fan motor. — Inspection lamp socket. — Glove compartment light.
E	Fuse **30/1** 16-Ampere	— Courtesy lights. — Clock. — Open door warning lights. — Country and town tone horns. — Cigar lighter. — Electro-fan motor. — Engine compartment lights.
F	Fuse **30/4** 8-Ampere	— Instrument panel lights. — Windshield wiper. — Direction signal lights and indicators. — Stop lights.
G	Fuse **30/5** 8-Ampere	— Available for any additional users.
H	Fuse **58/2** 8-Ampere	— R.H. front parking light. — L.H. tail light. — R.H. license plate light. — L.H. front parking light. — Parking light indicator.
I	Fuse **58/1** 8-Ampere	— R.H. tail light. — L.H. license plate light. — Back-up light. — Cigar lighter spot light. — Luggage compartment light.
L	Fuse **56/b2** 8-Ampere	— R.H. low beam.
M	Fuse **56/b1** 8-Ampere	— L.H. low beam.
N	Fuse **56/a2** 8-Ampere	— R.H. high beam.
O	Fuse **56/a1** 8-Ampere	— L.H. high beam. — High beam indicator.

LIGHTING SYSTEM SPECIFICATIONS

Headlights, high beam (inner pair) and low beam (outer pair)	four
Bulb	halogen, iodine vapour (*)
Front parking and direction signal lights	two
Double filament bulb:	
— parking	5 - watt
— direction signal	20 - watt
Side direction signal lights	two
Bulb	4-watt
Rear direction signal lights	two
Bulb	20-watt
Stop and tail lights	two
Double filament bulb:	
— stop	5-watt
— tail	20-watt
Back-up light	one
Bulb	21-watt
License plate lights	two
Bulb	5-watt
Open door warning lights	two
Bulb	5-watt
Engine compartment light: — 2 bulbs with push switch, automatic, operated by opening hood	5-watt
Interior lighting: — 2 bulbs with control switch and push switch, automatic, operated by opening door	5-watt
Luggage compartment light: Bulb	5-watt
Glove compartment light: — bulb with push switch, automatic, operated by opening lid	5-watt
Instrument lighting: — 6 bulbs	3-watt
Cigar lighter spot light: — bulb	3-watt
Electric clock light: — bulb	3-watt
Fuel reserve supply, Low oil pressure, No-charge, High beam, Direction signal repeater, Parking light, Parking brake « on », Choke « on » — eight bulbs	3-watt
Outer lighting control	by master switch on instrument panel
Headlight dipping	by lever under steering wheel

(*) Do not touch the transparent illuminating zone (head) with fingers: this bulb must be handled exclusively from the inserting base.

WARNING, CONTROL AND INDICATION SYSTEM SPECIFICATIONS

Engine revolution indication	electronic
Oil temperature indication	electric
Water temperature indication	electric
Engine oil pressure:	
— low pressure warning	red light
— pressure indication	gauge
Generator not charging battery	red light
Choke « on » warning	yellow light
Parking brake « on » warning	red light
Fuel reserve supply	red light
— contents in tank	1 Gal 3 pts to 2 Gals (G.B.) 1 Gal 5 pts to 2 Gals 3 pts (U.S.) (6-9 lt)
Headlamp high beam indication	blue light
Parking light indication	green light
Flashers « on » (direction signal)	green light

Flashing direction signals.	
No. of flashes per min. at normal total load of 44 watts:	
— at nominal voltage, 13.5 V and 68° F (20° C)	85 ± 8
— at 1.25 times nominal voltage (15 V) and 104° F (40° C), not above	120
— at 0.9 times nominal voltage (10.8 V) and at — 4° F (— 20° C), not below	60

Windshield wiper	crank mechanism
Wiper blades, strokes per min.	52 to 68
Variable speed rate device for wiper arms	rheostat
Bench test of motor and reducing gear:	
Feed voltage	14
Resistance torque	8.7 in.lbs (10 kgcm)
Stator temperature rise, not above	140° F (60° C)
Speed, warmed up, not above	68 r.p.m.
Current consumption, warmed up, not above	3 amps
Starting torque (with spindle held stationary), warmed up, at 14 V, not below	65.1 in.lbs (75 kgcm)
Pressure of wiper blades on windshield	14.1 to 17.6 ozs (400 to 500 gr)

Windshield washer	dual jet
Control	foot pump
Washer fluid: mixture of water and FIAT DP1 fluid, contentrated	30 % by volume (Summer) 100 % by volume (Winter)

Electric ventilating fan.	
Speed in free air, with fan fitted, voltage 12 V temp. 77° F (25° C):	
— 1st speed, resistor in circuit (1 ± 0.1 ohms)	3400 to 3600 r.p.m.
— 2nd speed, resistor cut out	2500 to 2700 r.p.m.
Nominal power	20 watts
Direction of rotation of motor (from fan side)	counter-clockwise

Instruments and Controls

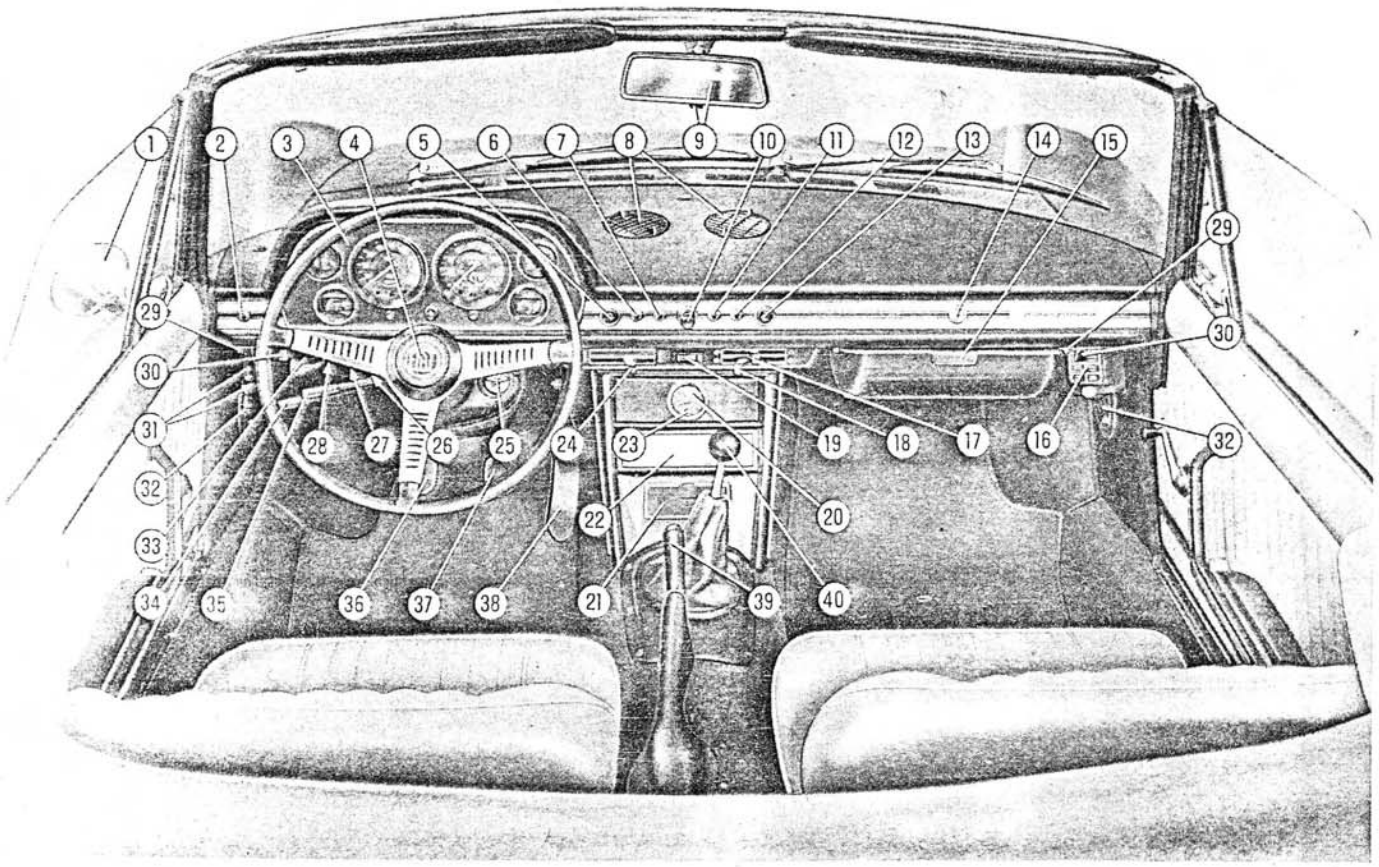


Fig. 135. - Instruments and controls.

1. Outer rear view mirror - 2. Outer lighting master switch - 3. Instrument cluster - 4. Horn button - 5. Wiper arm speed setting knob - 6. Windshield wiper switch - 7. Horn selector switch: electric (town), electro-pneumatic (country) - 8. Adjustable air diffusers to direct air onto windshield or inside car - 9. Inner rear view mirror - 10. Cigar lighter - 11. Extra switch - 12. Instrument panel light switch - 13. Instrument panel light and parking light indicator dimmer knobs - 14. Glove compartment lock - 15. Glove compartment - 16. Fuse holder - 17. Ventilation air intake control - 18. Heater control lever - 19. 3-position selector for controlling ventilation fan - 20. Electric clock - 21. Ash receiver - 22. Radio receiver housing lid - 23. Clock setting knob - 24. Heater-air control lever - 25. Key-type switch to control ignition, indications, starting and anti-theft device - 26. Manual accelerator control - 27. Choke control knob - 28. Inspection lamp socket - 29. Interior lights (two) - 30. Levers controlling air diffusers 32 - 31. Hood release and emergency control - 32. Adjustable air diffusers to direct atmosphere air under instrument panel - 33. Windshield washer and wiper foot control - 34. Headlight dipper switch - 35. Direction signal switch - 36. Clutch pedal - 37. Service brake pedal - 38. Accelerator pedal - 39. Emergency and parking brake ratchet lever - 40. Gearshift lever.

