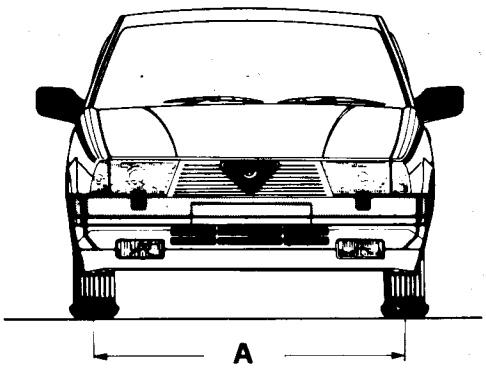
GROUP 00

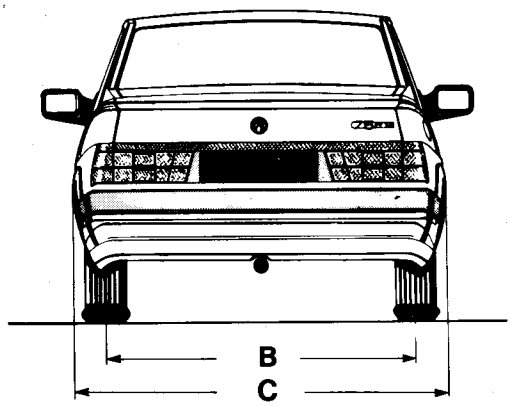
CONTENTS

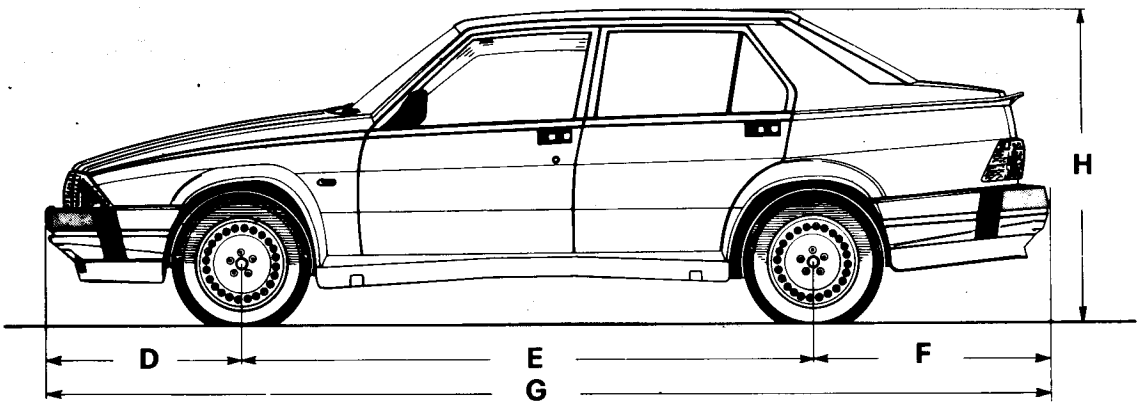
(*) SEE WORKSHOP MANUAL - 75 Twin Spark 2.0 — GR. 00

GENERAL VIEWS

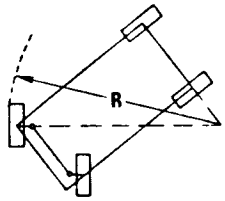
DIMENSIONS







Unit: mm

Model \ Dimensions	A	B	C	D	E	F	G	H Max	R(*)	
Twin Spark S	1376 (1) 1396 (2)	1362 (1) 1382 (2)	1660	825	2510	995	4330	1400	5050	

(1) With rims 5½J x 14"

(2) With rims 6½J x 14"

(*) Radius of the circumference described in correspondence with ground from driving wheel outer edge, with full steering lock.

WEIGHTS AND LOADS

Weights and loads		Model 75 Twin Spark S
Max weight allowed (kg)		1595
Kerb weight (kg)		1170
Carrying capacity (kg)		425
Max allowed gross weight per axle (kg)	Front	850
	Rear	990
Max towing gross weight (kg)		1200
Max vertical load on tow hook (kg)		60
Seating capacity	Front	2
	Rear	3

WHEELS AND TYRES

Rims and tyres			Model 75 Twin Spark S	
Rims			5 1/2J x 14" (1)	6 1/2J x 14" (2)
Tubeless tyres			195/60 VR14"	
Inflating pressure [kg/cm²] (3)	N	A	1,8	
		P	2,0	
	C	A	2,0	
		P	2,2	

A: Front
P: Rear

N: With reduced load and normal speed
C: At full load and high speed
V: Up to 230 km/h

(1) Rims with 4 securing screws
(2) Rims with 5 securing screws
(3) Pressure measured on cold tyres

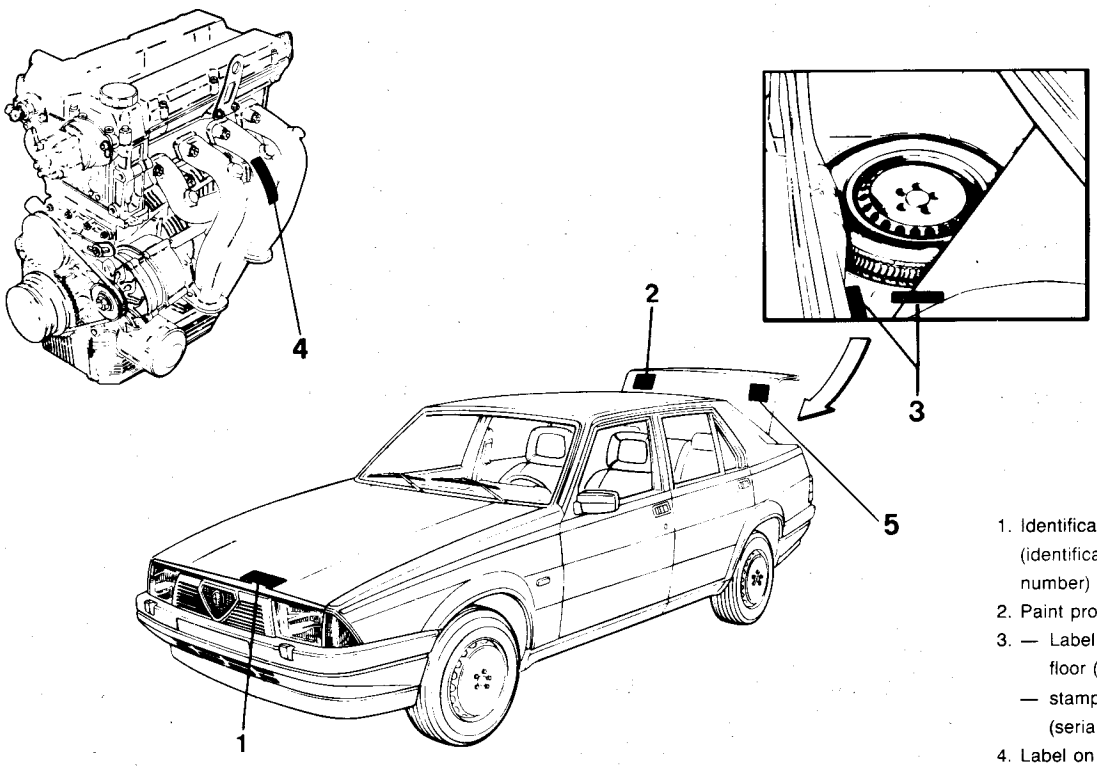
WARNING:
The wheel nuts must be tightened to a torque of 98 N·m (10 kg·m)

IDENTIFICATION DATA

Model				75 Twin Spark S	
Body				4 — door saloon	
Drive				LH	RH
Identification No.			— on identification label	161.30	—
Chassis No.	Type approval No.		— on identification label	162.B4	
			— on rear right side of luggage compartment floor	162.B40	
	Serial No.		— on rear right side of luggage compartment floor	from 00.001.001	
Engine No.	Type and serial No.		— on left rear side of engine block	062.24 from 000.001	

IDENTIFICATION LABELS

POSITION OF LABELS

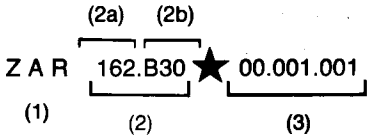


1. Identification label (identification No. and type approval number)
2. Paint products label
3. — Label on luggage compartment floor (type approval number)
   — stamped on sheet panel (serial number)
4. Label on engine block, left rear side (engine type and serial number)
5. Lubrication label

VEHICLE IDENTIFICATION CODES

A. Chassis numbering

It is composed of two groups of numbers and/or reference identifications.



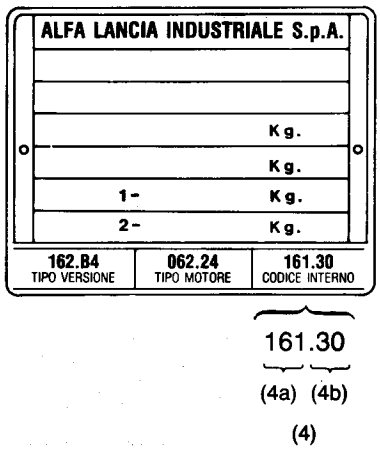
(1) Manufacturer identification characters.

(2) Number of «Type and version approved».
It is composed of six figures, subdivided as follows:

(2a) Basic type number: it is assigned to each vehicle having a common design type.

(2b) Type variation number: identifies the variations of the basic type.

(3) Serial number: is assigned individually to each vehicle as it is produced.



(4) Identification number: (on identification label).
It is composed of five figures, subdivided as follows:

(4a) Basic type code: it is assigned to each vehicle having a common design type and distinguishes the various models.

(4b) Type variation number: identifies, with the basic type, vehicles with various modifications.

For servicing purposes quote the identification number only (4).

B. Engine numbering

062.24 000.001

(1) (2)

(1) Type number (e.g.: **062.24** engine **2000** with **ML4.1 Motronic** fuel injection).

(2) Engine serial number: is assigned individually to each vehicle as it is produced.

INSTRUCTIONS FOR PRE-DELIVERY INSPECTION

This chapter lists and describes the pre-delivery operations required for the vehicles:

As regards the technical specifications related to each operation and the lubricant products (and similar) to be employed, refer to the «Technical Data and Specifications» present in each section.

CAUTION:
Pre-delivery inspection of a new vehicle, prior to customer delivery, consists of carrying out all the checking operations and tests described below in order to detect and thus eleminate any faults which may exist.
It goes without saying, however, that when Dealer personnel pick up the vehicle, they should perform a visual check in order to:

a. make sure the vehicle is in normal driving condition, especially as regards level of fluids and controls.
b. detect any dents or scratches on body or other damage to the upholstery.
c. make sure nothing is missing, especially factory supplied accessories spare tyre and any parts that are to be fitted on vehicle as part of pre-delivery completion.

If, as a consequence of the checks, topping up is required, proceed accordingly; this operation is to be considered as part of pre-delivery inspection. In the event of interventions (faults) other than those indicated, carry out the adjustments according to the current technical and administrative procedures.
As each operation is being carried out, the relevant card must be filled out and filled together with the other documents of the sold vehicle.
The pre-delivery card included in the Instruction Book supplied to the customer is to be duly filled out as evidence of the scrupulous execution of the pre-delivery checks.

OPERATIONS TO BE CARRIED OUT IN THE ENGINE COMPARTMENT

Coolant

— With engine cold check the level in the header tank.
Top up to the max. level with the specified coolant, if necessary.

Engine oil

— Check that the level is up to the «MAX» level on the dipstick (carry out this operation after having parked the vehicle on a flat surface and after the engine has been off for a few minutes).
If required top up with specified oil.

Power steering oil

— Check that the level is up to the «MAX» mark on the plug stick (before carrying out the check, with engine idling, rotate the steering wheel completely in both directions in order to carry out bleeding).

Brake and clutch fluid

— Check that the level is up to the «MAX» mark in the reservoir.
If required, top up with specified fluid, remembering that tins must be opened only at the moment of use.
Be sure to perform this operation with utmost care and cleanliness.

Battery electrolyte

— Check that the electrolyte covers the upper edge of the plates by **5 mm**, if not top up with distilled water.

Windscreen washer liquid

— Check that the relative tank is completely full, if not top up with the appropriate solution.

Engine electric fan

— Connect together the electric leads of the thermal switch and check that the electric fan functions correctly.
— Check that the leads are firmly connected to the thermal switch.

Check ignition advance

— Connect the stroboscopic gun to the 1st spark plug on the respective ignition distributor; connect the negative and positive leads of the gun to the relative terminals of the battery.
— Connect an electronic rev. counter to the engine.
— Start engine, warm it up to running temperature and with the engine idling, check the fixed ignition advance.

Check the tightness of the air intake ducts

— In order to detect any air loss in the whole air intake system, disconnect the flexible tube downstream from the constant idling regulation actuator and blow in air with a compressed air gun.
— Completely open the butterfly valve and brush or spray soapy water on all the joints.
The formation of bubbles or foam indicates air loss.

Check of CO percentage on idle (with Lambda sensor disconnected)

The reading of CO values (carbon monoxide) must be carried out using exclusively NDIR type analysers, connecting them to the exhaust tube.
The check is to be carried out with the engine completely warmed up (after the electric fan has come on and then gone off) and with the engine idling.

OPERATIONS TO BE CARRIED OUT ON EXTERIOR OF VEHICLE AND IN THE PASSENGER COMPARTMENT

Exterior cleaning

— After dewaxing, to be carried out using specified methods and products, wash the exterior of the vehicle with water-shampoo solution, rinse and dry. Complete cleaning by eliminating any residual dirt using appropriate products.

Paintwork

— Check all painted surfaces visually and remove accidental or manufacturing flaws, if any.

Exterior moldings and fittings

— Visually check all exterior fittings of the vehicle: bumpers, moldings, grills, headlamps, lettering and emblems making sure they are all securely fitted and are not spotted or dented.

Doors and hoods

— Visually check that all weatherstrips are correctly fitted and are not damaged out of shape or dirty.
— Also see that doors and hoods are correctly aligned and centred with respect to their respective relevant openings.

Factory issued accessories

— Check the presence of the following: tool kit, spare wheel, jack, Instructions Booklet, Service Booklet and Service Centre Guide.

Locks, hinges, window opening

— Check correct functioning of door locks (closing, locking and opening from inside and outside).
Similarly check the functioning of engine and luggage compartment hood locks.
— Check that door and hood hinges operate smoothly and noiselessly.
— Check that windows open and close all the way noiselessly and without sticking.

Interior finishings

— Check all upholstery (roof, carpets, panels etc.) removing any stains or scratches.

Seats safety belts and accessories

— Check that seats run freely on their tracks, noiselessly and without sticking. Also check that seat and head-rest adjustment devices function correctly.
— Check inside and outside rear-view mirrors making sure they adjust easily and stay firmly in place when set; also check snap switch on mirror for day/night driving.
— Check that seat belts and relative retractors are in good working order.
— Check the maneuverability of the sun-visors, ashtrays, glove compartment and any other standard accessories.

Heating and air conditioning system

— Check that the heater and the air inlet covers and flaps (opening and closing) function correctly.
— Check that the electric fan functions correctly at the various speeds.
— For vehicles with air conditioning, start the engine and check that, when the appropriate control in the vehicle is operated, this determines the closure of the electromagnetic coupling and consequently the operation of the compressor.

Lights, indicators, electrical accessories

— With ignition key set to «MARCIA», check the functioning of internal and external vehicle lights and where appropriate the relative instrument panel indicator lamps: front and rear lights, number plate lights, direction indicators, flashing hazard lights, stop lights, head-lamp high and low beam, head-lamp flashing, reversing lights, engine and luggage compartment lights, passenger compartment light (manual and door operation) and the switch-off timer for these, front and rear spot lamps instrument panel cluster lights and relative adjustment rheostat (or rheostats) and glove compartment lights.
— Check the functioning of the following instrument panel warning lights: alternator, fuel reserve, oil pressure, brake fluid level, hand brake on, rear window heater on, engine temperature.
Check the functioning of the Alfa Romeo Control lamps. These all come on simultaneously when the ignition key is set in the «MARCIA» position and then go out after a few seconds.
— Check that horns, cigar lighters, door locking device, power window controls and front seat electrical adjustment controls all function correctly.

Windscreen wipers, windscreen and head-lamp washers

— After fitting the wiper blades, check that the wipers function correctly at different speeds and on intermittent functioning.
— Operate the windscreen washer and check for an even spray from the jets and that the spray is correctly directed towards the upper part of the windscreen.
— Check that the spray is correctly directed towards the head-lamps (only where required by Regulations).

Tyre pressure

— Check and if necessary restore normal running pressure of tyres to specified values. Adopt the highest value for the spare wheel.

Tightening of wheel nuts or screws

— By means of a spanner, check that the wheel nuts are completely tightened. Check also that the nuts are appropriate for the type of vehicle or rim, as indicated in the Spare Parts Catalogue.

OPERATIONS TO BE CARRIED OUT ON UNDERSIDE OF VEHICLE

Speed gear-differential oil change

— Remove filler plug and check that the lubricant level reaches the lower rim of the relative hole.
Top up if necessary and re-fit filler plug.

Leakages

— Check visually for leaks or traces of leaks in the following systems: fuel and exhaust emission, power steering, brakes, clutch, engine cooling.
— Check for oil leaks from engine, gearbox and differential.

ENGINE CONTROLS AND TEST

Engine controls

— Check that the accelerator pedal functions without sticking and that with the pedal right down, the accelerator butterfly valve is completely open.

Engine starting and functioning

— Check that the engine starts normally. With the engine warmed up check that the engine runs smoothly at the correct specified r.p.m.

Dashboard instruments

— With the engine running, check the functioning of all electrically operated instruments: rev. counter, speedometer, oil pressure gauge, water temperature gauge, fuel level gauge, clock, Alfa Romeo Control.

Brake clutch and speed-gear controls

— With engine running, push the brake pedal and check that after the initial empty stroke, the pedal stops hard without elasticity.
Check that the handbrake lever functions normally.
— With the engine running, press down the clutch pedal and check that all speeds can be shifted without sticking or noise.

MAINTENANCE

The maintenance operations consists of checking and restoring the efficiency of some parts of the vehicle which are most likely to become worn or out-of adustment as a result of normal use (1).
A list of the various operations to be performed at different internals, as shown in the chart that follows, is contained in the coupons in the Service Book which accompanies each vehicle. These coupons have to be stamped by the Service Organisation Agency to show that the specified maintenance operations have been carried out.
Just as for pre-delivery inspection, should topping up ro change of fluids or lubricants - as already described in the text - become necessary, they will be considered as part of maintenance operations.
Should faults other than those listed be encountered, they must be repaired or adjusted according to current technical and administrative procedures.

(1) It should be noted that the presence of the catalyser entails perfect engine maintenance as a principal element affecting the life of the catalyser itself.

VEHICLE MAINTENANCE SCHEDULE

No.	OPERATION	A (1)	km/1000																				Notes
			10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	
1	Change engine oil, filter and check lubrication system tightness	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	(2) E
2	Change speed-gear differential oil	X				X				X				X				X				X	
3	Check speed-gear differential oil level			X				X				X				X				X			
4	Check and if necessary top up the level of the windscreen and head lamp washer liquid and check the functioning of the wash/wipe system	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	(3)
5	Check the level of brake and clutch fluid	X	X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		
6	Change the brake and clutch fluid					X				X				X				X				X	(4)
7	Check power steering oil level	X		X		X		X		X		X		X		X		X		X		X	
8	Check the antifreeze mixture level and inspect the cooling system for leaks	X	X	X	X		X	X	X		X	X	X		X	X	X		X	X	X		(3) E
9	Change the antifreeze mixture and inspect the cooling system for leaks					X				X				X				X				X	(5) E
10	Check tightness of nuts and bolts	X																					
11	Check front wheel toe-out and adjust if necessary	X																					
12	Check the good condition of drive shaft and steering box protective boots	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
13	Check power brake vacuum intake hose for wear and inspect brake system	X		X		X		X		X		X		X		X		X		X		X	
14	Check brake pads for wear and if necessary replace		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	(6)
15	Check handbrake travel and if necessary adjust	X		X		X		X		X		X		X		X		X		X		X	
16	Check tyre pressures	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	(3)
17	Check correct tightness of nuts, bolts and screws on induction and exhaust manifolds, oil sump and front engine cover	X																					E
18	Tighten cylinder head nuts	X																					E
19	Check and if necessary adjust accelerator cable	X																					
20	Check and adjust valve clearance. Check timing and tension of timing chain	X		X		X		X		X		X		X		X		X		X		X	E
21	Check good condition and tensioning of alternator, air conditioner compressor and power steering pump (if fitted) drive belts	X		X				X				X				X				X			E

No.	OPERATION	A (1)	km/1000																				Notes
			10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	
22	Replace alternator, air conditioner compressor and power steering pump (if fitted) drive belts					X				X				X				X				X	E
23	Check fuel delivery and fuel vapour (evaporation) recycling system for leaks	X		X		X		X		X		X		X		X		X		X		X	E
24	Check and clean air filter cartridge		X		X		X		X		X		X		X		X		X		X		(7) E
25	Replace air filter cartridge			X		X		X		X		X		X		X		X		X		X	E
26	Check air intake system downstream from air flow gauge for leaks	X		X		X		X		X		X		X		X		X		X		X	E
27	Replace fuel filter					X				X				X				X				X	E
28	Check exhaust emissions	X		X		X		X		X		X		X		X		X		X		X	E
29	Check and clean spark plugs		X		X		X		X		X		X		X		X		X		X		E
30	Replace spark plugs			X		X		X		X		X		X		X		X		X		X	E
31	Check and top up if necessary battery electrolyte. Tighten and grease terminal connections	X		X		X		X		X		X		X		X		X		X		X	(3)
32	Check and if necessary adjust head lamp setting	X																					
33	Lubricate door and hood hinges and if necessary adjust strikers. Grease front and rear hood catches	X		X		X		X		X		X		X		X		X		X		X	
34	Check under body and bodywork			X		X		X		X		X		X		X		X		X		X	
35	Test vehicle	X		X		X		X		X		X		X		X		X		X		X	
36	Check oxygen content of exhaust gases (Lambda sensor)											X										X	E
37	Replace exhaust gas catalyser (silencer box)											X										X	E

E = Maintenance connected with exhaust emission control

(1) A = 1000 ÷ 1500 km

(2) To be carried out every 6 months in any case. Check oil level frequently when refuelling

(3) Check frequently when refuelling

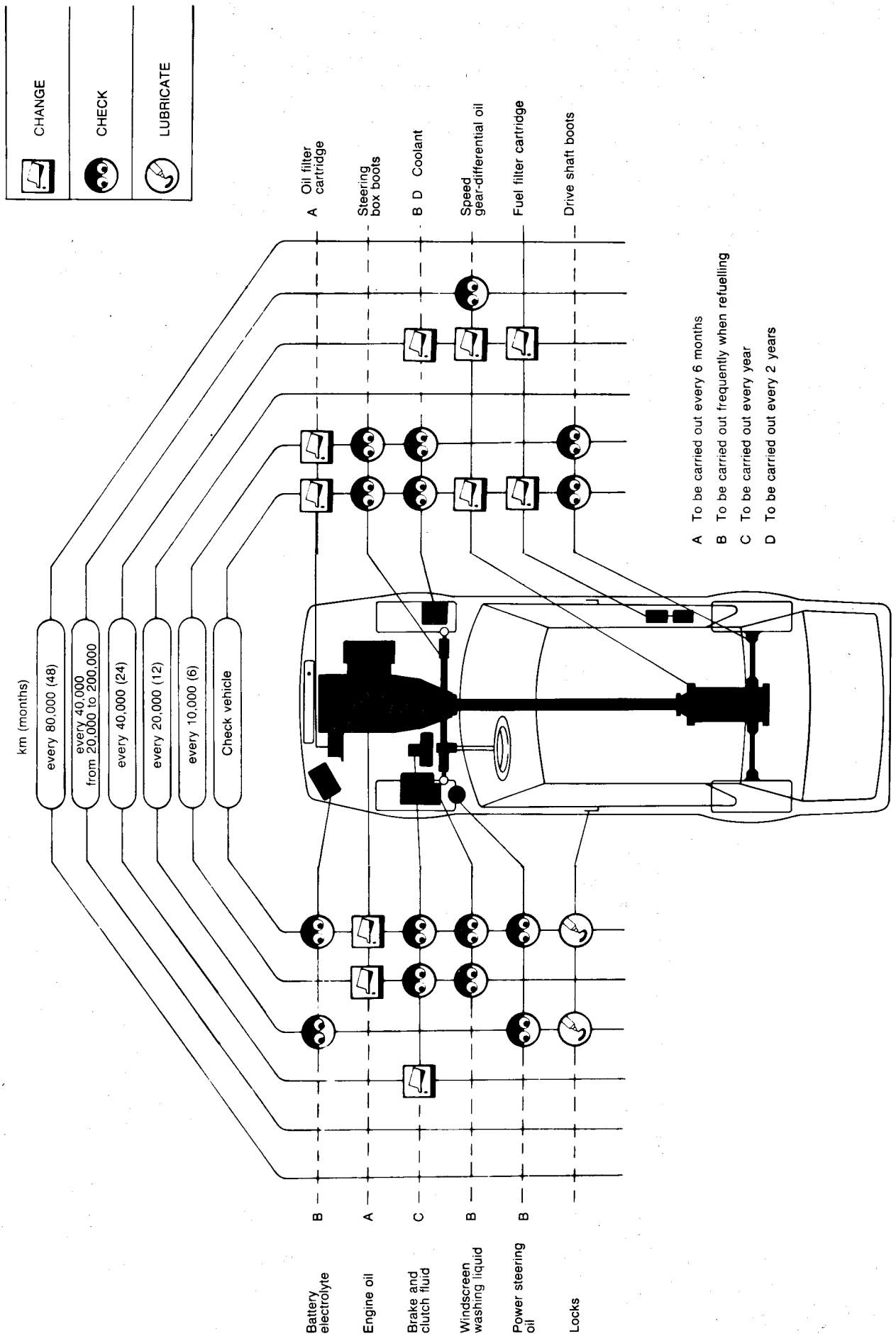
(4) To be carried out every year, in any case

(5) To be carried out every two years, in any case

(6) To be carried out with greater frequency when driving under particular stress conditions, for sports driving or on hilly roads

(7) Check with greater frequency when driving in dusty regions

FLUIDS AND LUBRICANTS SCHEDULE DIAGRAM



RECOMMENDED FUEL AND LUBRICANTS

FUEL

For correct engine functioning the use of **unleaded petrol** with the following characteristics is recommended:

Octane rating (Research Method)
R.O.N. ≥ 95

CAUTION:
To avoid permanent damage to the exhaust gas catalyser, never use, neither in case of emergency nor in small quantities, conventional petrol with lead.
To prevent the tank from being accidentally filled with lead petrol, the filler inlet tube has been designed in such a way as to permit the insertion of only those special delivery hoses fitted exclusively to unleaded fuel delivery pumps.
Should the fuel tank be filled with even a small quantity of lead petrol, do not start the engine, but proceed to the complete emptying of the fuel tank and the fuel delivery system.

FLUIDS AND LUBRICANTS

As for the corresponding model in the basic text, with vacuum fuel intake, except for the table concerning the type of oil to be used, which is to be modified as follows:

Type	Application	Classification	Name			Notes
			AGIP	IP	Others	
OIL	Engine - 01	SAE S E ASTM S E API SF	Sint 2000 SAE 10W50	SINTIAX SAE 10W40		Ambient temperature —18°C ÷ 40°C
	Gear box differential 13 - 17	SAE J 306 a API GL-5	Rotra SX SAE 75W90	Pontiax HDS SAE 75W90		Ambient temperature —40° ÷ 150°C
	Front suspension - 21	SAE J 306 a API GL-5	Rotra SX SAE 75W90	Pontiax HDS SAE 75W90		Ambient temperature —40° ÷ 150°C
	Steering box/wheel - 23	DEXRON B	ATF DEXRON B 11297	DEXRON FLUID B 11297		
	Air conditioner - 80				SUNISO 4 G SUNISO 5 DS	

APPROXIMATE REFILL CAPACITIES

Approximate refill capacities			Model 75 Twin Spark S
Fuel tank		l	49
Fuel reserve		l	8
Engine oil sump		kg With filter	5
		kg Without filter	4,5
Cam shaft support sumps (*)		kg	0,415
Gear box-differential oil		kg	2,05
Power steering system oil		kg	0,8
Coolant	Min Temp —30°C	Concentrated antifreeze l	1,2
		Distilled water l	6,8
		Antifreeze ready to use l	8
	Min Temp —45°C	Concentrated antifreeze l	2,65
		Distilled water l	5,35
		Antifreeze ready to use l	8

(*) Change oil only when dismantling. The quantity is only approximate, fill up to the level.

