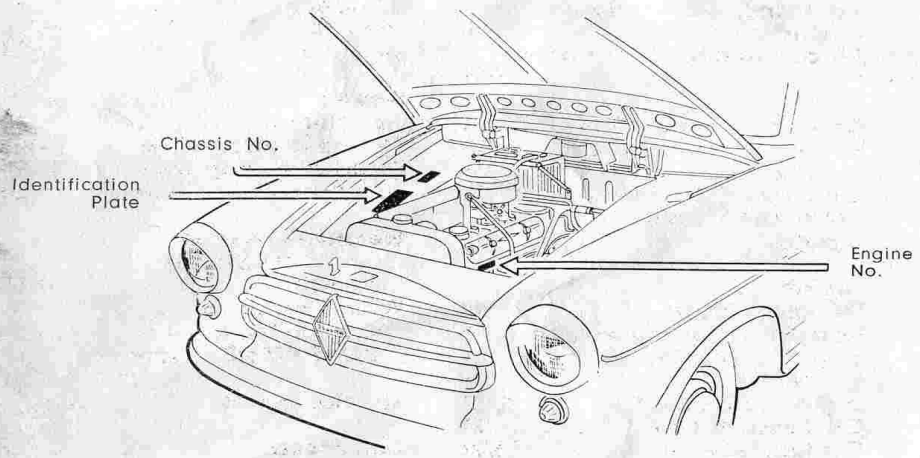
CHASSIS AND ENGINE NUMBER



N. B.

In case of enquiry, or when ordering spares, chassis and engine numbers should always be quoted. Only thus can we attend to customers' needs efficiently.

(The registration number is of no assistance and is not required.)

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

AUTOMOBIL- UND MOTOREN-WERKE

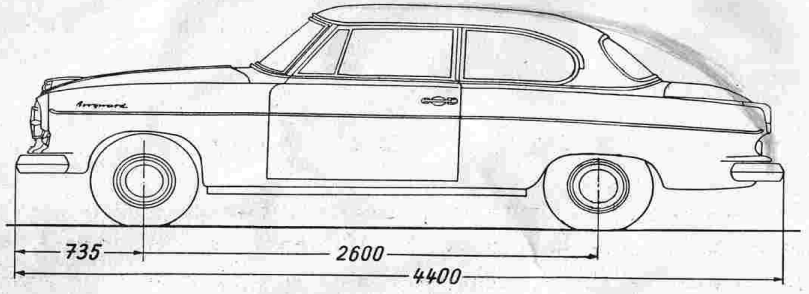
Service Dept.

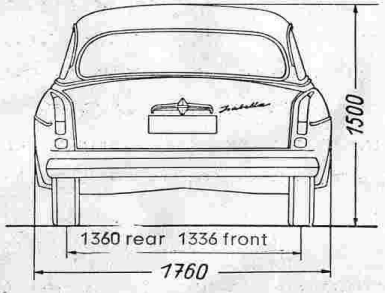
Bremen-Sebaldsbrueck, Germany.
Tel. 44 40 21, Telegrams: "Borgwardwerke, Bremen".

Hours of business 8.00 a. m. — 5.30 p. m., Monday to Friday
Closed on Saturdays.

CONTENTS

DIMENSIONS AND WEIGHTS





All dimensions in m/m

Weights:

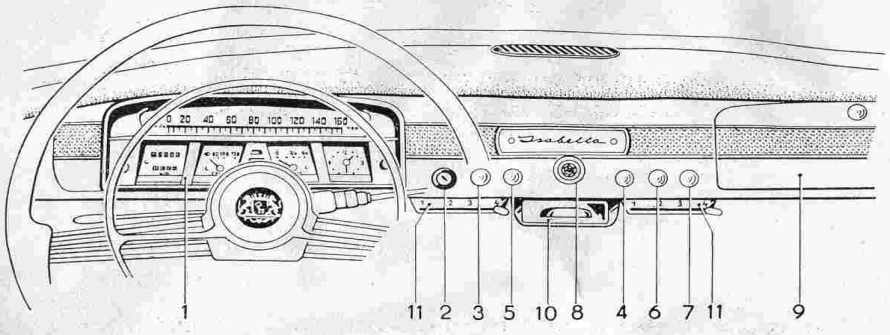
Unladen kerb weight	20⅝ cwt	(1,050 kg.)
Permissable all-up weight	27¾ cwt	(1,415 kg.)
Permissable load	5 persons + 88 lbs of luggage	
Permissable back axle loading	15¼ cwt	(780 kg.)
Permissable front axle loading	13⅜ cwt	(680 kg.)
Max: roof loading	220 lbs.	(100 kg.)
Permissable trailer load (with brakes)	15⅝ cwt	(800 kg.)
(without brakes)	10¾ cwt	(550 kg.)

INTRODUCTION

On 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 "Isabella". If driven with reasonable care, and properly and regularly greased and serviced, it will give many years of enjoyable motoring. To this end, hints and instructions will be found in the ensuing pages of this manual. It is recommended that the owner should acquaint himself thoroughly with the construction and mechanical details of the "Isabella" and by studying this handbook, learn the location of all the greasing and lubrication points on the car. In this way, the regular servicing at the recommended intervals can be carried out both quickly and efficiently.

Should repairs become necessary, it is of the greatest importance that only genuine "Borgward" spare parts should be used and that the work is carried out by qualified and authorized "Borgward agents. Never forget that your "Isabella" deserves the same high standard of workmanship in being overhauled as went into it's original construction!

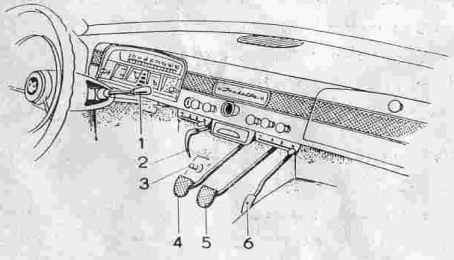
INSTRUMENT PANEL



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.

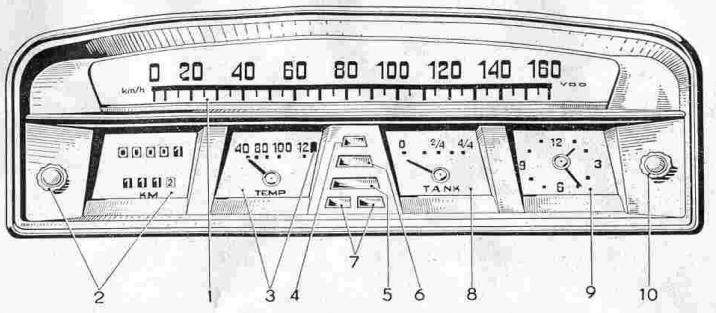
1. Multi-instrument unit
2. Ignition switch
3. Carburettor choke control
4. Push-pull switch for windscreen wipers
5. Push-pull headlamp switch
6. Push-pull parking lights switch
7. Push-pull knob for heater
8. Cigarette lighter
9. Dashboard locker lid
10. Ashtray
11. Control lever for heater & defroster

CONTROLS



1. Gear lever
2. Handbrake
3. Foot-operated dipswitch
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 maxima in the individual gears are not exceeded.

(Isabella TS, de Luxe & Coupé)

		k. p. h.		k. p. h.
1st	gear	up to 19 m. p. h.	(up to 30)	up to 25 m. p. h. (up to 40)
2nd	gear	9—31 m. p. h.	(15—50)	12—44 m. p. h. (20—70)
3rd	gear	22—56 m. p. h.	(35—90)	25—68 m. p. h. (40—110)
4th	gear	31—80 m. p. h.	(50—130)	31—93 m. p. h. (50—150)

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

3. The **water temperature gauge** shews the coolant temperature which should read over 80° C (176° F) 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 65°—70° C (149°—158° F) considerably increased wear will occur. You should therefor endeavour to keep the engine operating temperature within the prescribed limits.

   The working temperature may reach the 110° C (230° F) mark without damage to the engine, although this condition will only appear when the engine has been subjected to continuous heavy loads. A noticeable loss of coolant can scarcely occur through overheating, as the radiator is fitted with a relief valve which comes into operation at about 115° C (239° F).

A red warning lamp is built into the thermometer unit and comes operation at about 107° C (225° F). 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 "V" 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 headlights 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 dynamo commences to charge.

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 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 is below the prescribed minimum. If the warning light should come on when the sump is full, the contact switch which operates it should be checked.

7. The **direction indicators warning lights** come on when the requisite 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 apart.

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

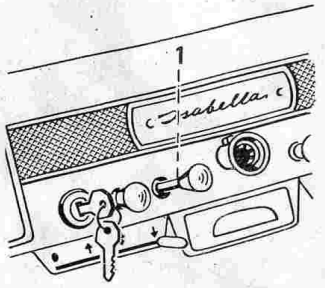
10. Dazzle-free, adjustable **dash lighting** is provided so that the instruments can be read comfortably when driving at night. To operate, turn knob on the right-hand side of the instrument panel to the right.

