1750 Berlina
1750 GT Veloce®
1750 Spider Veloce®

FUEL INJECTION MODELS

U.S.A. VERSION

Alfa Romeo

technical characteristics and principal inspection specifications

C O N T E N T S

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TECHNICAL CHARACTERISTICS

PRINCIPAL CHARACTERISTIC DATA

Number of cylinders	4
Bore	80 mm. (3.15")
Stroke	88.5 mm. (3.48")
Total cylinder displacement	1779 cc.
Max. power at 5,500 rpm	SAE 132 HP
Front track	1324 mm. (52.1")
Rear track	1274 mm. (50.1")
Wheelbase	2570 mm. (101.1")
Min. turning circle	11100 mm. (437")
Overall length	4390 mm. (172.7")
Overall width	1565 mm. (61.6")
Overall height (unladen)	1430 mm. (56.3")
Curb weight	1110 Kg. (2442 lbs)
Number of seats	4
Tires 165 x 14	PIRELLI cinturato SR KLEBER COLOMBES V 10 MICHELIN ZX

PERFORMANCE

With 41 : 9 final drive

Gear	After breaking in mph
1st	28
2nd	46
3rd	68
4th	91
5th	112
Rev.	30

Oil pressures with hot engine - psi	Engine running fast	minimum	50
		maximum	65-70
	Engine idling	minimum	7-14

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

Tires

Recommended tire pressure (cold) in psi at a maximum-loaded vehicle weight of 3340 lbs

Make	Front	Rear
Pirelli	22	23
Michelin	26	26
Kleber Colombes	24	29

Note: For sustained speeds exceeding the limits specified by Federal regulations, inflate to the following pressures:

Michelin	28	31
Kleber Colombes	27	31

Fuel, oil and coolant

Cooling system:

Alfa Romeo coolant mixture . . . . . abt. 2.5 gals

Fuel . . . . . " 12 gals

(For best engine performance the use of premium grade fuel is advised)

Fuel reserve . . . . . " 1.6-1.8 gals

Oil
- Engine (pan and filter)
  - when full * . . . . . " 7.1 qts
  - danger level . . . . . " 4.75 qts
- Transmission . . . . . " 3.8 pts
- Differential . . . . . " 3.0 pts
- Steering box . . . . . " .6 pt

* This quantity is that needed for regular changing. The total amount of oil in the circuit (pan, filter and passages) is . . . . . 7.8 qts

It is recommended to top up with the same type of oil as that in the engine.

Recommended lubricants

Part	Classification	Commercial equivalents AGIP	SHELL	ESSO
Engine	SAE 20 W/40 API MS	AGIP F.1 Supermotoroil Multigrade 20 W/40	SHELL Super Motor Oil 10 W/30	UNIFLO Motor Oil 10 W - 20 W - 40
Transmission Steering box and differential	SAE 90 API EP	AGIP F.1 Rotra Hypoid SAE 90	SHELL Spirax 90 EP	ESSO Gear Oil GX 90
Drive shaft universal joints and slip yoke	NLGI 1	AGIP F.1 Grease 15	SHELL Retinax G	Esso Multi-purpose Grease H
Front wheel bearings (see maintenance schedule)	NLGI 2/3	AGIP F.1 Grease 33 FD	SHELL Retinax AX	Esso Norva 275

API - American Petroleum Institute
NLGI - National Lubricating Grease Institute
SAE - Society of Automotive Engineers

Fuel injection

Fuel is supplied to the engine by injection into the intake port of each cylinder in quantities exactly metered in accordance with the opening of throttles and RPM range.

The metering device, or "control unit", consists mainly of a barrel-shaped cam which slides automatically lengthwise as the RPM varies and rotates about its axis exactly timed with the opening of throttles.

The lift of a follower, moving closely against the cam contour, controls the delivery of the injection pump, without any lag in respect to the demand of power.

On deceleration, the fuel delivery is automatically cut off thus permitting not only to eliminate the unburned gases in a condition remarkably critical for the exhaust emission levels, but also to affect favorably the fuel consumption.

The control unit also includes suitable compensating devices which gives proper corrections for atmospheric pressure, engine and room temperature, cold starting and initial running.

> For more detailed directions on the use, maintenance, testing and adjustment of the injection system, refer to the "Instructions and Maintenance manual".

Inspection specifications

Injection pump:

SPICA A1BB 4 C.S. 75

Injector rating:

new : 360-400 psi

used : > 260 psi

Timing the injection pump with the engine

At 70° BTDC of the induction stroke, the timing marks on the injection pump must be aligned.

Air induction system

The filtered air enters the engine thru four intake ports each with a throttle valve.

The idling air (throttle valves closed) is fed thru a separate circuit which, starting from the air cleaner connects to the intake ports downstream of the throttle valves and includes the idle equalizers "12".

The accelerator pedal is mechanically linked thru the rods "9", "10" and the relay crank "8" to both the throttle valve lever and the control unit lever. Therefore, any position of the accelerator pedal corresponds to an exact position of throttle valve and control unit levers.

Fuel feed system

Inserting the key in the ignition switch "16" and rotating clockwise to the first click will operate the electric pump "3". The gasoline flows from the tank "1" thru tank filter "2" and main filter "4" and feeds the injection pump "5".

The excess fuel, acting also as a coolant for the injection pump, before returning to the tank, passes thru a calibrated orifice which regulates the fuel pressure within the injection pump. A pressure switch "17" inserted in the delivery pipe will switch on the warning light "18" on dashboard if a pressure drop occurs in fuel lines.

A pressure relief valve in the main filter limits the fuel pump outlet pressure bypassing fuel to the recovery pipe.

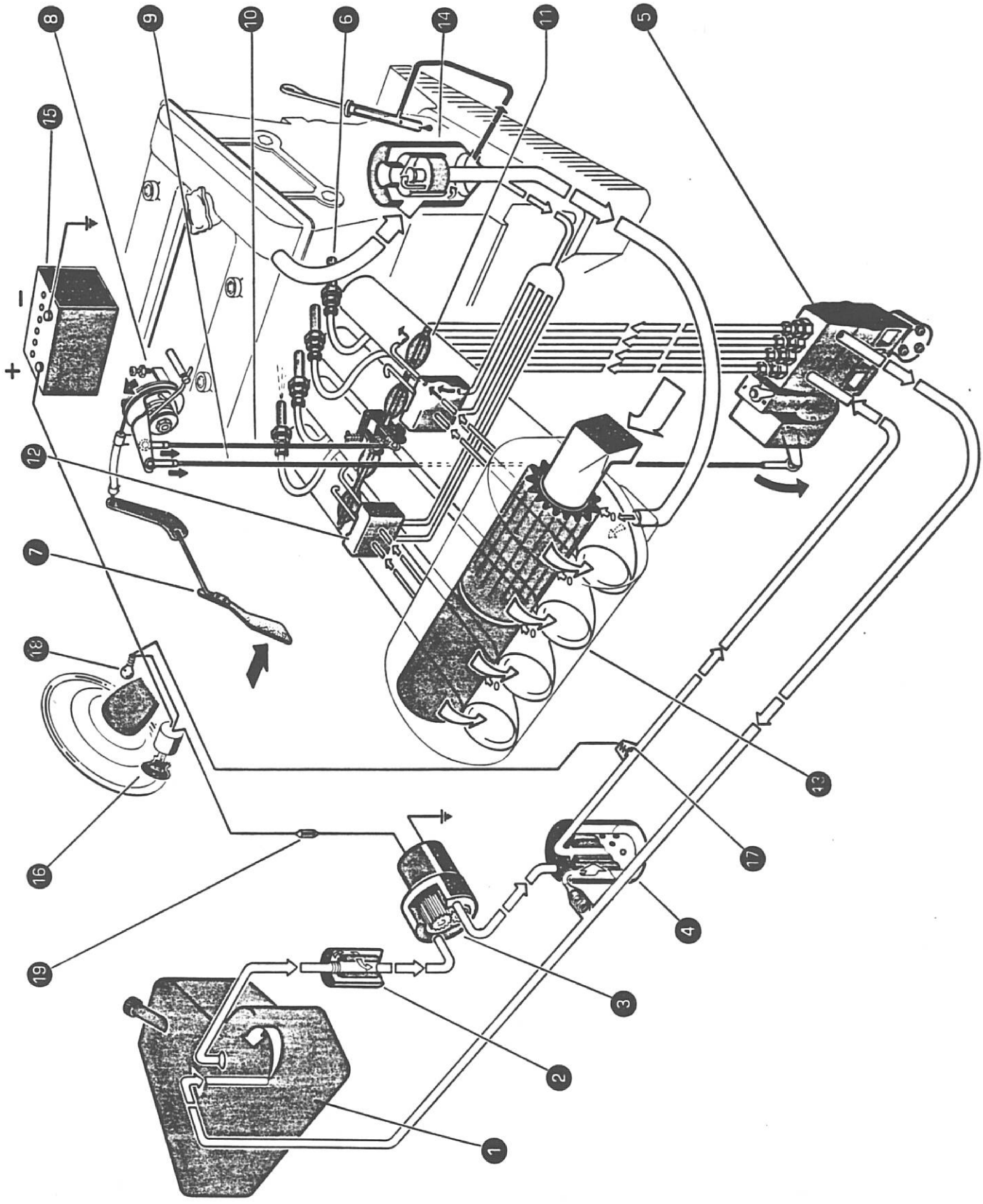
Crankcase ventilating system

The exhaust gases and the oil vapors developed during engine operation collect in the camshaft cover; from here they are sucked in the combustion chambers and burned.