ENGINE MAINTENANCE

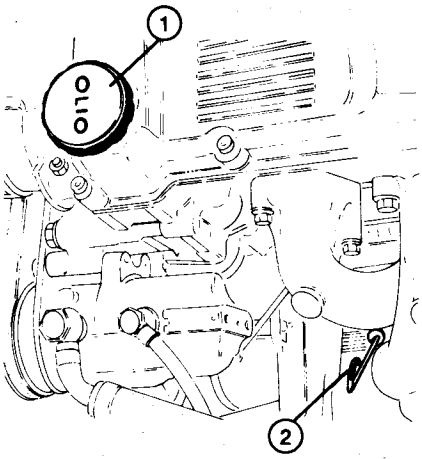
ENGINE MAIN MECHANICAL UNIT

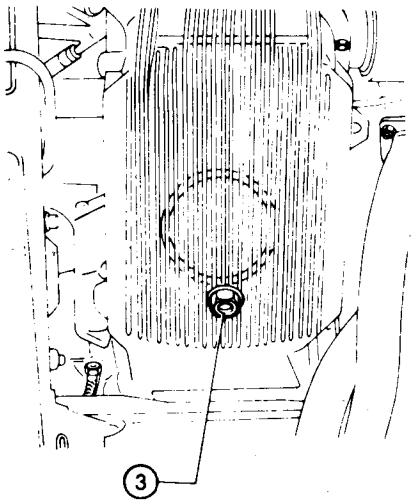
CHANGING OF ENGINE OIL AND OIL FILTER - CHECK OF LUBRICATION SYSTEM TIGHTNESS

a. With the engine warmed up, remove the oil filler cap (1), the dipstick (2) and unscrew the oil sump plug (3).
Let the oil drain off completely for at least **15 minutes.**

CAUTION:

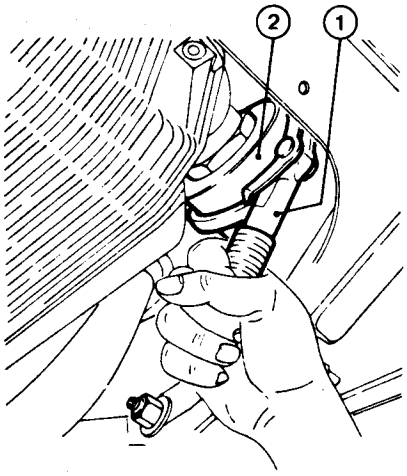
- **The presence of whitish substances in the oil is caused by the leakage of coolant liquid (water) into the oil, Identify the cause and proceed to preventive measures.**
- **An extremely low viscosity of the oil indicates that it has been diluted by the fuel.**





1. Oil filler cap
2. Oil dipstick
3. Oil sump plug

b. Using the appropriate wrench (1), dislodge the oil filter (2) and remove it, working from beneath the vehicle.



1. Wrench for removal of filter
2. Oil filter

c. When all the oil has drained off, clean the drain plug and screw it back on to the oil sump with the relative gasket.
d. Moisten the oil filter gasket with oil and fit it, screwing it on completely by hand.
e. Fill the engine with the recommended oil type and using the indicated quantity.

ENGINE OIL

Type: AGIP SINT 2000 10W50
IP SINTIAX 10W40

Quantity	5.0 kg
Sump to maximum level mark	4.5 kg
Filter capacity	0.5 kg
Difference between maximum and minimun levels on dipstick	1.15 kg
Cylinder head support sumps (*)	0.415 kg

(*) Filling to be carried out for each sump, if dismantled.

f. Check the oil level on the disptick.
g. Replace the filler cap and start the engine allowing it to idle for approximately two minutes.
h. Check that there are no oil leaks. If necessary tighten or replace any part which is poorly sealed.
i. Switch engine off and wait a few minutes.
j. Remove dipstick and clean it. Insert the dipstick again, remove it and check that the oil level reaches the MAX reference mark.

CAUTION:
Checking of the oil level is to be carried out with the vehicle parked on a level surface.

TIGHTENING OF CYLINDER HEAD NUTS

1. As per maintenance coupon

a. Remove the timing system cover following the procedure indicated in the paragraph «Check and adjustment of valve clearances», point 1.
b. With the engine cold, loosen the nuts by one turn, one at a time, following the sequence indicated in the figure. Moisten the surfaces between nut and washer and tighten to the specified torque.

(T) : **Tightening torques**
86 ÷ 88 N·m
(8.8 ÷ 9 kg·m)

c. Refit timing system cover following the reverse procedure to that employed for the removal.

2. When reassembling cylinder head

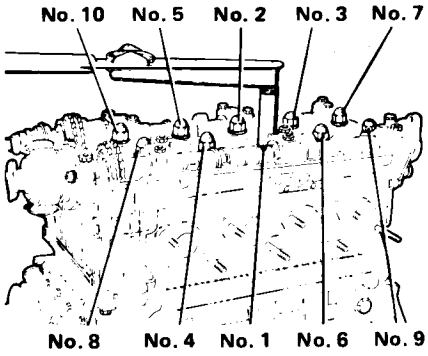
a. **Lubricate** washers nuts and threads and with the engine cold, tighten the nuts gradually to the specified torque following the sequence indicated in the figure.

(T) : **Tightening torque**
77 ÷ 79 N·m
(7.9 ÷ 8.1 kg·m)

b. Run the engine to normal running temperature and tighten the nuts, without loosening them to the specified torque, following the sequence indicated in the figure.

(T) : **Tightening torque**
82 ÷ 83 N·m
(8.4 ÷ 8.5 kg·m)

c. After approximately **1000 km** proceed, with the engine cold, as indicated at point 1.



CHECK AND ADJUSTMENT OF VALVE CLEARANCES

The following operations must be carried out with the engine cold

1. Removal of the timing system cover

a. Disconnect the negative terminal of the battery.

b. Unscrew the four screws (1) and remove the spark plug cover (2).

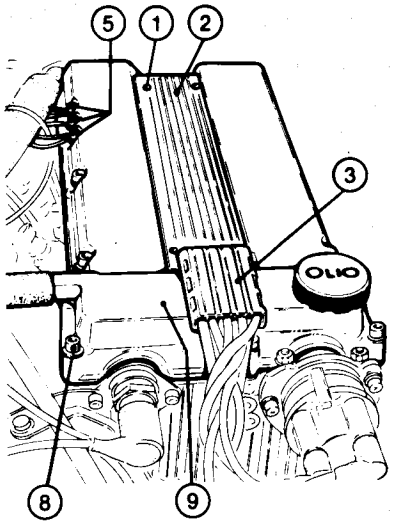
c. Remove the spark plug lead holding cover (3) and disconnect the leads from the spark plugs.

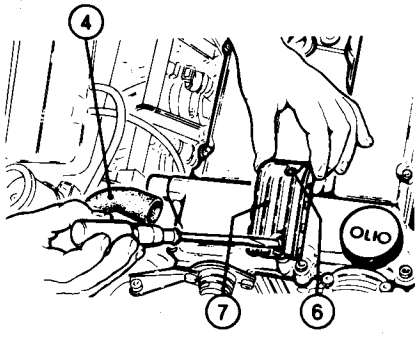
d. Disconnect the oil vapour breather tube (4) from the timing system cover.

e. Disconnect the fuel injection wiring ground leads (5), removing the three relative fixing screws on the timing system cover.

f. Unscrew the screws (6) and remove the spark plug wiring container (7).

g. Unscrew the thirteen screws (8) and remove the timing system cover (9) with the relative gaskets and oil retaining half rings.





1. Screws
2. Spark plug cover
3. Spark plug lead holding cover
4. Oil vapour breather tube
5. Fuel injection wiring grounds
6. Screws
7. Spark plug wiring container
8. Screws
9. Timing system cover

2. Valve clearance measurements

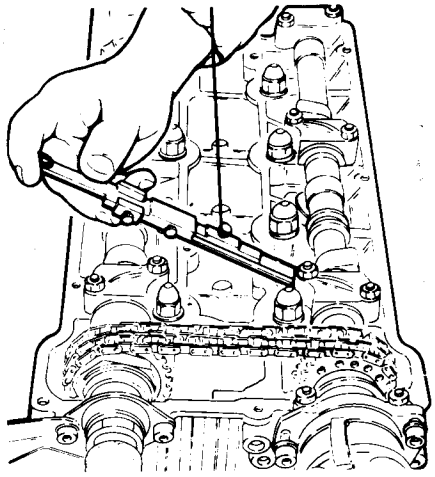
a. Clean the spark plug seats, remove the spark plugs and plug the holes to prevent foreign matter from entering.

b. With the engine cold and using feeler gauge **C.6.0168**, check that the clearance between the resting radius of the cams and the crowns of the cups lies between the specified values:

Valve clearances (with engine cold)

Intake:	**0.400 ÷ 0.450 mm**
Exhaust:	**0.450 ÷ 0.500 mm**

C.6.0168

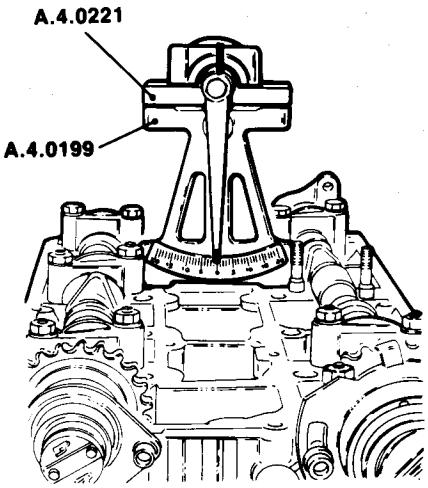


c. Should the clearances lie outside the specified values, proceed to adjust them following the procedure indicated in the following point 3.

3. Adjustment of valve clearance

a. Rotate the drive shaft until the notches on the cam shaft (1) are aligned with the notches on the relative caps (2).

— To check that the position of the notches on the caps coincides with the correct specified angle value, remove the caps using the tool **A.4.0199** equipped with the appropriate plate **A.4.0221** check respective angle values.

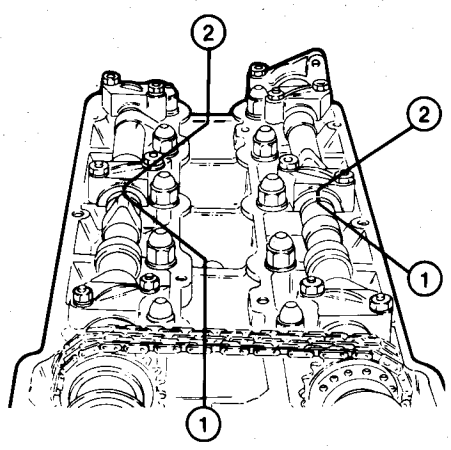


Angle position of notches on cam shaft caps

intake shaft cap:
+2°40'

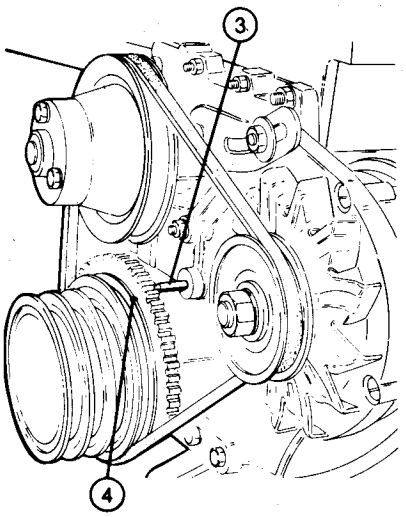
exhaust shaft cap:
—13°15'

— Should the notch not coincide with the specified value, mark a new notch on the cap in the correct position.
— Reassemble the camshaft caps and rotate the drive shaft until the notches on the cam shaft are aligned with the new notches marked on the respective caps.



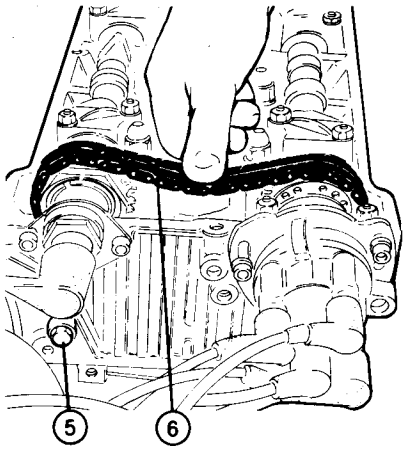
1. Cam shaft notches
2. Cap notches

NOTE:
When in this position, the fixed index point (3) on the water pump must be aligned with the reference notch (4) stamped on the front drive shaft pulley (Number 1 cylinder at Top Dead Centre position on the explosion stroke).



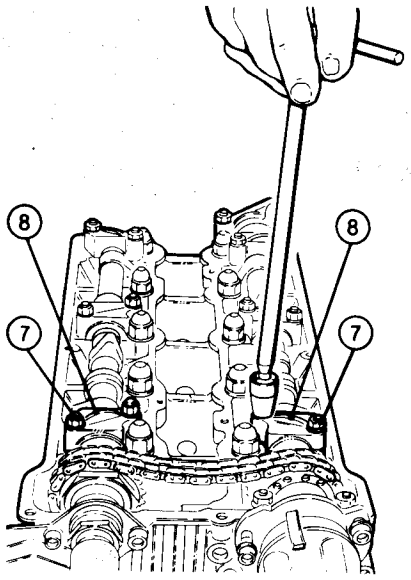
3. Fixed index point
4. Pulley notch

b. Loosen the chain tensioner securing screw (5).
c. Press the timing chain (6) downwards so as to overcome the tension of the chain tensioner spring and lock the chain tensioner in this position.



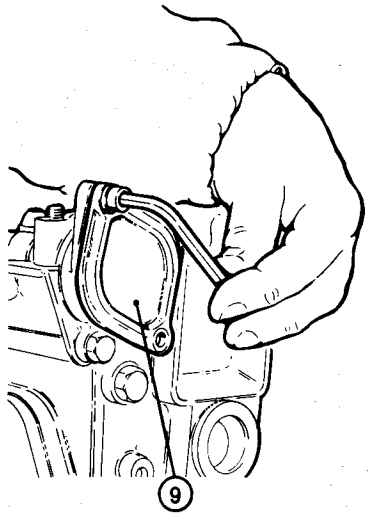
5. Chain tensioner locking screw
6. Timing chain

d. Loosen the nuts (7) and remove the cam shaft caps (8) being careful not to move the position of the chain with respect to the gears.



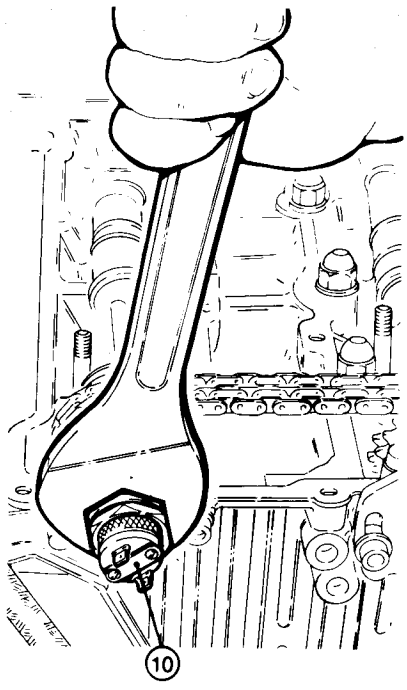
7. Cap securing nuts
8. Cam shaft caps

e. Remove the rear cover (9) on the cam shaft support, exhaust side.



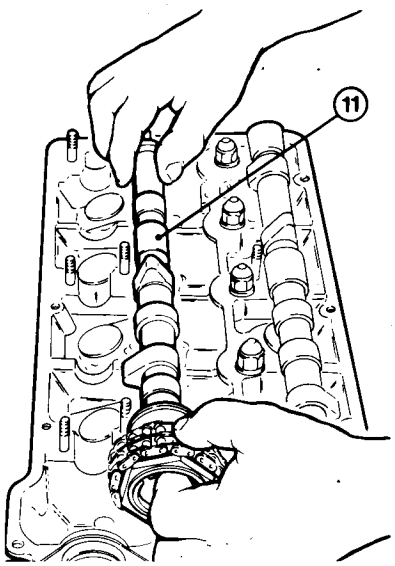
9. Rear cover

f. Remove the protective rubber cover and disconnect the power supply leads to the electric magnet of the timing variator (10) and remove the electric magnet itself, unscrewing it.



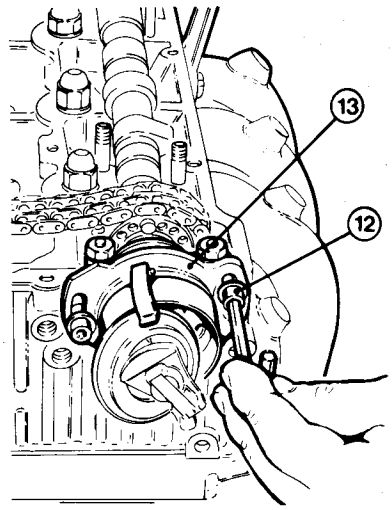
10. Timing variator electric magnet

g. Remove the intake side cam shaft (11) with the chain and rest it on the centre part of the cylinder head, being careful not to move the chain with respect to the gears.



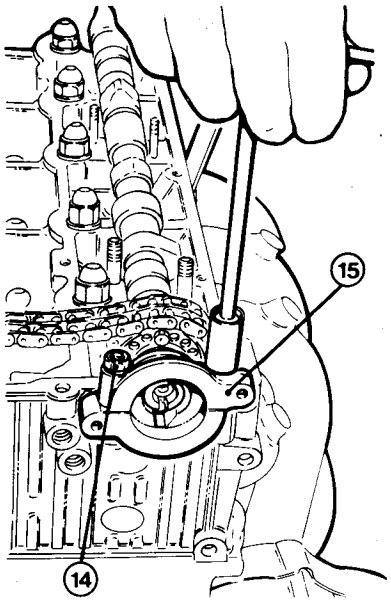
11. Intake side cam shaft

h. Unscrew the securing screws (12) and remove the distributor (13).



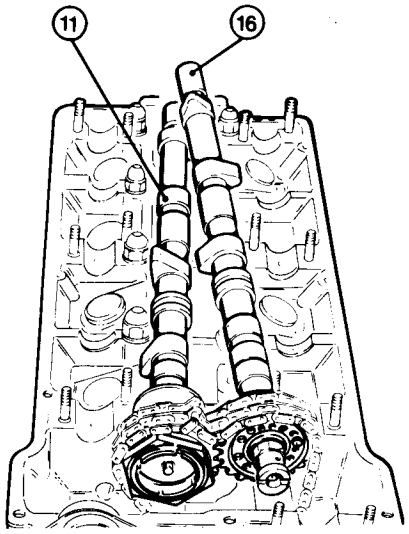
12. Distributor securing screws
13. Distributor

i. Remove the two nuts (14) and remove the distributor support flange (15).



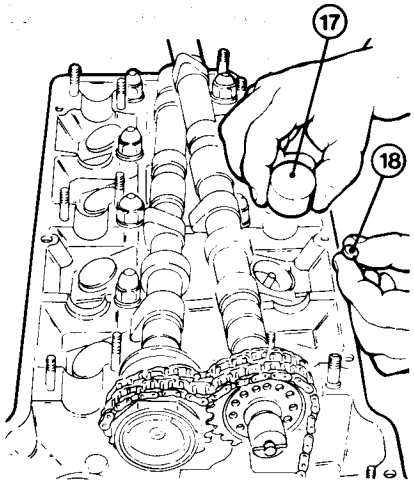
14. Flange securing nuts
15. Distributor support flange

j. Remove the exhaust side cam shaft (16) with the chain and rest it on the centre part of the cylinder head, being careful not to move the chain with respect to the gears.



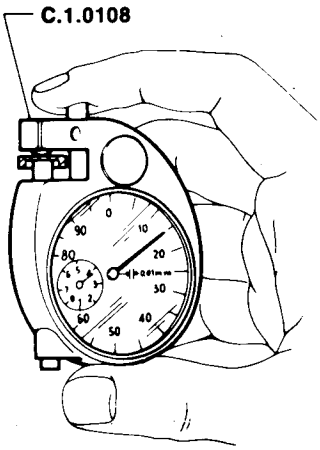
11. Intake side camshaft
16. Exhaust side camshaft

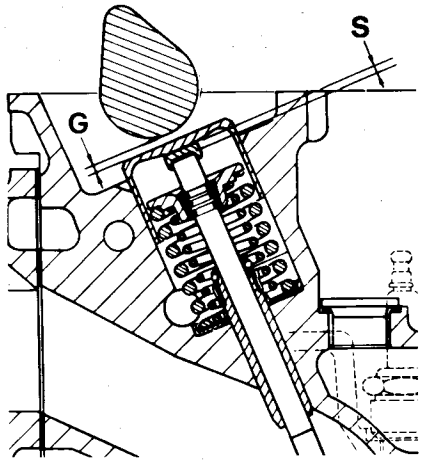
k. Withdraw the valve cup (17) and the valve clearance adjusting cap (18).



17. Valve cup
18. Adjustment cap

l. Measure the thickness **S** with the thickness gauge **C.1.0108**. Select a new cap of suitable thickness; caps are available with thickness from **1.3 mm** to **3.5 mm** with increments of **0.025 mm**.



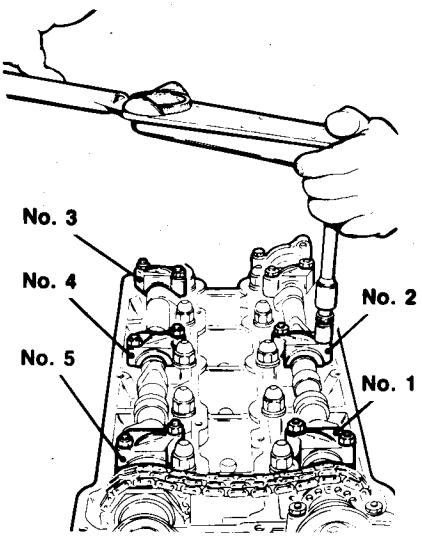


G. Valve clearance
S. Thickness of adjustment cap

m. Reassemble the valve cup (after lubricating with engine oil), the cam shafts and the chain.

n. Fit the distributor support flange and the cam shaft caps, being careful to respect the numbering stamped on these.

(T) : **Tightening torque**
Cam shaft cap securing nuts (in oil)
20 ÷ 25 N·m
(2.0 ÷ 2.5 kg·m)



o. Fit the rear cover (9) on the exhaust side cam shaft support.

p. Fit the timing variator electric magnet, screwing it in the support flange. Adjust the position of this so that the distance between the operating valve of the variator and the mobile core of the electric magnet is **0.1 ÷ 0.4 mm**.

q. Tighten the locking nut to the specified torque.

(T) : **Tightening torque**
Electric magnet securing nut
12.7 ÷ 14.7 N·m
(1.2 ÷ 1.4 kg·m)

r. Fit the ignition distributor without locking the relative securing screws.

s. Proceed to the tensioning of the timing chain, check the valve clearances again and then proceed to the setting of the timing (see paragraph «Check of timing chain tension and setting of timing»).

t. Position carefully the oil retaining half rings and the gaskets between cylinder head and the timing system cover.

u. Refit the timing cover working in reverse order with respect to the procedure followed for dismantling. Tighten the timing system cover securing screws to the specified torque:

(T) : **Tightening torque**
Timing system cover securing screws
10 ÷ 14 N·m
(1.0 ÷ 1.4 kg·m)

CHECK OF TIMING CHAIN TENSION AND SETTING OF TIMING

1. Check of timing chain tension

a. Remove cylinder head cover (see paragraph «Check valve clearance adjustment» point 1).

b. Loosen the chain tensioner securing screws.

c. Engage the highest speed, move the vehicle backwards and forwards and, keeping the chain stretched, lock the chain tensioner securing screw.

d. Position carefully the oil retaining half rings and the gaskets between the cylinder head and the timing system cover.

e. Refit the timing system cover by reversing the order of removal. Tighten the timing system cover securing bolts to the specified torque:

(T) : **Tightening torque timing system cover securing bolts**
10 ÷ 14 N·m
(1.0 ÷ 1.4 kg·m)

2. Setting of timing

The check must be carried out with the valve clearance at the specified values and the timing chain normally tensioned.

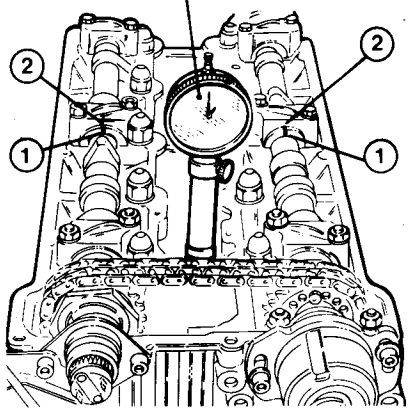
a. Remove the timing system cover (see paragraph «Check and adjustment of valve clearances» point 1).

b. Clean the spark plug seating of the 1st cylinder, remove spark plug and insert tool **C.6.0122** fitted with comparator, into spark plug support hole.

c. Engage the highest gear and move the vehicle backwards and forwards until the pointer on the comparator inverts its direction of rotation (piston No. 1 at T.D.C. with valves closed).

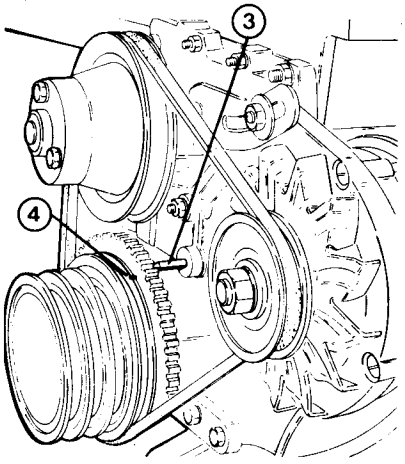
d. Make sure that the notches on the cam shafts (1) are aligned with the those on the caps (2), when the cams of the No. 1 cylinder are facing outwards.
To check that the notches marked on the caps are correctly positioned, proceed as indicated at point 3 of the paragraph «Check and adjustment of valve clearance».

C.6.0122



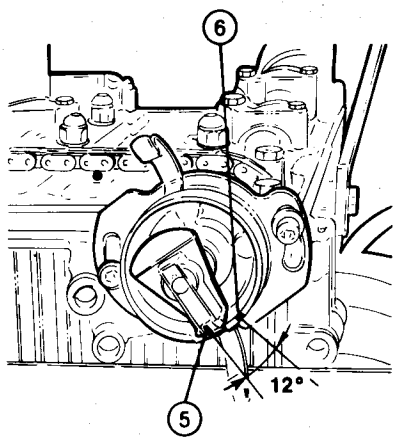
1. Cam shaft notches
2. Cap notches

e. Check also that the fixed index point (3) on the water pump is aligned with the reference notch (4) stamped on the drive shaft front pulley and on the ring gear (phonic wheel).



3. Fixed index point
4. Notch on drive shaft front pulley and ring gear

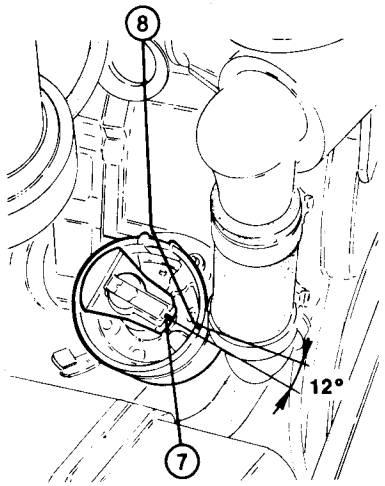
f. Make sure that the centre line of the distributor rotor arm on the cylinder heads (5) is correctly positioned with respect to the notch on the distributor casing (6) as indicated in the figure.



12° equivalent to a distance of 5 ÷ 6 mm

5. Distributor arm centre line
6. Reference notch on the distributor casing

g. Check that the centre line of the distributor rotor arm (7) on the front cover of the engine is correctly positioned with respect to the notch on the distributor casing (8) as illustrated in the figure.



