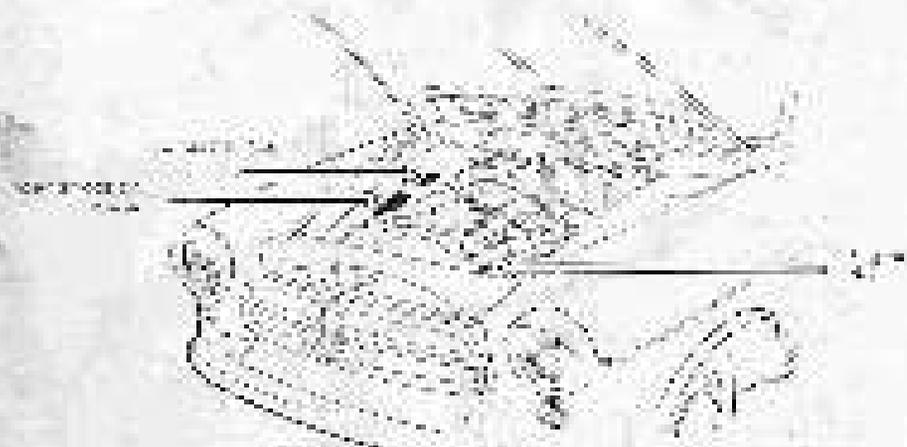


CHASSIS AND ENGINE NUMBER



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 an evidence and is not required.

CARL F. W. BORGWARD G.M.B.H.
AUTOMOBIL UND MOTOREN-WERKE
 Berlin-Dam.

Bismarck-Straße 24, Germany.
 Tel. 41 31 21, Telegrams: "Borgwardwerke, Bremen".

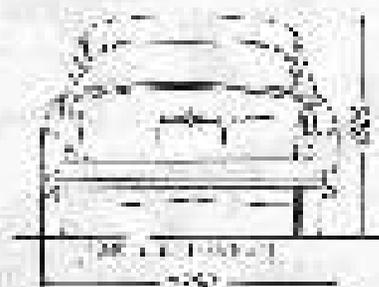
Hours of business: 8:30 p. m. — 5:30 p. m., Monday to Friday.
 Closed on Saturdays.

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DIMENSIONS AND WEIGHTS



All dimensions in mm.

Weights

Unladen curb weight	1170 cwt (130 kg)
Permissible full-up weight (740 lbs dry load)	2170 cwt (415 kg)
Permissible wind-up passengers	38 lbs of luggage
Permissible front axle loading	1500 cwt (170 kg)
Permissible rear axle loading	1270 cwt (140 kg)
Maximum loading	210 lbs (100 kg)
Permissible trailer load (with brakes)	1200 cwt (130 kg)
without brakes	1100 cwt (120 kg)

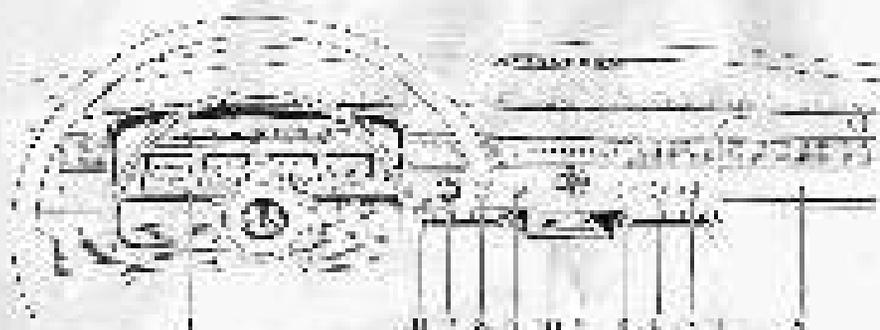
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INTRODUCTION

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 working pages of this manual. It is recommended that the owner should inspect ritmo 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 be 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 what was its original construction.

INSTRUMENT PANEL



As the controls and instruments vary slightly by the different models of the car, it is suggested to look at the positions that they can be reached or seen will come from the driver's subjectively point of view.

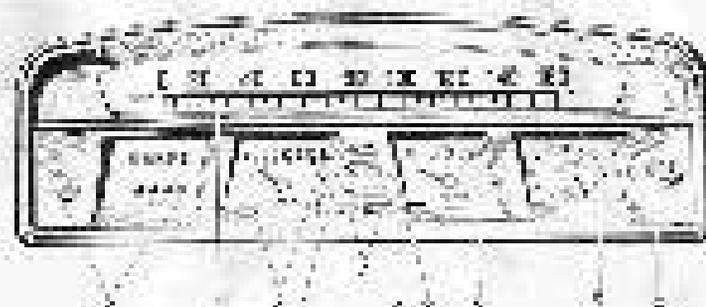
- | | |
|--|------------------------------|
| 1. Right-hand main switch | 2. Fuel and water for heater |
| 3. Ignition switch | 4. Cigarette holder |
| 5. Carburetor choke control | 7. Direction indicator |
| 6. Fuel and water for windshield wiper | 8. Airflow |
| 7. Control lever for heater | |
| 8. 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 in the car, 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 10 to 25, 25 to 50 & 50 to 80)

4 p.m. 1 p.m.

1st gear	up to 10 m.p.h. (up to 30)	up to 15 m.p.h. (up to 40)
2nd gear	5-10 m.p.h. (15-20)	10-15 m.p.h. (20-30)
3rd gear	20-25 m.p.h. (25-30)	25-30 m.p.h. (30-40)
4th gear	30-35 m.p.h. (35-40)	35-40 m.p.h. (40-50)

- As you sit in the car, you will find in the lower left corner a "temp" needle which can be rotated to show by turning the steering wheel.

- 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 observe that at the beginning of the engine operation, and a few minutes afterwards, the needle will drop to the level of the recommended normal temperature of 85 C (185 F) and slowly thereafter, however, will come to a point where it is necessary to keep the engine operating temperature within the specified limit.

The working temperature may reach the 90 C (194 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 normal speeds. A leak with a slight valve often comes into operation at about 75 C (165 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 vehicle should be stopped at once.

4. With handbrake on, in park, 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 oil 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 light 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 50, 100 and 150 miles per hour.

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. This is light.

LIGHTING SYSTEM

All the lights can be selected in any manner by a parallel switch independent entry of the ignition system.

Headlamps, as also side and tail lights 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".