The crankcase ventilating system controls gases both at high engine RPMs and at idling speed when the throttles are closed.

When the throttles are fully opened the vapors flow thru the hoses to the oil separator "14" and to the manifold chamber communicating with the intake ports.

When the throttles are partially closed, the secondary circuit comes into operation; such a circuit starts from the oil separator "14" and conveys unburned gases and vapors directly into the intake ports downstream of the throttles by means of the equalizers "12" provided with calibrated orifices. The oil collected in the separator returns to the pan via a suitable hose.



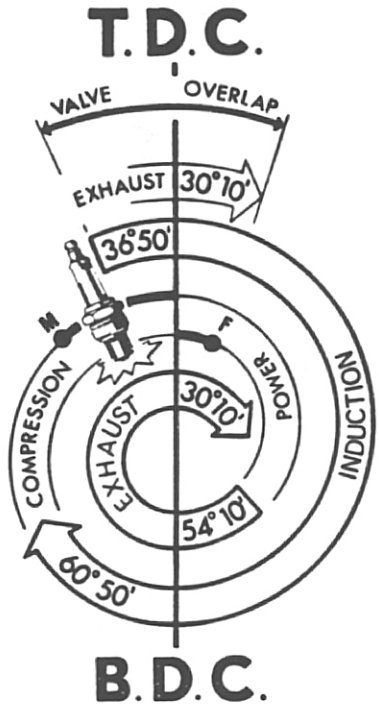
Checking of valve opening and closing angles

Clearance (with cold engine) between the unlobed profile of cam and the valve cup ceiling	intake	.475 to .500 mm (.0187 to .0197")
	exhaust	.525 to .550 mm (.0206 to .0216")
Opening of intake valve	lift of cup	.20 mm (.008")
	corresponding to an angle (before TDC)	18° 30' ± 1° 30'
Closing of intake valve	lift of cup	.20 mm (.008")
	corresponding to an angle (after BDC)	42° 30' ± 1° 30'
Opening of exhaust valve	lift of cup	.15 mm (.006")
	corresponding to an angle (before BDC)	42° 30' ± 1° 30'
Closing of exhaust valve	lift of cup	.15 mm (.006")
	corresponding to an angle (after TDC)	18° 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 end)

opening of intake valve (before TDC)	36° 50'
closing of intake valve (after BDC)	60° 50'
opening of exhaust valve (before BDC)	54° 10'
closing of exhaust valve (after TDC)	30° 10'
induction stroke	277° 40'
exhaust stroke	264° 20'



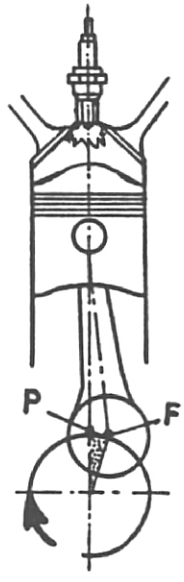
IGNITION

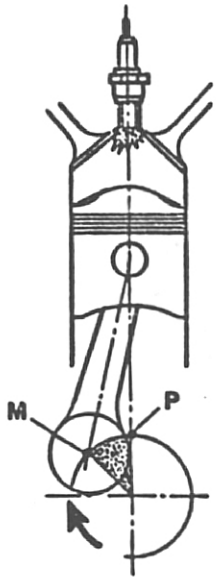
Firing order: 1 - 3 - 4 - 2 (no. 1 cylinder is that at the fan side)

IGNITION DISTRIBUTOR TIMING

Opening of contact points of ignition distributor S = .43 to .48 mm (.017 to .019")
The distributor is correctly fitted when the oiler is toward the engine.

Idle ignition	Maximum advance M Before T D C
1° / 3° A T D C	31° / 37° at 5000 rpm

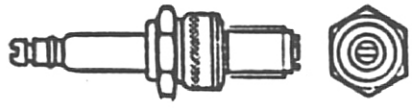




P = T.D.C.
F = Idle ignition
M = Maximum advance

SPARK PLUGS

Lodge HL



COOLING SYSTEM

The cooling circuit is provided with a compensating reservoir containing a special ALFA ROMEO Coolant Mixture which gives full protection against freezing down to -22°F.

TO ENSURE THE EFFICIENT OPERATION OF THE COOLING SYSTEM, THE FOLLOWING PROCEDURE SHOULD BE OBSERVED.

Occasionally, check level of coolant in the reservoir: this should be done exclusively with a cold engine as with a hot engine the level may increase remarkably, even after stopping the engine.

The level of mixture in the reservoir should never fall below the "Min" or exceed the "Max".

To top up the reservoir use the specified Coolant Mixture.

If too frequent a topping up is required, check the cooling system for damage.

Should sudden and excessive leaks be experienced from the system, the use of fresh water is provisionally allowed. To replenish the circuit follow the directions given on next page.

W A R N I N G

Never remove radiator plug unless absolutely necessary; in any case, to avoid severe injuries, wait that the liquid is cooled down to ambient temperature.

Changing the coolant mixture

Every 18,000 mi - 30,000 Kms (or once a year whichever comes first) flush the circuit and renew the coolant mixture. (See page 8).

IMPORTANT NOTE

In places where the temperature falls below -22°F the antifreeze mixture can be made stronger by varying its concentration.

To this end, a certain amount of mixture shall be drained off the circuit and replaced by the same quantity of "ALFA ROMEO Antifreeze" drawn from suitable containers.

The quantities of antifreeze to be added to radiator and reservoir depending on the lowest anticipated temperature are the following:

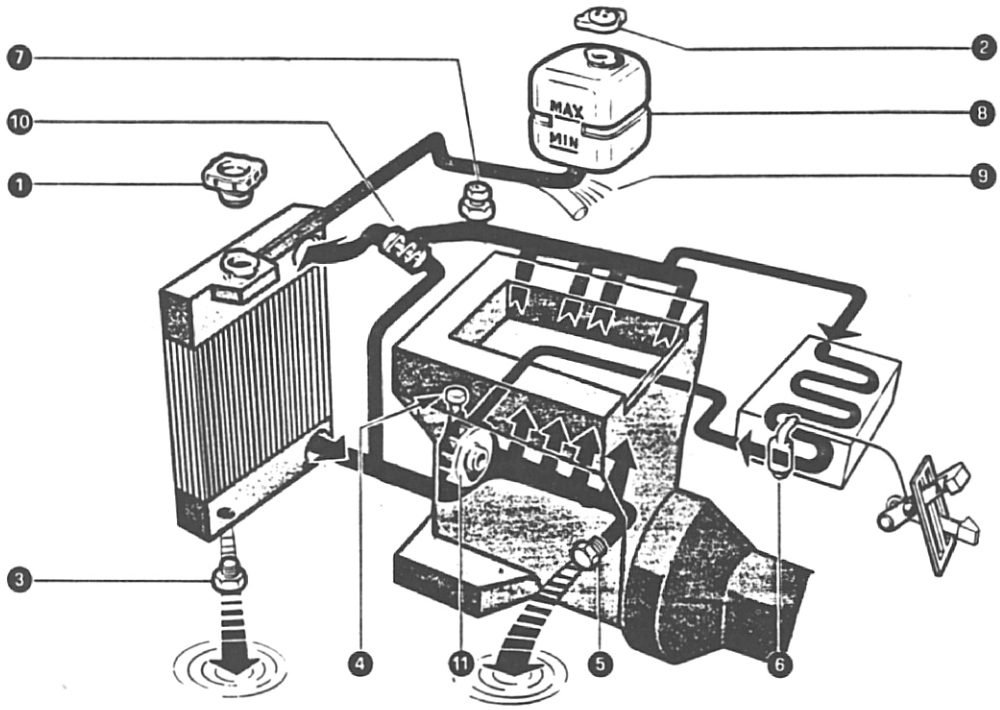
Temperature	Quantity of ALFA ROMEO coolant Mixture to be replaced with an equal quantity of "ALFA ROMEO Antifreeze"		
	Radiator	Reservoir	Total
-24°F	400 cc	100 cc	500 cc
-33°F	800 cc	200 cc	1000 cc
-38°F	1200 cc	300 cc	1500 cc

Draining and replenishing the system

Proceed as follows:

Draining

- Remove radiator filler plug "1".
- Unscrew the drain plug "3" and the bleed screw "7" on manifold.
- Turn on the heater cock "6".
- Turn on the drain plug "5" on crankcase; let liquid drain off and enpty the reservoir "8" by detaching pipe "9". Then reinstall drain plugs "3" and "5" and reconnect the pipe "9" to the reservoir.



