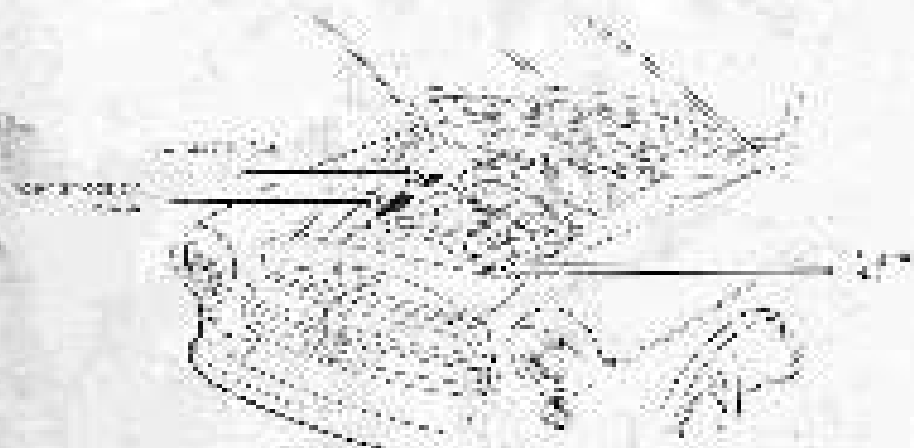


CHASSIS AND ENGINE NUMBER



H. II.

In case of engine or other uniting parts, details and engine numbers should always be noted. They may not be changed to avoid any needlessness.

If the registration number is not in evidence and is not required.

CARL F. W. BORGWARD G.M.B.H.

AVIONEN UND MOTOREN WERKE

Service Dept.

Bremen-Sebatelsand, Germany.

Tele 41 31 21, Telegrams: "Borgwardwerke, Bremen".

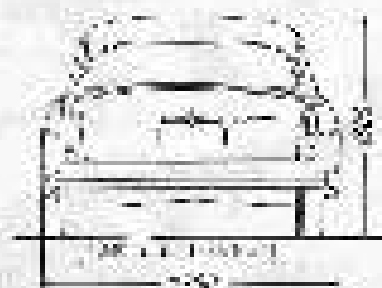
Hours of business: 8:30 p. m. — 5:30 p. m., Monday to Friday.
Closed on Saturdays.

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DIMENSIONS AND WEIGHTS



All dimensions in mm.

Weights

Unladen curb weight	1170 cwt (130 kg)
Maximum allowed weight (payload)	1275 cwt (140 kg)
Permissible load	5 persons + 33 lbs of luggage
Permissible front axle loading	1500 cwt (160 kg)
Permissible rear axle loading	1575 cwt (169 kg)
Maximum loading	210 lbs (100 kg)
Permissible trailer load (with brakes)	1500 cwt (160 kg)
without brakes	1275 cwt (140 kg)

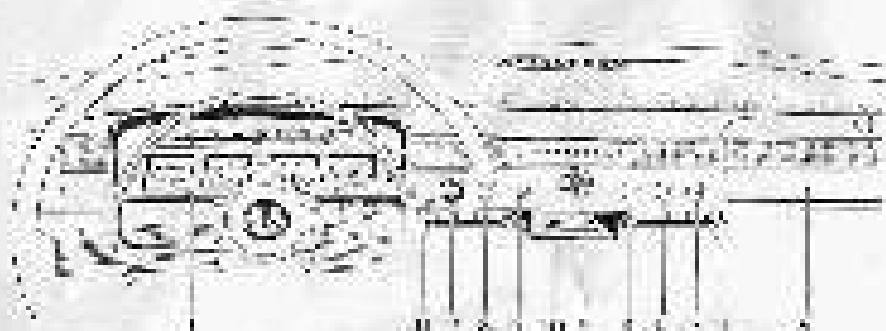
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INTRODUCTION

In preparing this instruction book, it has been our aim to present in a simple and concise manner all the information necessary for the correct care, operation and general maintenance of your new "Ritmo". If driven with reasonable care and properly and regularly serviced and re-loaded, it will give many years of enjoyable motoring. In this and other instructions will be found in the reading pages of this manual. It is recommended that the owner should inspect ritmally thoroughly with the construction and mechanical details of the "Ritmo" and by studying the handbook, learn the location of all the gauges and identification points on the car. In this way, the regular servicing at the recommended intervals can be carried out both quickly and efficiently.

Should repairs or overhauling be one of the greatest inconveniences that only genuine "Fiat" spare parts should be used and that the work is carried out by qualified and authorized "Fiat" spare parts. Make sure that your "Ritmo" deserves the same high standard of workmanship in being returned to service into its original construction.

INSTRUMENT PANEL



All the controls and instruments shown by the sketch are within of the vehicle. They are used in such positions that they can be reached or seen with ease from the driver's subjectively point of view.

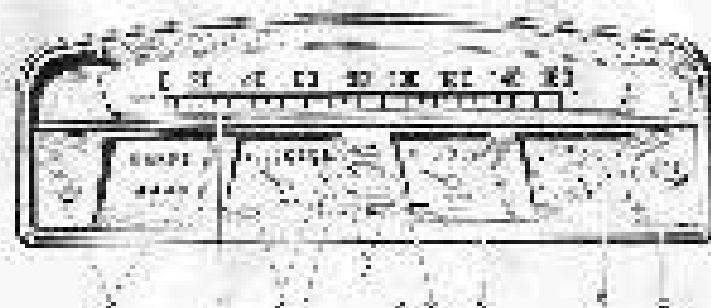
- | | |
|-------------------------------|------------------------------|
| 1. Right-hand main switch | 2. Fuel and water for heater |
| 3. Ignition switch | 4. Cigarette holder |
| 5. Carburetor choke control | 6. Directional indicator |
| 7. Airflow | 8. Control lever for heater |
| 9. Fuel and water for heater | |
| 10. Fuel and water for heater | |
| 11. Fuel and water for heater | |
| 12. Fuel and water for heater | |

CONTROLS



- | |
|-------------------------|
| 1. Gear wheel |
| 2. Handbrake |
| 3. Foot operated clutch |
| 4. Clutch pedal |
| 5. Brake pedal |
| 6. Accelerator pedal |

INSTRUMENTS



- The speedometer is one of the most important instruments on the panel, and which particular attention should be paid. We would ask that you pay particular attention to speeds that in the interests of economy the recommended maximum at low speeds should never be exceeded.

(From LATS, De Luxe & Coupe)

4 p.m. 1 p.m.

1st gear	up to 15 m.p.h. (up to 30)	up to 25 m.p.h. (up to 40)
2nd gear	5-15 m.p.h. (15-30)	12-24 m.p.h. (20-40)
3rd gear	20-30 m.p.h. (30-45)	30-45 m.p.h. (40-60)
4th gear	30-40 m.p.h. (40-55)	40-55 m.p.h. (50-70)

- As you sit in the instrument you will find in the lower section a "temp" indicator which can be rotated to show by turning the pointer to the proper mark.

- The water temperature gauge shows the coolant temperature which should read over 80 C (176 F) when the engine is hot. As an engine warms up you will appreciate that at the beginning of the engine operation, and a few minutes afterwards, the needle will be in the red. This is the maximum allowed engine temperature of 95 C (203 F) and 150 F. As the engine warms up you will see the needle in the red and should be careful not to keep the engine operating temperature within the specified limit.

The working temperature will never the 110 C (230 F) mark without damage to the engine, although this condition will only appear when the engine has been subjected to continuous heavy loads. A noticeable loss of coolant may appear even though working at high speeds. A leak with a gasket valve often comes into operation at about 115 C (240 F).

A red warning lamp is built into the pressure control air hose assembly at station 102 (298) in the vicinity of the under-panel driving condition. Its level of sensitivity to pressure should be checked and adjusted if necessary.

Should the red ignition warning light and the pressure warning light be illuminated simultaneously, it will signal correctly by lamp that the "P" test during the warm-up and dynamic run check and the engine should be stopped at once.

4. With handbrake on, in neutral, a blue warning light is illuminated in the dashboard. It is extinguished when the handbrake is released.

5. The red ignition light comes on when the engine is switched on and goes out when the engine is started and the dynamometer is engaged.

6. You will doubtless be aware that from the level of flow or effort and engine location, the action of pressure is of rather low importance than the quantity of air which is being forced through the bearings in any given time. The level of engine friction is a function of pressure, so that the driver should be in no doubt when a red warning light is included in the system, when lighter is shown, the oil pressure is below the prescribed minimum. If the warning light should come on again, the pump is full, the control valve which operates it should be checked.

7. The direction indicator warning lights come on when the direction indicator (102) (111) is switched.

8. Although the fuel gauge does not provide indication of the level of fuel in the tank, you are advised not to let the level fall too low on any motor highway. Fuel gauges can be checked at station 50 (100) (101).

9. The electric clock can be reset by means of an adjusting screw which is situated below it.

10. Directional indicator dash lighting is provided around the instrument, but can be made completely when driving at night by depressing the knob on the right-hand side of the instrument panel (102) (111).

LIGHTING SYSTEM

All the lights can be switched on by means of a parallel switch independent of the ignition system.

Headlamps on one side and tail light are operated by means of a parallel switch which has two positions.

Side and tail lights are for use when parking the car in a street or on the open road. They come on when the switch is pulled up to position "1".

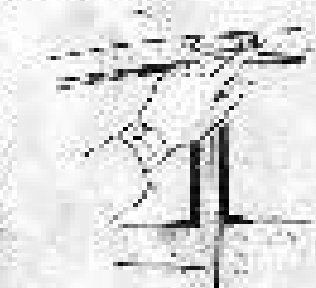
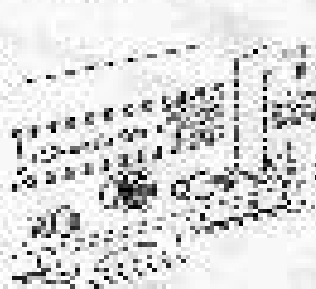
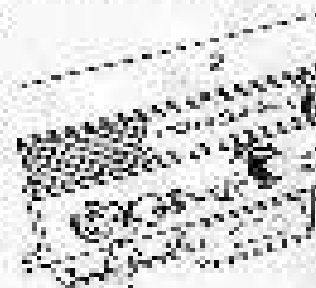
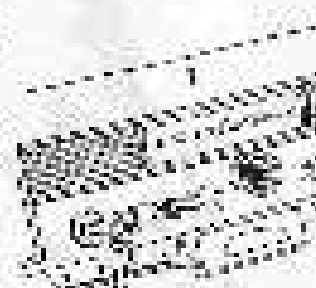
Yard or a handbrake can be switched on by pulling the switch out to position "2". The main beams are dipped by depressing the foot dipper switch. When the footbrake and an indicator beam, the blue warning light is illuminated.

The parking lights come automatically when reverse gear is engaged, but only when the light is switched on.

Labels "TS" and "TS de Luxe"

The parking lights are operated by a parallel system which has two positions, lighting the lights either on the left or right side or may be switched.

The interior of the car is illuminated by a roof light which is switched automatically by a courtesy switch when the driver's door is opened (your door on the "TS"); it can also be switched on when the door is closed by a push-button switch (102) (101) (101).



A red warning lamp is built into the instrument and will come operated at about 227°F (100°C). If this should happen under normal driving conditions, the level of coolant in the radiator should be checked and topped-up if necessary. Should the red lighting warning light and the temperature warning light be illuminated simultaneously, it will almost certainly be found that the "W" bulb serving the waterpump and dynamo has broken and the engine should be stopped at once.

4. With headlamps on main-beam, a blue warning light is illuminated on the dashboard; it is extinguished when the head-lights are dipped.

5. The red lightning light comes on when the engine is switched on and should stay on when the engine is started and the dynamo commences to charge.

6. You will sometimes be aware that from the point of view of efficient engine operation, the excess oil pressure is of rather less importance than the quantity of oil which is being forced through the bearings in any given time. This case of course involves a minimum oil pressure, so that the oil can do its job. In no doubt whatsoever, a warning light is included in the system which lights up whenever the oil pressure falls below the described minimum. If the warning light should come on when the pump is full, the correct action which you should be advised.

7. The direction indicator warning lights come on when the direction indicator (left or right) is selected.

8. Although the fuel gauge gives an accurate indication of the level of fuel in the tank, you are advised not to let the fuel get too low, as on some of our highways, filling stations can be as much as 20 miles (25 km) apart.

9. The electric clock can be set by means of an adjust screw which is situated below it.

10. Broad-beam, adjustable dash lighting is provided so that the instrument can be read comfortably when driving at night. To operate, turn knob on the right-hand side of the instrument panel to the right.

LIGHTING SYSTEM

The lights can be selected on or off, power off, each part being independent of the lighting system.

Headlamps and also the tail light are operated by means of a multi-pole switch which has two positions.

Side and tail lights are for use when parking the car in streets or on the open road, they come on when the switch is pulled out to position "1".

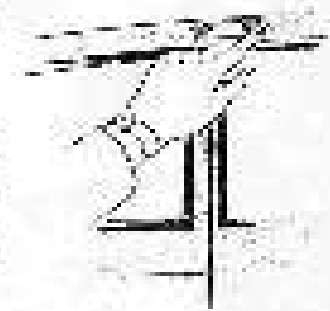
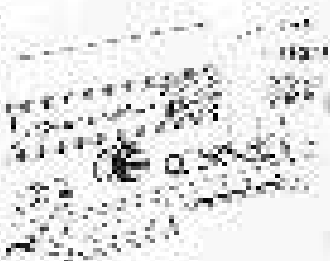
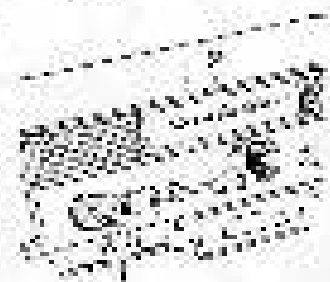
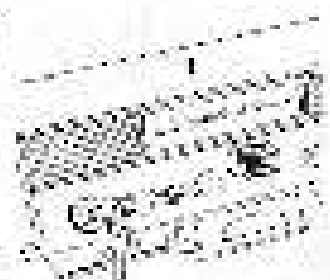
Your car's headlamps are switched on by pulling the switch out to position "2". The main beams are dipped by depressing the foot dipper switch, when the headlamps are on main-beam, the high warning light is illuminated.

The remaining lights come automatically when reverse gear is engaged, but only when the function is selected on.

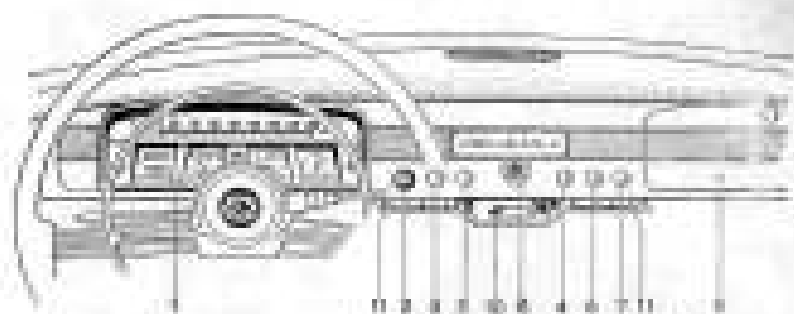
Labels "2R" and "1R de Law"

The parking lights are operated by a multi-pole switch which has two positions, lighting the lights either on the left or right side, as may be required.

