SPIDER JUNIOR
1.3/1.6

Alfa Romeo

technical characteristics
and
principal inspection specifications

CONTENTS

TECHNICAL CHARACTERISTICS

MAJOR INSPECTION SPECIFICATIONS

CAR TRIM AND STEERING GEOMETRY

December 1973

PRINCIPAL CHARACTERISTIC DATA

	Spider 1.3	Spider 1.6
Number of cylinders (in line)	4	4
Bore	74 mm	78 mm
Stroke	75 mm	82 mm
Cylinder capacity	1290 cc	1570 cc
Maximum power at 6000 rpm	SAE 103 bhp	SAE 125 bhp
Front track	1324 mm	1324 mm
Rear track	1274 mm	1274 mm
Wheelbase	2250 mm	
Minimum turning circle	10500 mm	
Overhaul length	4120 mm	
Overhaul width	1630 mm	
Overhaul height (unladen)	1290 mm	
Kerb weight (full tank)	990 kg	1020 kg
Boot capacity	300 dm^3	
Number of seats	2	
Fuel consumption per 100 km (Italian CUNA standard)	9.8 lts	10.5 lts

(Super grade fuel is recommended for good engine performance)

Recommendations for the first 1500 km

- Up to 500 km - max. engine R.P.M.: 3500 r.p.m.
- From 500 to 1500 km - max. engine R.P.M.: 4500 r.p.m.

Performance after running-in

With 41/9 final drive . . . . . :

Gear	Max. speed - kph	
	Spider 1.3	Spider 1.6
1st	44	44
2nd	74	74
3rd	108	108
4th	146	146
5th	over 170	over 185
Rev.	48	48

Oil pressures with hot engine:

- Min.pressure at idling speed . . . . . 0.5 kg/cm^2
- Min.pressure at top speed . . . . . 3.5 kg/cm^2
- Max.pressure at top speed . . . . . 4.5 - 5 kg/cm^2

WARNING - Check that alternator warning light goes off as soon as the engine exceeds idling speed.

FUEL, OIL AND COOLANT CAPACITIES

Water (engine & radiator) . . . . . 7.5 lt

Fuel (reserve 7 lt) . . . . . 46 lt

Oil:

- Engine (sump & filter):
  - to max. level* . . . . . 5.800 kg
  - to min. level . . . . . 4.000 kg
- Gearbox . . . . . 1.650 kg
- Differential . . . . . 1.250 kg
- Steering box:
  - Burman . . . . . 0.360 kg
  - ZF . . . . . 0.120 kg

* This quantity is that needed for regular changing; the total amount of oil in the circuit (sump, filter, passages) is 6.550 kg.

TYRES

Inflation pressures when cold kg/cm^2

			Front	Rear	
SPIDER 1.3	155 SR 15"	Kleber Colombes V 10 GT Michelin Z X Pirelli Cinturato S	1.6 1.7	1.7 1.8	With reduced load and touring riding
		Kleber Colombes V 10 GT Michelin Z X Pirelli Cinturato S	1.9 1.7 1.8	2.2 1.9 2.1	With full load and top range of speed
	165 SR 14"	Ceat D 2 Continental Conti TT 715 Good Year G.800 Firestone Cavallino Sport 200 Kleber Colombes V 10 Michelin Z X Pirelli Cinturato SR	1.7	1.8	Under all conditions
SPIDER 1.6	155 HR 15"	Michelin XAS	1.7 1.8	1.9 2.2	With reduced load and touring riding With full load and top range of speed
	165 HR 14"	Ceat D2 Continental Conti TT 714 Good Year Grand Prix Firestone Cavallino Sport 200 Pirelli HR Kleber Colombes V 10 GT Michelin X AS	1.7 1.4	1.8 1.7	Under all conditions

FLUIDS AND LUBRICANTS

	Grade	Recommended commercial equivalent	
	API-SAE-NLGI	A G I P	S H E L L
Engine	SAE 10 W/50 API SE	Sint 2000 SAE 10 W/50	Super Motor Oil 10 W/50
Gearbox - Steering box and differential	SAE 90 API GL - 5	F.1 Rotra MP SAE 90	Spirax 90 HD
Propeller shaft sliding yoke	SAE NLGI 1	F.1 Grease 15	Retinax G
Front wheel bearings	SAE NLGI 2/3	F.1 Grease 33 FD	Retinax AX
Brake and clutch fluid reservoir	ALFA ROMEO Std. no. 3681.69903 AGIP Brake Fluid Super HD ATE "Blau S"		

S A E - Society of Automotive Engineers

A P I - American Petroleum Institute

N L G I - National Lubricating Grease Institute

Two WEBER 40 DCOE 44 - 40 DCOE 45 carburettors for Spider Junior 1.6

	Spider 1.6
Venturi	30 mm
Main jet	117
Main mixture tube (with eight 1 mm dia. radial holes) with bowl of	820 F 16
Main air metering jet	180
Idling jet	50
Idling air metering jet	F 15
First progression hole	100
Second and third progression hole	160
Pump jet with horizontal spraying	35
Pump inlet valve with a by-pass of	60
Delivery of pump every 20 strokes (for each barrel)	3.5/4.5 cc
Travel of pump control rod	16 mm
Load of pump control spring with throttles closed	120 grs
Choke jet	65 F 5
Choke air passage	200
Choke mixture passage	100
Needle valve with a 50 gr pre-loaded spring	150
Float weight	26 grs
Distance between bowl cover with gasket and float top	7 mm

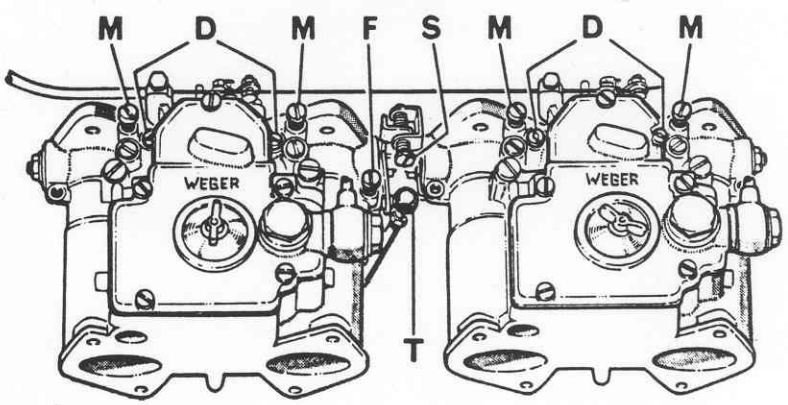
D Vacuum port

F Adjusting screw for minimum opening of throttle

M Idling mixture adjusting screw

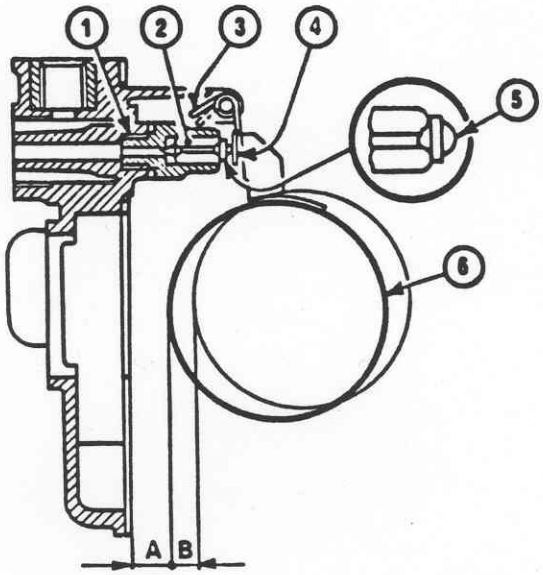
S Screw for synchronizing throttles of the two carburettors

T Joint for control linkage (to pedal)



Float level adjustment

WEBER 40 DCOE 44 & 40 DCOE 45 carburettor



Check the level of fluid in float chamber as follows:

- Make sure the float weight is as specified (26 grs - .9 oz), that there are no leaks or indentations and that float can rotate freely about the pivot pin.
- The float weight must not be altered; consequently haphazard repairs (tinning, etc.) are detrimental to proper float operation.
- Check that needle valve (1) is well screwed into its seating and that the spring-loaded ball (5) part of the needle (2) is not jammed.
- Hold the carburettor cover in a vertical position as shown in the figure so that the float (6) does not depress the ball (5).
- With the cover vertical and the float tongue (4) in light contact with the ball, the two floats should be at a distance A = 7 mm from the cover mating surface with the gasket fitted and well stuck to the cover.
- When the level has been set, check that the travel (B) of the float is 8 mm; if necessary, adjust the position of float pivot tail (3).

- If distance (A) is not as specified, slightly bend the float tongue (4) until the correct distance is obtained; inspect the working surface of the float tongue for any sign of nicks which may restrict the free movement of needle (2).

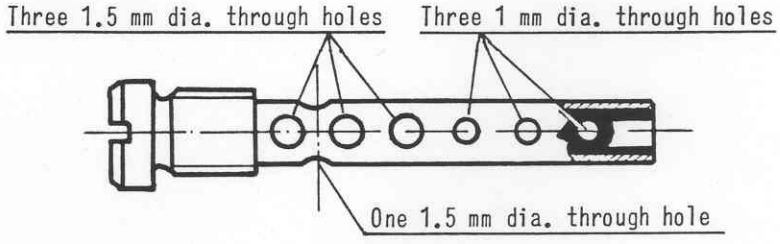
- Then fit the carburettor cover and check that the float can move freely without rubbing against the walls of the float chamber.