LIGHTING SYSTEM

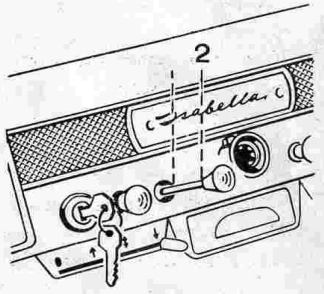
The **lights** can be switched on by means of a push-pull switch independently of the ignition system.

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 in streets or on the open road. They come on when the switch is pulled out to position "1".



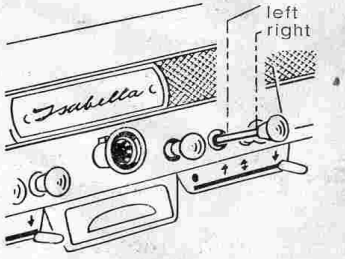
Your car's **headlamps** are switched on by pulling the switch out to position "2". The main beams are dipped by depressing the foot dipper switch. When the headlamps are on mainbeam, the blue warning light is illuminated.



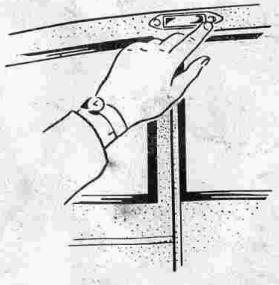
The **reversing lights** come automaticly when reverse gear is engaged, but only when the ignition is switched on.

Isabella "TS" and "TS de Luxe"

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 interior of the car is illuminated by a roof light which is switched on automaticly by a courtesy switch when the driver's door is opened (both doors on the "TS"). It can also be switched on when the door is closed by a push-button switch on the lamp itself.



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

8. Althoug 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 same motor highways, filling stations can be as much as 20 miles (30 km) apart.

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

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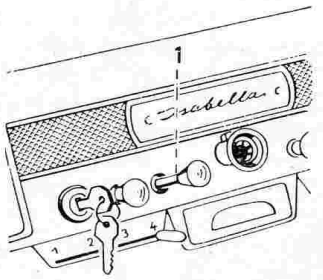

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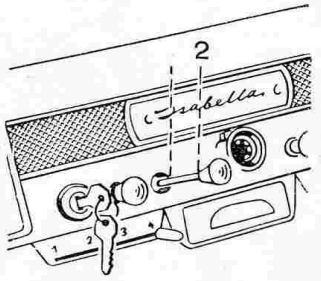
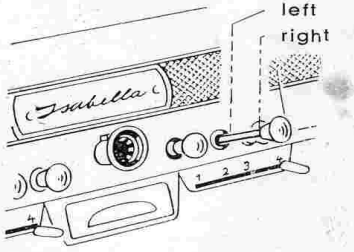


Your car's **headlamps** are switched on by pulling the switch out to position "2". The main beams are dipped by depressing the foot dipper switch. When the headlamps are on mainbeam, the blue warning light is illuminated.

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



Isabella "TS" and "TS de Luxe"
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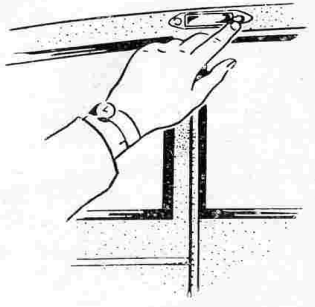

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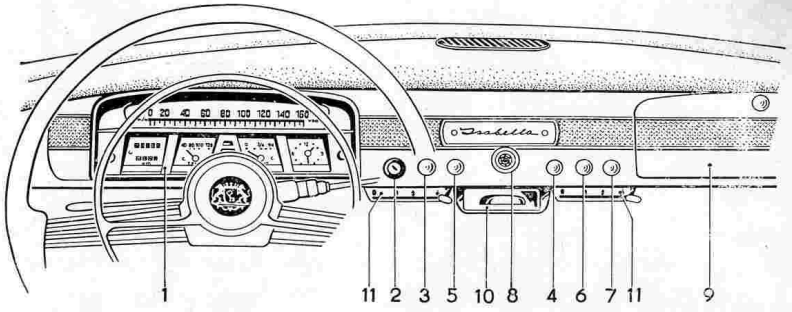

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9. Dashboard locker lid
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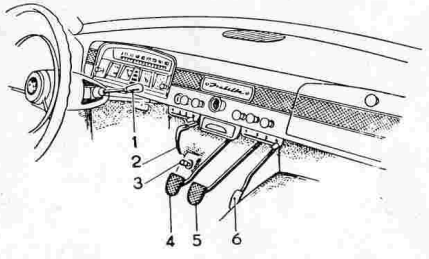
11. Control lever for heater and defroster

CONTROLS



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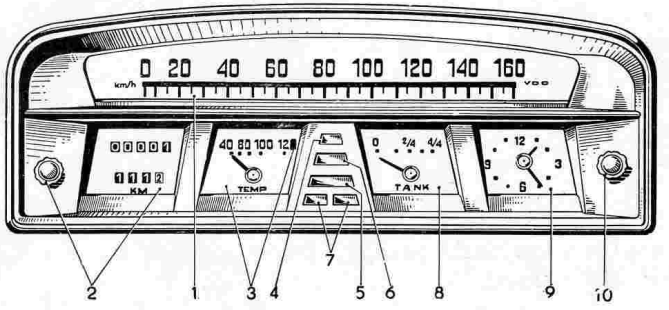
INSTRUMENTS



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		(Isabella TS, de Luxe and Coupé)	kph
1st	gear	up to 19 mph (up to 30)	up to 25 mph (up to 40)
2nd	gear	9—31 mph (15—50)	12—44 mph (20—70)
3rd	gear	22—56 mph (35—90)	25—68 mph (40—110)
4th	gear	31—81 mph (50—130)	31—93 mph (50—150)

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INSTRUCTION BOOK

for the
1½ litre

BORGWARD

Isabella

Saloon and Touring Sports Saloon
Touring Sports de Luxe
Coupé
Station Waggon
Models

16th Edition, August 1959

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

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

8. Althoug 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 same motor highways, filling stations can be as much as 20 miles (30 km) apart.

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

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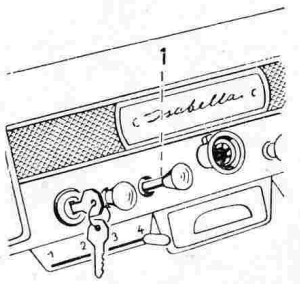
LIGHTING SYSTEM

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



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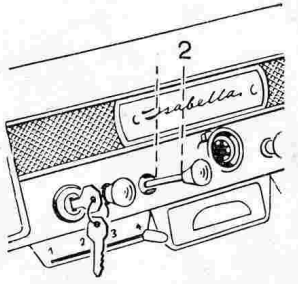

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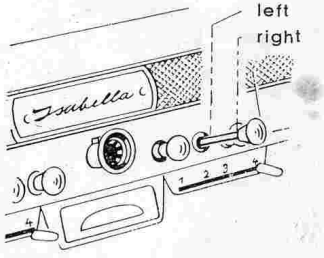
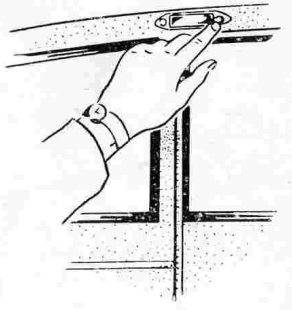


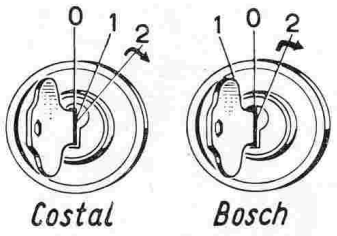
Isabella "TS" and "TS de Luxe"

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

SIGNALLING AND AUXILIARY EQUIPMENT



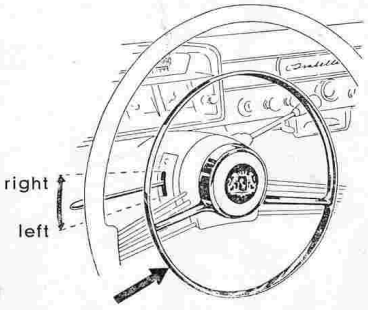
The items in this group can only be operated when the **ignition/starter key** is in position "2".

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 "2" and then turn further to the right.

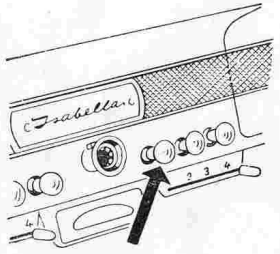


The **horn** is operated by a slight pressure on the knob in the centre of the steering wheel.