1 Radiator filler plug
2 Reservoir filler plug
3 Radiator drain plug
4 Bleed screw on pump
5 Drain plug on crankcase
6 Heater cock
7 Bleed screw on manifold
8 Reservoir
9 Supply line from reservoir to radiator
10 Thermostat
11 Centrifugal pump

Replenishing

- Remove radiator and reservoir filler plug and turn on the heater cock.
- Open the bleed screw "7" on manifold and "4" on pump.
- Pour coolant mixture through radiator filler port until coolant escapes from bleed screw "4"; then screw in the latter. Go on in adding mixture until it appears at the bleed screw "7" on manifold.
- With the bleed screw on manifold opened and no plug on filler port of radiator, start the engine and keep it idling for a few seconds in order to bleed air completely.
- Close the bleed screw on manifold.
- Add mixture to radiator filler port until full.
- Add mixture also to reservoir until "Max" level is reached.
- Put the filler plugs on reservoir and radiator.

Checking cooling system for proper operation after topping up

After the system has been fully replenished or even topped up owing to drainings for mixture change or for repair, it is advisable to check the system for proper operation as follows:

a) with the circuit closed and the heater cock opened, run the engine until the coolant mixture has reached a temperature of about 80-85°C and keep on idling the engine; in this condition the thermostat opens thus allowing possible air bubbles trapped in the circuit to pass in the radiator and then in the reservoir.

b) let the engine cool down to room temperature in order to allow the mixture in the reservoir to compensate for the air bled off as said above.

c) remove the filler plug and check that radiator is full.

d) fill the reservoir up to "Max" mark.

N.B. - If, when opening the filler plug as in c) above, the radiator is not full, repeat the procedure, keeping the engine running for a longer time at operating temperature (thermostat opened) to bleed all the air from the circuit.
Should the trouble persist, air instead of coolant from reservoir is likely to enter the circuit through some leaking component (radiator filler plug included) in this case, inspect the circuit accordingly, then again repeat the checking procedure.

Electrical equipment

Voltage . . . . . 12 Volts

Battery . . . . . 60 Amp.h

	MARELLI	BOSCH
Alternator		K1 (R,L) 14 V 35 A 20
Voltage regulator		AD 1/14 V
Starting motor		EF (R) 12 V 0,7 PS
Coil		K 12 V
Ignition distributor	S 103 B	
Windshield wiper (2-speed)		WS 4902 AR 5 A (0)

Bulb's wattage

Headlights	sealed beam
Fog lamps	sealed beam
Tail lights - parking & stop	5/21
Front direction indicators and road hazard flashers	21
Tail direction indicators and road hazard flashers	21
Back-up light	21
Front parking lights	5 globular
License plate light	5 globular
Engine compartment light	5 cylindrical
Courtesy light	5 cylindrical
Light in luggage compartment	5 cylindrical
Side marker lights	4 tubular
Lighting on instruments	3 tubular
Blower warning light	3 tubular
Alternator warning light	3 tubular
Parking light warning	3 tubular
High beam warning lights	3 tubular
Fuel reserve warning light	3 tubular
Low fuel pressure warning light	1.2 tubular
Direction indicators and road hazard flashers warning light	1.2 tubular
Low oil pressure warning light	1.2 tubular
Service brake warning light	1.2 tubular

Tightening torque specifications

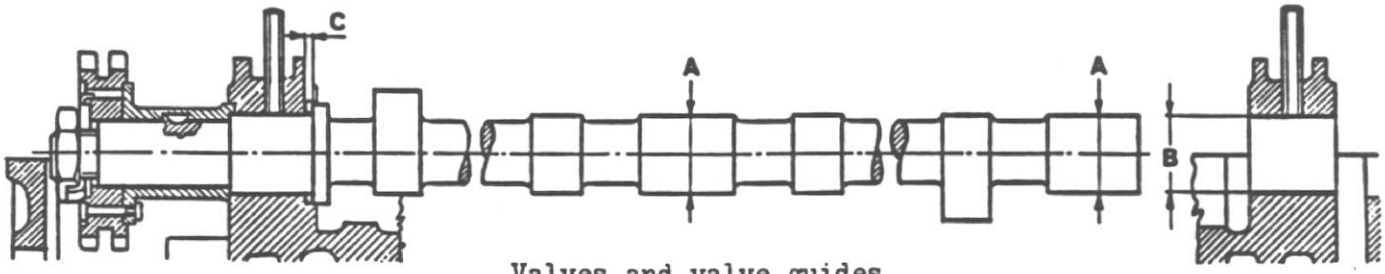
ENGINE - TRANSMISSION UNIT			Kgm.	lb. ft	Manner of tightening
Cylinder head nuts *	Inspection	when cold	7.2 to 7.4	52.1 to 53.5	Slacken in proper sequence, the nuts by one and one half turn and lubetorque
		when hot	7.6 to 7.7	55.0 to 55.7	Warm up the engine and when hot retighten without unscrewing
	After repairing	when cold	7.2 to 7.4	52.1 to 53.5	Retighten with lube
		when hot	7.6 to 7.7	55.0 to 55.7	Warm up the engine by actually driving the car and when hot retighten without unscrewing
		when cold	7.2 to 7.4	52.1 to 53.5	After tested the car, slacken, when cold and in proper sequence, the nuts by one and one half turn and lubetorque
Spark plugs			2.5 to 3.5	18.1 to 25.3	With graphite grease, when cold
Nuts of the camshaft caps			2 to 2.25	14.5 to 16.3	in oil
Nuts of the connecting rod caps			5 to 5.3	36.2 to 38.3	" "
Nuts of main bearing caps			4.7 to 5	33.9 to 36.1	" "
Screws of flywheel on crankshaft			4.2 to 4.5	30.4 to 32.5	" "
Nut of alternator pulley			3 to 3.5	21.7 to 25.3	dry
Nut of transmission main shaft yoke			11.9 to 12	86 to 86.8	"
Nut of transmission layshaft			4.5 to 5.5	32.6 to 39.7	"
Nut of transmission half-casing			1.8	13	"
Bolts joining transmission output shaft yoke to drive shaft yoke			4 to 4.5	29 to 32.5	"
Nut of transmission inner swivel			3.25 to 3.65	23.6 to 26.4	"
Oil drain plug on pan bottom			7 to 8	50.6 to 57.8	"
Injectors on intake manifold			2.8 to 3.2	20.3 to 23.1	"
REAR FRAME					
Screws securing ring gear to differential case			4.5 to 5	32.6 to 36.1	"
Ringnut securing yoke on final drive pinion shaft			8 to 14	50 to 101.2	"
Nuts securing bearing housing to real axle tubes			4.8 to 5.5	34.8 to 39.7	"
Nuts securing trailing arms to body			10 to 11.5	72.4 to 83	"
Nuts securing trailing arms to rear axle tubes			11.5 to 13	83 to 94	"
Nut securing T-arm to body			4.8 to 5.5	34.8 to 39.7	"
Nut securing T-arm to rear axle			11 to 15	79.6 to 108.5	"
Nut securing link to trailing arm bolt			5.2 to 5.9	37.6 to 42.6	"
Screws securing rear brake caliper to support (ATE brakes)			2.3 to 2.8	16.7 to 20.2	"
Nuts securing wheels			6 to 8	43.4 to 57.8	"
Bolts joining differential yoke to drive shaft yoke			3.5 to 4	25.3 to 28.9	"
Bolts for rebound strap butt joints			.5	3.6	"
Nuts securing rear axle tubes to differential carrier			2.4	17.4	"

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

FRONT FRAME	Kgm.	lb. ft	Manner of tightening
Nut securing steering wheel to column	5 to 5.5	36.1 to 39.7	d r y
Screws securing Burman steering box cover	2.3 to 2.5	16.7 to 18	"
Screws securing steering box & bellcrank bracket to body	4.8 to 5.5	34.8 to 39.7	"
Nuts of steering linkage ball joints	4.8 to 5.5	34.8 to 39.7	"
Nut securing steering arm to box	12.5 to 14	90.5 to 101.2	"
Nut securing shock absorber to suspension arms	8.2 to 9.2	59.3 to 66.5	"
Screws securing suspension upper front arm to body	2.3 to 2.8	16.7 to 20.2	"
Nut securing suspension upper front arm to rear arm	4 to 4.5	29 to 32.5	"
Nut securing suspension upper rear arm to body	12.5 to 14	83 to 94	"
Nuts securing lower arm shaft to cross-member (To tighten these nuts use tool A.5.0161 and torque to 5.2 - 5.5 / 37.6 - 39.7)	5.6 to 5.9	40.5 to 42.6	"
Nuts securing steering arm to steering knuckle	4 to 4.5	29 to 32.5	"
Nut securing suspension upper rear arm to steering knuckle	7.5 to 8.5	54.3 to 61.4	"
Nut securing lower ball joint to arm	8.2 to 9.2	59.3 to 66.5	"
Nut securing lower ball joint to steering knuckle	7.5 to 8.5	54.3 to 61.4	"
Nuts securing caliper to steering knuckle	7.5 to 8.5	54.3 to 61.4	"
Screws securing brake splash shields	.8 to 1	5.8 to 7.2	"
Nuts securing wheels & brake discs	6 to 8	43.4 to 57.8	"
ATE BRAKES			
Bleed screw	.2 to .35	1.5 to 2.5	"
Caliper joining bolt	2.9 to 3.4	21 to 24.6	"
Inlet fitting to caliper — with gasket	.8 to 1.1	6 to 8	"
Inlet fitting to caliper — without gasket	1 to 1.5	7.2 to 10.8	"