12° equivalent to a distance of 5 ÷ 6 mm

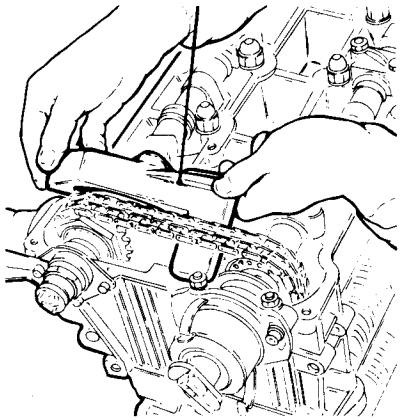
7. Distributor arm centre line
8. Reference notch on distributor casing

h. If the notches on the cam shafts are not correctly aligned with the notches on the respective caps, proceed as follows:

i. **Cam shaft intake side**

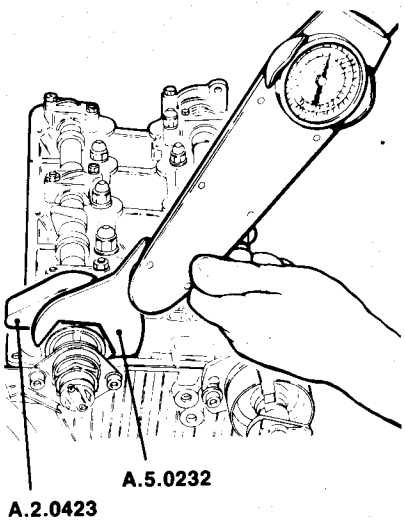
1. Remove tool **C.6.0122**.
2. Engage the highest speed and move the vehicle backwards and forwards so as to be able to insert the timing variator blocking tool **A.2.0423**.

A.2.0423



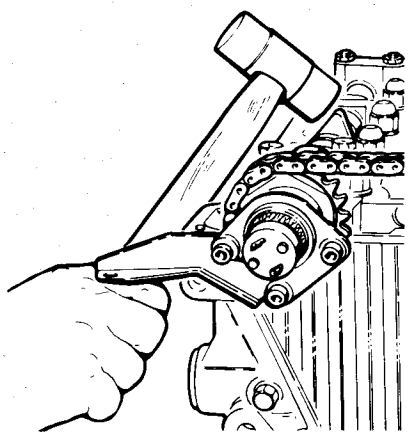
3. Loosen the timing variator securing nut by not less than **1/8 of a turn**, using the spanner **A.5.0232**.

CAUTION:
The above operation must be carried out with the utmost care so as to avoid uncoupling the front coupling.



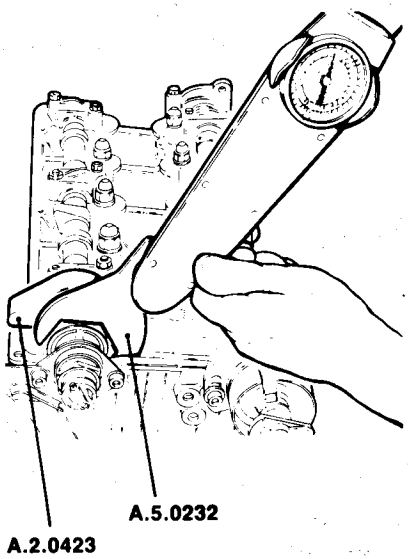
A.5.0232
A.2.0423

4. Unblock the cam shaft by removing tool **A.2.0423**.
5. Set the No. 1 cylinder in the T.D.C. position with valves closed (cams of No. 1 cylinder facing outwards).
6. Replace the tool **C.6.0122** in the spark plug seating hole in order to be sure of the T.D.C. position.
7. Unscrew further the timing variator securing nut, previously loosened, until the gear of the front coupling is disengaged.
8. Using a synthetic resin mallet, rotate the cam shaft until the notches are aligned.



9. Tighten the nut until the gear on the front coupling is blocked.
10. Block the timing variator using tool **A.2.0423**.
11. Fully tighten the nut using tool **A.5.0232** to a torque of
    88 ÷ 96 N·m
    (8.8 ÷ 9.6 kg·m);

    corresponding to:
    (108 ÷ 117 N·m)
    (11 ÷ 12 kg·m)
    on the axis of the nut.

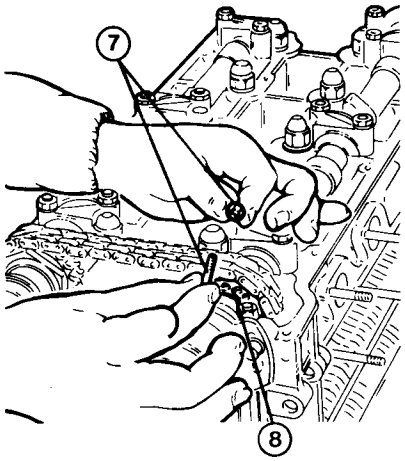


A.5.0232
A.2.0423

12. Unblock the timing variator by removing tool **A.2.0423**.

j. **Cam shaft exhaust side**

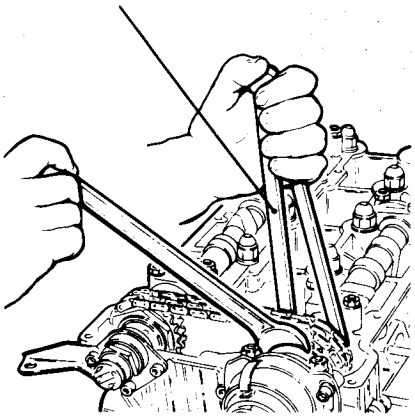
13. Remove the bolt (7) that secures the gear (8) to the sleeve on the cam shaft.



7. Bolt
8. Cam shaft gear

14. Lift the locking edge of the nut and using the tool **A.5.0103** to hold the gear, loosen the nut securing the gear to the cam shaft.
15. Using tool **A.5.0103**, turn the cam shaft without moving the chain, until the notches are aligned.

A.5.0103



16. Still using the tool **A.5.0103** to hold the gear, tighten the nut previously loosened.
17. Refit the bolt (7) in the aligned holes of the gear (8) and lock it.
18. Bend the locking edge of the nut back into position.
19. Make sure that the centre line of the distributor rotor arm is positioned as indicated in the previous point f. and then tighten the relative securing screws.

k. Position carefully the oil retaining half rings and the gaskets between the timing system cover and the cylinder head.

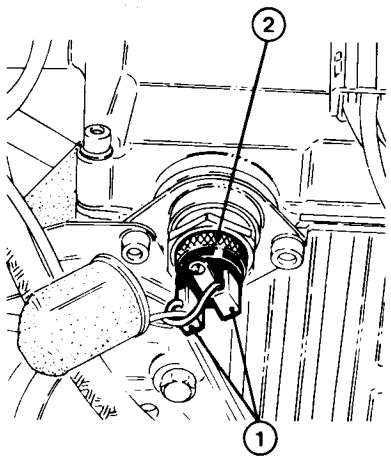
l. Refit the timing system cover by reversing the order of dismantling. Tighten the timing system cover securing screws to the recommended torque:

(T) : **Tightening torque for the timing system cover securing screws**
10 ÷ 14 N·m
(1.0 ÷ 1.4 kg·m)

CHECKING AND RESTORING OF GOOD WORKING ORDER OF THE TIMING VARIATOR

a. Start the engine and leave it running on idle.

b. Disconnect the connector (1) of the electromagnet (2) and connect the 12 V supply (battery) to the pins of the electromagnet itself. Under these conditions the engine should stop or in any case run unevenly.



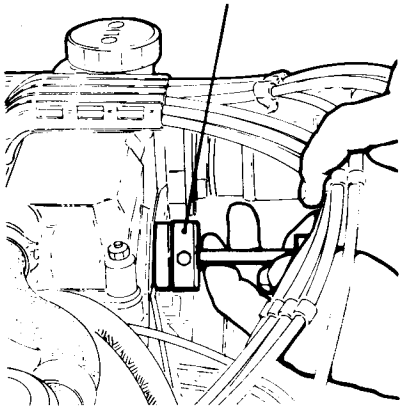
1. Electromagnet connectors
2. Timing variator electromagnet

c. If this occurs, the timing variator is to be considered as being in good working order. If not proceed as follows.

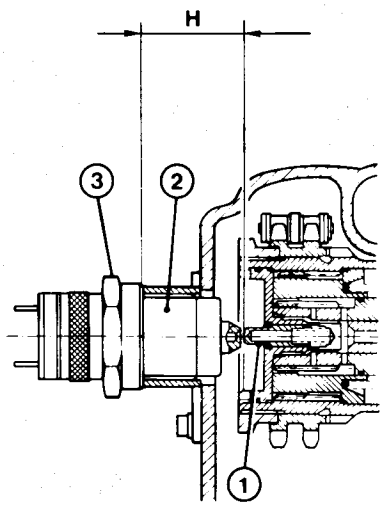
d. **Adjustment of the positioning of the electromagnet**

1. Unscrew and remove the electromagnet.
2. Using the tool **A.2.0449**, measure the distance «**H**» **between** the timing variator actuating valve (1) and the external edge of the electromagnet support flange. Transfer that measure, diminishing the value by **0.1 ÷ 0.4 mm** onto the electromagnet itself in such a way that when it is fitted, the mobile core (2) of the electromagnet is at a distance of 0.4 mm from the timing variator actuating valve.

A.2.0449



1. Timing variator actuating valve
2. Mobile core
3. Electromagnet securing nut



3. Fit the electromagnet, screwing it into the support flange (keeping the distance «**H**» unvaried) until the securing nut (3) meets the flange. Tighten the nut to the recommended torque.

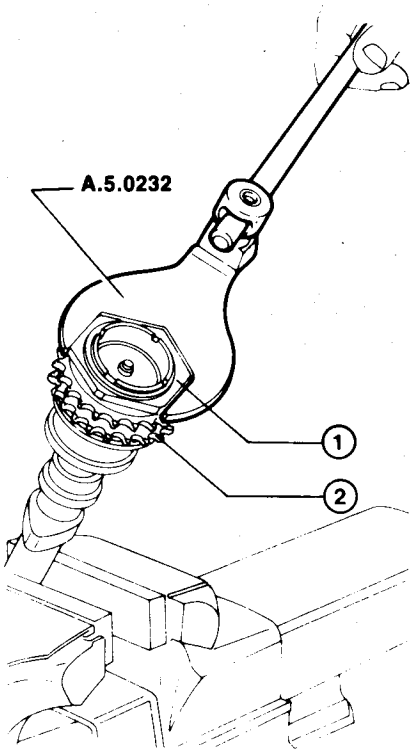
(T) : **Tightening torque**
Electromagnet securing nut
12.7 ÷ 14.7 N·m
(1.2 ÷ 1.4 kg·m)

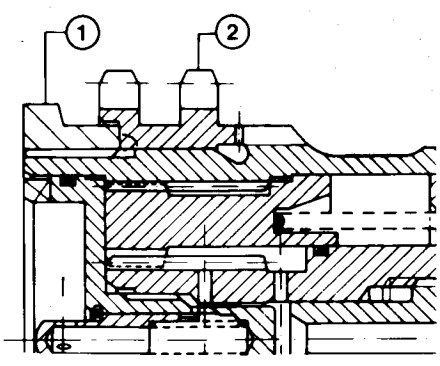
e. Remove the cam shaft with timing variator from cylinder head

1. Remove the timing system cover as indicated in «Check and adjustment of valve clearances» step 1.
2. Dismantle the intake side cam shaft operating as described in «Check and adjustment of valve clearances» step 3.

f. Remove the timing variator from the cam shaft

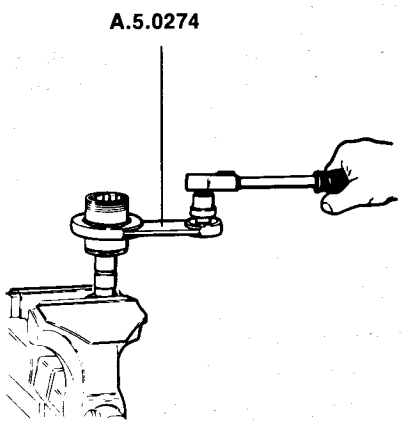
1. Lock the cam shaft in a vice fitted with protective jaws and using wrench **A.5.0232**, unscrew the nut (1) and then remove the gear (2).

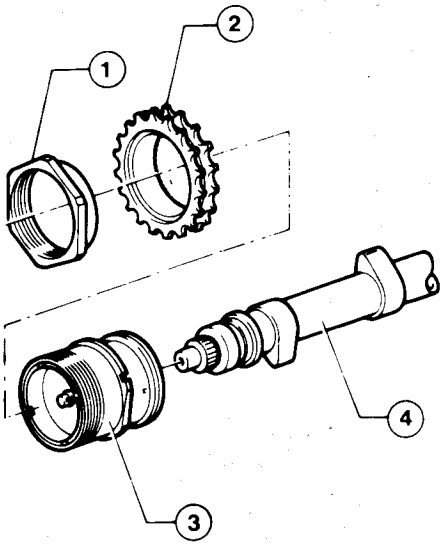




1. Nut
2. Timing chain gear

2. With the cam shaft still in the vice, use the wrench **A.5.0274** and unscrew the complete timing variator from the cam shaft.





1. Nut
2. Timing chain gear
3. Timing variator
4. Cam shaft

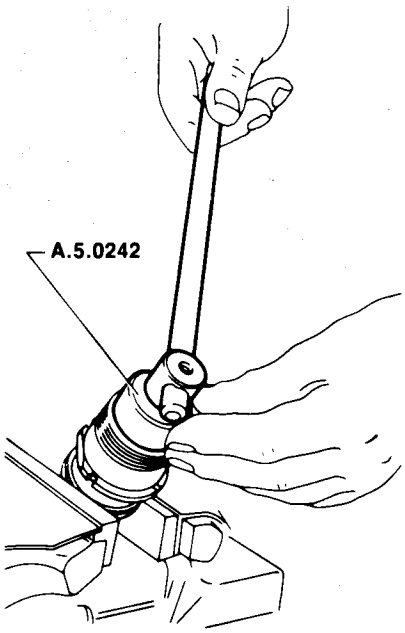
3. Move the actuating valve inwards, blow compressed air into the main duct and check that the timing variator rotates. If it is felt necessary proceed to the dismantling of the timing variator.

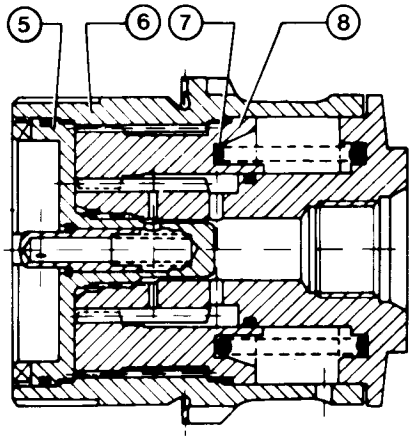
g. Dismantling of the timing variator

1. Using tool **A.5.0242**, unscrew the cover (7).

CAUTION:
The threading of the cover in question is «left-handed».

2. Withdraw the sleeve (6), the piston retaining spring (7) and the piston (8).





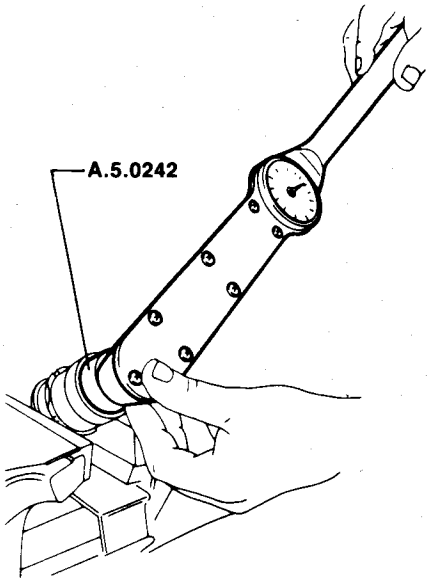
5. Cover
6. Sleeve
7. Spring
8. Piston

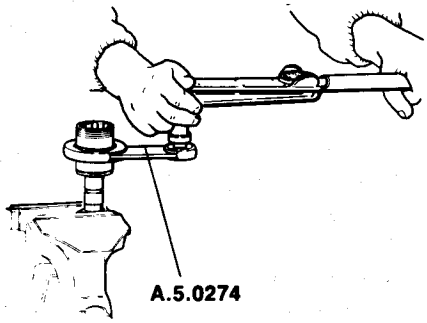
h. Checking of timing variator

1. Check all the oil passages for clogging.
2. Check the efficiency of the oil seal rings.

i. **Reassemble the timing variator**

1. Reassemble the timing variator by fitting the piston and the piston retaining spring.
2. Screw on the cover with the «left-handed» thread and with tool **A.5.0242** tighten it to the recommended torque **59 N·m (6 kg·m)**.





3. Fit the gear (2), and tighten the nut (1).

CAUTION:
The nut must be tightened so as to leave the gear (2) free.

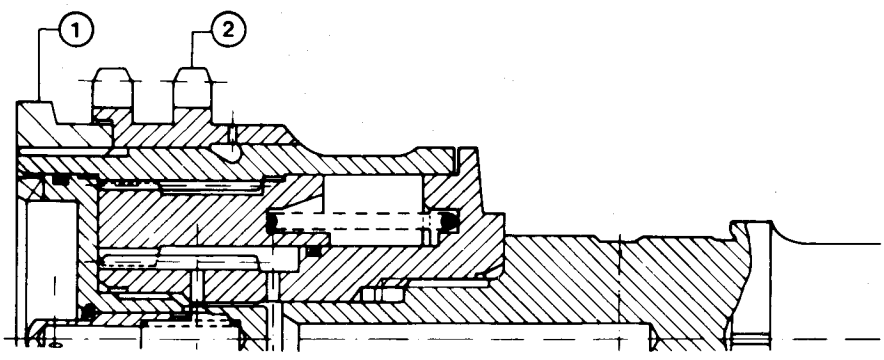
j. **Fitting of timing variator on cam shaft**

1. Smear a coat of Loctite sealing compound on the thread of the cam shaft.

CAUTION:
Take care to prevent the sealing compound from obstructing the oil passages.

2. Using the tool **A.5.0274**, screw the timing variator onto the cam shaft and tighten it to the recommended torque of **98 ÷ 117 N·m (10 ÷ 12 kg·m)**.

   Wait for approximately six hours before mounting the cam shaft on the cylinder head.

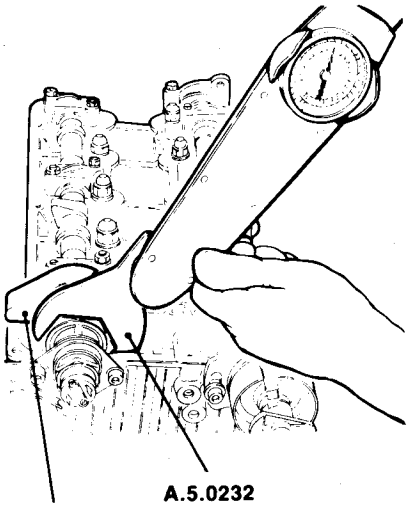


1. Nut
2. Timing chain gear

k. **Fitting of cam shaft on cylinder head**

1. Fit the cam shaft on the cylinder head following the procedure described in «Check and adjustment of valve clearances».
2. Tension the timing chain (see: «Check of timing and timing chain tension») and then tighten the gear until the coupling is tightly packed.
3. Block the timing variator, using tool **A.2.0423** tightening the nut to the recommended torque of **88 ÷ 96 N·m (8.8 ÷ 9.6 kg·m)** using the wrench **A.5.0232** corresponding to **108 ÷ 117 N·m (11 ÷ 12 kg·m)** on the axis of the nut.

With the valve closed, the piston, under the pressure of the oil, performs the stroke (12.3 ÷ 12.7 mm) due to the effect of the helical coupling, thus causing the cam shaft to rotate clockwise by approximately 14°45' ÷ 15°15'.



A.5.0232

A.2.0423

l. **Fitting of the timing system cover**

1. Fit the timing distribution cover (see: «Check and adjustment of valve clearances»).

ADJUSTMENT OF TENSION AND REPLACEMENT OF ALTERNATOR DRIVE BELT

1. Adjustment of tension

The tension of the belt is correct if it deflects by **10 ÷ 15 mm**, when a load of approximately **78 N (8 kg)** is applied to the centre of the belt.

To adjust the tension unscrew the nuts (1) and (2) on the adjustment arm and then loosen the bolt (3).

Move the alternator so as to increase the belt tensioning and tighten the nut (2).

Check the tension of the belt and then tighten the bolt (3) and the nut (1).

2. Replacement of belt

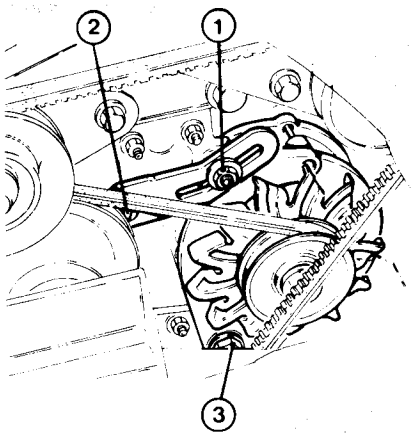
Remove the power steering pump drive belt and the air conditioner compressor drive belt as indicated in the following paragraphs.

Loosen the nuts (1) and (2) and the bolt (3). Move the alternator inwards and remove the worn belt.

Fit the new belt on the three pulleys and adjust the position of the alternator until the required belt tension is obtained.

Tighten fully the nut (2) and check the tension; tighten the bolt (3) and the nut (1).

Fit the power steering pump drive belt and the air conditioner compressor drive belt as indicated in the paragraphs below.



1. Nut
2. Nut
3. Bolt

ADJUSTMENT OF TENSION AND REPLACEMENT OF POWER STEERING PUMP DRIVE BELT

1. Adjustment of tension

The tension of the belt is correct if it deflects by **13 mm** when a load of approximately **147 ÷ 294 N (15 ÷ 30 kg)** is applied to the centre of the belt.

To adjust the tension loosen the screws (1) and (3) on the front bracket (2) of the pulley tensioner.

Move the bracket upwards to increase the tension of the belt and then tighten the screw (1).

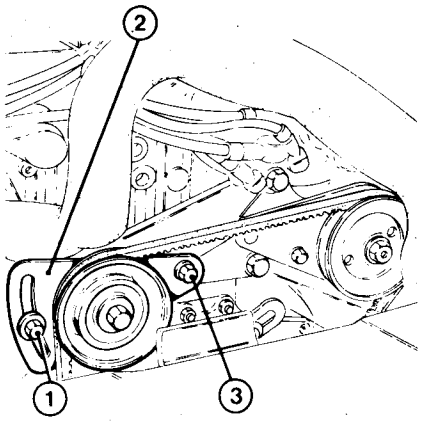
Check the tension of the belt again and then tighten the screws (1) and (3).

2. Replacement of the belt

Loosen the screw (1) and (3), move the belt tensioner bracket (2) downwards and remove the worn belt.

Fit the new belt on the three pulleys and adjust the position of the belt tensioner bracket until the required belt tension is obtained.

Tighten fully the screw (1), check the tension of the belt again and then tighten the screw (3).



1. Belt tensioner bracket securing screw
2. Belt tensioner bracket
3. Belt tensioner bracket securing **screw**

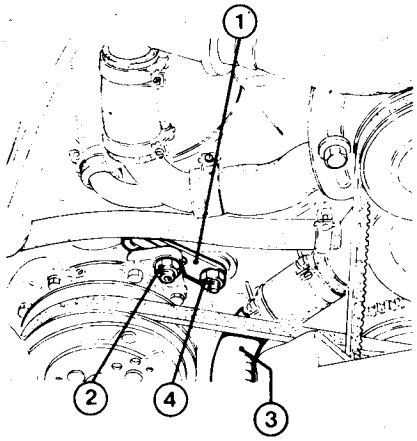
ADJUSTMENT OF TENSION AND REPLACEMENT OF AIR CONDITIONER COMPRESSOR DRIVE BELT

1. Adjustment of the tension

The tension is correct if the belt deflects by **10 ÷ 15 mm**, when a load of approximately **78 N (8 kg)** is applied to the centre of the belt.

To adjust the tension loosen the bolts (2) on the two slotted brackets (1) and then loosen the bolt (4).
Move the compressor outwards to increase the tension of the belt and re-tighten the bolts (2). Check the tension of the belt again and then tighten the bolt (4).

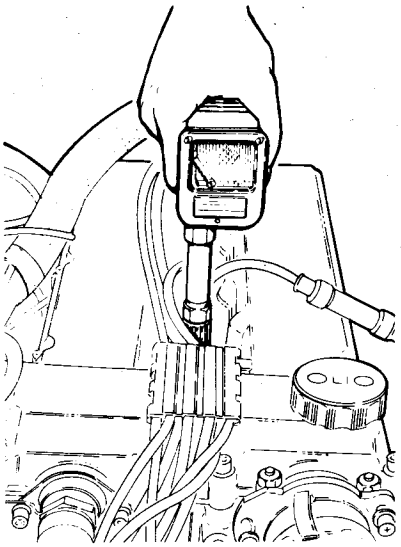
2. Replacement of the belt
Remove the power steering pump drive belt as indicated in the preceding paragraph.
Disconnect the cooling system hose (3) and empty the system using a suitable container to collect the fluid.
Loosen the bolts (2) on the two brackets (1) and the bolt (4) and then move the compressor inwards and remove the worn belt.
Fit the new belt on the two pulleys and adjust the position of the compressor until the belt tension required is obtained.
Tighten fully the bolts (2), check the tension of the belt and then tighten the bolt (4).
Re-fit the power steering pump drive belt and adjust the tension as indicated in the preceding paragraph.
Reconnect the cooling system hose (3), previously disconnected and fill the system with fluid of the recommended type and quantity as described in «Engine cooling» point 4.



1. Bracket
2. Bracket securing bolt
3. Cooling system hose
4. Conditioner support cradle securing bolt

CYLINDER COMPRESSION TEST

When checking poor engine performance because power is not up to normal, it is advisable to test cylinder compression using the appropriate tester.
The test is carried out as follows:
a. Start the engine and leave it running until it reaches normal running temperature.
b. Remove the spark plugs.
c. Disconnect the connectors from the power modules and the connectors on the electric fuel injectors.
d. Insert the compression testing insrument in a spark plug seating.



e. Turn the engine over a few times by means of the starter motor, keeping the accelerator pedal fully pressed.
(Make sure there are no leaks from the pressure gauge union).
f. Repeat the test to measure the compression values of the remaining cylinders taking care to reset the writing pointer of the tester each time; then compare the values measured.

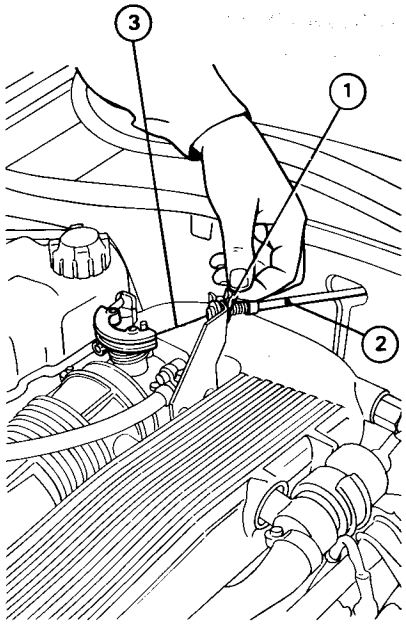
NOTE:
If the difference between the pressure values measured in the cylinders is excessive, seek the cause starting with a check of the tightness of the valves and if necessary proceeding to a check of the compression rings and the pistons.

FUEL SYSTEM

CHECK AND ADJUSTMENT OF THE ACCELERATOR

1. Checking of cable sliding
Check that the accelerator cable moves freely in its sheath.

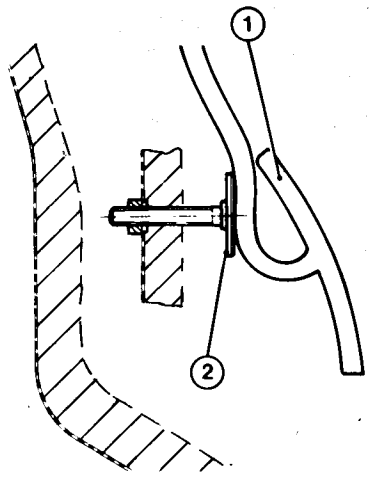
2. Adjustment of play in cable
a. With the accelerator pedal up, check that the accelerator end play on the control lever is **1 ÷ 2 mm**.
b. If necessary adjust the cable backlash by removing the adjusting spring (1) and moving the sheath (2) so as to produce the recommended backlash on the cable (3). Then reinsert the spring in the new position.