WARNING - The float level should be checked whenever the float or the needle valve has been changed. In the latter case it is also advisable to replace the gasket and make certain the new valve is securely screwed into its seating.

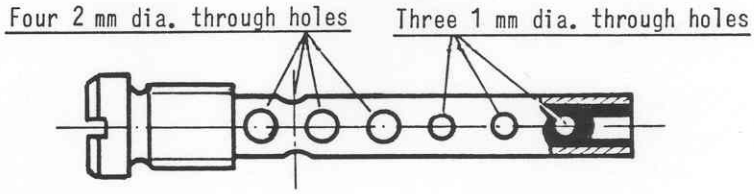
Two SOLEX { C 40 ADDH E/1 for Spider Junior 1.3
C 40 ADDH E/2 } carburettors for Spider Junior 1.6

	Spider 1.3	Spider 1.6
Venturi	28 mm	30 mm
Main jet	135	130
Main air metering jet	210	140
Idling jet	60	47
Idling air metering jet	175	130
First progression hole	100	115
Second, third and fourth progression hole	110	110
Pump jet	60	60
Delivery of pump every 20 strokes (for each barrel)	6.5/8.5 cc	7/9 cc
Choke jet	140	140
Choke air passage (choke mixture passage 125)	450	450
Needle seat	160	160
Needle seat shim	100	100
Float weight	13.6 grs	13.6 grs
Fuel level (in bowl reading) with a 2 mts H_2O pressure	15/16 mm	15.5/16.5 mm
Fuel level (intercommunicating containers reading) with a 2 mts H_2O pressure	17/18 mm	18/19 mm
Two horizontal passages connecting air restrictors chamber to bowl	7.2 mm	7.2 mm
Throttle angle	13°	13°

Main mixture tube for Spider 1.3



Main mixture tube for Spider 1.6



D Vacuum port

F Adjusting screw for minimum opening of throttle

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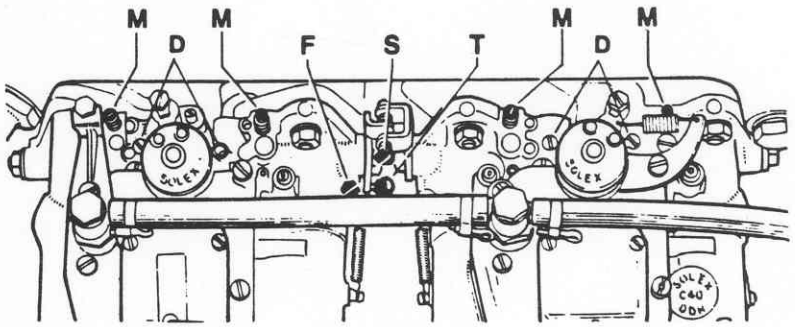
S Screw for synchronizing throttles of the two carburettors

T Joint for control linkage (to pedal)



Idle adjustment

To adjust the idle, follow the directions given below, applicable to both type of carburettors, and refer to the illustrations on the previous pages.

Preliminary steps

- Check the ignition timing and inspect the electric system (spark plugs, distributor, coil, etc.) for proper operation.
- Remove the air filter element and clean it thoroughly.
- Check the flexible mounts between carburettors and intake manifold for tightness.

Aligning the throttle valves

- Detach the control linkage "T" from carburettors.
- Slacken the screws "F" and "S" almost fully.
- Operate the throttle a few times to make sure there is no binding.
- Fully depress the throttle control lever of rear carburettor so that the throttles are fully closed; then screw in the screw "S" until contact is made.

Note: a more accurate check of the throttle valve alignment can be made with the suitable vacuum meter C.2.0014 to be connected to the vacuum ports "D" after removal of screws. (Refer to Tool Bulletin no. 154).

Idling

- Back up the screws "M" of four turns from closed position.
- Tighten the screw "F" to contact, then screw it in one more turn to ensure feeding of engine.
- Connect the accelerator control linkage "T" to carburettors.
- Start the engine and warm it up.
- If necessary, back up the screw "F" very slowly until the engine runs at about 700 rpms.

Caution: if the engine runs unevenly, act on the screws "M" alternatively until an even operation is obtained. Again adjust the idle speed as outlined above.

Checking the carbon monoxide emissions at idling speed

If it is necessary to check the CO concentration in the exhaust gases, proceed as follows:

- with the engine hot and idling, check the CO emission with a CO meter. If the concentration exceeds the prescribed limits, act on the mixture adjusting screws so as to lean the mixture.

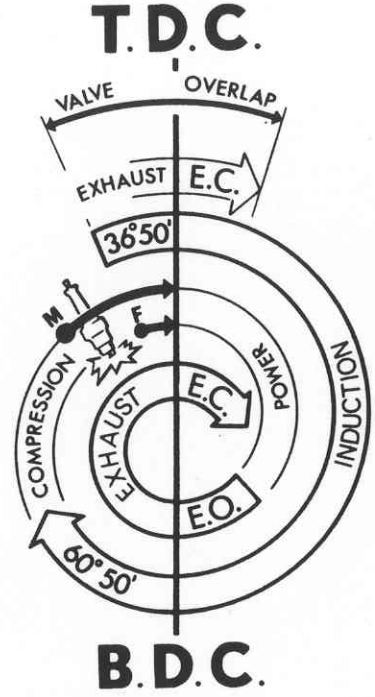
Checking of valve opening and closing angles

		Spider 1.3	Spider 1.6
Clearance (with cold engine) between the unlobed profile of cams and the valve cup ceiling	intake	0.475 / 0.500	0.475 / 0.500
	exhaust . . .	0.525 / 0.550	0.525 / 0.550
Opening of intake valve	lift of cup	0.20 mm	0.20 mm
	corresponding to an angle (before TDC)	18° 30' ± 1° 30'	18° 30' ± 1° 30'
Closing of intake valve	lift of cup	0.20 mm	0.20 mm
	corresponding to an angle (after BDC) .	42° 30' ± 1° 30'	42° 30' ± 1° 30'
Opening of exhaust valve	lift of cup	0.15 mm	0.15 mm
	corresponding to an angle (before BDC)	42° 30' ± 1° 30'	51° 30' ± 1° 30'
Closing of exhaust valve	lift of cup	0.15 mm	0.15 mm
	corresponding to an angle (after TDC) .	18° 30' ± 1° 30'	9° 30' ± 1° 30'

ANGLE VALUES OF THE ACTUAL DIAGRAM OF VALVE TIMING SYSTEM WITH COLD ENGINE

(clockwise rotation direction of the crankshaft as seen from the front side)

	Spider 1.3	Spider 1.6
Opening of intake valve (before TDC) . . .	36°50'	36°50'
Closing of intake valve (after BDC) . . .	60°50'	60°50'
Opening of exhaust valve (before BDC) . .	54°10'	63°10'
Closing of exhaust valve (after TDC) . . .	30°10'	21°10'
Induction stroke	277°40'	277°40'
Exhaust stroke	264°20'	264°20'



IGNITION

Firing order: 1 - 3 - 4 - 2

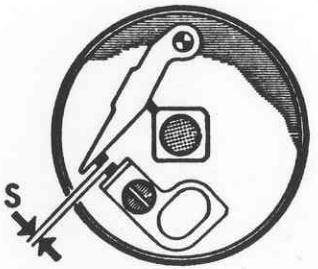
(no. 1 cylinder is that at the fan side)

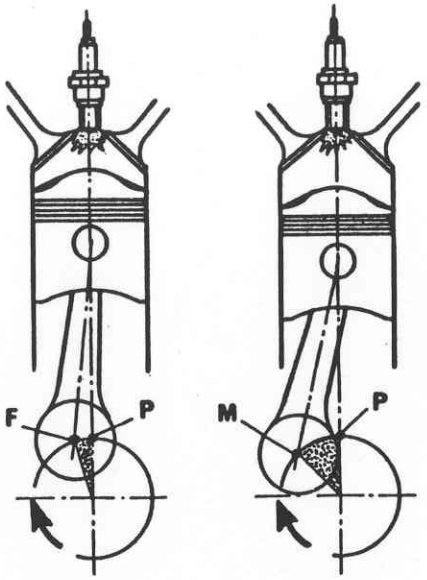
	1.3	1.6
E.O. Exhaust opens	54° 10'	63° 10'
E.C. Exhaust closes	30° 10'	21° 10'

VALUES OF ADVANCE OF IGNITION DISTRIBUTOR

Opening of contact points of ignition distributor S = 0.35/0.40 mm

Fixed advance F (Before T D C)	Maximum advance M (Before T D C)
7° ± 1°	38° $^{+\ 0°}_{-\ 3°}$ at 5100 r.p.m





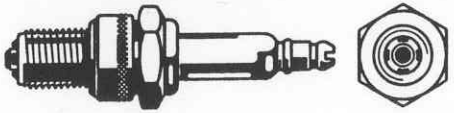
P = T.D.C.
F = Fixed advance
M = Maximum advance

CHECKING THE IGNITION TIMING
(with a stroboscopic light)

Run the engine at 800/900 r.p.m. and check whether reference plate and mark F on the crankshaft pulley are aligned (advance of 7° ± 1°); at 5100 r.p.m. the mark M should be seen in line with the reference plate (maximum centrifugal advance of 38° ± 3°).
If the marks are not in line or out of the specified tolerances, disconnect the distributor drive coupling and adjust as required.

