SPIDER 1300 JUNIOR

Alfa Romeo

technical characteristics and principal inspection specifications

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C O N T E N T S

T E C N I C A L C H A R A C T E R I S T I C S

M A J O R I N S P E C T I O N S P E C I F I C A T I O N S

WHEEL ALIGNMENT

TECHNICAL CHARACTERISTICS

Principal characteristic data

Number of cylinders	4
Bore	74 mm (2.913")
Stroke	75 mm (2.953")
Total cylinder capacity	1290 cc
Max. power at 6,000 rpm	SAE 103 HP
Front track	1324 mm (52.1")
Rear track	1274 mm (50.1")
Wheelbase	2250 mm (88,6")
Min. turning circle	10500 mm (413.4")
Overall length	4250 mm (167.3")
Overall width	1630 mm (64.2")
Overall height (unladen)	1290 mm (50.8")
Dry weight, with tools and jack	990 Kg (2182 lbs)
Number of seats	2
Fuel consumption for 100 Km (CUNA standard)	9.8 lt (28.8 mpg. GB) (24.0 mpg. US)

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

With 41 : 9 final drive

Gear	Max. Speeds					
	Running in				After running in	
	up to 1000 km (600 mi.)		1000 to 3000 km (600 to 1900 mi.)			
	Km/h	mph	Km/h	mph	Km/h	mph
1st	30	18	38	24	44	27
2nd	49	30	62	38	74	46
3rd	72	45	91	56	108	67
4th	98	60	123	76	146	91
5th	114	71	143	92	over 170	105
Rev.	-	-	-	-	48	30

Oil pressures with hot engine:

- min. pressure at idling speed . . . . . .5-1 Kg/cm^2 (7-14 psi)
- min. pressure at top speed . . . . . 3.5 Kg/cm^2 (50 psi)
- max. pressure at top speed . . . . . 4.5-5 Kg/cm^2 (65-70 psi)

Warning: Check that generator warning light goes off as soon the engine exceeds 1,100 rpm.

Tires

Inflation pressures (cold tires)

	Front wheels		Rear wheels	
	Kg/cm²	psi	Kg/cm²	psi
PIRELLI 155 x 15 Cinturato S	1.7 *	24.1	1.8 *	25.6
	1.8 **	25.6	2.1 **	29.8
MICHELIN 155 x 15 X	1.7 *	24.1	1.7 *	24.1
	1.9 **	27.0	1.9 **	27.0

* Inflate to the lower pressure for use with low load and touring riding

** Inflate to the higher pressure for use with full load and sustained high speed

Refillings

			G. B.	U. S.
Water (engine & radiator)		about 7.5 lt	1.65 gals	1.98 gals
Fuel (reserve 7 lt / 1.5 gals G.B. / 1.8 gals U.S.)		about 46 lt	10.1 gals	12.1 gals
Oil	Engine (sump & filter) to max. level *	about 6.0 Kg	5.95 qts	7.1 qts
	Engine (sump & filter) to min. level	about 4.0 Kg	3.95 qts	4.75 qts
	Gearbox	about 1.650 Kg	3.2 pts	3.8 pts
	Differential	about 1.250 Kg	2.5 pts	3.0 pts
	Steering box	about .250 Kg	.5 pt	.6 pt

* This quantity is that needed for regular changing; the total amount of oil in the circuit (sump, filter, passages) is 6.5 Kgs. (6.5 qts G.B.) (7.8 qts U.S.).

Prescribed oils and lubricants

	API - SAE - NLGI Number	Recommended commercial equivalent	
		A G I P	S H E L L
Engine	SAE 20 W/40 API MS	F.1 Supermotoroil Multigrade 20 W/40	• X 100 Multigrade 20 W/40 • Super Motor Oil "100"
Gearbox - Steering box and differential	SAE 90 API EP	F.1 Rotra Hypoid SAE 90	Spirax 90 EP
Propeller shaft universal joints and sliding yoke	NLGI 1	F.1 Grease 15	Retinax G
Front wheel bearings	NLGI 2/3	F.1 Grease 33 FD	Retinax AX
Brake fluid	ATE "Blau H"		

SAE - Society of Automotive Engineers

API - American Petroleum Institute

NLGI - National Lubricating Grease Institute

In countries where the recommended lubricants are not available it is possible to replace them with products of other leading Companies provided that in accordance with the prescribed specifications and grades.

Carburetion

2 Carburettors WEBER 40 DCOE 28

Venturi	28 mm (1.10")
Main jet	112
Main air metering jet	220
Idling jet (axial passage)	50 F11
Idling air metering jet	120
Choke jet	65 F5
Acceleration pump jet	35
Travel of acceleration pump control rod	14 mm (.55")
Delivery of acceleration pump every 20 strokes (for each barrel)	5 ± 1 cc.
Needle valve seat dia.	1.50 mm (.06")
Float weight	26 grs
Distance of fuel level from float chamber flange (with a pressure of 2 mts (6'6") H_2O upstream the needle valve)	29 ± .5 mm (1.12 to 1.16")