Control of the tail light is effected by foot light which is switched on automatically by a multi-pole switch when the clutch pedal is depressed. Such a foot light as the "1R" is not electrically connected to the main circuit, but is instead powered on or off by a pressure button within the lamp itself.



INSTRUMENT PANEL



All the controls and instruments necessary for the efficient operation of the car are to be found in such positions that they can be reached or seen with ease from the driver's adjustable seat.

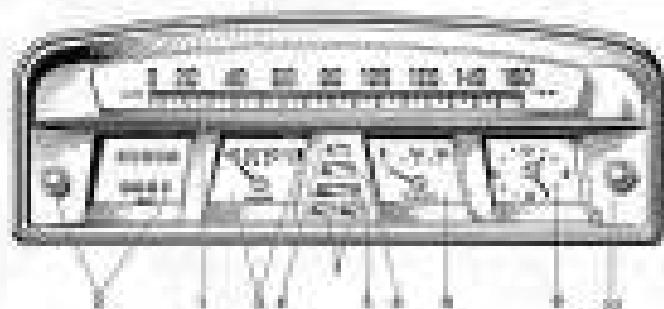
- | | |
|--|--|
| 1. Multi-instrument unit | 7. Push-pull knob for heater |
| 2. Ignition switch | 8. Cigarette lighter |
| 3. Carburetor choke control | 9. Downshift locker lid |
| 4. Windscreen wipers and washer switch | 10. Ashtray |
| 5. Push-pull headlamp switch | 11. Control lever for heater and defroster |
| 6. Push-pull parking lights switch | |

CONTROLS



1. Gear lever
2. Handbrake
3. Foot-operated direction
4. Clutch pedal
5. Brake pedal
6. Accelerator pedal

INSTRUMENTS



1. The speedometer is one of the most important instruments on the panel to which particular attention should be paid. We would ask that you pay particular attention to ensure that in the interests of economy the recommended miles in the individual gears are not exceeded.

(Dodge's 70, de Luxe and Coupe)

	mph	kph
1st gear up to 17 mph (up to 30)	up to 28 mph (up to 45)	
2nd gear 17-21 mph (30-50)	28-41 mph (45-70)	
3rd gear 21-30 mph (35-50)	35-48 mph (55-75)	
4th gear 31-41 mph (50-70)	50-67 mph (75-100)	

2. Next to the watermeter, you will find in the same section a "temp" recorder which can be returned to zero by turning the conveniently placed knob.

3. The water temperature gauge shows the coolant temperature which should read over 130°F (50°C) when the engine is hot. As an experienced driver, you will appreciate that at this temperature, the engine operates under the most favorable conditions and that should the engine be undercooled below a temperature of 140°-150°F (60°-70°C) considerably increased wear will occur. You should therefore endeavor to keep the engine operating temperature within the prescribed limits. The working temperature may reach the 180°F (110°C) mark without damage to the engine, although this condition will only appear when the engine has been subjected to continuous heavy loads. A noticeable loss of coolant can scarcely occur through overheating, as the radiator is fitted with a relief valve which comes into operation at about 120°F (50°C).

INSTRUCTION BOOK

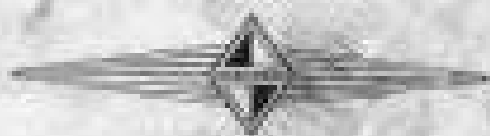
for the
11/2 Liter

BORGWARD

Isabella

— Saloon and Touring Sports Saloon
— Touring Sports de Luxe
— Coupé
— Ladies Wagon
— Models

1935 Edition, August 1935



CARL F. W. BORGWARD G. M. B. H.
Automobil- und Motoren-Werke, Bremen
Germany



A red warning lamp is built into the thermometer unit and forces operation at about 235°F (100°C). If this should happen under normal driving conditions, the level of coolant in the radiator should be checked and topped-up if necessary. Should the red ignition warning light and the temperature warning light be illuminated simultaneously, it will almost certainly be found that the "Y" belt driving the waterpump and dynamo has broken and the engine should be stopped at once.

4. With headlamps on mainbeam, a **blue warning light** is illuminated on the dashboard. It is extinguished when the head-lights are dipped.

5. The red **ignition light** comes on when the engine is switched on and should cut out when the engine is started and the dynamic conditions change.

6. You will doubtless be aware that from the point of view of efficient engine lubrication, the actual oil pressure is of rather less importance than the quantity of oil which is being forced through the bearings in any given time. This does of course involve a minimum of pressure, so that the driver should be in no doubt whatsoever, a **warning light** is included in the system which lights up whenever the oil pressure is below the prescribed minimum. If the warning light should come on when the pump is full, the control switch which operates it should be checked.

7. The **direction indicators warning lights** come on when the separate indicator (either left or right) is selected.

8. Although the **fuel gauge** gives an accurate indication of the level of fuel in the tank, you are advised not to let the level fall too low, as on some motor highways, filling stations can be as much as 20 miles (32 km) apart.

9. The **electric clock** can be re-set by means of an adjust screw which is situated below it.

10. Dazzle-free, adjustable **dash lighting** is provided so that all instruments can be read comfortably when driving at night. To operate, turn knob on the right-hand side of the instrument panel to the right.

LIGHTING SYSTEM

The lights can be switched on by means of a push-pull switch independently of the ignition system.

Headlamps and side and tail lights are operated by means of a push-pull switch which has two positions.

Side and tail lights are for use when parking the car in streets or on the open road. They come on when the switch is pulled out to position "1".

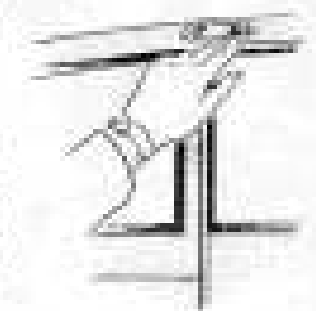
Foot car's headlamps are switched on by pulling the switch out to position "2". The main beams are dipped by depressing the foot dipper switch. When the headlamps are on mainbeam, the blue warning light is illuminated.

The **reversing lights** come automatically when reverse gear is engaged, but only when the ignition is switched on.

Labels "TR" and "TR de Luxe"

The **parking lights** are operated by a push-out switch which has two positions, lighting the lights either on the left or right side as may be required.

Interior of the car is illuminated by **tail light** which is switched on automatically by a courtesy switch when the driver's door is opened (both doors on the "TR"). It can also be switched on when the door is closed by a push-button switch on the lamp head.



SIGNALLING AND AUXILIARY EQUIPMENT



The items in this group can only be operated when the ignition/starter key is in position "1".

Position "0": Everything switched off.

Position "1": Radio operates, but ignition off.

Position "2": Ignition switched on.

To start insert ignition key, turn to position "1" and then turn further to the right.

The horn is operated by a slight pressure on the knob in the centre of the steering wheel.

Labels "18", "18 de luxe" and "Coopé"

When driving at night, the headlamps may be used for visual signalling by means of the contact ring on the steering wheel.

The brake lights come on automatically when the brakes are applied.

The directional indicators are operated by a small hand lever on the left-hand side of the steering column.

After the turn has been completed the self-cancelling switch operates automatically and the switch is returned to the neutral position. Two warning lights showing when and which of the indicators is operating are to be found in the centre of the instrument panel.

The self-cleaning pendant type windscreen wipers are controlled by turning the knob as shown in opposite illustration. The windscreen washer comes on when the knob is pulled out.

Labels "18 de luxe"

The push-pull switch on this model has two positions:

1. Windscreen wipers "on".
2. Windscreen wipers and electric windscreen washers "off".

The cigarette lighter is operated by pressing the lighter lever; the element glows red when it should be removed. The lighter socket also serves as a connection for the cigarette lamp.

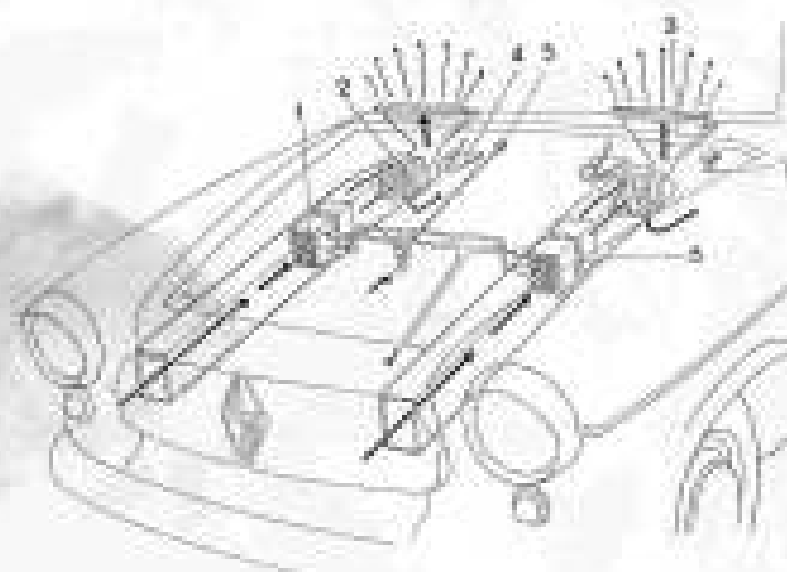
AIR CONDITIONER AND DEFROSTER

The air-conditioner provides either hot or cold air to the car interior. The change-over from cold to hot air and vice versa is effected by a control which can be easily reached from the driver's seat. In addition, the warm air produced by the heater can be used to defrost the windscreen. When it is switched on, warm air is blown onto the windscreen and effectively prevents either the formation of ice or the accumulation of snow.

When the heaters are not working, cool air can be directed onto the windscreen and this will prevent, particularly if the windows are closed, the misting up of the windscreen.

Labels "18" and "18 de luxe"

For heating the interior when the car is stationary, a fan is built into the system and this is operated by a push-pull switch (7) situated on the left-hand side under the instruments.



- | | |
|--------------------------|--|
| 1. Heater units | 5. Two-way switch hot/cold air |
| 2. Control levers | 6. Heater fans ("18" and "18 de luxe") |
| 3. Defroster air outlets | 7. Switch for heater fans |
| 4. Regulator lever | |

Two 4-position regulator levers one on each side, control the supply of hot or cold air through the air-conditioning system or the defroster as may be required.

The regulating levers have the following four positions:

1. Air conditioning system only switched on.
2. Both air-conditioner and defroster "on".
3. Defroster only switched on.
4. Defroster and air-conditioner "off".

The forward air selector switch can be operated in any of the above positions.

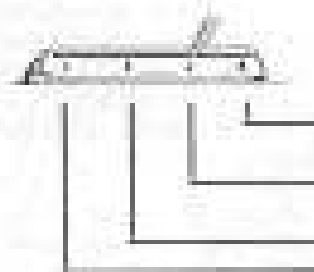
A push-pull control for changing over from one to the other is to be found on the instrument panel and connected to the stopcock on the heating system. This stops the supply of hot water to the heater units from the engine's cooling system. With the knob in the "in" position, the heat is switched off and when pulled out heat air is supplied by the system.

The heating can be checked by a slight twist of the control knob.

When **refilling the cooling system**, the heating system should be bled by adopting the following procedure —

1. Open the stopcock situated on the cylinder head by operating the hot/cold air selector knob. This permits warm water to flow into the heater units situated on either side.
2. Bleed off the bleeding screws on the connecting pipes to the heater units in order to prevent any air that may remain in the system to escape.

When water appears from the bleed screw vents, tighten down the screws freely and top up the radiator with coolant to bring the level just below the overflow pipe in the filler.



RUNNING IN INSTRUCTIONS

The treatment that your new "Isabella" receives during the first thousand miles or so will have a big influence on its operational life and output, particularly if it is kept throttled back during this period.

It is therefore advised that in your own interests, the speeds during the running-in period should be restricted as set out in the following table —

	Maximum speed (mph) (ft/l in brackets)				
	1st gear	2nd gear	3rd gear	4th gear (up to 55 mph)	5th gear (over 55 mph)
Isabella Isabella Coupé Isabella Wagon	17 (28)	24 (39)	34 (55)	41-45 (66-72)	48-52 (77-84)
Isabella 15 15 40 Coupé	14 (23)	17 (28)	24 (39)	31-35 (50-56)	38-42 (61-68)

After 1,000 miles (1,600 km), the speed should be increased gradually.

We strongly advise that these recommendations should be strictly adhered to in order to enable the bearings and moving parts to bed themselves in properly.

The speeds given above should not be rigidly adhered to without reference to the load on the engine. Continuous driving at low speeds can do just as much damage as thoughtless hard driving and the attainment of speed up an incline simply by progressive opening of the throttle can do considerable damage to a new engine. In such cases, you should always change down to the next gear, if with pay big dividends in terms of future engine life.

When it leaves the factory, the engine is filled with a special running-in oil which should be changed after the first 500 miles (800 km). This will remove foreign matter and abrasives which may have been worn off during the early part of the running-in period. It should be replaced without any special flushing out by a good standard motor oil with a grade of SAE 10W/20 or a SAE 10W/30 multigrade oil from a reputable firm.

In cases of doubt that may arise, reference should be made to the SCANDIA Servicing Manual.

STARTING THE ENGINE

1. Insure that the gearlever is in neutral.
2. Switch on the ignition by turning the ignition key to position "I". The red ignition light should then light up, only to be extinguished when the engine starts.
3. When starting the engine from cold in cold weather, the choke control should be pulled out to its full extent in under winter conditions, half way.



When the engine is warm, it is not necessary to use the choke, but the accelerator should be slightly depressed.

4. Turning the key further to the right brings the starter into operation. In order to protect the battery, the starter should not be engaged for more than 3—10 seconds at a time. Should the

engine fail to start after several attempts, you should not persist, but seek the cause.

5. On no account should the car be driven for any length of time with the choke pulled out, this leads not only to excessive fuel consumption but also to considerable wear to the cylinder walls and pistons. If the engine breathes over-rich mixtures, the plugs may become too wet to fire the mixture in the cylinder and the lubricating oil washed off the cylinder walls, or at least become very diluted which will lead to the damage mentioned above.

Excessive use of the choke and accelerator pedal when starting can lead to an over-rich mixture in the inlet manifold and cylinders which will make the engine unwilling to start. Should this occur, the choke control must be pushed in and the engine turned over a few times with the throttle fully opened (i. e. the accelerator fully depressed). In this way, fresh air is sucked to the mixture and if it is sufficiently richened so that it will fire.

When the engine starts never use the engine up to full throttle.

The engine should not be allowed to warm up when it is standing still, it is far better with the car on the move.

