

# *GT 1300 Junior*



*Alfa Romeo*

**technical characteristics  
and  
principal inspection specifications**

MODIFICATIONS from chassis no.	{	1.211.001 (L.H.D. cars)
		1.290.251 (R.H.D. cars)

## PRINCIPAL CHARACTERISTIC DATA

Wheel track {	front . . . . .	1324 mm (52.1")
	rear . . . . .	1274 mm (50.1")
Curb weight (full tank) . . . . .		990 Kg (2180 lbs)

## REFILLINGS

Engine (sump & filter) {	to max. level (for regular changing) . . . . .	5.800 Kg (5.75 GB qts) (6.80 US qts)
	to min. level . . . . .	4.000 Kg (3.95 GB qts) (4.75 US qts)
- The total amount of oil in the circuit (sump, filter, passages) is 6.550 Kg (6.5 GB qts) (7.8 US qts)		

## PRESCRIBED OILS AND LUBRICANTS

Brake fluid: ATE "Blau H"

## ELECTRICAL EQUIPMENT

Battery: 60 Ah

Two-speed windshield wiper {	BOSCH WS 13/11 S 1 A
	MARELLI TGE 93 BX

## DRY TIGHTENING TORQUE SPECIFICATIONS

### FRONT FRAME

Nut securing shock absorbers to suspension arms . . . . .	8.2 to 9.2 Kgm (59.3 to 66.5 lb-ft)
Nut securing upper wishbone front arm to rear arm . . . . .	4 to 4.5 Kgm (29 to 32.5 lb-ft)
Nut securing upper wishbone rear arm to body . . . . .	12.5 to 14 Kgm (90.5 to 101.2 lb-ft)
Nuts securing lower arm shaft to cross-member . . . . .	5.6 to 5.9 Kgm (40.5 to 52.6 lb-ft)
Nuts securing steering arm to steering knuckle . . . . .	4 to 4.5 Kgm (29 to 32.5 lb-ft)
Nuts securing splash shields to steering knuckle . . . . .	.8 to 1.1 Kgm (6 to 8 lb-ft)
Nut securing lower ball joint to wishbone . . . . .	8.2 to 9.2 Kgm (59.3 to 66.5 lb-ft)
Nuts securing caliper support to steering knuckle . . . . .	4 to 4.5 Kgm (29 to 32.5 lb-ft)

### ATE BRAKES

Brake bleed screw . . . . .		.2 to .35 Kgm (1.5 to 2.5 lb-ft)
Caliper joining bolts . . . . .		2.9 to 3.4 Kgm (21 to 24.6 lb-ft)
Inlet fitting to caliper {	with gasket . . . . .	.8 to 1.1 Kgm (6 to 8 lb-ft)
	without gasket . . . . .	1 to 1.5 Kgm (7.2 to 10.8 lb-ft)

## VALVES AND VALVE GUIDES

- Sodium-cooled ATE exhaust valves

Diameter of valve poppet . . . . .	O =	34.000 to 34.150 mm (1.3386 to 1.3838")
Diameter of valve stem . . . . .	M =	8.935 to 8.960 mm (.3518 to .3527")
Total length . . . . .	N =	108.5 to 108.6 mm (4.2717 to 4.2756")

## VALVE SPRINGS

(alternative to the existing ones)

	free length	length under test load	test load
Inner spring . . . . .	47 mm (1.85")	26 mm (1.02")	22.2 to 23.1 Kg (48.9 to 51.1 lbs)
Outer spring . . . . .	52 mm (2.05")	27.5 mm (1.08")	35.9 to 37.3 Kg (79 to 82 lbs)

## PISTONS, RINGS AND CYLINDER BARRELS

Diameter of pistons to be measured to square with the hole for piston pin and at a distance of 17 mm (.67") 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
BORG0 piston O.D. (new construction) . . . . .	73.945 to 73.955 mm (2.9112 to 2.9115")	73.955 to 73.965 mm (2.9116 to 2.9119")	73.965 to 73.975 mm (2.9120 to 2.9123")
Cylinder barrel I.D. . . . .	73.985 to 73.994 mm (2.9150 to 2.9153")	73.995 to 74.004 mm (2.9154 to 2.9157")	74.005 to 74.014 mm (2.9158 to 2.9161")

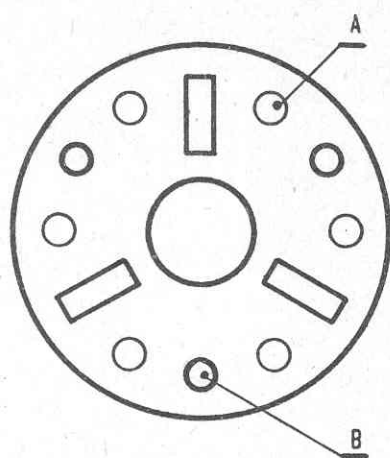
Clearance between cylinder barrel and new-construction BORG0 piston . . . . . .030 to .049 mm (.0012 to .0019")

## COMPRESSION AND OIL CONTROL RINGS

(for new-construction BORG0 pistons)

Height of grooves in piston for	Compression ring . . . . .	1.535 to 1.555 mm (.0605 to .0612")
	Oil scraper ring . . . . .	1.775 to 1.795 mm (.0699 to .0706")
Height of groove in piston for oil control ring . . . . .		4.015 to 4.035 mm (.1581 to .1588")
Thickness of rings	compression . . . . .	1.478 to 1.490 mm (.0582 to .0586")
	oil scraper . . . . .	1.728 to 1.740 mm (.0680 to .0685")
Thickness of oil control ring . . . . .		3.978 to 3.990 mm (.1566 to .1570")
End play of piston ring in groove	Compression ring . . . . .	.045 to .077 mm (.0018 to .0030")
	Oil scraper ring . . . . .	.035 to .067 mm (.0014 to .0026")
	Oil control ring . . . . .	.025 to .057 mm (.0010 to .0022")

CLUTCH



Rating of springs B

{	free length . . . . .	39.5 to 42.5 mm (1.56 to 1.68")
	length under test load .	29.2 mm (1.15")
	test load . . . . .	55 to 61 Kg (121 to 134 lbs)

FRONT SUSPENSION

SHOCK ABSORBERS

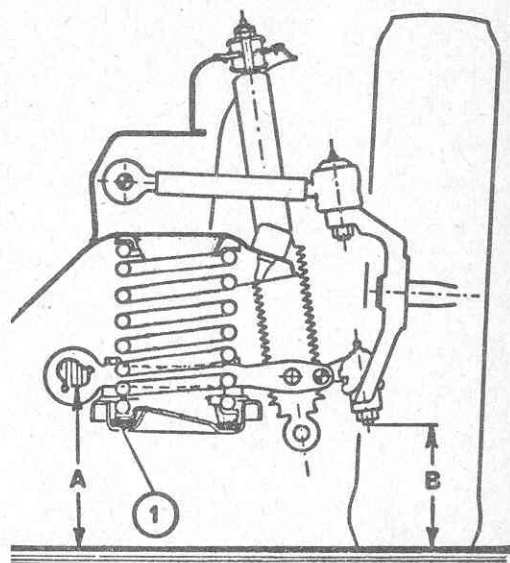
High speed . . . . .