Isabella "TS", "TS de Luxe" and "Coupé"

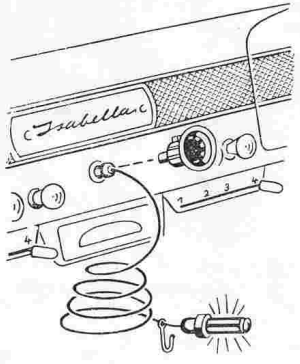
When driving at night, the headlamps may be used for visual signalling by means of the contact ring on the steering wheel.

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



The **directional indicators** are operated by a small hand lever on the lefthand 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-parking 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.

Isabella "TS de Luxe"

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

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

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

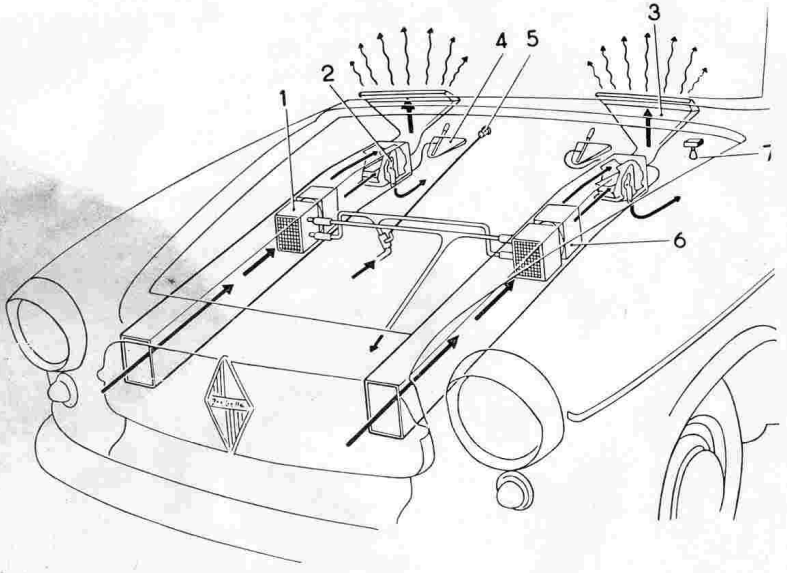
AIR CONDITIONER AND DEFROSTER

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.

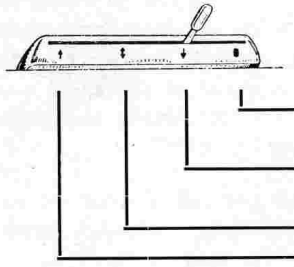
When the heaters are not working, cool air can be directed onto the windscreen and this will prevent, particularly if the windows are closed, the misting up of the windscreen.

Isabella "TS" and "TS 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-away switch hot/cold air
6. Heater fans ("TS" and "TS 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 defrosters as may be required.

The regulating levers have the following four positions:

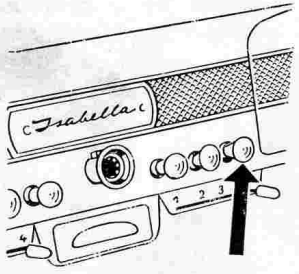
1. Air conditioning system only switched on.

2. Both air-conditioner and defroster "on".

3. Defroster only switched on.

4. Defroster and air-conditioner "off".

The hot/cold air selector switch can be operated in any of the above positions.

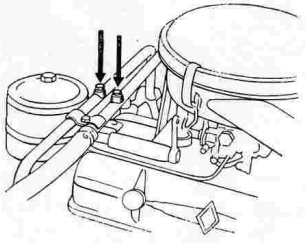


A push-pull control for changing over from one to the other is to be found on the instrument panel and connected to the stopcock on the heating system. This stops the supply of hot water to the heater units from the engine's cooling system. With the knob in the "in" position, the heat is switched off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

The heating can be checked by a slight twist on 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. Slack off the bleeding screws on the connecting pipes to the heater units in order to permit any air that may remain in the system to escape.



When water appears from the bleed screw vents, tighten down the screws firmly 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 it's 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) (kph in brackets)				
	1st gear	2nd gear	3rd gear	4th gear (up to 300 miles)	4th gear (from 300 miles)
Isabella Isabella Combi Station Waggon	12 (20)	28 (45)	44 (70)	37—50 (60—80)	43—62 (70—100)
Isabella TS TS de Luxe Coupé	16 (25)	31 (50)	50 (80)	43—56 (70—90)	50—68 (80—110)
After 1,2500 miles (2,000 km), the speed should be increased gradually					

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

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 maintenance 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, it will 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 300 miles (500 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 HD oil with a grade of SAE 20 W/20 or a SAE 10 W/30 multigrade oil from a reputable firm.

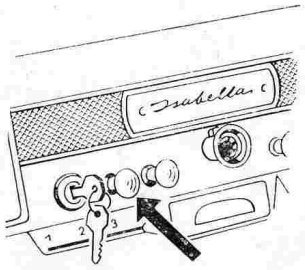
In cases of doubt that may arise, reference should be made to the BORGWARD Servicing Manual.

STARTING THE ENGINE

1. Ensure that the gearlever is in neutral.

2. Switch on the ignition by turning the ignition key to position "2". 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 it's full extent or under warmer 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 5—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 mixture, 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 added to the mixture until it is sufficiently weakened so that it will fire.

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

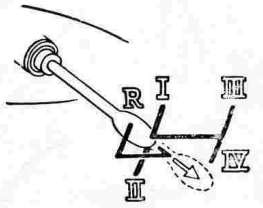
The engine should not be allowed to warm up whilst it is standing still, it is far better with the car on the move.

GENERAL DRIVING INSTRUCTIONS

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

For the Isabella "TS", "TS de Luxe" and "Coupé" however, it is essential that premium petrol with an octane value of over 92 should be used. Lower grades do not enable the "TS" engine to develop it's 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.

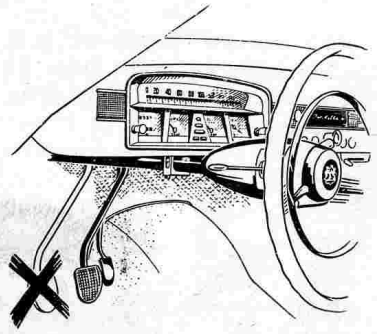
Reasonable limitation of speed will more than repay you in increased engine life and enable you to enjoy to the full the excellent acceleration and smooth surge of power which is the hallmark of the BORGWARD "Isabella". In congested traffic conditions, full use should be made of the fully synchromesh four-speed gearbox, always changing down in good time so that engine revs are not allowed to sink unduly. The fully synchromesh 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 strain on the driver, for the engine is designed to be cruised 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

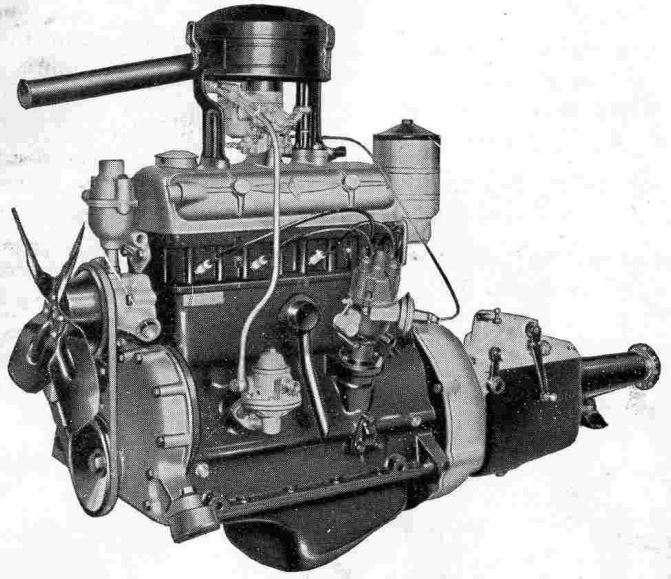


It is our constant aim through continuous development to increase the pleasures of driving and the fitting of the "Saxomat" FLR simplifies driving still further. At the same time however, it retans the use of the normal transmission and gearbox enabling the driver to obtain maximum performance by using 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 ticking 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 move forward without any fear that it may roll backwards.

To change gear with the car unden 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 power falls off. The re-engagement of the clutch follows automaticly 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 tickover 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 tickover re-adjusted.