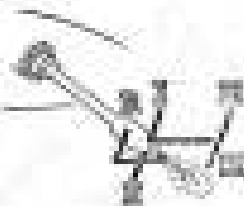
GENERAL DRIVING INSTRUCTIONS

Whenever possible, **branded fuels** from a reputable company should be used.

For the Isabella "15", "15 de Luxe" and "Coupe" however, it is essential that premium petrol with an octane value of over 90 should be used. Lower grades do not enable the "15" engine to develop its full output and are detrimental to it.

The layout of the positions of the individual gears is clearly shown in the adjacent diagram —

It goes without saying, that you should move off in bottom (1st) gear and when the car is on the move, change up through the gears in the correct sequence until the gear suitable to the prevailing conditions is reached.



The recommended speed range in the various gears has already been referred to on page 7 of this handbook.

Reasonable limitation of speed will more than repay you in increased engine life and enable you to enjoy to the full the excellent acceleration and smooth surge of power which is the hallmark of the BORGWARD "Isabella". In congested traffic conditions, full use should be made of the fully synchronized four-speed gearbox, always changing down in good time so that engine revs are not allowed to sink unduly. The fully synchronized gearbox permits smooth and rapid changes to be made and encourages the driver's sporting instincts.

Except when changing gear, the foot should never be allowed to rest on the clutch pedal as this will take up the play in the clutch linkage and may cause the clutch to slip which will lead to increased wear on the clutch linings.

Fast travel on modern motor highways presents no problem to the Isabella nor inflicts stress on the driver, for the engine is designed to be cranked at continuous high speeds and you need have no fear that this sort of treatment will overstrain the engine.

When **hill-climbing**, care should be taken not to let the engine speed sink unduly. Always change down in good time — it is much better for the engine!

USE OF THE "SAXOMAT" AUTOMATIC CLUTCH

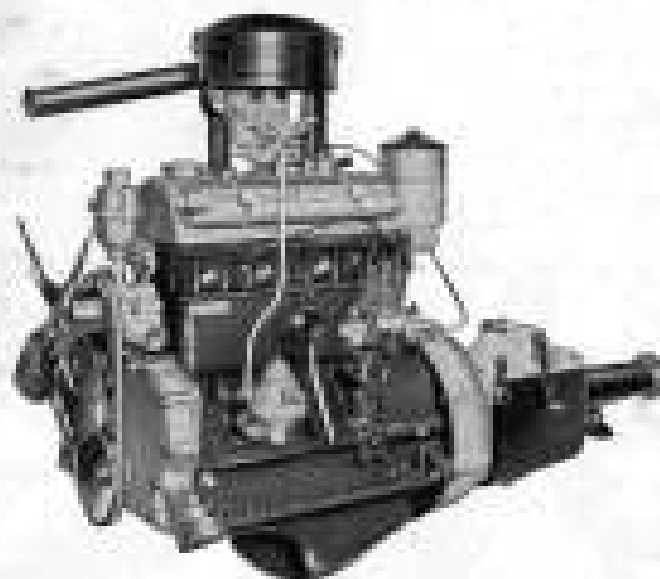


It is our constant aim through continuous development to increase the pleasure of driving and the fitting of the "Saxomat" F.R. simplifies driving still further. At the same time however, it retains the use of the normal transmission and gearbox enabling the driver to obtain maximum performance by using the gearbox in the normal way. The gear lever is still at the driver's command — only the clutch pedal is dispensed with.

Driving technique is considerably simplified by the lack of a clutch pedal. To move off, simply engage bottom (1st) gear whilst the engine is taking over. As the throttle is opened the drive is taken up evenly by the centrifugal clutch with the gradual build-up of torque. The car will then glide smoothly off. When starting off on a hill, the Saxomat eliminates that difficult operation of engaging the clutch, releasing the brakes and opening the throttle simultaneously. With the Saxomat, you simply select 1st gear, open the throttle and release the handbrake. The car will then race forward without any fear that it may roll backwards.

To change gear with the car under way, operate the gear lever in the usual way. When the lever is gripped an electrical contact releases the clutch and the change takes place normally as the gear is taken off. The re-engagement of the clutch follows automatically on the release of the gearlever and the sequence described above is repeated. When changing up, you should of course lift your foot from the accelerator pedal and open the throttle again as the gearlever is released.

Should the engine takeover be too fast, the car may commence to move automatically after engaging gear, without the throttle being opened. In cases such as this, the car should be held on the footbrake. Should this occur, you should take your car to an authorized BORGWARD service station to have the engine takeover re-adjusted.



Technical Data

(Details for "100" in brackets)

Different data for Isabella-Conti (Station car) see page 70

Type	Vertical in-line engine
Suspension	Front
No. of cylinders	4
Bore and Stroke	1.00" (25.4mm) / 1.00" (25.4mm)
Speed Valve	11.18 cu. in. (1.81 liter)
Compression ratio	10:1 (8.2:1)
Cooling system	Water
Lubrication	Over-head pump
Valves	2 ⁱⁿ / 2 ⁱⁿ
Ignition timing	1.5° (1.5° before T.D.C.)
Output	
Maximum continuous	45.5 h.p. (33.5 kW)
at 5,000 r.p.m.	1,700 (3,000)
Maximum torque	24.5 ft/lb (33.3 kgm) at 3,000 r.p.m. = 33.4 kgm

Fuel consumption:

Isabella:

37 mpg (3.0) at 50 mph (imp) at 55 mph = 5.1 liter/100 km at 55 km/h

Isabella 15, de Luxe and Cooper:

34 mpg (3.5) at 50 mph (imp) at 55 mph = 5.2 liter/100 km at 55 km/h

Isabella Conto (Station car):

34.5 mpg (3.2) at 55 mph (imp) at 60 mph = 5.3 liter/100 km at 60 km/h

Sump Capacity 7 pints (imp.)

8 1/2 pints (US) (4.0)

Valve Timing (Imp.)

Intake valve 30° - 1.58 in/rev
 Intake valve 10° before T.D.C.
 Intake valve 10° after T.D.C.
 Exhaust valve 10° before T.D.C.
 Exhaust valve 10° after T.D.C.

Poppet compressor (data):

1.161 (30° (3.2 mm))
 Exhaust (30° (3.2 mm))

Distributor Type 11 4 55 (1)

Sparking Plug:

Spark 10° (1.5) 1 (normal) / 10° (1.5) 1 (normal) / 10° (1.5) 1 (normal) / 10° (1.5) 1 (normal)

DESCRIPTION OF ENGINE

The Isuzu engine works on the 4-stroke Otto cycle. The crank has four strokes of the piston (two up and two down) to complete one working cycle of the engine and these are described as follows: —

- 1st stroke: The descending piston sucks in a mixture of vaporized fuel and air through the opened inlet valve.
- 2nd stroke: With both valves closed, the ascending piston compresses the mixture which is ignited electrically at top dead centre.
- 3rd stroke: The piston is forced downwards under the pressure of the burning gases and the power generated is transmitted to the crankshaft by the connecting rod.
- 4th stroke: On completion of its downward stroke, the piston as it's upward travel expels the burnt gases through the exhaust valve and out through the exhaust system.

The 62 cubic (l.) (l) engine develops 40 h. p. at 4,180 rpm (15°) 25 h. p. at 3,400 rpm.

The cylinders are arranged in line and fitted with a light alloy cylinder-head. Fully automatic pistons with offset little ends are fitted which add to the efficiency of its operation. The crankshaft is carried in three steel-locked main bearings mounted in the engine block.

The overhead valves are mounted in the cylinder head and operated by tappets, pushrods and rockers from the camshaft, carried in bearings in the block and driven by spur gears from the crankshaft. The rockers and valve gear are enclosed by the rocker-box cover, the removal of which gives access for tappet adjustment.

The carburetor is mounted on top of the engine cylinder head and supplies the cylinders with the correct mixture of vaporized fuel and air to enable it to function efficiently. An oil-choyng or filter (incorporating a strainer) is fitted to ensure the supply of dust-free air. The strainer is located on the left-hand side of the engine (left, as seen from the driver's seat).

The engine is flexibly mounted on three-point rubber suspension which effectively damp out all vibrations.

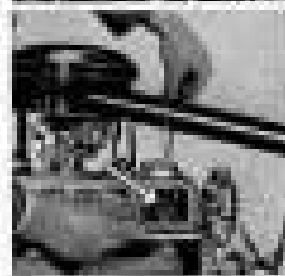
SERVICING AND MAINTENANCE OF THE ENGINE

It is strongly recommended that you should have any necessary work carried out at an authorized BOWWARD workshop staffed by specially trained mechanics. For those who wish to acquit themselves with the work detailed, the procedure is as follows: —

Adjust the tappet clearances after the first 100 (100 km) and 500 miles (1,600 km) and then thereafter as may be necessary, checking them in accordance with the instructions contained in the BOWWARD Servicing Manual.

The clearance between rocker face and valvestem should be set at .008" (.2 mm) with the engine hot, for both inlet and exhaust valves. After removing the two rocker-box covers situated on either side of the cylinder head cover, the tappets may be set with a screwdriver and ring-spanner and turning over the engine. The clearances should be checked with a .008" (.2 mm) feeler gauge from either the rear or offside of the engine as may be appropriate.

The correct tensioning of the "V" belt which drives both the generator and waterpump from a pulley on the nose of the crankshaft is most important. On it depends not only the cooling and electrical systems but also the life of the "V" belt itself. It is correctly tensioned when tightened to a pull of 44-55 lbs (20-25 kg) applied to the generator. As a quick check, the belt should be pushed in with the thumb and should "give" about 1/2" (.75 mm). The main engine bearing belts should be checked regularly for tightness. At the same time, inspect all rubber fittings of the engine mountings, radiator hose clips and battery earth leads.



ENGINE LUBRICATION

You will of course be well aware that the engine oil should be changed at regular intervals. It is at the same time interesting and important to know the causes that lead to oil consumption and the reasons for changing the oil.

One chief cause of oil consumption is to be found in the waste abrasive particles that come from the wearing of the moving parts such as pistons, rings, cylinder walls etc. The chief cause however, comes from the carbon residues obtained from combustion. In this case, incompletely burned fuels and oils form soot and carbon deposits in the combustion chamber and a proportion of these find their way into the lubricating oil, thereby reducing its effectiveness. It can be further affected by dilution. Under certain conditions for example, undercooling or continuous driving with choke set, the mixture in the cylinder will undergo incomplete combustion and some fuel may be deposited on the cylinder walls, where it will tend to wash the lubricant off the moving surfaces and drain off into the sump.

For these reasons it is particularly important that the oil should be changed at the stipulated intervals. Care should be taken to ensure that the engine operates at the recommended temperature and that if the choke is used for starting, it is pulled down as soon as conditions permit.

The recommendation that oil should be changed every 2,500 miles (4,000 km) is based on experience. Even though the system is fitted with a by-pass oil filter, these intervals should not be unduly extended. In winter, particularly if the car is used mainly for town driving, it is advisable that oil changes should take place at more frequent intervals, about every 1,000 miles (1,600 km). At this time of the year, the engine is operating under less favorable conditions, involving frequent use of the choke which may lead to dilution of the lubricating oil in the sump. In this connection, it must be emphasized that it is a bad policy to keep the engine idling to guard against undercooling. At takeover speeds, complete combustion of the mixture never takes place and oil dilutes and excessive wear on the cylinder walls and pistons will inevitably result.

The sump of the engine will hold 7 pints (imp) or 4.5 pints (US) of lubricating oil and the level should never be exceeded.

Whenever possible, the oil level should be checked daily with the engine switched off. First, withdraw the dipstick, wipe it clean and replace. It should then be withdrawn a second time and the oil

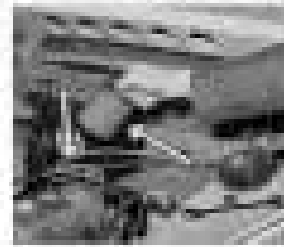
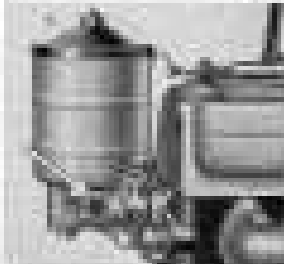
level read-off. Should the oil level fall below the minimum mark, oil must be added. Always top-up with oil of the same type and grade.

In the first instance, the oil should be changed at 300, 600 and 2,500 miles (500, 1,000 and 4,000 km) and thereafter, every 2,500 miles (4,000 km) (SAE 20 oil should be used both summer and winter, but under severe conditions with temperatures of 10°F (-11°C) and below, it should be replaced with SAE 10 oil.

Oil changes should always take place when the engine is hot and the oil will flow freely. The old oil in the body of the by-pass filter should not be drained off. The small quantity of the contaminated oil remaining in the filter body has no essential influence on the new oil.

The element in the by-pass filter should be renewed every 7,500 miles (12,000 km). The old element can be withdrawn after the filter lid has been removed. The filter lid gasket should be replaced at the same time. When changing the element in the by-pass filter drain off the rest of the old oil by loosening the sludge drain plug on the right-hand side of the filter body. After flowing off the oil tighten down the screw.

Should, for any reason, military oil be used instead of HD oil, the filter globe on the gear-type oil pump should be removed every 37,500 miles (60,000 km) and thoroughly cleaned. This necessitates the removal of the sump which should be cleaned at the same time.



ENGINE LUBRICATION

You will of course be well aware that the engine oil should be changed at regular intervals. It is at the same time interesting and important to know the causes that lead to oil consumption and the reasons for changing the oil.

One chief cause of oil contamination is to be found in the minute abrasive particles that come from the wearing of the moving parts such as pistons, rings, cylinder walls etc. The chief cause however, comes from the carbon residues obtained from combustion. In this case, incompletely burned fuels and oils burn and carbon deposits in the combustion chamber and a proportion of these find their way into the lubricating oil, thereby reducing its effectiveness. It can be further affected by dilution. Under certain conditions for example, undercooling or continuous driving with choke cut, the mixture in the cylinder will undergo incomplete combustion and some fuel may be deposited on the cylinder walls, where it will tend to wash the lubricant off the moving surfaces and drain off into the sump.

For these reasons it is particularly important that the oil should be changed at the stipulated intervals. Care should be taken to ensure that the engine operates at the recommended temperature and that if the choke is used for starting, it is pushed home as soon as conditions permit.

The recommendation that oil should be changed every 1,500 miles (2,400 km) is based on experience. Even though the system is fitted with a by-pass oil filter, these intervals should not be unduly extended. In winter, particularly if the car is used mainly for town driving, it is advisable that oil changes should take place at more frequent intervals, about every 1,000 miles (1,600 km). At this time of the year, the engine is operating under less favorable conditions, involving frequent use of the choke which may lead to dilution of the lubricating oil in the sump. In this connection, it must be emphasized that it is a bad policy to keep the engine idling to guard against undercooling. At tooover speeds, complete combustion of the mixture never takes place and oil dilution and excessive wear on the cylinder walls and pistons will inevitably result.

The sump of the engine will hold 7 pints (Imp) or 8.5 pints (US) or 4 l of lubricating oil and the level should never be exceeded.

