

# Ferrari

# 308



## Workshop

## Manual

# Ferrari

MODEL

*Dino 308 GT4*

WORKSHOP  
MANUAL

This book is a reprint by MAR PARTS Ltd.  
for reference by owners.

Original factory stocks exhausted.

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FERRARI-SERVIZIO ASSISTENZA TECNICA-Modena

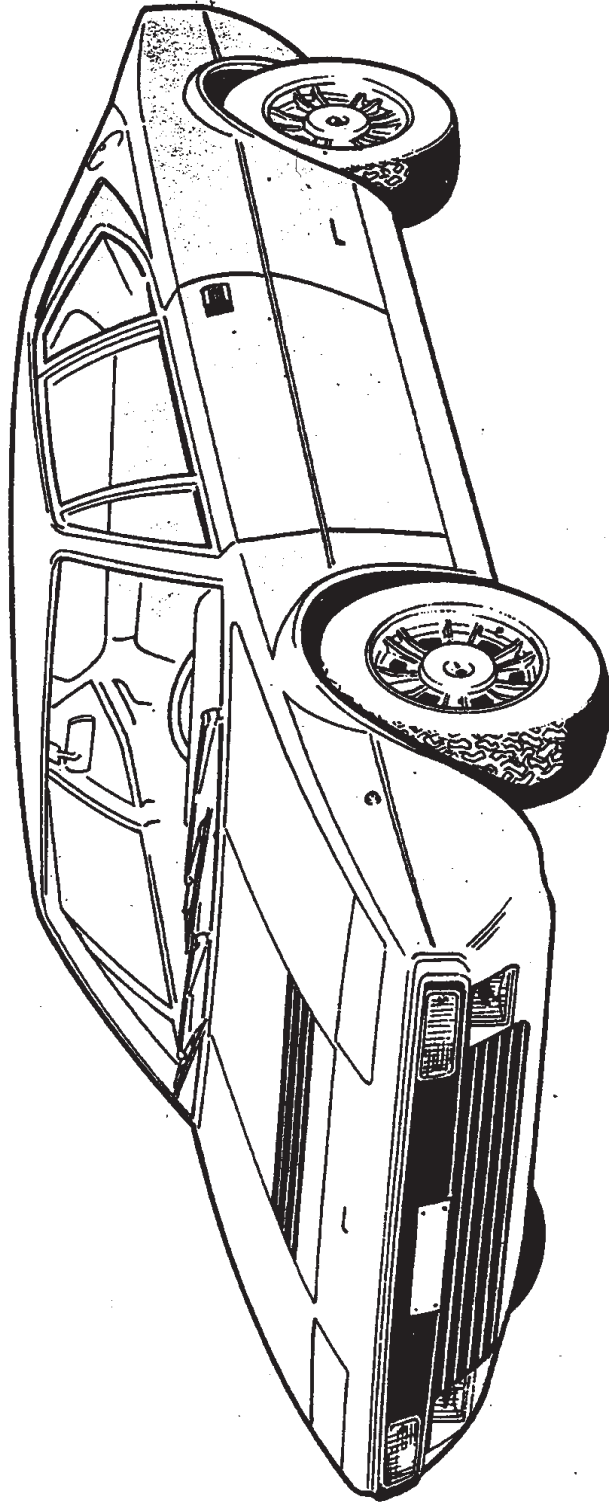
SECTION INDEX	Section
GENERAL INFORMATION	A
ENGINE	B
LUBRICATION COOLING FUEL SYSTEM	C
CLUTCH GEARBOX REAR AXLE	D
STEERING	E
FRONT SUSPENSION	F
REAR SUSPENSION SHOCK ABSORBERS	G
BRAKES WHEELS AND TYRES	H
INSTRUMENTS AND CONTROLS HEATING AND VENTILATION AIR CONDITIONING	I
ELECTRIC SYSTEM	L
SPECIAL TOOLS (Engine-Chassis) TIGHTENING TORQUES CHASSIS HITCH POINTS	M
BODY	N
EMISSION CONTROL SYSTEM	O

SECTION **A**

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GENERAL INFORMATION

	Page
MAIN SPECIFICATIONS	A 3
PERFORMANCES	A 4
REFUELLING	A 5
IDENTIFICATION PARTICULARS	A 6
SPARE PARTS	A 6



DINO 308 GT.4 MODEL

## GENERAL INFORMATION

## MAIN SPECIFICATIONS

## IDENTIFICATION PARTICULARS

Chassis type F 106 AL  
 Engine type F 106 A

## ENGINE

Layout transversal in front  
 of the rear axle  
 Cylinders 8 V 90  
 Bore mm. 81  
 Stroke mm. 71  
 Displacement cm<sup>3</sup> 2926,9  
 Compression ratio 8,8:1  
 DIN maximum power CV 250  
 Corresponding engine  
 speed RPM 7000  
 Maximum torque kgm. 29  
 Corresponding engine  
 speed RPM 5000  
 Italian fiscal rating CV 33

## CLUTCH

Dry single plate  
 Diaphragm pressure plate  
 Mechanical clutch control  
 Spring assisted

## GEARBOX

Five forward speeds and reverse  
 Synchromesh rings on forward  
 speeds.  
 Gearshift lever on tunnel

## REAR AXLE

Integral with the gearbox  
 Displacement final reduction  
 torque.  
 Reduction ratio 17/63  
 Limited slip differential  
 Self locking 40%

## STEERING

Rack and pinion type  
 Steering wheel turns from lock  
 to lock 3,28  
 Minimum turning circle  
 diameter m. 12

## FRONT SUSPENSION

Independent wheels.  
 Swinging arms with coil springs  
 on hydraulic shock absorbers.  
 Transversal anti-roll bar.

## REAR SUSPENSION

Independent wheels.  
 Swinging arms with coil springs  
 on hydraulic shock absorbers.  
 Transversal anti-roll bar.