Technical Data **Sump Capacity 7 pints Imp.**

(Details for "TS" in brackets) **8 1/2 pints US (4 l)**

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

Type	Vertical in line 4-stroke
Suspension	3 point
No. of cylinders	4
Bore dia	2.953" (75 m/m)
Stroke	3.326" (84.5 m/m)
Swept Volume	91.118 cu. in. (1,493 c.c.)
Compression ratio	7.0:1 (8.2:1)
Cooling system	Water
Lubrication	Gear type pump
Valves	o. h. v.
Ignition timing	T.D.C. (4° after T.D.C.)
Output:	
Maximum continuous rating	60 b. h. p. (75)
R. p. m.	4,700 (5,400)
Maximum torque	79.5 ft/lb = 11 mkg (84 ft/lb = 11.6 mkg)

Valve Timing (Tappet clearance .015" = 0.38 m/m)
Inlet opens 18° before T.D.C.
Inlet closes 56° after B.D.C
Exhaust opens 56° before B.D.C.
Exhaust closes 18° after T.D.C.

Tappet clearances (hot):
Inlet .008" (0.2 m/m)
Exhaust .008" (0.2 m/m)

Distributor Type VJ 4 BR 15

Sparking Plugs
Bosch W 175 T 1 (cementless)
Beru 175/14 (cementless)
Champion L-85

Fuel consumption:

Isabella:
25.9 mpg (US) or 31 mpg (Imp) at 61 mph = 9,1 litres/100 km at 98 kph

Isabella TS, de Luxe and Coupé:
25.5 mpg (US) or 30.7 mpg (Imp) at 68.5 mph = 9.2 litres/100 km at 68.5 kph

Isabella Combi (Station car):
26.5 mpg (US) or 31,5 mpg (Imp) at 58 mph = 8,9 litres/100 km at 93 kph

DESCRIPTION OF ENGINE

The Isabella engine works on the 4-stroke Otto cycle. This consists 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 it's downward stroke, the piston on it's upward travel expels the burnt gases through the exhaust valve and out through the exhaust system.

The 92 cu.in ($1^1/_2$ l) engine develops 60 b. h. p. at 4,700 rpm ("TS" 75 b. h. p. at 5,400 rpm).

The cylinders are arranged in line and fitted with a light alloy cylinder-head. Fully autothermic pistons with offset little ends are fitted which add to the efficiency of it's operation. The crankshaft is carried in three steel-backed 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.

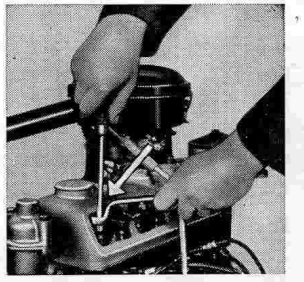
The carburettor is mounted on top of the engine cylinder head and supplies the cylinders with the correct mixture of vaporized fuel and air to enable it to function efficiently. An oil-damped air filter incorporating a silencer is fitted to ensure the supply of dust-free air. The plugs are located on 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 damps out all vibration.

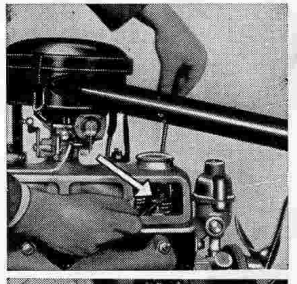
SERVICING AND MAINTENANCE OF THE ENGINE

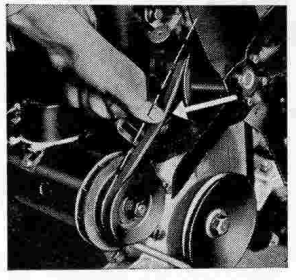
It ist strongly recommended that you should have any necessary work carried out at an authorized BORGWARD workshop staffed by specially trained mechanics. For those who wish to ecquaint themselves with the work entailed, the procedure is as follows: —

Adjust the tappet clearances after the first 300 (500 km) and 600 miles (1,000 km) and then thereafter as may be necessary, checking them in accordance with the instructions contained in the BORGWARD Servicing Manual.



The clearance between rocker face and valvestem should be set at **.008" (0.2 m/m)** 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" (0.2 m/m) feeler gauge from either the near 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 ist 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 $^5/_8$" (15 m/m). **The main engine bearer bolts** 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 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 form soot and carbon deposits in the combustion chamber and a proportion of these find their way into the lubricating oil, thereby reducing it's effectiveness. It can be further affected by dilution. Under certain conditions for example, undercooling or continuous driving with choke out, 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 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 (3,000 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 emphasised that it is a bad policy to keep the engine idling to guard against undercooling. At tickover 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.

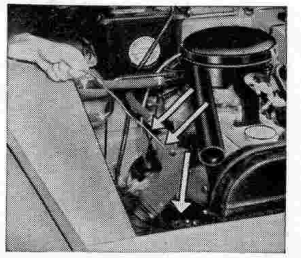
Whenever possible, the oil level should be checked daily with the engine switched off. First, withdraw the dipstick, wipe it clean and replace. It should then be withdrawn a second time and the oil level read off. Should the oil level fall below the **minimum mark,** oil must be added. Always top-up with oil of the same type and grade.

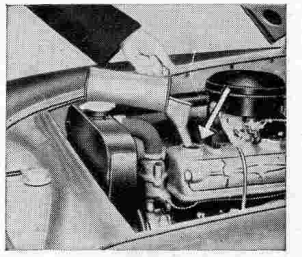
In the first instance, the oil should be changed at 300, 600 and 2,500 miles (500, 1,000 and 4,000 km) and thereafter, every 2,500 miles (4,000 km)m. SAE 20 oil should be used both summer and winter, but under severe conditions with temperatures of 18° F (—8° C) and below, it should be replaced with SAE 10 oil.

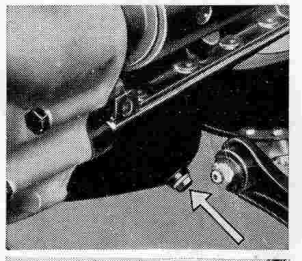
Oil changes should always take place when the engine is hot and the oil will flow freely. The old oil in the body of the by-pass filter should not be drained off. The small quantity of the contaminated oil remaining in the filter body has no essential influence to the new oil.

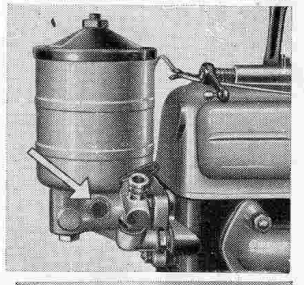
The **element in the by-pass** filter should by re-newed every 7,500 miles (12,000 km). The old element can be withdrawn after the filter lid has been removed. The filter lid gasket should be replaced at the same time. When changing the element in the by-pass filter drain off the rest of the old oil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

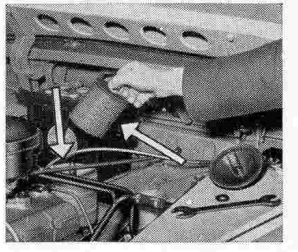
Should, for any reason, ordinary oil be used instead of HD oils, the filter gauze on the gear-type oil pump should be removed every 37,500 miles (60,000 km) and thoroughly cleaned. This necessitates the removal of the sump which should be cleaned at the same time.











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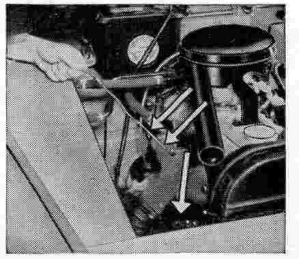
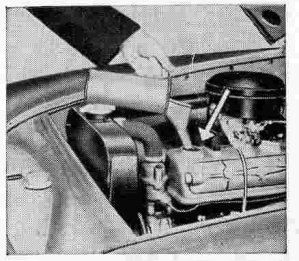
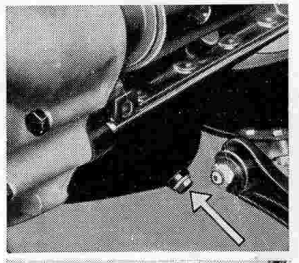
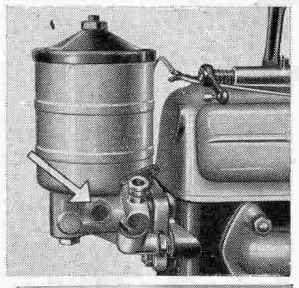
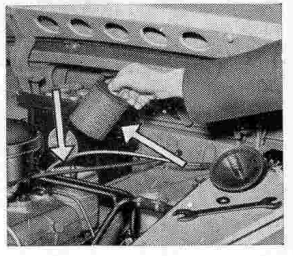










OIL CONSUMPTION

Oil consumption depends to large extent on how the car is driven. Oil consumption at high speeds will for instance, be far higher that at low speeds. A well designed engine will consume some oil, for if no oil were to get past the piston rings, the upper ring would run dry leading to excessive wear on the cylinder walls and on the rings themselves. The largest proportion of the oil consumed consists of that which finds it's way into the combustion chamber. More evaporates in the crankcase, while oil vapour in the rocker box is drawn in by the air filter and thus also reaches the combustion chamber.