Whenever possible, the oil level should be checked daily with the engine switched off. First, withdraw the dipstick, wipe it clean and replace. It should then be withdrawn a second time and the oil

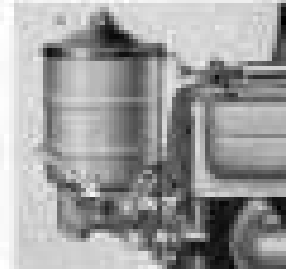
level read off. Should the oil level fall below the minimum mark, oil must be added. Always top-up with oil of the same type and grade.

In the first instance, the oil should be changed at 300, 600 and 1,500 miles (500, 1,000 and 2,400 km) and thereafter, every 1,500 miles (2,400 km). SAE 30 oil should be used both summer and winter, but under severe conditions with temperatures of 18°F (-8°C) and below, it should be replaced with SAE 15 oil.

Oil changes should always take place when the engine is hot and the oil will flow freely. The old oil in the body of the by-pass filter should not be drained off. The small quantity of the concentrated oil remaining in the filter body has no essential influence on the new oil.

The element in the by-pass filter should be re-newed every 7,500 miles (12,000 km). The old element can be withdrawn after the filter lid has been removed. The filter lid-gasket should be replaced at the same time. When changing the element in the by-pass filter drain off the rest of the old oil by loosening the sludge drain plug on the right-hand side of the filter body. After filling off the oil tighten down the screw.

Should, for any reason, ordinary oil be used instead of HD oil, the filter gauge on the gear-type oil pump should be removed every 17,500 miles (28,000 km) and thoroughly cleaned. This necessitates the removal of the sump which should be cleaned at the same time.



OIL CONSUMPTION

Oil consumption depends on many factors, such as the design of the engine, its high speed, etc. For instance, for a 1 liter 4 cyl. car engine, a well designed engine will consume some oil, but it will not give rise to a problem. On the other hand, a badly designed engine will consume a large quantity of oil, leading to excessive wear on the cylinder walls and on the rings themselves. The largest proportion of the oil consumed comes from the oil which is lost through the piston rings. More expensive in the construction, better the engine is, the lower the oil consumption is by the oil filter and the gas which the engine has to breathe.

Oil consumption increases continuously, increases by leakage even though the oil is burnt, by evaporation. For example, the loss of one drop of oil every 30 seconds of engine work is not serious as a rule. It is 20 ml. or 1 pint 100 ml. loss. The weight of the oil which has to be returned back to the sump is, in weight, 100 gms. If a quantity of oil which is lost should be added so that it will be fed below the piston rings, the loss is almost nil. During the engine test, sufficient oil will be returned to the sump, increasing, as is normal, with the engine cooling, and on every 1000 rev. or so, making at intervals a top-up of oil necessary. The pump should always be kept filled.

The oil level should never be checked with the engine running, as the oil will be splashed all over the sump. Oil should only be checked with the engine stopped. It is best to check at one point after the engine has stopped, the sump when the engine is stopped, oil has cooled. However, check the oil level immediately, the engine continues to run, as you will be able to observe immediately the level of amount of oil being used.

It is difficult to be precise about the exact amount of oil that should be used, so much depends on the way the engine is driven. An oil consumption of a quart in 2000 miles (3.14 km) (4000 km) should not be considered excessive. A reasonable consumption of oil indicates the design of the moving parts.

COOLING SYSTEM

The coolant temperature has considerable influence upon engine life, initial and subsequent, and to apply the most favorable working temperatures of 120° to 130° C. The amount of the loss of the heat which must be conducted away is distributed.

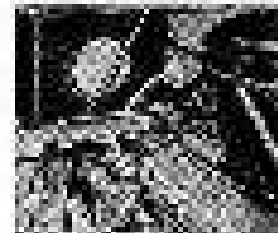
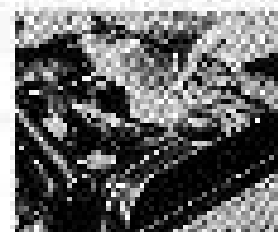
For this reason, you should be the compressor a cooling system when under normal operating conditions, but increase the cooling of the engine. Overcooling is caused by the regulation of the water thermostat.

Cooling water is circulated through the engine and cooled by the water pump. The thermostat which is fitted between the engine and the radiator controls the circulation of the coolant when the engine is running. The normal temperature of 120° to 130° C. has been selected. When the pump of the thermostat is closed, the water is fed directly back to the engine and operates over the engine system. The amount of water up gradually and the thermostat will be closed again.

If the engine is hot, the radiator thermostat should only be removed after the pressure relief valve has been released. Simply press the button on top of the thermostat.

The cooling system should be filled with clean water only. At least once a year, the whole cooling system should be flushed out. Any dirt and scale should be removed by using one of the various proprietary brands of water treating agents which are available. We recommend the use of a radiator cleaner for this purpose. In about 10% of undilution of water, be added to the coolant. Under no circumstances should a directional detergent be used for engine cooling with anti-rust and breaking down of the cooling system. Before refilling the system, you should ensure that:—

- 1) The radiator is completely filled up.
- 2) The cooling system is free from air bubbles.
- 3) The water filling and system should close completely, both when water appears from the water





The operator should be drilled in as below for maximum pipe life after opening.

When drilling the casing, water and mud should contain the following amounts:

1. Chlorine - 100 mg per cubic meter (100 ppm)
2. Formalin - 100 mg per cubic meter (100 ppm)
3. Daily for casing, use the volume and that time to repair.

In heavy weather, the clean air should be tested and found that the air is not clean. In such the system should be checked with fresh air. The fresh air should be tested and should also be tested.

Should the weather be not add water immediately. However, the air should contain and keep away with cold water with the water being changed to clean water. The air should be tested with the fresh air. The air should be tested with the fresh air.

Before using the air, address to the water. The air should be thoroughly tested. The air should be tested with the fresh air. The air should be tested with the fresh air.

When instructions are addressed see to be always.

Cooling and heating addresses should not be allowed to be to water. The air should be tested with the fresh air. The air should be tested with the fresh air.

Should a scale be used to confirm results and check, you should always use the fresh air. The air should be tested with the fresh air.

If addresses is not used, the cooling system must be thoroughly tested. The air should be tested with the fresh air.

The water pump should give a flow rate of 1000 gpm and when necessary, wellhead will deliver 1000 gpm.

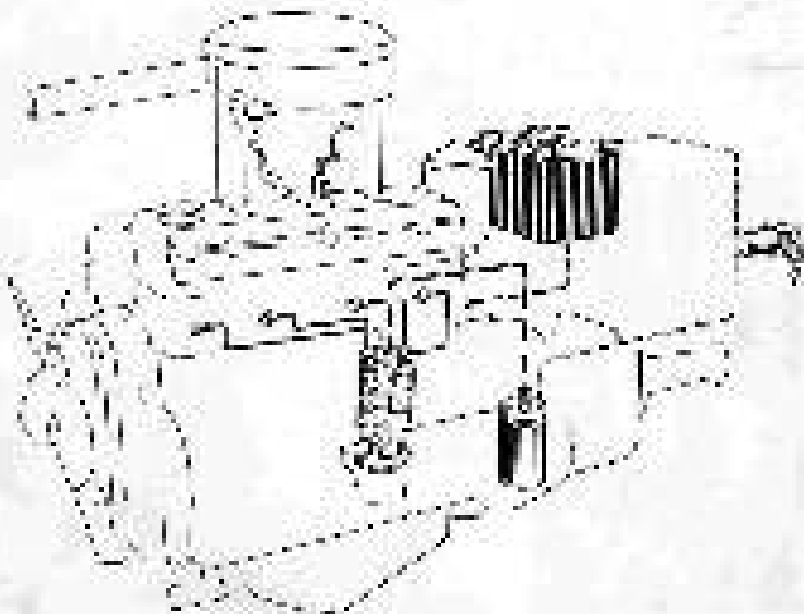


ITEM	QTY	UNIT	REMARKS
1	1	PC	PIPE
2	1	PC	PIPE
3	1	PC	PIPE
4	1	PC	PIPE
5	1	PC	PIPE
6	1	PC	PIPE
7	1	PC	PIPE
8	1	PC	PIPE
9	1	PC	PIPE
10	1	PC	PIPE



IGNITION SYSTEM

The function of the ignition system is to ignite the mixture of the gases at the end of the compression stroke. It consists of sparkplugs, ignition switch, and its related parts. The sparkplugs



When using spark, using the method, follow as No. 1 to 10.

The sparkplugs should be checked and the keeping clean of the sparkplugs. The sparkplugs should be checked and the keeping clean of the sparkplugs. The sparkplugs should be checked and the keeping clean of the sparkplugs.





The distributor itself controls the actual ignition and contains the contact-breaker and its cam and the rotor arm which distributes the high tension current to the cylinders in turn.

These particular parts require regular inspection.

It is most important that the contact-breaker points should be regularly checked and reset at 214° (2.4 mm) if necessary. To adjust, run the engine over with the cam open the points to the maximum amount. Slacken off the screws holding down the plate carrying the fixed point. Then move the plate to give the correct gap as measured with the feeler gauge, tighten the two screws and recheck the setting. Worn or pitted points should be refaced using a fine file; badly lapped points should be replaced.

It goes without saying that the points should be kept scrupulously clean. Oil and grease will cause mis-firing or irregular ignition. The oil on the distributor body should receive a few drops of engine oil every 1,500 miles (2,000 km).

Every 7,500 miles (10,000 km), the distributor cap should be removed and a few drops of engine oil applied to the cam belt. At the same time, the cams themselves should receive a light smear of grease. Inspect also the cam pad and replace if necessary. The sparking plugs require little attention other than regular cleaning and checking the gaps. The correct gap between the plug electrodes is $.027-.031^{\circ}$ (2.7-3.1 mm).



After some use, the plug insulators will become a light brown or greyish yellow in colour. Light grey or black insulators indicate that the engine is not getting the correct mixture, while oil-soaked plugs are indicative of badly fitting piston rings.

Plug electrodes should be cleaned with a fine wire brush and oil-soaked plugs washed out in petrol. It is recommended that plugs should be replaced every 10,000 miles or so (15,000 km). When replacing the sparking plugs in the engine, care must be taken to see that the plug washers which are sometimes loose are not overlooked.



Ignition Timing

The firing order is 1-3-4-2 numbering the cylinders from the rear and firing should take place at Top Dead Centre. The ignition timing can easily be checked from the marks on the flywheel and the clutch housing. Turn the engine over until the marks on the flywheel and housing coincide, with the piston in the compression stroke.



M. B. "15" engines have two marks on the flywheel:

1. T. D. C. (Top Dead Centre)
2. Ignition point (4° after T. D. C.)

With the engine set at the firing position, rotate the distributor until the contact-breaker points just begin to open. This must be done most carefully. Then insert a $.021^{\circ}$ (2.05 mm) feeler gauge between the points and turn the distributor backwards by gentle tapping.

When the fuel gauge can't be read, possibly sediment has fallen down the distributor.

An electrical test, especially when the engine is running, is made using the ignition wiring.

The following instructions are for the introduction of new fuel and may have to carry out the work themselves. However, possibly you should have the done in an authorized DOBOWARD workshop.

Ignition Troubles

1. The ignition system will only function properly when the battery is in good condition. Test it by using the tester.

2. In testing the reason of ignition trouble, the plugs should not be tested with the engine running, and the end of the plug lead about 1/2 to 1/4 inch away from the plug terminal. Hold the lead in your left hand, and bring the spark freely. If the spark in the plug is weak but strong to earth that that probably lies in the plug itself.

3. Another way of testing the work in the ignition system will remove the High tension lead near coil to distributor or the distributor cap, and hold it about 1/2 inch from the block earth. If with the engine running you sparks from the gap that either the distributor or plug leads are faulty, but if no sparks show the trouble may well be with the battery, distributor or one of the two leads from coil to distributor. First of all check the distributor cap for moisture, then that the contact brushes make an opening contact.

N.B. When testing ignition faults, always check the leads with a suitable tester or test them with some insulating vessel.

ENGINE FAULTS AND THEIR REMEDIES

Engine faults which are not immediately apparent should be looked by a systematic diagnosis following a fixed procedure. This will enable the trouble to be traced to its source and the correct remedy applied.

A. Engine motor refused to function.

Cause	Remedy
1. Loose battery leads.	Clean and re-tighten lead clamps on battery terminals. Clean the terminals from time to time to prevent oxidation.
2. Battery in low state of charge.	Have battery put on charge by a qualified agent.
3. Fault in the starter motor.	Have the motor tested in an authorized DOBOWARD workshop.

B. Engine will not start.

Cause	Remedy
1. Fuel tank is empty or low.	Check for leaks, fuel tank, and fuel pump.
2. Fuel filter is clogged up.	Replace the pump and filter if working properly.
3. Fuel pump not working.	Check the pump for correct stroke, check the fuel pump drive shaft, check the fuel pump inlet valve, check the fuel pump outlet valve, check the fuel pump inlet and outlet pipes, and check the fuel pump inlet and outlet valves with fully opened throttle.
4. Connections in points, distributor, petrol or battery circuit.	Clean and adjust contacts. Fine adjust.
5. Throttle opened too wide.	Adjust to give 1/2 inch throttle lift high speed position.

C. Motor starts and stops again.

Cause	Remedy
Accumulation of water in drain in the waterpump	Clean out drainpipe and try drain in the waterpump

D. Engine dies after irregularly after warming up on the exhaust intake of fuel.

Cause	Remedy
Overrunning motor will not set free	Adjust idling-spring control

E. Engine dies after irregularly; stalls at low rpm and when throttle is closed.

Cause	Remedy
1. Slow response to throttle	Turn governor control clockwise
2. Heavy fuel particles	Inspect down connections to lower carburetor, manifold and exhaust; replace as needed if necessary
3. Lack of compression	Consult your local FORWARD service station

F. Engine runs irregularly at more than 15 mph (24 km/h) in top gear.

Cause	Remedy
1. Faulty timing plug	Replace plug
2. Faulty plug lead	Check lead and replace if necessary

G. Motorback through carburetor when starting.

Cause	Remedy
1. Partially blocked fuel line	Check fuel line pipe
2. Misadjusted jets	See the repair unit, a working temperature of 130°-150° C, is correct

H. Engine does not fire on all cylinders.

Cause	Remedy
1. Valve ignored	Throttle correctly
2. Distribution dirty plugs	Check on valves; air may be necessary
3. Low valve not working, leading to loss of compression	Consult FORWARD workshop
4. Faulty firing pin	Consult FORWARD workshop

I. Engine runs as after a long journey.

Cause	Remedy
1. Increased viscosity of oil	Consult FORWARD workshop
2. Air in the oil	Change oil
3. Motor too wet	Re-clean

K. Engine does not give full power.

Cause	Remedy
1. Fuel or badly mixing valve	Consult service station
2. Misadjusted jets	With a hot engine, valve adjuster in the carburetor through. Consult your FORWARD service station. Change the jets in the carburetor. Check the operation of valves and bearings. Adjust valves with turn screw by hand.
3. Faulty fuel pump	Recommended operating temperature 130°-150° C. Check oil pressure as may be necessary. Replace the fuel pump
4. Airy carburetor, leading to fuel starvation	Consult FORWARD service station
5. Defective or unusable timing plug	Replace with a new plug

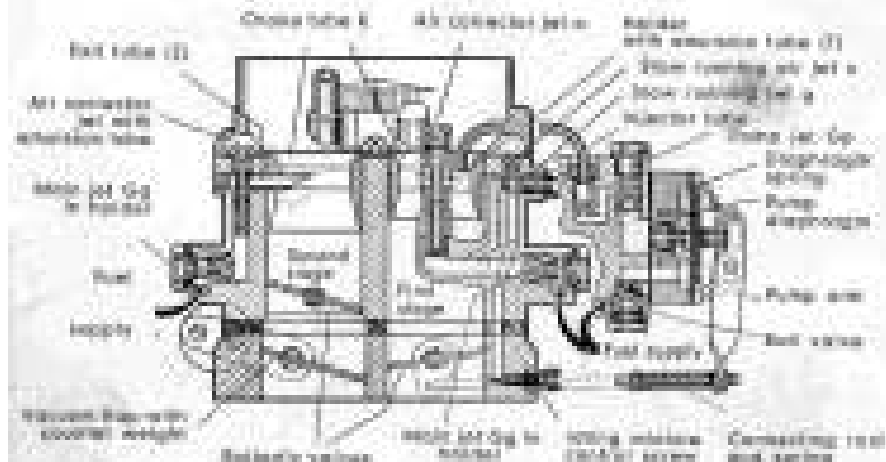
L. Engine overheats, radiator both.