1. Adjusting spring
2. Accelerator cable sheath
3. Accelerator cable

3. Checking the maximum opening of the butterfly valve
a. With the accelerator pedal pressed fully down, check that the accelerator control cam can still rotate by **1 ÷ 2 mm**.

b. If necessary proceed with the adjustment by means of the end of travel screw (2) under the accelerator pedal (1).



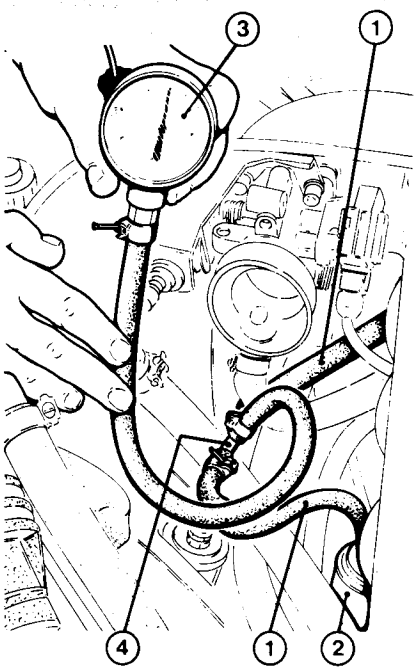
1. Accelerator pedal
2. End of travel screw

CHECK OF FUEL SYSTEM PRESSURE AND TIGHTNESS OF SYSTEM

1. Check of fuel system pressure

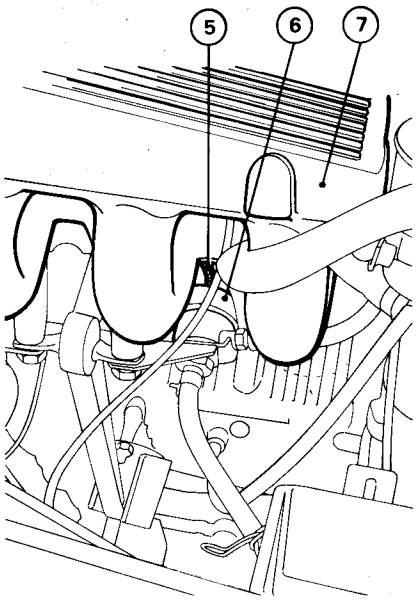
Carry out the check as follows:

a. Connect a pressue gauge (3) between the fuel delivery tube (1) and hammering damper (2) by means of a «T» adaptor (4).



1. Fuel delivery tube
2. Hammering damper
3. Pressure gauge
4. «T» adaptor

b. Disconnect the hose (5) that connects the pressure regulator (6) to the air intake box (7), in order to prevent any irregularities in the engine idling from causing irregular readings.



5. Vacuum hose
6. Pressure regulator
7. Air intake box

c. Start the engine; with the engine on idle, using the pressure gauge, check that the reading is equal to the recommended value:

Fuel pressure
284.3 ÷ 323.6 kPa
(2.8 ÷ 3.2 bar; 2.9 ÷ 3.3 kg/cm²)

d. Re-connect the hose (5) to the air intake box (7). With the engine on idle the fuel pressure should fall to approximately **0.5 bar** and then rise again when the accelerator butterfly valve is opened.
If this does not occur, search for possible leaks from the vacuum hose (5).

2. Check tightness of system

a. Keeping the pressure gauge connected, and with the engine on idle, choke the hose immediately downstream from the pressure regulator (6) until a pressure value of **4 bar** is read (ensure that the pressure does not exceed this value).

b. With the pressure at **4 bar** check that the fuel system tubes and unions do not present leaks.

c. If the pressure does not reach the value of **4 bar**, and no leaks are encountered, check the filter and/or the functioning of the fuel pump.

TROUBLE DIAGNOSIS PROCEDURE FOR THE CHECKING OF THE TIGHTNESS OF THE FUEL INJECTION SYSTEM

The procedure is to be carried out at the intervals indicated in the «Vehicle maintenance schedule» and in the presence of the following symptoms:

— Smell of petrol
— Visible signs of leaks from the unions and connections of the system.

The possible causes are:

— Petrol leaks from the components, the unions and the connections of the system.

Carry out the procedure described in the preceding paragraph for the «Check of the fuel system pressure» and the «Check of the fuel system tightness» and in particular:

a. Make sure of the presence of fire fighting equipment in the workshop so as to be able to work in conditions of maximum safety.

b. Run the engine to normal running temperature.

c. Switch the ignition off.

d. Inspect visually the components and unions of the fuel system so as to locate the origin of the leak.

e. Check the entire system (connecting tubes, unions, components) using an exhaust gas analyser (NDIR system).

f. The pointer of the analyser will react in the vicinity of the zone of the leak.

The analyser test must be carried out slowly so as to allow for the slow response time of the instrument.

g. Following the location of the leak by means of the procedure indicated in points **d.** and/or **e.** eliminate the leak by replacing the defective components of the system or by suitably tightening the loose clips.

h. On completion of the preceding operation, start the engine, let the engine idle for a few minutes and then switch the ignition off.

i. Repeat the test described in points **c.** and **d.** in order to check the exactness of the diagnosis and the effectiveness of the repair.

l. On completion of the procedure described in points **a.** to **h.**, carry out a road test of at least 30 minutes, followed by a final check to ensure the correct working order of the system.

CHECK OF THE TIGHTNESS OF THE FUEL VAPOUR EMISSION (EVAPORATION) SYSTEM

The procedure described below must be carried out when checking the fuel system pressure and in the presence of the smell of petrol.

The probable cause is a blow-by of vapour from the tubes, unions or parts of the system.

PROCEDURE «A»

a. Disconnect the tube connecting the vapour cleaner and the fuel tank and connect it to a compressed air source, with a pressure gauge between the source of compressed air and the tube.

b. Pressurise the system with compressed air until a pressure of:

0.025 bar (2.49 kPa; 0.0255 kg/cm^2; 254 mm H_2O)

is obtained and close the system.

If this value cannot be reached, open the compressed air source and check the tightness of the system (with an HC analyser of a «Snoop» leak detector).

c. Measure the fall in pressure in the system (this must not be more than:

0.00125 bar (0.125 kPa; 0.00127 kg/cm^2; 12.7 mm H_2O)

after 10 minutes).

d. If after 10 minutes the fall in pressure is greater than the specified value, locate the leaks by smearing the tubes and unions with soapy water or by using the «Snoop» detector.

e. Bubbles will appear in the presence of leaks.

f. In the case of leaks coming from the filler cap/pipe, replace the cap first of all. If after replacing the cap the tightness of the system is restored, this means that the cap was defective. If the tightness is not restored replace the filler pipe.

g. Replace the parts that are thought to be defective and/or adeguately tighten loose pipe clips etc.

h. Repeat the operations **b.** and **c.** to check the correctness of the diagnosis.

ALTERNATIVE PROCEDURE «B»

To be carried out with the fuel tank at least 3/4 full.

a. Disconnect the tube connecting the vapour cleaner and the fuel tank and connect it to a compressed air source, with a pressure gauge between the source of compressed air and the tube.

b. Pressurise the system blowing propane into the vapour breather tubing until a pressure value is obtained equal to:

0.025 bar (2.49 kPa 0.0255 kg/cm^2; 254 mm H_2O)

c. Check for the existence of propane leaks from the tubing, unions or parts of the system, by using an HC (probe) sensor connected to an HC analyser.

d. Repair the leak (or tighten the pipe clips, if this is sufficient).

e. Repeat operations **b.** and **c.** to check the correctness of the diagnosis.

CHECK THE TIGHTNESS OF THE AIR INTAKE SYSTEMS DOWNSTREAM FROM THE AIRFLOW GAUGE

In order to detect the existence of air leaks throughout the entire air intake system, disconnect the flexible air intake hose that connects the constant idle actuator with the corrugated air intake sleeve and blow in air with a compressed air gun.

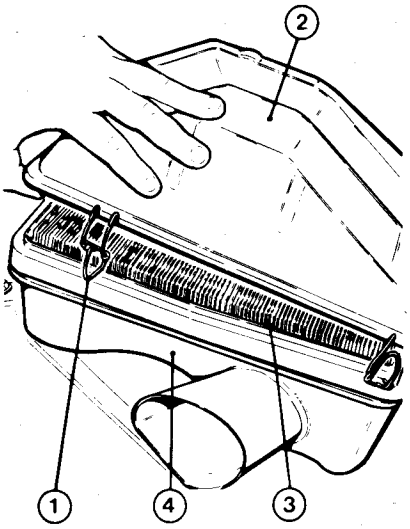
Completely open the accelerator butterfly valve and smear or spray soapy water on all the joints in the system; the formation of bubbles or foam indicates the existence of leaks.

CHECKING CLEANING AND REPLACEMENT OF THE AIR FILTER

a. Release the clips (1) which secure the filter cover (2) to the filter container.

b. Lift the cover enough to remove the cartridge (3) without damaging the surrounding components.
c. Clean the cartridge container (4).
d. Clean the cartridge thoroughly, by blowing low pressure compressed air into the cartridge from the filter lower side.
e. Insert the filter cartridge in the container ensuring that the «top» label is facing upwarsd.
f. Fit the cover (2) securing it with the clips (1).

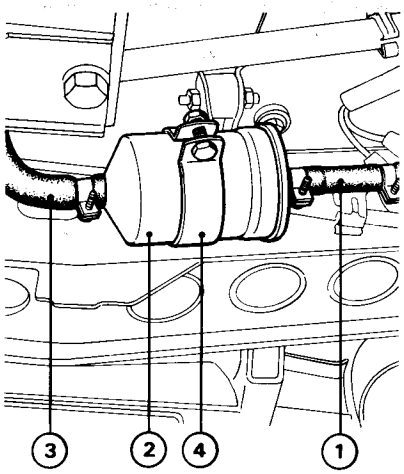
The air filter cartridge should be replaced periodically (see: «Vehicle maintenance schedule»).



1. Clips
2. Cover
3. Filter cartridge
4. Filter container

REPLACEMENT OF FUEL FILTER

a. Working from underneath the vehicle, pinch the tubes (1) and (3).
b. Loosen the pipe clips and disconnect the tubes (1) and (3) from the filter (2).
c. Loosen the filter retaining clip (4) and remove the filter.
d. Refit the new filter taking care to see that the arrow stamped on the filter is pointing in the direction of the fuel delivery.
e. When the new filter is fitted, remove the clips from the fuel delivery tubes.



1. Fuel inlet tube
2. Fuel filter
3. Fuel outlet tube
4. Filter retaining clip

CHECK OF IDLE R.P.M.

The check of the idle r.p.m. is to be carried out with the engine at normal running temperature, the gear speed in neutral and all the ancillary devices excluded.

Idle r.p.m.
800 ±50 r.p.m.

The regulation of the idle r.p.m. is automatically controlled in all engine functioning conditions by means of the constant idle actuator.
With the engine running on idle, the function of the actuator is to bring the actual r.p.m. to the nominal r.p.m. (800 ±50 r.p.m.) by acting on the accelerator butterfly by-pass.

As well as controlling the idle r.p.m., it also acts as an additional air box and regulator for the operation of the air conditioning systen.
When the compressor begins to operate, the electronic control unit automatically maintains the correct r.p.m. by means of the idle actuator.

NOTE:
With the Motronic system, periodic adjustment of the idle r.p.m. is not possible.
If the idle r.p.m. is above or below the recommended values and the vehicle presents no mechanical faults, then the fault probably lies in the electronic circuits. In this case it will be necessary to resort to the trouble diagnosis procedure using the appropriate tester.
If the specified idle r.p.m. is still not achieved, it will be necessary to replace the defective components.

CHECK OF EXHAUST EMISSIONS (CO) WITH ENGINE RUNNING ON IDLE

The check is to be carried out using NDIR type equipment. The gas to be analysed is taken from the end of the exhaust pipe upstream from the catalyser (catalytis silencer).
The check is carried out with the engine at normal running temperature, (after the electric fan has come on and then gone off) and after having carried out the idle r.p.m. check (see: «Check of the Idle r.p.m.»).
The following preliminary checks are also to be carried out:

— Check of engine oil level
— Cleaning of air filter cartridge
— Check of ignition system efficiency
— Ignition timing

The CO level should fall within the specified values:

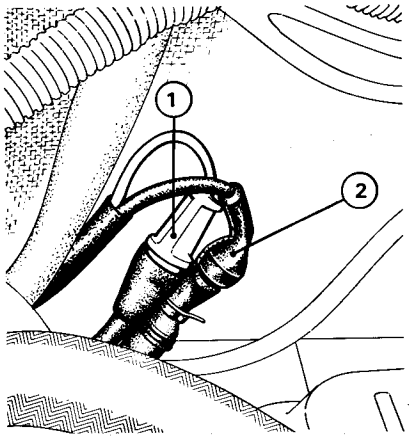
% CO ≤0.2

NOTE:
With this configuration of the Motronic ML4.1 system, periodic adjustments of the CO emissions with the engine on idle are not possible. If the values are found to fall outside the specified limits and the vehicle does not present any mechanical fault, then it is probable that the fault lies in the electronic circuits.
In this case it will be necessary to resort to the trouble diagnosis procedure using the appropriate tester.
If the CO level is still found to fall outside the specified limits, it will be necessary to replace the defective components.

EXHAUST SYSTEM

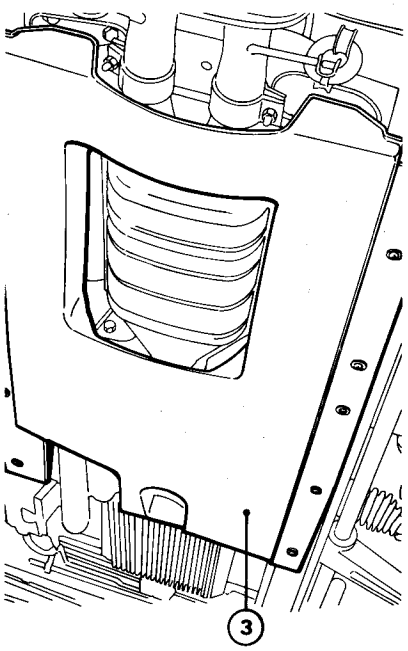
REPLACEMENT OF THE LAMBDA SENSOR AND THE CATALYSER

1. Set vehicle on lift.
2. Working from the engine compartment remove the rear cover and disconnect the connectors (1) and (2) of the Lambda sensor wiring.



1. Lambda sensor connector
2. Lambda sensor resistance connector

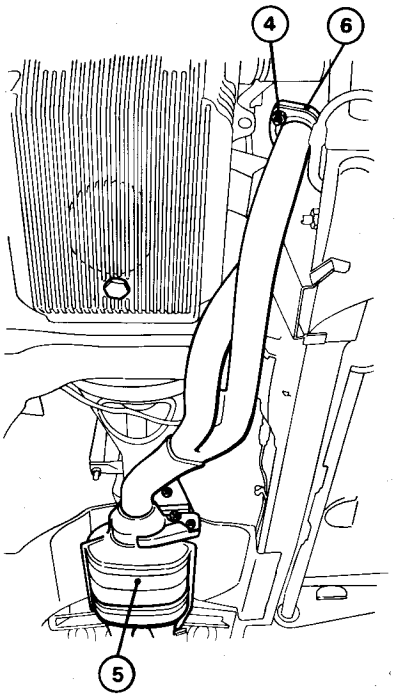
3. Working from beneath the vehicle unscrew the screws and remove the catalytic silencer heat shield (3).



3. Catalytic silencer heat shield

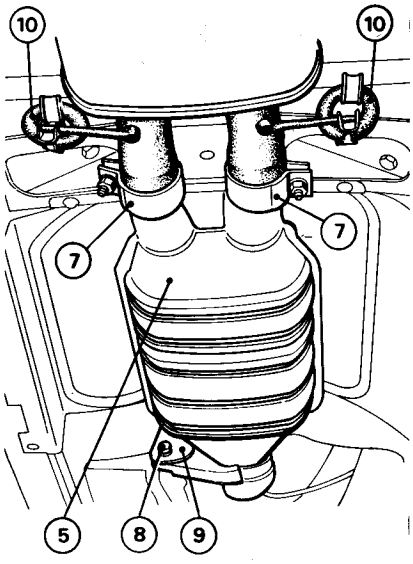
4. Unscrew the wire clip securing bolt and free the lead of the Lambda sensor.

5. Unscrew the nuts (4) securing the catalyser (5) to the two exhaust manifolds (6).



4. Securing nuts
5. Catalyser
6. Exhaust manifolds

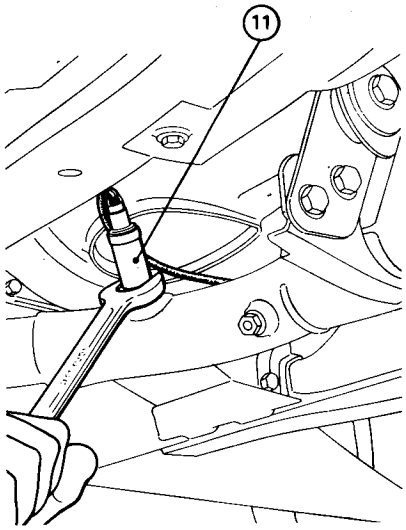
6. Loosen the two clips (7) at the rear of the catalyser (5).
7. Unscrew and remove the two bolts (8) securing the catalyser to the support (9) and release the retaining rings (10).



7. Clips
8. Securing bolts
9. Support
10. Elastic retaining rings

8. Disconnect the catalyser from the two exhaust manifolds and also remove the respective gaskets.
9. Remove the catalyser disconnecting it from the central length of the exhaust piping, knocking it lightly with a plastic hammer round the circumference of the connecting parts.
10. Fit a new Lambda sensor in a new catalyser proceding as follows:

a. Grease the thread of the body of the sensor with R. Gori Never Seez grease or alternatively BOSCH 5.964.00.105 grease.
b. Using a suitable spanner, fit the Lambda sensor (11) in the catalyser.



11. Lambda sensor

11. Refit the catalyser by reversing the order of removal and being sure to carry out the following:

a. Fit new gaskets between the catalyser and the exhaust manifolds.
b. Shake the exhaust pipe a little so as to seat it properly and then tighten all the securing nuts and bolts.
c. Position the Lambda sensor lead and fix it with the appropriate clip.
d. Reconnect the two connectors of the Lambda sensor wiring located in the engine compartment.
e. Start the engine and check that there are no leaks of exhaust gases from the pipe connections and that there is no excessive noise coming the system.

ENGINE IGNITION

CHECK OF INGITION TIMING

a. Connect the stroboscopic gun to the terminal of the No. 1 cylinder spark plug on the distributor. Connect the negative and positive leads of the stroboscopic gun to the respective battery terminals.

b. Connect an electronic rev counter to the engine.

c. Run the engine to normal running temperature and at idle r.p.m. (**800 ±50 r.p.m.**), check that the notch on the engine pulley is aligned with the fixed reference index on the water pump.

Fixed advance
10° ±1° before T.D.C.

Take especial care to see that the engine is running at the idle r.p.m.: 800 ±50 r.p.m.

CAUTION:
The system does not require and does not permit any adjustment of the spark advance. Do not rotate the ignition distributor. If it is rotated, the firing order could be modified, thus resulting in very serious consequences.
If the timing is not within the specified values and the vehicle does not present any mechanical fault, then there is probably a fault in the electronic circuits. In this case it will be necessary to resort to the trouble diagnosis procedure using the appropriate tester.

CHECK, CLEANING AND/OR REPLACEMENT OF THE SPARK PLUGS; FIRING ORDER

1. Checking

— The standard spark plugs fitted are of the surface discharge type with four points and a central electrode. No adjustment of the distance between the electrodes is required by this type of spark plug.
— The use of spark plugs with different features or dimensions can cause serious damage to the engine and can also alter the exhaust emission levels.
— Clean and replace the spark plugs periodically at the intervals indicated in the «Vehicle maintenance schedule».
— Replace the spark plugs if the ceramic insulator is cracked or the electrodes are excessively worn.

2. Replacement

a. With the engine cold, roll back the rubber cap, blow compressed air into the spark plug seating in order to remove any foreign matter and then remove the spark plugs.

b. **Grease** the threads with **ISECO Molikote A grease** and tighten the spark plugs to:

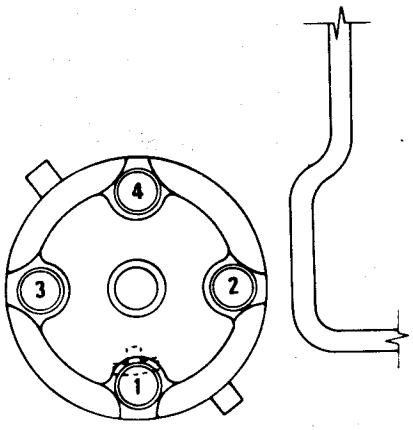
25 ÷ 34 N·m
(2.5 ÷ 3.5 kg·m)

c. Make sure that there is both a good mechanical and electrical connection between the spark plug leads and the connectors.

d. If in doubt slide the rubber cap back along the spark plug lead, fully tighten the connector and slide the rubber cap back over the connector.

Connect the connector to the spark plug.

CAUTION:
The spark plug leads must be reconnected according to the correct firing order.
Firing order: 1-3-4-2.



ENGINE COOLING

CHECK OF ANTIFREEZE MIXTURE LEVEL AND COOLING SYSTEM TIGHTNESS CHECK

1. Check of system

a. Check that the coolant level in the filler tank is within the MAX and MIN reference marks.

b. Inspect the tubes and couplings checking that they are not worn and do not leak.

c. Inspect the filler tank cap checking that the springs, the gasket and the valves are in good condition.

d. Check that the electric fan is in correct working order.

— Disconnect the two leads of the thermal switch on the radiator and short circuit them.
— Turn the ignition key and check that the fan starts.

e. Check the radiator referring to Group 07 - Cooling of the «WORKSHOP MANUAL - ENGINES».

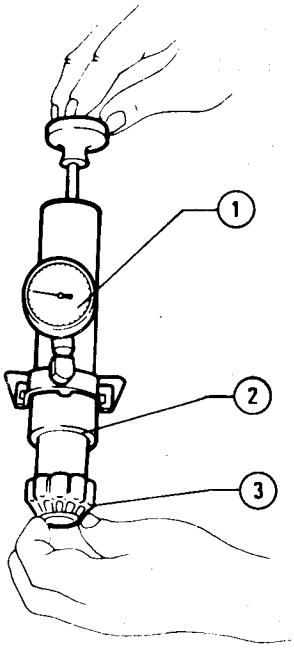
f. Should it be necessary to top up with considerable quantities of coolant liquid, check the system carefully for possible leaks and eliminate them.

2. Pressurised cap tightness test

a. Attach the appropriate coupling (2) to the testing instrument and insert it in the pressurised cap.

b. Pressurise the cap and from the reading on the tester, check that the relief valve opens at the specified pressure.

Specified cap pressure
68.6 kPa
(0.69 bar; 0.7 kg/cm²)



1. Testing instrument
2. Coupling
3. Cap

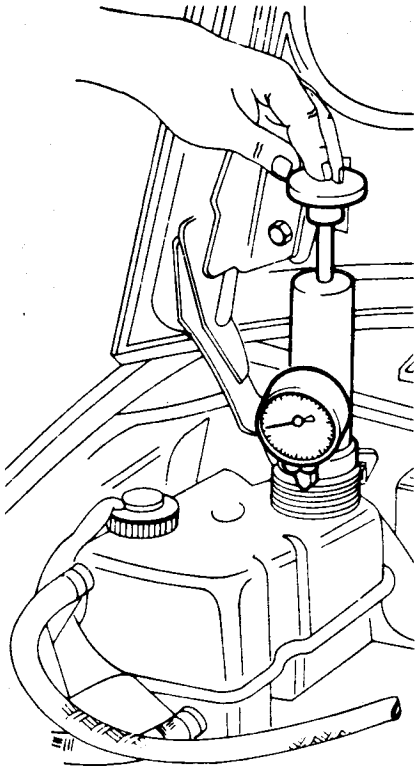
3. Tightness test of cooling system

a. Unscrew the pressurised cap of the header tank.

b. Attach the hydraulic system tester to the header tank filler inlet.

c. Pressurise the system and from the reading on the instrument, check that the pressure is at the specified value.

Cooling system pressue check
107.9 kPa
(1.08 bar; 1.1 kg/cm²)



4. System refill

Having previously drained the system, refill it with the following type and quantity of coolant:

Min. External temperature **°C**		**—30°**	**—45°**
Concentrated antifreeze Std No. 3681-69956	l	1.2	2.65
Distilled water for dilution	l	6.8	5.35
Ready to use antifreeze Std No. 3681-69958	l	8	8

To increase the antifreeze protection from −30° to −45°C without draining the whole system, replace 2 litres of the mixture with as many litres of the specified concentrated antifreeze.

CAUTION:
Products harmful to paintwork.
Avoid contact with painted surfaces.

Refilling must be carried out through the filler tank inlet, being careful to observe the following:

a. The heater control knob must be set to the «fully open position».

b. Fill the system until the level reaches the maximum mark of the header tank.

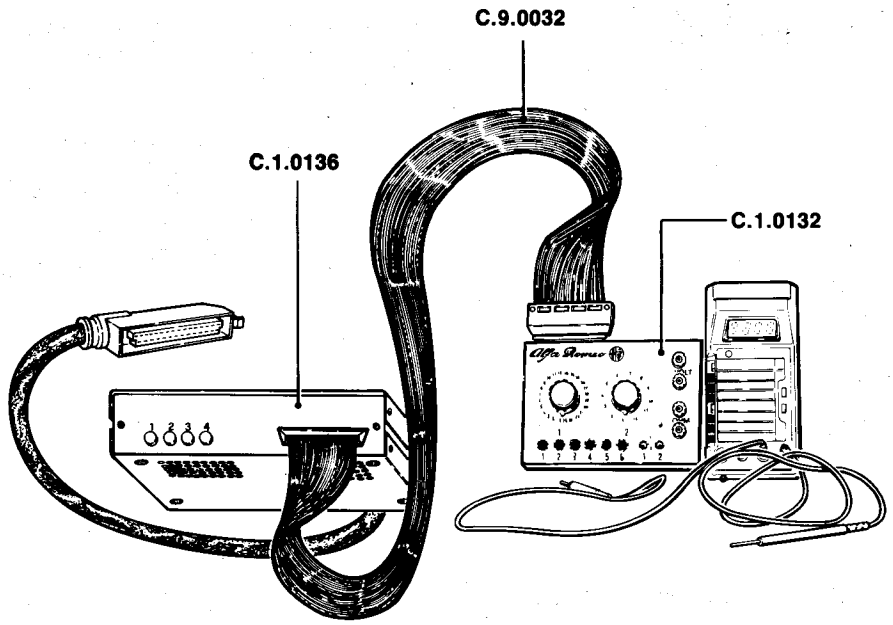
c. Start the engine and run it to normal running temperature so that the opening of the thermostat frees the residual air in the system.

d. With the engine cold, top up the level to the maximum mark of the header tank.

e. Refit the filler cap.

ELECTRICAL CHECKS USING THE TROUBLE DIAGNOSIS TESTING INSTRUMENT
(MOTRONIC ML4.1 - DOUBLE IGNITION - 4 CYLINDERS)

CAUTION:
IF ONE OF THE FOLLOWING TESTS DOES NOT GIVE A POSITIVE RESULT, IDENTIFY THE CAUSE OF THIS BY CARRYING OUT THE FAULT FINDING PROCEDURE.



PRELIMINARY OPERATIONS

— Switch off the ignition.
— Disconnect the negative terminal of the battery.
— Disconnect the multiple connector from the Motronic electronic control unit.

NOTE:
With a voltmeter, check that there is no tension on pin 8 of the wiring side multiple connector (otherwise see test 13.7).