## BRAKES

Self-ventilating discs; hydraulically  
 operated by pedal acting on  
 the four wheels. Two pumps, two  
 independent circuits.  
 Vacuum servo-brake.  
 Limiting braking valve on the re-  
 ar brakes.

Hand brake:  
 mechanically operated by control  
 levers acting on the rear caliper  
 cylinders.

## WHEELS and TYRES

Special light alloy wheels 6½x14"  
 Tubeless tyres Michelin 205/70 VR  
 14 XWX  
 Spare wheel (European version).  
 Rim 3¼Bx18"  
 Michelin tyre 105 R 18xT

## ELECTRIC SYSTEM

Voltage 12 Volts.

## AIR CONDITIONING SYSTEM

System Borletti  
 Compressor 700 AP

## WEIGHTS

Kerb weight kg 1365

PERFORMANCES

Maximum speeds, fully laden, on smooth level road, with run-in, engine:

1st gear	km/h	66
2nd gear	"	95
3rd gear	"	132
4th gear	"	180
5th gear	"	236
Reverse	"	-

Maximum climbable gradients, full y laden, on good road, with run-in engine:

1st gear	45%
2nd gear	35%
3rd gear	25%
4th gear	18%
5th gear	9%
Reverse	-

BRAKING DISTANCE

Test conditions:  
Full of fuel and two people on board; dry level road and tyres in good conditions.

ACCELERATION

Standing start kilometre .26"2/10  
From 0 to 400 metres 14"4/10

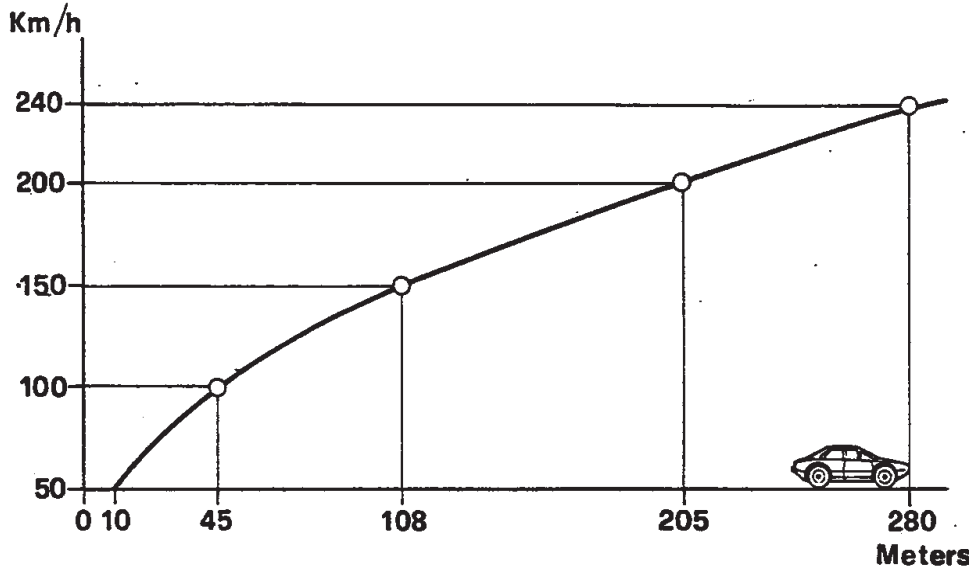


Fig. 2 - BRAKING DISTANCE DIAGRAM.