Cause	Remedy
1. Airflow, radiator system not sufficient	See FORWARD workshop
2. Blockage in cooling system	Check radiator cap, hoses and circulation. If the radiator is blocked up, the motor must be up to 1500 rpm for 10 min. and then 1500 rpm for 10 min. Repeat 3 times.
3. Faulty fan	Replace fan
4. Faulty fan belt	See part C (2) above.

M. Superheats.

Cause	Remedy
1. Ignition air not restricted	Check operation of motor and consult your FORWARD service station
2. Cooling water in radiator too low	Top-up the radiator. Check the engine oil level, which should be at 100% full on 1500 rpm. The clock. Add water slowly with the engine running.
3. Insufficient combustion or loss of cooling of engine	Consult your FORWARD service station

ISABELLA "18" TWIN-CHOKE CARBURETOR



The twin-choke carburetor has the double-choke carburetor, in which two fuel choke tubes, each with its own butterfly valve, float needle and spring, float or off. The butterfly valve in stage 1 opens. This allows maximum flow to the accelerator pedal by means of the mixture passage. The butterfly valve of stage 2 is restricted so that at stage 1 for longer and longer to open when 100% of stage 1 is either more than half opened.

An automatic operating mechanism valve is attached to stage 1. It allows the two butterfly valves and valves take action with the increasing mixture induced by the engine speed increases from its maximum. It is also with a counterweight.

Operation of Stage 1 and 2

Starting The slow-running device in the carburetor is fixed to the fuel line and operates in two phases.

In the first phase the butterfly valve remains closed and the mixture enters the engine through the lower passage (slow running device) in the second phase the butterfly valve is slightly opened and more mixture enters the choke tube through the supplementary holes in the fuel jet passage.

When operation starts the influence of the mixture induced in the starting device, the mixture is pulled through the action of the accelerator tube (1) and in the second stage through the restricted jet tube (2) where it mixes with the incoming air.

As the engine speed increases, the valve of stage 1 is half opened, after that of stage 2, starting closed. In the following stages, both butterfly valves are fully opened and the mixture valve closed. At 100% of opening on the engine speed increases to its maximum.

Settings of the 32 PITCH type jet carburetor

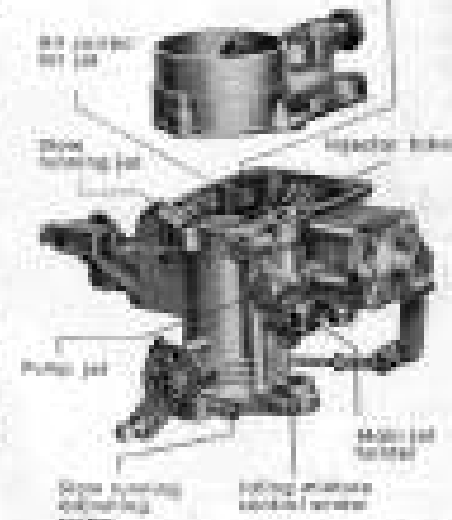
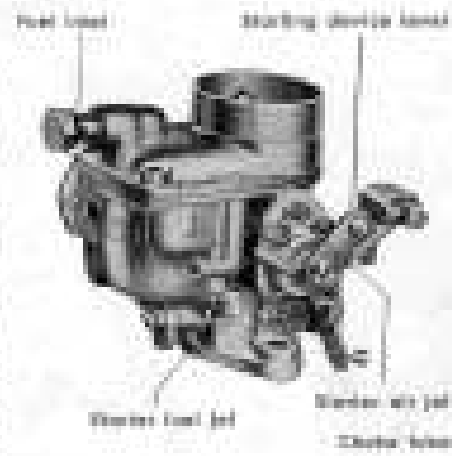
	Stage 1	Stage 2	Stage 3	Stage 4
Choke tube (2)	21	21	21	21
Main jet (2) in float	100	100	100	100
All connector jet (2)	175	175	175	175
Slow running jet (2)	55	55	55	55
Slow running jet (2) in float	55	55	55	55
Pump jet (2)	41	41	41	41
Starter air jet (2)	4	4	4	4
Starter fuel jet (2)	100	100	100	100
Starter air jet (2)	4	4	4	4
Slow running air jet (2)	1.8	1.8	1.8	1.8
Emulsion tube	35	35	35	35
Float needle valve	12	12	12	12
Weight/float (2) in (2) in	2.7	2.7	2.7	2.7
Float needle valve	12	12	12	12
Tank capacity 18 gals (imp)				
12 gals (US) (48 l)				

FUEL SYSTEM

Technical Data: Tank capacity 18 gallons (imp) or 12 gallons (US) or 48 l. (For "18", use only high grade fuel with a rating of 81 octane and over.)

Different data for Isabella Combi (Station car) in brackets ()

Fuel pump	PC 10006a
Carburetor	32 PITCH
Main jet	100 (110)
Slow running jet	55 (60)
Pump jet	41
All connector jet	175 (180)
Choke tube	36 (23)
Starter fuel jet	100
Starter air jet	4
Slow running air jet	1.8
Emulsion tube	35
Weight/float (2) in (2) in	2.7
Float needle valve	12
Tank capacity 18 gals (imp)	
12 gals (US) (48 l)	



Fuel is supplied to the carburetor by a fuel pump driven from the camshaft. The pump requires no particular attention.

Should the pump fail to deliver the necessary quantity of fuel, you should consult your BORGWARD service station.

The function of the carburetor is to supply the engine at all times and under all conditions, with a correctly balanced mixture of vaporized fuel and air.

The correct carburettor settings for use with all branded makes of fuel are made at the factory before the car is dispatched. The settings are carefully chosen to ensure high performance coupled with economy.

These standard settings should not be altered unless special circumstances dictate, as for example at higher altitudes than are normally encountered. In this case, main jet size should be reduced by one for every 3,300' (1,000 m) increase in altitude.

Carburettor adjustment will normally be confined to slow-running and should be as follows: —

1. Warm up the engine to normal operating temperature.
2. Screw in slow-running adjusting screw to increase engine speed slightly.
3. Undo mixture control screw until engine runs irregularly, then screw it until engine runs smoothly.
4. Undo adjusting screw until the engine ticks over at 530—600 r. p. m.

Unscrewing the mixture control screw enriches the mixture, screwing it in weakens it. The screw should never be tightened down completely.

The accumulation of dirt and sediment in the fuel system, including the tank, will lead to trouble. The whole system should therefore be thoroughly cleaned out periodically.



The element in the air filter should be removed every 2,500 miles (4,000 km) and washed in petrol. After allowing it to dry, it should be given a coat of engine oil, superfluous oil being carefully wiped off.

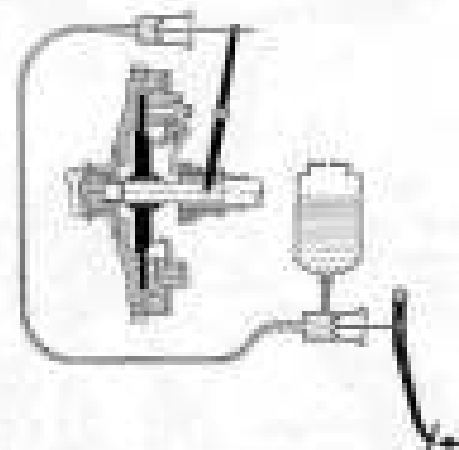
Should an oil-bath air filter be fitted, it should be cleaned out every 2,500 miles (4,000 km) and the oil level checked every 1,250 miles (2,000 km).

The cleaning interval of 2,500 miles (4,000 km) applies to the conditions normally prevailing on the roads in north-west Europe. In dusty areas, it should be done more frequently and under desert conditions daily, if possible.

We do not recommend that owners should interfere with the carburettors of their engines. This is specialist work and should be left to the skilled staff of a BORGWARD service station. The throttle linkage should be lightly oiled from time to time.

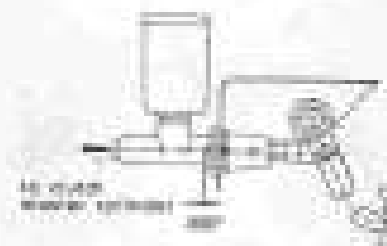
CLUTCH

A single dry-plate clutch connects the engine to the gearbox and the connection can be broken by depressing the clutch pedal. When the clutch pedal is pressed down, the pressure is transmitted to the clutch withdrawal race and the clutch is disengaged.



The proper functioning of the system depends to a large degree on its correct adjustment.

First of all, check the play of the piston-rod of the piston in the clutch master cylinder which is attached to the clutch pedal. This should be $300''$ (3.2 mm) and can be adjusted by altering the length of the pressure rod.



At the same time there should be a clearance of $100''$ — $150''$ (2.5—3 mm) between the piston rod and the clutch cylinder mounted on the clutch housing.

This should be adjusted as follows: —

1. Pull back the de-clutching lever until it reaches the clutch withdrawal race, taking the piston rod with it to the rear.



1. Set the adjusting nut so that when the de-clutching lever returns under the pressure of its spring, it has a movement of $0.007-118$ ($0.01-0.02$ mm). This will give a play of $0.07-118$ ($0-3$ mm) at the clutch withdrawal face.

Bleeding Procedure

Whenever work has been done on the clutch, its hydraulic system should be bled without fail. First of all, it should be ascertained that there is sufficient fluid in the clutch master cylinder. Then the rubber cap should be removed from the bleed screw on the clutch cylinder and a bleeding tube fitted. The end of the bleeding tube is then inserted in a container full filled with brake fluid. The bleed screw is then loosened and the clutch pedal operated, when fluid and air bubbles will be expelled into the container. Continue this procedure until no more air bubbles appear in the container, then tighten down the bleed screw with the clutch pedal still depressed. Allow pedal to return and replace rubber dust cap.

The above procedure is generally adequate to bleed the system if any of the leads have been disconnected or repairs carried out. If the clutch master cylinder has been removed and air is in the system in consequence, the same process as described above for the clutch cylinder should suffice to clear the system.

THE "SAECOMAT" AUTOMATIC CLUTCH

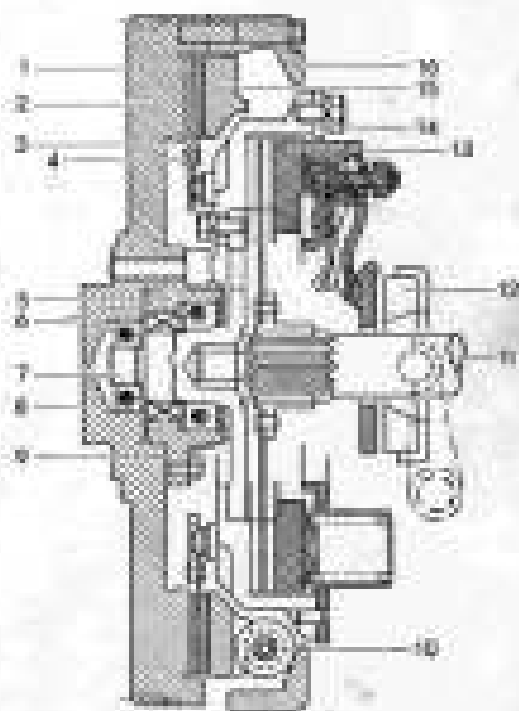
We have already described on page 16, the procedure to be adopted when driving an "Isabella" fitted with a "Saecomat" automatic clutch. In the following pages, will be found a short description of its construction and operation.

The "Saecomat" consists of a centrifugal clutch combined with a spacer clutch which operates on starting and stopping and is dependent upon the r. p. m. On changing gear when under way, the spacer clutch is operated electro-pneumatically by the engine vacuum working through an electro-magnetic valve. The take-up of the drive after a change has been made, comes about quite simply through a two-stage release of the vacuum pressure.

The clutch operation is initiated by the gripping of the gearlever, to which is connected an electrical contact which transmits current to the electro-magnet; this in turn operates a valve connected to the vacuum. Due to the difference in pressure between the atmosphere and the vacuum in the inlet manifold, a diaphragm operates the clutch withdrawal reel. Thus, the clutch is released at the beginning of a gearchange. The release of the vacuum when the drive is taken up again and the simultaneous take-up of torque by the clutch, follows in two stages. In the first stage, the vacuum is released very rapidly by the opening of the magnetic valve until the clutch begins to bite. In the second stage, the remaining vacuum is released slowly through a small jet so that the clutch becomes fully engaged fairly quickly. As the throttle is opened, the release of vacuum and thereby the engagement of the clutch, is accelerated. This occurs through the reduction of vacuum in the choke tube of the carburettor with the opening of the throttle. This operates through a reducing valve which causes a quicker take-up by the spacer clutch as the throttle is opened and engine r. p. m. increases. The clutch is therefore completely dependent of the throttle opening and responds to the loading demands of getting away and acceleration.