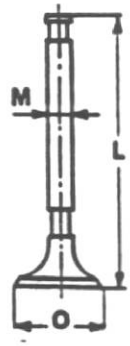
Camshafts

Diameter of journals	A =	26.959 to 26.980 mm (1.0614 to 1.0622")
Diameter of journal bearings	B =	27.000 to 27.033 mm (1.0630 to 1.0642")
Clearance between journals and bearings	B-A =	.020 to .074 mm (.0008 to .0028")
End play of camshaft in thrust bearing	C =	.065 to .182 mm (.0026 to .0071")



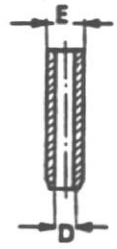
Valves and valve guides

		INTAKE			EXHAUST (sodium cooled)
		LIVIA H	ATE	GARRONE	LIVIA C
Valves	Diameter of valve poppet . . O	41.000 to 41.150 mm (1.614 to 1.620")	41.000 to 41.200 mm (1.614 to 1.622")	41.000 to 41.150 mm (1.614 to 1.620")	37.000 to 37.150 mm (1.4567 to 1.4625")
	Diameter of valve stem . . . M		8.972 to 8.987 mm (.3532 to .3538")		8.935 to 8.960 mm (.3518 to .3527")
	Total length L	106.900 to 107.150 mm (4.2087 to 4.2186")	106.800 mm (4.2047")	107.000 mm (4.2126")	106.300 mm (4.1850")



N.B.: ATE - LIVIA - GARRONE intake valves are alternate supply.

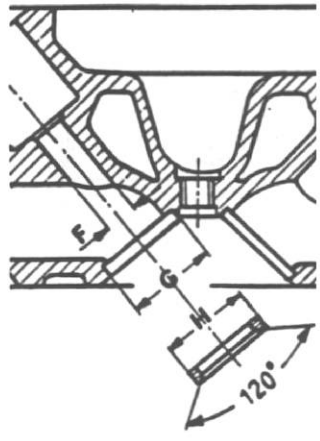
Valve guide	Outside diameter with guide removed	E =	14.033 to 14.044 mm (.5528 to .5529")
	Inside diameter with guide assembled in cylinder head	D =	9.000 to 9.015 mm (.3544 to .3549")
Projection of intake valve guides from their recesses in cylinder head			13.800 to 14.000 mm (.543 to .551")
Projection of exhaust valve guides from their recesses in cylinder head			16.800 to 17.000 mm (.662 to .669")
Clearance between guide assembled in cylinder head and valve stem	intake		.013 to .043 mm (.0005 to .0031")
	exhaust		.040 to .080 mm (.0016 to .0031")



Valve seats

Diameter of valve guide seat in cylinder head F = 13.990 to 14.018 mm (.5508 to .5519")
Interference between seat and valve guide E-F = .015 to .054 mm (.0006 to .0021")

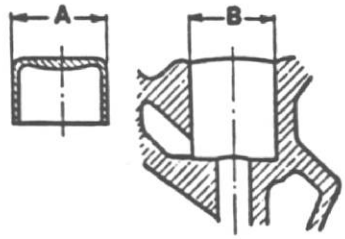
		Intake	Exhaust
Outer diameter of the valve seat intert . . . . . H	standard	42.597 to 42.632 mm (1.6771 to 1.6784")	38.597 to 38.632 mm (1.5196 to 1.5209")
	oversized	42.897 to 42.932 mm (1.6889 to 1.6902")	38.897 to 38.932 mm (1.5314 to 1.5327")
Diameter of recess in the cylinder head for valve seat insert . . . . . G	standard	42.532 to 42.557 mm (1.6744 to 1.6754")	38.532 to 38.557 mm (1.5169 to 1.5179")
	oversized	42.832 to 42.857 mm (1.6862 to 1.6872")	38.832 to 38.857 mm (1.5288 to 1.5298")



Interference between valve seat insert and recess in cylinder head . . . H-G .100 to .040 mm (.0039 to .0010")

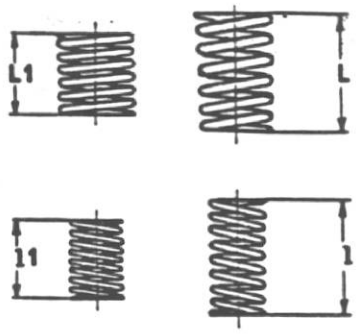
Valve cups

Diameter of cup . . . . . A	standard	34.973 to 34.989 mm (1.3769 to 1.3775")
	oversized	35.173 to 35.189 mm (1.3848 to 1.3854")
Diameter of cup seat in cylinder-head . . . . . B	standard	35.000 to 35.025 mm (1.3780 to 1.3789")
	oversized	35.200 to 35.225 mm (1.3859 to 1.3868")
Clearance between seat and cup		.011 to .052 mm (.0005 to .0020")



Valve springs

	Free length	Length under test load	Test load
Inner spring I	46.50 mm (1.83") 47.35 mm (1.88") 47.00 mm (1.85")	11 = 26 mm (1.02")	22.3 to 23.1 Kg. 49.9 to 51.1 lbs
Outer spring L	51.30 mm (2.02") 52.80 mm (2.08") 52.00 mm (2.05")	L1 = 27.5 mm (1.08")	35.67 to 37.13 Kg. 78.6 to 81.8 lbs 35.87 to 37.33 Kg. 79.1 to 82.3 lbs



Connecting rods

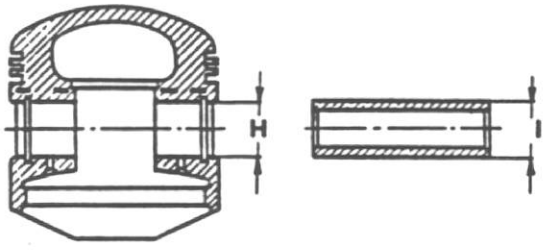
Length between ℄ of big end and ℄ of small end of connecting rod . D =		156.950 to 157.050 mm (6.1792 to 6.1830")
Inner diameter of the big end of connecting rod . . . . . E =		53.695 to 53.708 mm (2.1140 to 2.1144")
Inner diameter of bushing in the small end of rod . . . . . C =		22.005 to 22.015 mm (.8664 to .8867")
Thickness of connecting rod bearings F	standard	1.829 to 1.835 mm (.0720 to .0722")
	1st oversize	1.956 to 1.962 mm (.0770 to .0772")
	2nd oversize	2.083 to 2.089 mm (.0820 to .0824")
Radial clearance between crankpins and bearings for big end of connecting rod		.025 to .063 mm (.0010 to .0024")
Maximum out of parallelism between ℄ of big end hole and ℄ of small end hole		.078 mm (.0031")

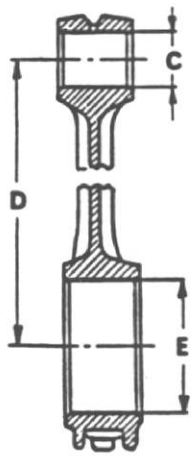
Piston pins

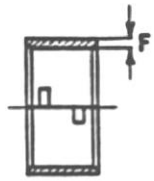
O.D. of pin I	black	21.994 to 21.997 mm (.86590 to .86602")
	white	21.997 to 22.000 mm (.86605 to .86614")
Clearance between con. rod small end bore and piston pin	black . .	.008 to .021 mm (.0003 to .0008")
	white . .	.005 to .018 mm (.0002 to .0007")

Piston pin holes

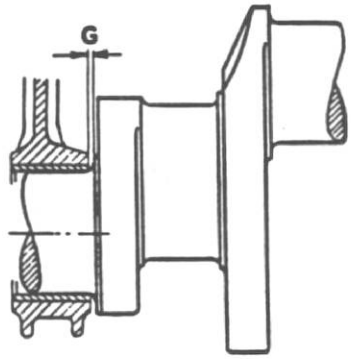
BORGO piston H	black	22.000 to 22.002 mm (.86614 to .86621")
	white	22.003 to 22.005 mm (.86626 to .86633")







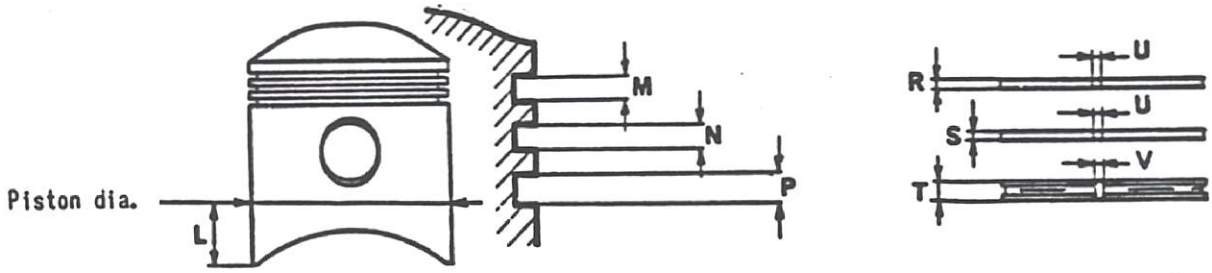
End play of the connecting rods on the crankpins G .200 to .300 mm (.0079 to .0118")



Pistons and piston rings

Diameter of pistons to be measured to square with the hole for piston pin and at a distance of L = 15 mm (.591") from the lower border of skirt.