Low speed . . . . .

ALL IN QUANT	
Extension	Compression
150 to 190 Kgs (330 to 520 lbs)	55 to 80 Kgs (121 to 175 lbs)
25 to 55 Kgs (55 to 121 lbs)	9 to 22 Kgs (20 to 48 lbs)

## DISTANCE OF LOWER WISHBONE OF FRONT SUSPENSION FROM A REFERENCE LEVEL

$$A-B = 24 \pm 5 \text{ mm } (.94 \pm .2")$$



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

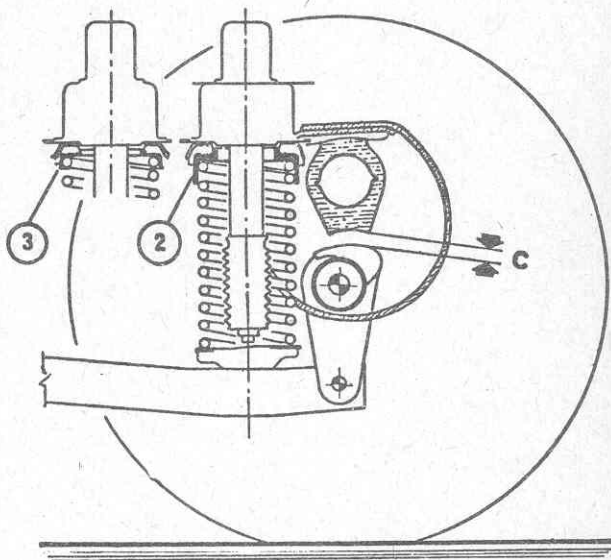
To adjust, add shims in 1.

Shims are available in the following thicknesses:

$$3.5 \text{ mm } (.14") - 7 \text{ mm } (.28") - 10.5 \text{ mm } (.42")$$

## DISTANCE OF REAR AXLE FROM RUBBER BUFFERS

$$C = 41 \pm 5 \text{ mm } (1.62 \pm .2")$$



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

Shims are available in the following thicknesses:

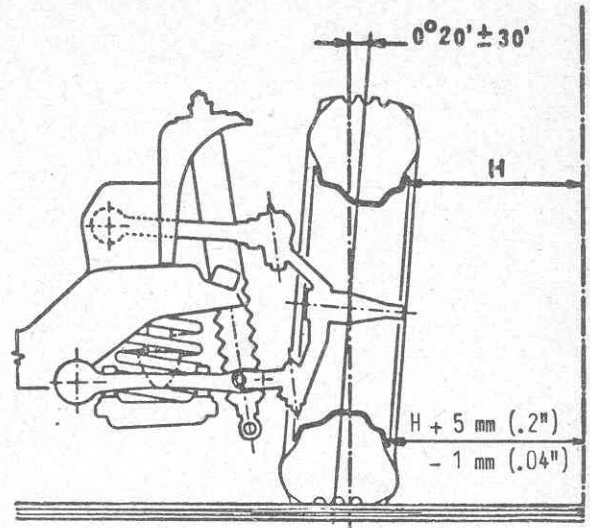
$$6.5 \text{ mm } (.26") - 11.5 (.45") - 16.5 \text{ mm } (.65") - 21.5 \text{ mm } (.85")$$

In the condition as specified check the wheel angles.



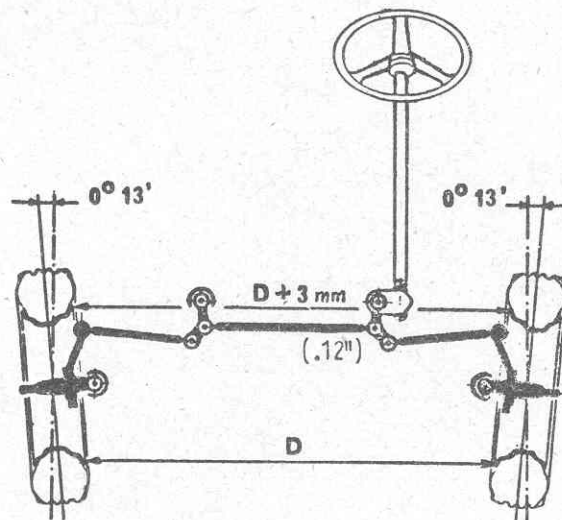
FRONT WHEEL CAMBER

Difference in camber angle between R.H. and L.H. wheel =  $0^{\circ} 40'$



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")
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.

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## C o n t e n t s

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### \*\*\*\*\* TECHNICAL CHARACTERISTICS \*\*\*\*\*

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### \*\*\*\*\* MAJOR INSPECTION SPECIFICATIONS \*\*\*\*\*

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### Wheel alignment

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\*\*\*\*\* 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 CV
Front track . . . . .	1310 mm (4'3")
Rear track . . . . .	1270 mm (4'2")
Wheelbase . . . . .	2350 mm (7'8½")
Min. turning circle . . . . .	10700 mm (35')
Overall length . . . . .	4080 mm (13'4 5/8")
Overall width . . . . .	1580 mm (5'2 1/4")
Overall height (unladen) . . . . .	1315 mm (4'4")
Dry weight, with tools and jack . . . . .	930 kg (2020 lbs)
Number of seats . . . . .	4
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	M a x .   S p e e d s					
	R u n n i n g   i n				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/cm2(7-14 psi)
	min. pressure at top speed: 3.5 Kg/cm2 (50 psi)
	max.pressure at top speed: 4.5-5 Kg/cm2(65-70 psi)

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

## T I R E S

### Inflation pressures (cold tires)

	Front wheels		Rear wheels	
	Kg/cm <sup>2</sup>	psi	Kg/cm <sup>2</sup>	psi
PIRELLI 155 x 15 Cinturato S . . . . .	1.7 *	24.1	1.8 *	25.6
	1.8 **	25.8	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 short bursts to top speed.