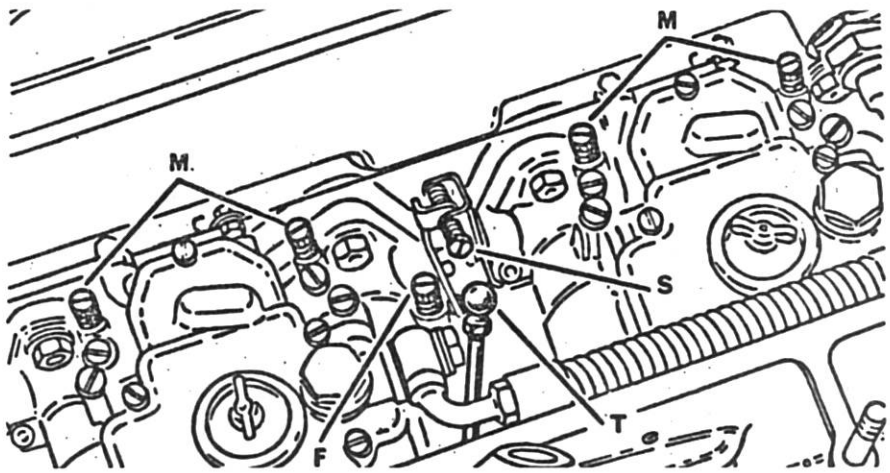
Idling adjustment

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)



PREPARATORY 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

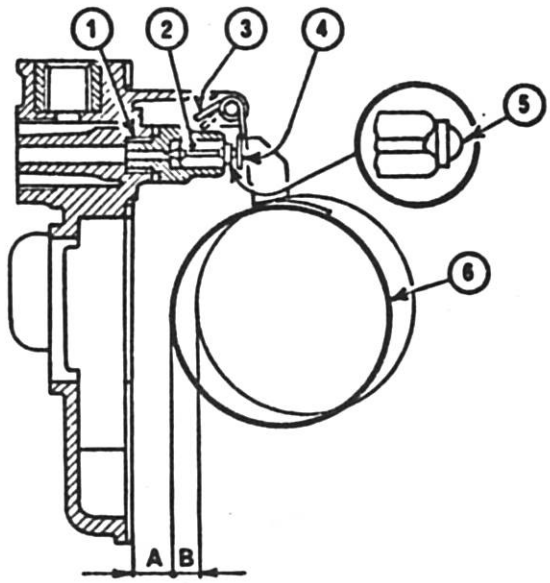
- Detach the control linkage "T" from carburettors.
- Slacken the screw "F" and "S" almost fully.
- Operate the throttles a few times to make sure there is no binding.
- Fully depress the trottle control lever of rear carburettor so that the throttles are fully closed; then screw in the screw "S" until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

IDLING

- Back up the screw "M" of half a turn.
- 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 600 to 700 rpms.

Float level adjustment

WEBER 40 DCOE 28 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.
- With the cover vertical and the float tongue (4) in light contact with the ball, the two floats should be at a distance A = 8.5 mm (.33") 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 (8) of the float is 6.5 mm (.26"); if necessary, adjust the position of float pivot tail (3).
- The adjustment described above will correspond to a fuel level of 29 ± .5 mm (1.12 to 1.16") from the upper face of the float chamber (with a pressure of 2 mts - 6'6" H_2O upstream the needle valve).
- 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.

C A U T I O N - 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.

Valve timing

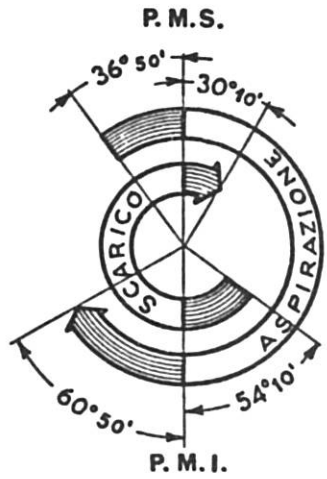
CHECKING OF VALVE OPENING AND CLOSING ANGLES

Clearance (with cold engine) between the unlobed profile of cams 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 of	18° 30' ± 1° 30'
Closing of intake valve	lift of cup	.20 mm (.008")
	corresponding to an angle . . . . . after BDC of	42° 30' ± 1° 30'
Opening of exhaust valve	lift of cup	.15 mm (.006")
	corresponding to an angle . . . . . before BDC of	42° 30' ± 1° 30'
Closing of exhaust valve	lift of cup	.15 mm (.006")
	corresponding to an angle . . . . . after TDC of	18° 30' ± 1° 30'

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

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

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	227° 40'
exhaust stroke	264° 20'



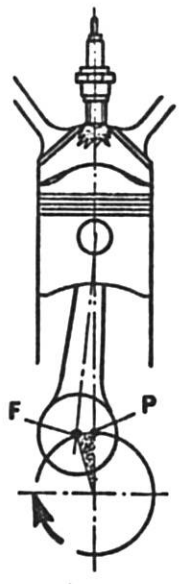
Ignition

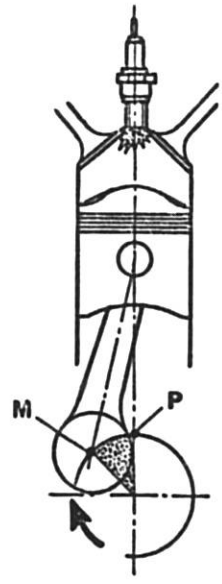
Firing order: 1 - 3 - 4 - 2 (no. 1 cylinder is that at the fan side)

VALUES OF ADVANCE OF IGNITION DISTRIBUTOR

Opening of contact points of ignition distributor S = .35 to .40 mm (.014 to .016)
The distributor is correctly fitted when the oiler is toward the engine.