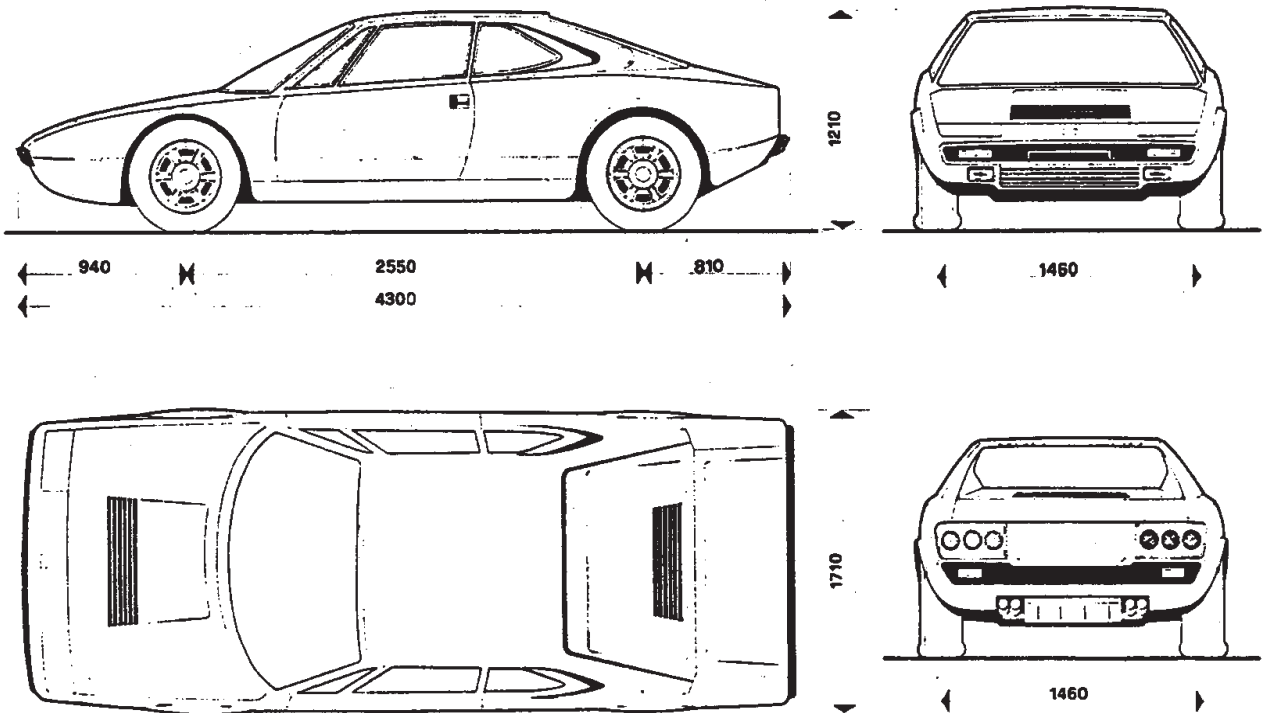


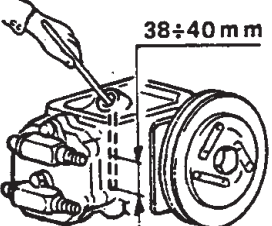



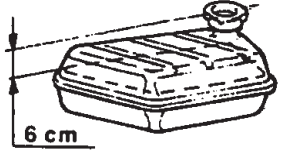
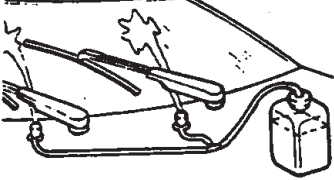
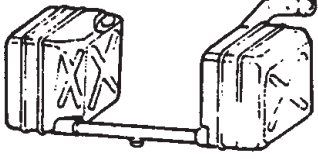
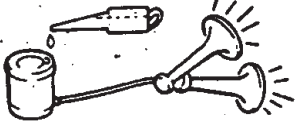


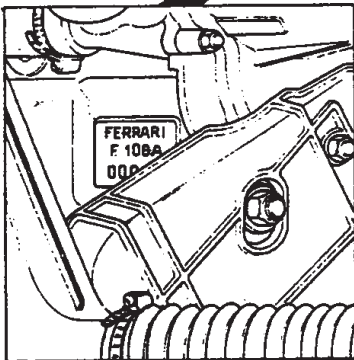
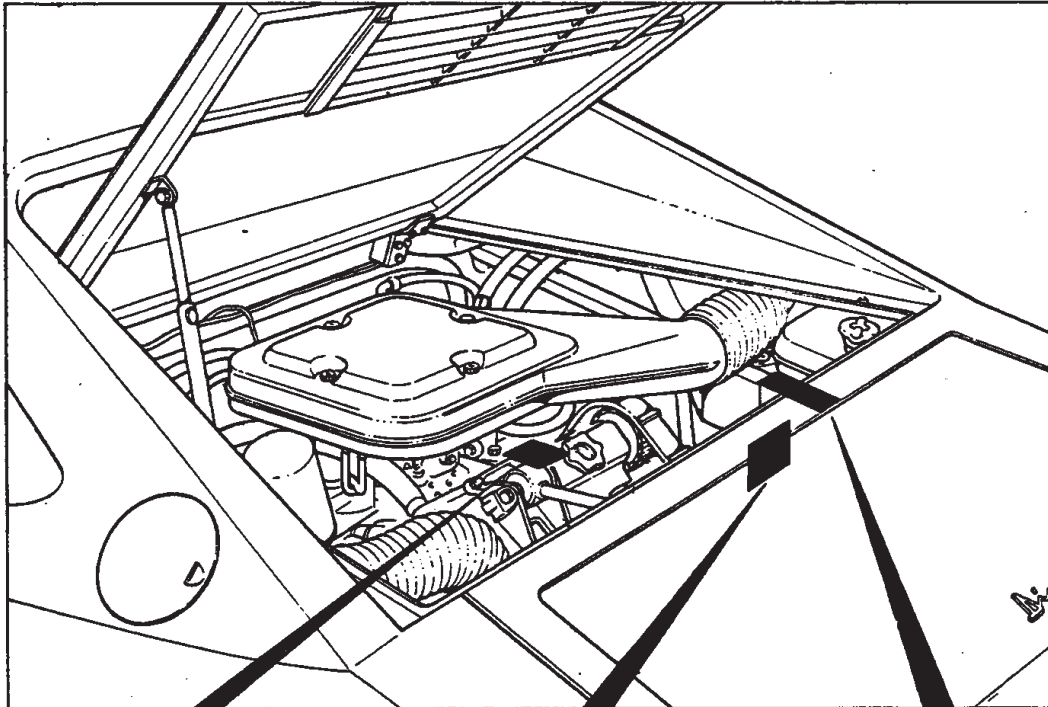
Fig. 3 - MAIN DIMENSIONS of CAR

## REFUELLING

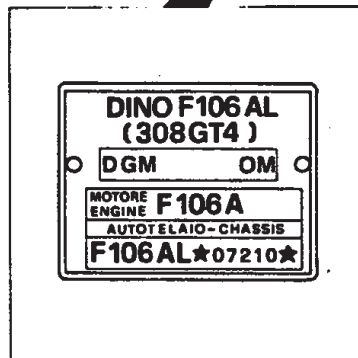
ITEMS TO BE SERVICED	Quantity litres	FILL WITH	REFERENCES
ENGINE - Oil sump and filter	9	AGIP SINT 2000 SAE 10 w 50	
GEARBOX-DIFFERENTIAL	4	Agip F1 ROTRA MP SAE 80	
AIR CONDITIONER - Compressor - Circuit capacity	330 cc kg 1	Agip TER 54 FREON 12 ANIDRO	
SHOCK ABSORBERS - Front (each) - Rear (each)	0,190	Agip OSO 35	
BRAKE CIRCUIT	0,58	Fluid ATE Blue S DOT 3 or AGIP F1 DOT 3	
STEERING BOX	0,190 ÷ 0,210	Agip F1 ROTRA MP SAE 90	
COOLING SYSTEM	18	Antifreeze mixture	
WINDSCREEN WASHER BOTTLE	1	Water and glass cleaner mixture.	
FUEL TANKS - Reserve	78 ÷ 80 15	Premium grade 98/100 O.N.	
HORN COMPRESSOR	A few drops	FIAMM oil	

## IDENTIFICATION PARTICULARS

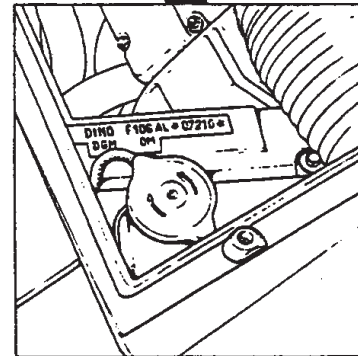
Fig. 4 - Car Identification Particulars



Engine type (F 106A) and identification number.