\*\* Inflate to the higher pressure for use with full load and top speed (highways).

### R e f i l l i n g s

			G.B.	U.S.
Water (engine & radiator) . . . . .	about	7.5 lt	1.65 gals	1.98 gals
Fuel (reserve 7 lt/1.5 gals GB / 1.8 gals US) . . . . .	about	46 lt	10.1 gals	12.1 gals
Oil . . . . .	Engine (pan & filter) . . . . .	5.0 Kg	4.95 qts	5.95 qts
	to max. level *	about		
	to min. level	about	3.2 qts	3.8 qts
	Gearbox . . . . .	1.650 Kg	3.2 pts	3.8 pts
	Differential . . . . .	1.250 Kg	2.5 pts	3.0 pts
	Steering box . . . . .	.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 5.75 Kgs. (5.7 qts G.B.) (6.8 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	X100 Multigrade 20W/40
Gearbox (for correct use of lubricant refer to footnote 1)	SAE 90 SAE 90 EP	F.1 Rotra SAE 90 F.1 Rotra Hypoid SAE 90	Dentax 90 Spirax 90 EP
Steering box and differential	SAE 90 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	Castrol Girling Brake Fluid Amber		

(\*) For steady temperatures below 0° C (32°F) we advise the use of

AGIP F.1 Supermotoroil Multigrade 10 W/40
SHELL Super Motor Oil

Note 1 - AGIP F.1 Rotra Hypoid or SHELL Spirax should be used exclusively in gearboxes as directed on the red transfer applied on them.

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.

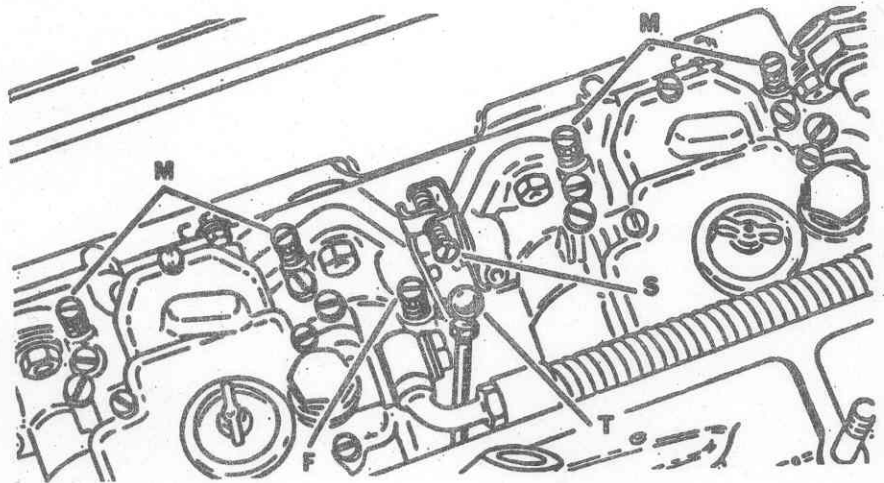
# Carburetion

## 2 Carburetors WEBER 40 DCOE 28

Venturi .....	30 mm (1 3/16")
Main jet .....	112
Main air metering jet .....	220
Idling jet .....	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 <sub>2</sub> O 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 carburetors.
- 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 carburetors and intake manifold for tightness.

### ALIGNING THE THROTTLE VALVES

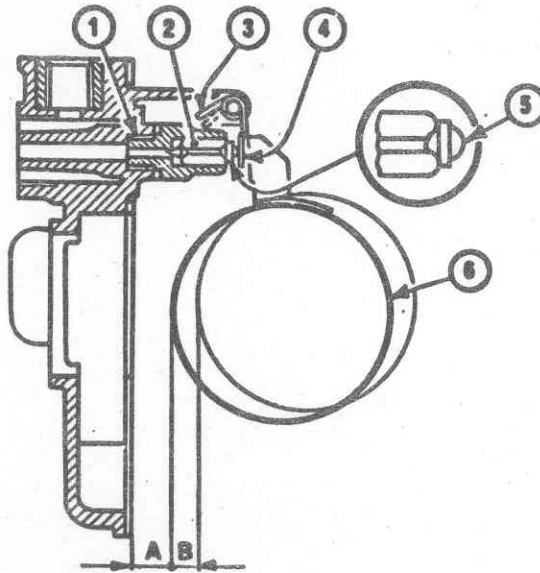
- Detach the control linkage "T" from carburetors.
- Slacken the screws "F" and "S" almost fully.
- Operate the throttles a few times to make sure there is no binding.
- Fully depress the throttle control lever of rear carburetor so that the throttles are fully closed; then screw in the screw "S" until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

## 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  $29 \pm .5$  mm (1.12 to 1.16") from the upper face of the float chamber (with a pressure of 2 mts - 6'6" H<sub>2</sub>O 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:

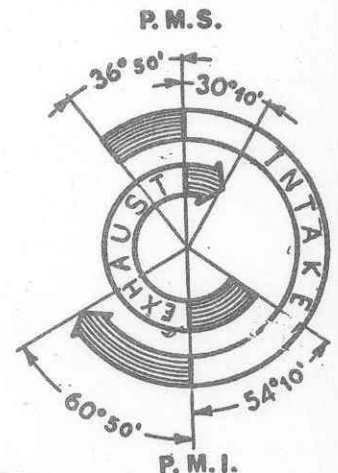
lift of cup . . . . .	.15 mm (.006")
corresponding to an angle . . . . . before BDC of	42°30' ± 1°30'

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

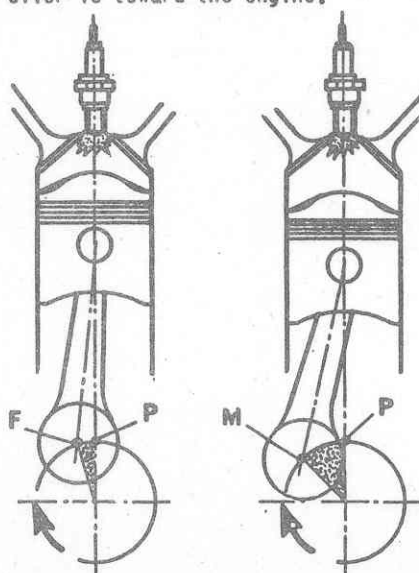
Firing order: 1 - 3 - 4 - 2 (no. 1 cylinder is that at the fan side)

### Values of advance of ignition distributor

Opening of contact points of ignition distributor . . . . . S = .30 to .40 mm (.014 to .016")

The distributor is correctly fitted when the oiler is toward the engine.