— Connect the wiring side multiple connector to the appropriate connector on the interface **C10136**.
DO NOT CONNECT THE ELECTRONIC CONTROL UNIT
— Select the ML4.1 motorization by pressing button No. 4 on the interface **C10136**.
— Connect the interface to the universal trouble diagnosis instrument **C10132** using the lead **C90032**.
— Reconnect the negative terminal of the battery.
— Disconnect the fuel pump relay.

SETTING FOR OHM READINGS

— Set the selectors (1) and (2) to position 1.
— Set the switch (1) to position 2.
— Set the switch (2) to position 1.
— Place the test prods of a multimeter in the aprropriate «OHM» sockets of the trouble diagnosis insrument.
— Ignition switched off.

TEST No. 1

CHECK ACCELERATOR BUTTERFLY MINIMUM OPENING MICRO-SWITCH - PIN 2 WIRING SIDE

— Ignition switched off.
— Selector (2) in position 1.
— Multimeter 200 Ohm F.S.
— Read a value of less than 10 Ohm on multimeter.
— Press the accelerator pedal lightly and read an infinite resistance on the multimeter.

TEST No. 2

CHECK ACCELERATOR BUTTERLY OPENING MICRO-SWITCH - PIN 3 WIRING SIDE

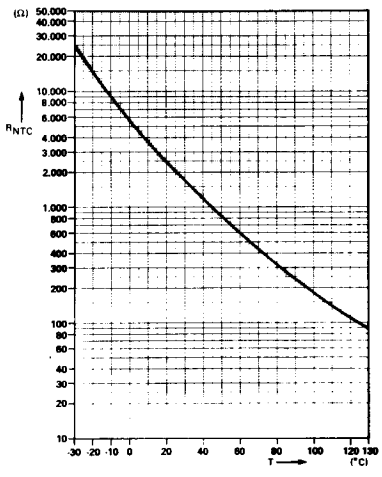
— Ignition switched off.
— Selector (2) in position 2.
— Multimeter 200 Ohm F.S.
— Read an infinite resistance on the multimeter.
— Press the accelerator pedal lightly and read a value of less than 10 Ohm on the multimeter.
(The change of state occurs when the butterfly is open at an angle of approximately 60°)

TEST No. 3

ENGINE TEMPERATURE SENSOR TEST - PIN 13 WIRING SIDE

— Ignition switched off.
— Selector (2) in position 3.
— Multimeter 20 kOhm F.S.
— Read a value on the multimeter as a function of the temperature.

— 10°C = 9 kOhm
0°C = 6 kOhm
+ 10°C = 3,8 kOhm
+ 15°C = 3 kOhm
+ 20°C = 2,5 kOhm
+ 25°C = 2,1 kOhm
+ 30°C = 1,7 kOhm
+ 40°C = 1,2 kOhm
+ 60°C = 600 Ohm
+ 80°C = 330 Ohm



TEST No. 4

AIR TEMPERATURE TEST - PIN 22 WIRING SIDE (PIN 6 TO GROUND BY MEANS OF C10136)

— Ignition switched off.
— Selector (2) in position 4.
— Multimeter 20 kOhm F.S.
— Read an infinite resistance on the multimeter.
— Press the button (3) and read a value on the multimeter as a function of the temperature (see graph test No. 3).

— **Disconnect the terminal from the battery.**
— **Insert the interface connector in the electronic control unit connector.**
— **Reconnect the negative terminal of the battery.**

TEST No. 5

GROUND CHECK FOR SCREENED CABLES - PIN 23 ELECTRONIC CONTROL UNIT

— Ignition switched off.
— Selector (2) in position 5.
— Multimeter 200 Ohm F.S.
— Read a value of less than 10 Ohm on the multimeter.

TEST No. 6

SETTING FOR DIFFERENT MOTORIZATIONS - PIN 11 WIRING SIDE (LONGITUDINAL ENGINE)

— Ignition key in MARCIA (running) position.
— Selector (2) in position 9.
— Multimeter 200 Ohm F.S.
— Read an infinite resistance value on the multimeter.

SETTING FOR VOLT READING

— Set selectors (1) and (2) to position 1.
— Set the switch (1) to position 2.
— Set the switch (2) to position 1.
— Measure the battery tension directly from the terminals of the battery itself with the ignition key in the MARCIA (running) position, note down the value.
— Switch the igntion off.
— Place the test prods of the multimeter in the appropriate «VOLT» socket of the trouble diagnosis instrument.

TEST No. 7

CHECK +12 V DIRECT - PIN 18 ELECTRONIC CONTROL UNIT MULTIPLE CONNECTOR

— Ignition switched off.
— Multimeter 20 V F.S.
— Selector (1) in position 1.
— Read a value equal to the battery tension previously noted down ±50 mV.

TEST No. 8

CHECK +12 V FROM IGNITION SWITCH - PIN 35 ELECTRONIC CONTROL UNIT

— Multimeter 20 V F.S.
— Selector (1) in position 2.
— With ignition switched off read a value of 0 V. With the ignition key in the MARCIA (running) position read a value equal to the battery tension previously noted down ±50 mV.

Turn ignition key to the MARCIA (running) position

TEST No. 9

CHECK GROUND - PIN 16 ELECTRONIC CONTROL UNIT

— Ignition key in MARCIA (running) position.
— Multimeter 200 mV F.S.
— Selector (1) in position 3.
— Read a tension of less than 30 mV on the multimeter.

TEST No. 10

CHECK POWER SUPPLY TO AIR FLOW GAUGE - PIN 9 ELECTRONIC CONTROL UNIT

— Ignition key in MARCIA (running) position.
— Multimeter 20 V F.S.
— Selector (1) in position 6.
— Read a tension value of between 4.5 V and 5.5 V on the multimeter.

TEST No. 11

CHECK AIR FLOW GAUGE POTENTIOMETER - PIN 7 ELECTRONIC CONTROL UNIT

— Ignition key in MARCIA (running) position.
— Multimeter 20 V F.S.
— Selector (1) in position 7.
— Read a tension value of between 100 mV and 300 mV on the multimeter.
— Operate the air flow gauge butterfly manually and check that the tension increases evenly, without gaps or jumps, to a value equal to or greater than 4.2 V.

TEST No. 12

CHECK POWER SUPPLY TO AND WIRING OF CONSTANT IDLE ACTUATOR

— Ignition key in MARCIA (running) position.
— Multimeter 20 V F.S.
— Selector (1) in position 5.
— Read a tension of between 4 V and 12 V on the multimeter.
— Disconnect the idle actuator connector for a moment and check that the tension falls to approximately 0 V (no tension).

— **Disconnect the fuel relay (with the ignition key in the MARCIA (running) position the relay can be excited or start to tick).**

TEST No. 13
TESTS TO BE CARRED OUT ONLY WITH THE ENGINE NOT RUNNING

NOTE:
Make sure the check on pin 8 has been carried out, as described in the preliminary operation.

TEST No. 13.1

INDUCTIVE SENSOR TEST - PIN 25 ELECTRONIC CONTROL UNIT

— Multimeter 20 V F.S.

Set for alternating current readings

— Selector (1) in position 18.
— Attempt to start engine and read a tension greater than 1.5 V on the multimeter.

Reset multimeter for direct current readings

TEST No. 13.2

CHECK OF INJECTION TIME

— Multimeter 2 V F.S.
— Selector (1) in position 14.
— Switch (1) in position 1.
— Switch (2) in position 1.
— Attempt a prolonged engine starting and read a tension of between 200 mV and 1 V (2÷10 msec) on the multimeter.

TEST No. 13.3

CHECK OF ELECTRIC FUEL INJECTOR CURRENT

— Multimeter 2 V F.S.
— Selector (1) in position 13.
— Switch (2) in position 1.
— Attempt a prolonged engine starting and read a tension of between 200 mV and 300 mV on the multimeter.

TEST No. 13.4

CHECK ACTUATING COIL A - PIN 1 ELECTRONIC CONTROL UNIT

— Multimeter 2 V F.S.
— Selector (1) in position 16.
— Switch (1) in position 2.
— Attempt a prolonged engine starting and read a tension on the multimeter corresponding to the r.p.m. during starting
(e.g.: 20 mV = 200 r.p.m.
30 mV = 300 r.p.m.)

TEST No. 13.5

CHECK ACTUATING COIL B - PIN 19 ELECTRONIC CONTROL UNIT

— Multimeter 2 V F.S.
— Selector (1) in position 16.
— Switch (1) in position 1.
— Attempt a prolonged engine starting and read a tension on the multimeter corresponding to the r.p.m. during starting
(e.g.: 20 mV = 200 r.p.m.
30 mV = 300 r.p.m.)

TEST No. 13.6

CHECK FUEL SYSTEM

— Connect a pressure gauge to the fuel distribution pipe.
— Turn the ignition key to the MARCIA (running) position.
— Press button No. 4 of the trouble diagnosis instrument and check that the fuel pressure reaches a value equal to or greater than 2.8 bar.

NOTE:
It is possible that the pump is already turning.

TEST No. 13.7

CHECK CONNECTION - PIN 8 ELECTRONIC CONTROL UNIT

— Multimeter 20 V F.S.
— Switch the ignition off.
— Disconnect wiring side multiple connector.
— Place the test prods of the multimeter across pin 8 of the multiple connector and ground.
— Read a value of no tension on the multimeter.

TESTS TO BE CARRIED OUT WITH THE ENGINE RUNNING

TEST No. 14

CHECK THE POSITIVE HALF WAVE OF THE INDUCTIVE SENSOR

— Start engine.
— Multimeter 20 F.S.
— Selector (1) in position 11.
— Check that with the engine running on idle the reading on the multimeter is between 250 mV and 2 V.
— Speed up the engine and check that the value read increases.

TEST No. 15

CHECK NEGATIVE HALF WAVE OF THE INDUCTIVE SENSOR

— Start engine.
— Multimeter 20 V F.S.
— Selector (1) in position 12.
— Proceed as for test No. 14 checking that the value read is equal to or greater than the value previously read.

TEST No. 16

CHECK ELECTRIC FUEL INJECTOR CURRENT

— Start engine.
— Multimeter 2 V F.S.
— Selector (1) in position 13.
— Switch (1) in position 1.
— Switch (2) in position 1.
— Operate the accelerator with brief spurts of acceleration, checking that the maximum readings on the multimeter are 350 mV ±40 mV (with the engine temperature greater than +50°C).

NOTE:
The reading in millivolts shows the current to the electric fuel injectors
(e.g.: 200 mV = 2 A
300 mV = 3 A
400 mV = 4 A)

TEST No. 17

CHECK FUEL INJECTION TIME

— Start engine.
— Multimeter 2 V F.S.
— Selector (1) in position 14.
— Switch (1) in position 1.
— Switch (2) in position 1.
— With engine warmed up and running on idle, read a tension of between 150 mV and 250 mV on the multimeter, equivalent to an injection time of 1.5÷2.5 msec.

NOTE:
If the engine is cold or the external temperature is very low, the injection times are longer.

— Check the fuel enrichment during acceleration by effecting short sharp spurts of acceleration and checking that the reading on the multimeter tends to increase.
— If the engine has reached or almost reached normal running temperature press button No. 5 (cold engine simulation) of the trouble diagnosis instrument and check the fuel enrichment with the engine cold by lengthening the injection times.
— If the external temperature is greater than 10°C, press the button No. 6 (cold air simulation) of the trouble diagnosis instrument and check that a small increase in the injection time occurs.

TEST No. 18

CHECK ACTUATING COIL A (PIN 1) AND COIL B (PIN 19)

— Start engine.
— Multimeter 2 V F.S.
— Selector (1) in position 16.
— Switch (1) in position 2.
— Read a tension corresponding to the engine r.p.m. (TEST COIL A) on the multimeter
(e.g.: 800 r.p.m. = 80 mV
1000 r.p.m. = 100 mV
3000 r.p.m. = 300 mV
4000 r.p.m. = 400 mV
5000 r.p.m. = 500 mV)
— Switch switch (1) in position 1 and check for the above tensions (TEST COIL B).

TEST No. 19

CHECK IGNITION ADVANCE

— Start the engine.
— Multimeter 2 V F.S.
— Selector (1) in position 17.
— Switch (1) in position 2.
— With the engine running at normal running temperature and on idle, read a tension of between 70 mV and 130 mV corresponding to an ignition advance of 7÷13 degrees.
— Speed the engine up to 2000 r.p.m. and check that the ignition advance increase.

TEST No. 20

CHECK FUNCTIONING OF THE CONSTANT IDLE ACTUATOR

— With the engine running on idle, disconnect the actuator for a moment and check that the engine r.p.m. increases.
— Reconnect the connector and check the idle r.p.m. again.

TEST No. 21

CHECK THE FUNCTIONING OF THE ELECTRONIC CONTROL UNIT

— With the engine running at between 1000 and 1500 r.p.m. press button

No. 2 (full load) and check for the action of the timing variator (a momentary fall in the r.p.m. should be noticed).
— With the engine running at 3000 r.p.m. press the button No. 1 (accelerator butterfly closed) and check for a cut in the fuel delivery which will result in a fall in the r.p.m. followed by increases and reduction (hunting).

TEST No. 22

CHECK THE CONNECTIONS TO THE AIR CONDITIONER (IF FITTED) - PIN 29 AND 32 ELECTRONIC CONTROL UNIT

— Multimeter 20 V F.S.
— Selector (1) in position 9.
— Start engine.
— Make sure that the heating and ventilation systems are switched off.
— Read 0 V on the multimeter.
— Switch the heating and ventilation systems on but without activating the air conditioning compressor (fan in position 1 and temperature regulation on minimum).
— Read + 12 V on the multimeter.

NOTE:
The engine r.p.m. may increase but NOT diminish.

— Selector (1) in position 10.
— With the compressor switched on read + 12 V on the multimeter.
— With the compressor switched off read 0 V on the multimeter.
— Check that the engine r.p.m. does not fall below the minimum value.

TEST No. 23

CHECK THE SETTINGS FOR THE VARIOUS MARKETS

NOTE:
The setting is carried out by means of the connection, using the appropriate connector (S30), of a device in the form of a relay with a casing of a different colour.

— Place the test prods of the multimeter in the «OHM» sockets of the trouble diagnosis instrument.
— Multimeter 200 Ohm F.S.
— Disconnect the negative terminal of the battery.
— Disconnect the multiple connector of the interface **C.1.0136** from the electronic control unit.
— Reconnect the terminal of the battery.
— Ignition switched off.
— With the selector (2) at the positions 7 and 8, read the values given below, on the multimeter, as a function of the setting for the market in question.

Selector position (2)	NON-POLLUTING VERSION WITH UNLEADED PETROL	
	95 OCTANE	91 OCTANE
7	Infinite resistance	Resistance less than 10 Ohm
8	Resistance less than 10 Ohm	Resistance less than 10 Ohm
	Bright yellow coloured device inserted in connector S30	Sky-blue coloured device inserted in connector S30

— Reconnect the multiple connector of the interface **C.1.0136** to the electronic control unit.

TEST No. 24

CHECK LAMBDA SENSOR

— Place the test prods of the multimeter in the «VOLT» sockets of the trouble diagnosis instrument.
— Multimeter 2 V F.S.
— Selector (1) in position 22.
— Start the engine and check that, with regard to the r.p.m. range, the reading on the multimeter falls between 100 mV and 1 V approximately.

TEST No. 25

CHECK FUEL VAPOUR CONTROL SOLENOID VALVE ACTUATOR

— Multimeter 20 V F.S.
— Place the test prods of the multimeter directly on the pins of the solenoid valve.
— Start the engine.
— Accelerate the engine with short sharp bursts and check the momentaneous reading of + 12 V (with each acceleration).

TEST No. 26

CHECK THE POWER SUPPLY TO THE LAMBDA SENSOR PREHEATING RESISTANCE

— Multimeter 20 V F.S.
— Start the engine.
— Place the test prods of the multimeter directly on the pins of the Lambda sensor preheating resistance.
— Read + 12 V on the multimeter.
— With the resistance disconnected, check also for a resistance value (multimeter 200 Ohm F.S.) of between 3 Ohm and 20 Ohm on the pins of the resistance itself.

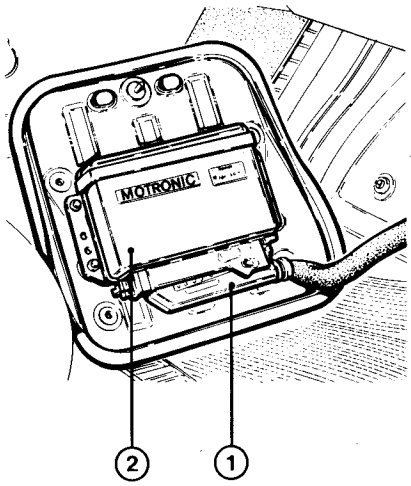
TROUBLE DIAGNOSIS
(MOTRONIC ML4.1 SYSTEM - DOUBLE IGNITION - 4 CYLINDERS)

NOTE:
For the correct use of this trouble diagnosis procedure, it is assumed that the vehicle is in working order, that the engine is in good operating condition (valves, clearances, cylinders, etc.) and that the ignition is working efficiently (spark plugs, distributore, coils).

PRELIMINARY OPERATIONS

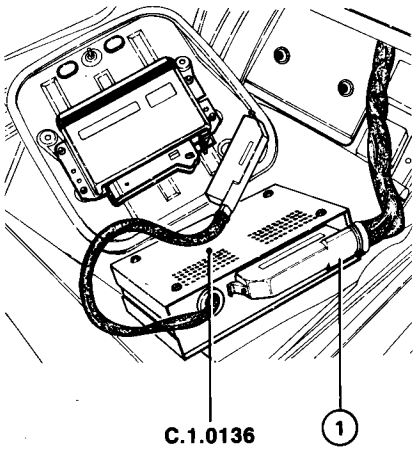
1. Switch the ignition off.
2. Disconnect the negative terminal of the battery.
3. Disconnect the multiple connector (1) from the Motronic electronic control unit (2) (located under the floor on the right side of the passenger compartment).

NOTE:
With a voltmeter, check that there is no tension on pin 8 of the wiring side multiple conductor (otherwise see test 13.7).



1. Electronic control unit multiple conductor
2. Motronic electronic control unit

4. Connect the multiple connector (1) (wiring side) to the relative connector on the interface **C.1.0136**. **DO NOT CONNECT THE ELECTRONIC CONTROL UNIT.**

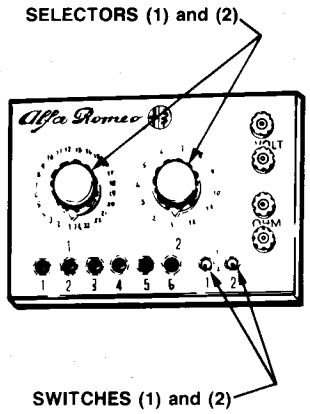


1. Motronic electronic control unit multiple connector

5. Select the ML4.1 motorization by pressing button No. 4 on the interface unit **C.1.0136**.
6. Connect the interface unit **C.1.0136** to the trouble diagnosis instrument **C.1.0132** using the lead **C.9.0032**.
7. Reconnect the negative terminal of the battery.
8. Disconnect the fuel pump relay.

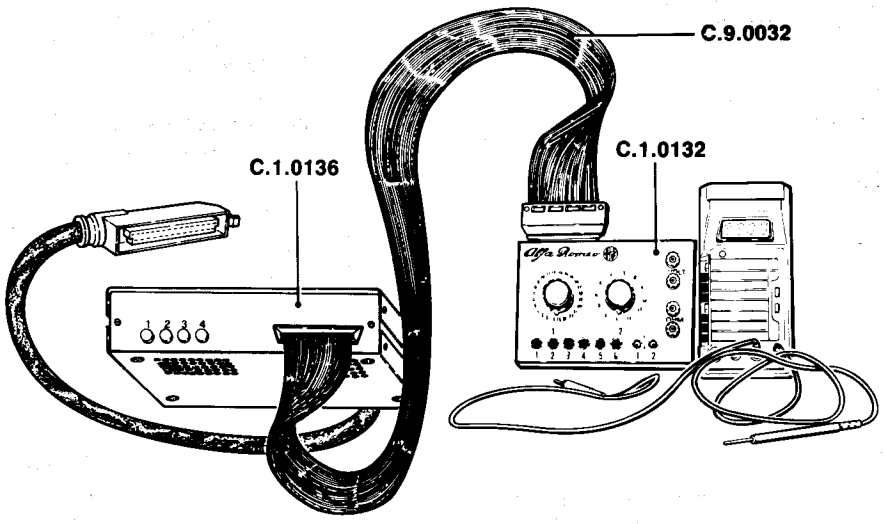
SETTING FOR OHM READINGS

1. Set the selectors (1) and (2) to position 1.
2. Set the switch (1) to position 2.
3. Set the switch (2) to position 1.



4. Place the test prods of a multimeter in the appropriate «OHM» sockets of the trouble diagnosis instrument.

NOTE:
Should none of the tests give positive results, check that there is tension on the wiring side multiple connector (pin 5 ground and pin 18 = +12 V) even with the ignition switched off.



TEST No. 1 — ACCELERATOR BUTTERFLY MINIMUM OPENING MICRO-SWITCH

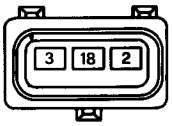
- *Ignition switched off.*
- *Selector (2) in position 1.*
- *Set the multimeter for 200 Ohm F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Read a value of less than 10 Ohm on the multimeter (with the accelerator released).
Press lightly on the pedal and read a value of infinite resistance.

NO

Disconnect the minimum accelerator butterfly opening switch connector (S6). Place the test prods of the multimeter on the pins 2 and 18 of the switch and check for the previous reading.



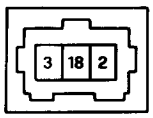
SWITCH
- FRONT VIEW

NO

Check adjustment of switch and if necessary replace it.

YES

With the multimeter set on 200 Ohm F.S., check circuit continuity between:
- pin 18 switch connector and ground point (G131) on the timing system cover;
- pin 2 switch connector and pin 2 Motronic electronic control unit multiple connector (S1).



SWITCH CONNECTOR
- FRONT VIEW

NO

Replace wiring.

YES

TEST No. 2

TEST No. 2 — CHECK ACCELERATOR BUTTERFLY MAXIMUM OPENING MICRO-SWITCH

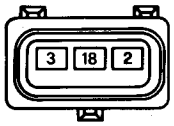
- *Ignition switched off.*
- *Selector (2) in position 2.*
- *Set the multimeter for 200 Ohm F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Read an infinite resistance on the multimeter (with the accelerator pedal released).
Press the pedal fully down and read a value of less than 10 Ohm.

NO

Disconnect the connector from the accelerator butterfly maximum and minimum opening switch (S6).
Place the test prods of the multimeter on pins 3 and 18 of the switch and check for the previous reading.



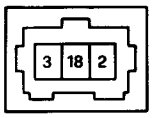
SWITCH
- FRONT VIEW

NO

Check adjustment of switch and if necessary replace it.

YES

With the multimeter set for 200 Ohm F.S., check circuit continuity between:
- pin 18 switch connector and ground point (G131) on timing system cover;
- pin 3 connector and pin 3 Motronic electronic control unit (S1).



SWITCH CONNECTOR
- FRONT VIEW

NO

Replace wiring.

YES

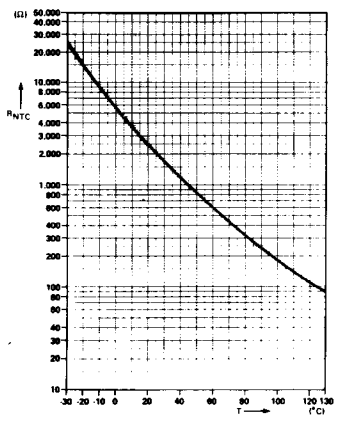
TEST No. 3

TEST No. 3 — TEST ENGINE TEMPERATURE SENSOR

- *Ignition switched off.*
- *Selector (2) in position 3.*
- *Set multimeter for 20 kOhm F.S.*

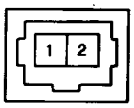
NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Read on the multimeter a resistance value which is a function of the engine temperature as indicated in the graph.



NO

Check the wiring continuity between:
- pin 13 Motronic electronic control unit multiple connector (S1) and pin 1 engine temperature sensor connector (S7);
- pin 2 sensor and grounds (G131) on timing system cover.



SENSOR CONNECTOR
- FRONT VIEW

NO

Replace wiring.

YES

Replace engine temperature sensor.

YES

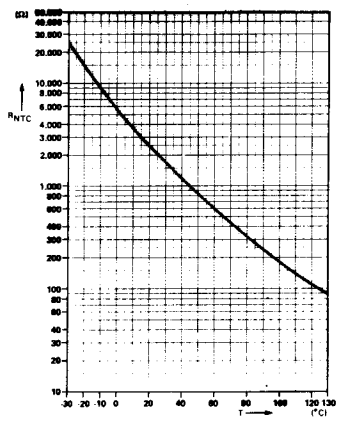
TEST No. 4

TEST No. 4 — TEST AIR TEMPERATURE SENSOR

- *Ignition switched off.*
- *Selector (2) in position 4.*
- *Set multimeter for 20 kOhm F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Read an infinite resistance on the multimeter.
Press button (3) and read the multimeter a resistance value which is a function of the air temperature as indicated in the graph.



NO

Check the resistance of the air flow gauge (S5) between pin 5 and 4 (the value is a function of the air temperature as indicated in graph of the preceding point).

NO

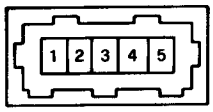
Replace air flow gauge.

YES

Check the wiring continuity between:
- pin 4 air flow gauge connector (S5) and pin 6 Motronic electronic control unit multiple connector (S1);
- pin 5 air flow gauge connector and pin 22 Motronic electronic control unit multiple connector.

NO

Replace wiring.



AIR FLOW GAUGE CONNECTOR
- FRONT VIEW

YES

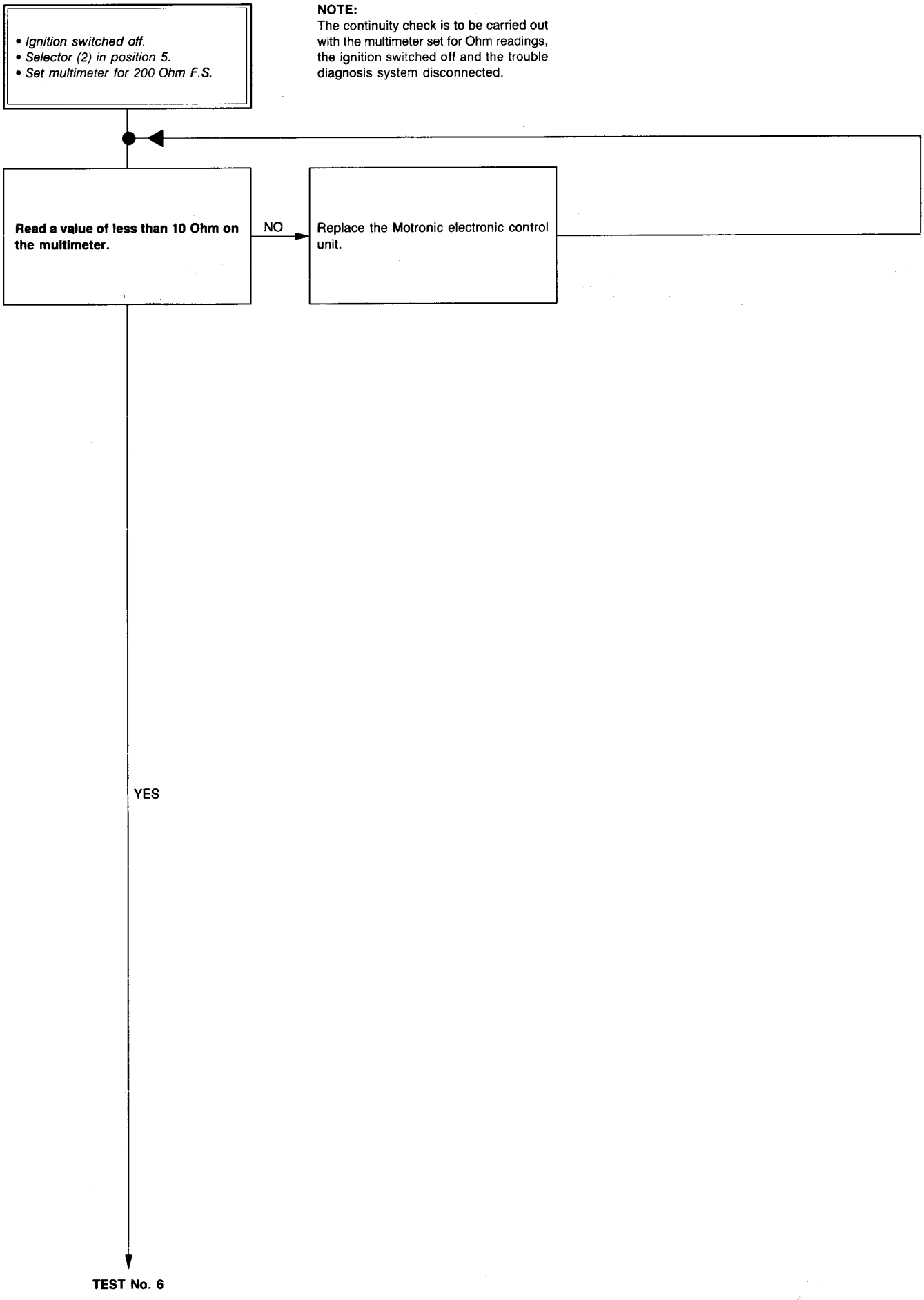
Replace air flow gauge.