Identification plate: qualification number; engine type; chassis type and number.



Chassis type (F 106 AL) and identification number.

## SPARE PARTS

Instructions to follow when ordering parts.  
When ordering spare parts, always specify clearly part description and reference number: you will find it on the "Spare Parts Book". Furthermore, also engine and chassis numbers are requested.



SECTION **B**

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ENGINE

	Page
MAIN SPECIFICATIONS	B 3
TROUBLES AND REMEDIES	B 5
CRANKCASE AND LINERS	B11
PISTONS - CONNECTING RODS	B13
CRANKSHAFT - MAIN BEARINGS	B19
CYLINDER HEADS	B23
VALVE MECHANISM	B27
ENGINE ASSEMBLING	B31

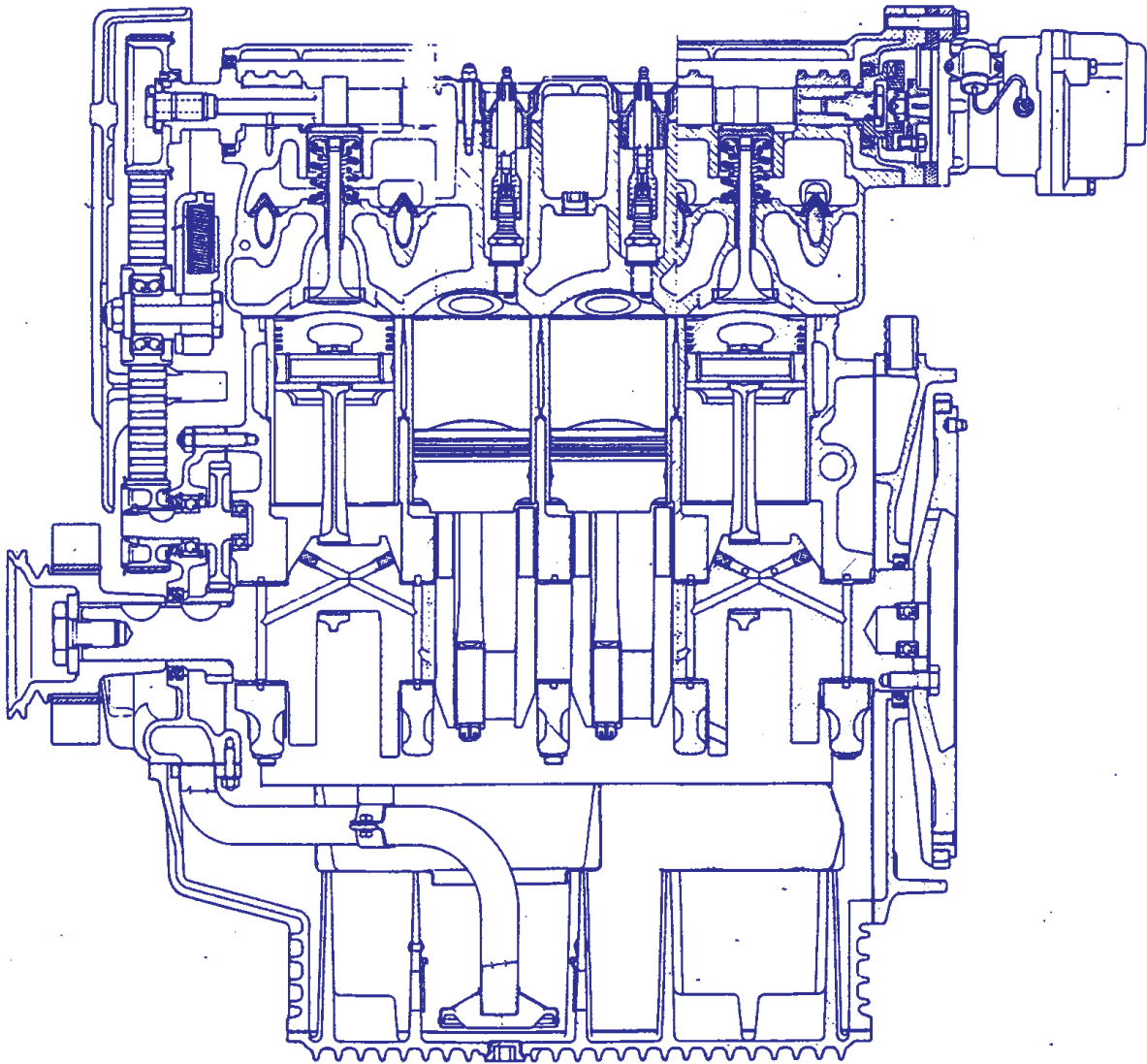


Fig. 1 - LONGITUDINAL SECTION of ENGINE

ENGINE

MAIN SPECIFICATIONS . . . . . Page B 3

TROUBLE DIAGNOSIS and REMEDIES . . . . . Page B 5

MAIN SPECIFICATIONS

ENGINE	
Type . . . . .	F 106 A
Cylinders . . . . .	8 V 90°
Bore . . . . . mm.	81
Pistons stroke . . . . . mm.	71
Displacement . . . . . cm3	2926,9
Compression ratio . . . . .	8,8:1
Maximum engine speed . . . . . RPM	7000
DIN maximum power . . . . . cv	250
Corresponding engine speed . . . . . RPM	7000
Maximum torque . . . . . kgm	29
Corresponding engine speed . . . . . RPM	5000
Italian fiscal rating . . . . . cv	33
CRANKSHAFT	
Type . . . . .	flat : cranks at 180°
Number of supports . . . . .	5
Main bearings . . . . .	thin-wall, anti-fric <u>t</u> tion lining
Thrust bearings . . . . .	2 on the rear support
CONNECTING RODS	
Bearings . . . . .	thin-wall, anti-fric <u>t</u> tion lining
PISTONS	
Type . . . . .	conical piston skirt
1st slot ring . . . . .	4 rings
2nd and 3rd slot ring . . . . .	chromium plated A.C. type for seal
4th slot ring . . . . .	conical A.C. type for seal
Hole for pin . . . . .	ROF scraper ring with clamp
Pin . . . . .	not misaligned rod small end
VALVE GEAR	
Drive . . . . .	Toothed belts
Valves . . . . .	over-head
Camshafts . . . . .	4 over-head
FUEL SYSTEM	
Electric pump . . . . . N.1	Corona
Double barrel carburettors . . . . . N.4	Weber 40 DCNF 35/36/ 37/38
Air filter . . . . . N.1	cartridge type
Crankcase emission control system.	

## Main Specifications (continuation)

<b>LUBRICATION</b>		
Pump . . . . .	N.1	gear type
Filters . . . . .	N.1	cartridge type
Pressure relief valve . . . . .		with spring and adjustment by spacers
Lubrication pressure . . . . .	kg/cm <sup>2</sup>	5,5 ÷ 6,5 at 6000 RPM (100° C)
Oil cooling . . . . .		by radiator
<b>COOLING</b>		
Type . . . . .		by centrifugal pump, radiator and thermostatic valve.
Fans . . . . .	N.2	electric and automatic
Expansion tank . . . . .		with calibrated valve at 0,9 kg/cm <sup>2</sup>
<b>IGNITION</b>		
Type . . . . .		battery and coils
		2 distributors with idle retarded operating
Firing order . . . . .		1-5-3-7-4-8-2-6
<b>STARTER</b>		
Type . . . . .		electric motor
Engagement . . . . .		electro-magnetic
Control . . . . .		by ignition key
<b>ENGINE MOUNTING</b>		
Type . . . . .		elastic, on 4 mountings and longitudinal tie-rod.

ENGINE TROUBLE DIAGNOSIS AND REMEDIES

ENGINE DOES NOT START

POSSIBLE CAUSES	REMEDIES
1) Low battery charge.	1) Check and re-charge battery.