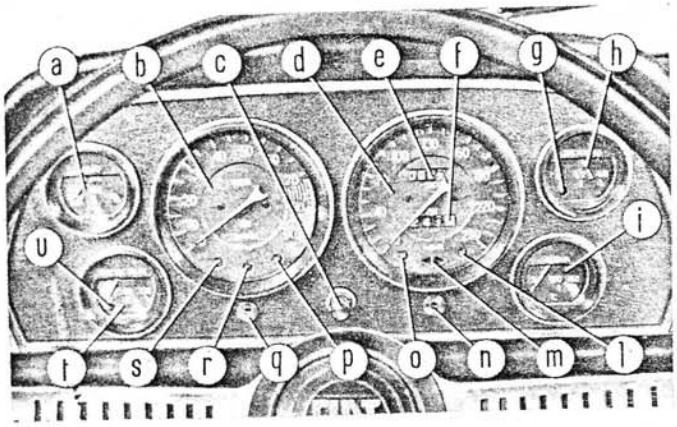


Fig. 136. - Instrument cluster.

a. Oil temperature gauge - b. Engine tachometer - c. Trip odometer setting knob - d. Speedometer - e. Total odometer - f. Trip odometer - g. Fuel reserve supply indicator - h. Fuel gauge - i. Water temperature gauge - l. High beam indicator - m. Direction signal arrow tell-tale - n. Speedometer gauge fixing knob - o. Parking light indicator - p. Parking brake « on » warning light - q. Tachometer gauge fixing knob - r. Choke « on » warning light - s. No-charge indicator - t. Oil pressure gauge - u. Low oil pressure indicator.

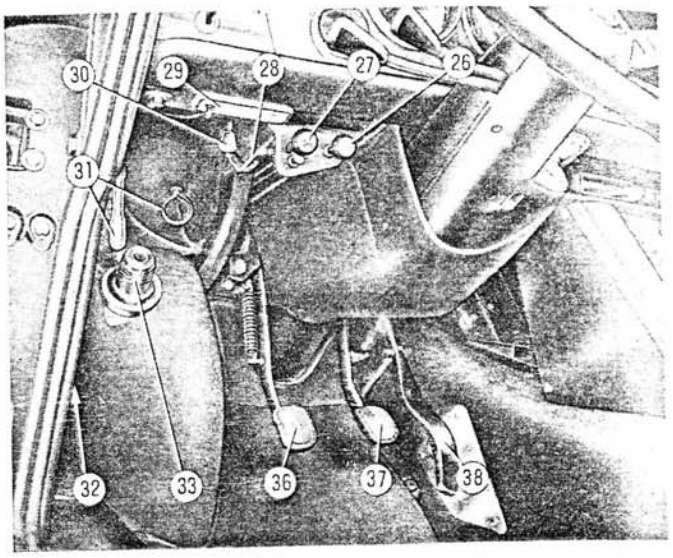


Fig. 137. - Detail of controls.

26. Manual accelerator control - 27. Choke control - 28. Inspection lamp socket - 29. Interior lights (two) - 30. Lever controlling air diffuser 32 - 31. Hood release and emergency control - 32. Adjustable air diffuser to direct air under instrument panel 33. Windshield washer and wiper foot control - 36. Clutch pedal - 37. Brake pedal - 38. Accelerator pedal.

Air Conditioning System

GENERAL

Car ventilation and heating may be adjusted at will, according to seasonal requirements.

Main operating conditions of the system are outlined hereafter.

Summer Ventilation.

With a closed top, air may be admitted into car by adjusting the swivelling ventipanes and winding down the window drop panes.

A further amount of fresh air may be admitted by moving rightwards (M, fig. 138) the upper lever (G) which controls the air scoop and by moving rightwards (D) the lever (C) which controls the shutter (L).

Fresh air enters the car also through adjustable diffusers (A): by suitably positioning these diffusers a flow of fresh air may be directed onto passengers or the windshield.

To have air flow in through these diffusers only, shift lever (C) all the way to the left (B).

At low road speeds the amount of incoming air may be increased by turning on the fan switch (E).

This switch is energized only when ignition is ON.

Fresh air may be admitted to the front passenger compartment through the side adjustable diffusers (32, fig 135) as well. Pull levers (30) to open these air intakes.

Midseason Ventilation.

During this period, to demist windshield simply let in fresh air by moving lever (G) rightwards (M) closing shutter (L) and positioning adjustable diffusers (A) so that the thin wing is turned toward the windshield.

Should it be desired to admit slightly warmed air move partially rightwards heater control lever (H).

Winter Heating.

For passenger compartment heating, and for windshield demisting and defrosting:

- shift the air scoop control lever (G, fig. 138) all the way to the right (M);
- shift the heater control lever (H) all the way to the right (I);
- start the ventilation fan, if necessary, through switch (E);
- open shutter (L) by shifting lever (C) all the way to the right.

Warmed air is thus blown both into car and against windshield; to blow air only against windshield shift lever (C) all the way to the left.

With extremely low temperatures, move lever (G) only partially to the right, to let in a limited amount of cool air.

To activate air circulation in car interior it is good practice to partly open the door swivelling ventipane.

NOTE - Should heating be poor, check the thermostat on head outlet duct for incorrect operation.

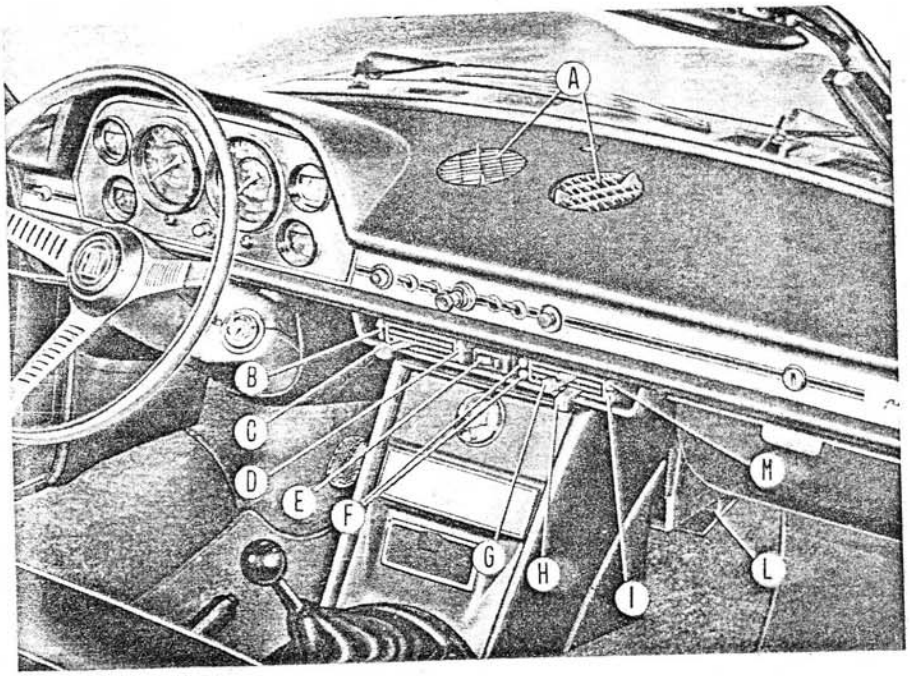


Fig. 138. - Arrangement of heater in car interior.

A. Air diffusers - B. L.H. position of lever C - C. Lever controlling shutter L - D. R.H. position of lever C - E. Ventilation fan switch - F. L.H. position of levers G and H - G. Ventilation air intake control - H. Heater control lever - I. R.H. position of lever H - L. Warmed air intake shutter - M. R.H. position of lever G.

FIAT-DINO « Roadster » and « Coupe » cars can be optionally equipped with an all-transistor radio receiver of the Autovox 170 series fitted with the automatic pre-tuning of stations.

For the installation of receiver and trimming of antenna, see the instruction leaflet which comes with the radio mounting kit.

FIAT-DINO COUPE

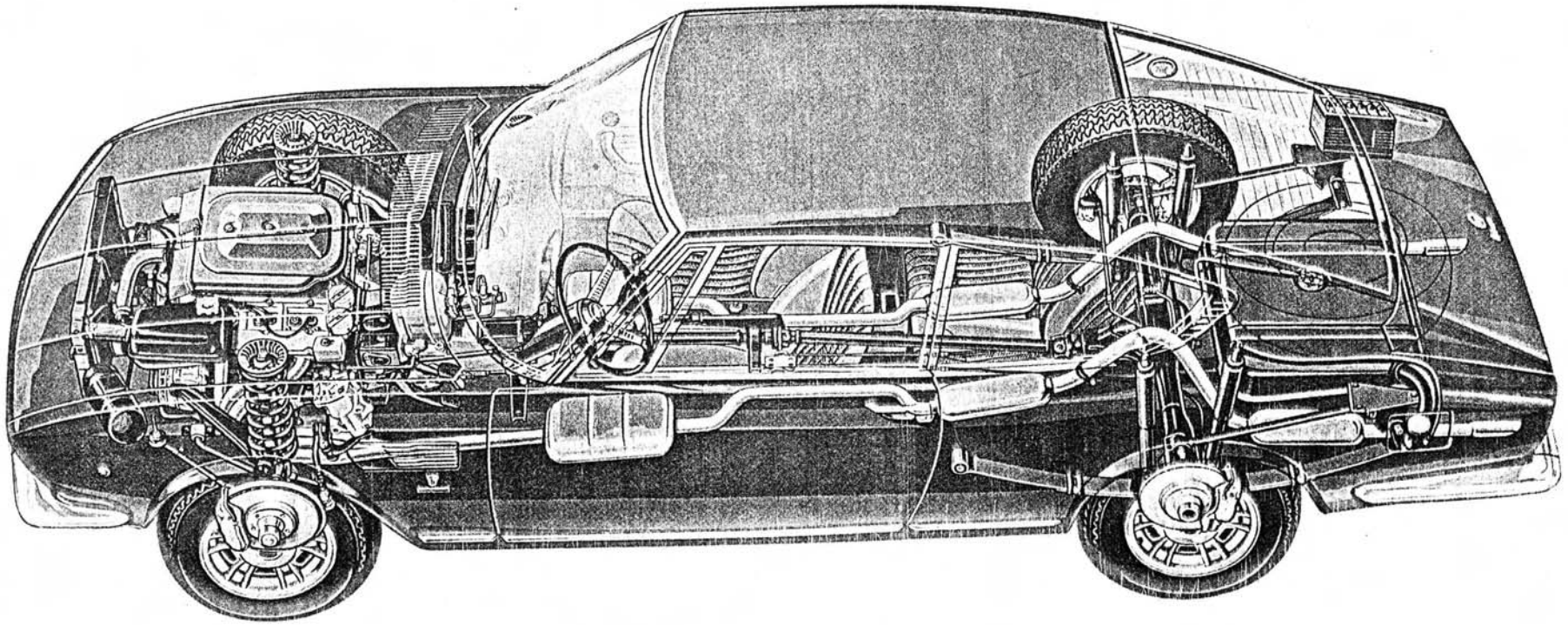


Fig. 139. - Phantom view of running gear units.