Oil consumption can also be considerably increased by leakage even though the leak itself is by no means apparent. For example, the loss of one drop of oil every 30 yards (30 m) or so can amount to as much as a quart in 650 miles (1 l per 1,000 km). Thus, the level of oil in the sump may fall to the minimum mark on the dipstick, in which case, it is essential that sufficient oil should be added so that it will not fall below that level before the next oil change. Running the engine with insufficient oil will cause serious damage. To avoid overheating, as in summer with the engine pulling hard on steep gradients or running at continuous high speeds on fast motorways, the sump should always be kept filled.

The oil level should never be checked with the engine running as this will never give an accurate reading. Oil splash over the interior of the engine can amount to as much as one pint which will drain back into the sump when the engine is switched off. You should therefore check the oil level before starting the engine and only then, will you be able to ascertain accurately the actual amount of oil being used.

It is difficult to be precise about the exact amount of oil that should be used, so much depends on the way that the car is driven. An oil consumption of a quart in 2,500 miles (1 l per 4,000 km) should not be considered excessive. A reasonable consumption of oil enhances the life of the moving parts.

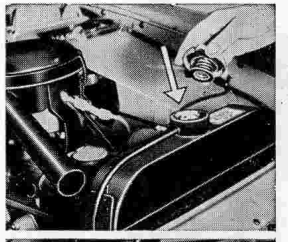
COOLING SYSTEM

The coolant temperature has considerable influence upon engine life, output and consumption and to attain the most favorable working temperatures of 176° F (80° C), it is essential that some of the heat which results from combustion should be dissipated.

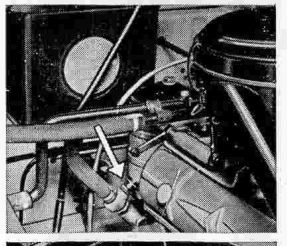
For this reason, your "Isabella" car incorporates a cooling system which under all normal operating conditions, will prevent the overheating of the engine. Overcooling is obviated by the installation of a built-in thermostat.

Cooling water is circulated through the engine and radiator by the water pump. The thermostat which is fitted between the engine and the radiator controls the circulation of the coolant which can circulate freely once a temperature of 176° F (80° C) has been reached. Below this point, the thermostat valve remains closed and the water is led directly back to the engine and cylinder head through a by-pass. This enables it to warm up quickly and protects moving parts from undue wear.

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



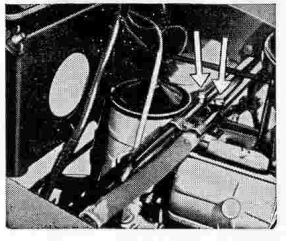
The **cooling system** should be filled with clean water only. At least once a year, the whole cooling system should be flushed out. Rust, sludge and scale should be removed by using one of the reputable proprietary brands of radiator flushing agent which are obtainable. We recommend that 1—2% (140 c. c. or rather less than 1/4 pint (Imp) or 0,3 pints (US) of anti-corrosion oil should be added to the coolant. Under no circumstances should anti-corrosion oil be used if the engine is filled with anti-freeze!

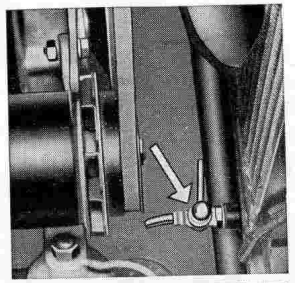


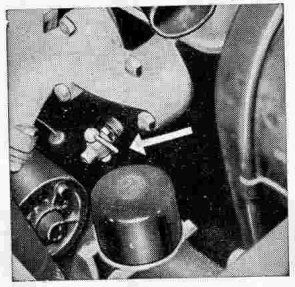
Draining and refilling the cooling system

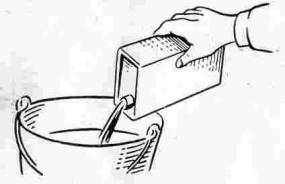
Before refilling the system you should ensure that: —

1. The cock on the cylinderhead is open.
2. The bleeding screws on the heater unit hoses are undone.
3. Commence filling and tighten down bleed screws when bubble-free water appears from the vents.









The radiator can now be filled to just below the overflow pipe in the filler opening.

When draining the cooling system, you should observe the following precaution: —

1. Open the heater cock on the cylinder-head.
2. Remove the radiator cap.
3. Drain the coolant from the radiator and then from the engine.

In **frosty weather,** the bleed screws on the heater unit hoses should also be undone. To drain the system completely, the water hoses on the lower side of the heater units should also be removed.

Should the **radiator boil,** do not add water immediately. Remove the filler cap carefully and top-up slowly with cold water with the engine running; otherwise it can lead to the setting up of stresses within the structure that may lead to fracture of the block.

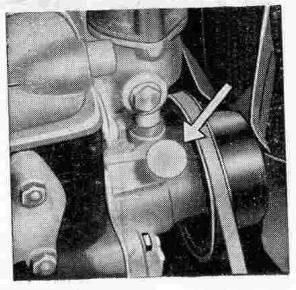
Before being filled with **anti-freeze** in the winter, the cooling system should be thoroughly flushed, particularly if an anti-scale mixture has previously been employed.

Mixing instructions for anti-freeze see table alongside.

Tempe-rature	Anti-freeze			Water		
	Imp pts	Us pts	l	Imp pts	Us pts	l
down to 14°F	2,6	3,2	1,5	9,7	11,7	5,5
down to -4°F	4,4	5,3	2,5	7,9	9,5	4,5
down to -22°F	5,3	6,4	3,0	7,1	8,5	4,0

Coolant containing anti-freeze should not be allowed to run to waste, but should be collected in a suitable container for re-use. It should be noted that anti-freeze mixtures sometimes contain harmful ingredients and all equipment and containers should therefore be thoroughly washed in hot water.

Should a scale inhibitor be used in conjunction with anti-freeze, you should ascertain that it is of a type that is cleared for joint use with anti-freeze.

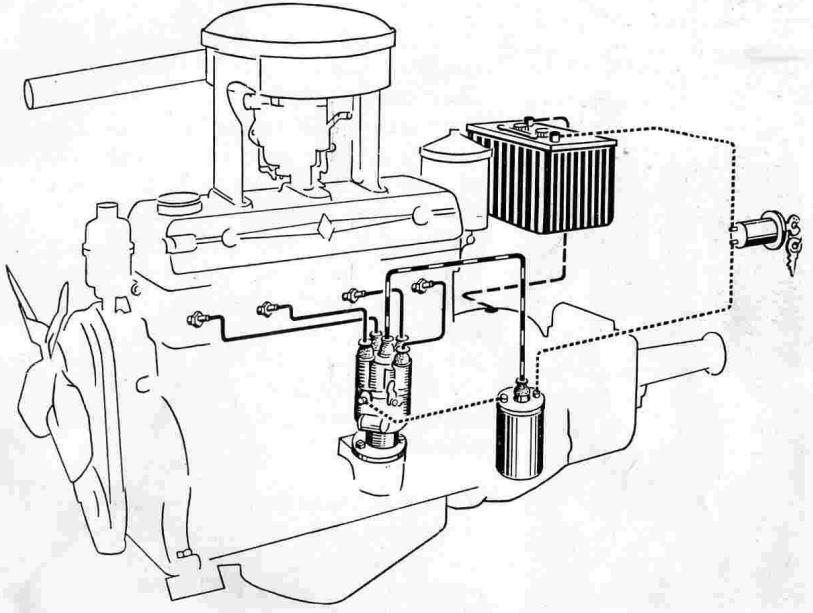


If anti-freeze is not used, the cooling system must be thoroughly drained (as instructed above) should be any possible danger of frost.

The **waterpump** greaser should be given a turn every 7,500 miles (12,000 km) and when necessary, re-filled with ball-race grease.

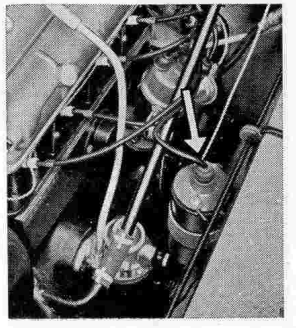
IGNITION SYSTEM

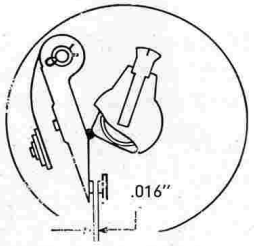
The function of the ignition system is to ignite the mixture in the cylinder at the end of the compression stroke. It consists of accumulator, ignition switch, coil, distributor and sparking plugs.



The firing order, taking the rearmost cylinder as No. 1, is 1—3—4—2.

The coil needs no special attention other than the keeping clean of the insulated top. Care should be taken that ignition is not left switched on when the engine is not running. If this should happen and the contact-breaker points on the distributor are closed, it will run down the battery. At the same time, the coil itself may be damaged through overheating.