SPARK PLUGS

Lodge 2HL



ENGINE - GEARBOX UNIT - TRANSMISSION

			Kgm	MANNER OF TIGHTENING
Cylinder head nuts	Inspection	when cold	6.2/6.4	Slacken, in proper sequence, the nuts by one and one half turn and torque with lube between washer and nut
		when hot	6.6/6.7	Warm up the engine and when hot retighten without unscrewing
	After repairing	when cold	6.2/6.4	Retighten with lube
		when hot	6.6/6.7	Warm up the engine by actually driving the car and when hot retighten without unscrewing
		when cold	6.2/6.4	After tested the car, slacken, when cold and in proper sequence, the nuts by one and one half turn and torque with lube between washer and nut
Spark plugs			2.5/3.5	With lube Std. no. 4500-18304
Nuts of the camshaft caps			2 / 2.25	in oil
Bolts of the connecting rod caps	Spider 1.3		3.4/3.6	" "
	Spider 1.6		5/5.3	" "
Nuts of main bearing caps	Spider 1.3		3.2/3.5	" "
	Spider 1.6		4.7/5	" "

WARNING: In case of any repair work involving the removal of cylinder head, the gasket must be renewed at all times.

	Kgm	Manner of tightening
Transducer on manifold	3.5/4	in oil
Pulley on crankshaft	19/20	" "
Bolts securing flywheel to crankshaft	4.2/4.5	" "
Palnuts of main bearing caps	1.1/1.3	" "
Oil drain plug on sump	7/8	dry
Screws securing clutch to engine	1.275/1.650	"
Nut of alternator pulley	3.5/3.6	"
Nut of gearbox main shaft yoke	11/12	"
Nut of gearbox layshaft	4.5/5.5	"
Nuts and bolts of gearbox half-casings	1.8	"
Bolts joining output shaft yoke to prop shaft yoke	5.5/5.7	"
Nut of gear lever swivel to bracket	3.25/3.65	"
Nuts of pedal housing to brake booster	1.2/1.5	"
Nut securing flange to prop shaft front section	9 / 11	"
Bolts joining propeller shaft sections	3.2/3.5	"
REAR FRAME		
Screws securing ring gear to differential case	4.5/5	"

	Kgm	Manner of tightening
Ringnut securing yoke on final drive pinion shaft	8 / 14	dry
Nut securing caliper bracket to bearing housing	4.8/5.5	"
Bolts securing radius rods to body	8.1 / 10	"
Bolts securing radius rods to rear axle tubes	11 / 13.65	"
Screws securing reaction triangle to body	4.4 / 5.45	"
Nut securing reaction triangle to differential carrier	10.2/12.6	"
Nut securing stabilizer rod to rear axle	3.3/3.5	"
Screw securing rear brake caliper to support	5.5/6.5	"
Nuts securing wheels	6/8	"
Bolts joining differential yoke to drive shaft yoke	3.2/3.5	"
Bolts for rebound strap butt joints	0.5	"
Nuts securing real axle tubes to carrier	2/2.4	"
Nuts securing shock absorbers to body	2.4 / 2.95	"
F R O N T F R A M E		
Nut securing steering wheel to column	5/5.5	"
Screws securing Burman steering box cover	2.3/2.5	"

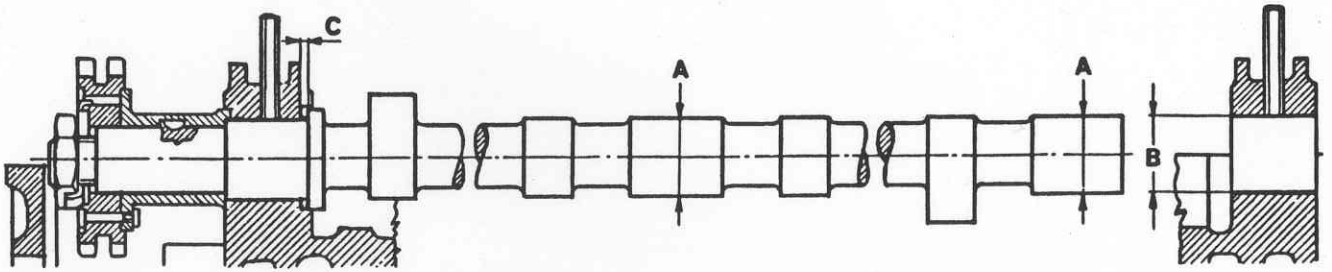
	Kgm	Manner of tightening
Bolts securing steering box to body	5.12/5.45	dry
Bolts securing crank bracket & steering lock to body	4.4 / 5.45	"
Nuts of steering linkage ball joints	4.8/5.5	"
Nut securing steering arm to box	12.5/14	"
Screws securing upper wishbone front arm to body	2.2 / 2.75	"
Nut securing upper wishbone front arm to rear arm	3.8/4.7	"
Nut securing upper wishbone rear arm to body	11 / 13.65	"
Bolts securing lower wishbone shaft to cross-member (to tighten these nuts use tool A.5.0161 and torque to 5.2/5.5 Kgm)	5.6/5.9	"
Nuts securing steering arm to steering knuckle	4/4.5	"
Nut securing upper wishbone rear arm to steering knuckle	7.5/8.5	"
Nut securing lower ball joint to wishbone	8.2/9.2	"
Nut securing lower ball joint to steering knuckle	7.5/8.5	"
Screws securing calipers to steering knuckle	7.5/8.5	"
Nuts securing splash shields to steering knuckle	0.8/1	"
Nuts securing wheels and brake discs	6/8	"
Bolt securing steering column to bracket	1.62/1.91	"
Nut securing shock absorber to lower arms	7.5/8.5	"
Nuts securing pedal support to brake servo unit	1.2/1.5	"

	Kgm	Manner of tightening
A T E B R A K E S		
Bleed screw	0.2 / 0.35	dry
Caliper joining bolt	2.9/3.4	"
Inlet fitting to caliper — with gasket	0.8/1.1	"
Inlet fitting to caliper — without gasket	1/1.5	"

All dimensions, unless otherwise stated, are in millimeters

C A M S H A F T S

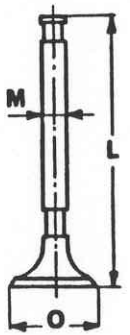
Diameter of journals		A =	26.959/26.980
Diameter of journal bearings		B =	27.000/27.033
Clearance between journals and bearings	new	B - A =	0.020/0.074
	wear limit		0.100
End play of camshaft in thrust bearing		C =	0.065/0.182



Valves and valve guides

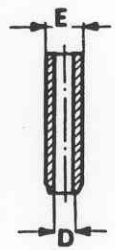
			Intake		
			A T E	LIVIA H	GARRONE
VALVES	Diameter of valve poppet O	Spider 1.3	37.000/37.200	37.000/37.150	
		Spider 1.6	41.000/41.200	41.000/41.150	41.000/41.150
	Diameter of valve stem . M	Spider 1.3	8.972/8.987	8.972/8.987	
		Spider 1.6	8.972/8.987	8.972/8.987	8.972/8.987
	Total length L	Spider 1.3	108.9/109.1	109/109.3	
		Spider 1.6	106.365/107.235	106.903/107.157	106.560/107.430

			Exhaust (sodium cooled)	
			A T E	LIVIA C
VALVES	Diameter of valve poppet . . . O	Spider 1.3	34.000/34.150	34.000/34.150
		Spider 1.6	37.000/37.200	37.000/37.150
	Diameter of valve stem . . M	Spider 1.3/1.6	8.935/8.960	8.935/8.960
	Total length L	Spider 1.3	108.50/108.60	108.60/108.85
		Spider 1.6	106.050/106.150	106.173/106.427



N.B. - ATE - LIVIA - GARRONE intake valves are alternative supply as well as Livia C and ATE exhaust valves.

Valve guide	Outside diameter with guide removed	E =	14.033/14.044
	Inside diameter with guide assembled in cylinder head	D =	9.000/9.015
Projection of intake valve guides from their recesses in cylinder head			13.800/14.000
Projection of exhaust valve guides from their recesses in cylinder head			16.800/17.000
Clearance between guide assembled in cylinder head and valve stem	intake		0.013/0.043
	exhaust		0.040/0.080
Height of cylinder head when new			111.913/112.000
Minimum grinding limit of cylinder head			111.500
Tolerance on flatness of head surface (block side)			0.05



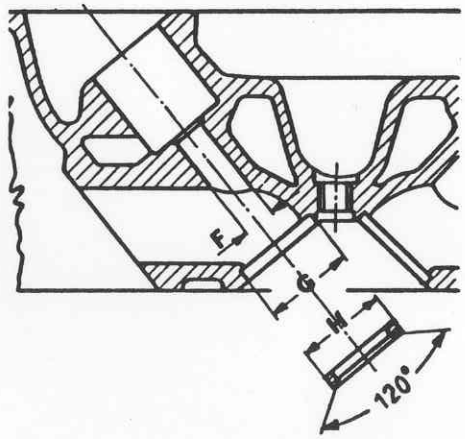
Note - In the event of head renewal, cut reference marks on front camshaft caps by using the special tool C.6.0124 as directed in the I.S. 03.74.1.1.