COUPE VERSION

DIFFERENCES FROM ROADSTER

CHASSIS

— Dimensions, weights and performance.

— Wheels: tire pressure.

— Steering: turning circle 38 ft (11.6 mt).

— Front suspension: wheel camber and tread.

— Rear suspension: **two-leaf** semi-elliptic spring.

— Brakes: adjustment of pressure regulator control rod (fig. 146).

— Air conditioning system: two adjustable outlets for air delivery to rear passenger compartment; two adjustable slits to activate air circulation in car interior.

NOTE - The front wheel hub, axle shafts and brakes show a different design from the Roadster version cars « of initial production » due to the wheel mounting. As a matter of fact in the Coupe wheels are fixed by studs instead of wing nuts as shown in figures 147-148.

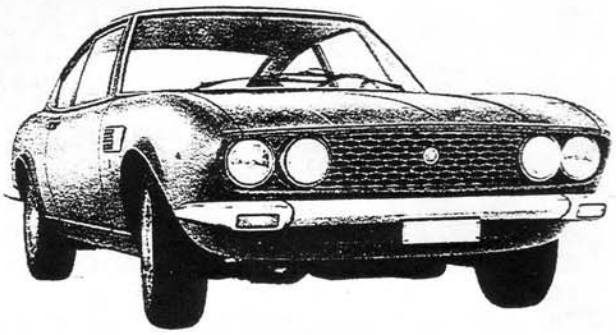


Fig. 140. - Front view of car.
In foreground, parking and direction signal lamps embedded in bumpers.

ELECTRICAL

— Layout of system.

— Fuses (fig. 149).

— Instruments and controls (figures 150-151-152).

— Front parking and direction signal lamps: embedded in bumper (fig. 140).

— Electric window regulators.

— Two dome lamps fitted to rear side trim panel; each lamp has an individual switch and can also be operated by opening doors through a push switch on jamb.

Fig. 141. - FIAT-DINO Coupe.

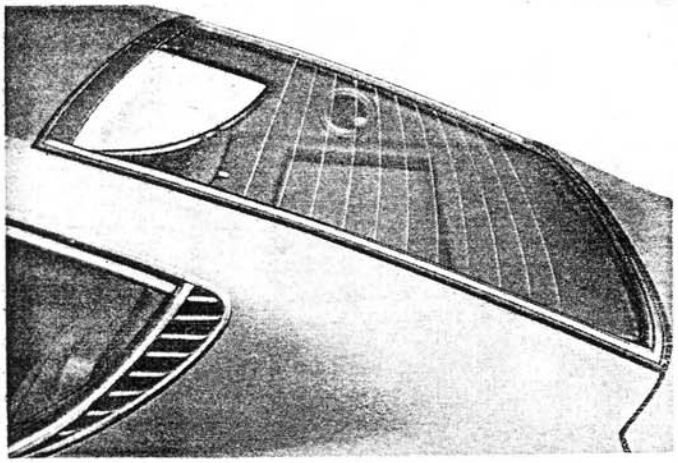


Fig. 142. - Close-up view of rear window with defrosting resistors.

— Thermal resistors for defrosting the rear window (fig. 142).

— Optical indicator showing when rear window resistors are on.

— Switch, on shelf between instrument panel and floor tunnel, for turning on rear window resistors.

— Switch (on shelf) for cutting off rear dome lights.

— Switch (on shelf) for turning on interior lights.

— Two switches (on shelf), with automatic cancellation, for electric window regulator control.

BODY

Monocoque **Coupe** type with four seats, two doors and two side windows.

Front hinged **hood**, locked by a lever placed in glove compartment;. heater air scoops on the middle and under the windshield; exhaust air slits laterally.

Rear view mirror on the middle of the cross member over the windshield; mirror fitted with non-glare device.

Windshield in curved safety glass, rubber weatherstrips with bright metal frame.

Slits on front side panels for air exhaust.

Doors hinged at front, with two windows, the front to swing and the rear controlled by an electric regulator. Doors fitted with lock and locking control operated from inside the car.

External door handles with plunger release.

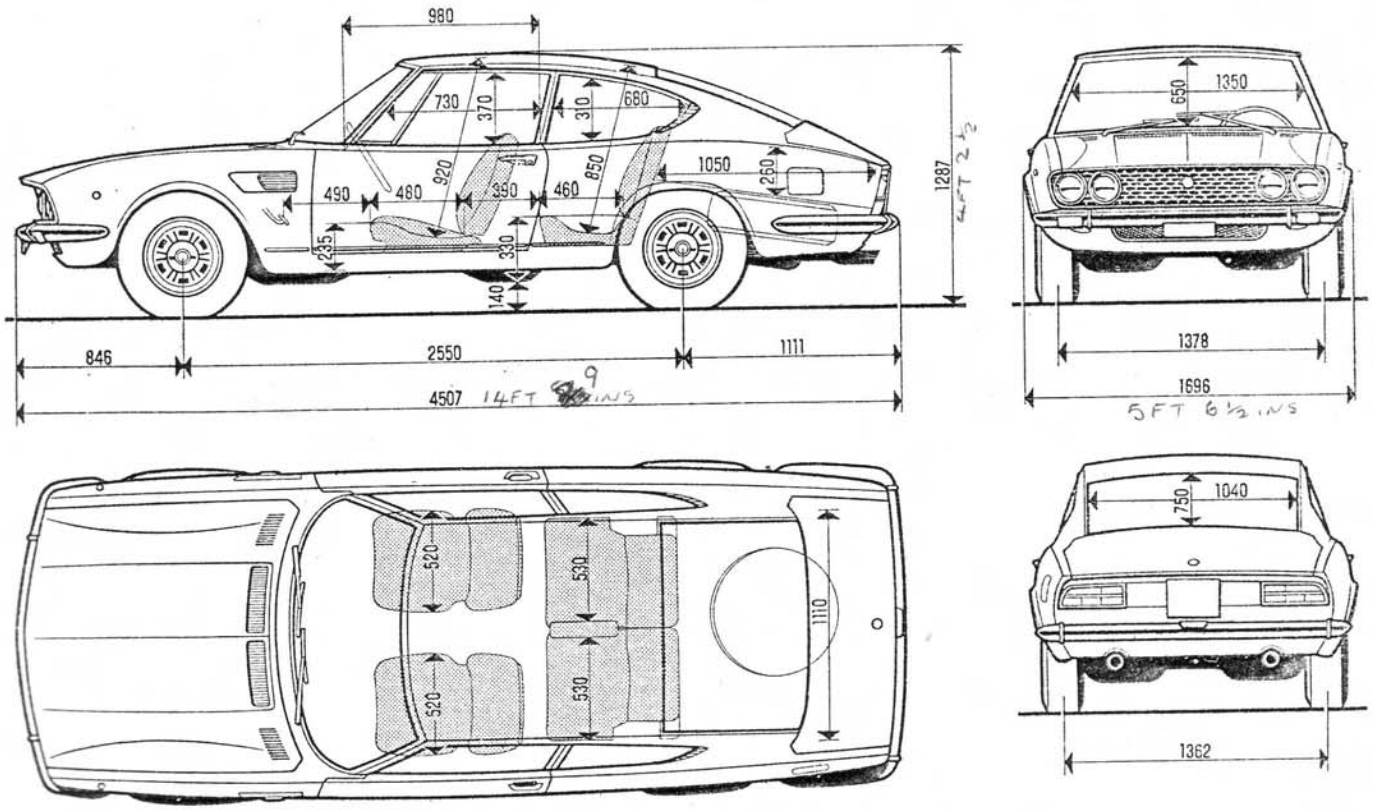


Fig. 143. - Coupe leading dimensions (height applies to an unloaded car).

Rear quarter window in curved safety glass of the drop type, controlled by a winged rotor regulator; rubber weatherstrip with bright metal frame.

Fuel tank filler on L.H. rear fender, with spring cover.

Luggage compartment at rear, with key lock and release control on driver's side door pillar, in car interior. Spare wheel, tool kit, jack and battery housed inside compartment.

Front license plate fitted centrally on bumper.

Rear license plate fitted on vertical liner; bright metal plate frame.

Bumpers front and rear in chromium plated steel.

Instrument panel in shock-resistant plastic material with wooden extensions; the panel incorporates:

four revolving air diffusers, on top;

instruments on driver's side;

fuse holder lid and key-locked glove compartment on passenger's side;

heater controls on the middle.

Wooden shelf arranged centrally between instrument panel and floor tunnel, carries various controls.

Plastic-lined **floor tunnel**, incorporates:

ash receivers for front passengers;

utility box with cover and ash receiver for rear passengers.

Bucket front seats, sliding adjustment: adjustable back folding forward, with safety catch.

Rear seats of the fixed type: seat back collapsible forward to form an uninterrupted floor with luggage compartment (fig. 144).

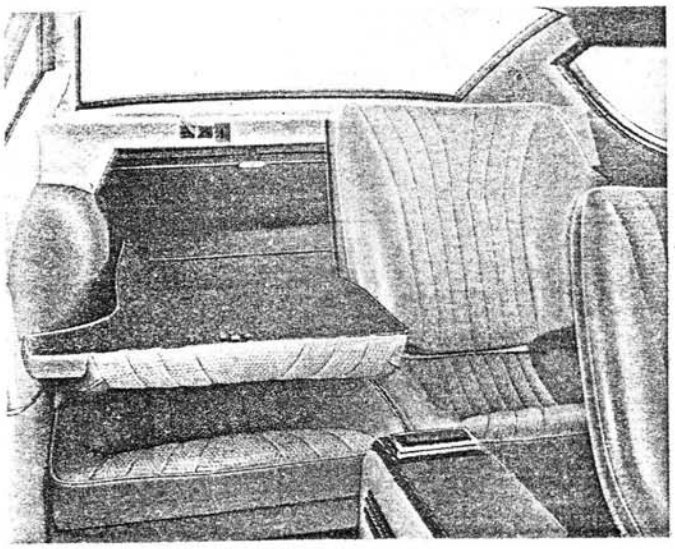


Fig. 144. - Rear seat backs are folding down for increased luggage room.

Safety catch for both seat backs. Center armrest, removable.

No. 4 side armrests, padded, with assist handle incorporated.

Utility shelf, plastic lined, behind rear seats.

Map pockets on dash footboard sides.