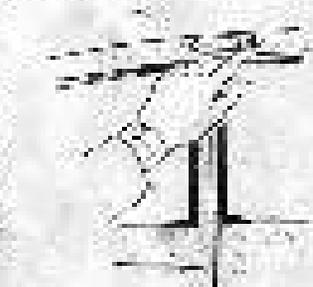
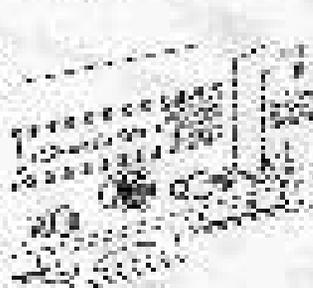
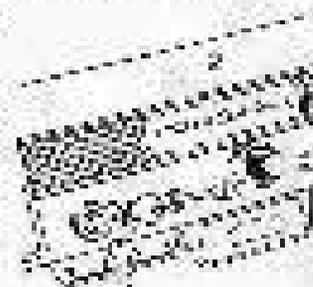
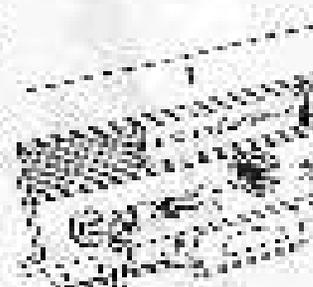
Yard or a handbrake can be switched on by pulling the switch out to position "2". The main beams are dipped by depressing the foot dipper switch. When the footbrake is on, the main beam, the blue warning light is illuminated.

The parking lights come automatically when reverse gear is engaged, but only when the light switch is in position "1".

Labels "TS" and "TS de Luxe"

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

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 "R" side) and can also be selected or when the door is closed by a push-button switch on the lamp itself.



A red warning lamp is built into the instrument unit and comes 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 system 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 ignition 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 driver should be 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 warn of 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, use 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 independent of the ignition system.

Headlamps and also the 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".

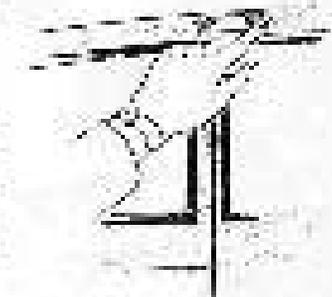
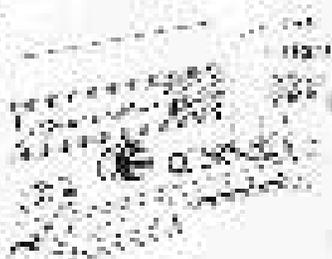
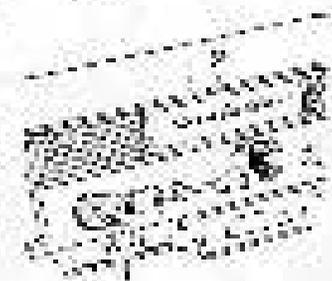
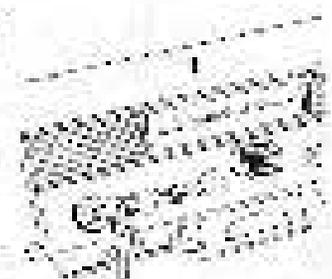
Your car's headlamps are switched on by pulling the switch out to position "2". The main beams are dipped by depressing the foot dipper switch when the headlamps are on main-beam, the low warning light is illuminated.

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

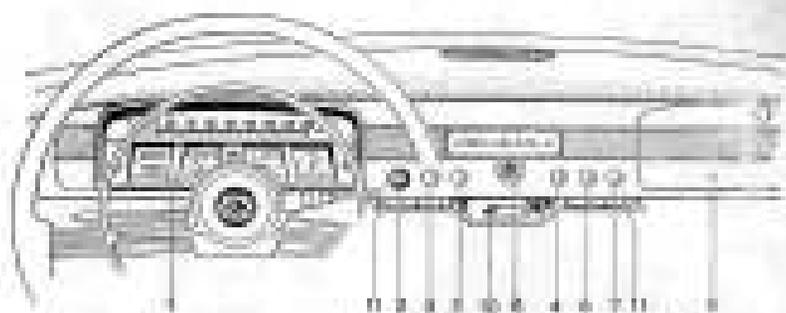
Labels "2R" and "1R de Law"

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

The master of the car is controlled by tail light which is switched on automatically by a push-pull switch when the clutch pedal is depressed. Such a lamp as the "1R" is also electrically connected to a warning lamp which is placed by a push-pull switch on the lamp bracket.



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.

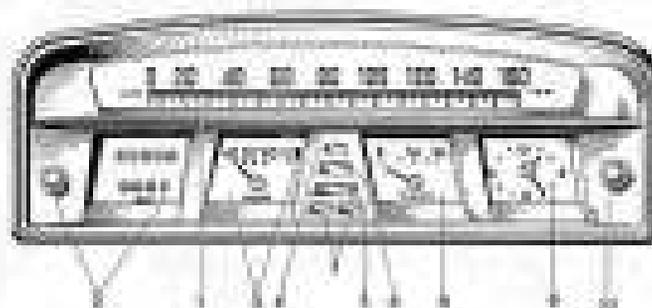
- | | |
|--|--|
| 1. Multi-instrument unit | 7. Push-pull knob for heater |
| 2. Ignition switch | 8. Cigarette lighter |
| 3. Carburetor choke control | 9. Downshift locker lid |
| 4. Windscreen wipers and washer switch | 10. Ashtray |
| 5. Push-pull headlamp switch | 11. Control lever for heater and 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)	23-41 mph (38-70)	
3rd gear 21-30 mph (35-50)	35-48 mph (58-78)	
4th gear 31-41 mph (50-70)	51-67 mph (84-108)	

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 1934



CARL F. W. BORGWARD G. M. B. H.
Automobil- und Maschinen-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".

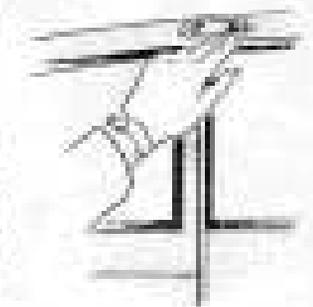
Foot car's headlamps are switched on by pulling the switch out to position "2". The main beams are dipped by depressing the foot dipper switch. When the headlamps are on mainbeam, the blue warning light is illuminated.

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 a foot 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 rather also serves as a connection for the cigarette lamp.