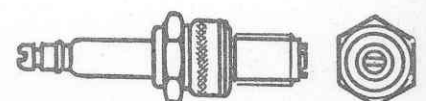
Fixed advance F Before T D C	Maximum Advance M Before T D C
2° / 4°	40° / 43° at 5000 rpm



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

### Spark plugs

Lodge 2HL



## Electrical equipment

Voltage . . . . .	12 V
Battery . . . . .	40 Ah

Generator . . . . .	EG (R) 14 V 25 A 9
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 . . . . .	WS 13/11 T 1a

B O S C H
EG (R) 14 V 25 A 9
VA 14 V 25 A
EF (R) 12 V 0,7 PS
TK 12 A 19
JF 4
WS 13/11 T 1a

### Bulb's wattage

Headlights (high and low beams) . . . . .	45/50 asymmetric
Tail lights - parking & stop . . . . .	5/20
Front lights - direction indicators } . . . . .	20
Tail lights - direction indicators } . . . . .	
Back-up light . . . . .	
Front parking lights } . . . . .	5 globular
License plate light } . . . . .	
Engine compartment light } . . . . .	5 cylindrical
Courtesy light inside the car } . . . . .	
Side lights - direction indicators } . . . . .	3 tabular
Instrument panel light . . . . .	
Tell-tale for fuel reserve . . . . .	
Tell-tale for high beams . . . . .	
Tell-tale for parking lights . . . . .	
Tell-tale for direction indicators . . . . .	
Tell-tale for generator . . . . .	
Tell-tale for blower . . . . .	



# Tightening torque specifications

## ENGINE - GEARBOX UNIT

	Kgm.	lb. ft	Manner of tightening
Nuts of cylinder head { after repairing, when cold . . . . .	6.2 to 6.4	44.8 to 46.3	Slacken and retighten without lube
{ when hot . . . . .	6.6 to 6.7	47.7 to 48.4	Lock without slackening the nut
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	i n o i l
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 generator pulley . . . . .	3 to 3.5	21.7 to 25.3	d r y
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 joining gearbox output shaft yoke to prop. shaft yoke .	4.5 to 5.5	32.6 to 39.7	"
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	d r y
Ringnut securing yoke on final drive pinion shaft . . . . .	8 to 14	58 to 101.2	"
Nuts securing bearing housing to rear 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).	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 prop. shaft yoke . . . . .	3.5 to 4	25.3 to 28.9	"

## FRONT FRAME

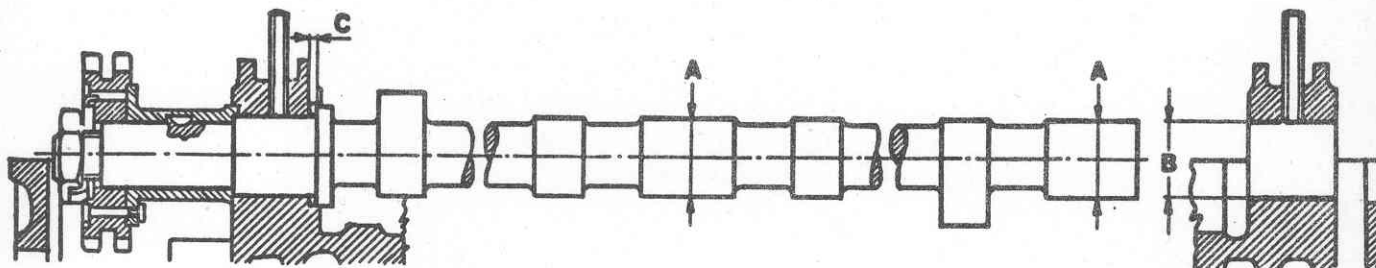
Nut securing steering wheel to column . . . . .	5 to 5.5	36.1 to 39.7	d r y
Screws securing Burman steering box cover . . . . .	2.3 to 2.5	16.7 to 18	"
Screws securing steering box & bellcrank bracket to body .	4.8 to 5.5	34.8 to 39.7	"
Nuts of steering linkage ball joints . . . . .	4.8 to 5.5	34.8 to 39.7	"
Nut securing steering arm to box . . . . .	12.5 to 14	90.5 to 101.2	"
Screws securing upper attachment of shock absorber to body.	2.3 to 2.8	16.7 to 20.2	"
Nut securing shock absorber to suspension arms . . . . .	7.5 to 8.5	54.3 to 61.4	"
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 . . . . .	4.8 to 5.5	34.8 to 39.7	"
Nut securing upper wishbone rear arm to body . . . . .	11.5 to 13	83 to 94	"
Nuts securing lower wishbone shaft to cross-member . . . . .	13 to 18	94 to 130	"
Nuts securing steering arm to steering knuckle . . . . .	4.8 to 5.5	34.8 to 39.7	"
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 . . . . .	7.5 to 8.5	54.3 to 61.4	"
Nut securing lower ball joint to steering knuckle . . . . .	7.5 to 8.5	54.3 to 61.4	"
Nuts securing caliper support to steering knuckle . . . . .	4.8 to 5.5	34.8 to 39.7	"
Screws securing front brake caliper to support (ATE brakes)	7.5 to 8.5	54.3 to 61.4	"
Screws securing front brake discs . . . . .	7.5 to 8.5	54.3 to 61.4	"
Nuts securing wheels . . . . .	6 to 8	43.4 to 57.8	"

## ATE BRAKES

Front brake bleed screw . . . . .	.2 to .35	1.5 to 2.5	d r y
Caliper joining bolts . . . . .	2.9 to 3.4	21 to 24.6	"
Inlet fitting to caliper (without gasket) . . . . .	.8 to 1.1	6 to 8	"

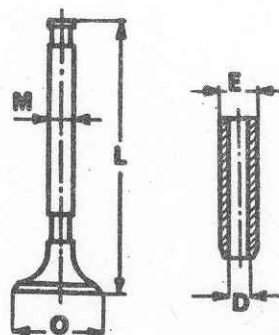
### CAMSHAFTS

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")
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 type)
		LIVIA H	LIVIA C
Valves	poppet dia. Ø	37.000 to 37.150 mm (1.4657 to 1.4625")	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")
	Total length L	109 to 109.3 mm 4.2913 to 4.3131")	108.6 to 108.9 mm (4.2758 to 4.2874")