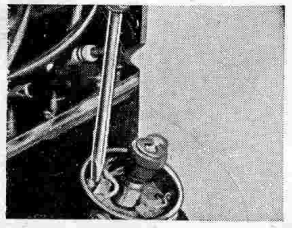


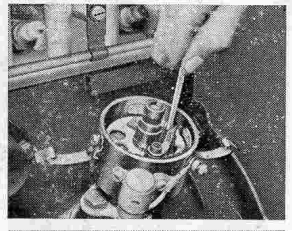


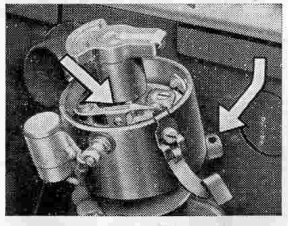
The distributor itself controls the actual ignition and contains the contact-breaker and it's cam and the rotor arm which distributes the high tension current to the cylinders in turn.

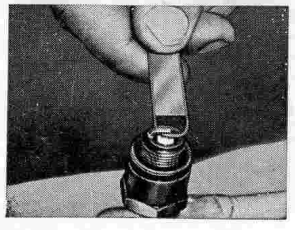
These particular items require regular inspection.

It is most important that the contact-breaker points should be regularly checked and re-set at .016" (0.4 m/m) if necessary. To adjust, turn the engine over until the cam opens 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 re-check the setting. Worn or pitted points should be re-faced using a fine file; badly burned points should be re-placed.







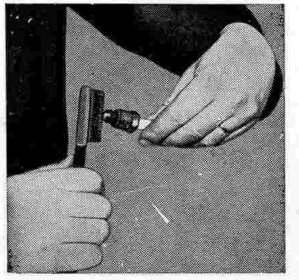


It goes without saying that the points should be kept scrupulously clean. Oil and grease will cause mis-firing or irregular ignition. The oiler on the distributor body should receive a few drops of engine oil every 2,500 miles (4,000 km).

Every 7,500 miles (12,000 km), the distributor cap should be removed and a few drops of engine oil applied to the cam felt. 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" (0.7—0.8 m/m).

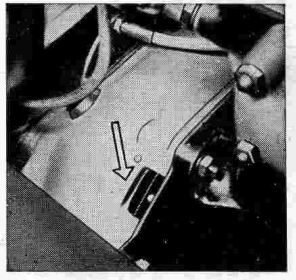
After some use, the plug insulators will become a light brown or greyish yellow in colour. Light grey or black insulators indicate that the engine is not getting the correct mixture, whilst oiled-up plugs are indicative of badly fitting piston rings.

Plug electrodes should be cleaned with a fine wire brush and oiled-up 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 on the compression stroke.



N. B. "TS" 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 .0012" (0,03 m/m) feeler gauge between the points and turn the distributor backwards by gentle tapping.

When the feeler gauge can be just smoothly withdrawn, tighten down the distributor.

An electrical test lamp can also be used to ensure accurate timing of the ignition setting.

The foregoing instructions are for the information of owners who may have to carry out the work themselves. Whenever possible you should have the done in an authorized BORGWARD workshop.

Ignition Troubles

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

2. In tracing the source of ignition troubles, the plugs should next be tested. With the engine running, hold the end of the plug lead about $^3/_{16}$" (5 m/m) away from the plug terminal. Finally hold the lead the same distance from the cylinderhead (earth). If the spark to the plug is weak but strong to earth, then fault probably lies in the plug itself.

3. Another means of tracing the fault in the ignition system is to remove the high tension lead from coil to distributor at the distributor end and hold it about $^3/_{16}$" (5 m/m) from the block (earth). If, with the engine turning over sparks jump the gap, then either the distributor or plug leads are faulty, but if no sparks show the trouble may well lie with a faulty coil, distributor or one of the two leads from coil to distributor. First of all, check the distributor cap for moisture, then that the contact-breaker points are opening correctly.

N. B. When tracing ignition faults, always insulate the leads with a suitable holder or hold them with some insulating material!

ENGINE FAULTS AND THEIR REMEDIES

Engine faults which are not immediately apparent should be tackled by a process of elimination following a fixed plan. This will enable the trouble to be traced to it's source and the correct remedy applied.

A. Starter motor refuses to function.

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

B. Engine will not start.

Cause	Remedy
1. No fuel in carburettor.	Check fuel leads, fuel tank and fuel pump.
2. Ignition not switched on.	Switch on ignition and see if warning lamp lights up.
3. Too much fuel.	Flooded carburettor. Float needle does not seat properly. Punctured float, which should be replaced. Engine overchoked. Fully open throttle, if necessary remove plugs and turn over engine. Start again with fully opened throttle.
4. Contact-breaker points dirty, pitted or badly burned.	Clean and adjust. Replace if necessary.
5. Throttle opened too wide.	Inspect to see if carburettor linkage has jammed.

C. Motor starts and stops again.

Cause	Remedy
Accumulation of water or dirt in the carburettor.	Clean out carburettor and jets.

D. Engine ticks over irregularly after warming up ant the exhaust smells of fuel.

Cause	Remedy
Slow-running mixture control set too rich.	Adjust slow-running control.

E. Engine ticks over irregularly; stalls at low rpm and when throttle is closed.

Cause	Remedy
1. Slow running mixture too weak.	Turn slow-running control clockwise.
2. Leaky inlet manifold.	Tighten down connections between carburettor, manifold and cylinderhead replacing gaskets if necessary.
3. Lack of compression.	Consult your nearest BORGWARD workshop.

F. Engine runs irregularly at more than 15 mph (25 kph) in top gear.

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

G. Blow-back through carburettor when starting.

Cause	Remedy
1. Partially blocked fuel line.	Blow out fuel pipe.
2. Mixture too cold.	Run the engine until a working temperature of 185° F (85° C) is reached.

H. Engine does not fire on all cylinders.

Cause	Remedy
1. Loose ignition lead.	Fit lead correctly.
2. Defective or dirty plugs.	Clean or replace as may be necessary.
3. Inlet valve not seating, leading to loss of compression.	Consult BORGWARD workshop.
4. Badly fitting pistons.	Consult BORGWARD workshop.

I. Engine runs on after a long journey.

Cause	Remedy
1. Incorrect seating of inlet valves leading to ignition in the inlet manifold.	Consult BORGWARD workshop.
2. Mixture too weak.	As above.

K. Engine does not give full power.

Cause	Remedy
1. Burnt or badly seating valves.	Consult service station.
2. Mixture too rich.	Worn float needle valve or worn float spindle or linkage. Consult your BORGWARD service station.
3. Mixture too poor.	
4. Car rolls badly.	Ensure that brakes are not binding. Check temperatures of drums and bearings. Jack up axles and turn wheels by hand.
5. Engine too cold.	Recommended operating temperature 185° F (85° C). Blank off radiator as may be necessary. Replace thermostat.
6. Dirty carburettor, leading to fuel starvation.	Consult BORGWARD service station.
7. Defective or unsuitable sparking plugs.	Fit new or suitable plugs.

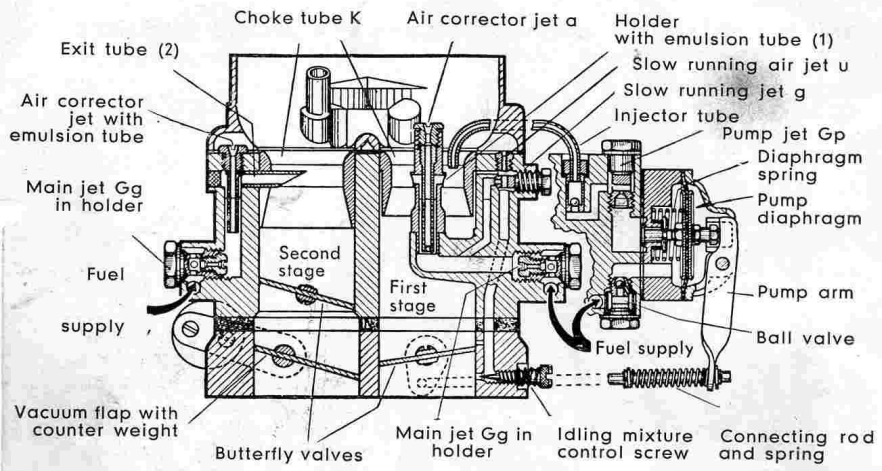
L. Engine overheats, radiator boils.

Cause	Remedy
1. Automatic ignition advance out of order.	See BORGWARD workshop.
2. Blockage in cooling system.	Check waterpump drive and circulation after removal of radiator cap. (Do not remove filler cap if red ignition light glows.)
3. Inefficient fan.	Re-tension fan-belt.
4. Too rich mixture.	See para K. (2) above.