Sun visors padded and adjustable both ways; vanity mirror on passenger's side visor.

Moquette **mats** on passenger and luggage compartment floors.

Trim panel of imitation leather.

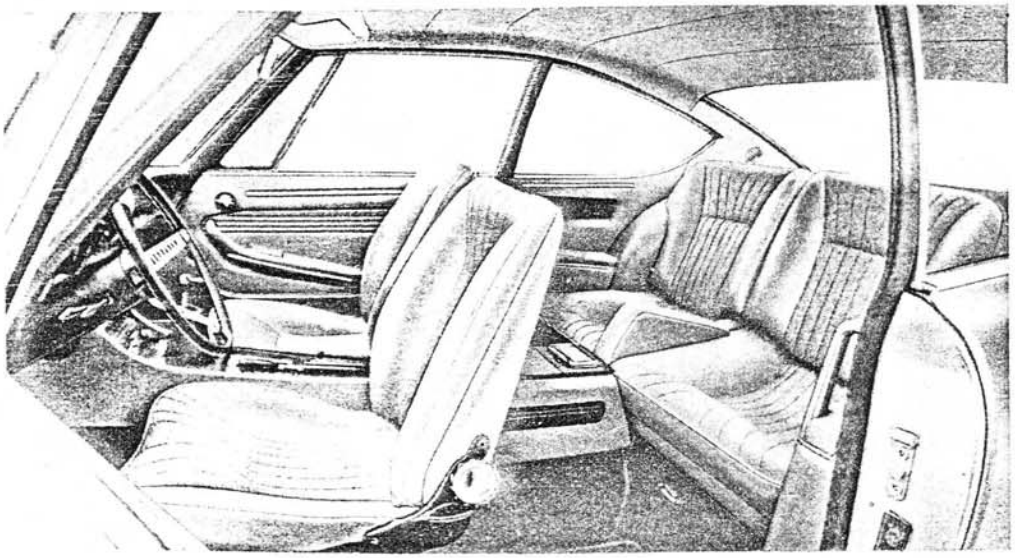


Fig. 145 - Interior view of passenger compartment.

WEIGHTS

Curb weight of car (with full tanks, spare wheel, tools and accessories)	2,822 lbs (1,280 kg)
Payload: 4 persons plus 88 lbs (40 kg) luggage, or	705 lbs (320 kg)
Total weight, fully loaded	3,527 lbs (1,600 kg)
Distribution of full-load weight:	
— front axle	1,653 lbs (750 kg)
— rear axle	1,874 lbs (850 kg)

WHEELS AND TIRES

Tire pressures:
— front 28 1/2 psi (2 kg/cm²) — rear 31.3 psi (2.2 kg/cm²).

FRONT AND REAR SUSPENSION

Front wheel camber	angle	0° 30′ ± 20′
	measured at rim edge	.039″ to .197″ (1 to 5 mm)
Front tread		54.25″ (1,378 mm)

PERFORMANCE

Maximum **speed** fully loaded on level road in good condition, engine run-in:

— first gear	37 mph (60 kph)
— second gear	65 mph (105 kph)
— third gear	90 mph (145 kph)
— fourth gear	121 mph (195 kph)
— fifth gear, abt	124 mph (200 kph)

Steepest **gradient** climbable with full load, on a road in good condition, engine run-in:

— first gear	40 %
— second gear	23 %
— third gear	15 %
— fourth gear	10 %
— fifth gear	7.5 %

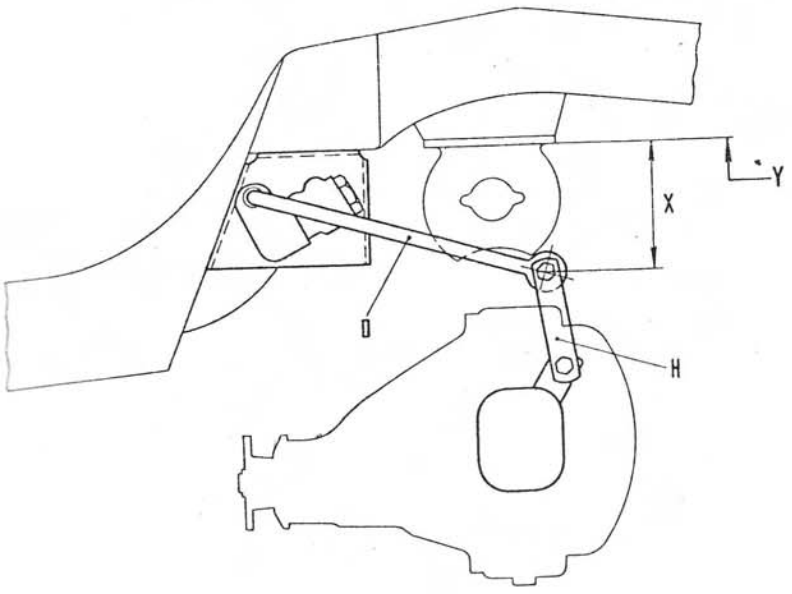
NOTICE

For inspections, assemblies and adjustments which must be made with car « at load », this condition should be intended as follows: three persons plus 66 lbs (30 kg).

SEMI-ELLIPTIC SPRING TEST DATA

	POSITION	Load		Camber		Camber in 2nd and 3rd positions		Deflection rate	
		lbs	kg	in	mm	in	mm	in % lbs	mm % kg
1st	Initial load for ckecking deflection rate	518	235	—	—	—	—	—	—
2nd	Static load	739	335	2.638 ± .118	67 ± 3	1.890 ± .150	48 ± 3.8	.86 ± .07	48 ± 3.8
3rd	Bottoming load	959	435	—	—	3.780 ± .300	96 ± 7.6	—	—

Springs are identified by a daub of white paint.



BRAKES

The control rod of pressure regulator must be adjusted at a distance (X, fig. 146) of **5.905″ $^{+.197″}_{0}$ (150 $^{+5}_{0}$ mm)** from the base of buffer plate.

Fig. 146. - Detail of pressure regulator adjusting diagram.

D. Regulator control rod - H. Shackle - X. Rod distance adjustment 5.905″ $^{+.197″}_{0}$ (150 $^{+5}_{0}$ mm) - Y. Lower face of buffer plate.

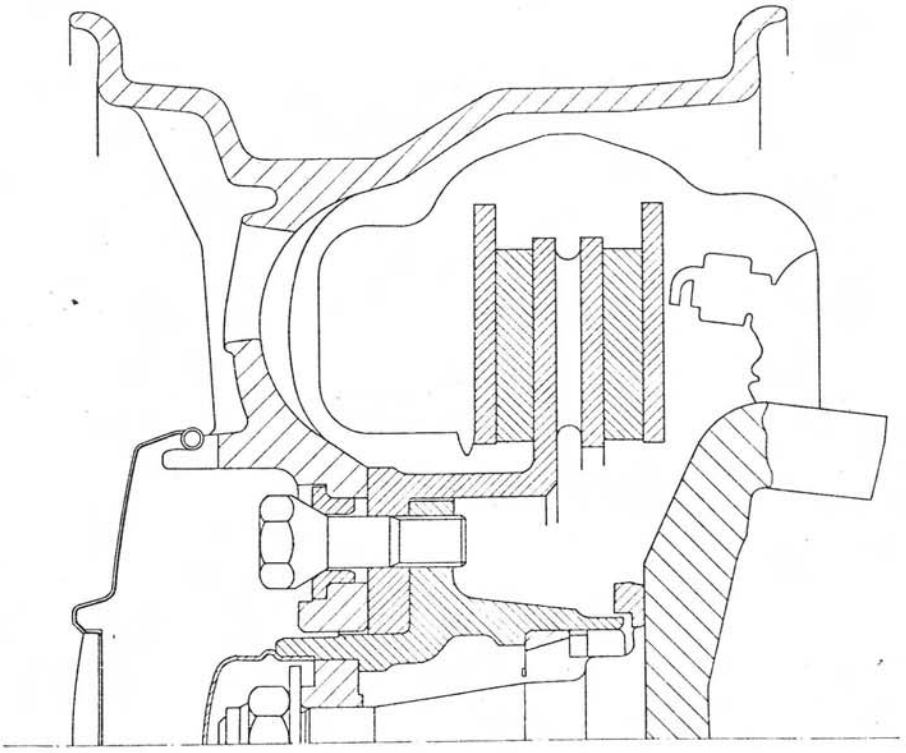


Fig. 147. - Scrap section view of L.H. front wheel and hub.

On all Coupe cars and Roadster version cars of ... production front and rear wheels are fixed by means ... Hence front wheel hubs and axle shafts have ... modified accordingly.

Figures 147 and 148 illustrate, in front and rear section details, respectively, the items involved in this modification, or: front wheel hub and brake disc, and rear axle shaft and brake disc.

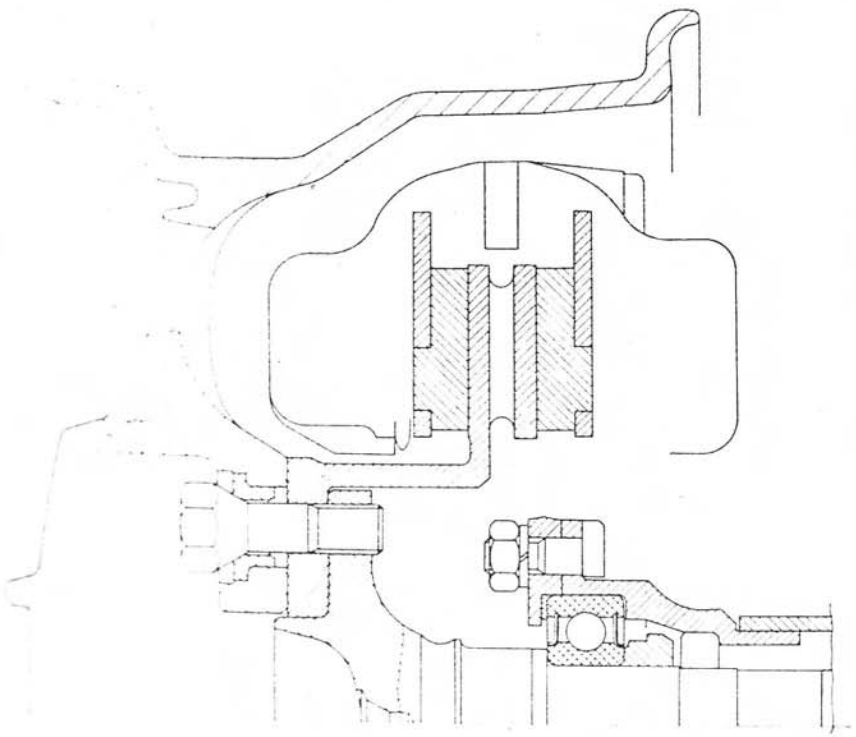


Fig. 148. - Scrap section view of L.H. rear wheel and axle shaft.