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 { exhaust	.013 to .043 mm (.0005 to .0031") .040 to .080 mm (.0016 to .0031")

### Valve seats

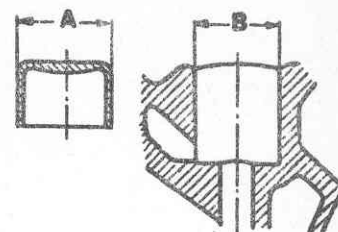
Diameter of valve guide seat in cylinder head . . . . .	F	13.990 to 14.018 mm (.5508 to .5518")
Interference between seat and valve guide . . . . .	E-F	.015 to .054 mm (.0006 to .0021")

		Intake	Exhaust
		standard	oversized
Outside diameter of the valve seat . . . . .	H	38.597 to 38.532 mm (1.5196 to 1.5209")	35.422 to 35.457 mm (1.3946 to 1.3960")
		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	38.532 to 38.557 mm (1.5169 to 1.5179")	35.357 to 35.382 mm (1.3920 to 1.3930")
		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 . . . . .	.H-G	.100 to .040 mm (.0039 to .0016")
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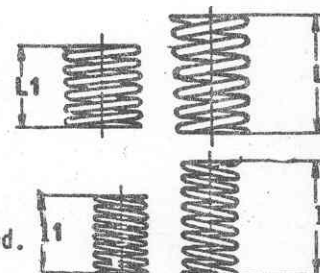
## Valve cups

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 . . . . .	{ 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 . . . . . B-A	.011 to .052 mm (.0005 to .0020")



## Valve springs

	Free length	Length under test load	Test load
Inner spring . . l	red mark 47.3 mm (1.87")	l1 = 26 mm (1.02")	22.2 to 23.1 Kg.
	green mark 46.5 mm (1.83")		48.9 to 51.1 lbs
Outer spring . . L	red mark 52.8 mm (2.08")	L1 = 27.5 mm (1.08")	35.7 to 37.1 Kg.
	green mark 51.3 mm (2.02")		78.6 to 81.8 lbs



**Note** - The RED-mark valve spring should be fitted with the color-marked coil downward.

## Connecting rods

Length between $\Phi$ of big end and $\Phi$ of small end of connecting rod . D	147.955 to 148.045 mm (5.8250 to 5.8285")
Inside diameter of the big end of connecting rod . . . . . E	53.695 to 53.708 mm (2.1140 to 2.1144")
Inside diameter of bushing in the small end of rod . . . . . C	22.005 to 22.015 mm (.8664 to .8667")
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 $\Phi$ of big end hole and $\Phi$ of small end hole measured on piston pin overall length . . . . .	.0317 mm (.0018")

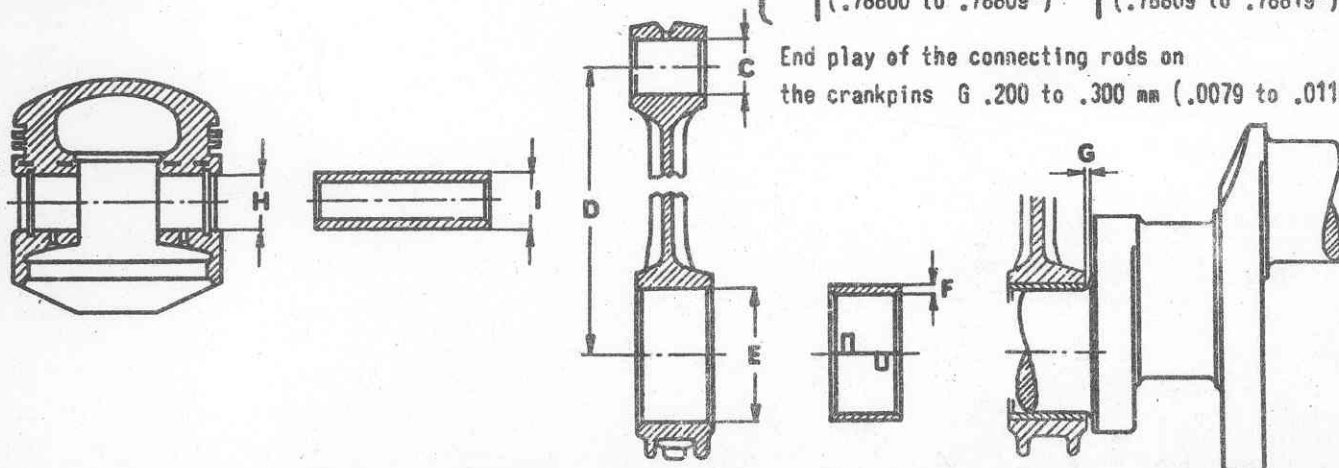
## PISTON PINS

O.D. of pin . . . . . l	{ 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

	Black color	White color
Borgo piston . . . . .	20.000 to 20.002 mm (.7874 to .78748")	20.003 to 20.005 mm (.78752 to .7876")
Mahle piston . . . . . H	19.996 to 19.999 mm (.78784 to .78796")	19.999 to 20.002 mm (.78796 to .78809")
K.S. piston . . . . .	20.000 to 20.0025 mm (.78800 to .78809")	20.0025 to 20.0050 mm (.78809 to .78819")

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

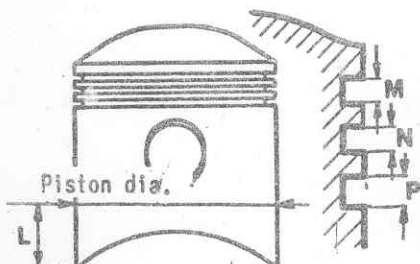


### Pistons and piston rings

Diameter of pistons to be measured to square with the hole for piston pin and at a distance of  $L = 10-12 \text{ mm}$  (.394 - .472) from the lower border of skirt.

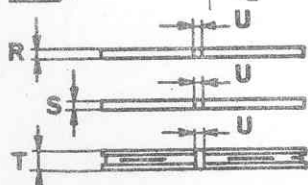
For cylinder barrel classification purpose, use the minimum diameter recorded.