M. Engine pinks.

Cause	Remedy
1. Ignition too far advanced.	Check operation of rotor arm. Consult your BORGWARD service station.
2. Coolant level in radiator too low.	Top-up the radiator. Should the engine be too hot, allow to cool off first, as it may crack the block. Add water slowly with the engine running.
3. Spontaneous combustion due to build-up of carbon.	Consult your BORGWARD service station.

ISABELLA "TS" TWIN-CHOKE CARBURETTOR



The twin-choke carburettor like the double downdraught carburettor, ist equipped with two choke tubes, each with it's own butterfly valve. Each constitutes one stage. First of all, the butterfly valve in stage I opens, this being connected directly to the accelerator pedal by means of the throttle linkage. The butterfly valve of stage II is connected to that of stage I by linkage and begins to open when that of stage I is rather more than half opened.

An automaticly operating vacuum-controlled valve is situated in stage II below the main butterfly valve and comes into action with the increasing vacuum induced as the engine speed increases towads it's maximum. It is fitted with a counterweight.

Operation of Stages I and II

a) Idling. The slow-running device in the carburettor is fitted to the first stage and operates in two phases:
In the first phase, the butterfly valve remains closed and the mixture enters the venturi through the lower aperture (Idling mixture control screw). In the second phase, the throttle valve si slightly opened and more mixture enters the choke tube through two supplementary bores so that the flow ist enhanced.

Normal operation: under the influence of the vacuum induced in the mixing chamber, the mixture is sucked through the outlets of the emulsion tube (1) and in the second stage through the horizontal exit tube (2) where it mixes with the inflowing air.

In this lightly loaded throttle range, the valve of stage I is half opened, whilst that of stage II remains closed. In the fulload range, both butterfly valves are fully opened with the vacuum valve closed at low r. p. m., opening as the engine speed increases to it's maximum.

Settings of the 32 PAJTA type twin-choke carburettor

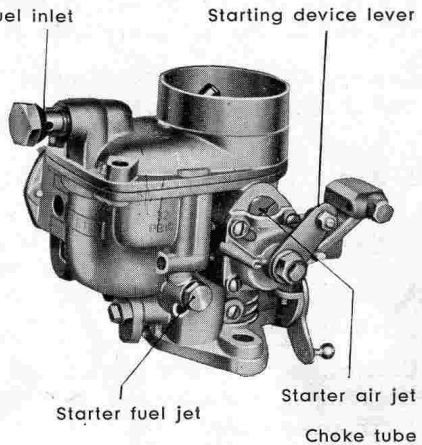
	Stage I	Stage II
Choke tube "K"	22	25
Main jet "Gg"	127,5	140
Air corrector jet "a"	220	110 C
Slow running jet "g"	45	—
Slow running jet bore	1.5	—
Slow running air jet "u"	2.0	—
Pump jet "Gp"	50	—
Starter air jet bore	4	
Starter fuel jet "Gs"	150	

	Stage I	Stage II
Emulsion tube	44	—
Float needle valve	2.0	
Float	.257 oz. (7.3 ar.)	
Accelerator pump No. 831	.046—.053 fl.oz. (1.3-1.5 c.c.) stroke	
Split-pin position	middle	—
Injector tube	upper	—
Emulsion tube holder	Res. 5.5	—
Butterfly valves	8°	17°

FUEL SYSTEM

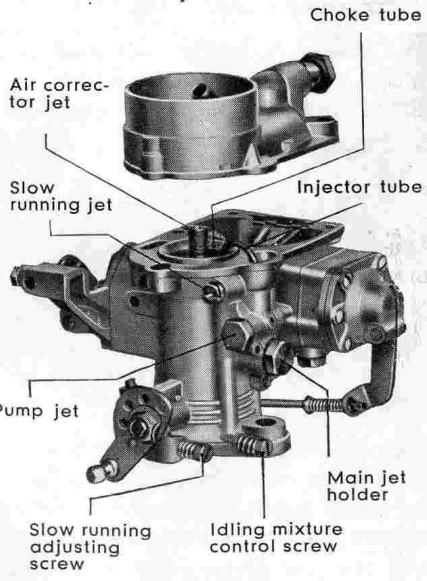
Technical Data: Tank capacity 10 gallons (Imp) or 12 gallons (US) or 46 l. (For "TS", use only high grade fuel with a rating of 92 octane and over.)
Different data for Isabella Combi (Station car) in brackets ( )!

Fuel pump	PE 10209a
Carburettor	32 PJCB
Main jet	130 (110)
Slow running jet	55 (50)
Pump jet	40
Air corrector jet	175 (180)
Choke tube	26 (23)
Starter fuel jet	150
Starter air jet	4
Slow running air jet	1.6
Emulsion tube	35
Weight of float	.053 oz.(5.7 g)
Float needle valve	1.5
Tank capacity 10 galls (Imp)	
12 galls (US) (46 l)	



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

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



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

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

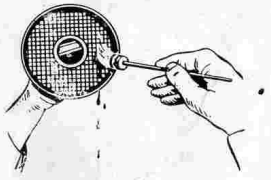
These standard settings should not be altered unless special circumstances dictate, as for example at higher altitudes than are normally encountered. In this case, main jet size should be reduced by one for every 3,300' (1,000 m) increase in altitude.

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

1. Warm up the engine to normal operating temperature.
2. Screw in slow-running adjusting screw to increase engine speed slightly.
3. Undo mixture control screw until engine runs irregularly, then screw in until engine runs smoothly.
4. Undo adjusting screw until the engine ticks over at 500—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 throughly 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.

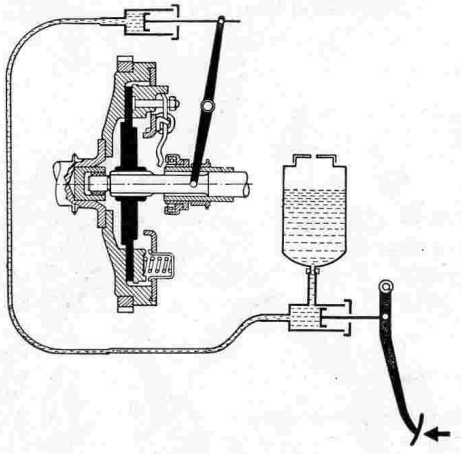
Should an oil-bath air filter be fitted, it should be cleaned out every 2,500 miles (4,000 km) and the oil level checked every 1,250 miles (2,000 km).

The cleaning interval of 2,500 miles (4,000 km) applies to the conditions normally prevailling 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.

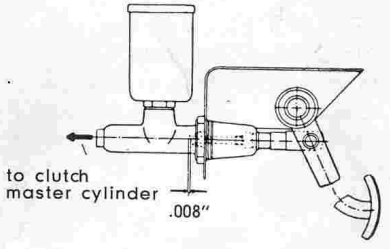
CLUTCH

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 it's correct adjustment.

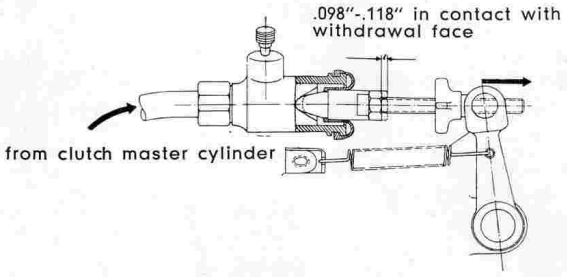
First of all, check the play of the piston-rod of the piston in the clutch master cylinder which is attached to the clutch pedal. This should be .008" (0.2 m/m) and can be adjusted by altering the length of the pressure rod.



At the same time there should be a clearance of .098"—.118" ($2^1/_2$—3 m/m) 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.



2. Set the adjusting nut so that when the de-clutching lever returns under the pressure of it's spring, it has a movement of .098"—.138" ($2^1/_2$—$3^1/_2$ m/m). This will give a play of .079"—118" (2—3 m/m) 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 immersed in a container half 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 "SAXOMAT" AUTOMATIC CLUTCH

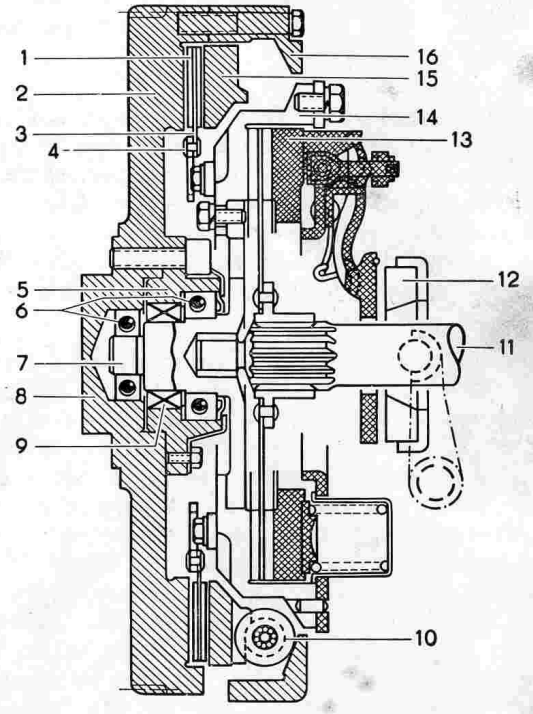
We have already described on page 16, the procedure to be adopted when driving an "Isabella" fitted with a "Saxomat" automatic clutch. In the following pages, will be found a short description of it's construction and operation.