Fixed advance F Before T D C	Maximum advance M Before T D C
2° / 4°	40° / 43° at 5300 rpm

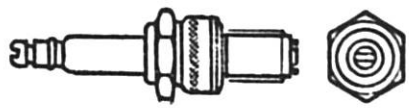




P = T.D.C.
F = Fixed advance
M = Maximum advance

Spark plugs

Lodge 2HL



Electrical equipment

Voltage	12 V
Battery	60 Ah

	BOSCH
Generator	EG (R) 14 V 25 A 29
Voltage regulator	VA 14 V 25 A
Starting motor	EF (R) 12 V 0,7 PS
Coil	TK 12 A 19
Ignition distributor	JF 4
Windshield wiper (2 speed)	WS 13/11 T 3 A

Bulb's wattage

Headlights (high and low beams)	45/50 asymmetric
Tail lights - parking & stop	5/21
Front lights - direction indicators	21
Tail lights - direction indicators	21
Back-up light	21
Front parking lights	5 globular
License plate light	5 globular
Engine compartment light	5 cylindrical
Courtesy light (rearview mirror)	5 cylindrical
Side lights - direction indicators	4 tubular
Instrument panel light	3 tubular
Tell-tale for fuel reserve	3 tubular
Tell-tale for generator	3 tubular
Tell-tale for blower	3 tubular
Tell-tale for high beams	1.2 tubular
Tell-tale for parking lights	1.2 tubular
Tell-tale for direction indicators	1.2 tubular

Tightening torque specifications

ENGINE - GEARBOX UNIT			Kgm.	lb. ft	Manner of tightening
Cylinder head nuts *	Inspection	when cold	6.2 to 6.4	45 to 46	Slacken in proper sequence, the nuts by one and one half turn and lubetorque
		when hot	6.6 to 6.7	47.7 to 48.5	Warm up the engine and when hot retighten without unscrewing
	After repairing	when cold	6.2 to 6.4	45 to 46	Retighten with lube
		when hot	6.6 to 6.7	47.7 to 48.5	Warm up the engine by actually driving the car and when hot retighten without unscrewing
		when cold	6.2 to 6.4	45 to 46	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			3.4 to 3.6	24.5 to 26.4	" "
Nuts of main bearing caps			3.2 to 3.5	23.5 to 25.3	" "
Screws of flywheel on crankshaft			4.2 to 4.5	30.4 to 32.5	" "
Nut of generator pulley			3 to 3.5	21.7 to 25.3	dry
Oil drain plug			7 to 8	51 to 57	"
Nut of gearbox main shaft yoke			12	86.8	"
Nut of gearbox layshaft			5	36.1	"
Nut of gearbox half-casing			1.8	13	"
Bolts joing gearbox output shaft yoke to prop. shaft yoke			4 to 4.5	29 to 32.5	"
Nut of gearbox inner swivel			3.25 to 3.65	23.6 to 26.4	"
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 radius rods to body			10 to 11.5	72.4 to 83	"
Nuts securing radius rods to rear axle tubes			11.5 to 13	83 to 94	"
Nut securing reaction triangle to body			4.8 to 5.5	34.8 to 39.7	"
Nut securing reaction triangle to rear axle			11 to 15	79.6 to 108.5	"
Screws securing rear brake caliper to support (ATE brakes)			5.5 to 6.5	39.7 to 47.0	"
Nuts securing wheels			6 to 8	43.4 to 57.8	"
Bolts joining differential yoke to prop. shaft yoke			3.5 to 4	25.3 to 28.9	"
Nuts securing rear axle tubes to differential carrier			2.4	17.4	"

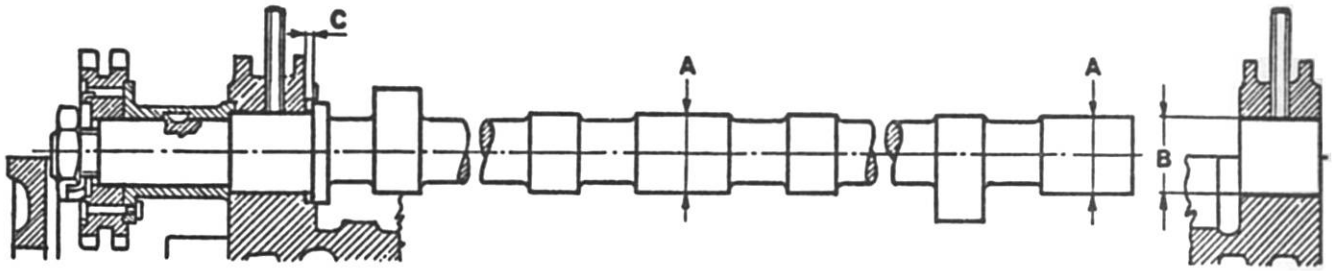
* Warning: in case of any repair work involving the removal of cylinder head, the gasket must be renewed at all times.