2) Battery terminal connections are corroded or loose.	2) Clean, check and tighten terminal clamps.
3) Faulty starter motor.	3) Bench-test the starter motor
4) Faulty starter switch.	4) Replace.
5) Faulty ignition coils.	5) Check and replace if necessary.
6) Cables from coil to distributor and from distributor to spark plugs are loose or broken.	6) Check, remake connections or replace faulty cables.
7) Cracked distributor caps.	7) Replace the caps.
8) Damp or dirt on distributor caps contacts or on current wires.	8) Dry and clean cables and cap contacts.
9) Distributor rotor showing carbonization or wear traces	9) Clean rotor or, if necessary replace.
10) Distributor breaker points are dirty, oxidized or excessively opened.	10) Clean and adjust breaker points opening.
11) Distributor central point of cap is broken or the relevant pressure spring is defective.	11) Replace the central point and relevant spring.
12) Short-circuited condenser or poorly insulated condenser.	12) Bench-test condensers; replace if faulty.
13) Dirty spark plugs or plug gaps too wide.	13) Clean plugs and set exact electrode gap.
14) Flooded carburettor due to incorrect level or dirt between needle and seat.	14) Check and adjust.
15) Fuel pump does not operate.	15) Check fuses, connections, filters and fuel in tank.
16) Dirt or water in fuel lines, in tanks or in carburettors.	16) Remove and carefully clean carburettors; should this inconvenient occur again wash and blow the fuel tank and lines.

ENGINE STALLS

POSSIBLE CAUSES	REMEDIES
1) Idling speed too low.	1) Slightly enlarge the carburettor throttle opening and adjust mixture strength.
2) Idle mixture too lean or too rich.	2) Adjust mixture strength.
3) Flooded carburettor.	3) Follow instructions mentioned in 'Carburettors' chapter (Section C).
4) Dirt or water in fuel lines or in carburettors.	4) Remove and carefully clean the carburettors; should this inconvenient occur again, wash and blow tank and lines.

## ENGINE STALLS (continuation)

POSSIBLE CAUSES	REMEDIES
<ul style="list-style-type: none"> <li>5) Starter engaged with warm engine.</li> <li>6) Corroded or loose battery terminal clamps.</li> <li>7) Cables from ignition coils to distributors and from distributors to spark plugs are loose.</li> <li>8) Sparking plugs are dirty, damp or with excessive gaps or too closed gaps.</li> <li>9) Contact breaker points are dirty, oxidized or with no flat surfaces.</li> <li>10) Worn distributor rotor contact.</li> <li>11) Incorrect ignition advance.</li> <li>12) Faulty ignition coils and condensers.</li> <li>13) Overheated engine.</li> </ul>	<ul style="list-style-type: none"> <li>5) Disconnect starter and check warning light.</li> <li>6) Clean and tighten locking nuts.</li> <li>7) Check and remake connections</li> <li>8) Clean and dry sparking plugs then adjust electrodes gap.</li> <li>9) Clean and adjust contact breaker points gap.</li> <li>10) Replace rotor.</li> <li>11) Check.</li> <li>12) Check and replace if necessary.</li> <li>13) Check the coolant in water radiator; check water pump and thermostat working conditions; look for possible leaks. Check fans working conditions.</li> </ul>