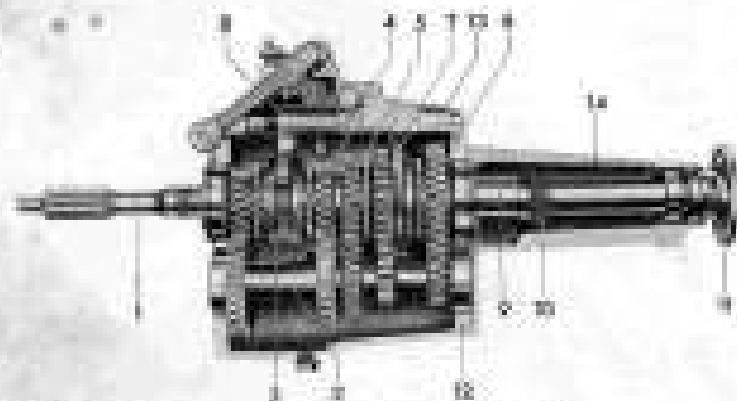
The servicing and maintenance of the "Saecomat" automatic clutch is limited to lubrication and a few simple checks that are set out in the servicing schedule. Should the "Saecomat" require adjustment or technical attention, it should be left to the qualified personnel of an authorized BORGWARD service station who are fully trained for the work.

THE "ISOMAT" AUTOMATIC CLUTCH



- | | |
|-----------------------|--|
| 1. Centrifugal clutch | 10. Centrifugal weights |
| 2. Flywheel | 11. Drive shaft |
| 3. Clutch disc | 12. Spicer clutch withdrawal mechanism |
| 4. Carrier ring | 13. Spicer clutch |
| 5. Housing flange | 14. Drive casing |
| 6. Ball-rod | 15. Pressure plate |
| 7. Journal | 16. Casing |
| 8. Crankshaft | |
| 9. Pinion | |

GEARBOX



- | | |
|----------------------------------|------------------------------------|
| 1. Input shaft | 8. Selector fork |
| 2. Layshaft | 9. Mainshaft |
| 3. Selector for 3rd and 4th gear | 10. Speedometer drive shaft-gear |
| 4. 3rd gear pinion | 11. Propeller shaft drive flange |
| 5. 2nd gear pinion | 12. Gearbox casing |
| 6. 1st gear pinion | 13. Gearbox cover |
| 7. Reverse gear pinion | 14. Speedometer drive (SM) housing |

Technical data:

GR capacity: 1½ tons (Imp) or 2½ tons (US) or 1.1

Ratio	Climb		
	Isobella Standard	TS	Combi
1st gear 1.66 : 1	47%	42%	38%
2nd gear 2.19 : 1	31%	27%	24%
3rd gear 3.36 : 1	19%	14%	13%
4th gear 1 : 1	9%	11%	7%
Reverse gear 4.06 : 1			
Maximum speeds	Climb		
	mph	mph	mph
1st gear	29 38	25 40	20 32
2nd gear	38 62	44 70	34 58
3rd gear	62 96	69 100	57 92
4th gear	89 128	93 150	78 123

The "Isobella" is fitted with a fully synchromesh, stepped and reverse gearbox.

Synchromesh ensures that the parts engaged when a gear change takes place, are brought together at correctly balanced speeds to enable seamless changes to be made. It also permits down-ward changes to be made without the necessity of double de-

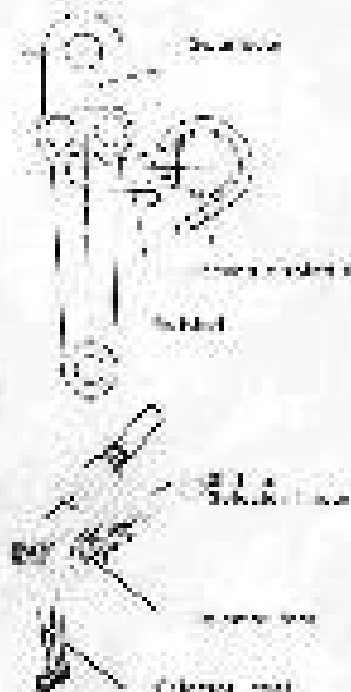
changing the gear change is effected by compressing return spring 11, which operates the lever 12 of the gearbox through cable 13 (Fig. 1).

The gearbox itself requires little maintenance other than cleaning the oil level and changing the oil at the recommended intervals. This should be done after a run when the oil is warm and should take place in the clear houses after the first 500 and 1000 miles (800 and 1600 km) and thereafter every 750 miles (1200 km).

Before the gearbox and steering column are fitted, the following should be checked: (a) The oil level should be checked and there should be no leaks. (b) The workshop practice of greasing the bushes when carrying out adjustments is to ensure that the cable 'feet' never become jammed in the grooves. If any noticeable operation is difficult, it is possible to adjust the position of the 'feet' by turning the eccentric screws on the opposite side of the groove. This will result in the cable after it is fixed on the spools to move later and allow the return spring to act in the steering return position.

Steering Column Gear Change

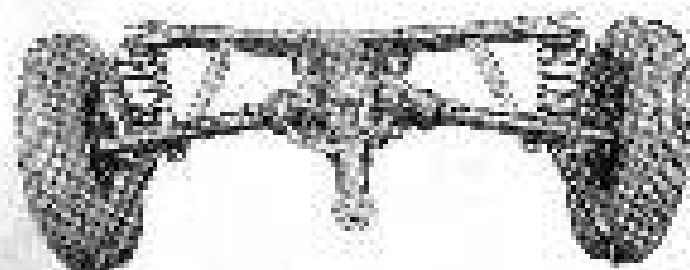
Adjustments to the gear change column should be made only when necessary. In this position, the 'bender cable' should be attached to the steering cable in the standard position.



Proceed as follows:—

1. Engage the gear lever.
2. Depress gear lever by means of the 'bender cable' until a springy resistance becomes noticeable.
3. Hold 'bender cable' tight and, the springy resistance still there, turn it and inspect for wear.
4. With the gearbox lever in the 'N' gear position, adjust and secure the gearchange mechanism to the steering lever on the gearbox.
5. Check by releasing wheel gear when with the wheel in gear and

REAR AXLE



Technical Data

Oil capacity

Empty 500 pints (Imp), 570 pints (US), 110 l
 Road 275 pints (Imp), 310 pints (US), 160 l

Welds

27 x 13

Crown wheel and pinion

27 x 13

Spindle bearing

Top roller bearing 27 x 13

Pinion bearing

Bottom 27 x 13

Pinion bearing

Top roller bearing 27 x 13

Pinion

Top roller bearing 27 x 13

Pinion

Bottom 27 x 13

Pinion bearing

27 x 13 (27 x 13)

27 x 13 (27 x 13)

27 x 13 (27 x 13) (27 x 13)

27 x 13 (27 x 13) (27 x 13)

27 x 13 (27 x 13) (27 x 13)

27 x 13 (27 x 13) (27 x 13)

You should always test a suspension with a speed test drive. That is to say that the ground should be raised the entire length of the road, the very ends of the independent suspension being raised up first and effectively covered by the suspension shock absorbers when the end of the road is reached.

Maintenance of the rear axle is similar to that of the gearbox. There are no adjustments that can be carried out, simply check all nuts and bolts for tightness, especially those on the swing arms and track arms.

The assembly of the rear axle is carried out in the factory to an exceedingly high standard and upon this depends the life and quiet running of the unit. Should the rear axle ever require attention, the work should be entrusted to a SCORPION agent who is equipped with all the necessary facilities and has the experience to carry out the work efficiently.

SPRINGING

A proportion of the road irregularities are absorbed by the tires, but by far the largest amount is absorbed by the suspension which ensures a smooth and comfortable ride under all road conditions, no matter how the car is loaded.

The excellent springing of the "Isabella" is largely attributable to the use of coil springs front and rear, working in conjunction with hydraulic telescopic shock-absorbers. These latter require no maintenance as they are factory-sealed units and must be replaced by new dampers in case of trouble. For these items, a Replacement Exchange Service is available whereby new shock-absorbers may be obtained at a reasonable figure.

FRONT WHEEL SUSPENSION



Technical Data:

(Wheel angle measured with vehicle laden)

Track	47.5" (1,206 mm)
Knuckle inclination	21° 15'
Castor	21° 30'
Camber	0-0'
Toe-in	Nil (wheels pressed in at rear and measured at axle level)
Tire	150-13
Tire pressure (not measured hot after use)	21 psi (1.5 atm.) (24 psi or 1.7 atm. on motorways)

SCORPION S&P 2304/13

The independent front suspension is of the double wishbone type, each pair being of unequal length, working in conjunction with hydraulic shock-absorbers.

Check the steering wheel when attaching to the vehicle to be that the wheel is centered. It should extend only the width of the front wheel of the car.

It is possible to turn the car on and the steering wheel to the wheel can be carried out without the front suspension. Only being necessary to have the front suspension repaired. However, the shaft of the front suspension should be removed together with the steering angles, shock and springs.

Front Wheel Alignment

When carrying out adjustment by the rear wheel, the vehicle must be on a level ground. The car should be driven by loading the front axle with a weight of about 400 kg (880 lb) or 500 kg (1100 lb).



Diagram of the car

Steering lock

To lock the front wheel, turn the steering wheel to the right or left side of the road (turn left or right). On the right-hand side, the left wheel will lock at 90° and the right wheel at 45°. On the left-hand side, these figures are reversed.

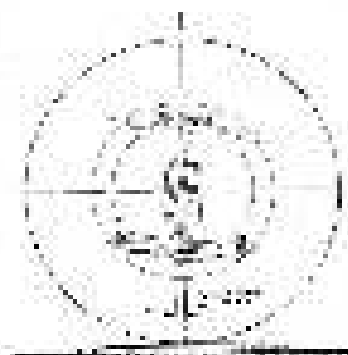
Kingpin inclination = 0° 30'



The inclination of the kingpin in relation to the vertical depends on the distance to the center of the wheel axle. A wheel that has a radius of 260 mm.

di Center = 0° 30'

The center angle is measured from the car frame. The bearings are measured from the vertical axis of the front suspension by the shoulder of the bearing cap and the hole in a bracket on the body. A 30° angle is used with pins & connector or 15° in the inclination of the kingpin.



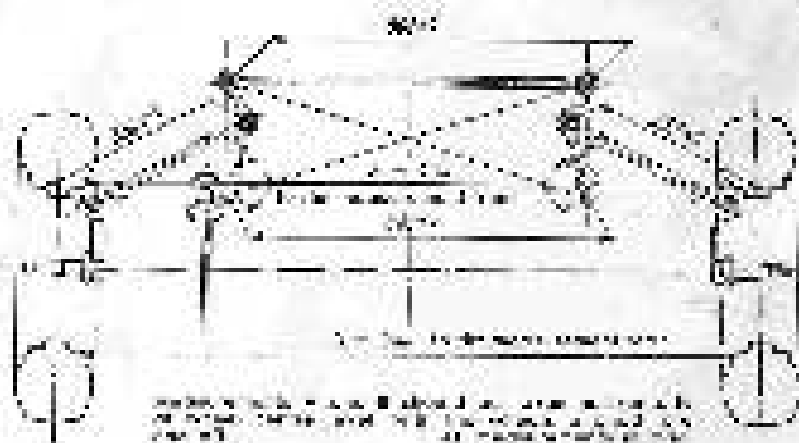
di Center = 0° 30'

Center adjustment is by means of the eccentric speed ball joint. Turning it through 30° gives a 10° angle of inclination.



di Toe-in = 10' (When it is placed at the rear to eliminate play)

When adjusting for toe-in, the wheel must be with the wheels and steering arm aligned vertically. The length of the center axle is 100 mm (4 1/8 in). See diagram on page 16. The damaged threads may be replaced. During the adjustment for toe-in, the wheels should be checked together at the rear to a pressure of between 200 and 250 kPa (28 and 35 lb/in²). This will take up any play in the steering linkage.



To check the steering geometry for the purpose of measurement, the car will be placed straight in a level lot. All height measurement should be taken from the tire chews. The distance between the steering knuckle and pivot and the different roller and nut are checked by means of feel from the left and steering arm pivot to the left-hand carrier master joint, checking a tolerance of 0.015 in.

How dark the steering adjustment is checked. The toe wheel correctly can now be accurately adjusted by means of the adjustable nut-bush, giving the correct toe measurement for the vehicle. 1/4" of wheel is used as the width for wheel center.

In the FORWARD adjustment, wheel chews of the tire are set out as follows: forward. Do not replace to any of the rear wheel chews, which are set out as follows: the rear wheel chews are set out as follows.

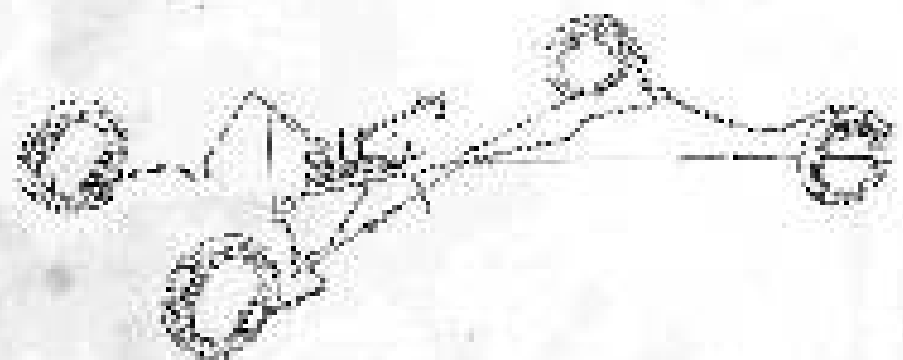
Steering

The wheel and axle should be free and always be well greased. Check all the nuts and locking devices on the steering linkage, together with the fit of the ball joints and the steering knuckle.

At the same time, check the steering knuckle with the car being driven in a straight line.

The method of adjustment is as follows:

HYDRAULIC BRAKE SYSTEM



The "front" line is supplied with two independent energy sources.

1) The outer type handbrake serves only as a parking brake. It operates on the rear wheels only by way of cables from the handbrake lever. It does not influence the front wheel allowing it to return to the "off" position.

2) The two-wheel, internally-expanding hydraulic brake system, which has two wheels. They operate only when the foot brake pedal which is connected to the brake master cylinder is depressed. When the brake pedal is pressed down, the pressure in the lower master cylinder forces fluid along the brake hoses to the front cylinder, which then by its outward stroke forces the brake shoes against the brake drums.

A slight pressure on the brake pedal is generally sufficient to make the brakes of the lower wheel and not connect adjusted clear interval on the front cylinder to the foot of the brake pedal. Under these conditions, the brakes should not be considered as safe. If there is too much play in the front cylinder, the wheel should be adjusted to get four or five lbs. pressure with the foot pedal. Measure the air pressure on the front cylinder with a gauge. Measure the wheel chews and check.



bleeding point

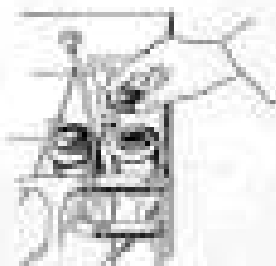


bleeding point

Maintenance

The brake pipes and hoses should be regularly checked for correct positioning and good condition.

To increase the efficiency of the brakes, the system should be thoroughly bled at all points after the first 500-600 miles (800-1,000 km). Always ascertain that there is sufficient fluid in the reservoir. Only approved hydraulic fluid should be used. Even a small quantity of mineral oil can cause damage to the rubber fittings of the system.



Bleeding the brakes

First ascertain that the reservoir of the brake master cylinder contains enough fluid; it should be at least 3/4 full. Then remove the rubber dust cap from the wheel brake cylinder.