YES

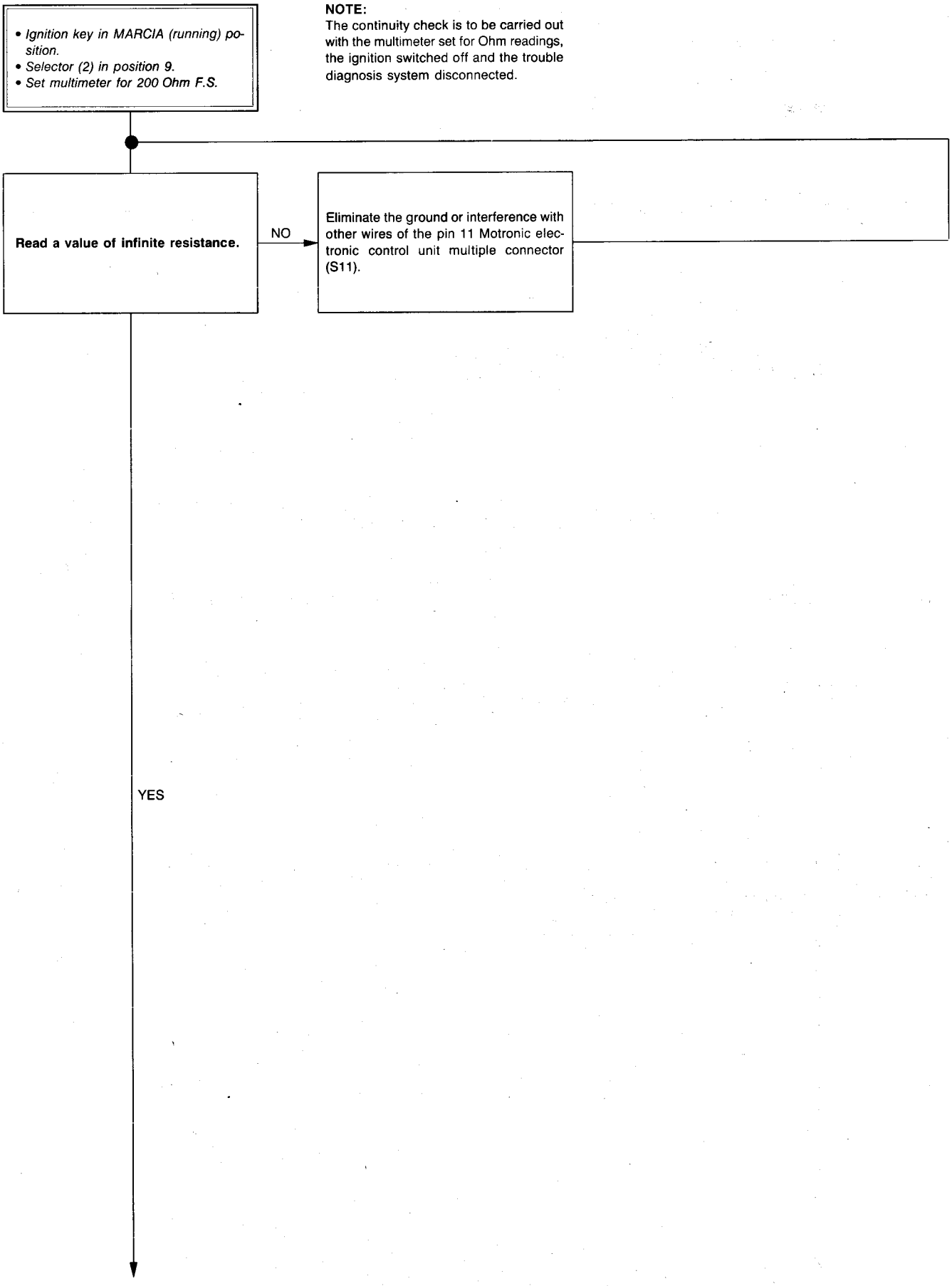
- *DISCONNECT NEGATIVE TERMINAL OF THE BATTERY.*
- *INSERT THE CONNECTOR OF THE INTERFACE UNIT IN THE CONNECTOR OF THE MOTRONIC ELECTRONIC CONTROL UNIT.*
- *RECONNECT THE NEGATIVE TERMINAL OF THE BATTERY.*

TEST No. 5

TEST No. 5 — CHECK GROUND FOR SCREENED CABLES

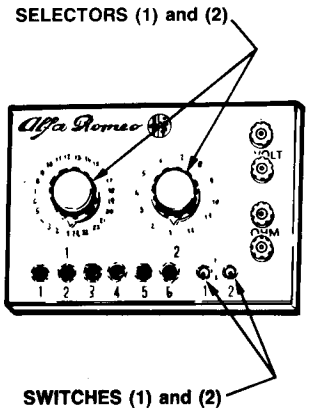


TEST No. 6 — SETTING FOR DIFFERENT MOTORIZATIONS (LONGITUDINAL ENGINE)



SETTING FOR VOLT READINGS

1. Set the selectors (1) and (2) in position 1.
2. Set the switch (1) in position 2.
3. Set the switch (2) in position 1.



4. Measure the battery tension directly across the terminals of the battery itself with the ignition key in the MARCIA (running) position and note down the value.
5. Switch the ignition off.
6. Place the test prods of a multimeter in the «VOLT» sockets of the trouble diagnosis instrument.

TEST No. 7 — CHECK +12 V DIRECT TO THE MOTRONIC ELECTRONIC CONTROL UNIT

• Ignition switched off.
• Set multimeter for 20 V F.S.
• Selector (1) in position 1.

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

On the multimeter, read a battery tension corresponding to the value measured directly across the terminals of the battery itself (±50 mV).

NO

Check the wiring continuity between:
- pin 18 Motronic electronic control unit multiple connector (S1) and the positive terminal of the battery;
- pin 5 Motronic electronic control unit multiple connector and ground (G131) on the timing system cover.

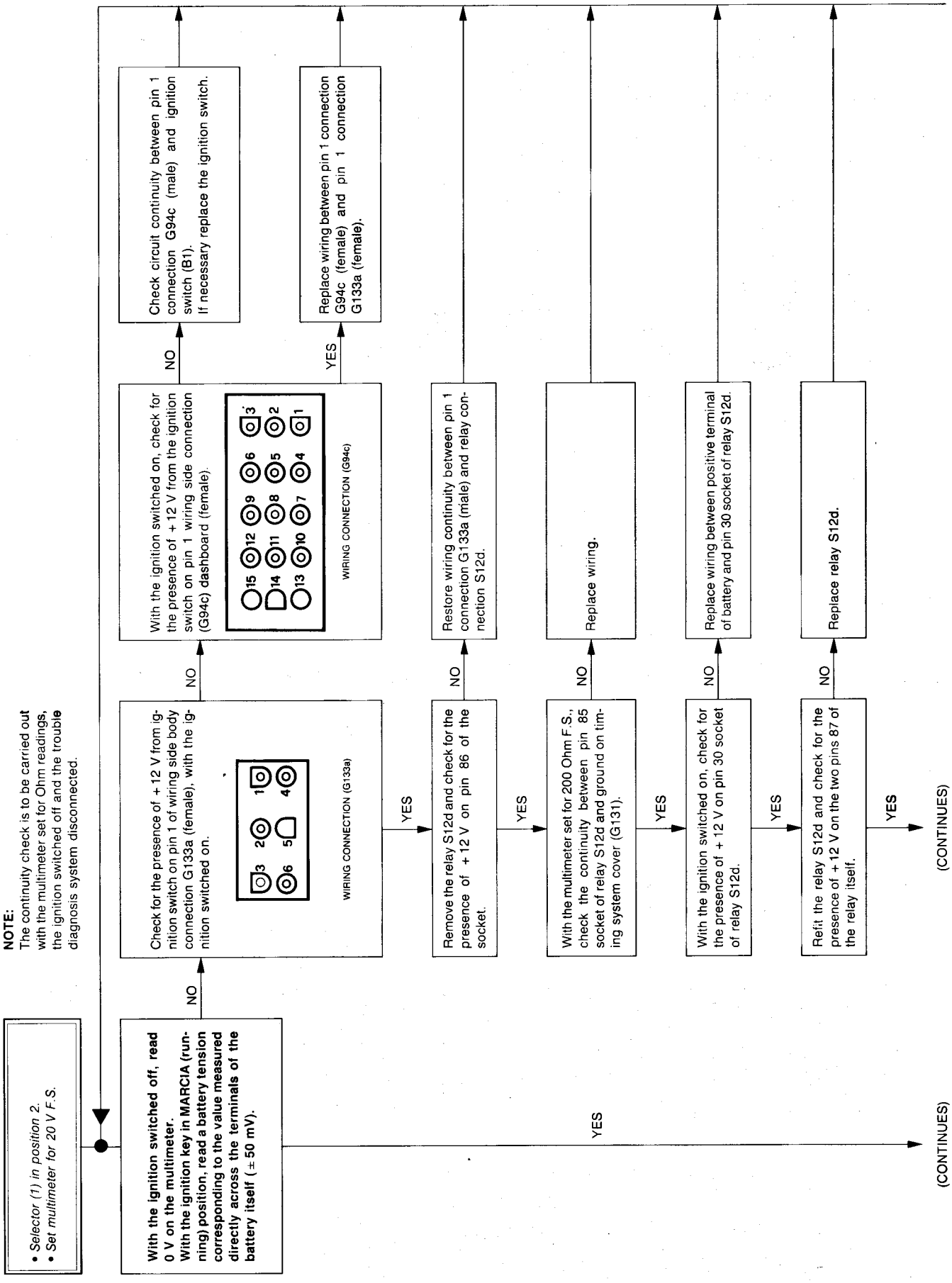
NO

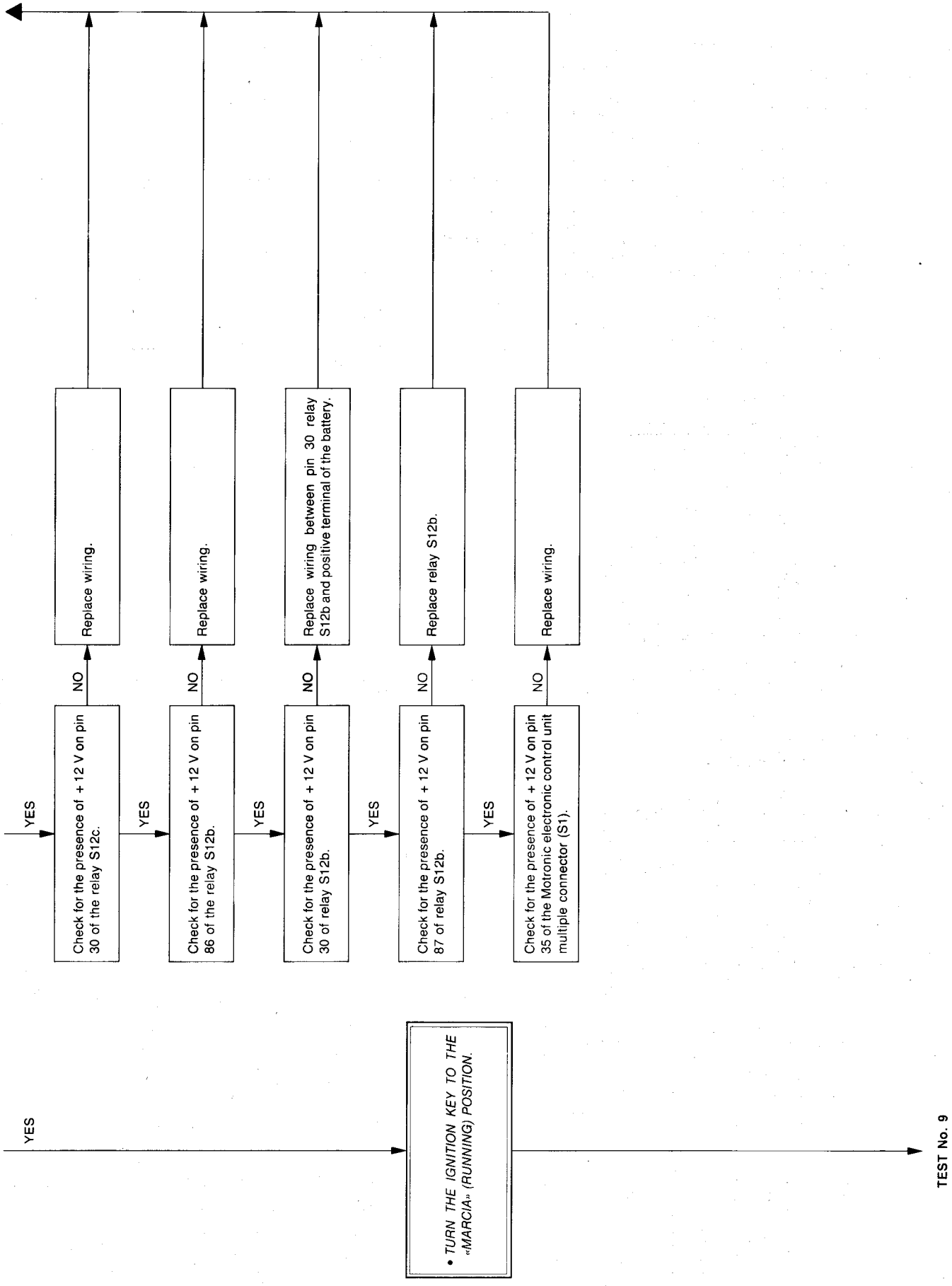
Replace wiring.

YES

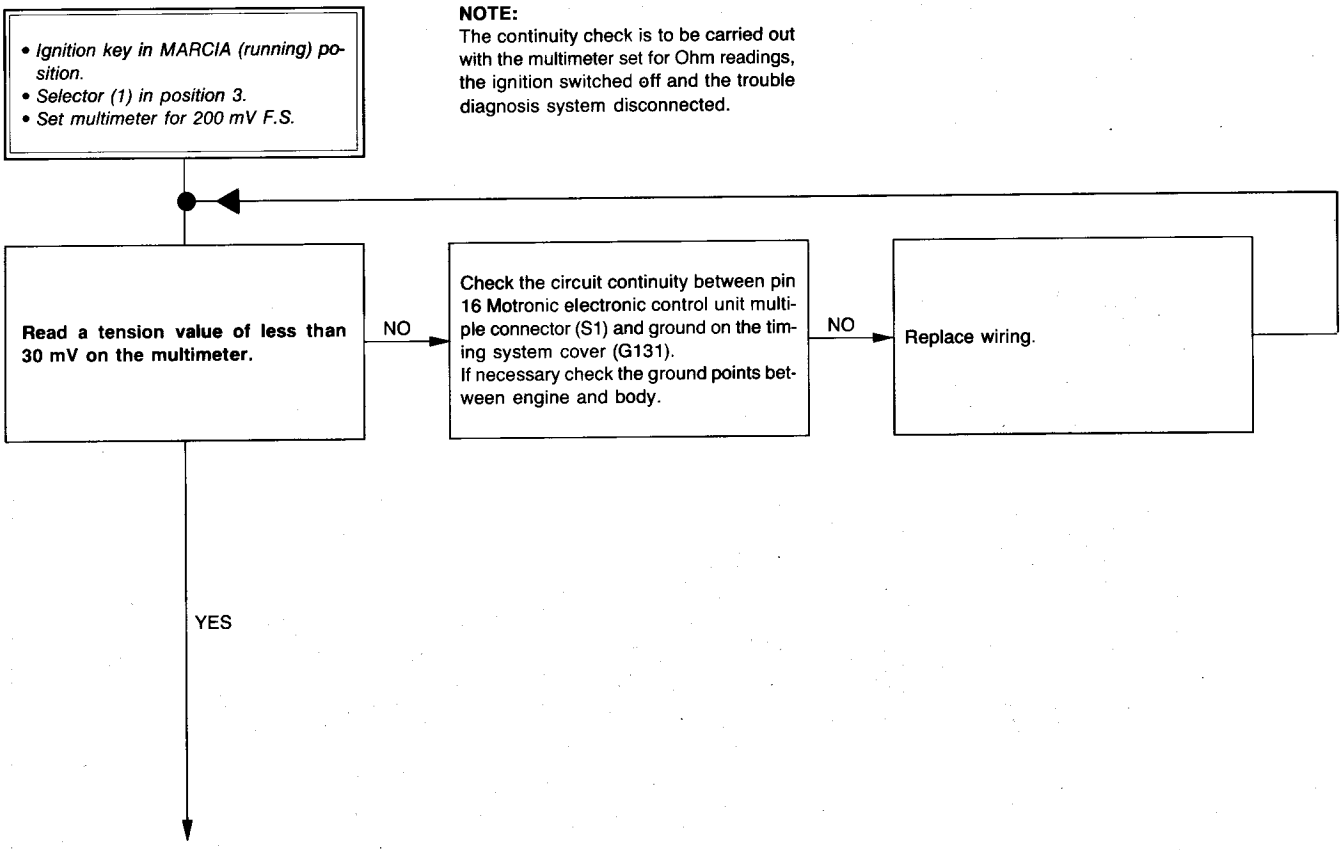
TEST No. 8

TEST No. 8 — CHECK +12 V FROM IGNITION SWITCH

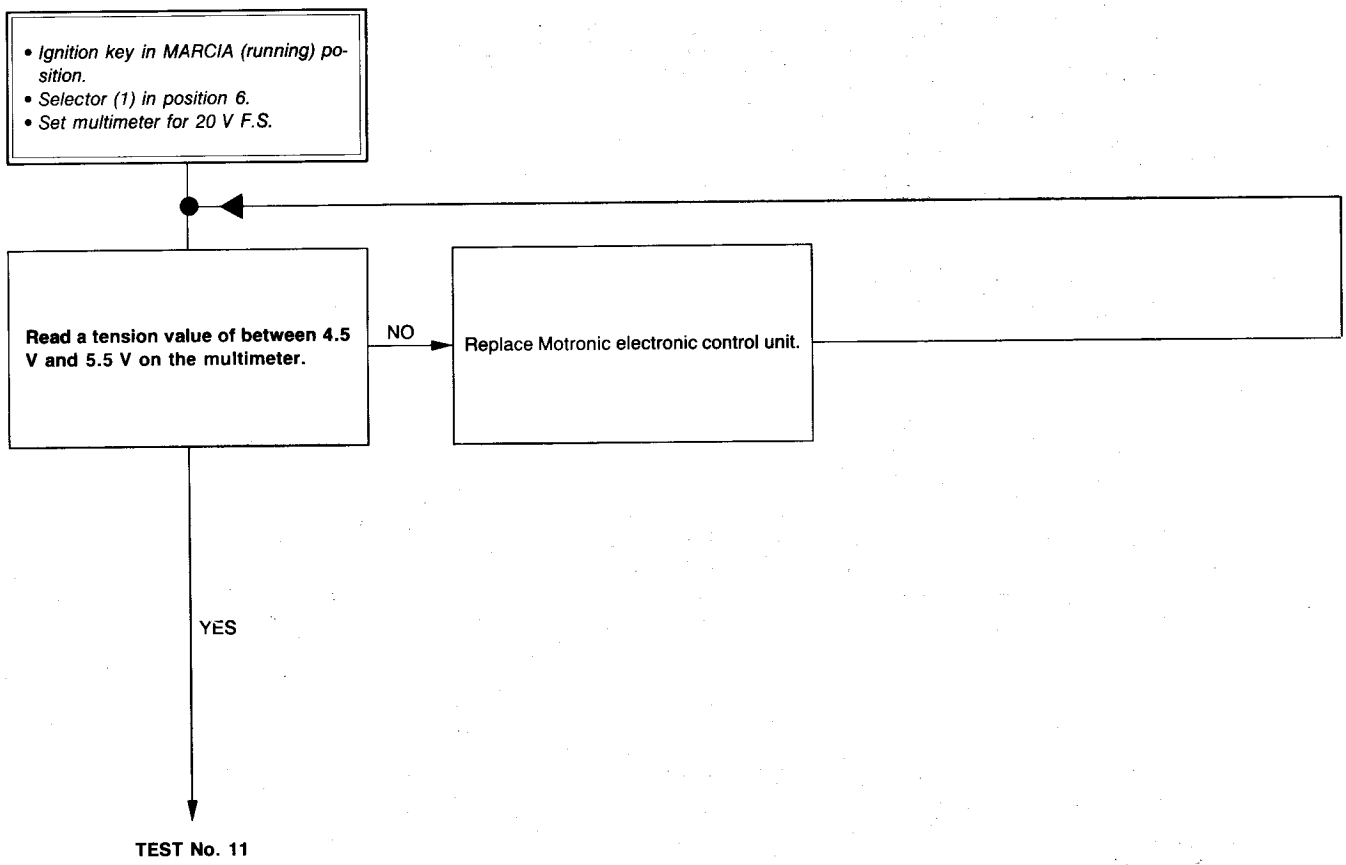



YES
Check for the presence of + 12 V on pin 30 of the relay S12c.
NO
Replace wiring.
YES
Check for the presence of + 12 V on pin 86 of the relay S12b.
NO
Replace wiring.
YES
Check for the presence of + 12 V on pin 30 of relay S12b.
NO
Replace wiring between pin 30 relay S12b and positive terminal of the battery.
YES
Check for the presence of + 12 V on pin 87 of relay S12b.
NO
Replace relay S12b.
YES
Check for the presence of + 12 V on pin 35 of the Motronic electronic control unit multiple connector (S1).
NO
Replace wiring.
YES
• TURN THE IGNITION KEY TO THE «MARCIA» (RUNNING) POSITION.
TEST No. 9

TEST No. 9 — CHECK GROUND PIN 16 MOTRONIC ELECTRONIC CONTROL UNIT MULTIPLE CONNECTOR



TEST No. 10 — CHECK POWER SUPPLY TO AIR FLOW GAUGE



TEST No. 11 — CHECK AIR FLOW GAUGE POTENTIOMETER

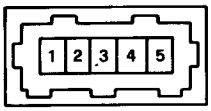
- *Ignition key in MARCIA (running) position.*
- *Selector (1) in position 7.*
- *Set multimeter for 20 V F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Read 100 ÷ 300 mV on multimeter. Operate the air flow gauge butterfly manually and check that the tension increases evenly to a value equal to or greater than 4.2 V without intermediate gaps.

NO

Disconnect the air flow gauge connector (S5) and check wiring continuity between:
- pin 2 connector and pin 7 Motronic electronic control unit multiple connector (S1);
- pin 3 connector and pin 9 Motronic electronic control unit multiple connector;
- pin 4 connector and pin 6 Motronic electronic control unit multiple connector.



AIR FLOW GAUGE CONNECTOR - FRONT VIEW

NO

Replace wiring.

YES

Replace air flow gauge.

YES

TEST No. 12

TEST No. 12 — CHECK WIRING AND POWER SUPPLY TO CONSTANT IDLE ACTUATOR

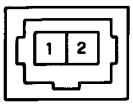
- *Ignition key in MARCIA (running) position.*
- *Selector (1) in position 5.*
- *Set multimeter for 20 V F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Read a tension of between 4 V and 12 V on the multimeter.

NO → Disconnect the constant idle actuator (S29) and check (with the ignition on) for the presence of +12 V between pin 2 connector and the ground on the timing system cover (G131).

NO → Replace wiring between pin 2 constant idle actuator connector and pin 87 relay S12b.



CONSTANT IDLE ACTUATOR CONNECTOR - FRONT VIEW

YES → Turn the ignition off and disconnect the Motronic electronic control unit multiple connector (S1). Check the wiring continuity between pin 1 constant idle actuator connector and pin 33 electronic control unit.

NO → Replace wiring.

YES → Replace constant idle actuator.

YES

Disconnect the constant idle actuator for a moment and check that the tension falls to 0 V (no tension).

NO → Replace Motronic electronic control unit.

YES

- *RECONNECT THE FUEL PUMP RELAY (With the ignition key in MARCIA (running) position the relay may be excited or start to tick).*

YES

TEST No. 13 — TESTS TO BE CARRIED OUT WITH THE ENGINE NOT RUNNING

NOTE: Make sure that the check on pin 8, as described in the preliminary operations, is carried out.

TEST No. 13.1 — TEST INDUCTIVE SENSOR

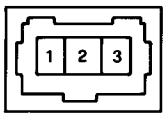
- *Selector (1) in position 18.*
- *Set multimeter for 20 V F.S. **ALTERNATING CURRENT**.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Attempt an engine starting and read a tension greater than 1.5 V on the multimeter.

NO

Check the wiring continuity between:
- pin 25 Motronic electronic control unit multiple connector (S1) and pin 1 r.p.m. sensor connector (S13);
- pin 23 Motronic electronic control unit and pin 2 r.p.m. sensor connector.



R.P.M. SENSOR CONNECTOR
- FRONT VIEW

NO

Replace wiring.

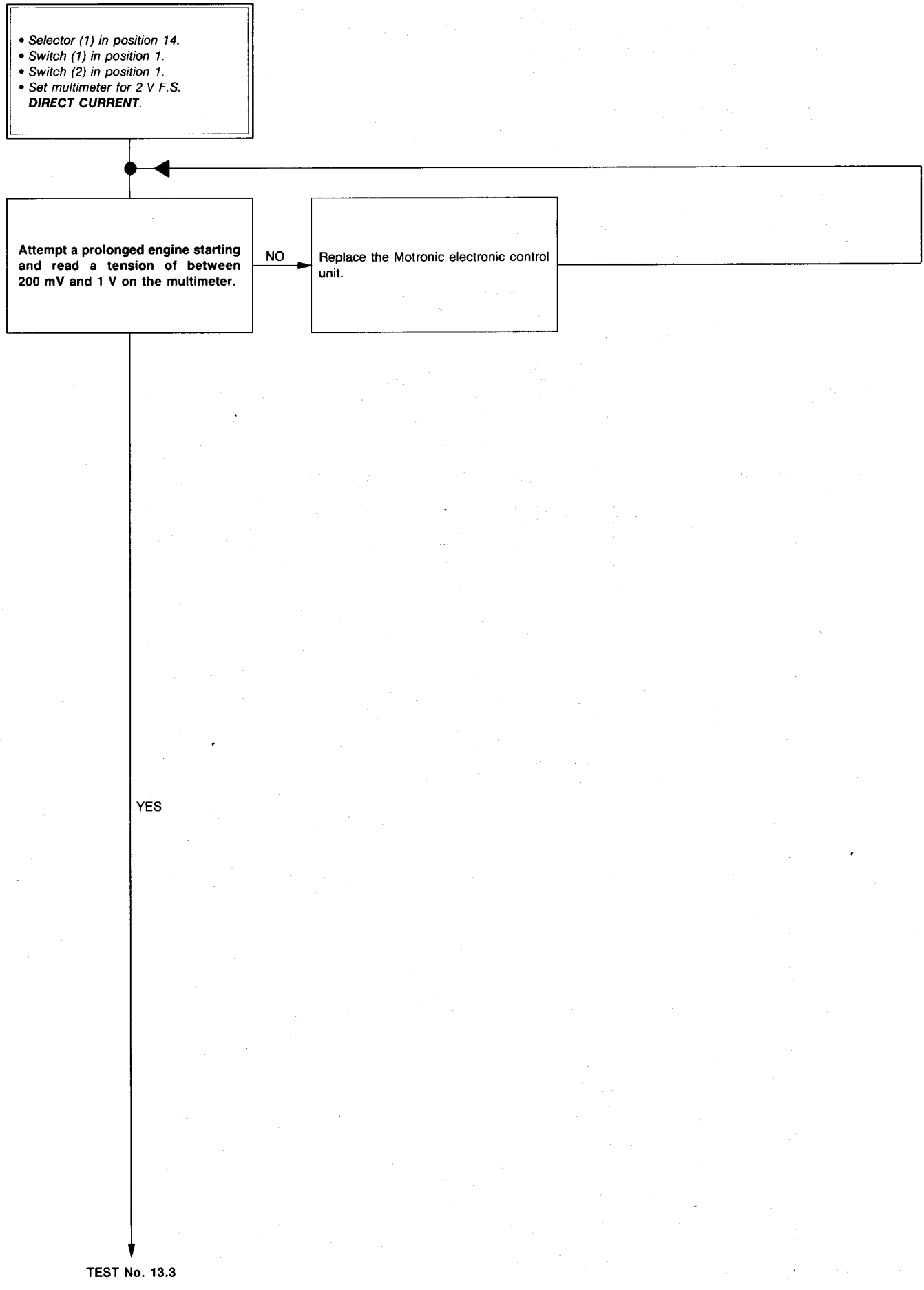
YES

Replace the r.p.m. sensor.
If necessary check the sensing system.