NOTE - Due to a special design feature, the axle shaft bearing protrudes from its seat on rear axle and, with bearing fitted in place, a clearance of .0000" to .0047" (0 to 0.12 mm) must be felt between the bearing and the shoulder face on axle casing (fig. 68).

This clearance is assured by the presence of a shim (5, fig. 68) which is fitted in production between bearing and caliper carrier plate on installation of axle shafts. FIAT Service Workshops should have the axle shaft overhaul equipment available to accomplish the work.

The bearing shim comes in the following thicknesses: .0591" - .0598" - .0606" - .0614" - .0622" - .0630" - .0638" - .0646" - .0653" - .0661" - .0669" (1.50 - 1.52 - 1.54 - 1.56 - 1.58 - 1.60 - 1.62 - 1.64 - 1.66 - 1.68 - 1.70 mm).

Electric System

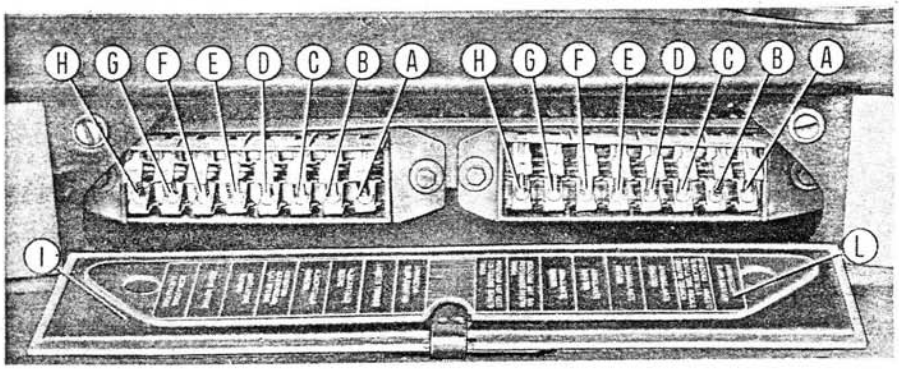


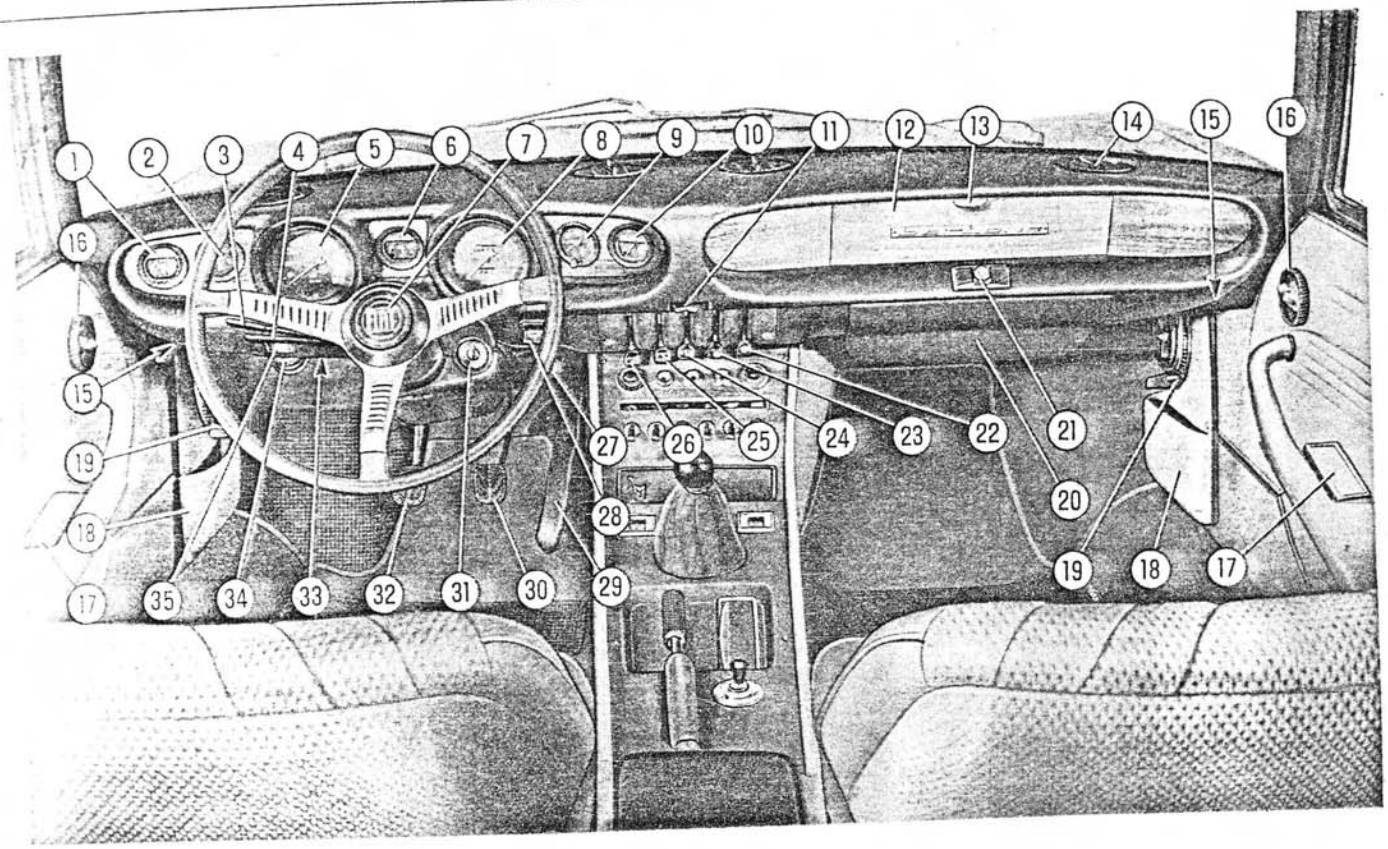
Fig. 149. - Arrangement of fuses (see tag 1. Fuse holder lid - 2. Tag showing circuit protected by single fuses.

ELECTRIC SYSTEM - FUSES

Fuses (fig. 149)	Circuits protected (R.H. fuse holder)
A 8-Amp.	— Available for any additional users.
B 16-Amp.	— Rear window defroster, relay switch and indicator.
C 25-Amp.	— R.H. window regulator.
D 25-Amp.	— L. H. window regulator.
E 16-Amp.	— Inspection lamp socket. — Glove compartment light. — Front and rear courtesy lights. — Clock. — Open door warning lights. — Town and country tone horns. — Cigar lighter.
F 16-Amp.	— Radiator cooling fan motor.
G 8-Amp.	— No-charge indicator and sending unit. — Low oil pressure indicator. — Choke « on » warning light. — Parking brake « on » warning light. — Water temperature gauge. — Fuel gauge and reserve supply indicator. — Engine tachometer. — Oil temperature gauge. — Oil pressure gauge. — Radiator cooling fan motor relay switch field winding. — Electric fuel pump, relay switch, and switch field winding.
H 8-Amp.	— Voltage regulator. — Alternator field winding.

Fuses (fig. 149)	Circuits protected (L.H. fuse holder)
A 8-Amp.	— Available for any additional users.
B 8-Amp.	— Ventilation fan motor. — Engine compartment lights. — Instrument panel lights. — Windshield wiper. — Direction signal lights and indicators. — Stop lights. — Rear window defroster relay switch field winding.
C 8-Amp.	— L.H. low beam.
D 8-Amp.	— R.H. low beam.
E 8-Amp.	— L.H. high beam. — High beam indicator.
F 8-Amp.	— R.H. high beam.
G 8-Amp.	— L.H. front parking light. — Parking light indicator. — R.H. tail light. — L.H. license plate light. — Back-up light. — Cigar lighter spot light. — Luggage compartment light. — Front ash receiver light. — Control switch panel on shelf.
H 8-Amp.	— R.H. front parking light. — L.H. tail light. — R.H. license plate light.

Instruments and Controls



Figs. 150-151. - Instruments and controls.

1. Water temperature gauge - 2. Oil temperature gauge - 3. Headlight dipper switch - 4. Direction signal switch - 5. Engine tachometer gauge, incorporating: a. Electronic tachometer - b. No-charge indicator - c. Choke « on » warning light - 6. Oil pressure gauge - d. Low oil pressure indicator - 7. Horn button - 8. Speedometer gauge, incorporating: e. Direction signal arrow tell-tale - f. Parking brake indicator - g. Speedometer - h. Total odometer - i. Trip odometer - l. High beam indicator - m. Trip odometer setting knob - 9. Electric clock - n. Clock time setting knob - 10. Fuel gauge - o. Fuel reserve supply indicator - 11. 3-position selector for ventilation fan control - 12. Fuse holder lid - 13. Release spring for lid 12 - 14. Adjustable diffusers (four) to direct air onto windshield or inside car - 15. Interior lights (two) - 16. Ventilation pane control knobs - 17. Door control handle - 18. Map pockets (two) - 19. Adjustable diffusers for admission of cool air under instrument panel - 20. Glove compartment enclosing hood release knob - 21. Plunger, for release of compartment 20 - 22. Heater control lever - 23. Ventilation air intake control - 24. Front compartment heating lever - 25. Rear compartment heating lever - 26. Choke lever - 27. Manual accelerator control - 28. Wiper on-off switch - 29. Accelerator pedal - 30. Service brake pedal - 31. Key-type switch for ignition, appliances, indications, starting and anti-theft device - 32. Clutch pedal - 33. Inspection lamp socket - 34. Foot pump to operate windshield wiper and washer - 35. Outer lighting master switch.