	Class A - BLUE	Class B - PINK	Class C - GREEN
Borgo piston . . . . .	73.930 to 73.940 mm (2.9128 to 2.9132")	73.940 to 73.950 mm (2.9132 to 2.9136")	73.950 to 73.960 mm (2.9136 to 2.9140")
Mahle piston . . . . .	73.925 to 73.935 mm (2.9126 to 2.9130")	73.935 to 73.945 mm (2.9130 to 2.9134")	73.945 to 73.955 mm (2.9134 to 2.9138")
K.S. piston . . . . .	73.925 to 73.935 mm (2.9126 to 2.9130")	73.935 to 73.945 mm (2.9130 to 2.9134")	73.945 to 73.955 mm (2.9134 to 2.9138")



Height of grooves in piston for rings

piston	compression rings M and N	oil control ring P
BORG	2.022 to 2.047 mm (.0797 to .0806")	4.006 to 4.031 mm (.1578 to .1588")
MAHLE	2.025 to 2.040 mm (.0798 to .0803")	4.015 to 4.030 mm (.1582 to .1587")
K. S.	2.022 to 2.047 mm (.0797 to .0806")	4.006 to 4.031 mm (.1578 to .1588")



Thickness  
of rings

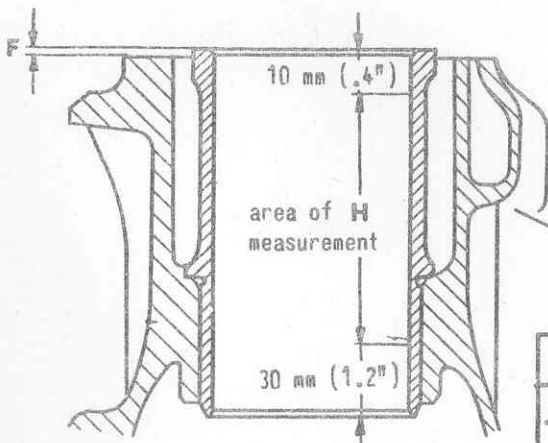
compression (chromium-plated)	R	1.978 to 1.990 mm (.0779 to .0784")
compression (normal)	S	1.978 to 1.990 mm (.0779 to .0784")
oil control	T	3.958 to 3.970 mm (.1559 to .1564")

Gap of rings to be checked in ring gauge or in cylinder barrels . . . . .	U	.25 to .40 mm ( .010 to .015")
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Piston	Compression rings	Oil control rings
NAHLE	.035- to .062 mm (.0014 to .0024")	.045 to .072 mm (.0018 to .0028")
BORG	.032 to .069 mm (.0013 to .0027")	.036 to .073 mm (.0014 to .0028")
K. S.	.032 to .069 mm (.0013 to .0027")	.036 to .073 mm (.0014 to .0028")

End play of rings in grooves

## CYLINDER BARRELS



Cylinder barrel diameter

BLUE	PINK	GREEN
73.985 to 73.994 mm (2.9150 to 2.9153")	73.995 to 74.004 mm (2.9154 to 2.9157")	74.005 to 74.014 mm (2.9158 to 2.9161")

Clearance between cylinder barrel and piston

with Borgo piston	with Mahle piston	with K.S. piston
.045 to .064 mm (.0018 to .0025")	.050 to .069 mm (.0020 to .0027")	

Wear limit ..... .120 mm (.0047")

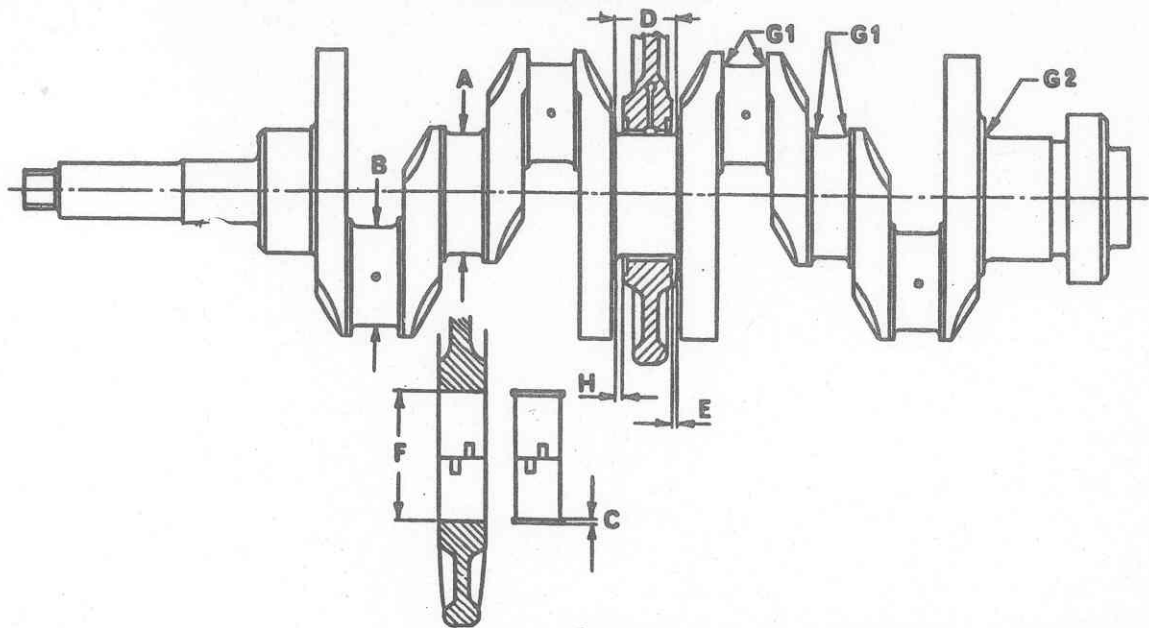
Elongation and taper of barrels	{	new . . . . .	.010 mm (.0004")
		wear limit . . . . .	.050 mm (.0019")

Projection of barrels from cylinder block . . . . .	F	.000 to .060 mm (.0000 to .0024")
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Surface roughness . . . . . 20 - 40 microinches RMS