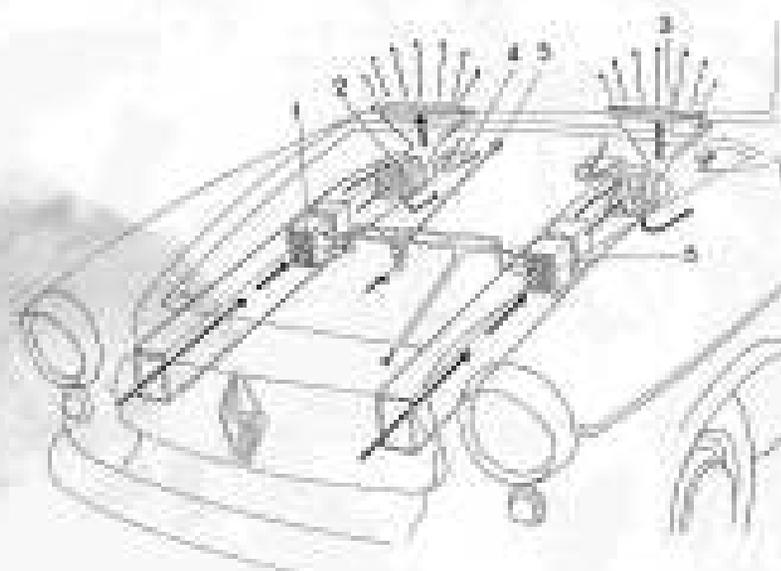
AIR CONDITIONER AND DEFROSTER

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

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.

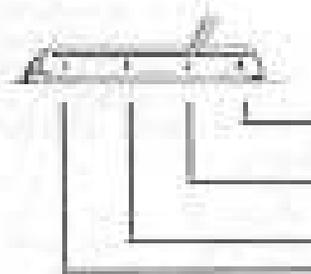
A push-pull control for changing over from one to the other is to be found on the instrument panel and connected to the stopcock on the heating system. This stops the supply of hot water to the heater units from the engine's cooling system. With the knob in the "in" position, the heat is switched off 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 20W/30 or a SAE 30W/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.

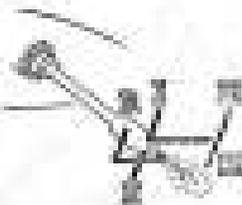
GENERAL DRIVING INSTRUCTIONS

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

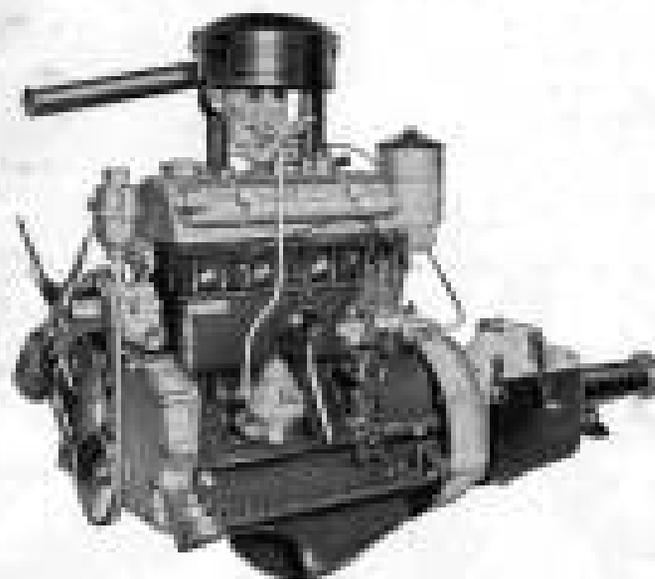


It is our constant aim through continuous development to increase the pleasure of driving and the firing of the "Saxomat" FR simplifies driving still further. At the same time however, it retains the use of the normal transmission and gearbox enabling the driver to obtain maximum performance by using 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 takes place 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)
Stroke	1.00" (25.4mm)
Stroke volume	11.18 cu. in. (1.82 ltr.)
Compression ratio	10:1 (8.5:1)
Cooling system	Water
Lubrication	Over-head pump
Valves	2 ⁱⁿ 2 ^v
Valve timing	120° (120° before T.D.C.)
Output	
Maximum continuous	45.5 hp (33.2 kW)
at 5,000 r.p.m.	1,700 (3,000)
Maximum torque	24.2 ft-lb (32.8 kgm)
at 3,000 r.p.m.	24.2 (32.8)

Fuel consumption:

Isabella:

37 mpg (3.0) at 50 mph (80 km/h) 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 (80 km/h) at 55 mph = 5.2 liter/100 km at 55 km/h

Isabella Conto (Station car):

34.5 mpg (3.2) at 55 mph (88 km/h) at 60 mph = 5.1 liter/100 km at 60 km/h

Sump Capacity 7 pints (imp.)

8 1/2 pints (US) (4.0)

Valve Timing (Imp.)

Intake valve 120° - 120° after T.D.C.

Exhaust valve 120° before T.D.C.

Exhaust valve 120° before T.D.C.

Exhaust valve 120° after T.D.C.

Poppet compressor (Imp.)

1.00" (25.4mm)

Stroke 1.00" (25.4mm)

Exhaust 1.00" (25.4mm)

Distributor Type 12 1 1 1 1

Sparking Plug

Spark 12 1 1 1 1 (120° before T.D.C.)

Spark 12 1 1 1 1 (120° before T.D.C.)

Coil type 1-10

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" IS. b. h. p. at 3,400 rpm).

The cylinders are staggered 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 plugs are 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 on, 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 2,000 miles (3,200 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

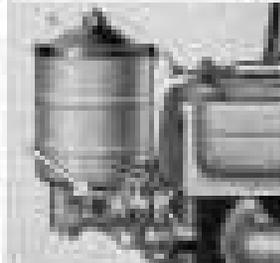
level read-off. Should the oil level fall below the minimum mark, oil must be added. Always top-up with oil of the same type and grade.

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

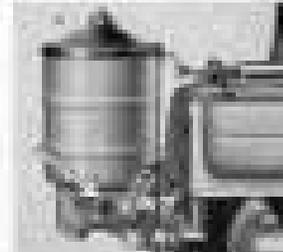
level read off. Should the oil level fall below the minimum mark, oil must be added. Always top-up with oil of the same type and grade.

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 in 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 5,000 miles (8,000 km) and thoroughly cleaned. This necessitates the removal of the wisp which should be cleaned at the same time.





The operator should be drilled in as below for maximum pipe life and life span.

When drilling the casing, the operator should observe the following:—

1. Check the speed and direction of the drill.
2. Remove the casing cap.
3. Drill the casing with the rotation and the feed to remove.