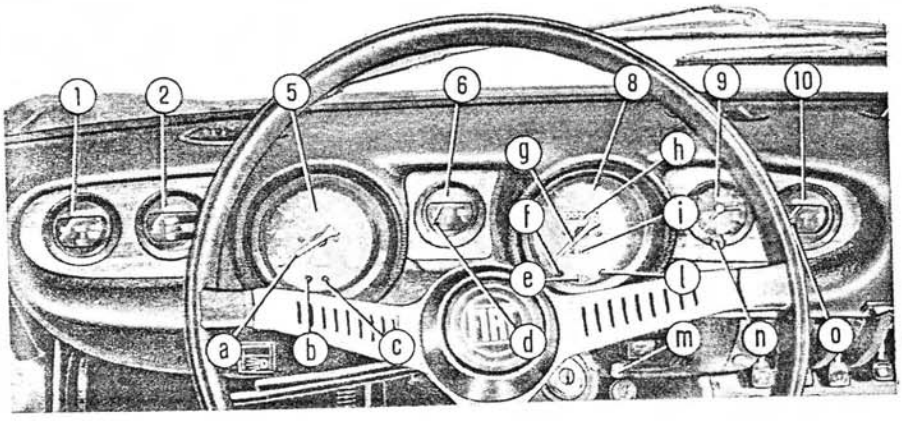


Fig. 151. - Close-up view of instruments and controls.

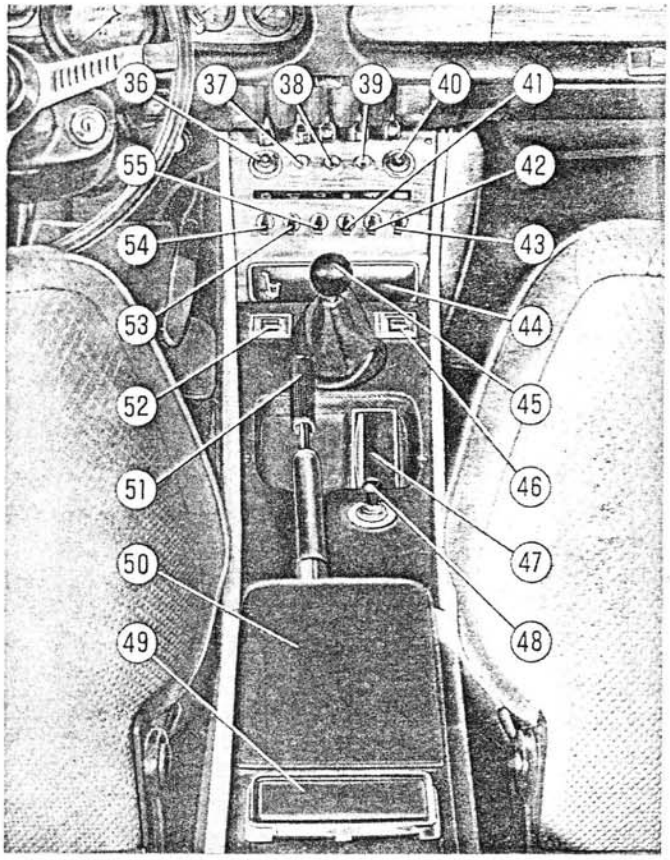


Fig. 152. - Controls on center shelf.

36. - Instrument light and parking light indicator dimmer knob - 37. Parking brake « on » warning light - 38. Extra indicator (optional) - 39. Rear window defroster indicator - 40. Wiper speed control knob - 41. Extra switch - 42. Selector switch for electric (town) or electro-pneumatic (country) horns - 43. Rear window defroster switch - 44. Radio receiver housing lid - 45. Gearshift lever - 46. R.H. door window regulator switch - 47. Front ash receiver - 48. Cigar lighter - 49. Rear ash receiver - 50. Utility box - 51. Parking brake ratchet lever - 52. L.H. door window regulator switch - 53. Front interior light switch - 54. - Instrument light switch - 55. Front and rear interior light cut-off switch.

Body

ELECTRIC WINDOW REGULATORS

As already outlined, the car is fitted with electric window regulators controlled by two switches (46 and 52, fig. 152).

Window regulators consist each of a motor (3, fig 154) mounted in the door framework; the motor actuates the cable-and-sheave mechanism moving the door window glass.

In case of failure of the regulator motor, a special crank (1, fig. 153) is supplied with the tool kit for winding the window glass manually.

For correct performance of window cranking operation some rules should be observed as outlined hereafter.

Pry out the bayonet-coupled plug which blanks the crank seat opening, using the yoked end of the crank grip.

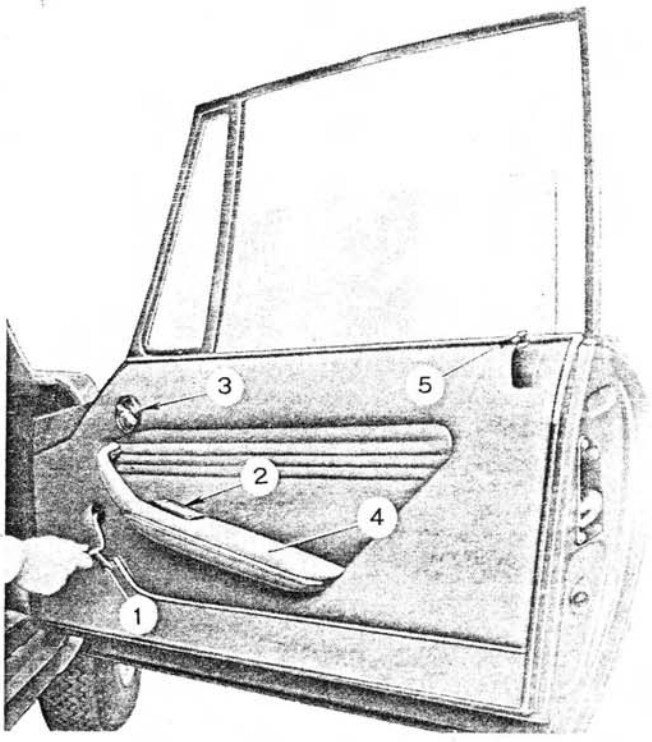


Fig. 153. - Interior view of door.

1. Crank for manual window regulator - 2. Interior door handle - 3. Ventipane control knob - 4. Arm rest - 5. Door locking knob.

Fit the crank (fig. 153) into the free opening and press down until the crank gear (4, fig. 154) is felt to come into mesh with the drive shaft gear (1, fig. 154).

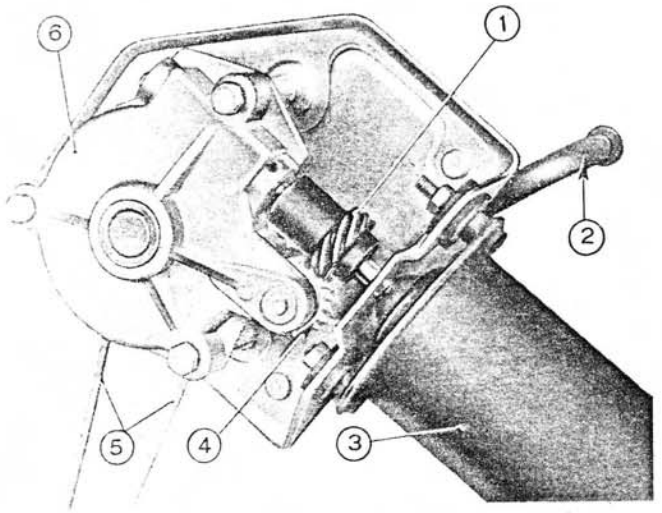


Fig. 154. - Detail of window regulator.

1. Drive shaft and gear - 2. Emergency crank - 3. Window regulator motor - 4. Crank end gear - 5. Regulator cable - 6. Regulator mechanism.

Much care should be excercised in this step because good meshing of gears is a premise for correct operation of cranking mechanism.

Adjustment.

If the window travel must be adjusted, proceed as follows.

Remove the door locking knob (5, fig. 153).

Remove the arm rest (4) and the inside door handle

Screw down the ventilator window winged knob (3).

Remove the door trim panel fixing screws and slide off the trim panel from the underside.

Wind the window glass all the way up.

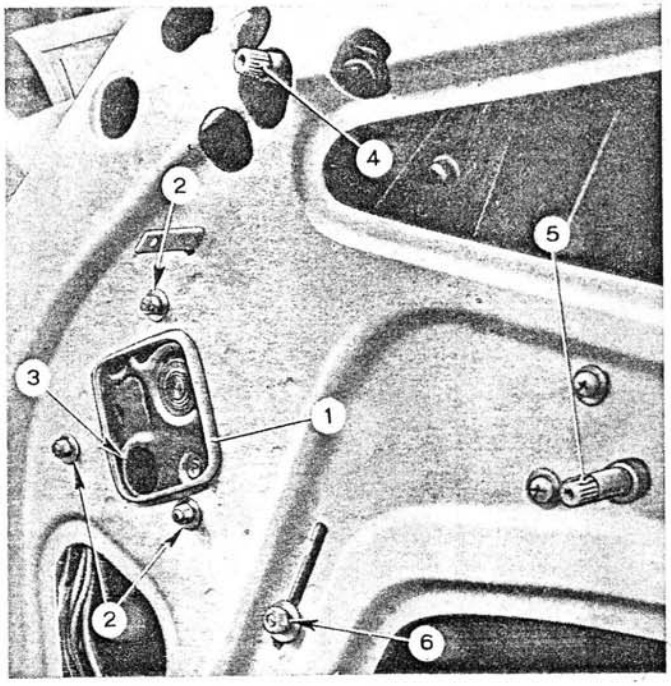


Fig. 155. - Detail of door controls.

1. Window regulator mechanism - 2. Regulator mechanism mounting nuts - 3. Regulator emergency crank opening - 4. Ventilator window swivelling shaft - 5. Remote control handle shaft - 6. Movable sheave lock and adjusting nut.

Loosen the movable sheave fixing nut (6, fig. 155) and stretch the window regulator cable by repositioning the sheave pin in the slot cut in door framework; lock the sheave nut.

Removing Window Regulator Motor.

In case the window regulator motor must be removed for service, just wind the window down, disconnect the wires and remove the nuts (2, fig. 155) which secure the mechanism to door framework.