## ENGINE LACKS POWER

POSSIBLE CAUSES	REMEDIES
<ul style="list-style-type: none"> <li>1) Incorrect ignition timing.</li> <li>2) Accelerator pedal does not reach full throttle position</li> <li>3) Faulty distributor automatic advance.</li> <li>4) Too small opening of distributor breaker points.</li> <li>5) Incorrect valve timing.</li> <li>6) Faulty distributor micro-switch.</li> <li>7) Weak compression.</li> <li>8) Sparking plugs are dirty, damp or with excessive gap.</li> <li>9) Sparking plugs are too worn or of a not recommended type.</li> <li>10) Fuel has a low octane number</li> <li>11) Worn cams.</li> <li>12) Fuel mixture too rich or too lean.</li> </ul>	<ul style="list-style-type: none"> <li>1) Check and carry out correct timing.</li> <li>2) Check nature of obstruction and remove it.</li> <li>3) Overhaul distributor as explained under relevant heading.</li> <li>4) Adjust contacts opening.</li> <li>5) Check and adjust if necessary.</li> <li>6) Check and replace if necessary.</li> <li>7) Check valves seal and cylinders seal.</li> <li>8) Clean sparking plugs and adjust exact electrodes gap.</li> <li>9) Replace plugs or use the recommended type.</li> <li>10) Use the recommended fuel.</li> <li>11) Check timing; replace the camshaft if necessary.</li> <li>12) Check carburettor jets size.</li> </ul>

ENGINE LACKS POWER (continuation)

POSSIBLE CAUSES	REMEDIES
13) Some carburettor throttles do not open completely.	13) Check controls.
14) Too weak valve springs due to deformation.	14) Check following the table on page B 24; replace springs if necessary.
15) Poor fuel feeding due to faulty pump or obstructed filters.	15) Check, clean, replace faulty items if necessary.
16) Picking-up between crankshaft and bearings or valves and guides.	16) Check and replace faulty items if necessary

ENGINE MISSES AT HIGH SPEEDS

POSSIBLE CAUSES	REMEDIES
1) Poor fuel feed.	1) Obstructed electric pump and filters, too warm fuel, tanks almost out of reserve.
2) Obstructed air filter.	2) Clean, blow or replace it if necessary.
3) Filters on lines or on carburettors are partially obstructed.	3) Clean filters.
4) Sparking plugs are dirty, damp or have uncorrectly adjusted gap.	4) Clean and adjust gap; replace if necessary.
5) Some faulty or not well closed sparking plugs lead to self-ignition.	5) Check sparking plugs condition and type.
6) Ignition timing advance is higher than values recommended for high speeds.	6) Check using stroboscope at 5000 engine RPM.
7) Faulty distributor micro-switch.	7) Check and replace if necessary
8) Too weak or deformed distributor breaker points springs.	8) Check and replace worn items if necessary.
9) Some valve springs are deformed and have insufficient load.	9) Check and replace springs.
10) Some valves do not run freely in proper guides and do not close well.	10) Check and replace valves and guides if necessary.
11) One or more carburettors flooded.	11) Check needle valve or replace if worn out.
12) Water in fuel.	12) Carefully clean the whole system.

ENGINE MISFIRES IN ACCELERATION

POSSIBLE CAUSES	REMEDIES
1) Sparking plugs are dirty, damp or have excessive gap.	1) Check, clean and adjust electrodes gap.

## ENGINE MISFIRES IN ACCELERATION (continuation)

POSSIBLE CAUSES	REMEDIES
2) Incorrect ignition timing.	2) Check static advance and retard between R1 and R2.
3) Incorrect idle mixture.	3) Adjust it.
4) Incorrect carburettor throttle opening synchronization.	4) Check and adjust.
5) Faulty fuel pump.	5) Check connections tightening, lines and filters cleaning.
6) Faulty acceleration pumps.	6) Check stroke, jets cleaning and cylinder condition.
7) Incorrect compression in cylinders.	7) Check compression using manometer.
8) Engine valves are burnt or damaged.	8) Check and replace valves.
9) Valve clearance wrongly adjusted.	9) Adjust correctly.
10) Some flooded carburettors due to dirt between needle and seat.	10) Clean float chambers and carburettors filters.
11) Incorrect float chamber level.	11) Check level.
12) Air leakage between manifolds and heads and between heads and exhaust manifolds	12) Check manifolds and flanges tightening.
13) Excessive clearance between carburettor controls	13) Check and replace faulty items.
14) Automatic advance does not operate.	14) Test on bench.
15) Distributor breaker points are dirty and have incorrect opening.	15) Check, clean and adjust.
16) Distributor microswitch wrongly adjusted.	16) Check and re-set adjustment.

## NOISY TAPPETS and VALVES

POSSIBLE CAUSES	REMEDIES
1) Excessive clearance between cam and shim on valve.	1) Adjust and replace shims.
2) Some cams or shims are worn	2) Check and replace camshaft and thimble.
3) Some broken valve springs.	3) Replace broken springs.
4) Excessive clearance between thimble and guide hole.	4) Check
5) Some valve stems not free in proper guides.	5) Check
6) Timing belts are too loose or too worn.	6) Check stretcher conditions and belts wear.



NOISY CONNECTING ROD PINS

POSSIBLE CAUSES	REMEDIES
<ol style="list-style-type: none"> <li>1) Excessive clearance between con.rod bearings and crankshaft pins.</li> <li>2) Poor oil delivery.</li> <li>3) Unsuitable oil.</li> <li>4) Too low oil pressure.</li> <li>5) Excessive clearance between piston pins and con.rod bushes.</li> </ol>	<ol style="list-style-type: none"> <li>1) Dismantle, check bearings and pins wear. If necessary replace bearings and grind shaft.</li> <li>2) Check oil pump and lines.</li> <li>3) Replace oil.</li> <li>4) Check oil pump valve.</li> <li>5) Dismantle, check pins and bushes wear. If necessary replace worn items.</li> </ol>