In heavy weather, the clear distance in the casing and holes should not be reduced. In case the system breaks, the hole water head or the casing should be checked and should also be removed.

Should the weather hole or cut add water immediately, remove the cut and continue and stop up slowly with cold water with the casing being removed to be used in the casing as a measure of the distance. The cut lead to fracture of the hole.

Before using the cut, address to the water, the casing pipe should be thoroughly tested, especially if an operator makes an incorrect case employed.

When instructions or addresses are to be changed.

Cooling and heating addresses should not be allowed to be too slow, but should be checked if a suitable one after for cases it should be made that will be an optimal direction. Some of the ingredients and all you prefer, you can make a hole to make an thoroughly water to be used.

Should a scale fracture be used in confined spaces and in such you should observe the hole of a pipe that is closed for joint or with addresses.

If addresses is not used, the sealing system must be thoroughly checked (as presented above) should be any possible danger of fire.

The waterway process should give a free flow and after 100% and other necessary, well and will deliver again.

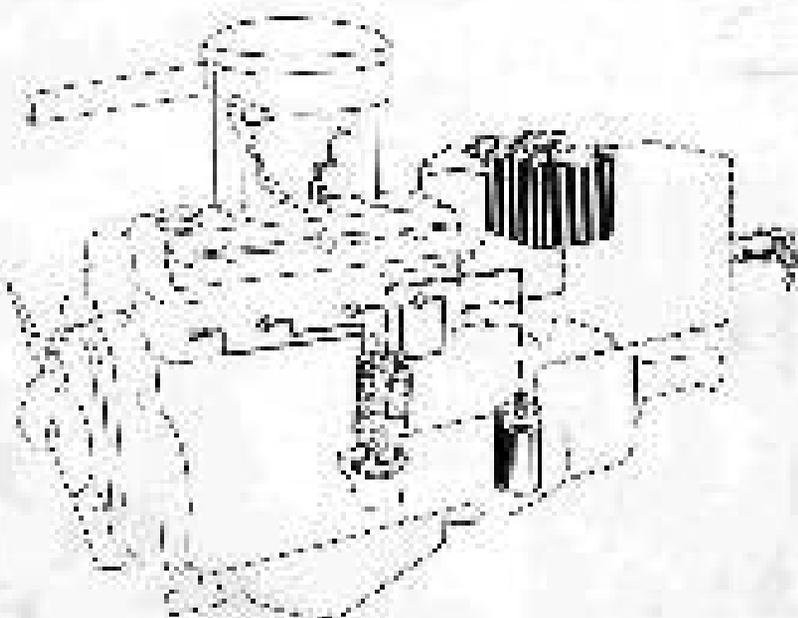


ITEM	QTY	UNIT	REMARKS
1. 1/2" x 1/2" x 1/2" x 1/2"	10	PCS	
2. 1/2" x 1/2" x 1/2" x 1/2"	10	PCS	
3. 1/2" x 1/2" x 1/2" x 1/2"	10	PCS	
4. 1/2" x 1/2" x 1/2" x 1/2"	10	PCS	
5. 1/2" x 1/2" x 1/2" x 1/2"	10	PCS	
6. 1/2" x 1/2" x 1/2" x 1/2"	10	PCS	
7. 1/2" x 1/2" x 1/2" x 1/2"	10	PCS	
8. 1/2" x 1/2" x 1/2" x 1/2"	10	PCS	
9. 1/2" x 1/2" x 1/2" x 1/2"	10	PCS	
10. 1/2" x 1/2" x 1/2" x 1/2"	10	PCS	



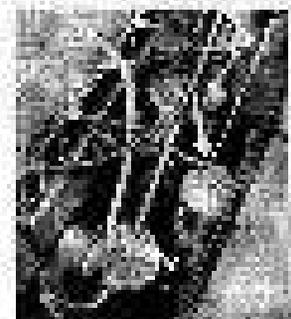
IGNITION SYSTEM

The function of the ignition system is to ignite the mixture of the products of the end of the compression stroke. It consists of sparkplugs, ignition switch, and its control and delivery system.



When using the ignition system, follow the following:—

The spark plug should be checked after the keeping clean of the spark plug. The spark plug should be checked that ignition is not lost, especially when the engine is running. The spark plug and the system should be checked in the cut back and closed, it will be shown the battery. At the same time the spark plug may be damaged through overloading.





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, carefully withdraw the filter 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 spark plugs. You may have to carry out the work described, 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 system 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 is to 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. If you do check the distributor cap for moisture, then that the correct trouble points are usually correct.

N.B. When testing ignition faults, always make the leads with a suitable holder or take them with some insulating material.

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 corrosion.
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 petrol, fuel tank, and fuel pump.
2. Ignition not working.	Check the points and gap of contact breaker. Check the distributor for correct timing. Check the spark plug leads, distributor cap, and distributor rotor for correct contact.
3. Low compression.	Check the piston rings, if necessary remove pistons and rings and check. Start engine with fully opened throttle.
4. Compression point slightly pulled or badly adjusted.	Clean and adjust valves. Check setting.
5. Throttle opened too early.	Inspect to see if carburettor is kept in a jammed.

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/running control

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

Cause	Remedy
1. Slow response throttle	Turn governor control clockwise
2. Heavy fuel particles	Inspect down connection between carburetor, manifold and exhaust; replace gaskets if necessary
3. Lack of compression	Consult your agent FORWARD

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

Cause	Remedy
1. Faulty carburetor jets	Repair jets
2. Faulty jet pump	Check pump and replace if necessary

G. Stalls through carburetor when starting.

Cause	Remedy
1. Partially blocked filter	Slow start jet pipe
2. Misaligned jets	See the repair unit, a working temperature of 120° - 125° C is correct

H. Engine does not fire on all cylinders.

Cause	Remedy
1. Valve ignored	Th read correctly
2. Distribution dirty stage	Check on valves; it 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. Valve timing irregular	
3. In the air, manifold	
4. Malfunction work	Re-align

K. Engine does not give full power.

Cause	Remedy
1. Fuel or faulty mixing valve	Consult your agent
2. Misalign fuel jet	Align fuel jet; valve correct in the valve in groups. Consult your FORWARD agent. Adjust spray bar; it may be out of timing. Check injector condition and bearings. Adjust with screw turn-head by hand.
3. Misalign fuel jet	Recommended operating temperature 120° - 125° C. Check oil pressure; it may be necessary replace the filter
4. Dirty carburetor, leading to fuel starvation	Consult FORWARD service station
5. Defective or unusable sparking plug	Please contact your agent

L. Engine overheats; radiator both.

Cause	Remedy
1. Airflow, radiator system out of order	See FORWARD workshop
2. Blockage in cooling system	Check radiator cap, hoses and circulation. If the radiator is blocked up, the engine will stop. Use 20 ml (1/2 pint) of RADIATOR FLUSH.
3. Insufficient oil	See part C (2) above.
4. Oil in the water	See part C (2) above.