Valve seats

Diameter of valve guide seat in cylinder head . . . . . F = 13.990/14.018

Interference between seat and valve guide 0.054/0.015

		Intake	Exhaust
Outside diameter of the valve seat insert . . . . . H =	standard	42.597/42.632	38.597/38.632
	oversized	42.897/42.932	38.897.38.932
Diameter of recesses in the cylinder head for valve seat insert . . . . . G =	standard	42.532/42,557	38.532/38.557
	oversized	42.832/42.857	38.832/38.857



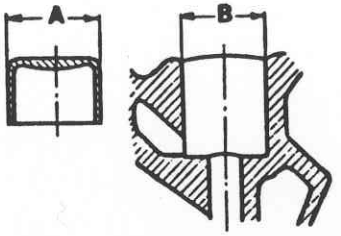
Interference between valve seat insert and recesses in cylinder head 0.040/0.100

Valve cups

Diameter of cup A = { Standard 34.973/34.989
Oversized 35.173/35.189

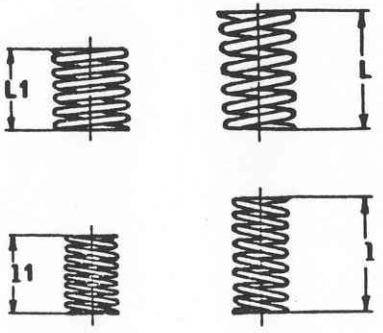
Diameter of cup seat in cylinder head B = { Standard 35.000/35.025
Oversized 35.200/35.225

Clearance between seat and cup 0.011/0.052



Valve springs

	Length		Test load
	Free	Under test load	
Inner spring . . . . . 1 =	46.50 47.35 47.00	l1 = 26	22.24/23.16 kg
Outer spring . . . . . L =	51.30 52.80 52.00	L1 = 27.5	35.67/37.13 kg 35.87/37.33 kg



Connecting rods

	Spider 1.3	Spider 1.6
Length between ℄ of big end and ℄ of small end of connecting rod . . . . . D =	132.955/133.045	147.955/148.045
Inside diameter of the big end of connecting rod . . . . . E =	48.658/48.671	53.695/53.708
Inside diameter of bushing in the small end of rod . . . . . C =	20.005/20.015	22.005/22.015
Thickness of connecting rod bearings Vandervell: V.P.2. F = Standard . .	1.822/1.829	1.829/1.835
1st-oversize	1.949/1.956	1.956/1.962
2nd-oversize	2.076/2.083	2.083/2.089
Thickness of connecting rod bearings CLEVITE & SFCM . . F = Standard . .	---	1.831/1.837
1st-oversize	---	1.958/1.964
2nd-oversize	---	2.085/2.091

Radial clearance between crankpins and bearing for big end of connecting rod . . . . . Spider 1.3 = 0.025/0.064; Spider 1.6 = 0.025/0.063

Maximum out of parallelism between ℄ of big end hole and ℄ of small end hole . . . . . Spider 1.3 = 0.0317; Spider 1.6 = 0.0337

Offset of big end & rod ℄ with respect to small end ℄ M = Spider 1.3 = 1.300/1.700; Spider 1.6 = 1.375/1.625

Note - On Spider 1.6 Vandervell, Clevite & SFCM con-rod bearings are alternative equipment.

Piston pins

O.D. of pin . . . . . Black color: Spider 1.3 I = 19.994/19.997; Spider 1.6 I = 21.994/21.997

O.D. of pin . . . . . White color: Spider 1.3 I = 19.997/20.000; Spider 1.6 I = 21.997/22.000

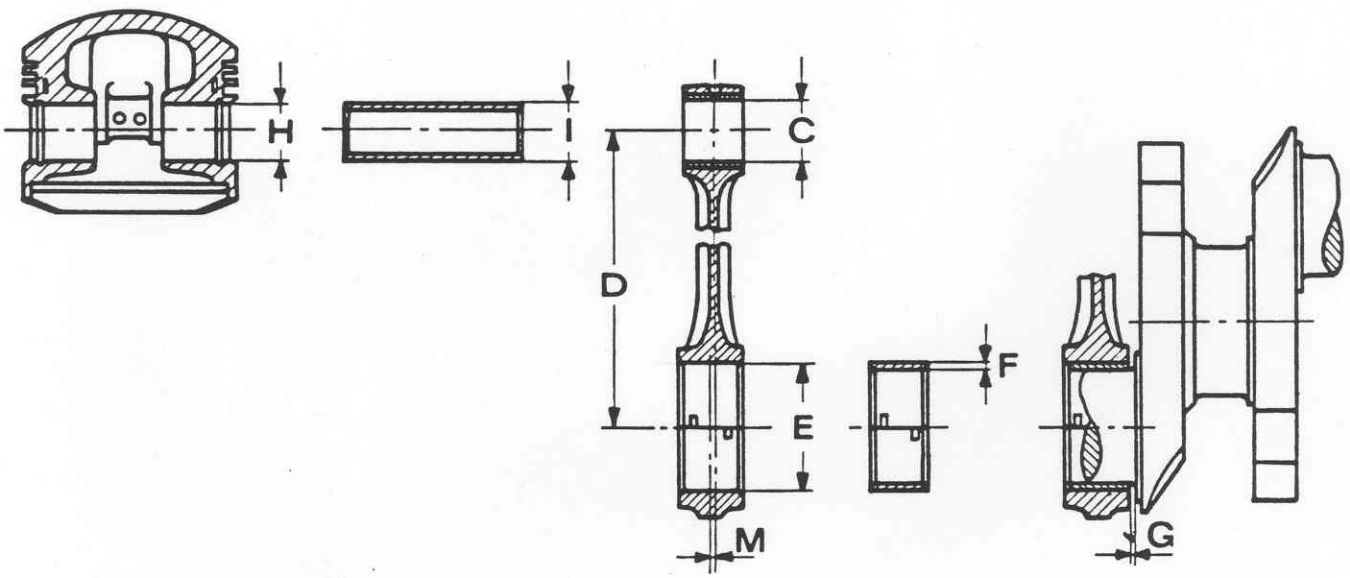
Clearance between piston pin and small end hole . . . . . Black color 0.008/0.021

Clearance between piston pin and small end hole . . . . . White color 0.005/0.018

Piston pin hole

		Black mark	White mark
BORGO piston . . . . . H =	Spider 1.3 =	20.000/20.002	20.003/20.005
	Spider 1.6 =	22.000/22.002	22.003/22.005

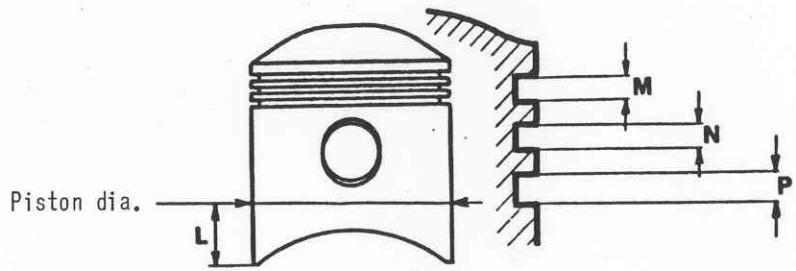
End play of the connecting rods on the crankpins . . . . . G = 02/03

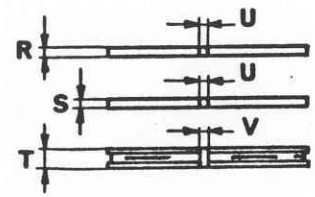


Pistons and piston rings

Diameter of pistons to be measured at right angle to the hole for piston pin and at a distance of L = 17 mm from the lower border of skirt.
For cylinder classification purpose, use the minimum diameter recorded.

		Class A (Blue)	Class B (Pink)	Class C (Green)
BORGO piston diameter	Spider 1.3	73.945/73.955	73.955/73.965	73.965/73.975
	Spider 1.6	77.945/77.955	77.955/77.965	77.965/77.975





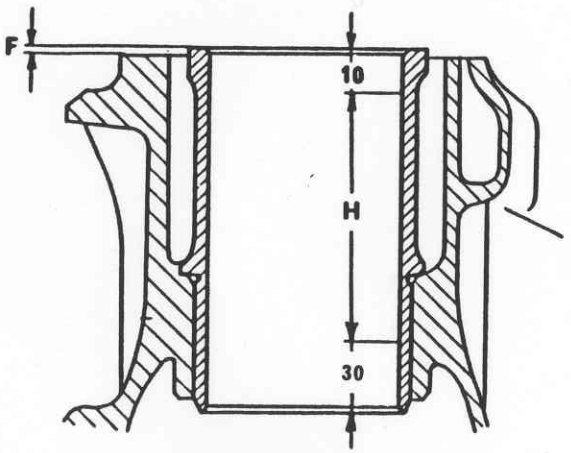
Height of grooves for piston rings	chromium-plated compression ring	M =	1.535/1.555
	oil scraper ring	N =	1.775/1.795
	oil control ring	P =	4.015/4.035
Thickness of rings	chromium-plated compression ring	R =	1.478/1.490
	oil scraper ring	S =	1.728/1.740
	oil control ring	T =	3.978/3.990
End play of rings in grooves	chromium-plated compression ring		0.045/0.077
	oil scraper ring		0.035/0.067
	oil control ring		0.025/0.057