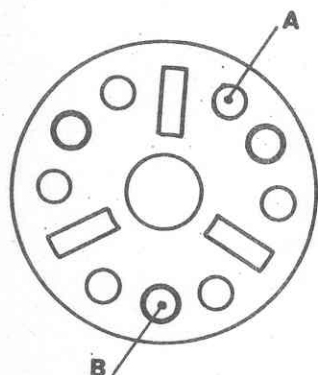
# C R A N K S H A F T



Diameter of main journals A . . . . .	<div> <div>Standard</div> <div>1st undersize</div> <div>2nd undersize</div> </div>	<div> <div>59.960 to 59.973 mm ( 2.3606 to 2.3611")</div> <div>59.706 to 59.719 mm ( 2.3506 to 2.3511")</div> <div>59.452 to 59.465 mm ( 2.3407 to 2.3411")</div> </div>
Diameter of crankpins B . . . . .	<div> <div>Standard</div> <div>1st undersize</div> <div>2nd undersize</div> </div>	<div> <div>44.963 to 44.975 mm (1.77154 to 1.77201")</div> <div>44.709 to 44.721 mm (1.76154 to 1.76200")</div> <div>44.555 to 44.467 mm (1.75133 to 1.75199")</div> </div>
Thickness of main bearings C . . . . .	<div> <div>Standard</div> <div>1st oversize</div> <div>2nd oversize</div> </div>	<div> <div>1.829 to 1.835 mm ( .0720 to .0722" )</div> <div>1.956 to 1.962 mm ( .0770 to .0772" )</div> <div>2.083 to 2.089 mm ( .0820 to .0822" )</div> </div>
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 . . . . .	<div> <div>Standard</div> <div>1st oversize</div> <div>2nd oversize</div> </div>	<div> <div>30.000 to 30.035 mm (1.1811 to 1.1824")</div> <div>30.127 to 30.162 mm (1.1861 to 1.1874")</div> <div>20.254 to 30.289 mm (1.1911 to 1.1924")</div> </div>
Thickness of thrust rings for central journal E	<div> <div>Standard</div> <div>1st oversize</div> <div>2nd oversize</div> </div>	<div> <div>2.311 to 2.362 mm ( .0910 to .0929")</div> <div>2.374 to 2.425 mm ( .0935 to .0954")</div> <div>2.438 to 2.489 mm ( .0960 to .0980")</div> </div>
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	<div> <div>main journals and crankpins G1</div> <div>pin on flywheel side G2</div> </div>	<div> <div>1.7 to 2.1 mm ( .069 to .082" )</div> <div>3.7 to 4.1 mm ( .146 to .161" )</div> </div>
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 $\Phi$ of the two pairs of crankpins and $\Phi$ of main journals .		.300 mm (.0118" )

## C L U T C H

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")



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 springs 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)

## G E A R B O X

Transmission ratios . . . . .	{	1st gear	3.30 : 1
		2nd gear	1.99 : 1
		3rd gear	1.35 : 1
		4th gear	1.00 : 1
		5th gear	.86 : 1
		Reverse gear	3.01 : 1

Maximum eccentricity of main shaft . . . . .	.05 mm (.020")
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End play between forks and sleeves . . . . .	{	assembly . . . . .	.15 to .34 mm (.006 to .013")
		wear limit . . . . .	.85 mm (.033")

	Gear	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")
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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")
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Rear axle and suspension

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 gear 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 preload 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 - ALLINQUANT	
	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 . . . . .	437 mm (17.2")	} Colored marks:  Blue-Blue Blue-White
Length under test load . . . . .	252 mm (10")	
Test load . . . . .	268.7 to 285.3 Kgs (592 to 628 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 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.

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 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 . . . . . 303 mm (11.9")  
Length under test load . . . . . 200 mm (7.8")  
Test load . . . . . 776 to 828 Kg (1720 to 1825 lbs)

} Colored marks:

WHITE -WHITE - SKY BLUE

### CHECKING OF SHOCK ABSORBERS ON TEST BENCH

Calibration data (when cold)

	G I R L I N G		ALLINQUANT	
	Extension	Compression	Extension	Compression
High speed . . . . .	210 to 310 Kgs (463 to 683 lbs)	27 to 52 Kgs (60 to 114 lbs)	150 to 190 Kgs (331 to 418 lbs)	55 to 80 Kgs (121 to 176 lbs)
Low speed . . . . .	30 to 52 Kgs (66 to 114 lbs)	9 to 22 Kgs (20 to 48 lbs)	25 to 55 Kgs (56 to 121 lbs)	9 to 22 Kgs (20 to 48 lbs)

## B R A K E S (ATE make)

### 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 .22mm (.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: 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")	

### C A L I P E R S

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.

### H A N D   B R A K E

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:

A T E   D I S C   B R A K E S   Publication no. 1202.

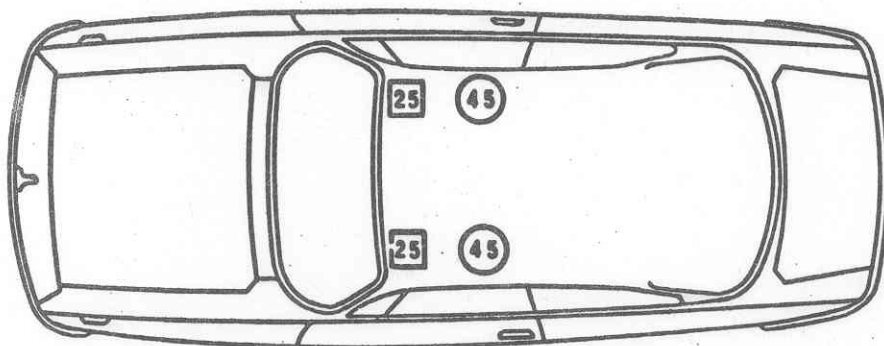
Note - when reassembling the operating levers, a slight quantity of grease AGIP F1 Gr SM or SHELL Retinax AM is to be applied to the pivot points and rubbing surfaces of levers.

## WHEEL ALIGNMENT AND CAR "TRIM"

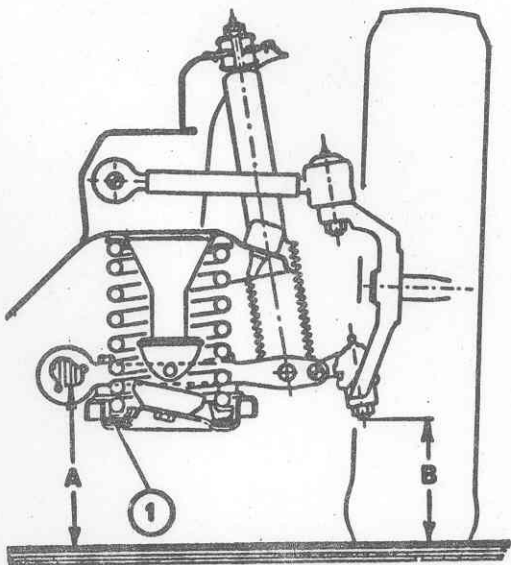
Put the car under static load, with shock absorbers and stabilizer rod connected, with full tank or equivalent, with spare wheel, tool kit and the tires inflated as specified.