M. Superheats

Cause	Remedy
1. Ignition air not restricted	Check operation of valve arm. Consult your FORWARD service station.
2. Cooling water in radiator too low	Top-up the radiator. Check the engine oil level; it may be out of level. If this is the case, add water slowly with the engine running.
3. Insufficient combustion or loss of cooling of water	Consult your FORWARD service station.

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 ft) 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.

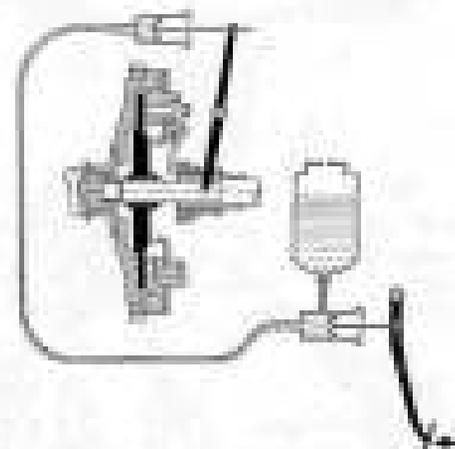
Should an oil-bath air filter be fitted, it should be cleaned out every 2,500 miles (4,000 km) and the oil level checked every 1,250 miles (2,000 km).

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.

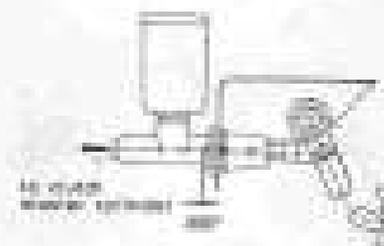
CLUTCH

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 $200''$ (5.2 mm) and can be adjusted by altering the length of the pressure rod.



At the same time there should be a clearance of $200''$ — $100''$ (5.1—5 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 $0.007-118$ ($0.01-0.15$ 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

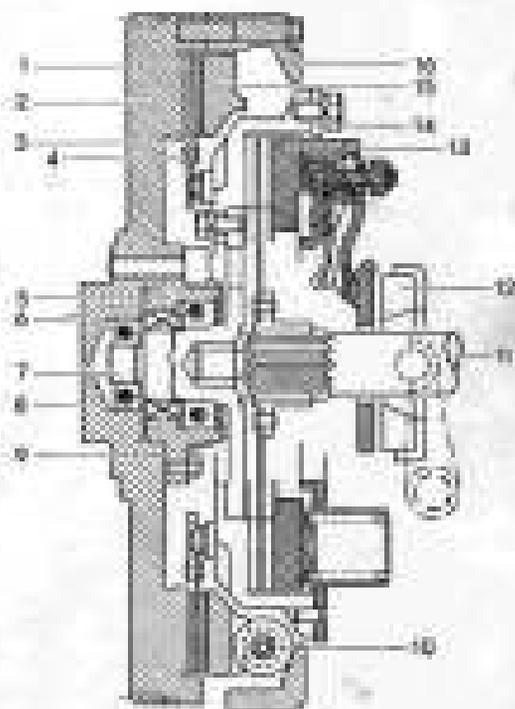
We have already described on page 16, the procedure to be adopted when driving an "Isabella" fitted with a "Saecomat" automatic clutch. In the following pages, will be found a short description of its construction and operation.

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 accelerating demands of getting away and acceleration.

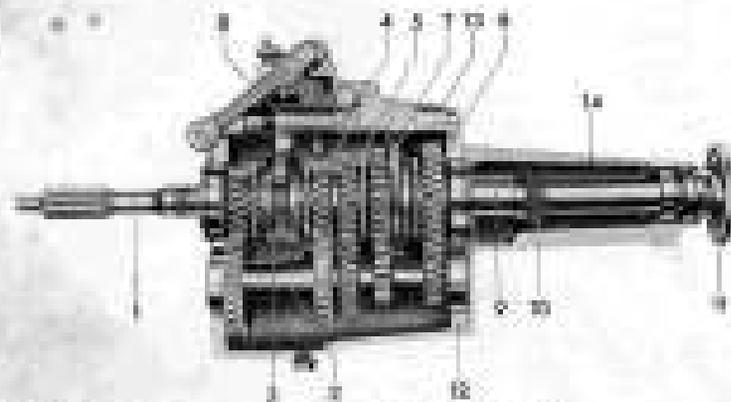
The servicing and maintenance of the "Saecomat" automatic clutch is limited to lubrication and a few simple checks that are set out in the servicing schedule. Should the "Saecomat" require adjustment or technical attention, it should be left to the qualified personnel of an authorized BORGWARD service 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. Speed clutch withdrawal mechanism |
| 4. Carrier ring | 13. Spacer clutch |
| 5. Housing flange | 14. Drive casing |
| 6. Ball-rod | 15. Pressure plate |
| 7. Journal | 16. Casing |
| 8. Crankshaft | |
| 9. Piston | |

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%	18%
3rd gear 3.36 : 1	19%	14%	11%
4th gear 1 : 1	9%	11%	7%
Reverse gear 4.06 : 1			
Maximum speeds	Isobella Standard	TS	Combi
	mph/kph	mph/kph	mph/kph
1st gear	29 / 46	25 / 40	20 / 32
2nd gear	38 / 61	44 / 70	34 / 54
3rd gear	48 / 76	59 / 93	47 / 73
4th gear	59 / 93	73 / 115	58 / 92

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 effortless changes to be made. It also permits down-ward changes to be made without the necessity of double de-

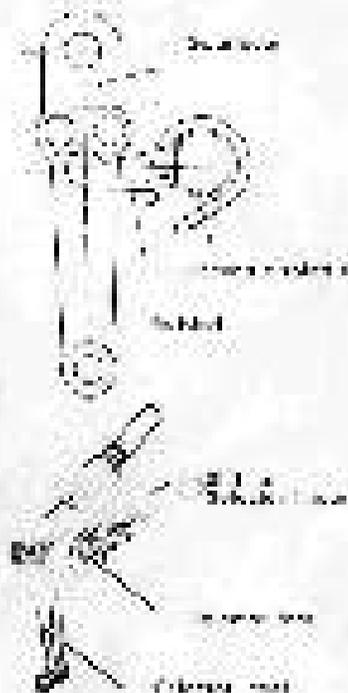
changing the gear change is effected by compressing return spring 1, and then operating the lever 2 of the gearbox through cable 3 (Fig. 1).