Fit the rubber bleeding tube provided in the bleed bit to the bleed valve and through the hex-spanner supplied with it.

Invert the end of the tube in a clean container half filled with brake fluid.

Unscrew the bleed valve screw with the hex-spanner supplied, not completely, a turn or so is sufficient. Operate the brake pedal quickly and freely, allowing it to return slowly.

This will expel both fluid and air into the container.

Continue this procedure until no more air bubbles appear in the container. Then tighten down the bleed valve with the brake pedal still depressed. Allow the brake pedal to return to its normal position and replace the dust cap. Repeat this process on all four wheels in turn.

BRAKE ADJUSTMENT

If the brakes fail to grip adequately, they should be adjusted at once. The car should be jacked up so that both front and rear wheels are clear of the ground. Spin each wheel forward in turn and undo the appropriate eccentric adjuster for the individual shoe until the shoe just rubs on the drum. Turn both the adjuster and the wheel just revolves freely.

Care should be taken when adjusting the rear wheels, that only the top eccentric adjuster is used.

If the brake shoe linings have been renewed or other repairs involving the dismantling of the rear brakes are carried out, it will be necessary to completely re-adjust the brakes and this will involve the use of the lower adjuster.

Basic adjustment

The procedure for the rear brakes is as follows: —

Each brake shoe is set separately, turning first the upper eccentric until the wheel is locked. Then turn the lower adjuster either to the right or left until the wheel is free to revolve again. Continue this process on each shoe until the wheel is no longer able to turn freely, even if the lower eccentric is turned. (Generally it will be found that two operators will be sufficient.)

Then find the normal position of the lower adjuster so that the wheel is just able to turn. Firmly release the shoe just enough to enable it to turn freely, using the upper adjuster.

The front wheel brakes (if leading shoes) are fitted with one eccentric adjuster for each shoe. Adjustment after an overhaul does not differ from the normal procedure.

Adjustment

(Rear brakes)
Slightly off lower eccentric

Then undo upper eccentric (to) and wheel locks

Adjust lower eccentric until wheel spins freely



Adjust eccentric screw until shoe locks

Figure 1



Figure 1

Use bottom adjuster with shoe 115 at top

The procedure, top adjuster (Fig. 1), bottom adjuster (Fig. 2) must be repeated until further adjustment of the bottom adjuster no longer releases the wheel. (Continuous adjustment.)



Figure 2

Use bottom adjuster with shoe 115 at top

Turn lower eccentric adjuster either to right or left so that the wheel can only just turn. Tighten down hexagonal locknut.



Figure 3

Use bottom adjuster with shoe 115 at top

Ease brake shoe from drum by turning upper adjuster inward. Repeat the process on the other shoe and on the other wheels of the car.

Handbrake adjustment

The adjustment of the handbrake is taken up by a handbrake fitted to the operating crank. See brake layout diagrams on page 47.

The handbrake is correctly adjusted when a noticeable braking effect is felt when it is pulled 1/4 of the way out.

ELECTRICAL SYSTEM

The electrical installation of the car can be divided into four main parts: —

- a) Supply — Generator
- b) Storage — Accumulator

and the consumers of current which are: —

- c) Lights and signalling equipment
- d) Starter and ignition

The vehicle is wired on the single pole system, i. e. current (+) is led to the individual units by single wiring, the return (—) being by the metal parts of the car (earth).

Generator 15 DRS 180/4-2500 R 12 v B

The generator which is driven by a "V" belt from a pulley on the nose of the crankshaft, supplies current to the consumer units and to the accumulator which is charged automatically when the engine is running.



Accumulator 27 AH amp/hr

The battery stores the energy produced by the dynamo and provides current to the various forms of electrical equipment such as the starter, lights and ignition as may be needed.



Starter 300-5A / 4 AH 12

The starter turns over the engine when you wish to start. When the starter is engaged, a sliding pinion moves along the starter-pinion shaft and engages with the starter dog on the flywheel.



When the engine starts and the starter switch is released, the increasing speed of the flywheel throws the pinion back along its shaft so that it disengages.

Whenever work is being carried out on the electrical system, the negative lead from the battery should always be disconnected to avoid any possibility of a short circuit.

When tracing faults in the electrical system, you should make use of the wiring diagram opposite.

All leads that might become chafed or worn, should be examined periodically for damage.

Accumulator

In order to preserve the battery in a serviceable condition, you should observe the following points:—

1. The battery should be kept clean and dry. The terminals should be coated with acid-proof grease.
2. To guard against shorting, no metal objects should be left on the battery.
3. At least once a fortnight, the battery level should be checked and maintained at about $\frac{1}{2}$ — $\frac{3}{4}$ " (5—10 mm) above the plates. Should it fall below this level, it should be topped-up with distilled water.
4. Pure acid only should be used to replace that in the cells. The specific gravity of the replacement must approximate that of the electrolyte in the cells. Distilled water only may be added to electrolyte that has evaporated.
5. After topping up with either water or acid, the density should only be checked after the electrolyte has been thoroughly mixed, preferably after it has been on charge for half an hour. The correct specific gravity for the electrolyte of a fully charged battery is 1.305.
6. When working on the electric, the negative lead from the battery should always be disconnected.
7. To inspect the battery cells, a naked flame should never be used; only electric light.
8. The battery should not be allowed to remain uncharged, but should be put on charge every 4 weeks if not in use.
9. Should the battery be put to very heavy use as in winter, or a lot of town journeys with continuous starting and stopping and heavy demands upon the lights, it should be removed from the car and re-charged.

BULBS FITTED TO THE "ISABELLA"

Headlamps filar	6V 25/35 W
Double filament bulb (eye, dipping)	6V 45/40 W
Side light bulb	6V 2 W
Bulb for indicators, front	6V 10 W
Bulbs for brake lights and indicators, rear	6V 15 W
Tubular lamp for interior light	6V 5 W
Tubular bulb for tail lights	6V 5 W
Oil pressure warning light	6V 2 W
Maintenance warning light	6V 2 W
Indicator warning lights	6V 2 W
Dash lighting	6V 2 W
Ignition warning light	6V 5 W
Parking light ("10" only)	6V 2 W
Reserving light	6V 10 W

When changing bulbs in any of the cars lights, care should be taken to replace them with new ones of the identical type, ratings and voltage. This is necessary to ensure satisfactory results from the lighting system and to avoid overloading the battery.

Never touch headlamp bulbs with greasy fingers as this may cause deterioration of the reflectors. Always use a clean rag.

If a headlamp bulb has to be replaced on the road, it is advisable to fit-align it with the other, two—making sure that the headlamp rim allows it to be adjusted both vertically and horizontally.

Large headlamp



Small headlamp



GENERAL NOTES

Windscreen wipers

Because of its curved windscreen, your BORGWARD "Isabella" car is fitted with special wipers. The blades of these are less rigid than those used on normal flat screens and are more susceptible to damage. Constant treatment can harm the thin steel reinforcements of the wiper blades or jam the mounting.



Care must be taken when cleaning the windscreen that the wipers are folded back at the arm and not at the blade.

Push-button Radio

A special instruction booklet on the operation of the push-button wireless set will be found amongst the other documents relating to the car. You are reminded that when using the wireless when the engine is switched off, the ignition key must be turned to position "T". (See also page 11.)

Precautions in Winter

In addition to the usual toolkit, you are advised to carry the following additional equipment: —

1. Shovel, in case the car has to be dug out of the snow.
2. Small bag of acid to get the car on the move on icy roads.
3. Rope or chain to stand the jack.
4. Snow chains or "Iceman and Country" tires.

Snow chains should not be used on icy roads and should be removed on roads free of snow. Otherwise increased wear and damage to the tires will result.

COACHWORK



A special feature of your BORGWARD "Isabella" car is its all-steel integral body-on-chassis. Its rigid construction using box-shaped side members and the central transmission tunnel ensures that it possesses the necessary torsional rigidity. The body is mounted on the front and rear cross-members with soft rubber mountings to keep it free of road shocks and vibration. The front wheels are mounted independently on double wish-bone or unequal length arms and the rear wheels independently on swing axle. Coil springs working in conjunction with telescopic shock-absorbers and fitted with gas test and bendover the car with excellent suspension and outstanding roadholding.



Doors and Windows

It is advisable to leave a window slightly open when closing doors, as it may be difficult owing to build-up of air pressure inside the car.



Both doors are fitted with wind windows and these in conjunction with the protected rear windows provide adequate and draught-free ventilation.



Seats

The front seats are adjustable and may be altered to suit the requirements of the individual.



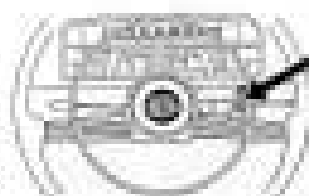
The seat release is actuated by a button in front of the seat, allowing it to be moved either backwards or forwards. As soon as the button is released, the lock is engaged and the seat remains firmly fixed.



The Isabella '75 is fitted with fully reclining front seats, which can be folded back for sleeping. The backrest is adjusted by a hand control on the outside of the seat.

Bonnet

A 'T' type lever situated under the dash operates the mechanism to release the bonnet. It should be pulled smartly backwards when the lock should open quite easily.



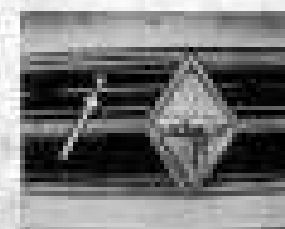
To lift the bonnet, release the catch and pull forward the lever situated behind the radiator grille.

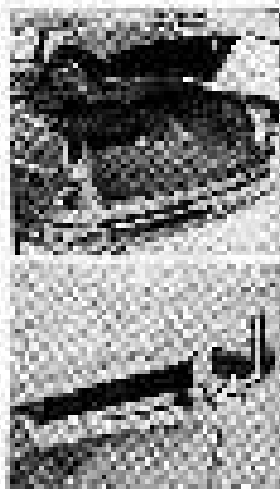
Ensure that the lock is released fully, otherwise the device may not work properly and the lock remains open. If the 'T' handle is pulled half-heartedly, the bonnet may be released as far as the retaining hook but it is possible that it may lock itself again.



Drivers should ascertain for themselves that the bonnet is efficiently secured. It is NOT sufficient that the 'T' handle returns to its original position and the bonnet should be inspected to ensure that it is securely pressed down and locked.

If the lock has sprung back with the bonnet up, it can only be reset with the aid of a screwdriver or similar tool.





Trunk mechanism

In addition to the baggage normally carried in the car, the trunk provides much space for the necessary tools which it provides. To open the door, first pull the release lever which is on the inside corner of the trunk lid. The release lid of the lid will then allow you to pull the lid down. To close the lid again, simply push it down lightly until the lid is closed. Do not push with great difficulty. Make sure that the release catch has returned to its original position.

Seat Wheel

The spare wheel is located in a convenient position in the baggage compartment. After removing the retaining cover, the spare wheel cover can be lifted out and the wheel removed from the trunk.

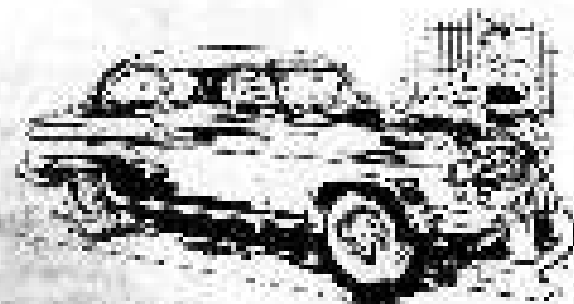
Refueling

The fuel tank is located in the rear part of the right hand side wing. It is being accessed through a special tap. This tap can be used when refueling. This is the only gas tap in the car.

BODY UNDERBODIES

The body has a special underbody treatment which is applied to the chassis and body. This is done to protect the body from rust. It is applied to the body in a special way. It is applied to the body in a special way. It is applied to the body in a special way. It is applied to the body in a special way.

CARE OF THE COACHWORK



To preserve the appearance of your car, regular washing and oiling of the coachwork is essential. It will also preserve the finish.

Washing the car

1. The use of new vehicles is particularly frequent washing to preserve the durability and finish of the paint. In any case, the car should be washed down whenever it becomes dirty. Make sure that the brush is allowed to remain, the more will be the adverse effect upon the paintwork. Instead of dirt damage the brush of the carwork directly after washing it is immediately washed off.
2. A large amount of water is used for washing down the bodywork, a lot of oil is used for the chassis and a lot of oil for the chassis. It is also used for the chassis and a lot of oil for the chassis. It is also used for the chassis and a lot of oil for the chassis.
3. The chassis should be washed from the underside and the chassis with the aid of a brush and a powerful hose.
4. The painted surfaces of the bodywork and the wheels should be washed down with a fine spray of water. The dirt is removed from the painted surfaces should be washed down with the bodywork as far as possible. The dirt should be washed off with the sponge using plenty of water and wringing it out frequently so that it does not scratch the body. The car should be washed with the sponge using plenty of water and wringing it out frequently so that it does not scratch the body. The car should be washed with the sponge using plenty of water and wringing it out frequently so that it does not scratch the body.

4. Working in bright sunlight should be avoided as the water dries on the surface too quickly and appears to stain spots are particularly evident in creases of the rubber as it dries and may cause considerable swelling of the particles at these sites.

Periodical washing of the sponges should be avoided as it is preferable to remove dirt by rinsing in hot water and increase the life of the polyethylene layer as it may become cloudy. The sponge should be washed in warm water with a good brush fitted with a suitable synthetic bristles and polished with a circular motion. A final rub being given which does not tend to abrade the top glass face.

It may not always be possible to remove any small marks and the sponges may sometimes be damaged by excessive use. The use of water should always be avoided as heat or particles as likely to do as may cause swelling damage to the surface. The addition of detergent to the water for use on the glass is inadvisable as such becomes stuck to the sponge head and the rest of the car generally.

A low steam soap solution of not more than 1-2% should be used to spray all glass areas. A good commercial solution would not be used if it may attack the paint. When the sponges have been washed from the affected surface, wash down using plenty of water which is washed at least of the soap solution and then rub clean with a cloth.

Glass can be cleaned in cold water and soap sponges or two with a suitable proprietary liquid or solution which will attack no other parts which may be free of lamps or glass.

For applying an impression of either plastic or paper material care must be taken frequently when drying in hot weather or slowly in hot weather. These must be dried by removal of water using a suitable brush.

It is rare that the car paint does not come free contact with air in the weather particularly in workrooms. The same applies to a car body and a good measure of oil film sometimes contain impurities. For typical details of the clean

Care of the sponges

After washing down with water, all sponges placed down should be rubbed with a soft cloth and a good measure of a proprietary detergent. On no account should knives or sharp objects

be used for care for the sponges as it will only cause damage to the polyethylene. It should be cleaned with a coarse domestic cleaner after spray with hot water and allowed to dry before being given a final polish with a clean soft cloth. The sponge should be stored in the creases of the car and protect it against corrosion and deterioration. This procedure should be carried out with particular care after washing the car during the winter months.