	Class A (Blue)	Class B (Pink)	Class C (Green)
BORGO piston diameter	79.945 to 79.955 mm (3.1476 to 3.1479")	79.955 to 79.965 mm (3.1479 to 3.1483")	79.965 to 79.975 mm (3.1483 to 3.1487")

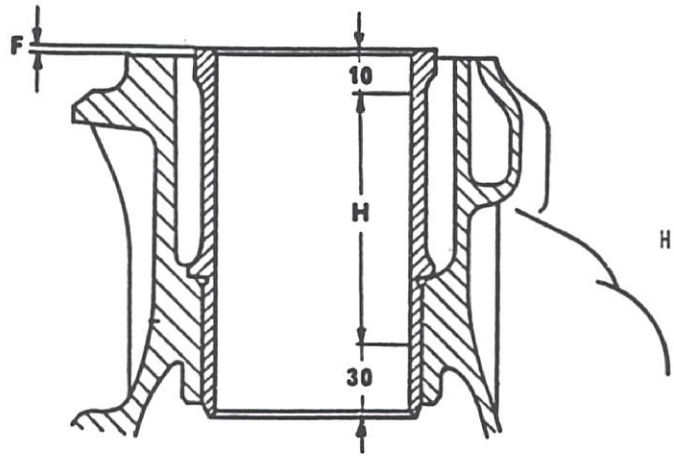


Height of groove in piston for chromium-plated compression ring	M =	1.525 to 1.545 mm (.0601 to .0609")
Height of groove in piston for oil scraper ring	N =	1.775 to 1.795 mm (.0699 to .0706")
Height of groove in piston for oil control ring	P =	4.015 to 4.035 mm (.1581 to .1588")
Thickness of chromium-plated compression ring	R =	1.478 to 1.490 mm (.0582 to .0586")
Thickness of oil scraper ring	S =	1.728 to 1.740 mm (.0681 to .0685")
Thickness of oil control ring	T =	3.978 to 3.990 mm (.1567 to .1571")
End play of rings in grooves: chromium-plated compression rings		.035 to .067 mm (.0014 to .0026")
End play of rings in grooves: oil scraper ring		.035 to .067 mm (.0014 to .0026")
End play of rings in grooves: oil control ring		.025 to .057 mm (.0010 to .0022")
Gap of compression ring to be inspected in ring gauge or in cylinder barrels	U =	.300 to .450 mm (.0118 to .0177")
Gap of oil rings to be inspected in ring gauge or in cylinder barrels	V =	.250 to .400 mm (.0100 to .0157")

Cylinder barrels

	Blue	Pink	Green
Cylinder barrel bore	79.985 to 79.994 mm (3.1490 to 3.1493")	79.995 to 80.004 mm (3.1494 to 3.1497")	80.005 to 80.014 mm (3.1498 to 3.1501")

Clearance between cylinder barrel and piston . . . . . .030 to .049 mm (.0012 to .0019")

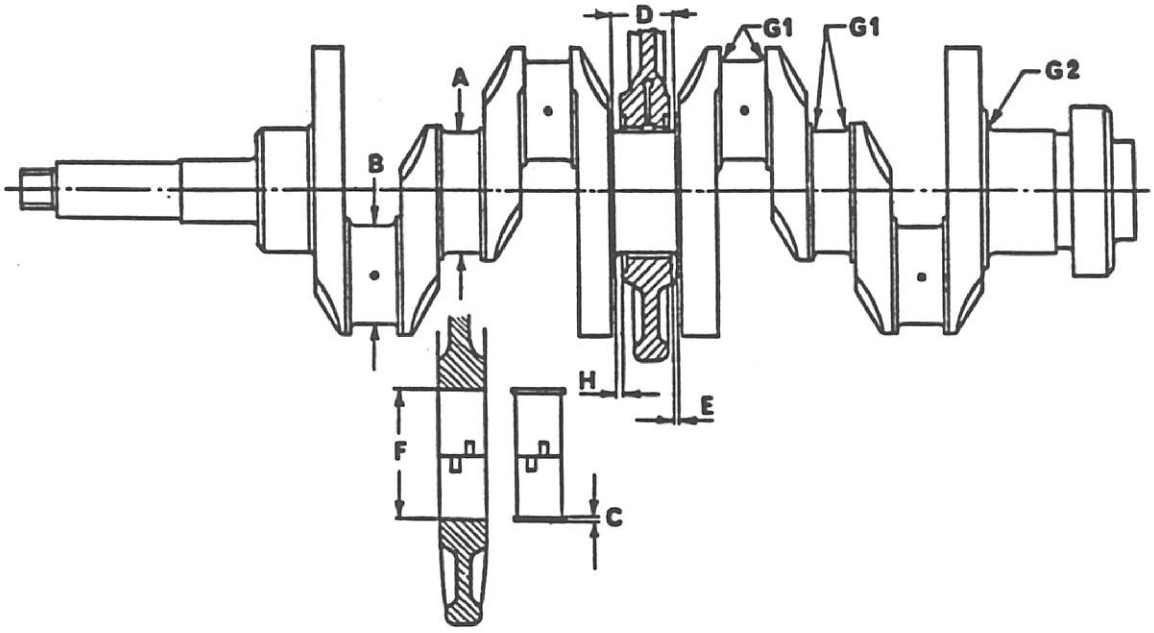


H = area of measurement

Projection of barrels from cylinder block . . . . . F = .001 to .060 mm (.00004 to .0024")

Surface roughness of barrel bore . . . . . 20 to 40 microinches RMS

Crankshaft



Diameter of main journals A	standard	59.960 to 59.973 mm (2.3606 to 2.3611")
	1st undersize	59.706 to 59.719 mm (2.3506 to 2.3511")
	2nd undersize	59.452 to 59.465 mm (2.3407 to 2.3411")
Diameter of crankpins B	standard	49.987 to 50.000 mm (1.9680 to 1.9685")
	1st undersize	49.733 to 49.746 mm (1.9581 to 1.9585")
	2nd undersize	49.479 to 49.492 mm (1.9480 to 1.9485")
Thickness of main bearings C	standard	1.829 to 1.835 mm (.0720 to .0722")
	1st oversize	1.956 to 1.962 mm (.0770 to .0772")
	2nd oversize	2.083 to 2.089 mm (.0820 to .0822")
Diameter of seat for main bearings in crankcase . . . . . F =		63.657 to 63.676 mm (2.5062 to 2.5069")
Length of central journal D	standard	30.000 to 30.035 mm (1.1811 to 1.1824")
	1st oversize	30.127 to 30.162 mm (1.1861 to 1.1874")
	2nd oversize	30.254 to 30.289 mm (1.1911 to 1.1924")
Thickness of thrust rings for central journal E	standard	2.311 to 2.362 mm (.0910 to .0929")
	1st oversize	2.374 to 2.425 mm (.0935 to .0954")
	2nd oversize	2.438 to 2.489 mm (.0960 to .0980")
End play of crankshaft . . . . . H =		.076 to .263 mm (.003 to .010")
Radial clearance between journals and main bearings		.014 to .058 mm (.0005 to .0022")

Note - Radial clearance = main bearing ID - (twice bearing thickness + journal OD)

Fillet radii	main journals & crankpins G1	1.7 to 2.1 mm (.07 to .08")
	pin on flywheel side G2	3.7 to 4.1 mm (.15 to .16")
Main journals & crankpins surface roughness		63 microinches RMS
Maximum elongation of main journals and crankpins		.007 mm (.00027")
Maximum taper of main journals and crankpins measured on their full length		.01 mm (.00039")
Maximum error of parallelism of main journals and crankpins measured on their full length		.015 mm (.00059")
Maximum misalignment allowed between main journals		.01 mm (.00039")
Maximum misalignment allowed between ℄ of the two pairs of crankpins and ℄ of main journals		.300 mm (.0118")

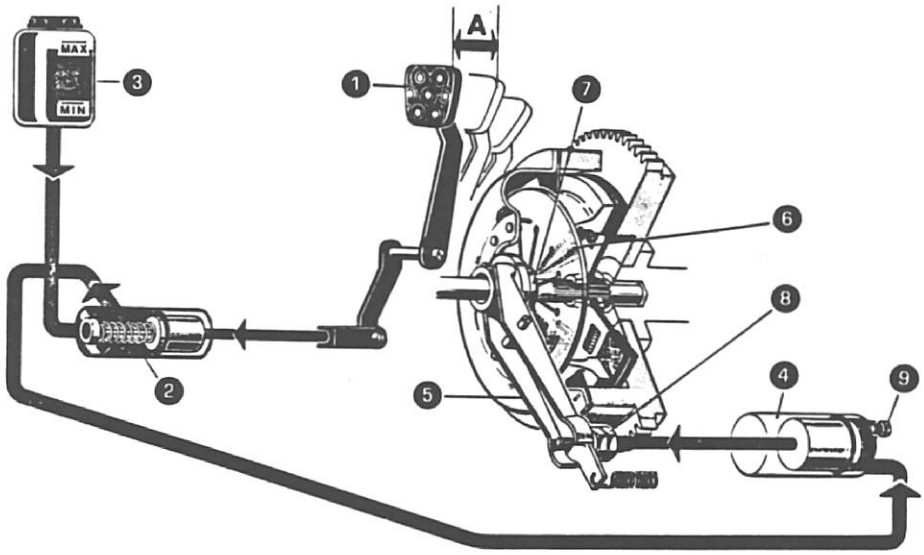
CLUTCH

The clutch is of the hydraulically-operated single plate dry type. The clutch pedal acts on a master cylinder supplied with the same type of fluid as the brake system.