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 flat 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 oil leaks. (b) The workshop practice of greasing the bushes when carrying out adjustments is to ensure that the axle legs never freely rotate in the ball race grooves. If any noticeable operation is to be carried out, it is possible to check the position of the finger by turning the steering spindle on the opposite side of the steering column. (c) The return spring will require the return after it is fitted on the spindle to move fast and without friction when it is rotated 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 tender cable should be attached to the steering cable in the rearward position.



Proceed as follows:—

1. Remove the return spring.
2. Depress gear lever by means of the tender cable until a springy resistance becomes noticeable.
3. Hold tender cable tight and, the springing feeling still existing, turn the return spring and re-attach it to the cable.
4. With the gearbox lever in the 1st gear position, adjust and secure the gearchange mechanism to the steering lever on the gearbox.
5. Check by rotating wheel gear lever with the cable in gear position.

REAR AXLE



Technical Data

Oil capacity

Empty 500 pints (Imp), 500 pints (US), 110 l
 Road 250 pints (Imp), 250 pints (US), 110 l

Welds

20/11

Cross-section and pinion

27 x 13

Special oil bearing

Top of oil bearing 20/11

Ball bearing

Ball 20/11 6035

Pinion bearing

Top of pinion bearing 20/11

Pinion

Top of pinion bearing 20/11

Pinion

Ball race 20/11

Pinion bearing

Ball 20/11 6035

20/11 6035

Ball race 20/11 6035

20/11 6035

(See p. 15 for correct die dimensions)

You should always test a bearing with a special test plate. This is a ring that fits around the shaft and the bearing. The inner rim of the ring has very close fit to the bearing. The outer rim has a groove to cut up into and effectively covered by thin metal shrouds. When the rim of the ring is

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	NO (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 2304/73

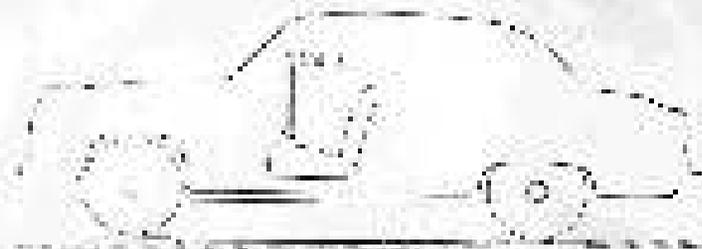
The independent front suspension is of the double wishbone type, each pair being of unequal length, working in conjunction with hydraulic shock-absorbers.

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 rear end and the steering wheel to the rear and can be carried out without the front suspension. Only being necessary to have the rear 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 procedure is similar to that by loading the four wheels with a weight of 150 kg (about 330 lb) (Fig. 2-12, 13) kg.



steering wheel

Steering lock

To lock the front wheel, use the steering wheel and wheel on both sides of the vehicle. When the vehicle is on the left wheel set a lock of 30° and the right wheel of 45°. The rear wheel lock must be kept as shown in Fig. 2-13.

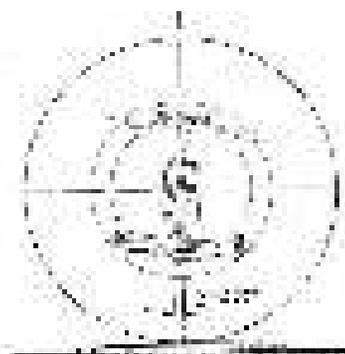
Kingpin inclination = 0° 30'



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 vertical. The distance from the center of the front suspension to the center of the steering knuckle and the wheel axle should be the same. A 30° angle is used with the body. A 30° angle is used with the body. A 30° angle is used with the body. A 30° angle is used with the body.



di Center = 0° 30'

Center adjustment is by means of the steering knuckle. The angle of the steering knuckle is 30° from the vertical axis of the wheel.



di Toe-in = 0° (When it is placed at the rear to eliminate play)

When adjusting the toe, the wheel should be with the wheel and steering arm aligned vertically. The length of the wheel axle should be 150 mm. See also the kingpin inclination. The wheel should be placed together at the rear to a position of between 30° and 35°. The wheel should be placed together at the rear to a position of between 30° and 35°. The wheel should be placed together at the rear to a position of between 30° and 35°.

bleeding
pedal



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 1/2 full. Then remove the rubber dust cap from the wheel brake cylinder.

Fit the rubber bleeding tube provided in the tool kit to the bleed valve and through the hex-screw 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-screw 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)
Block off lower eccentric

Then undo upper eccentric (to) and wheel locks

Adjust lower eccentric until wheel spins freely



Adjust eccentric screw with shoe locked

Figure 1



Use bottom adjuster with shoe fits on top

Figure 1

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

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



Lock adjuster with it control position

Figure 3

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 41 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 300-54 / 4 AM 2

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 1.325.
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 re-align it with the other, two-wheeled lamp — we insist on the headlamp rim being able 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 18.)

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 jolt.
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 axles. Coil springs working in conjunction with telescopic shock-absorbers are fitted front and rear and under 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.



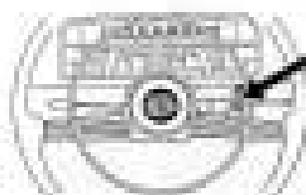
The seat release is actuated by a button in front of the seat, allowing it to be moved either backwards or forwards. As soon as the button is released, the lock is engaged and the seat remains firmly fixed.



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.



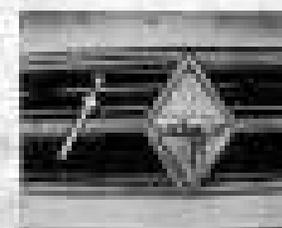
To lift the bonnet, release the catch and pull forward the lever situated behind the radiator grille.

Ensure that the lock is released properly, 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 located inside the trunk. Then pull the release bar of the lock. The lid will then swing forward. To lock it, first push the lid down. Then push the lid up. To close the lid, again depress down. To lock it, push the lid up. To unlock it, push down. To lock it, push up. To unlock it, push down. To lock it, push up. To unlock it, push down.

Seat Wheel

The spare wheel is located in a compartment under the luggage seat. After removing the retaining cover, the spare wheel cover can be lifted out and the wheel removed from the car.