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 upper wishbone front arm to body	2.3 to 2.8	16.7 to 20.2	"
Nut securing upper wishbone front arm to rear arm	4 to 4.5	29 to 32.5	"
Nut securing upper wishbone rear arm to body	12.5 to 14	83 to 94	"
Nuts securing lower wishbone shaft to cross-member (To tighten these nuts use tool A.5.0161 and torque to 5.2 to 5.5 (37.6 to 39.7)	5.6 to 5.9	94 to 130	"
Nuts securing steering arm to steering knuckle	4 to 4.5	29 to 32.5	"
Nut securing upper wishbone rear arm to steering knuckle	7.5 to 8.5	54.3 to 61.4	"
Nut securing lower ball joint to wishbone	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	"

MAJOR INSPECTION SPECIFICATIONS

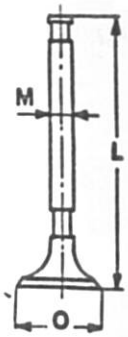
Camshafts

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")
Radial 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")

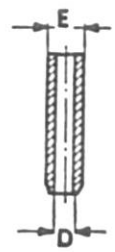


Valves and valve guides

		Intake	Exhaust (sodium cooled)	
		LIVIA H	LIVIA C	A T E
Valves	poppet dia. . . . . O	37.000 to 37.150 mm (1.4657 to 1.4625")	34.000 to 34.150 mm (1.3386 to 1.3838")	34.000 to 34.150 mm (1.3386 to 1.3838")
	stem dia. . . . . M	8.972 to 8.987 mm (.3532 to .3538")	8.935 to 8.960 mm (.3518 to .3527")	8.935 to 8.960 mm (.3518 to .3527")
	total length . . . L	109 to 109.3 mm (4.2913 to 4.3131")	108.6 to 108.9 mm (4.2758 to 4.2874")	108.5 to 108.6 mm (4.2720 to 4.2758")



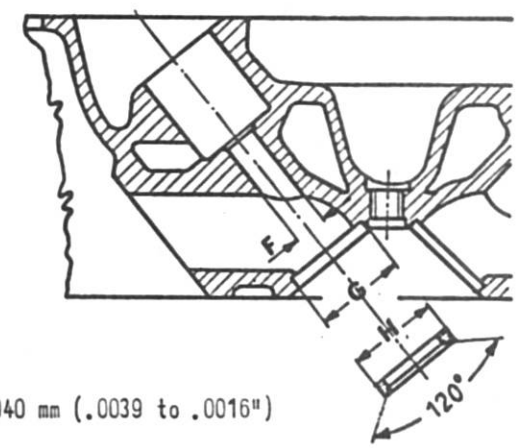
Valve guide	Outside diameter with guide removed . . .	E =	14.033 to 14.044 mm (.5528 to .5529")
	Inside diameter with guide assembled in cylinder head	D =	9.000 to 9.015 mm (.3544 to .3549")
Projection of intake valve guides from their recesses in cylinder head			13.800 to 14.000 mm (.543 to .551")
Projection of exhaust valve guides from their recesses in the 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 .5518")
Interference between seat and valve guide		.015 to .054 mm (.0006 to .0021")

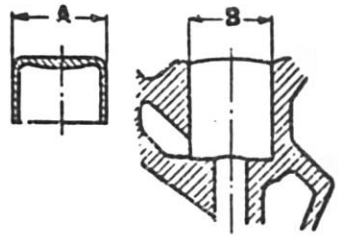
		Intake	Exhaust
Outside diameter of the valve seat . . . H	standard	38.597 to 38.632 mm (1.5196 to 1.5209")	35.422 to 35.457 mm (1.3946 to 1.3960")
	oversized	38.897 to 38.932 mm (1.5314 to 1.5327")	35.722 to 35.757 mm (1.4054 to 1.4077")
Diameter of recess in the cilinder head for valve seat G	standard	38.532 to 38.557 mm (1.5169 to 1.5179")	35.357 to 35.382 mm (1.3920 to 1.3930")
	oversized	38.832 to 38.857 mm (1.5288 to 1.5298")	35.657 to 35.682 mm (1.4038 to 1.4048")



Interference between valve seat and recess in cylinder head .100 to .040 mm (.0039 to .0016")

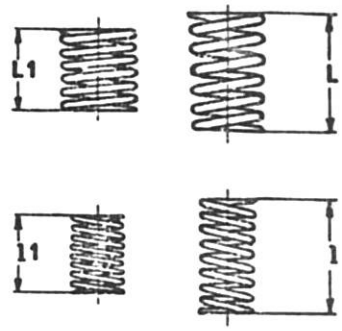
Valve cups

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")	I1 = 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