ENGINE VIBRATION

POSSIBLE CAUSES	REMEDIES
<ol style="list-style-type: none"> <li>1) Faulty ignition or excessive advance.</li> <li>2) Faulty carburation.</li> <li>3) Faulty carburettor synchronization.</li> <li>4) Excessive clearance between main bearings and pins.</li> <li>5) Connecting rods and pistons not equal in weight.</li> <li>6) Incorrect clearance between cams and shims.</li> <li>7) Irregular compression in cylinders.</li> <li>8) Flexible mountings/engine tie rod worn or too stiff.</li> <li>9) Engine flywheel/clutch assembly out of balance.</li> <li>10) Faulty cylinders.</li> </ol>	<ol style="list-style-type: none"> <li>1) Check and overhaul ignition system.</li> <li>2) Check and adjust.</li> <li>3) See relevant heading on page 20.</li> <li>4) Check diameter of main journals.</li> <li>5) Check assemblies and equalize weights.</li> <li>6) Adjust.</li> <li>7) Check compression in each cylinder.</li> <li>8) Check and replace if necessary.</li> <li>9) Balance flywheel and clutch assembly.</li> <li>10) Find out faulty cylinders then check sparking plugs and wires.</li> </ol>

EXCESSIVE OIL PRESSURE

POSSIBLE CAUSES	REMEDIES
<ol style="list-style-type: none"> <li>1) Unsuitable engine oil - too thick.</li> <li>2) Oil pressure valve is locked or incorrectly adjusted.</li> <li>3) Obstructed oil lines.</li> </ol>	<ol style="list-style-type: none"> <li>1) Change oil with correct type.</li> <li>2) Check and replace faulty items if necessary. Adjust again as prescribed.</li> <li>3) Carefully wash oil lines and replace filter.</li> </ol>

TOO LOW OIL PRESSURE

POSSIBLE CAUSES	REMEDIES
<ol style="list-style-type: none"> <li>1) Too high oil temperature.</li> <li>2) Engine oil not suitable for working conditions.</li> <li>3) Excessive clearance between main journals, crankpins and relevant bearings.</li> </ol>	<ol style="list-style-type: none"> <li>1) Reduce engine revs.</li> <li>2) Change oil with correct type.</li> <li>3) Dismantle, check crankshaft and, if necessary, grind it. Replace bearings.</li> </ol>

## TOO LOW OIL PRESSURE (continuation)

POSSIBLE CAUSES	REMEDIES
4) Oil pressure adjusting valve faulty or jammed.	4) Check.
5) Obstructed oil inlet filter.	5) Remove sump cover then clean filter.
6) Faulty oil pressure gauge.	6) Check and replace if necessary.
7) Too low oil level in sump.	7) Check and re-set level.

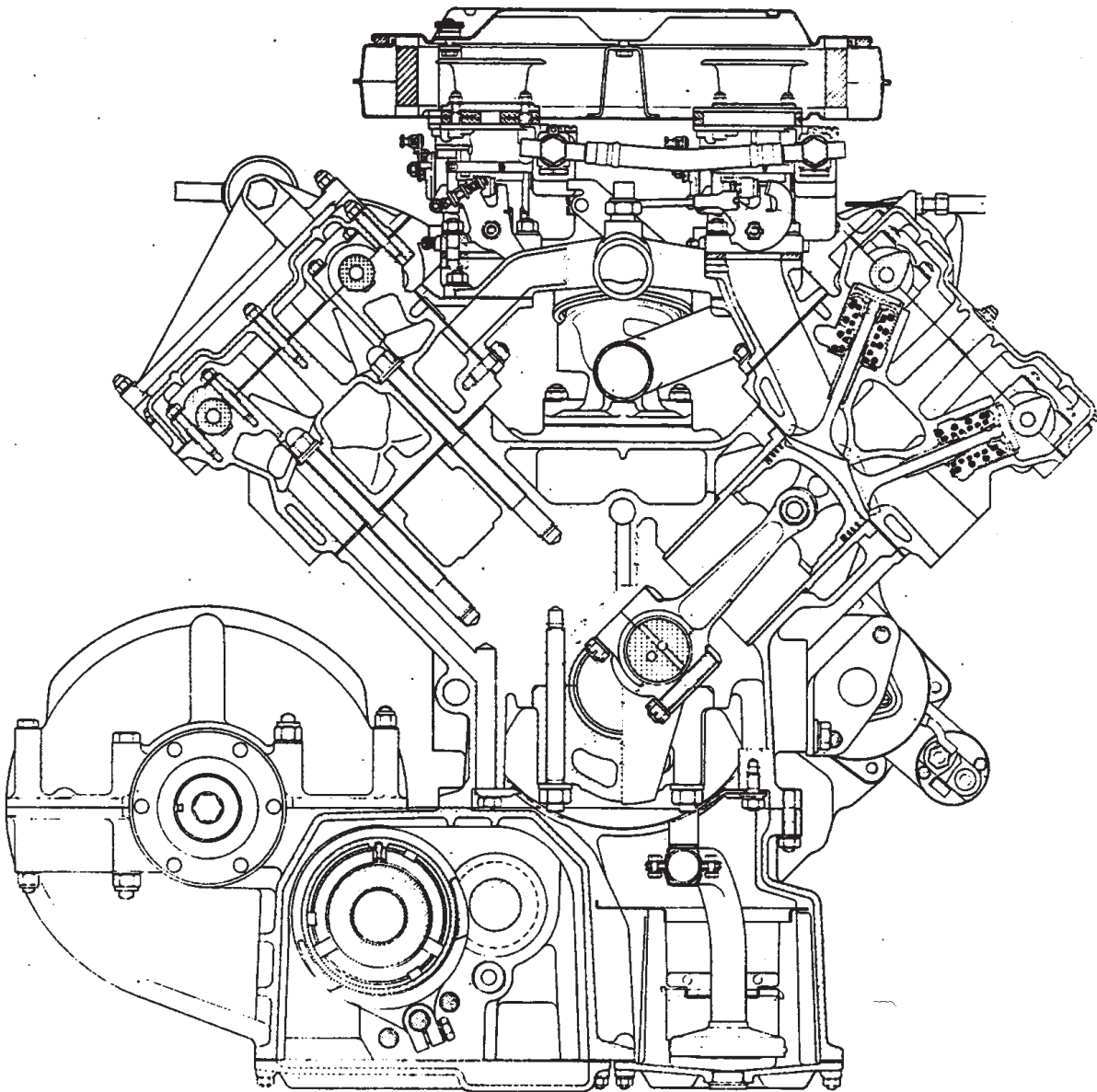


Fig. 2 - Cross section of engine.