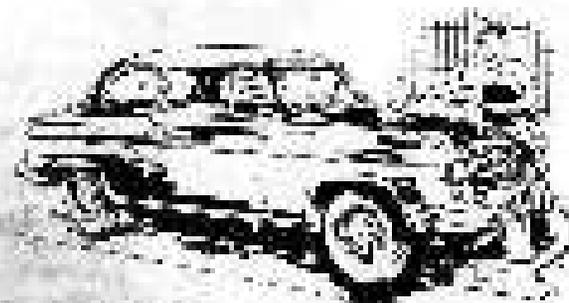
Refueling

The fuel tank is located in the rear part of the right hand side. It is filled by means of a special tap. The fuel tank is located in the rear part of the right hand side.

BODY UNDERBODIES

The body has a special underbody treatment. It is made of a special material which is resistant to rust. It is made of a special material which is resistant to rust. It is made of a special material which is resistant to rust. It is made of a special material which is resistant to rust.

CARE OF THE COACHWORK



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

Washing the car

1. The use of new waxes is particularly frequent. Washing regularly the durability and finish of the paint. In any case, the car should be washed down whenever it is necessary. When the car is washed, the brush should be allowed to remain, the more will be the adverse effect upon the paintwork. Instead of dirt damage the brush of the carwork should be used. The car should be washed with a brush.
2. A large amount of water should be used for washing down the bodywork. A lot of water should be used for the wheels and a lot of water for the chassis. A large amount of water should be used for the wheels and a lot of water for the chassis. A large amount of water should be used for the wheels and a lot of water for the chassis.
3. The car should be washed from the underside and the wheels 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 lot of water. A lot of water should be used for the wheels and a lot of water for the chassis. A large amount of water should be used for the wheels and a lot of water for the chassis.

4. Working in bright sunlight should be avoided as the water dries on the surface too quickly and appears to stain. Work is particularly difficult to remove if the water is hot and shivers and may cause considerable swelling of the particles at a later date.

Radical swelling of the polymer should be avoided, as it is vulnerable to O₂ and O₃ damage to reduce further to the surface and increase the size of the polymer. Layer coats may be necessary. The car should be covered in areas with a clean water spray. This is followed up with a suitable polish, such as a wet buff polishing with a circular motion. A final rub being given which does not tend to abrade the top glass finish.

It may not always be possible to remove any good markings and the surface may need to be polished with a suitable compound. The use of water should always be avoided as much as possible as failure to do so may cause swelling damage to the surface. The outside of the car can be best cleaned by use of the jet. Innumerable marks become stuck to the large head ends and the front of the car generally.

A low steam soap solution of not more than 1-2% should be used to spray all down spots. A clean, smooth wheel should be used to spray down the car. When the spots have been removed from the affected surface, wash down using plenty of water. Water is needed at the end of the soap solution and then rub down with a cloth.

Glass can be cleaned in a similar way using parts of two with a suitable proprietary liquid or solvent, such as a suitable car cleaner which may be free of lumps or spots.

For applying an appearance of other products, such as spray-on wax, they should frequently be washed down in hot weather or spray to not work. These should be removed at once using a suitable brush.

It is rare that the car paint does not come free covered with dirt. The wheels are particularly dirty. Wash down the car using a suitable spray. Chemical sprays can be taken sometimes contain ingredients that help the ability of the clean.

Care of the dashboard

After washing down with water, all dash-replaced parts should be rubbed with a soft cloth and a spot removed with a proprietary cleaner. Care is essential should know the appropriate

time for use for the purpose as it will only cause damage to the plastic finish. It should be cleaned with a clean, smooth cloth after being given a final polish with a clean soft cloth. The oil coat was applied upon in the correct manner and protect it against corrosion and discoloration. This procedure should be carried out with particular care after washing the car during the winter months.

Care of the headlamps (Sphering)

The principal factor which is used for the sphering consists of fine sands or impurities of silica. The usual preparation should be carried out by using oil and the particles and a suitable type of solvent to give a fine finish of dirt. A screen should not be used as this may disturb the particles. The light should be removed in order to get rid of the particles and the colour. A coarse water with the addition of some soap should be used to wash away the particles and with clean water and a soft cloth.

Red lenses should be treated in the same way taking care that the red colour is not lost. See 4.11.

TIRES

The first thing a tyre owner should do is simply wash the dirt from the surface of the tyre and the tread. It is also possible for the tyre 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, as a regular and a large size. The tread should not be exposed for long lengths of time to the direct rays of the sun as the rubber may become brittle and crack.

A tyre may be left in a car for a long time, or a burnt tyre at the front for a long time, or a burnt tyre at the rear.

At the end of a year, or whenever the car is changed, the tyre 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.



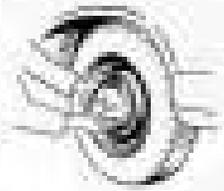
Remove the wheel disc with the pull off hook which will be found in the tool kit.



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 vaseline.
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 5.00-15 —
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 use spare wheel, unless, 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.



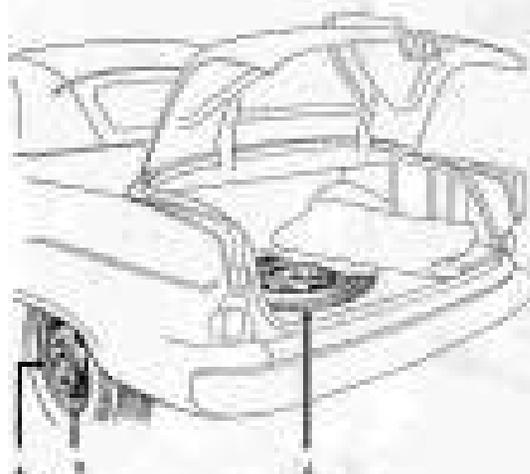
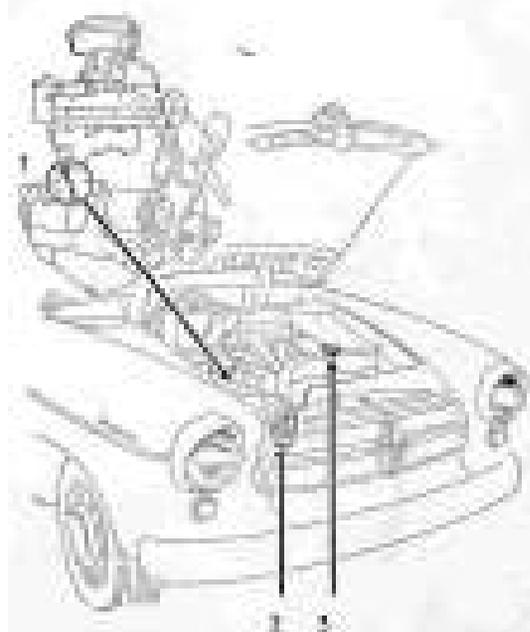
BORGWARD