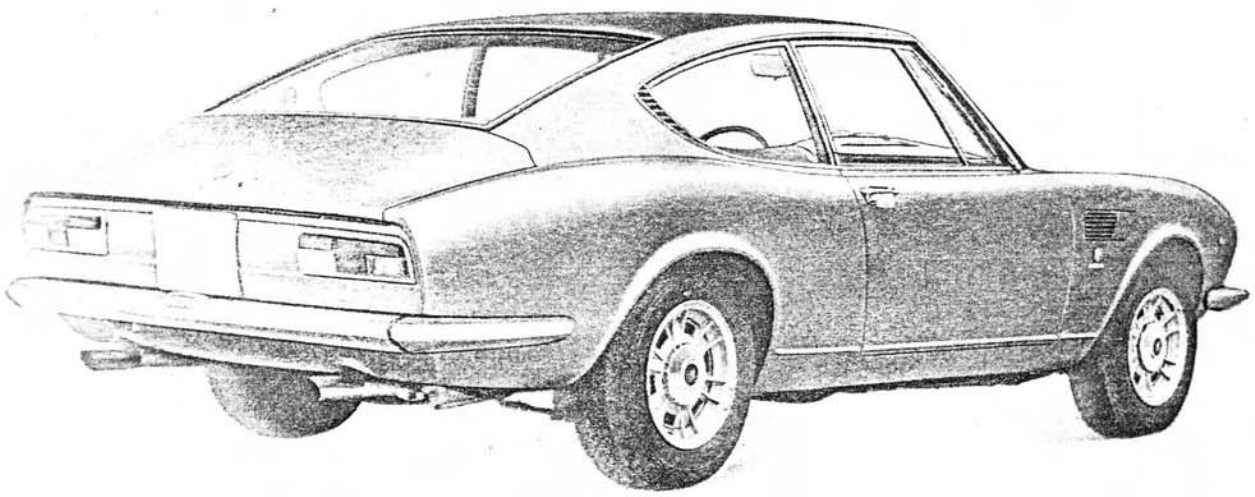


Fig. 156. - FIAT-DINO Coupe.

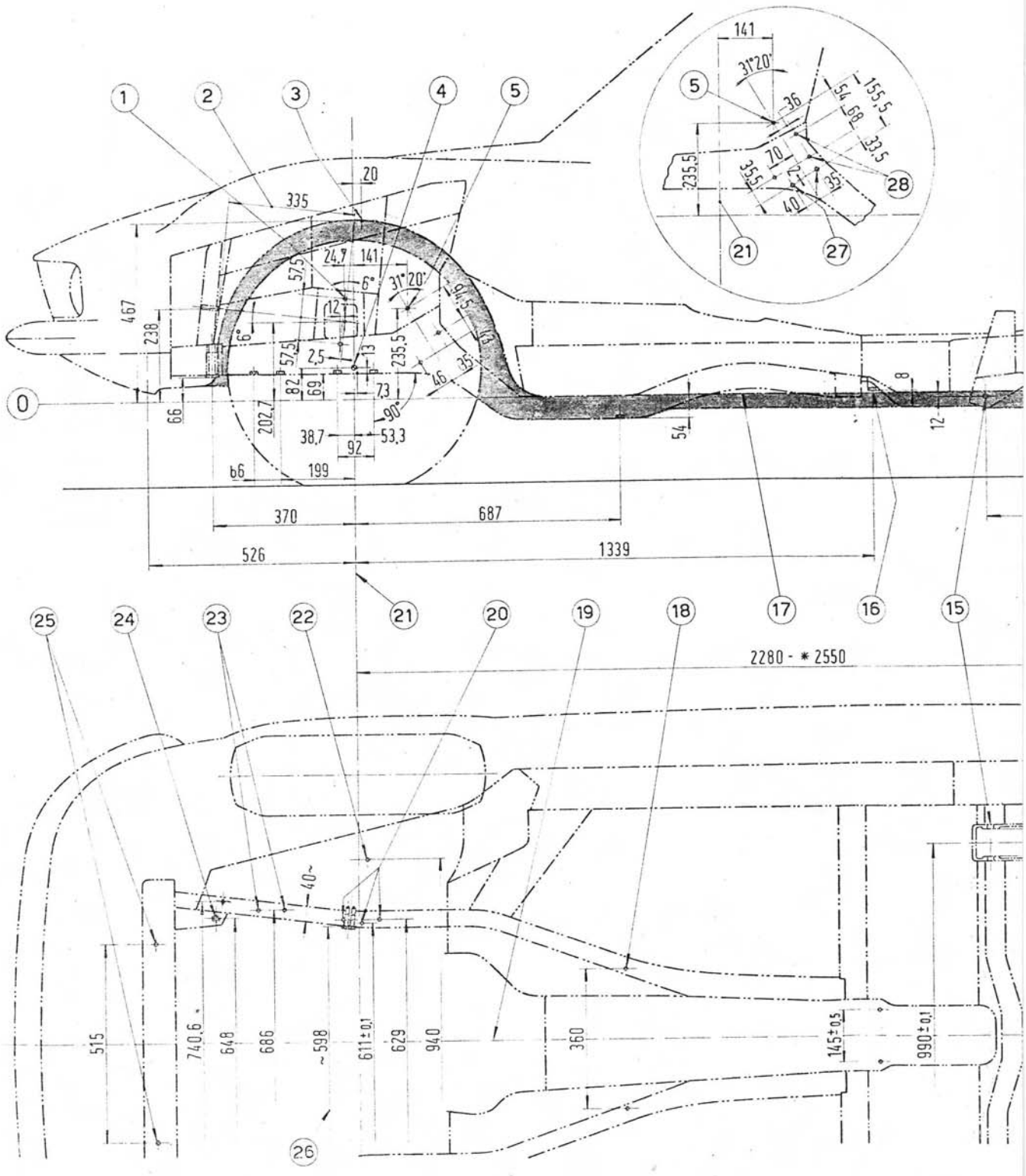
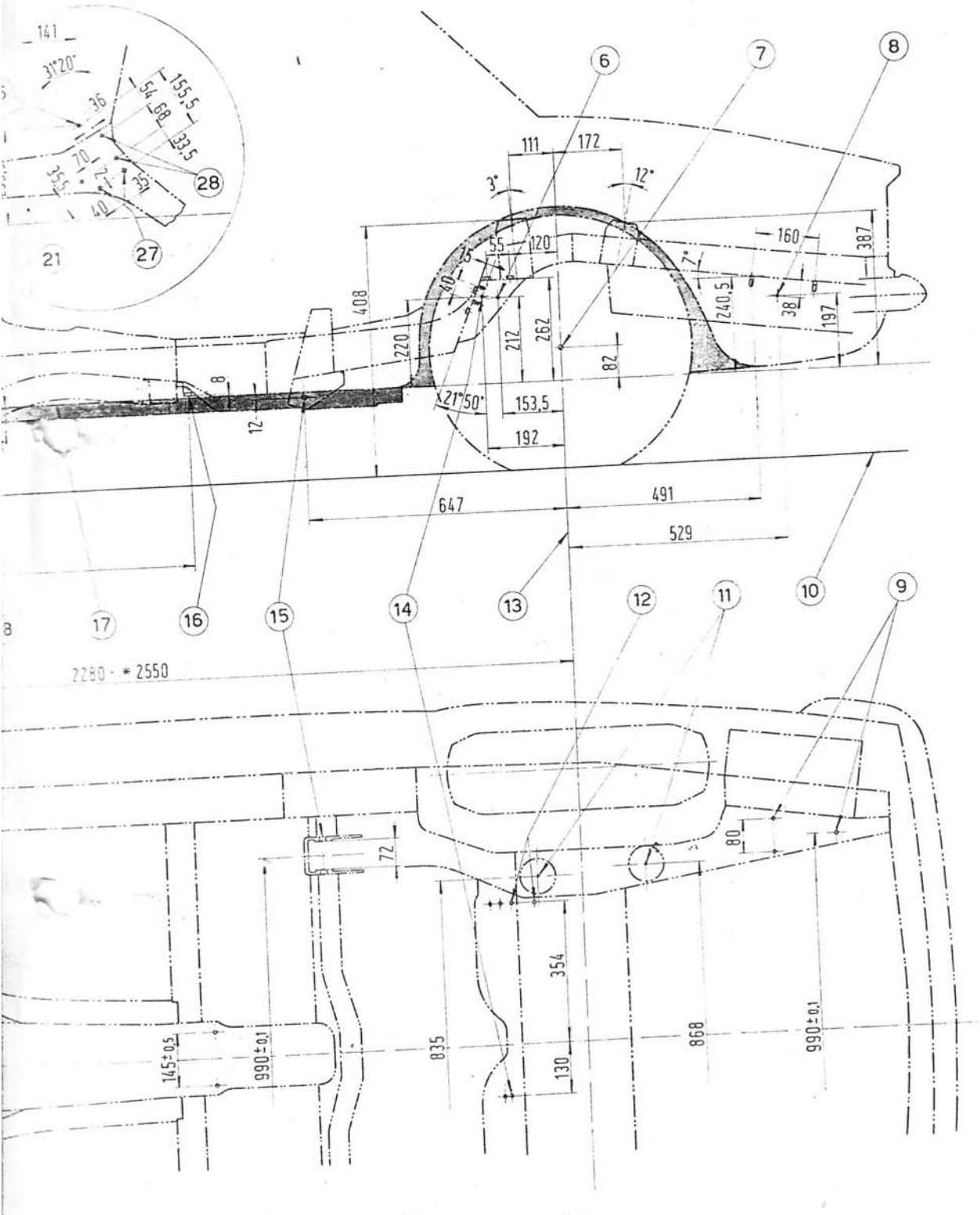


Fig. 157. - FIAT-Dino Roadster and Coupe - Main metric data for checking run

1. Upper control arm mounting point - 2. Upper control arm C/L distance - 3. Front coil spring center - 4. Fron regulator and mounting center - 7. Rear wheel center - 8. Side strut center - 9. Side strut and leaf spring rear mo 12. Brake pressure regulator bracket mounting point - 13. Rear wheel axis - 14. Brake pressure regulator interm shaft center mounting - 17. Reference line - 18. Power plant mounting point - 19. Car C/L - 20. Front cross me center - 23. Sway bar mounting point - 24. Front suspension strut mounting - 25. Radiator lower mounting - 26. ing gear mounting.

(*) These figures apply to Coupe version.



Coupe - Main metric data for checking running gear mounting points.

stance - 3. Front coil spring center - 4. Front wheel center - 5. Steering gear center - 6. Brake pressure center - 9. Side strut and leaf spring rear mounting - 10. Ground line - 11. Rear shock absorber mounting - el axis - 14. Brake pressure regulator intermediate bracket center - 15. Leaf spring front center - 16. Prop ing point - 19. Car C/L - 20. Front cross member mounting - 21. Front wheel axis - 22. Front coil spring ount ng - 25. Radiator lower mounting - 26. Body interior - 27. Steering lock adjusting screw - 28. Steering gear mounting.

N.B. - The graph illustrates the body of Roadster version.