Gap of compression ring and oil scraper ring (to be inspected in ring gauge or in cylinder sleeves)	Spider 1.3 U =	0.25/0.40
	Spider 1.6 U =	0.30/0.45
Gap of oil control ring (to be inspected in ring gauge or in cylinder sleeves)	Spider 1.3 V =	0.20/0.35
	Spider 1.6 V =	0.30/0.45

Cylinder sleeves

		Blue	Pink	Green
Cylinder sleeve diameter	Spider 1.3	73.985/73.994	73.995/74.004	74.005/74.014
	Spider 1.6	77.985/77.994	77.995/78.004	78.005/78.014

Clearance between cylinder sleeve and piston 0.030/0.049



H = Area of measurement

Wear limit 0.12

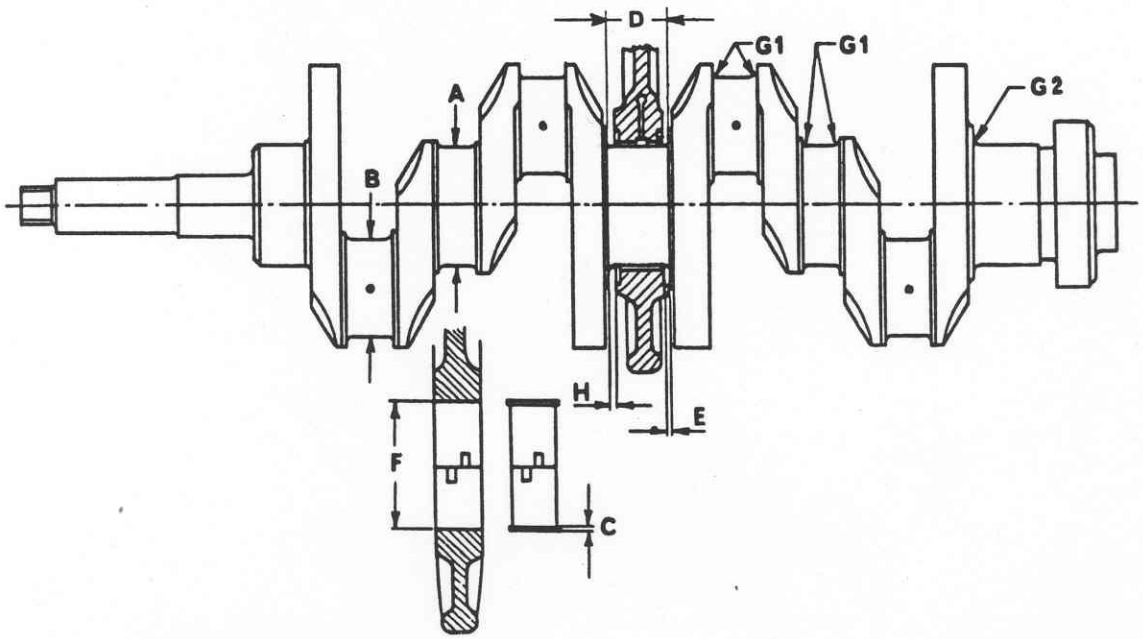
Elongation and taper of sleeves
- when new 0.01
- wear limit 0.05

Protrusion of barrels from cylinder block . . . . . F = 0.00/0.06

Surface roughness . . . . . Ra = 0.5/1 μ

Note - To check the protrusion of cylinder sleeves use tool C.6.0148 as directed in T.B. no. 144.

C R A N K S H A F T



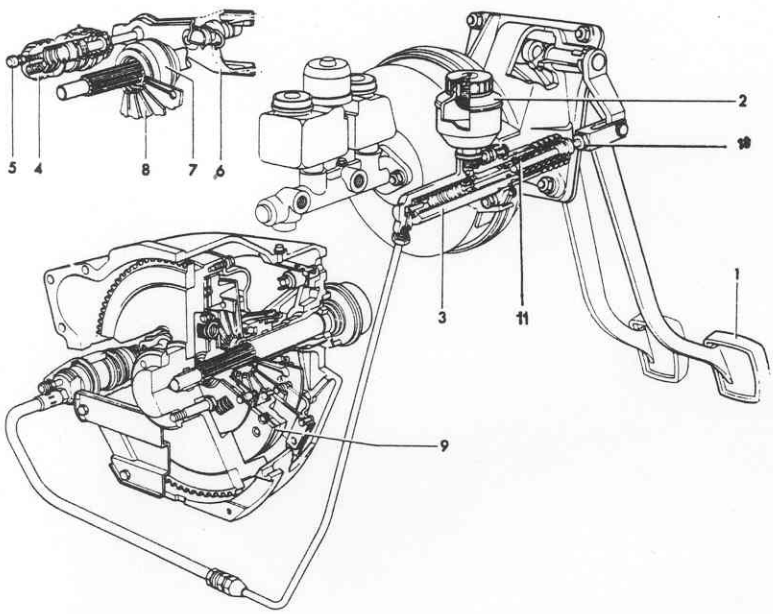
Diameter of main journals A =	Standard		59.960/59.973
	1st undersize		59.706/59.719
	2nd undersize		59.452/59.465
Diameter of crankpins B =	Standard	Spider 1.3 B =	44.963/44.975
		Spider 1.6 B =	49.987/50.000
	1st undersize	Spider 1.3 B =	44.709/44.721
		Spider 1.6 B =	49.733/49.746
	2nd undersize	Spider 1.3 B =	44.455/44.467
		Spider 1.6 B =	49.479/49.492
Thickness of main bearings CLEVITE & VANDERVELL C =	Standard		1.829/1.835
	1st oversize		1.956/1.962
	2nd oversize		2.083/2.089
Thickness of main bearings S F C M . . . . . C =	Standard		1.824/1.830
	1st oversize		1.951/1.957
	2nd oversize		2.078/2.084
Diameter of seat for main bearings in crankcase . . . . . F =			63.657/63.676
Length of central journal D =	Standard		30.000/30.035
	1st oversize		30.127/30.162
	2nd oversize		30.254/30.289

Thickness of thrust rings for central journal . . . . . E =	Standard	2.311/2.362
	1st oversize	2.374/2.425
	2nd oversize	2.438/2.489
End play of crankshaft . . . . . H =		0.076/0.263
Clearance between journals and main bearings (*)		0.014/0.058

(*) Clearance = main bearing ID - (twice bearing thickness + journal OD)

Fillet radii	main journals and crankpins . . . . . G1 =	1.7/2.1
	rear main journal . . . . . G2 =	3.7/4.1
Main journals & crankpins surface roughness . . . . . R =		0.16 μ
Maximum elongation of main journals and crankpins		0.007
Maximum taper of main journals and crankpins as measured on their full length		0.01
Maximum error of parallelism of main journals and crankpins as measured on their full length		0.015
Maximum misalignment allowed between main journals		0.01
Maximum misalignment between ℄ of the two pairs of crankpins and ℄ of main journals		0.300

The clutch is of the automatic clearance take-up, hydraulically-operated single-plate dry type.
The clutch pedal acts on a master cylinder supplied by the fluid reservoir "2". When the clutch pedal is depressed, the fluid under pressure actuates the piston in the cylinder "4" connected to the clutch release lever "6".
The driven plate "9" is controlled by means of diaphragm spring "8".
This type of clutch has the throwout bearing constantly in contact with the diaphragm spring. Thus, no more clearance exists and the wear is automatically taken up. No regular adjustment of the play is required.

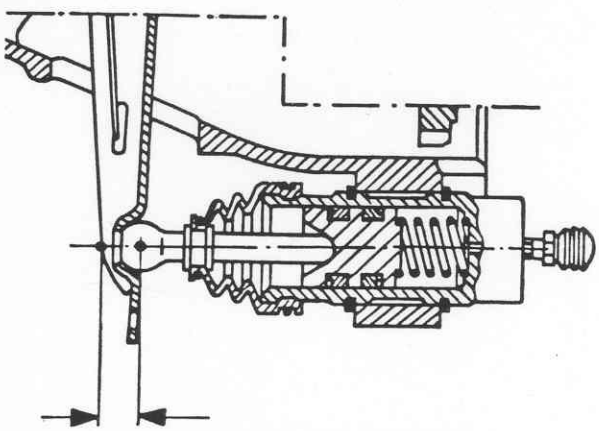


1 Pedal
2 Clutch fluid reservoir
3 Master cylinder
4 Operating cylinder
5 Air bleed screw
6 Release lever
7 Throwout bearing
8 Diaphragm spring
9 Driven plate
10 Locknut
11 Push rod

If necessary, check that, when the clutch pedal is depressed fully the push rod of cylinder "4" moves through a total travel of 11 to 12 mm.

If adjustment is needed, proceed as follows:

- slacken the locknut "10" on master cylinder push rod
- screw in or unscrew the push rod "11" to increase or diminish its travel until the travel of the rod of cylinder "4" falls within the above specified limits. In this conditions, the travel of master cylinder rod shall in turn be 27 ± 1.5 mm.