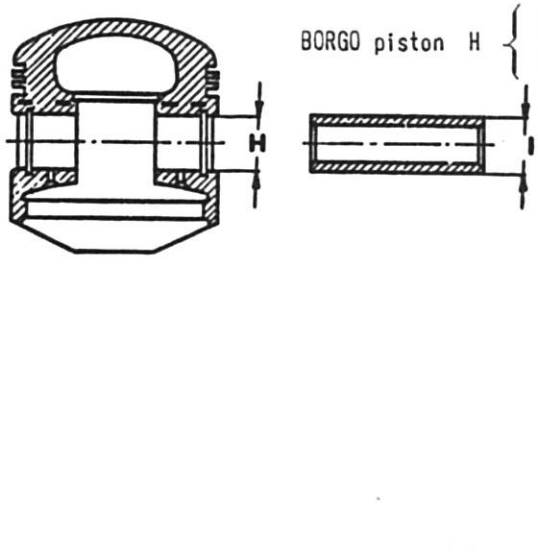
Length between ℄ of big end and ℄ of small end of connecting rod . . D =		132.955 to 133.045 mm (5.239 to 5.242")
Inside diameter of the big end of connecting rod . . . . . E =		48.658 to 48.671 mm (1.9172 to 1.9176")
Inside diameter of bushing in the small end of rod . . . . . C =		20.005 to 20.015 mm (.7882 to .7886")
Thickness of connecting rod bearings F	standard	1.822 to 1.829 mm (.0718 to .0720")
	1st oversize	1.949 to 1.956 mm (.0768 to .0770")
	3rd oversize	2.076 to 2.083 mm (.0817 to .0820")
Radial clearance between crankpins and bearing for big end of connecting rod		.025 to .064 mm (.0010 to .0024")
Maximum out of parallelism between ℄ of big end hole and ℄ of small end hole measured on piston pin overall length		.0317 mm (.0018")

Piston pins

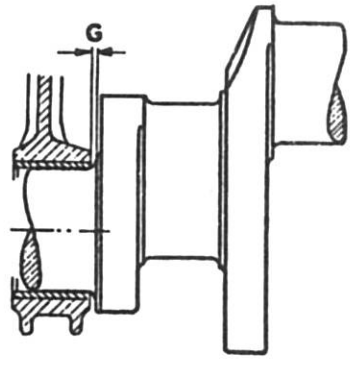
O.D. of pin I	Black color	19.994 to 19.997 mm (.78777 to .78788")
	White color	19.997 to 20.000 mm (.78788 to .78800")
Clearance between piston pin and small end hole	Black color	.008 to .021 mm (.0003 to .0008")
	White color	.005 to .018 mm (.0002 to .0007")

Piston pin holes

BORGO piston H	Black color	20.000 to 20.002 mm (.7874 to .78748")
	White color	20.003 to 20.005 mm (.78752 to .7876")



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

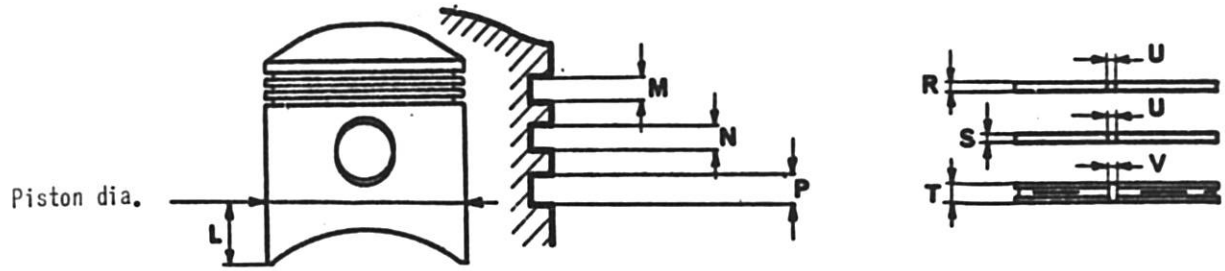


Pistons and piston rings

Diameter of pistons to be measured to square with the hole for piston pin and at a distance of L = 17 mm (.670") from the lower border of skirt.

For cylinder barrel classification purpose, use the minimum diameter recorded.

	Class A (Blue)	Class B (Pink)	Class C (Green)
BORGO piston	73.945 to 73.955 mm (2.9112 to 2.9115")	73.955 to 73.965 mm (2.9115 to 2.9119")	73.965 to 73.975 mm (2.9119 to 2.9123")