AZZURRO-NERO
GIALLO
GRIGIO-NERO
VERDE-NERO
AZZURRO
GIALLO
BIANCO
NERO
ROSSO
MARRONE
GRIGIO
VERDE
BIANCO-NERO
ROSA
GIALLO-NERO
GRIGIO-ROSSO
30/51
86
85
87
15
54
30
56a
56b
58
67
31
50
F C INT D 31
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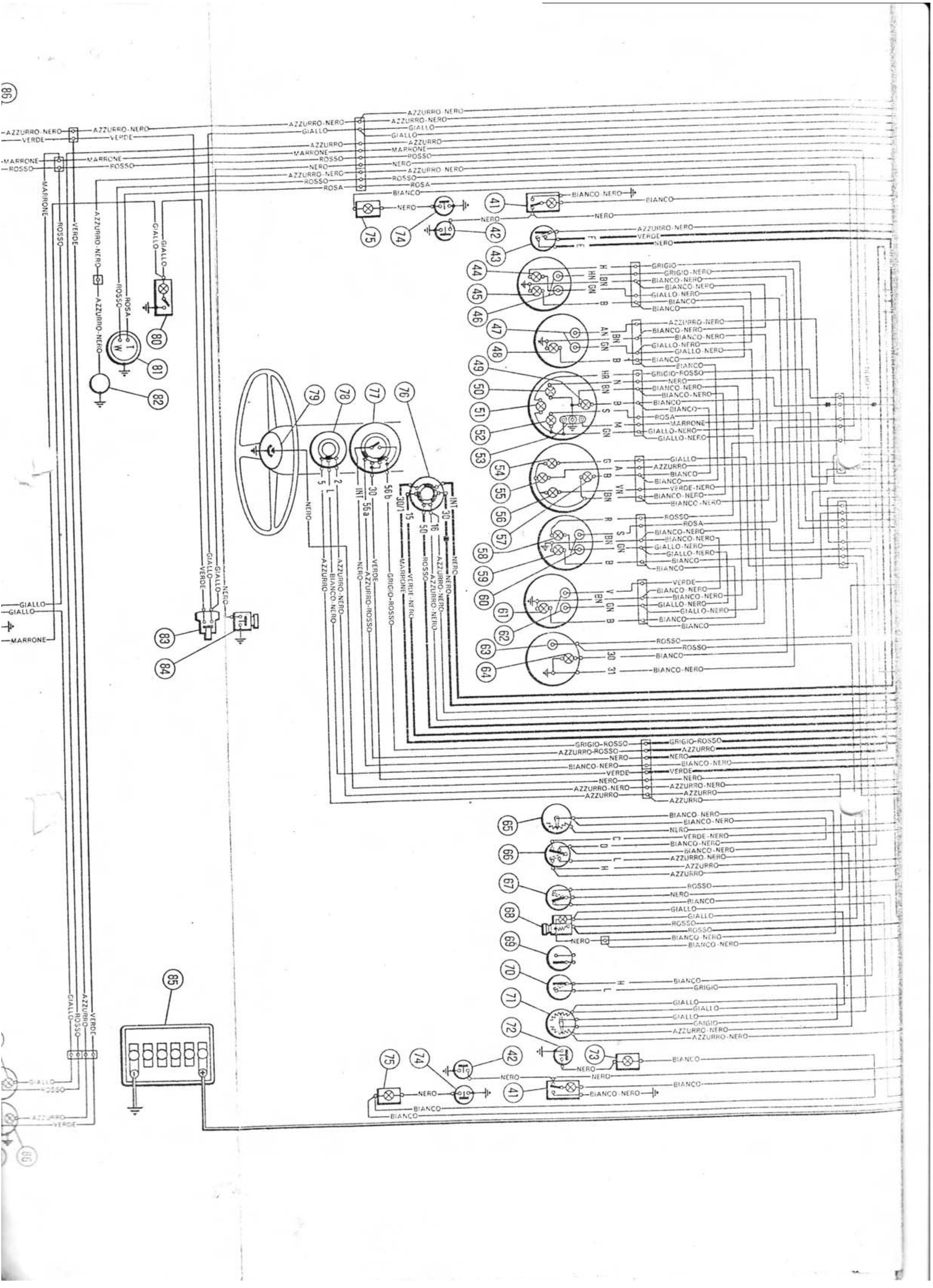

Fig. 134. - Wiring diagram.

1. Front direction signal lights.
2. Front parking lights.
3. Low beam headlights (with halogen bulb).
4. High beam headlights (with halogen bulb).
5. Town tone horn.
6. Engine cooling fan motor.
7. Alternator.
8. Spark plugs.
9. Ignition distributor.
10. Thermal switch for motor 6.
11. Side direction signal lights.
12. Low oil pressure indicator sending unit.
13. Pressure switch for electric fuel pump 82.
14. Relay switch for motor 6.
15. Water temperature gauge thermal switch: shifts gauge pointer to red end of scale (dangerous water temperature) irrespective of impulses from sender 23.
16. Ignition coil.
17. Engine compartment lights.
18. Electro-pneumatic horn compressor.
19. Electro-pneumatic horn relay switch.
20. Oil temperature gauge sending unit.
21. Oil pressure gauge sending unit.
22. Water temperature gauge extra resistor.
23. Water temperature gauge sending unit.
24. Starting motor.
25. Voltage regulator.
26. Inspection lamp socket.
27. Foot pump for windshield washer and wiper.
28. Stop light jam switch.
29. Jam switch for indicator 51.
30. Wiper motor.
31. Three-position ventilation fan selector switch.
32. Ventilation fan motor extra resistor.
33. Two-speed ventilation fan motor.
34. Parking brake « on » warning light flasher unit.
35. Relay switch for pump 82.
36. Relay switch for high beam.
37. Relay switch for indicator 50.
38. Direction signal flasher unit.
39. Fuses.
40. Engine compartment light push switch.
41. Courtesy lights under dashboard, with switch built-in.
42. Push switches on doors for courtesy lights.
43. Outer lighting master switch.
44. Low oil pressure indicator (red).
45. Oil pressure gauge light.
46. Oil pressure gauge.
47. Oil temperature gauge.
48. Oil temperature gauge light.
49. Engine tachometer light.
50. No-charge indicator (red).
51. Choke « on » warning light (yellow).
52. Parking brake « on » indicator (red).
53. Engine tachometer.
54. Parking light indicator (green).
55. Direction signal arrow tell-tale (green).
56. High beam indicator (blue).
57. Speedometer light.
58. Fuel reserve supply warning light (red).
59. Fuel gauge light.
60. Fuel gauge.
61. Water temperature gauge light.
62. Water temperature gauge.
63. Electric clock.
64. Clock light.
65. Windshield wiper motor rheostat.
66. Windshield wiper switch.
67. Horn selector switch.
68. Electric cigar lighter, with spot light.
69. Extra switch.
70. Instrument panel light switch.
71. Dimming rheostats for instrument panel and direction signal repeater lights.
72. Glove compartment light jam switch.
73. Glove compartment light.
74. Open door warning light jam switch.
75. Open door warning lights.
76. Key-type switch for ignition, services, starting and anti-theft device.
77. Selector switch for outer lighting and light flashes.
78. Direction signal switch.
79. Horn button.
80. Luggage compartment light, with switch built-in.
81. Fuel gauge tank unit.
82. Electric fuel pump.
83. Back-up light jam switch.
84. Push switch for parking brake « on » indicator.
85. Battery.
86. Rear direction signal lights.
87. Back-up lights.
88. Tail and stop lights.
89. License plate lights.

NOTE - The symbol ⫿ means that the cable is fitted with a numbered strip or ferrule.

COULOR CODE

Nero = **Black**	Azzurro = **Blue**	Giallo = **Yellow**
Grigio = **Grey**	Verde = **Green**	Rosso = **Red**
Bianco = **White**	Rosa = **Pink**	Marrone = **Brown**
	INT = **Switch**	

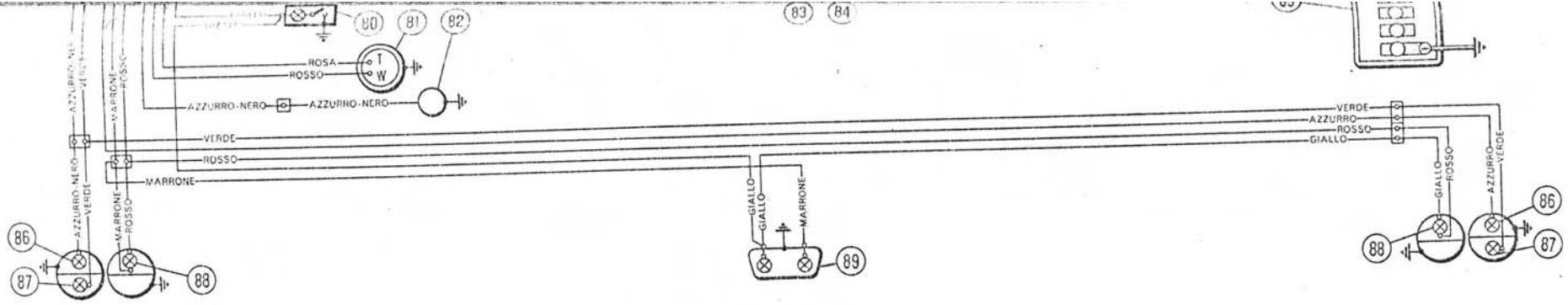

Fig. 134. - Wiring diagram.

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13. Pressure switch for electric fuel pump 82.
14. Relay switch for motor 6.
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17. Engine compartment lights.
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19. Electro-pneumatic horn relay switch.
20. Oil temperature gauge sending unit.
21. Oil pressure gauge sending unit.
22. Water temperature gauge extra resistor.
23. Water temperature gauge sending unit.
24. Starting motor.
25. Voltage regulator.
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41. Courtesy lights under dashboard, wit[illegible]witch built-in.
42. Push switches on doors for courtesy [illegible]ghts.
43. Outer lighting master switch.
44. Low oil pressure indicator (red).
52. Parking brake « on » indicator (red).
53. Engine tachometer.
54. Parking light indicator (green).
55. Direction signal arrow tell-tale (green).
56. High beam indicator (blue).
57. Speedometer light.
58. Fuel reserve supply warning light (red).
59. Fuel gauge light.
60. Fuel gauge.
61. Water temperature gauge light.
62. Water temperature gauge.
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64. Clock light.
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83. Back-up light jam switch.
84. Push switch for parking brake « on » indicator.
85. Battery.
86. Rear direction signal lights.
87. Back-up lights.
88. Tail and stop lights.
89. License plate lights.

NOTE - The symbol ▮ means that the cable is fitted with a numbered strip or ferrule.

COLOR CODE