11 to 12 mm Release travel

		Spider 1.3	Spider 1.6
Transmission ratios	1st gear	3.30 : 1	3.30 : 1
	2nd gear	1.99 : 1	1.99 : 1
	3rd gear	1.35 : 1	1.35 : 1
	4th gear	1 : 1	1 : 1
	5th gear	0.86 : 1	0.79 : 1
	Rev.	3.01 : 1	3.01 : 1

Maximum eccentricity of main shaft at the working areas of 1st, 2nd, 3rd and 5th speed gears and at the working areas of roller bearing		0.01
End play between forks and sleeves	assembly	0.150/0.340
	wear limit	0.850
Calibration of spring for striking rod balls	free length	35.8
	length under test load	17.2
	test load	7.680/8.320 kg
Maximum end play of mainshaft gears	1st speed gear	0.170/0.245
	2nd & 3rd speed gears	0.130/0.205
	5th speed gear	0.160/0.220
	Reverse gear	0.160/0.220
Radial clearance between gear bushings and mainshaft	1st speed gear	0.125/0.170
	2nd & 3rd speed gears	0.095/0.140
	5th speed gear	0.065/0.107
Distance between outer planes of the engaging teeth of 3rd and 4th gears		42/42.200
Distance, in neutral, of the rear band (propeller shaft side) of 5th speed sleeve from the rear edge of gear engaging teeth		12.900

		Spider 1.3	Spider 1.6
Overall ratios with 41:9 final drive	1st gear	15.049 : 1	15.049 : 1
	2nd gear	9.055 : 1	9.055 : 1
	3rd gear	6.172 : 1	6.172 : 1
	4th gear	4.555 : 1	4.555 : 1
	5th gear	3.918 : 1	3.603 : 1
	Rev.	13.710 : 1	13.710 : 1

Maximum eccentricity of axle shafts	0.100
Backlash of differential gears	0.050
Backlash of final drive	0.050/0.100
Reference dimension on special tool C.6.0101 for pinion-to-ring gear fitting	70 ± 0.0025
Pre-load on pinion bearing	11.500/15.500 kg/cm
Total preload on bevel drive bearings	16.500/24.500 kg/cm
Max. end play between T-arm and attachment to body	1 mm

Checking of shock absorbers on test bench - Calibration data (when cold)

	S P I C A	
	Extension	Compression
High speed	135/190 Kg	50/80 Kg
Low speed	19/55 Kg	9/22 Kg

Checking of suspension springs

Free length	Length under test load	Test load	Identification number
437 mm	252 mm	269/274 kg	16
		275/280 kg	17
		281/285 kg	18

Adjustment of clearance in wheel bearings

When performing regular servicing or whenever the removal of wheel hubs is required, adjust the bearing clearance as follows:

- Pre-load the bearings by applying a torque of 2 to 2.5 Kgm to the castellated nut; at the same time rotate the hub to set the bearings properly and to prevent the rollers from brinelling the races.
- Slacken the nut and tighten it again to 0.5 - 1 Kgm with a torque wrench.
- Back up the nut by a quarter turn and insert the split pin; if the slot in the castellated nut and the hole in the axle are not aligned, screw in the nut of the minimum required to line up the hole and the next slot.
  Lightly tap on the stub axle end with a mallet to settle the bearings.
- Make sure the bearing retainer plate is not blocked by inserting the tip of a screwdriver in the plate holes; the plate should be easily rotated.
- If the plate is blocked, unscrew the nut by one slot and tap slightly on the stub axle end with a mallet.

Wheel bearing lubricating instructions

The quantity of lubricating grease should be about 65 grammes (2½ ozs) for each hub; do not exceed such a quantity to avoid bearing overheating, grease leakage, etc. The grease should be well distributed inside the bearings and into side recesses. Subsequently, at the regular schedule, remove the hub cover and pack the outboard bearing.

Ball joints

End play of lower ball joint in its socket . . . . . 1 mm

Note - Ball joints require no regular lubrication being provided with special grease seals which retain the grease packed in by factory on assembly.

Checking of shock absorbers on test bench - Calibration data (when cold)

	SPICA - ALLINQUANT	
	Extension	Compression
High speed	150/190 Kg	55/80 Kg
Low speed	25/55 Kg	9/22 Kg

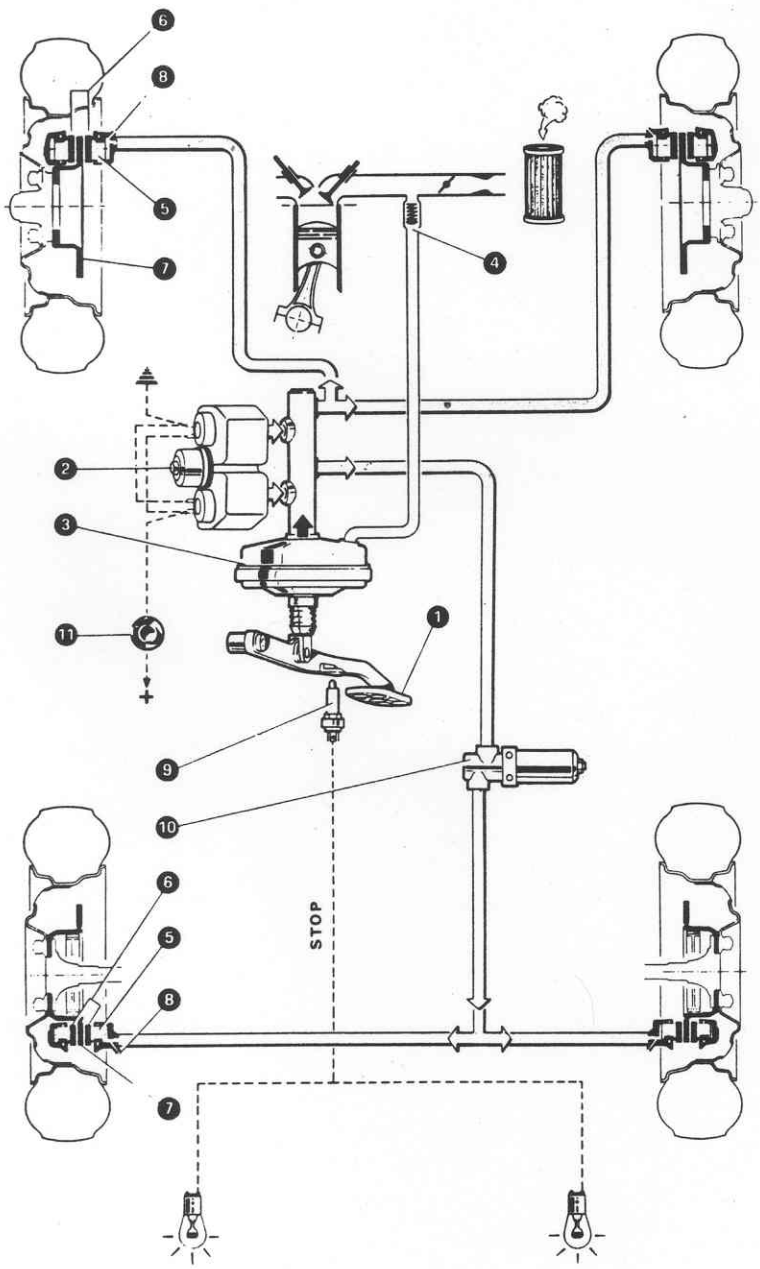
Checking of front suspension springs

Free length mm	Length under test load mm	Test load Kg	Identification number
318	214	729.5/738	19
		739/747	20
		748/756	21
		757/766	22
		767/774.5	23

The brake unit consists of a dual hydraulic braking system.
Each one of the separate circuits, front and rear, is servo assisted and controlled by a tandem master cylinder, with one cylinder operating the front brakes and the other cylinder the rear brakes.
The friction pads of the front and rear brakes are directly actuated by the cylinders integral with the calipers. The brakes are self-adjusting.
A regulator, inserted in the rear brake circuit, regulates the pressure between front and rear brakes to provide balanced braking action.
The pressure regulator must never be tampered with; specifically, do not attempt to act on the adjusting nut as it is factory sealed.
A warning light, located in the instrument panel, will alert the driver if the level of fluid in the reservoir falls below the minimum. This warning light serves also as handbrake warning light. To check the operation of the warning light pull the handbrake lever.

Possible causes for lighting of warning light may be:

- Low level of fluid in reservoir
- Faulty contact in electrical system
- Handbrake applied



1 Brake pedal
2 Fluid reservoir (with minimum level senders)
3 Vacuum servo & master cylinder
4 Vacuum port
5 Brake pistons
6 Brake pads
7 Brake discs
8 Air bleed screws
9 STOP light switch
10 Pressure regulator
11 Warning light for minimum level of fluid

D i s c

When a brake disc is replaced it is necessary to check it for run-out after installation:

- use a dial indicator and the special tool A.2.0151 which is mounted to the caliper by means of the pad retaining pins.

Maximum permissible run out as measured at the swept surface should not exceed 0.22 mm.

Note - Run-out readings can be misleading if bearing clearance is not as specified; therefore, check and adjust if necessary, according to factory instructions.

If the disc is scored, see I.S. 22.70.2.1; the grinding of the surfaces is allowed providing not to exceed an undersize of 1 mm, equalized on both faces, i.e. 0.5 mm each face; disc grinding limit: front 10 mm; rear 8.5 mm thick.