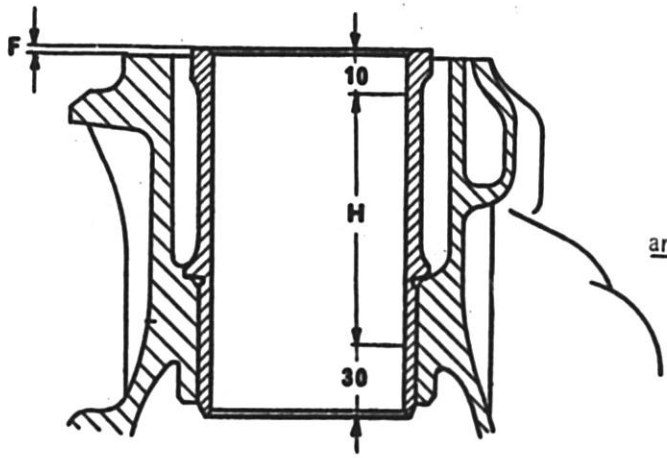


Height of grooves in piston for rings	compression (chromium-plated)	M =	1.535 to 1.556 mm (.0605 to .0613")
	compression (standard)	N =	1.775 to 1.795 mm (.0699 to .0706")
	oil control	P =	4.015 to 4.035 mm (.1581 to .1590")
Thickness of rings	compression (chromium-plated)	R =	1.478 to 1.490 mm (.0582 to .0586")
	compression (standard)	S =	1.728 to 1.740 mm (.0681 to .0685")
	oil control	T =	3.978 to 3.990 mm (.1567 to .1571")
End play of rings in grooves	compression (chromium-plated)		.045 to .077 mm (.0018 to .0030")
	compression (standard)		.035 to .067 mm (.0014 to .0026")
	oil control		.025 to .057 mm (.0010 to .0022")
Gap of compression rings to be inspected in ring gauge or in cylinder barrels		U =	.250 to .400 mm (.0100 to .0157")
Gap of oil scraper rings to be inspected in ring gauge or in cylinder barrels		V =	.200 to .350 mm (.0078 to .0138")

Cylinder barrels

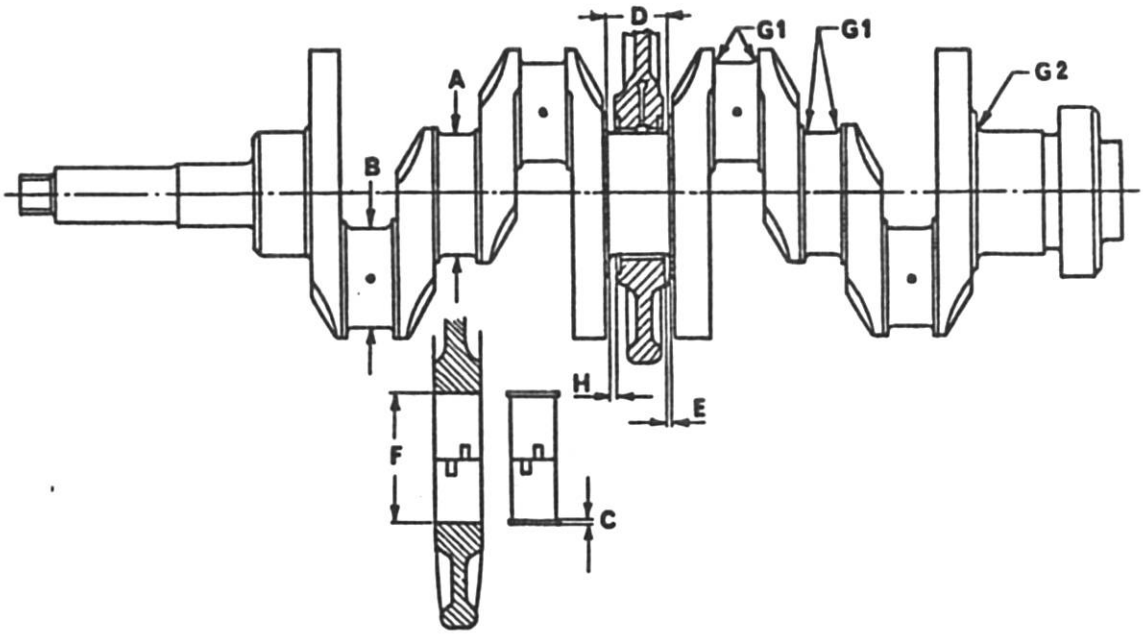
	Blue	Pink	Green
Cylinder barrel diameter	73.985 to 73.994 mm (2.9128 to 2.9131")	73.995 to 74.004 mm (2.9132 to 2.9135")	74.005 to 74.014 mm (2.9136 to 2.9139")

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



Wear limit		.120 mm (.0047")
Elongation and taper of barrels	new	.010 mm (.0004")
	wear limit	.050 mm (.0019")
Projection of barrels from cylinder block	F =	.000 to .060 mm (.0000 to .0024")
Surface roughness		20 - 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	44.963 to 44.975 mm (1.77154 to 1.77201")
	1st undersize	44.709 to 44.721 mm (1.76154 to 1.76200")
	2nd undersize	44.555 to 44.467 mm (1.75133 to 1.75199")
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")
Clearance between journals and main bearings (*)		.014 to .058 mm (.0005 to .0022")

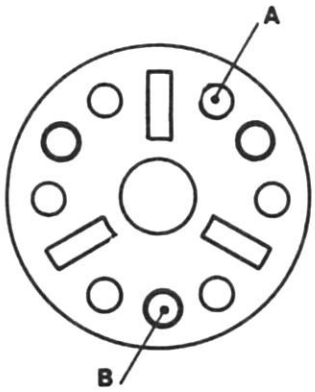
(*) Clearance = main bearing ID - (twice bearing thickness + journal OD)

Fillet radii	main journals and crankpins . . . . . G1 =	1.7 to 2.1 mm (.069 to .082")
	pin on flywheel side . . . . . G2 =	3.7 to 4.1 mm (.146 to .161")

Main journals & crankpins surface roughness	16 microinches
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 between ℄ of the two pairs of crankpins and ℄ of main journals . . .	.300 mm (.0118")