Isabella
combi

Station Waggon

The construction of the "Isabella" Station Waggon 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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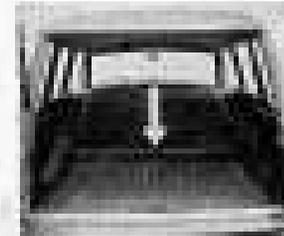
VARIATIONS FROM THE STANDARD "ISABELLA" SALOON

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 bodystrip brackets and fold bodystrip 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-pronged 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 23 psi — 1.6 atm
(25.5 psi — 1.8 atm loaded and at max. road speed)



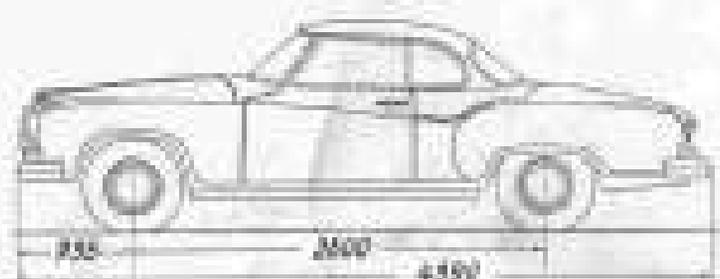
BORGWARD

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



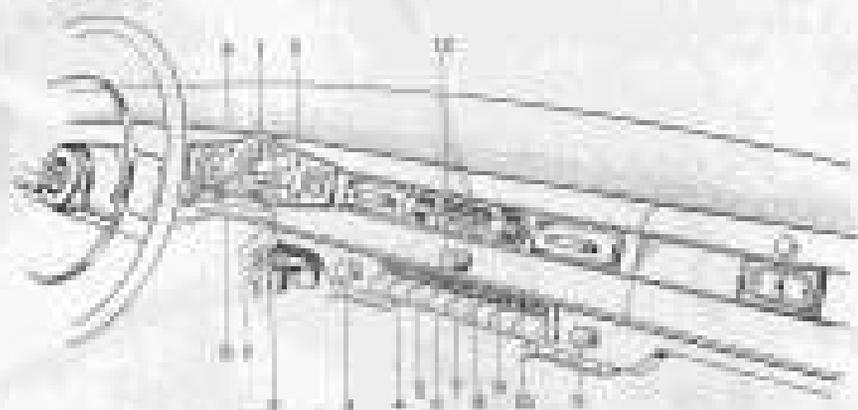
All dimensions in mm.

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 (1,190 kg)
Permissible axle loading, front	15% cwt (1,190 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: —

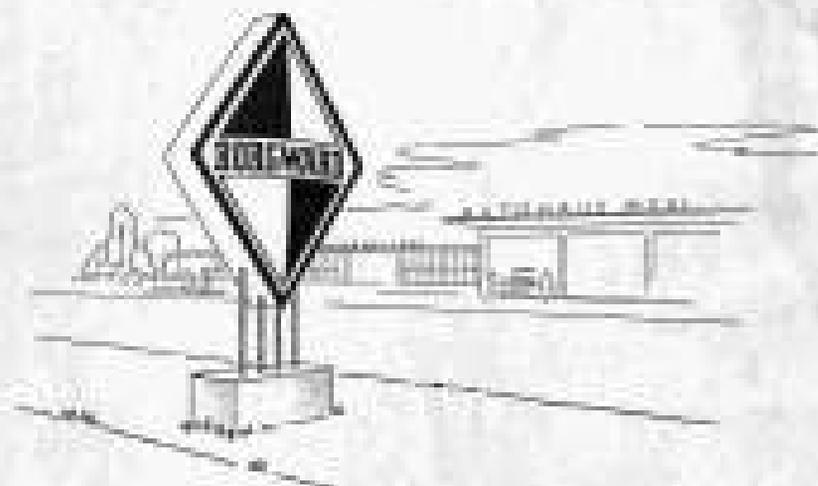
1. Choke control.
4. Dash lighting.
5. Handbrake.
6. Side & tail lights.
7. Fog lamp. This switch is provided so that additional fog lamps can be fitted.
8. Windscreen wipers. The wiper switch has two positions. When fully pushed home, both wipers and windscreen wipers are switched on; in the halfway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

The chart is divided into sections to clearly indicate the chart to be used.

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)	Change oil (change oil)	Change oil (change oil)
SAE 30	General	SAE 30	SAE 30
SAE 40	General	SAE 40	SAE 40
SAE 50	General	SAE 50	SAE 50
SAE 60	General	SAE 60	SAE 60
SAE 70	General	SAE 70	SAE 70
SAE 80	General	SAE 80	SAE 80
SAE 90	General	SAE 90	SAE 90
SAE 100	General	SAE 100	SAE 100
SAE 110	General	SAE 110	SAE 110
SAE 120	General	SAE 120	SAE 120
SAE 130	General	SAE 130	SAE 130
SAE 140	General	SAE 140	SAE 140
SAE 150	General	SAE 150	SAE 150
SAE 160	General	SAE 160	SAE 160
SAE 170	General	SAE 170	SAE 170
SAE 180	General	SAE 180	SAE 180
SAE 190	General	SAE 190	SAE 190
SAE 200	General	SAE 200	SAE 200

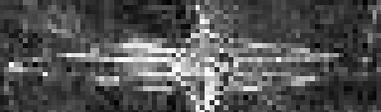
Lubrication Chart	Oil		Oil	Oil
	Oil	Oil		
1. Change oil (change oil) (change oil) (change oil)	7	0	0	0
2. Check oil level (change oil) (change oil)	0	1	1	0
3. Oil change (change oil) (change oil)	1	1	1	0
4. Lubricants (change oil) (change oil)	0	0	0	0
5. Change oil (change oil) (change oil) (change oil)	0	0	0	0

Working Points:

The chart is divided into sections to clearly indicate the chart to be used.

Recommended Items of Maintenance:

1. Change oil (change oil) (change oil) (change oil)
2. Check oil level (change oil) (change oil)
3. Oil change (change oil) (change oil)
4. Lubricants (change oil) (change oil)
5. Change oil (change oil) (change oil) (change oil)



OPERATING INSTRUCTIONS

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