Warning: the discs must be renewed when worn down to the following wear limits: front 10 mm; rear 8.5 mm.

Inspection specifications after regrinding of disc surfaces:

- Max. out of parallelism with disc mounting plane: 0.05 mm;
- Max. out of flat: 0.025 mm and max. difference in thickness: 0.038 mm as measured along any radial line;
- Max. out of flat: 0.025 mm and max. difference in thickness: 0.015 mm as measured along any circular line;
- The surface should show no sign of scoring or porosity.

The surface roughness should be:

- 32 microinches as measured circularly;
- 50 microinches as measured radially.

Friction pads

	Front	Rear
Thickness when new	15 mm	
Wear limit	7 mm	

Calipers

On replacement of disc or caliper, measure the running clearance between caliper and disc on each side; the difference should not exceed 0.5 mm.

To centralize the caliper about the disc, insert shims between caliper and mounting flange as required.

Hand brake

It is mechanically operated and acts on the rear wheels through suitable shoes which spread apart against a drum machined in the disc casting.

For a brief description and repair and maintenance instructions refer to:

ATE DISC BRAKES (Publication no. 1202)

An elastic stretcher in the linkage facilitates handbrake engagement and disengagement.

Note - When reassembling the operating levers, a slight quantity of grease AGIP F.1 GR SM or SHELL Retinax AM is to be applied to the pivot pins and rubbing surfaces of levers.

Bleeding the brake system

The bleeding should be performed with the greatest care and following these instructions:

- Fill the reservoirs,if necessary,with the genuine fluid freshly drawn from sealed containers; during bleeding operations pay attention that fluid level does not drop below the full by more than a quarter.

- Push rubber pipes over the bleed screws of a front and a rear wheel (either the two at right side or the two at left side); the other end will lead to glass containers half full of fluid.

  Loosen the bleed screws of front and rear wheel at the same time;depress the brake pedal several times allowing it to return slowly and waiting a few moment before depressing it again.

  This sequence must be repeated until the pipes discharge fluid free from air bubbles.

  Then, hold the pedal down, tighten the bleed screws and remove the pipes.

  Proceed the same way for the other two wheels; then, top up fluid in reservoirs.

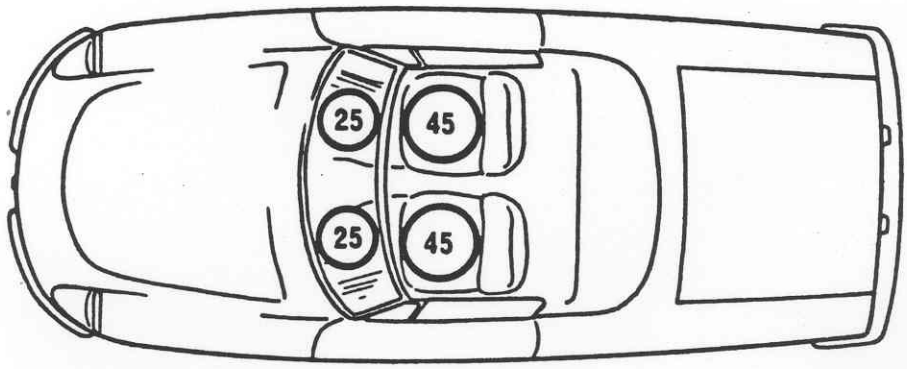
If the bleeding has been carefully performed,it will be found that,when brake pedal is depressed, direct action on the fluid can be felt,free of resilience,immediately at the end of the free travel. If not, repeat the procedure.

Checking of wheel angles and car "trim" under static load

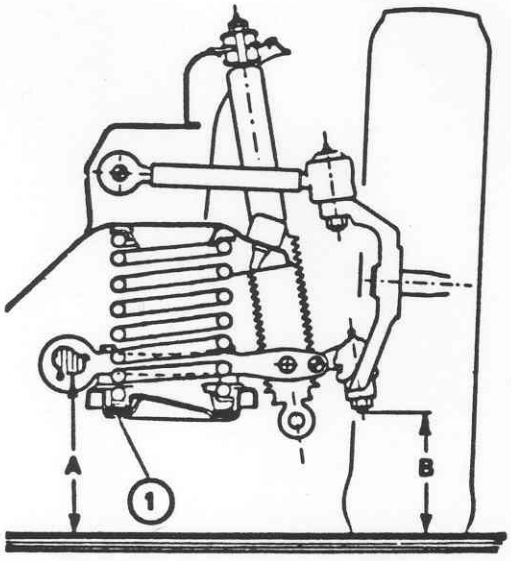
Put the car under static load, with shock absorbers and stabilizer rods disconnected, with full tank or equivalent with spare wheel, tool kit and the tyres inflated as specified.

Before checking, slightly move the car up and down so as to settle the suspension.

Static load
- 2 weights of 45 Kgs on front seats
- 2 weights of 25 Kgs on flooring where feet rest



Front suspension height



A - B = 24 ± 5 mm

Dimension "A" must be measured in correspondence of the lower line of wishbone shaft as shown.

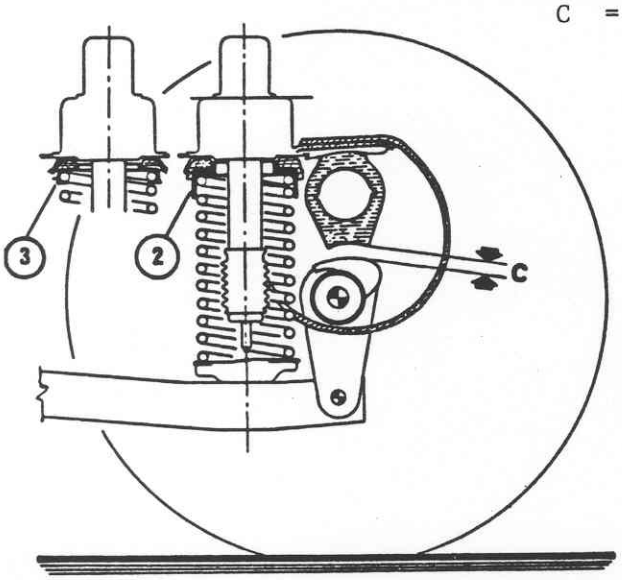
To adjust add shims in "1".

Shims are available in the following thicknesses:

3.5 - 7 - 10.5 mm

Distance of rear axle from rubber buffers

C = 33 ± 5 mm



N o t e

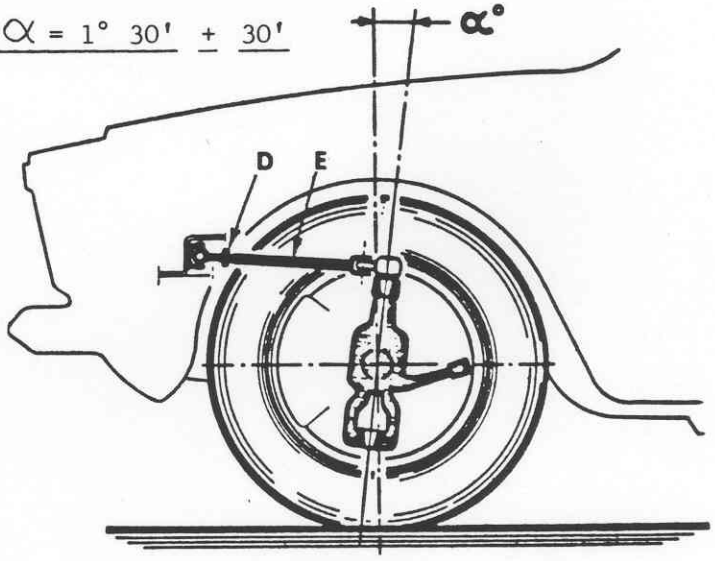
To adjust, remove the seat "3" and add shims in "2" as shown.

Shims are available in the following thicknesses:

6.5 - 11.5 - 16.5 - 21.5 mm

In the condition as specified check the wheel angles.

Caster angle: α = 1° 30' ± 30'



The difference in caster angle between R.H. and L.H. wheel must not exceed 0° 20'.

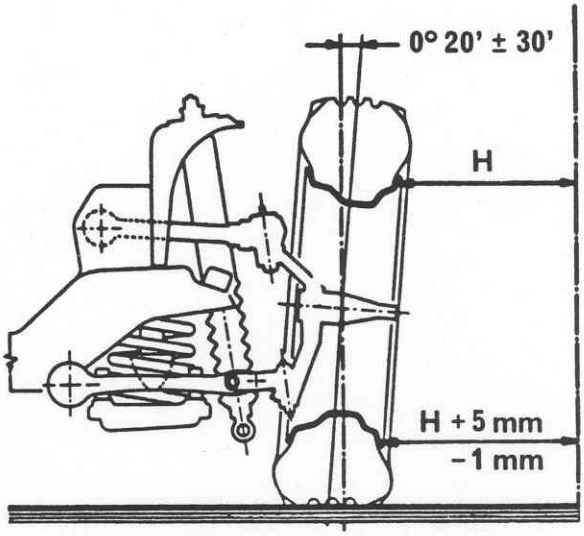
To adjust, loosen jam nut "D" and rotate rod "E".

Small adjustments of the caster angle allow to correct slight drift tendency of the car.