Clutch

Pedal free travel	23 mm (.9")
Distance between thrust ring and the reference sleeve of tool C.6.0104 (red dot)	.75 to 1.25 mm (.029 to .053")
Squareness of the clutch driven plate assembled on gearbox direct drive shaft	.50 mm (.019")
Wear limit of driven plate thickness	6 mm (.236")
Number of springs	9



Rating of spring A	free length	43 to 46 mm (1.69 to 1.81")
	length under test load	29.2 mm (1.150")
	test load	44.5 to 49.5 Kg (98.1 to 109.1 lbs)
Rating of spring B	free length	48.5 to 51.5 mm (1.91 to 2.02")
	length under test load	29.4 mm (1.157")
	test load	50 to 54 Kg (110 to 119 lbs)
Total spring load		432 to 480 Kg (952 to 1058 lbs)
Disengagement load		137 to 163 Kg (305 to 357 lbs)

Gearbox

Transmission ratios	1st gear	3.30 : 1
	2nd gear	1.99 : 1
	3rd gear	1.35 : 1
	4th gear	1 : 1
	5th gear	.86 : 1
	Reverse gear	3.01 : 1
Maximum eccentricity of main shaft		.05 mm (.020")
End play between forks and sleeves	assembly	.15 to .34 mm (.006 to .013")
	wear limit	.85 mm (.033")

		1st - 2nd - 3rd	5th - Rev.
Calibration of spring for striking rod balls	free length	15.2 mm (.600")	30.5 mm (1.2")
	length under test load	10 mm (.390")	20 mm (.78")
	test load	2.88 to 3.12 Kg (6.4 to 6.8 lbs)	4.32 to 4.68 Kg (9.5 to 10.3 lbs)

Maximum end play of the main shaft gears	1st speed gear	.170 to .245 mm (.0067 to .0096")
	2nd & 3rd speed gear	.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 gear	.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 to 42.2 mm (1.65 to 1.66")
Distance, in neutral, of the rear band (propeller shaft side) of 5th speed sleeve from the rear edge of gear engaging teeth		12.9 mm (.508")

REAR AXLE AND SUPPLEMENT

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.	3.918 : 1
Rev. . .	13.710 : 1

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

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	429 mm (16.9")	Colored marks:
Length under test load	252 mm (10")	White - white
Test load	257 to 273 Kg (565 to 600 lbs)	Blue - white

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 nut and lock it to a torque of 2.5 Kgm (18 lb-ft) 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 lb-ft);
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 minimum 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.

Subsquently, 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").

N o t e - 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

Free length	317 mm (12.5")	Colored marks:
Length under test load	200 mm (7.8")	White - Blue
Test load	820.6 to 871.4 Kg (1810 to 1920 lbs)	Blue - Blue

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 (ATE make)

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 undersize of 1 mm (.0394"),equalized on both faces,i.e. .5 mm (.0197") each face;disc wear limit: front 10 mm (.394") 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:

- 26 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.

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)

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.

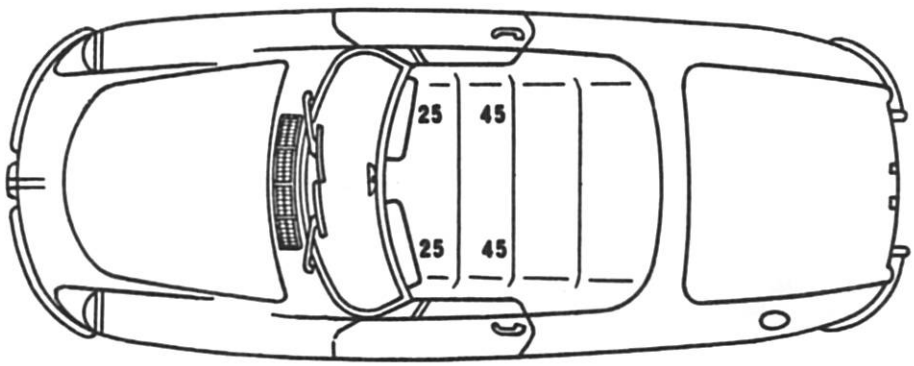
WHEEL ALIGMENT AND CAR "TRIM"

Checking of wheel angles and car trim under static load

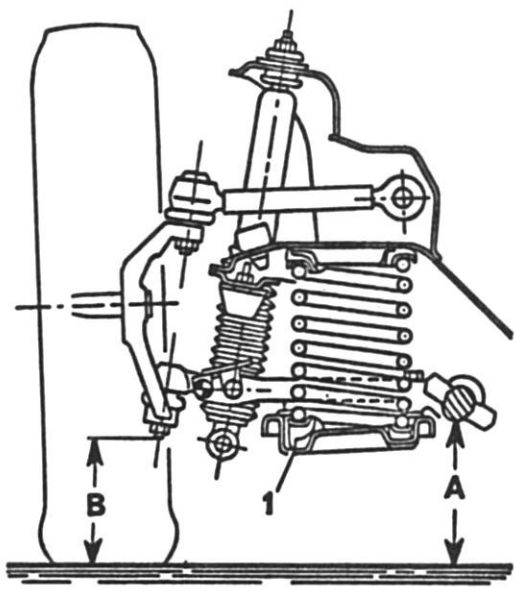
Put the car under static load, with shock absorbers and stabilizer rod disconnected, with full tank or equivalent, with spare wheel, tool kit and the tires inflated as specified.