## C R A N K C A S E   A N D   L I N E R S

MAIN SPECIFICATIONS . . . . .	Page B 11
GENERAL INFORMATION . . . . .	" B 11
CHECKING MAIN BEARINGS . . . . .	" B 11
CYLINDER LINERS . . . . .	" B 12

## MAIN SPECIFICATIONS

DESCRIPTION	mm
Liners seats diameter in crankcase	87,000 + 87,035 93,000 + 93,022
Liners nominal diameter	81,000 + 81,020
- 1st oversize diameter	81,150 + 81,170
- 2nd oversize diameter	81,300 + 81,320
Liner maximum wear (on diameter)	0,080 + 0,100
Allowed ovalization and taper ratio	0,010 + 0,015
Liners grinding                      Roughness $\mu$	0,6 + 0,8
Liners protrusion from crankcase on heads surface	0,01 + 0,05
Diameter of main bearing housing	66,675 + 66,688

## GENERAL INFORMATION

Crankcase is in light aluminium alloy at high endurance; removable liners in special cast iron. When disassembling the engine, always carefully clean the engine block: take off the relevant plugs then flush with oil all lubrication ways.

## CHECKING MAIN BEARINGS

Put the suitable 361/AS/4736 boring bar of mm. 66,675 -0,01/ -0,02 in diameter, in the main bearing housing; then tighten the mountings at the tightening torque shown on table "Tightening Torque" (page M 5). Assemble the cylinder heads with used gaskets, lock the nuts following instructions shown on the same table.

In case the boring bar runs without any effort, that means there is no deformation or there is a very slight one.

If the gauge effort is more or less remarkable, touch up the housing using a scraper starting from the central support.

After having put the boring bar efforts into standard conditions, smooth the bearing housings using the AV-240 lapping tool which has been previously spreaded with cromax or excelsior paste and oil.

## CYLINDER LINERS

Liners are free assembled in their housings.

They are supplied ready to be assembled, that is with prescribed allowances.

Maximum allowed wear on diameter is of mm.  $0,08 + 0,10$  measured at approx. 10 mm. from the face of cylinder heads gasket.

Should wear exceeds this value, it is advisable to replace cylinder liners.

Ovalization and taper ratio of liners on cylinder block must not exceed mm.  $0,010 + 0,015$ .

Only in case of imperative reasons it is advisable to grind.

When effecting this operation, cylinder liner should be removed from engine block; then with proper grinding bring the inner diameter size up to the measure corresponding to the 1st or 2nd oversize.

During the grinding operation carefully check the perpendicularity between grinded surface and head surface ( $\perp 0,02$ ).

The roughness degree of grinding should be of  $0,6 + 0,8 \mu$

Before re-assembling the cylinder liners (removed for a whatever reason), carry out a careful cleaning and replace seal rubbers.

Liners protrusion from the gasket face, without seal ring A, must be between mm.  $0,01 + 0,05$  and it should be equal for all the liners of each cylinder file and near to mm.  $0,03$ .

Use gauge 542-CS-6768 for this checking.

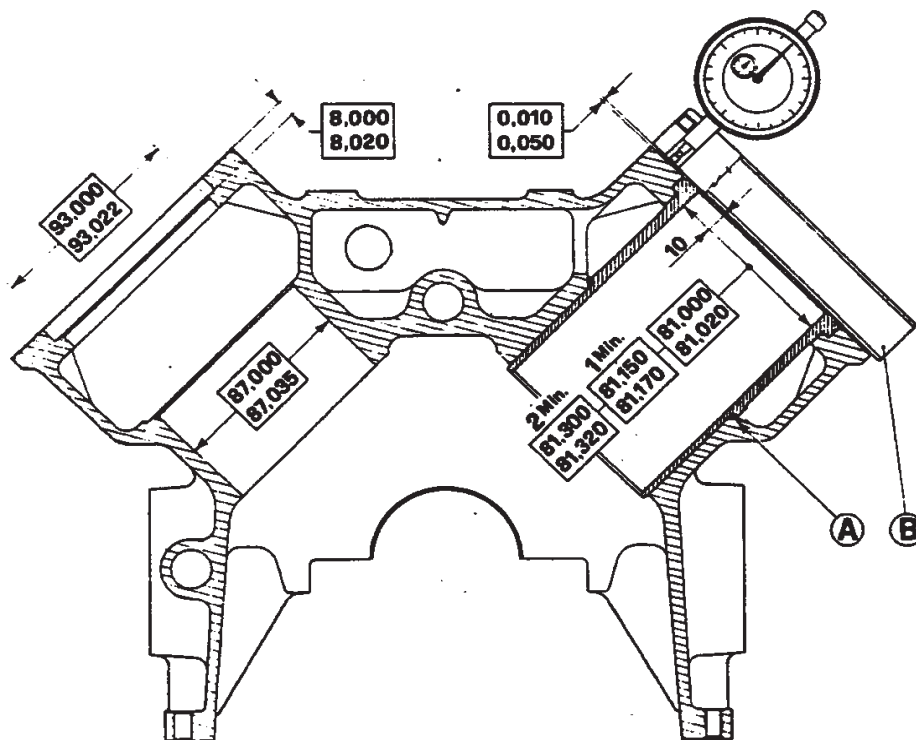


Fig. 3 - LINER HOUSING IN CRANKCASE.

A - seal ring; B - gauge 542-CS-6768.