Care of the handkerchiefs

The principal factor which is used for the sponging is that of the handkerchiefs which are used. The usual preparation should be avoided as they will not be suitable and a suitable type of cloth is prepared by hand of dry cleaner should not be used. A dry clean detergent should be prepared that will destroy the surface of the handkerchiefs and the color. However, with the addition of pure soap or other material which will destroy the surface with clean water and a soft cloth.

Red clothes should be washed in the same way taking care that the red clothes are not too hot.


TIRES

The first thing a tire man should do is simply wash the dirt from the surface of the tread and the sidewalls. It is also possible for the tire to be washed in a water tank after they have been in use in a car. Be careful to wash around from time to time with a soap and a large tin. The tread should not be exposed to any length of time to the direct rays of the sun or the rubber may become brittle and crack.

A good way to keep the tire from the dirt when on a burn is to use the tire for more than one day and the rest.

At the end of a year or two, if the tire is changed, the tire should be inspected for any damage to the tread.

WHEEL CHANGING




When changing a wheel, ensure that the handbrake is firmly on and a low gear engaged to obviate the possibility of the car moving. The car should, if possible, be on level ground.



Remove the wheel disc with the pull-off hook which will be found in the tool kit.



Slightly slacken wheel nuts and then jack up the car by inserting the jack in the socket, one of which will be found on either side of the car.



After the wheel has been changed, the nuts should be screwed on hand-tight so that the wheel centres itself on the ball bearings of the wheel nuts. Tighten the nuts diagonally with the wrench and lower the jack. Finally tighten diagonally with a torque wrench set at 57 lbf (12 mkg).



Repress wheel disc with a light blow from the flat of the hand. Check that the retaining spring is fully home.

LAYING UP YOUR BORGWARD "ISABELLA"

If your BORGWARD "Isabella" is to be laid up for any length of time, it is recommended that the following precautions should be taken: —

1. The car should be stored in a dry, well ventilated garage.
2. Drain the engine and radiator of oil and water when the engine is hot. Care must be taken to ensure that the units of the heating system are completely drained. If necessary, disconnect the hoses and blow out with compressed air to clear any water that may remain.

It is recommended that 2—10% anti-corrosion oil should be added to the cooling system and the engine run on this mixture for some time before it is drained.

3. Empty fuel tank, fuel pump and carburettor.
4. Clean shim-type oil filter.
5. Pour anti-corrosion oil in through the plug holes and turn the engine over a few times so that the cylinder walls become thoroughly coated.
6. Remove battery and store in a dry place, free from the danger of heat. It should be put on charge at least once every four weeks.
7. Remove tires. Sprinkle inside of tires and the inner tubes with French Chalk and store in a dark place. If the tires are not to be removed, the vehicle must be jacked up on supports to take the weight off the tires.
8. Grease all greasing points.
9. Clean body and all mechanical parts.
10. Clean all chromium plated parts with pure vasoline.
11. If possible, cover the vehicle with a tarpaulin.

PREPARATIONS FOR LONG JOURNEYS

Before setting out on a long journey, it is recommended that you should give your car a thorough checkover. If possible, you should have this work carried out at an authorized BORGWARD agent. In any case, the following points should be observed:

1. Check the oil level. Always top up with the same grade and brand of oil.

2. Check the belt tension (it must not slip).

3. Check water level in radiator. Use "anti-freeze" if necessary.

4. Check wheel nuts for tightness, especially after a wheel change.

5. Check tire pressure:

Tires 5.70-15 —
Front 27 psi = 1.9 atm
28 psi = 2.0 atm
Rear 26 psi = 1.9 atm
28 psi = 2.0 atm

6. Do not over-inflate spare wheel, valves, spare bulbs and fuses.

7. Take car documents and list of BORGWARD agents with you.

Important

Ensure that the brake function properly, if necessary, have them adjusted and the reservoir topped-up with brake fluid.



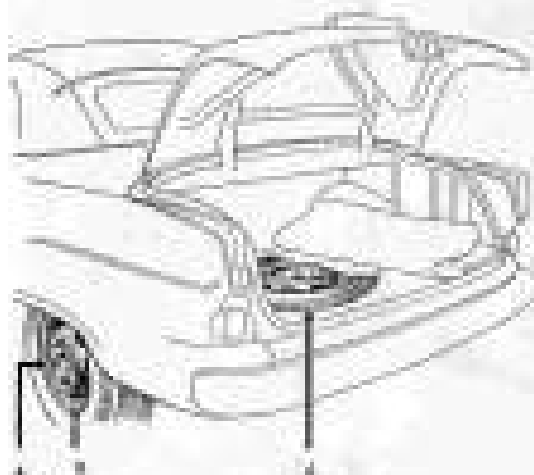
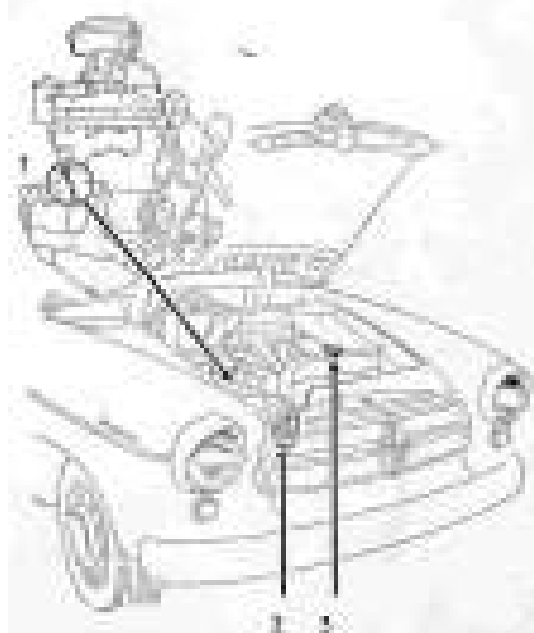
BORGWARD

Isabella combi

Station Wagon

The construction of the "Isabella" Station Wagon is fundamentally the same as that of the standard "Isabella" saloon.

The servicing and maintenance of this model are identical with that of the "Isabella" standard saloon.



DIMENSIONS AND WEIGHTS



All dimensions in inches

Weights

Unladen weight approx.	2,487 lbs. (1,125 kg)
Permissible all-up weight approx.	5,623 lbs. (2,550 kg)
Permissible load	801 lbs. (363 kg)
Permissible rear axle loading	2,205 lbs. (1,000 kg)
Permissible front axle loading	1,500 lbs. (680 kg)
Max. roof load	120 lbs. (55 kg)
Permissible trailer load (with brakes)	1,764 lbs. (800 kg)
(without brakes)	1,523 lbs. (690 kg)

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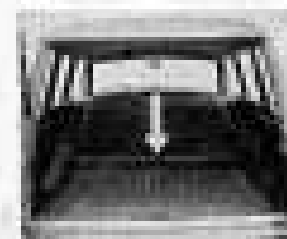
VARIATIONS FROM THE STANDARD "ISABELLA" SALOON

Rear seat and loading space

The rear seat can be folded forward to make full use of the loading space. First, pull up the seat by means of the loop provided, then detach bodyside brackets and fold backrest forward until it locks into position.



To raise the backrest, turn the locking ring to the right.



Spare wheel

The spare wheel, jack and multi-purposed wrench are located underneath the rear floor. When the floor can't be unimpeded by goods, ice or dry blood, to remove the spare wheel, undo retaining screw and lift clear of its holder.



VARIATIONS FROM STANDARD "ISABELLA" SALOON

Engine: 4-14 1.8 112

Max. output: 55 b. h. p. 3750 at 4200 rpm

Gears:

1st gear	30%
2nd gear	18%
3rd gear	17%
4th gear	35%

Wheels: 4-10-15

Tire pressures:

Front 21 psi — 1.8 atm
(27 psi — 1.9 atm for motorway driving)

Rear 27 psi — 1.9 atm
(35.5 psi — 2.5 atm loaded and at max. road speed)



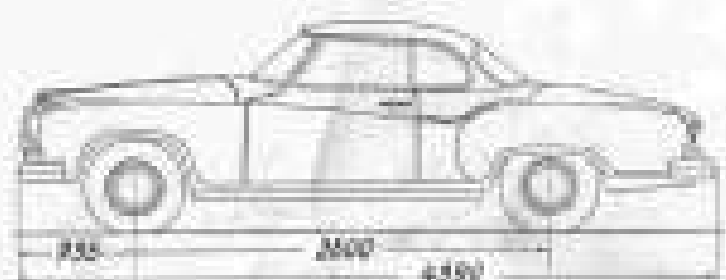
BORGWARD

Isabella
coupé

The construction of the "Isabella" Coupé is fundamentally the same as that of the "Isabella 15" saloon.

The servicing and maintenance of the model are identical with that of the "Isabella" standard saloon.

DIMENSIONS AND WEIGHTS



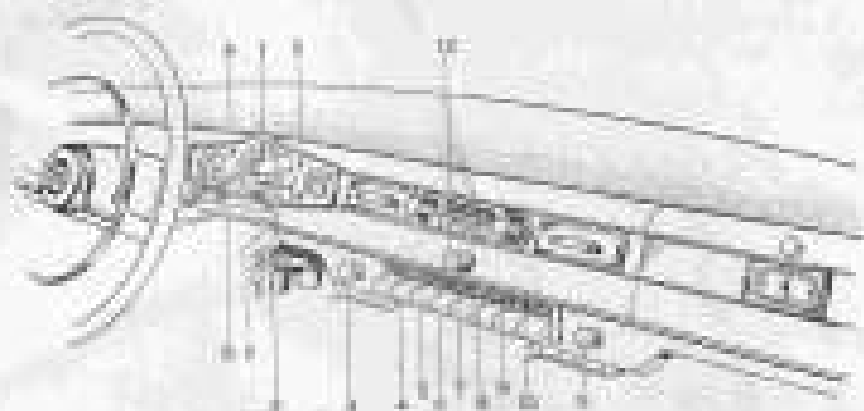
All dimensions in mm.

Weights:

Unladen weight	21% cwt (1,700 kg)
Permissible all-up weight	27% cwt (2,195 kg)
Permissible load	4 persons + 1 cwt of luggage
Permissible axle loading, back	15% cwt (1,180 kg)
Permissible axle loading, front	15% cwt (1,180 kg)

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VARIATIONS FROM THE STANDARD "ISABELLA" SALOON



- All the instruments necessary to the efficient operation of your car are grouped together in one **multi-instrument unit** which is situated clearly visible above the steering column. This comprises the **speedometer, fuel gauge and a thermometer** to show the operating temperature of the coolant. In addition to the instruments, you will find the following warning lights: —
 - lights if the oil pressure falls below the minimum permissible figure.
 - is operative as soon filled with a manually operated gearbox.
 - shows a blue light when the headlights are on "main-beam".
 - lights up if the coolant temperature exceeds the maximum limit.
- The built-in **steering ignition lock** locks the steering when the key is turned to the "Off" position, thereby providing adequate protection against theft. The **starter button** acts as a safety catch as it is only possible to turn the ignition key when in the "Off" position after the starter button has been pressed.



The electric switches for the lights and auxiliary equipment are arranged as a row of **push buttons** easily identified by recognizable symbols.

These switches are arranged as follows: —

1. Choke control.
4. Dash lighting.
5. Handbrake.
6. Side & tail lights.
7. Fog lamp. This switch is provided so that additional fog lamps can be fitted.
8. Windscreen wipers. The wiper switch has two positions. When fully pushed home, both wipers and windscreen wipers are switched on; in the halfway position only the wipers are operative.

The electrical windscreen wiper installation automatically sprays the field of vision covered by both wipers, with water from a special container located in the engine compartment. Clean water only should be used.

9. Stationary heater. A fan which is installed in the left-hand heater console can be switched on to provide interior heating when the car is parked. With the control lever in position "2", the fan can be used for concentrated defrosting of the windscreen.
10. Parking lights. This switch has two positions which enables the left or right-hand parking lights to be isolated.
11. The switching gear of the air conditioning system from cold air to hot effected by a forward control.

Control knob "in" — cold air
Control knob "out" — hot air

12. The cigarette lighter is located in the middle of the instrument panel. To operate, press the lighter into the holder; as soon as it glows red, it will automatically spring back ready for use.



No matter how carefully your BORGWARD has been looked after with regular servicing at the scheduled intervals, the time will eventually come when it will need some repair involving the use of

Genuine BORGWARD SPARE

By using these, you will ensure that your vehicle will receive replacements of exactly the same high quality as those for which they are exchanged.

Whenever possible therefore, repairs should be carried out at one of our appointed workshops which can easily be recognised by the "Borgward Service Station" sign outside. You will find a comprehensive list of authorised Borgward dealers in our dealers' list. The workshops are staffed by trained engineers and equipped with special tools specially developed for use with our vehicles. They stand on a position to handle any kind of routine work, expertly and at once.

Appointed workshops can supply you with genuine BORGWARD spares at the best.

EXPLANATION OF THE LUBRICATION CHART

The lubrication chart for each of the operating points are clearly shown. However, when more than one operating point is shown, the chart is divided into sections. The chart is divided into sections to clearly indicate the chart to be used.

The operating points and means for oil to be changed with the chart are shown. The chart is divided into sections to clearly indicate the chart to be used.

After working for an hour or so, you should transfer to the chart to determine the operating oil for those points.

The meaning of the symbols used in the chart are as follows:

Working points:

- Change oil (change oil) (change oil) (change oil)
- Check oil level (change oil) (change oil)
- Oil change (change oil) (change oil)

Lubricants:

Oil	Engine oil (change oil)	Grease	Change oil
HD	Engine oil (change oil)	Grease	Change oil
D	Engine oil (change oil)	Grease	Change oil
HD	Engine oil (change oil)	Grease	Change oil
A	Engine oil (change oil)	Grease	Change oil
HD	Engine oil (change oil)	Grease	Change oil
TC	Engine oil (change oil)	Grease	Change oil
BF	Engine oil (change oil)	Grease	Change oil

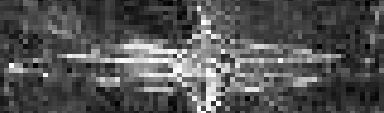
Working points	Oil		Grease	Change oil
	Oil	Grease		
1. Change oil (change oil) (change oil) (change oil)	7	0	C	1
2. Change oil (change oil) (change oil) (change oil)	0	1	1	C
3. Change oil (change oil) (change oil) (change oil)	1	1	1	1
4. Change oil (change oil) (change oil) (change oil)	0	0	0	1
5. Change oil (change oil) (change oil) (change oil)	0	0	0	0

Working points:

The meaning of the symbols used in the chart are as follows:

Recommended items of maintenance:

1. Change oil (change oil) (change oil) (change oil)
2. Change oil (change oil) (change oil) (change oil)
3. Change oil (change oil) (change oil) (change oil)
4. Change oil (change oil) (change oil) (change oil)
5. Change oil (change oil) (change oil) (change oil)



OPERATING INSTRUCTIONS

WILSON JONES & CO.
NEW YORK, N. Y.