Before checking, slightly jolt the car so as to settle the suspensions.

Static load  $\left\{ \begin{array}{l} 2 \text{ weights of } 45 \text{ Kgs (100 lbs) on front seats} \\ 2 \text{ weights of } 25 \text{ Kgs (55 lbs) on flooring} \\ \text{where feet rest} \end{array} \right.$



### DISTANCE OF LOWER WISHBONE OF FRONT SUSPENSION FROM A REFERENCE LEVEL



$$A-B = 34 \pm 3 \text{ mm (1.34} \pm .12\text{")}$$

Note - for suspensions having the upper limiting bumper outside the spring, A-B should be:  $14 \pm 3 \text{ mm (.55} \pm .12\text{")}$

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 :  
 $3.5 \text{ mm (.14")}$  -  $7 \text{ mm (.28")}$  -  $10.5 \text{ mm (.42")}$

## DISTANCE OF REAR AXLE FROM RUBBER BUFFERS

$$C = 15 \pm 5 \text{ mm } (.59 \pm 2")$$

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

Shims are available in the following thicknesses:

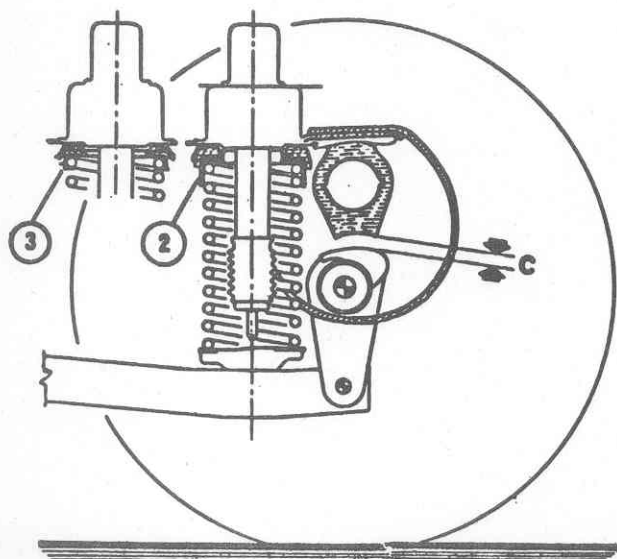
6.5 mm (.26")

11.5 mm (.45")

16.5 mm (.65")

21.5 mm (.85")

In the condition as specified check the wheel angles.



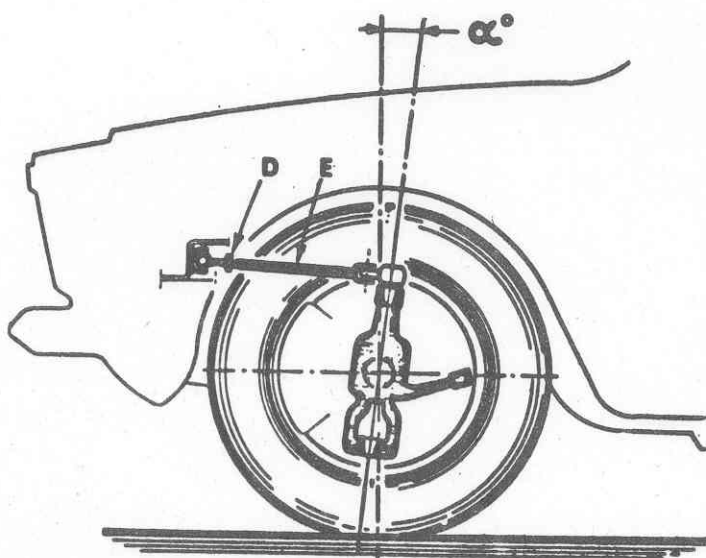
## Caster angle

$$\alpha = 1^\circ \pm 30'$$

The difference in caster angle between R.H. and L.H. wheel must not exceed  $0^\circ 20'$ .

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

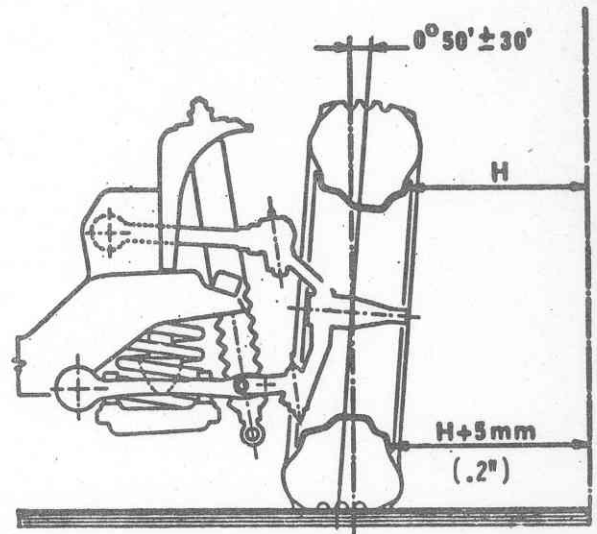
Small adjustments of the caster angle allow to correct slight drift tendency of the car.



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.

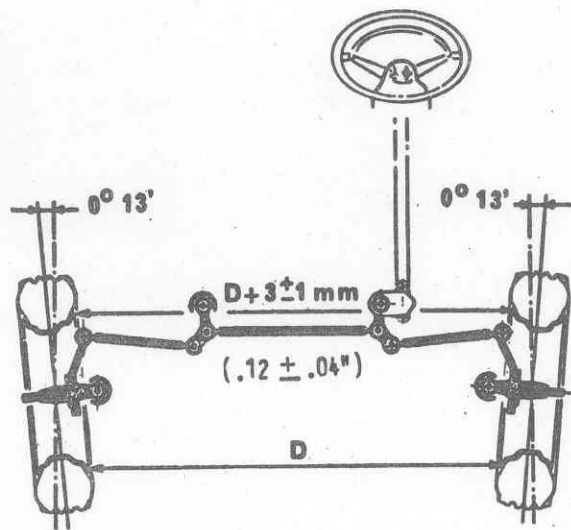
## FRONT WHEEL CAMBER

Difference in camber angle between  
R.H. and L.H. wheel -  $0^{\circ} 40'$



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

## FRONT WHEEL TOE-IN



Rod length:

side . . . . .	272 to 288 mm (10.7 to 11.3" )
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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