When the clutch pedal is depressed, the fluid under pressure actuates the piston in the cylinder "4" connected to the clutch disengagement lever "5".

The pressure plate is controlled by means of diaphragm spring "6".

The clutch pedal free travel "A" should be about 1 1/4" (30-32 mm). When owing to wear on the clutch disc facing, the pedal free travel is reduced to 3/4" (17-19 mm) the free travel must be restored.



A Pedal free travel
B Disengagement lever free travel

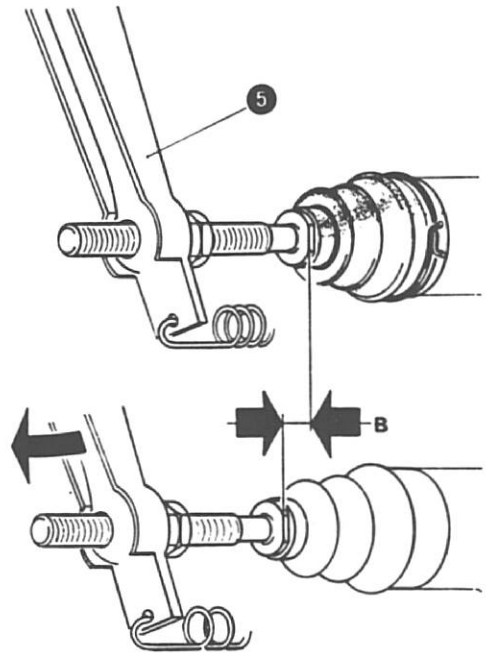
1 Pedal
2 Master cylinder
3 Clutch & brake fluid reservoir
4 Slave cylinder
5 Disengagement lever
6 Diaphragm spring
7 Throwout bearing
8 Adjusting nuts
9 Air bleed screw

Adjustment

Measure with a rule the free travel "B" at the end of push rod of cylinder "4" depressing the clutch pedal until the throwout bearing "7" contacts the spring "6"; the travel "B" should be about .08-.10" (2-2.5 mm).

If the travel is shorter, act on the adjusting nut "8".

At the same time make sure that, by pressing the pedal as far as it will go, the push rod can move through a total travel of .53 - .56" (13.5-14.2 mm). If any component of the system has been removed, thoroughly bleed the circuit. To check as specified use special tool no. C.6.0146 (see Tool Bulletin no. 135).



Inspection specifications

Wear limit of driven plate thickness	6.5 mm
Squareness of driven plate as mounted on gearbox output shaft	0.50 mm

TRANSMISSION

Transmission ratios	1st gear	3.30 : 1
	2nd gear	1.99 : 1
	3rd gear	1.35 : 1
	4th gear	1.00 : 1
	5th gear	.79 : 1
	Rev.	3.01 : 1
Maximum eccentricity of main shaft		.050 mm (.020")
End play between forks and sleeves	assembly	.150 to .340 mm (.006 to .013")
	wear limit	.850 mm (.033")
Calibration of striking rod ball spring (1st, 2nd, 3rd, 4th, 5th & Rev.)	free length	35.8 mm (1.41")
	length under test load	17.2 mm (.69")
	test load	7.680 to 8.320 mm (16.97 to 18.3 lbs)
Maximum end play of mainshaft gears	1st speed gear	.170 to .245 mm (.0067 to .0096")
	2nd & 3rd speed gears	.130 to .205 mm (.0052 to .0081")
	5th speed gear & Rev.	.160 to .220 mm (.0063 to .0087")
Radial clearance between gear bushings and mainshaft	1st speed gear	.125 to .170 mm (.0049 to .0067")
	2nd & 3rd speed gears	.095 to .140 mm (.0038 to .0055")
	5th speed gear	.065 to .107 mm (.0026 to .0041")
Distance between outer planes of the engaging teeth of 3rd and 4th gears		42.000 to 42.200 mm (1.65 to 1.66")
Distance, in neutral, of the rear band (drive shaft side) of 5th speed sleeve from the r e a r edge of gear engaging teeth		12.9 mm (.508")

REAR AXLE AND SUPPLEMENTS

Transmission-axle overall ratios-with 41 : 9 final drive	1st gear	15.049 : 1
	2nd gear	9.055 : 1
	3rd gear	6.172 : 1
	4th gear	4.555 : 1
	5th gear	3.603 : 1
	Rev. . .	13.710 : 1

Maximum eccentricity of axle shafts	.10 mm (.004")
Play between teeth of planetary gears	.05 mm (.002")
Play between teeth of final drive	.05 to .10 mm (.002 to .004")
Reference dimension on tool C.6.0101 for pinion-to-ring gear fitting . .	70 ± .0025 mm (2.7559 ± .0001")
Maximum end play between T-arm and attachment to body	1 mm (.04")
Pre-load on pinion bearing	11.5 to 15.5 Kgcm (10 to 13.5 in. lbs)
Total pre-load on final drive bearings	16.5 to 24.5 Kgcm (14.4 to 21.3 in. lbs)

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

	BIANCHI	
	Extension	Compression
High speed	135 to 190 Kgs (298 to 418 lbs)	50 to 80 Kgs (111 to 176 lbs)
Low speed	19 to 55 Kgs (42 to 121 lbs)	9 to 22 Kgs (20 to 48 lbs)

Checking of suspension springs

Free length	467 mm (18.4")
Length under test load	252 mm (10")
Test load	349 to 371 Kgs (770 to 815 lbs)

FRONT SUSPENSION

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:

1) Screw in the castellated nut and lock it to a torque of 2.5 Kgm (18 ft-lbs) while at the same time revolving the wheel hub to set the bearings properly in their seats;
2) Unscrew the nut half a turn or more;
3) Lightly tap on the stub axle end with a mallet in order to return the outboard bearing in its proper position even in the case a slight interference between bearing cone and stub axle exists;
4) Lock the nut in place to 1.5 Kgm (10.8 ft-lbs);
5) Unscrew the nut of a quarter turn;
6) If the hole in the axle is aligned with a slot in the castellated nut insert the cotter pin; if not, screw in the nut by the minumum angle needed to line up the hole and the next slot;
7) Again tap lightly on stub axle end to restore the same condition as under step 3;
8) The end play so obtained on stub axle should fall between .02 - .12 mm (.0008 - .0047").

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 (.04")

Note - Ball joints require no regular lubrication being provided with special grease seals which retain the grease packed in by factory on assembly - Only if strictly needed (joints squealing) grease with SHELL Retinax A or AGIP F.1 Grease 30 (See I.S. 1.05.097/1).

Checking of suspension springs

	R.H. side	L.H. side
Free length	345 mm (13.6")	355 mm (14")
Length under test load	214 mm (7.9")	214 mm (7.9")
Test load	902 to 958 Kgs (1986 to 2110 lbs)	970 to 1030 Kgs (2138 to 2271 lbs)

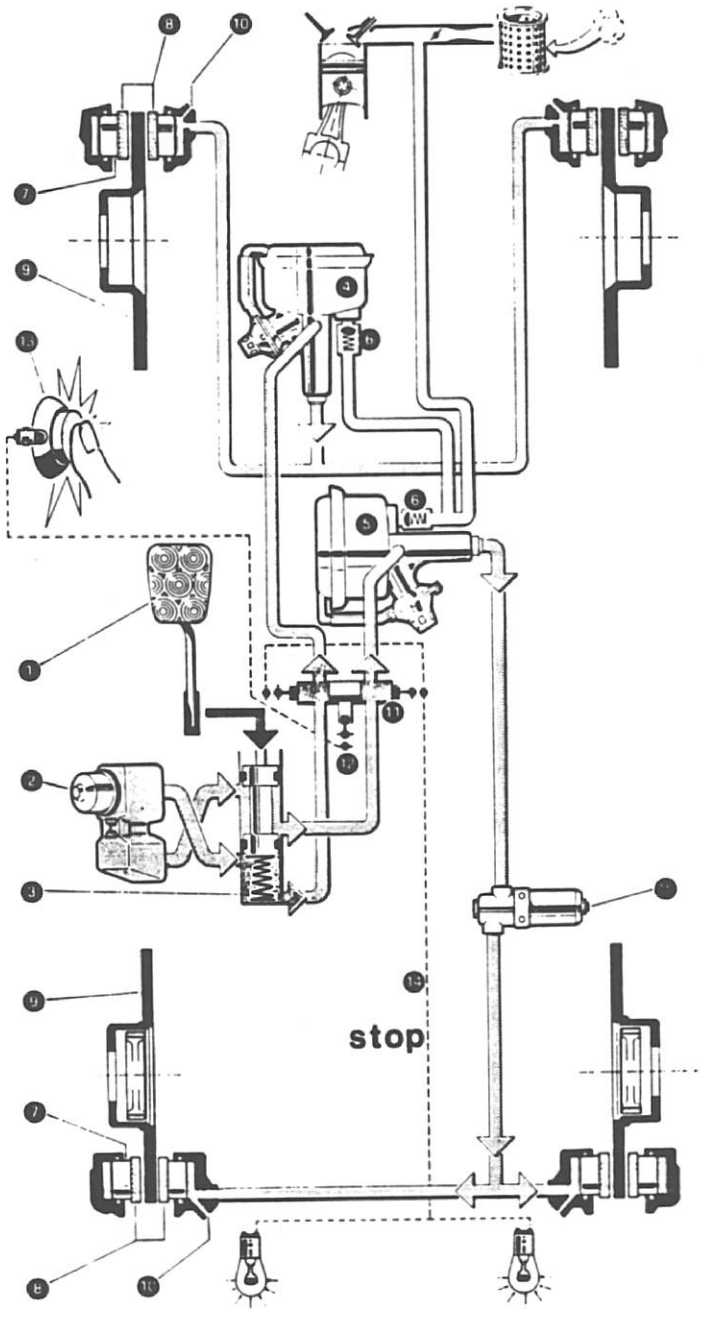
Checking of shock absorbers on test bench