N.B. - Before checking the caster angle shake the front end of car in order to allow the rubber bushing on the front slanting arm to set properly.

Front wheel camber

Difference in camber angle between R.H. and L.H. = 0° 40'



Note - Not adjustable. Check the chassis and suspension arms if necessary.

T o e - i n

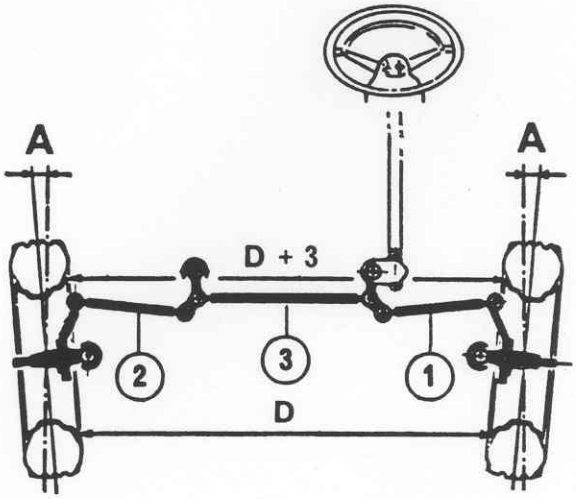
Lock steering wheel in the central position, i.e. with the spokes symmetrically disposed in relation to the vertical.

Starting with the track rod "1" on the steering box side, place the corresponding wheel so that the toe-in is 1.5 mm.

Measure the length thus obtained of the track rod and adjust the rod "2" on the other side to a length 5 mm shorter.

Bring the wheel to a 1.5 mm toe-in by adjusting the centre track rod "3".

A { for 15" rims = 0° 13'
  { for 14" rims = 0° 14'



Rod length:

side	264/280 mm
track	530/550 mm

With the toe-in as specified, the length of rods as measured between ball joint centers should fall within the limits shown. If these values cannot be restored, the cause will probably be attributable to distortion of the body resulting from a collision.

Note - For R.H.D. the side rods maintain the same length (symmetrical adjustment).

1	Engine compartment light switch	
2	Engine compartment light bulb	5 W
3	Junction boxes and connectors	
4	Distributor Bosch 0231 129 036 JF4 - Marelli S 145 A	
5	Coil Bosch K 12 V - Marelli BE 200 A	
6	Coolant thermometer sender	
7	Oil pressure gauge sender	
8	Reversing light switch	
9	Alternator Bosch G1→ 14 V 33 A 27	
10	Starting motor Bosch EF→ 12 V 0.7 P S - Paris-Rhone D 8 E 109 12 V	
11	Horn	
12	Battery 12 V - 60 Ah	
13	Brake fluid level warning light switches	
14	Voltage regulator Bosch A D 1/14 V	
15	Horn relay	
16	Front direction indicators bulb	21 W
17	Front parking lights bulb	5 W
18	Headlamp Hi/Low bulb	45/40 W
19	Side direction indicators bulb	4 W
20	Windscreen wiper (two speed) Bosch WS 4912 AR 2 A (1)	
21	Blower motor (two speed)	
22	Instrument lights bulb	3 W
23	Reserve warning light bulb	3 W
24	Blower warning light bulb	3 W
25	Alternator warning light bulb	3 W
26	Direction indicators warning light bulb	1.2 W
27	Bulb for brake fluid level and handbrake telltale	1.2 W
28	Parking light warning bulb	3 W
29	High beam warning light bulb	3 W
30	Stop light switch	
31	Windscreen washer, foot operated	
32	Instrument lights switch	
33	Blower switch	
34	Flasher unit	

35 Parking brake warning light switch
36 Windscreen wiper switch
37 Ignition and starting switch
38 Horn control switch
39 Parking lights, headlamps and flashing switch
40 Direction indicators switch
41 Fusebox
42 Toggle switch for courtesy light in mirror
43 Courtesy light bulb . . . . . 5 W
44 Switch for courtesy light on jambs
45 Boot light switch
46 Boot light bulb . . . . . 5 W
47 Fuel level sender
48 Rear direction indicators bulb . . . . . 21 W
49 Rear parking and stop lights bulb . . . . . 5/21 W
50 Reversing lights bulb . . . . . 21 W
51 Number plate light bulb . . . . . 4 W

The figure following the colour code on the diagram shows the wire gauge in mm^2.

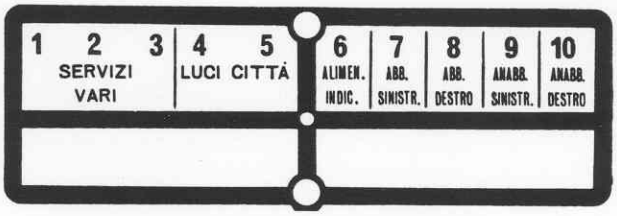
Where not shown the wire gauge is 1 mm^2.

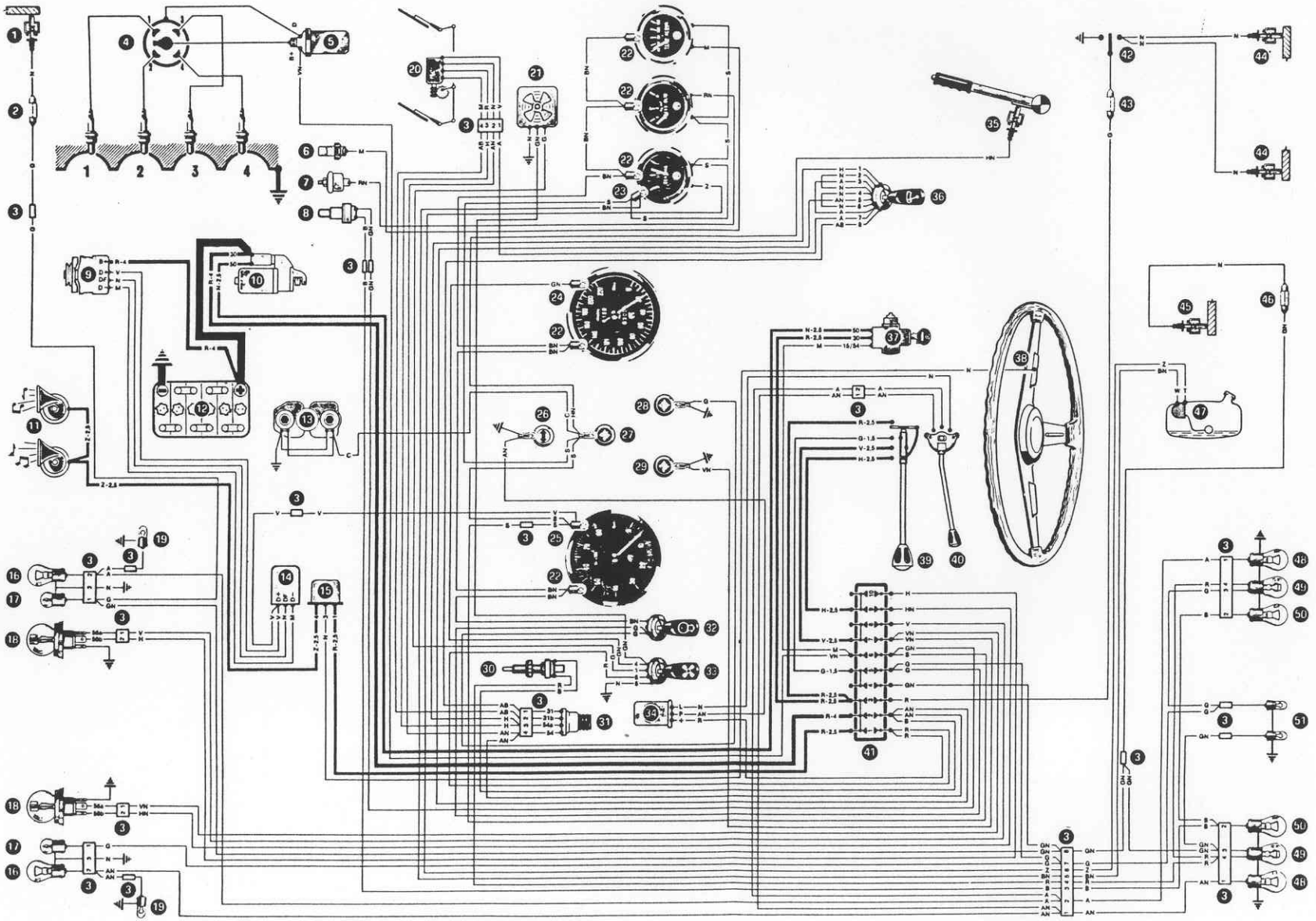
Cable colour code

A	blue	V	green
B	white	Z	violet
C	orange	AB	blue/white
G	yellow	AN	blue/black
H	grey	BN	white/black
M	brown	GN	yellow/black
N	black	HN	grey/black
R	red	RN	red/black
S	pink	VN	green/black

Plate on fusebox

1 - 2 - 3	Servizi vari	=	Main devices
4 - 5	Luci città	=	Parking lights
6	Alimen. indic.	=	Indicating devices
7	Abb. sinistr.	=	L.H. high beam
8	Abb. destro	=	R.H. high beam
9	Anabb. sinistr.	=	L.H. low beam
10	Anabb. destro	=	R.H. low beam





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