YES

TEST No. 13.2

TEST No. 13.2 — CHECK FUEL INJECTION TIME



TEST No. 13.3 — CHECK CURRENT TO ELECTRIC FUEL INJECTORS

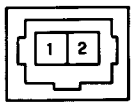
- *Selector (1) in position 13.*
- *Switch (2) in position 1.*
- *Set multimeter for 2 V F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Attempt a prolonged engine starting and read a tension of between 200 and 300 mV on the multimeter.

NO

Disconnect the electric fuel injectors and check the wiring continuity between:
- pin 87 relay (S12b) and pin 1 for each electric fuel injector connector (S3);
- pin 14 Motronic electronic control unit multiple connector (S1) and pin 2 for each electric fuel injector.



ELECTRIC FUEL INJECTOR CONNECTOR - FRONT VIEW

NO

Replace wiring.

YES

Check the efficiency of the fuel injectors by checking the resistance value of the coil (≃ 16 Ohm).

NO

Replace defective electric fuel injectors.

YES

Replace the Motronic electronic control unit.

YES

TEST No. 13.4

TEST No. 13.4 — CHECK COIL A ACTUATOR

- *Selector (1) in position 16.*
- *Switch (1) in position 2.*
- *Set multimeter for 2 V F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Attempt a prolonged engine starting and read a tension on the multimeter corresponding to the engine r.p.m. during starting.

e.g.: 20 mV = 200 r.p.m.
30 mV = 300 r.p.m.

NO → Disconnect the coil A module connector (A8a) and repeat the preceding procedure checking the tension value as specified.

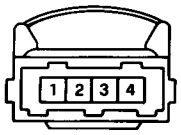
YES → Replace module assembly and coil.

NO

With the ignition switched on and the coil module connector disconnected, check, with the multimeter set for 20 V F.S., for:
- the presence of +12 V between the ground on the timing system cover (G131) and pin 1 module connector;
- 0 V between the ground on the timing system cover and pin 4 module connector;
- 0 V between the ground on the timing system cover and pin 3 module connector.

NO → **Replace relative wiring.**

Check the wiring continuity (see NOTE) between pin 1 Motronic electronic control unit multiple connector (S1) and pin 2 coil A module connector.



COIL A MODULE CONNECTOR
- FRONT VIEW

YES

YES

Replace Motronic electronic control unit.

YES

TEST No. 13.5

TEST No. 13.5 — CHECK COIL B ACTUATOR

- *Selector (1) in position 16.*
- *Switch (1) in position 1.*
- *Set multimeter for 2 V F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Attempt a prolonged engine starting and read a tension on the multimeter corresponding to the engine r.p.m. during starting.

e.g.: 20 mV = 200 r.p.m.
30 mV = 300 r.p.m.

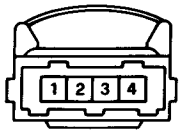
NO → Disconnect the coil B module (A8b) and repeat the preceding procedure checking for a tension value as specified.

YES → Replace module assembly and coil.

NO → With the ignition switched off and the coil module connector disconnected, check, with the multimeter set for 20 V F.S.m for:
- the presence of +12 V between the ground on the timing system cover (G131) and pin 1 module connector;
- 0 V between the ground on the timing system cover and pin 4 module connector;
- 0 V between the ground on the timing system cover and pin 3 module connector.

NO → Replace wiring.

Check the circuit continuity between (see NOTE) pin 19 Motronic electronic control unit multiple connector (S1) and pin 2 coil B module connector.



COIL BE MODULE CONNECTOR
- FRONT VIEW

YES → Replace Motronic electronic control unit.

YES → **TEST No. 13.6**

TEST No. 13.6 — FUEL SYSTEM CHECK

- *Connect a pressure gauge to the fuel distribution pipe.*
- *Ignition key in MARCIA (running) position.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Press button 4 of the trouble diagnosis instrument and check that the fuel pressure reaches approximately 2.8 bar.

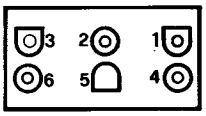
NOTE:
It is possible that the pump is already turning.

NO → Remove the relay S12a and check the wiring continuity between:
- pin 85 socket of relay S12a and pin 20 Motronic electronic control unit multiple connector (S1);
- pin 86 socket of relay S12a and pin 87 socket of relay S12b.

NO → Replace wiring.

YES → With relay S12a removed check the wiring continuity between:
- pin 30 socket of relay S12a and pin 86 socket of relay S12d;
- pin 87 socket of relay S12a and pin 4 wiring connection G133a engine side (male).

NO → Replace wiring.



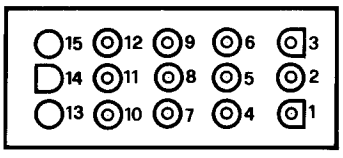
WIRING CONNECTION (G133a)

YES → Check wiring continuity between:
- pin 4 wiring connection G133a body side (female) and single union G133b;
- single union G133b and union O on the fuse box.

NO → Replace wiring.

YES → Check good condition of fuse 13 and wiring continuity between:
- pin 6 fuse box connector H and pin 1 union G73a (female);
- pin 1 connection G73a (male) and pin 2 connection G107 (female) (pink-white wire).

NO → Replace fuse or replace wiring.



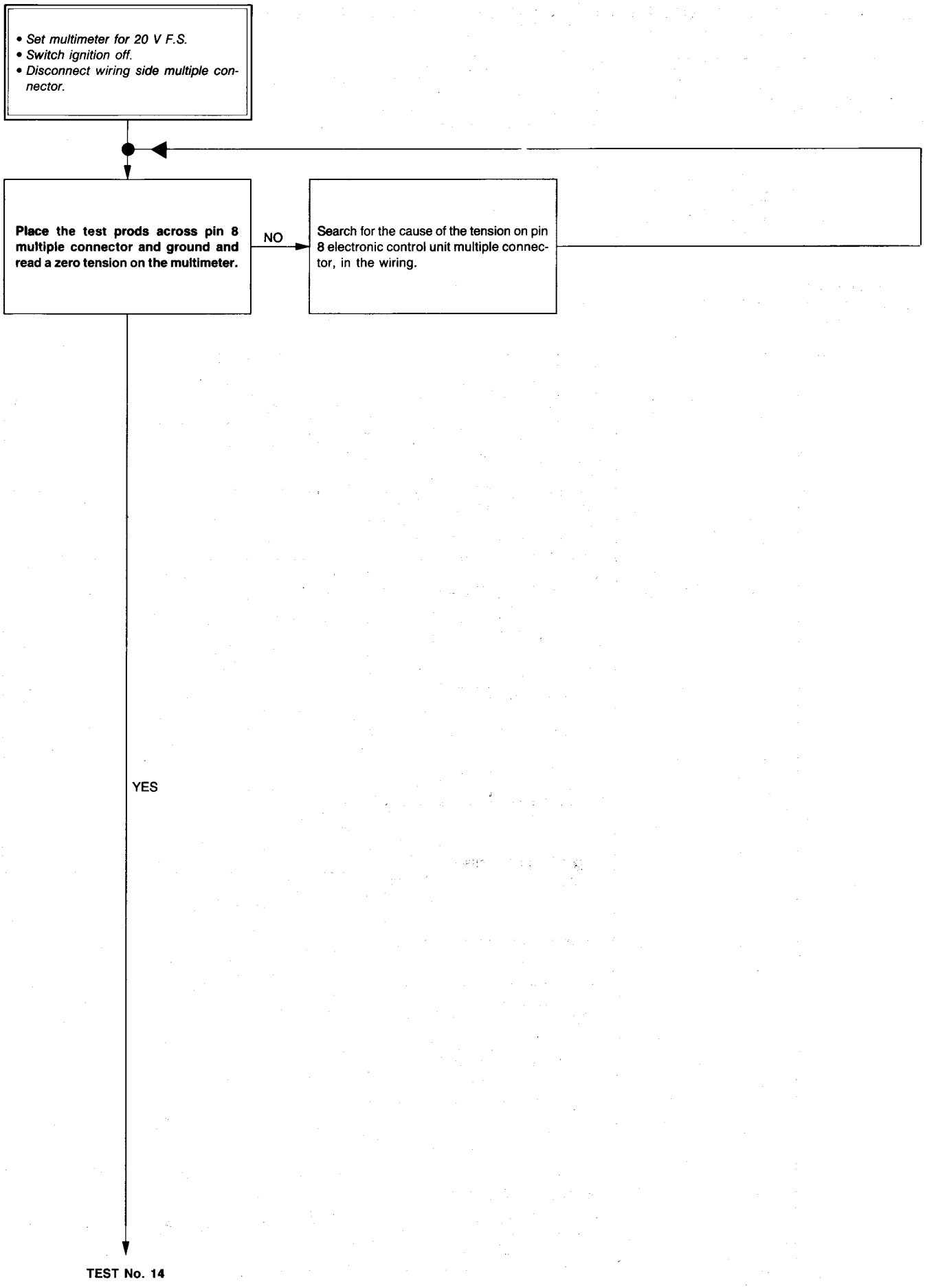
WIRING CONNECTION (G73a)

YES → With botton no. 4 pressed (on the trouble diagnosis instrument), check for the presence of + 12 V directly on the connections of the pumps.

YES → Replace pump that is not functioning.

YES → **TEST No. 13.7**

TEST No. 13.7 — CHECK CONNECTION PIN 8 ELECTRONIC CONTROL UNIT



TESTS TO BE CARRIED OUT WITH THE ENGINE RUNNING

TEST No. 14 — CHECK POSITIVE HALF WAVE OF THE INDUCTIVE SENSOR

- *Start engine.*
- *Selector (1) in position 11.*
- *Set multimeter for 20 V F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Check that with the engine running on idle the multimeter reading is between 250 mV and 2 V.
Speed up the engine and check that value increases.

NO

With the use of a feeler gauge, check that the air gap between the phonic wheel and the sensor is 1 ±0,5 mm.

NO

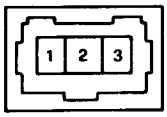
Set the correct gap.

YES

Check the wiring continuity between:
- pin 25 Motronic electronic control unit multiple connector (S1) and pin 1 r.p.m. sensor connector (S13);
- pin 23 Motronic electronic control unit multiple connector and pin 2 r.p.m. sensor connector.

NO

Replace wiring.



R.P.M. SENSOR CONNECTOR
- FRONT VIEW

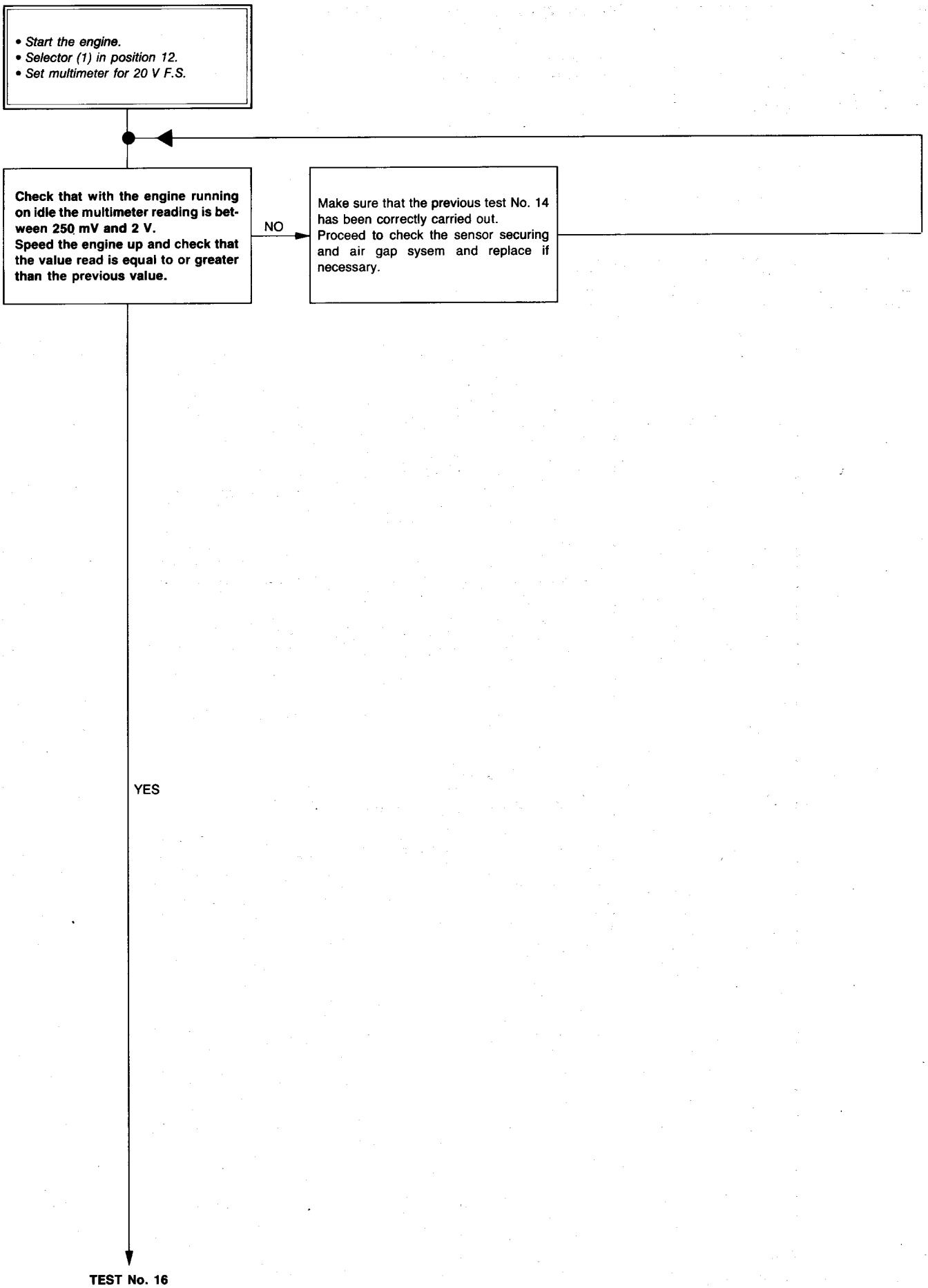
YES

YES

Replace the r.p.m. sensor.
If necessary check the sensing system.

TEST No. 15

TEST No. 15 — CHECK THE NEGATVE HALF WAVE OF THE INDUCTIVE SENSOR



TEST No. 16 — CHECK OF CURRENT TO ELECTRIC FUEL INJECTORS

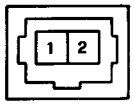
- *Start engine.*
- *Selector (1) in position 13.*
- *Switch (1) in position 1.*
- *Switch (2) in position 1.*
- *Set multimeter for 2 V F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Operate the accelerator effecting brief and rapid accelerations and check that the maximum readings on the multimeter are 350 mV ±40 mV (with the engine temperatur grater than 50°C).

NO

Disconnect the electric fuel injector connectors (S3) and check the wiring continuity between:
- pin 87 relay S12b and pin 1 of each electric fuel injector connector;
- pin 14 Motronic electronic control unit multiple connector (S1) and pin 2 of each electric fuel injector connector.



ELECTRIC FUEL INJECTOR CONNECTOR - FRONT VIEW

NO

Replace wiring.

YES

Check the efficiency of the electric fuel injectors by checking the resistive value of the coil (≃16 Ohm).

NO

Replace defective electric fuel injectors.

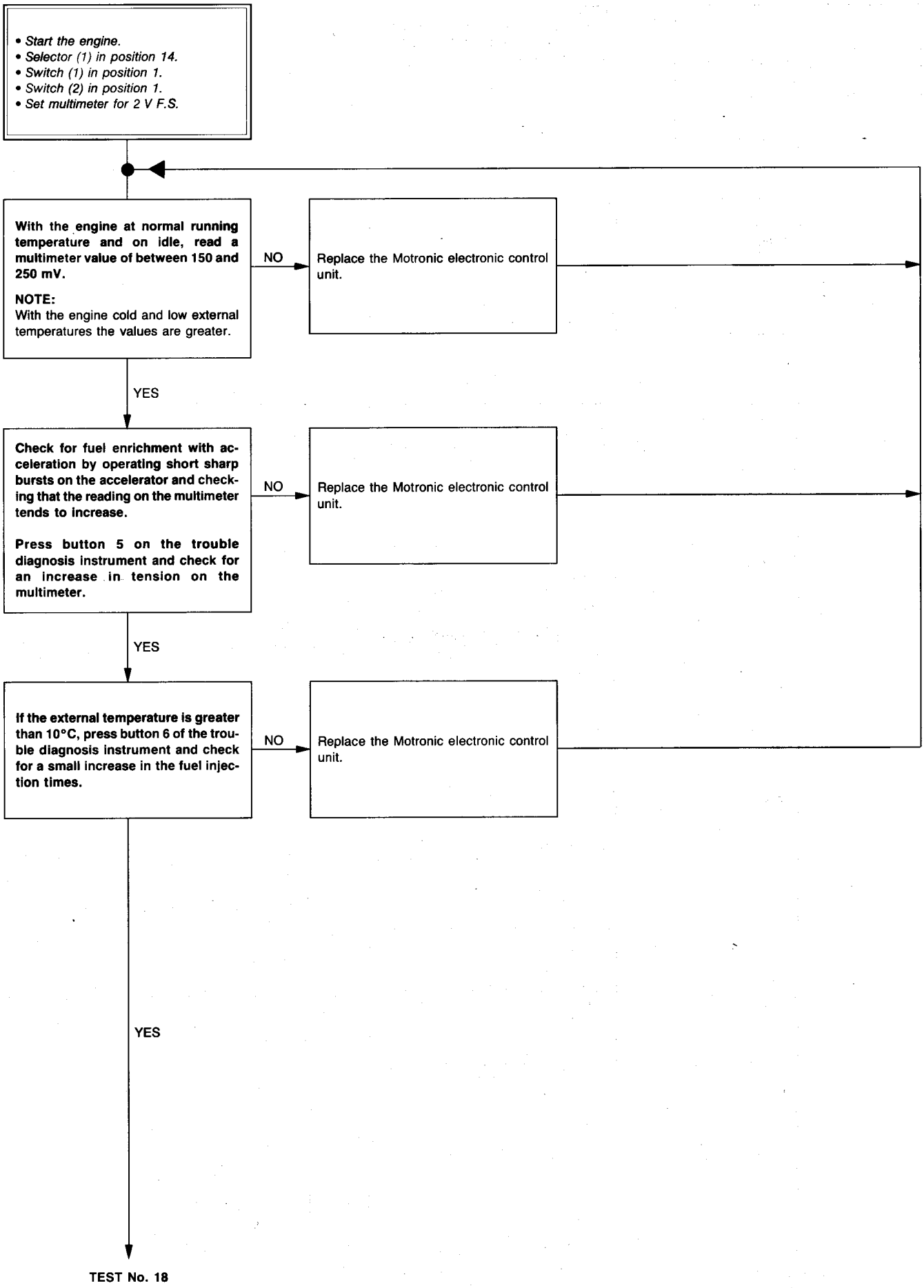
YES

YES

Replace the Motronic electronic control unit.

TEST No. 17

TEST No. 17 — CHECK FUEL INJECTION TIME



TEST No. 18 — CHECK ACTUATOR COIL A AND COIL B

- *Start the engine.*
- *Selector (1) in position 16.*
- *Switch (1) in position 2.*
- *Set multimeter for 2 V F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

Read a tension corresponding to the engine r.p.m. on the multimeter.

e.g.: 80 mV = 800 r.p.m.
300 mV = 3000 r.p.m.

NO

Disconnect coil A module connector and repeat the preceding procedure checking the tension value as specified.

YES

Replace module assembly and coil A.

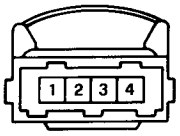
NO

With the ignition switched on, the coil module disconnected and the multimeter set for 20 V F.S., check for:
- the presence of +12 V between the ground on the timing system cover (G131) and pin 1 module connector;
- 0 V between the ground on the timing system cover and pin 4 module connector;
- 0 V between the ground on the timing system cover and pin 3 module connector.

Check wiring continuity (see NOTE) between pin 1 Motronic electronic control unit multiple connector (S1) and pin 2 coil A module connector.

NO

Replace relative wiring.



COIL A MODULE CONNECTOR
- FRONT VIEW

YES

Replace the Motronic electronic control unit.

YES

(CONTINUES)

YES

Set switch (1) to position 1 and check for the previous tension values.

NO

Disconnect coil B module connector and repeat the preceding procedure checking the tension value as specified.

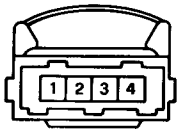
YES

Replace module assembly and coil B.

NO

With the ignition switched off, the coil module disconnected and the multimeter set for 20 V F.S., check for:
- the presence of + 12 V between the timing system cover ground (G131) and pin 1 module connector;
- 0 V between the ground on the timing system cover and pin 4 module connector;
- 0 V between the ground on the timing system cover and pin 3 module connector.

Check the wiring continuity (see NOTE) between pin 19 Motronic electronic control unit multiple connector (S1) and pin 2 coil B module connector.



COIL B MODULE CONNECTOR
- FRONT VIEW

NO

Replace relative wiring.

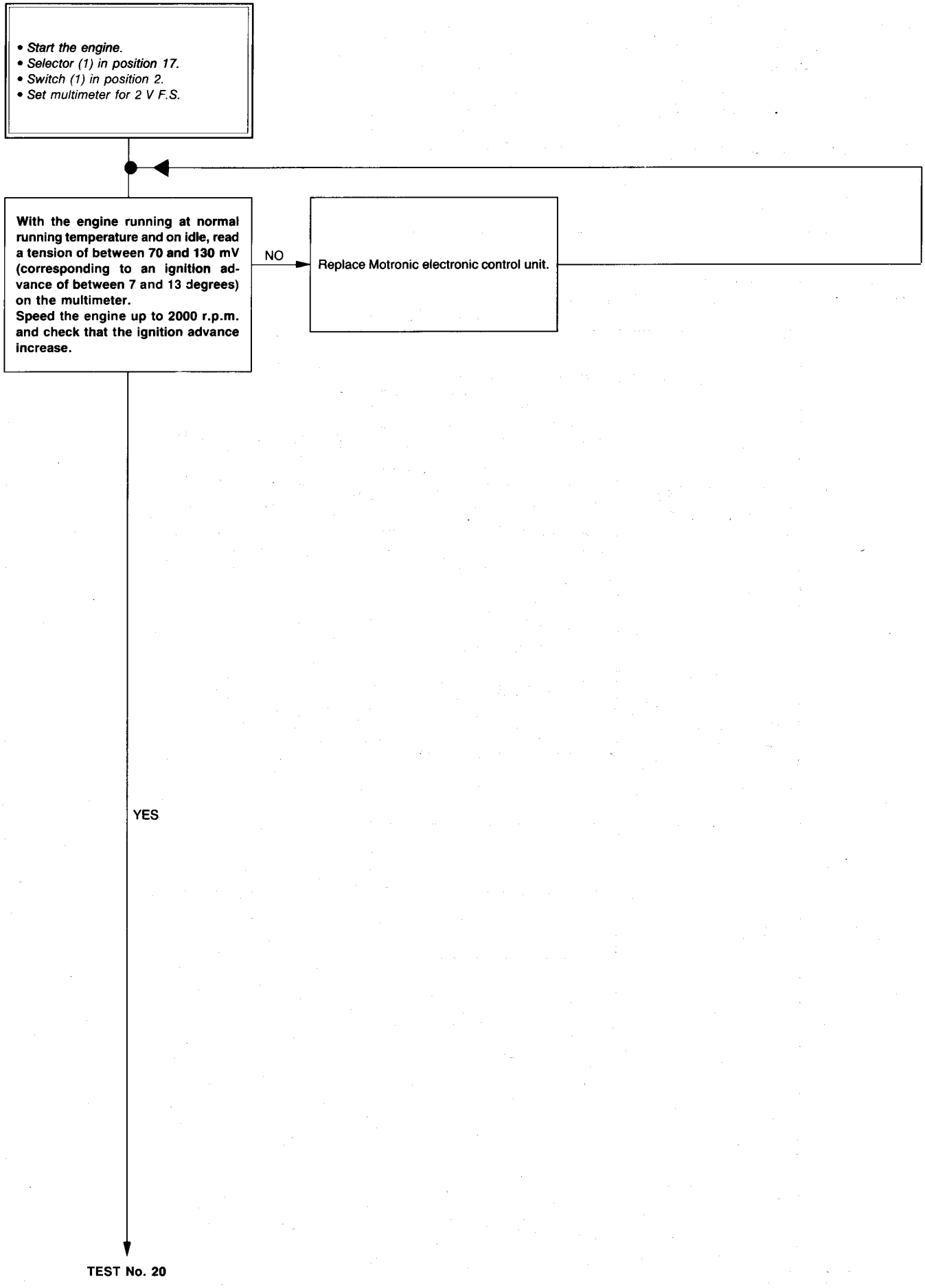
YES

Replace Motronic electronic control unit.