Calibration data (when cold)

	ALLINQUANT	
	Extension	Compression
High speed	150 to 190 Kgs (331 to 418 lbs)	55 to 80 Kgs (121 to 176 lbs)
Low speed	25 to 55 Kgs (56 to 121 lbs)	9 to 22 Kgs (20 to 48 lbs)

BRAKES

The brake system consists of four disc brakes operated by a dual hydraylic system.
Each one of the separate circuits, front and rear, is servo assisted by a vacuum booster. The boosters are 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 modulating valve, inserted in the rear brake circuit, regulates the pressure between front and rear brakes to provide balanced braking action.



1 Brake pedal
2 Fluid reservoir
3 Master cylinder
4 Front brakes booster
5 Rear brakes booster
6 Suction port
7 Plungers
8 Friction Pads
9 Discs
10 Bleed screws
11 Pressure switch cluster
12 Pressure switch for brake warning light
13 Brake warning light
14 Stop light cable
15 Modulating valve

Disc

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 .22 mm (.0086").

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. 0.00.055/3; the grinding of the surfaces is allowed providing not to exceed an under size of 1 mm (.0394"), equalized on both faces, i.e. .5 mm (.0197") each face; disc wear limit: front 11.5 mm (.452") rear 8.5 mm (.335") thick.

Inspection specifications after regrinding of disc surfaces:

- Max. out of parallelism with disc mounting plane: .05 mm (.0020");
- Max. out of flat: .025 mm (.0010") and max. difference in thickness: .038 mm (.0015") as measured along any radial line;
- Max. out of flat: .025 mm (.0010") and max. difference in thickness: .015 mm (.0006") as measured along any circular line;
- The surface should show no sign of scoring or porosity.

The surface roughness should be:

- 20 microinches as measured circularly;
- 36 microinches as measured radially.

Friction pads

	Front	Rear
Thickness when new	15 mm (.590")	
Wear limit	7 mm (.275")	

Calipers

On replacement of disc or caliper, measure the running clearance between caliper and disc on each side; the difference should not exceed .5 mm (.0197")

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

Parking 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)

Note - When reassembling the operating levers, a slight quantity of grease AGIP F1 Gr SM or SHELL Retinax AM is to be applied to the pivot points and rubbing surfaces of levers.

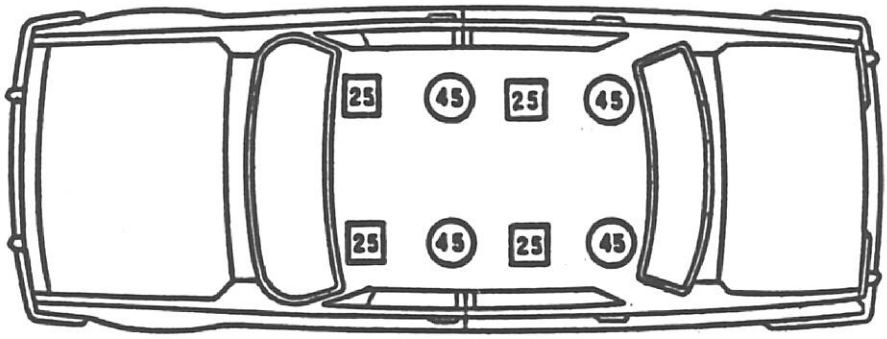
Checking of wheel angles and car "trim" under static load

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 tires inflated as specified.

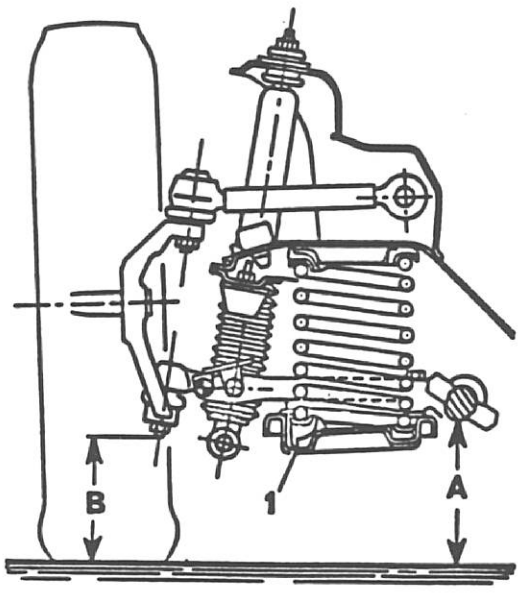
Before checking, slightly move the car up and down so as to settle the suspensions.

Front seats { 1 weight of 45 Kgs on each seat
2 weights of 25 Kgs on flooring where feet rest

Rear seats { 2 weights of 45 Kgs on seat
2 weights of 25 Kgs on flooring where feet rest



Distance of lower arms of front suspension from a reference level



$A - B = 34 \pm 5$ mm ($1.34 \pm .20$")

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

To adjust add shims in "1".

Shims are available in the following thicknesses:
3.5 mm (.14") - 7 mm (.28") - 10.5 mm (.42")

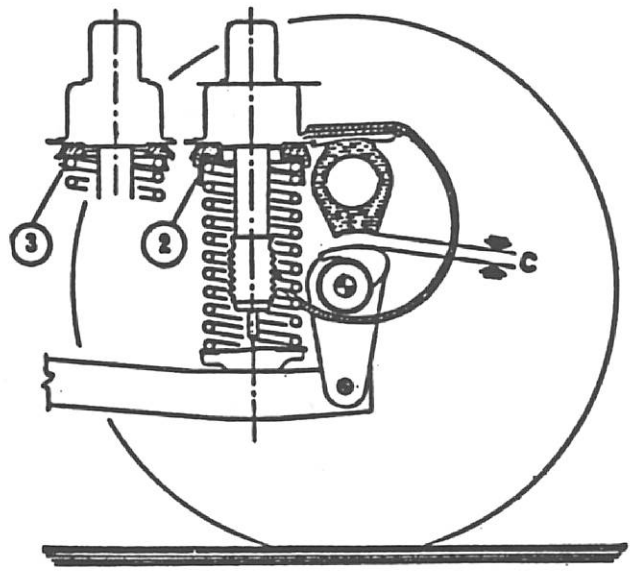
Distance of rear axle from rubber buffers

C = 36 ± 5 mm (1.42 ± .20")

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

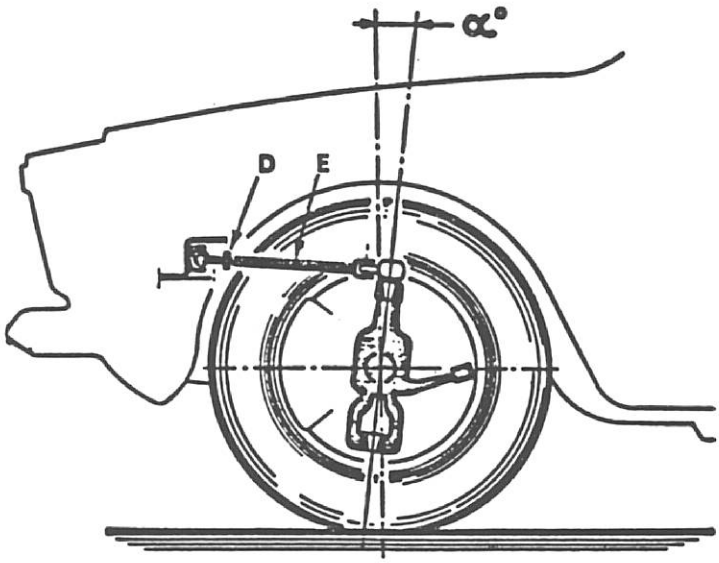
Shims are available in the following ticknesses:

6.5 mm (.26")
11.5 mm (.45")
16.5 mm (.65")
21.5 mm (.85")



In the conditions 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'.