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 fest rest



Distance of lower wishbone of front suspension from a reference level



A - B = 24 ± 5 mm (.95 ± .2")

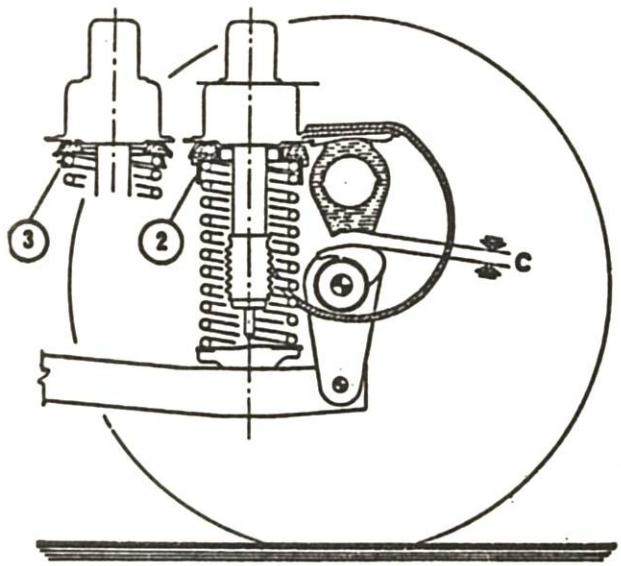
Dimension "A" must be measured in correspondence of the lower line of wishbone shaft as shown.

To adjust, add shims in "1".

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

Distance of rear axle from rubber buffers

C = 33 ± 5 mm (1.30 ± .20")



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

Shims are available in the following tick nesses:

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

In the condition as specified check the wheel angles.

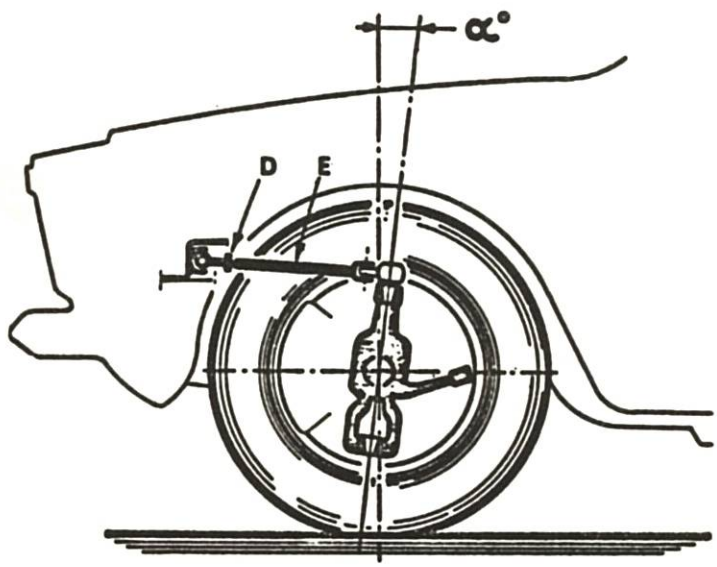
Caster angle: α = 1° 30' ± 30'

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"

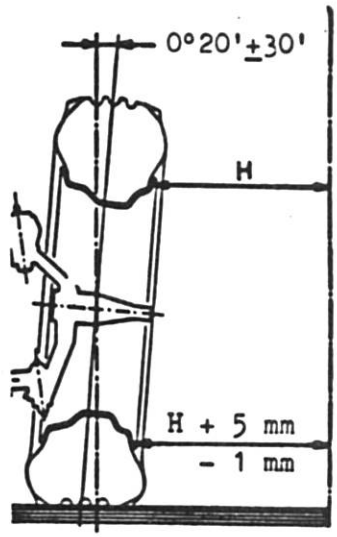
Small adjustments of the caster angle allow to correct slight drift tendency of the car.

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

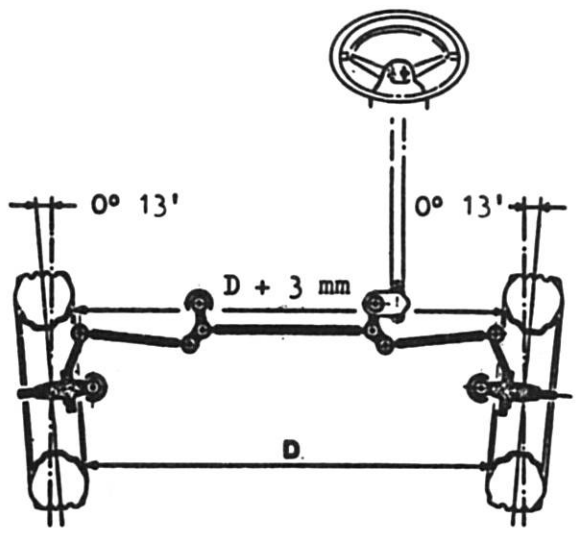
Front wheel camber



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

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

Front wheel toe-in



Rod length:

side	264 to 280 mm (10.4 to 11.0")
track	530 to 550 mm (20.86 to 21.66")

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.

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