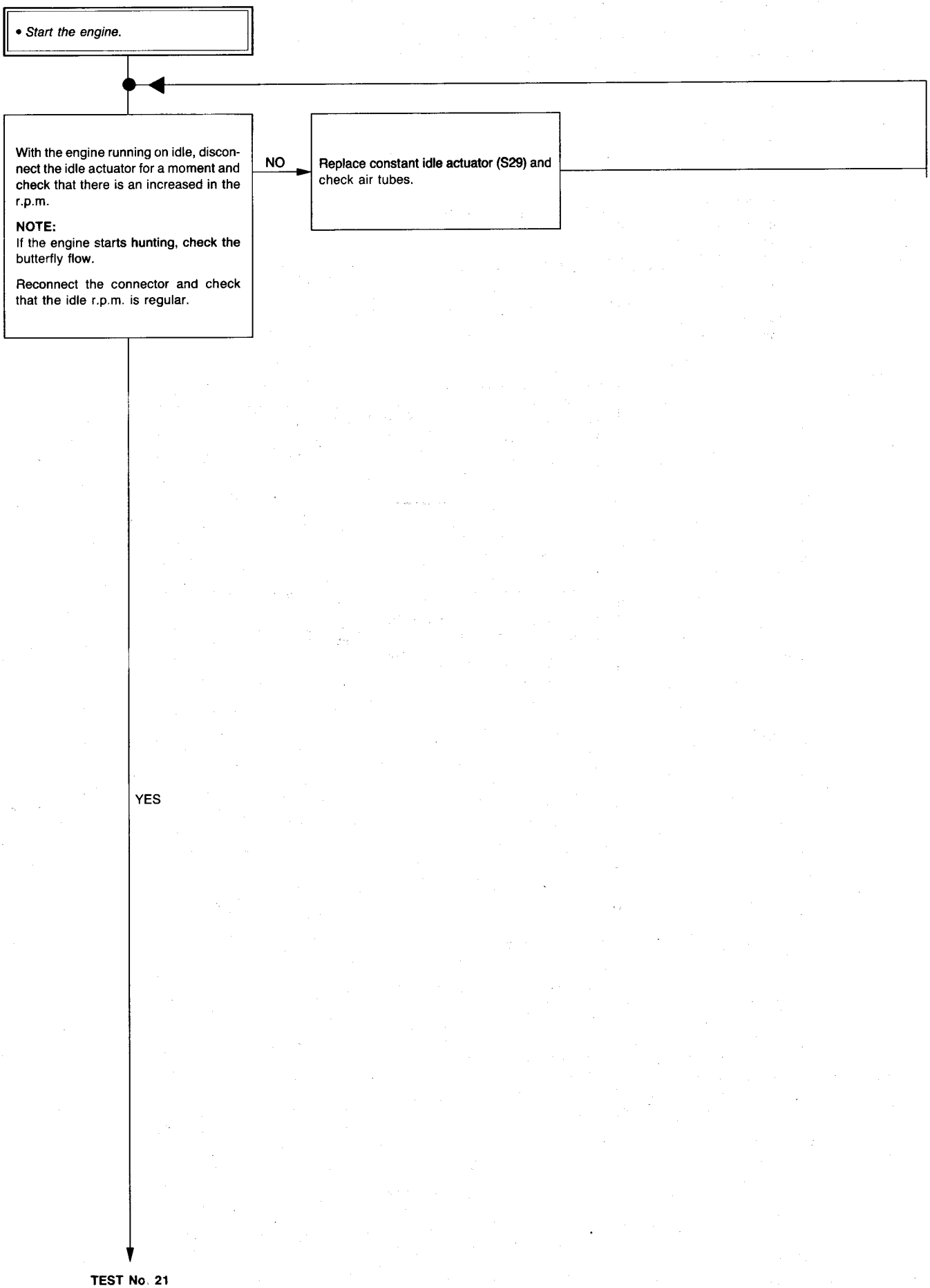
YES

TEST No. 19

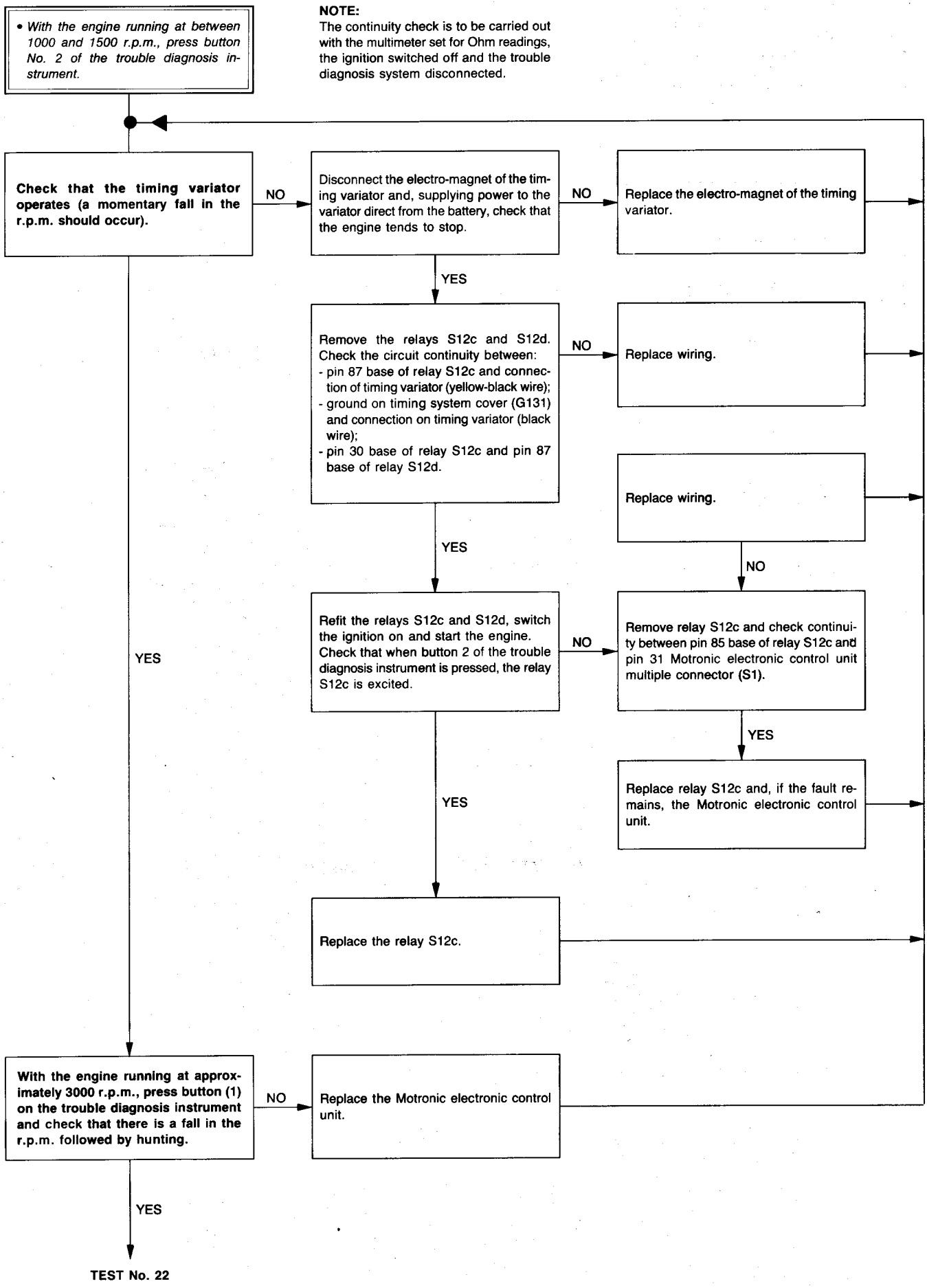
TEST No. 19 — CHECK IGNITION ADVANCE



TEST No. 20 — CHECK FUNCTIONING OF CONSTANT IDLE ACTUATOR



TEST No. 21 — CHECK FUNCTIONING OF ELECTRONIC CONTROL UNIT



TEST No. 22 — CHECK OF CONNECTIONS TO CONDITIONER (IF FITTED)

- *Selector (1) in position 9.*
- *Set multimeter for 20 V F.S.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

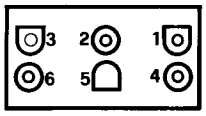
Start the engine making sure that the heating and ventilation systems are switched off.
Read 0 V on the multimeter.

Switch on the heating and ventilation system, but without operating the compressor (ventilator in position 1 and temperature regulation on minimum).
There will be an increase in the engine r.p.m. and a reading of 12 V on the multimeter.

NOTE:
The r.p.m. may increase but NOT decrease.

NO

Stop the engine, switch off the ignition and disconnect the Motronic electronic control unit multiple connector (S1) and the wiring connection G133a.
Check the wiring continuity between pin 29 Motronic electronic control unit multiple connector and pin 6 connection G133a engine side (male).



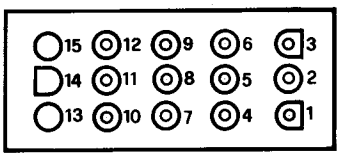
WIRING CONNECTION (G133a)

NO

Replace wiring.

YES

Check wiring continuity between:
- pin 6 wiring connection G133a body side (female) and pin 12 connection G94c dashboard side (female);
- pin 12 connection G94c (male) and conditioner control.



WIRING CONNECTION (G94c)

NO

Replace wiring and if necessary replace conditioner control.

YES

(CONTINUES)

YES

• *Selector (1) in position 10.*

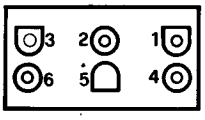
With the compressor operating read +12 V on the multimeter.

With the compressor not in operation, read 0 V on the multimeter.

Check that the engine r.p.m. does not fall below the idling value.

NO

Stop the engine, switch the ignition off and disconnect the Motronic electronic control unit multiple connector and the wiring connection body side.
Check the wiring continuity between pin 32 electronic control unit multiple connector and pin 3 connection G133a engine side (male).



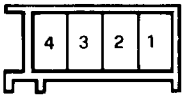
WIRING CONNECTION (G133a)

NO

Replace wiring.

YES

Check the wiring continuity between pin 3 connection G133a (female) and pin 4 connection G38.



WIRING CONNECTION (G38)

NO

Replace wiring.

YES

TEST No. 23

TEST No. 23 — CHECK THE SETTINGS FOR THE DIFFERENT MARKETS

NOTE: The setting is carried out by means of the connection, using the appropriate connector (S30), of a device in the form of a relay with a casing of a different colour.

- *Multimeter 200 Ohm F.S.*
- *Disconnect the negative terminal of the battery.*
- *Disconnect the multiple connector of the interface* ***C.1.0136*** *from the electronic control unit.*
- *Reconnect the negative terminal of the battery.*
- *Switch ignition off.*

NOTE:
The continuity check is to be carried out with the multimeter set for Ohm readings, the ignition switched off and the trouble diagnosis system disconnected.

With the selector (2) at the positions 7 and 8, read the values given below, on the multimeter, as a function of the setting for the market in question.

Selector position (2)	NON-POLLUTING VERSION WITH UNLEADED PETROL	
	95 OCTANE	91 OCTANE
7	Infinite resistance	Resistance less than 10 Ohm
8	Resistance less than 10 Ohm	Resistance less than 10 Ohm
	Bright yellow coloured device inserted in the connector (S30)	Sky-blue coloured device inserted in connector (S30)

NO

With the electronic control unit multiple connector and the maps switching device disconnected, check that there is no continuity between:
- pin 27 electronic control unit multiple connector and ground;
- pin 10 electronic control unit multiple connector and ground;
- pin 27 and pin 10 electronic control unit multiple connector.

Check that there is continuity between terminal 87 of the base of the setting device and ground.

NO

Replace wiring.

YES

Replace the map switching device.

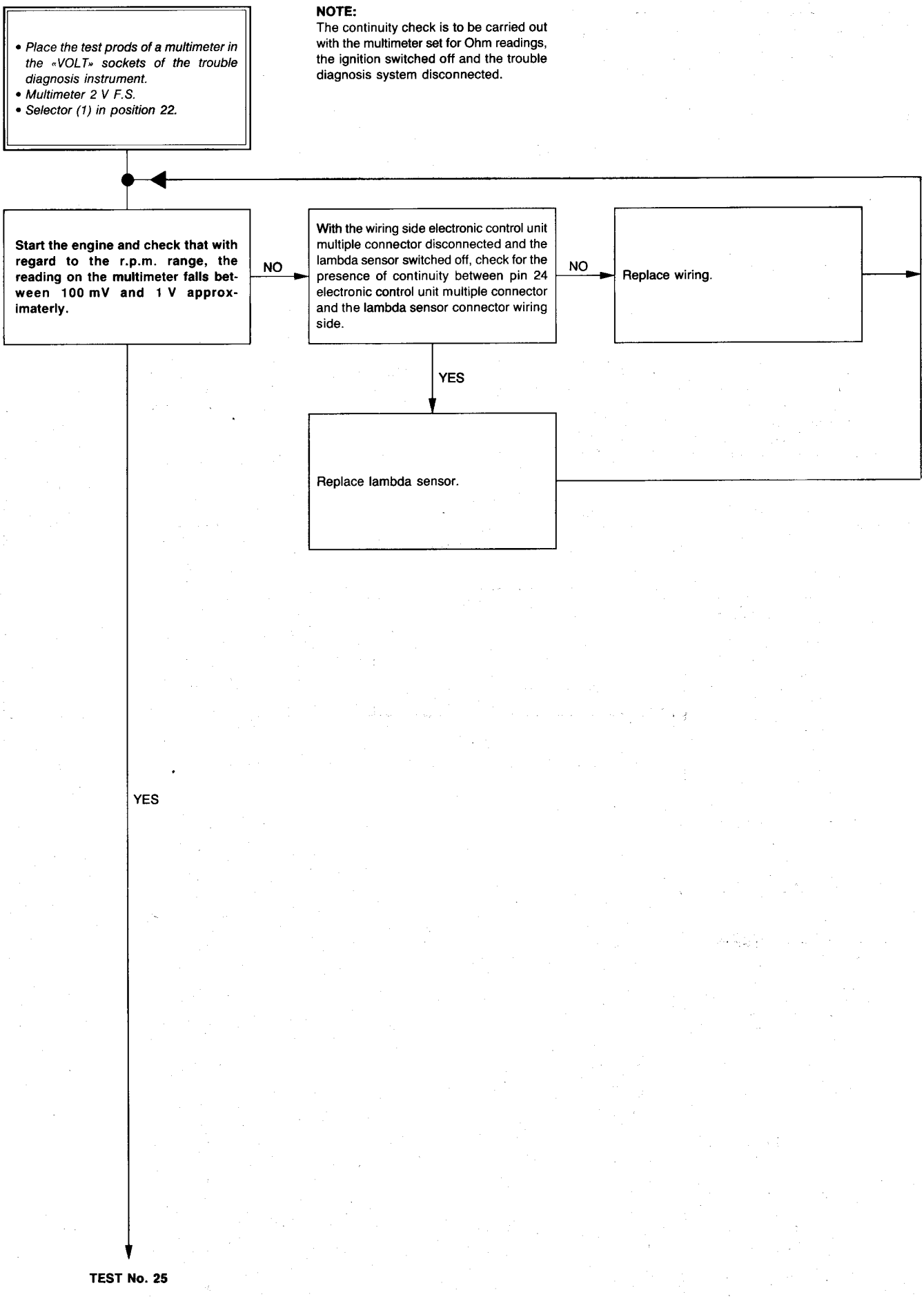
YES

- *Reconnect the multiple connector of the interface* ***C.1.0136*** *to the Motronic electronic control unit.*

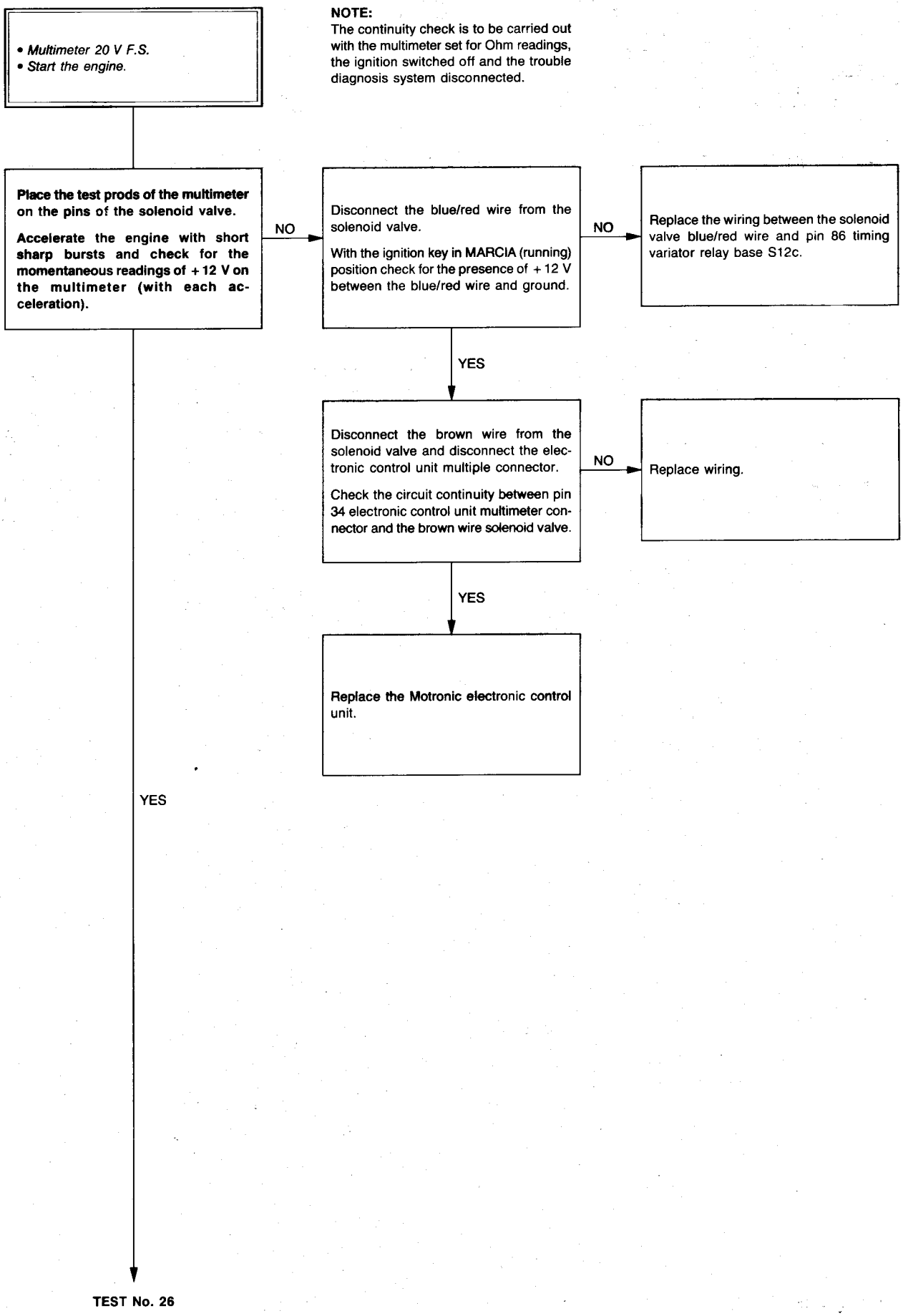
YES

TEST No. 24

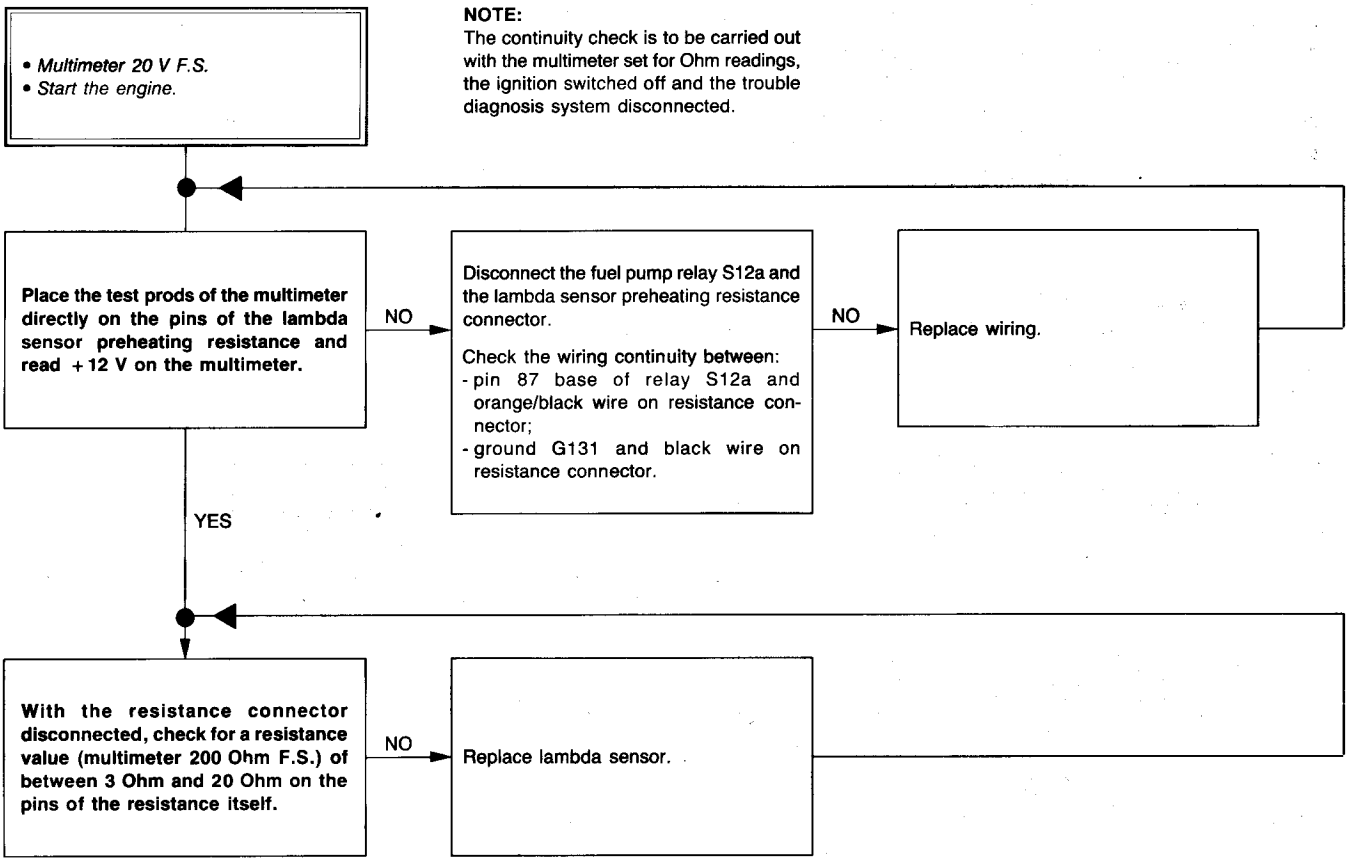
TEST No. 24 — CHECK LAMBDA SENSOR



TEST No. 25 — CHECK FUEL VAPOUR CONTROL SOLENOID VALVE ACTUATOR



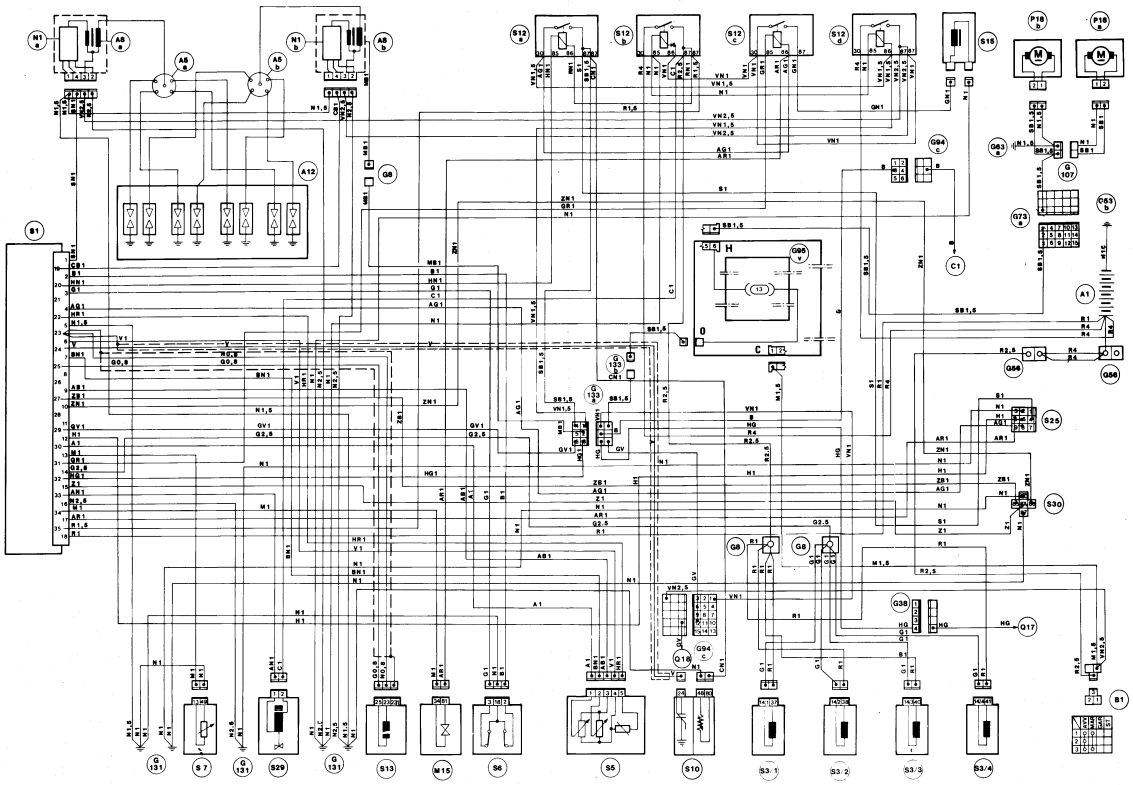
TEST No. 26 — CHECK POWER SUPPLY TO THE LAMBDA SENSOR PREHEATING RESISTANCE



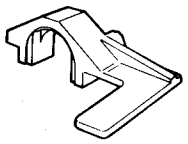
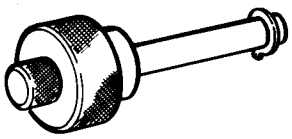
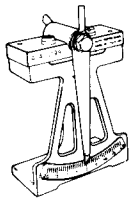
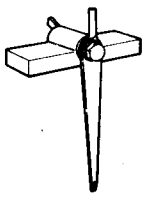
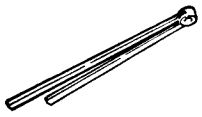
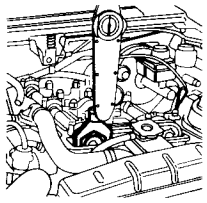
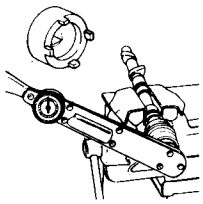
IGNITION AND INJECTION WIRING DIAGRAM

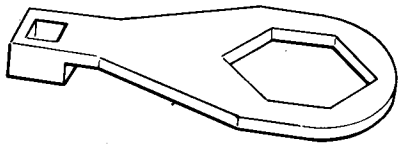
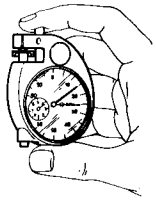
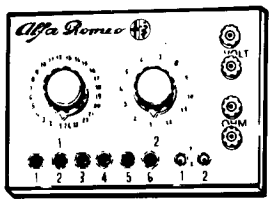
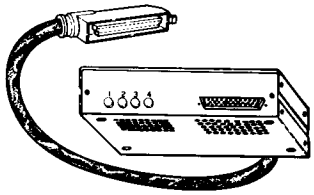
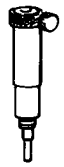
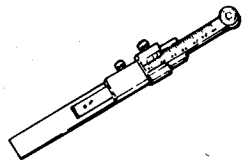
(MOTRONIC ML4.1 SYSTEM - 4 CYLINDERS)

A1 Battery
A5a Ignition distributor A
A5b Ignition distributor B
A8a Ignition coil A
A8b Ignition coil B
A12 Spark plugs
B1 Ignition switch
C1 Electronic rev-counter
G8 Single connector
G38 Connector for air-conditioner wiring
G53b Engine compartment ground left side
G56 Branch terminal board
G63a Rear right ground
G73a Connector for right rear services
G94c Engine compartment connector right side
G95v Fuse
G107 Connector for fuel pump
G131 Ground on upper cover
G133a Electronic injection-ignition wiring connector A
G133b Electronic injection-ignition wiring connector B
M15 Fuel vapour control solenoid valve
N1a Electronic ignition module A
N1b Electronic ignition module B
P18a Main electric fuel pump
P18b Auxiliary electric fuel pump
Q17 Relay for simultaneous control of engine cooling fan and supplementary fan
Q18 Heater
S1 Injection control unit
S3 Injectors
S5 Air flow gauge
S6 Accelerator butterfly switch
S7 Engine coolant temperature sensor
S10 Lambda sensor
S12a Motronic relay (fuel pump)
S12b Motronic relay (with diode)
S12c Motronic relay (timing variator)
S12d Main Motronic relay
S13 Timing and r.p.m. sensor
S25 Connector for self diagnosis
S29 Idle r.p.m. actuator
S30 Map switching device connector



SPECIAL SERVICE TOOLS

Identification number	Name	
A.2.0423	Tool for clamping valve timing variator (use with **A.5.0231, A.5.0232 and A.5.0242**)	
A.2.0449	Tool for positioning of timing variator electro-magnet	
A.4.0199	Tool for checking the reference notches on the cam-shaft caps	
A.4.0221	Upper plate for tool **A.4.0199**	
A.5.0103	Wrench for turning cam shaft	
A.5.0232	Spanner for cam shaft gear fixing ring nut	
A.5.0242	Spanner for timing variator cover	

Identification number	Name	
A.5.0274	Wrench for mounting of timing variator on cam shaft	
C.1.0108	Dial thickness meter for valve caps	
C.1.0132	Universal trouble diagnosis instrument	
C.1.0136	Interface	
C.6.0122	Instrument for checking Top Dead Centre point	
C.6.0168	Feeler gauge for valve clearance	
C.9.0032	Interface-universal trouble diagnosis instrument connection lead