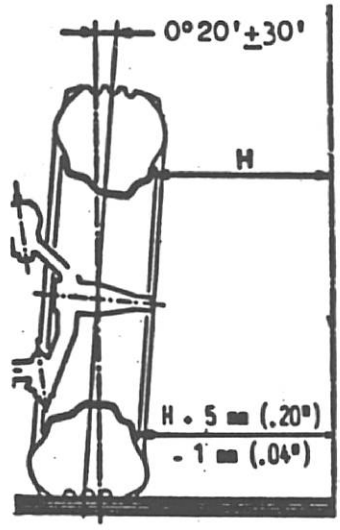
To adjust, loosen jam nut "D" and rotate rod "E".

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

The caster angle should be checked under static load and alignment conditions as specified and with shock absorbers disconnected at an end.

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

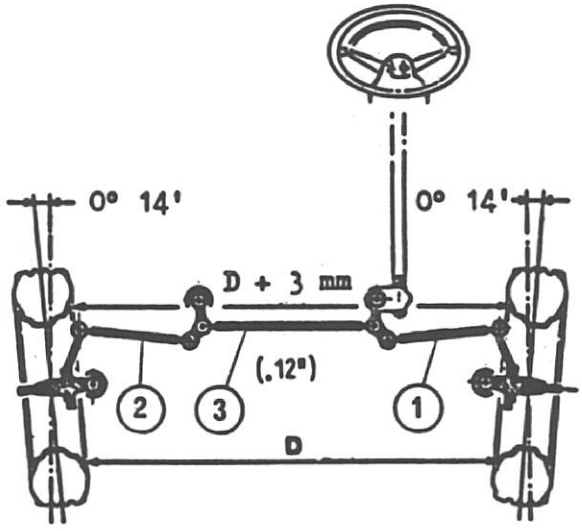


Difference in camber angle between R.H. and L.H. wheel - 0° 40'

N o t e - Not adjustable. Check the chassis and suspension arms if necessary.

FRONT WHEEL TOE-IN

Lock steering wheel in the central position i.e. with the spokes symmetrically disposed in relation to the vertical. Starting with the rod "1" on the steering box side, place the corresponding wheel so that the toe-in is .06" (1.5 mm). Measure the length thus obtained of the rod and adjust the rod "2" on the other side to a length .20" (5 mm) shorter. Bring the first wheel to a .06" toe-in by adjusting the center track rod "3".



Rod length:

side	264 to 280 mm (10.4 to 11")
track	530 to 550 mm (20.86 to 21.65")

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.

"1750 GT Veloce and 1750 Spider Veloce" VARIANTS

PRINCIPAL CHARACTERISTIC DATA

Number of cylinders		4
Bore		80 mm. (3.15")
Stroke		88.5 mm. (3.48")
Total cylinder displacement		1779 cc
Max. power at 5,500 giri/min.		SAE 132 HP
Front track		1324 mm. (52.1")
Rear track		1274 mm. (50.1")
Wheel base	GT Veloce	2350 mm. (92.7")
	Spider Veloce	2250 mm. (88.6")
Min. turning circle	GT Veloce	10700 mm. (420.1")
	Spider Veloce	10500 mm. (413.4")
Overall length	GT Veloce	4080 mm. (161")
	Spider Veloce	4250 mm. (167.3")
Overall width	GT Veloce	1580 mm. (62.2")
	Spider Veloce	1630 mm. (64.2")
Overall height (unladen)	GT veloce	1315 mm. (51.8")
	Spider Veloce (with top)	1290 mm. (50.8")
Curb weight (full tank)		1040 Kg. (2293 lbs)
Number of seats	GT Veloce	2
	Spider Veloce	2
Tires 165 x 14		PIRELLI cinturato HR KLEBER COLOMBES V 10 GT MICHELIN X A S

PERFORMANCE

With 41 : 9 final drive

Gear	After breaking in mph
1st	29
2nd	48
3rd	71
4th	99
5th	118
Rev.	32

Tires

Recommended tire pressure (cold) in psi
at a maximum-loaded vehicle weight of 3000 lbs GT Veloce and 2760 lbs Spider Veloce

Make	Front	Rear
Pirelli	24	26
Michelin	20	24
Kleber Colombes	24	26

Electrical equipment

	BOSCH	
	1750 GT Veloce	1750 Spider Veloce
Two-speed windshield wiper	WS 4903 AR 2 A (0)	WS 4904 AR 2 A (0)

Bulb's wattage

1750 GT Veloce

Headlights	sealed beam
Fog lamps	sealed beam
Tail lights - parking & stop	5/21
Front direction indicators and road hazard flashers	21
Tail direction indicators and road hazard flashers	21
Back-up light	21
Front parking lights	5 globular
License plate light	5 globular
Engine compartment light	5 cylindrical
Courtesy light	5 cylindrical
Side marker lights	4 tubular
Lighting on instruments	3 tubular
Blower warning light	3 tubular
Alternator warning light	3 tubular
Fuel reserve warning light	3 tubular
Low oil pressure warning light	3 tubular
Direction indicators and road hazard flashers warning light	1.2 tubular
Parking light warning	1.2 tubular
High beam warning light	1.2 tubular
Low fuel pressure warning light	1.2 tubular
Service brake warning light	1.2 tubular

1750 Spider Veloce

Headlights	sealed beam
Tail lights - parking & stop	5/21
Front direction indicators and road hazard flashers	21
Tail direction indicators and road hazard flashers	21
Back-up light	21
Front parking light	5 globular
Side marker lights	4 tubular
License plate light	5 globular
Engine compartment light	5 cylindrical
Courtesy light (in rearview mirror)	5 cylindrical
Glove box light	5 cylindrical
Ash tray light	3 cylindrical
Lighting on instruments	3 tubular
Alternator warning light	3 tubular
Blower warning light	3 tubular
Fuel reserve warning light	3 tubular
Direction indicators and road hazard flashers warning light	1.2 tubular
Low oil pressure warning light	1.2 tubular
Parking light warning	1.2 tubular
High beam warning light	1.2 tubular
Low fuel pressure warning light	1.2 tubular
Service brake warning light	1.2 tubular

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

	BIANCHI	
	Extension	Compression
High speed	135 to 190 Kgs (298 to 418 lbs)	50 to 80 Kgs (111 to 176 lbs)
Low speed	19 to 55 Kgs (42 to 121 lbs)	9 to 22 Kgs (20 to 48 lbs)

Checking of suspension springs

	1750 GT Veloce	1750 Spider Veloce
Free length	437 mm (17.2")	429 mm (16.9")
Length under test load	252 mm (10")	252 mm (10")
Test load	268.7 to 285.3 Kgs (592.5 to 645 lbs)	257 to 273 Kgs (566 to 600 lbs)
Colored marks	Blue-Blue Blue - White	White-White White - Blue

FRONT SUSPENSION

Checking of shock absorbers on test bench

Calibration data (when cold)

	ALLINQUANT	
	Extension	Compression
High speed	150 to 190 Kgs (330 to 420 lbs)	55 to 80 Kgs (121 to 175 lbs)
Low speed	25 to 55 Kgs (55 to 121 lbs)	9 to 22 Kgs (20 to 48 lbs)

Checking of suspension springs

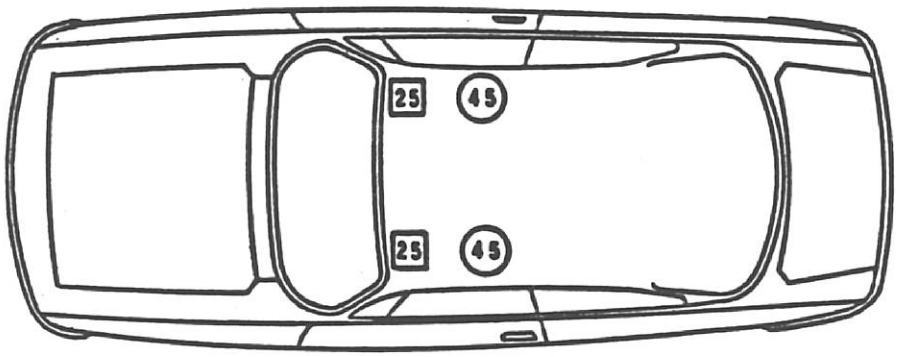
	1750 GT Veloce	1750 Spider Veloce
Free length	313.5 mm (12.3")	317 mm (12.5")
Length under test load	200 mm (7.8")	200 mm (7.8")
Test load	858 to 911.5 Kgs (1988 to 2005 lbs)	820.6 to 871.4 Kgs (1809.4 to 1920.5 lbs)
Colored marks	White-White White - Blue	White - Blue Blue-Blue

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 tires inflated as specified.

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

Static load { 2 weights of 45 Kgs (100 lbs) on front seats
2 weights of 25 Kgs (55 lbs) on flooring where feet rest



Distance of lower arms of front suspension from a reference level

GT Veloce : A - B = 34 ± 5 mm (1.34 ± .2")
Spider Veloce: A - B = 24 ± 5 mm (.94 ± .2")

See figure on page 22

Distance of rear axle from rubber buffers

GT Veloce : C = 41 ± 5 mm (1.62 ± .2")
Spider Veloce: C = 33 ± 5 mm (1.30 ± .2")

See figure on page 23

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