The "Saxomat" 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-pneumaticly 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 rod. 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 throttly 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. increased. The clutch is therefore completely dependent of the throttle opening and responds to the exacting demands of getting away and acceleration.

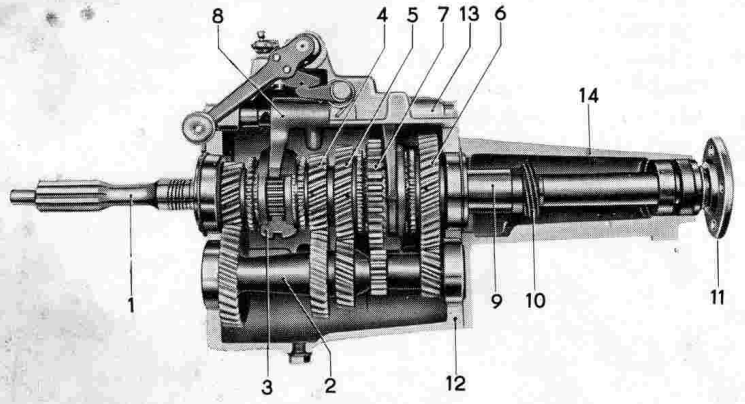
The servicing and maintenance of the "Saxomat" automatic clutch is limited to lubrication and a few simple checks that are set out in the servicing schedule. Should the "Saxomat" require adjustment or technical attention, it should be left to the qualified personnel of an authorized BORGWARD service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

THE "SAXOMAT" AUTOMATIC CLUTCH



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

GEARBOX



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

Technical data:

Oil capacity: 1 3/4 pints (Imp) or 2 1/8 pints (US) or 1 l

Ratios	Climb Isabella Standard	TS	Combi
1st gear 3.86 : 1	40%	42%	36%
2nd gear 2.15 : 1	21%	22%	18%
3rd gear 1.36 : 1	13%	14%	11%
4th gear 1 : 1	9%	11%	7%

Reverse gear 4.06 : 1

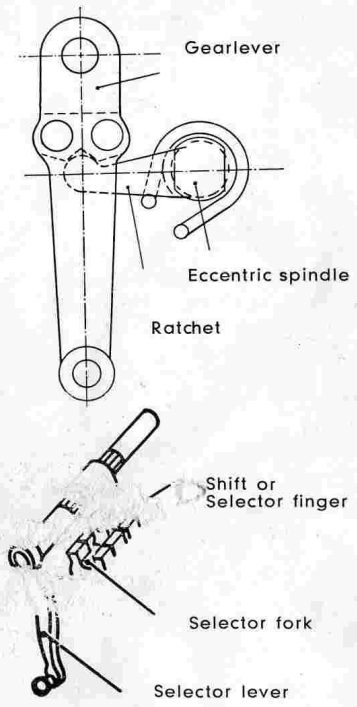
Maximum speeds	Isabella Standard mph	kph	TS mph	kph	Combi mph	kph
1st gear	20	33	25	40	20	32
2nd gear	38	62	44	70	36	58
3rd gear	60	96	69	110	57	92
4th gear	81	130	93	150	78	125

The "Isabella" is fitted with a fully synchromesh 4-speed and reverse gearbox.

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

clutching. The gear change is effected by a steering column mounted gearlever operating the selectors in the gearbox through suitable linkage.

The gearbox itself requires little maintenance other than checking 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 first instance after the first 600 and 7,500 miles (1,000 and 12,000 km) and thereafter every 7,500 miles (12,000 km). Further maintenance and attention should not be necessary. Should trouble occur and there be no BORGWARD workshop available, care must be taken when carrying out adjustments to ensure that the shift finger moves freely in the selector fork grooves. If any noticeable opposition to this is felt, it is possible to re-adjust the position of the finger by turning the eccentric spindle on the left-hand side of the gearbox. This will enable the ratched which is carried on the spindle to move fore and aft and the finger to be located in the correct neutral position.



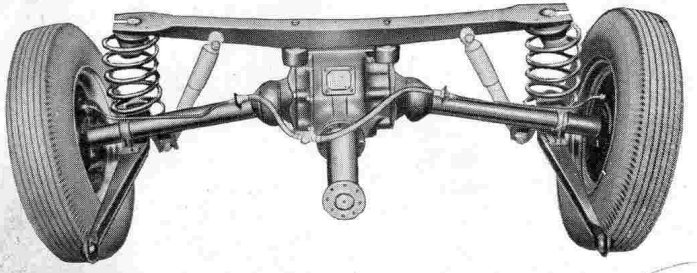
Steering Column Gear Change

Adjustments to the gear change linkage should be made with bottom gear selected. In this position, the Bowden cable should be attached to the selector lever of the gearchange rod.

Proceed as follows: —

1. Engage bottom gear.
2. Depress gear lever by means of the Bowden cable until a springy resistance becomes noticeable.
3. Hold Bowden cable tight and after adjusting for length, attatch to ball-joint on selector rod.
4. With the selector lever in the 1st gear position, adjust and secure the gearchange transfer rod to the selector lever on the gearbox.
5. Check by selecting each gear in turn with the clutch depressed.

REAR AXLE



Technical Data

Oil capacity:

Empty $3^{1}/_{16}$ pints (Imp), $3\,^{3}/_{4}$ pints (US), $1\,^{3}/_{4}$ l

Re-fill $2\,^{5}/_{8}$ pints (Imp), $3\,^{3}/_{16}$ pints (US), $1\,^{1}/_{2}$ l

Ratio	3.9 : 1
Crownwheel and pinion	39 x 10
Differential bearing	Taper-roller bearing 30210
Pinion bearing	Ball-race 6205
	Taper-roller bearing 33[illegible]5
	Taper-roller bearing 30.306 WM 024
Axle bearing	Ball-race 6207 C 4
Tires	5.90x13 ("Combi" 6.40x13)
Track	4' $5^{15}/_{16}$" (1,370 m/m)
Tire pressures	24 psi (1.7 atm.) (27 psi or 1.9 atm. on motorways).
	(see p. 68 for "Combi" tire pressures)

Your BORGWARD "Isabella" is equipped with a hypoid final drive. That is to say, that the pinion is situated below the centre line of the axle. The swing arms of the independent rear axle are mounted on coil springs and effectively damped by telescopic shock-absorbers when the car is on the move.

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

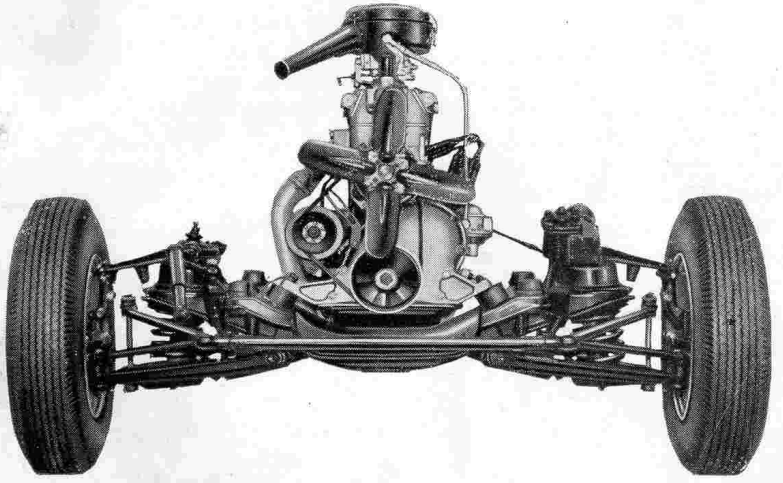
The assembly of the rear axle is carried out in the factory to an exceedingly high standard and upon this depends the life and quiet running of the unit. Should the rear axle ever require attention, the work should be entrusted to a BORGWARD agent who is equipped with all the necessary facilities and 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	4' 5" (1,346 m/m)
Kingpin inclination	$6^0 \pm 15'$
Castor	$3^0 \pm 30'$
Camber	$0—1^0$
Toe-in	Nil (wheels pressed in at rear and measured at axle level)
Tires	5.90—13
Tire pressures (not measured hot after use)	21 psi (1.5 atm.) (24 psi or 1.7 atm. on motorways)

BEARING SKF 6304/C3

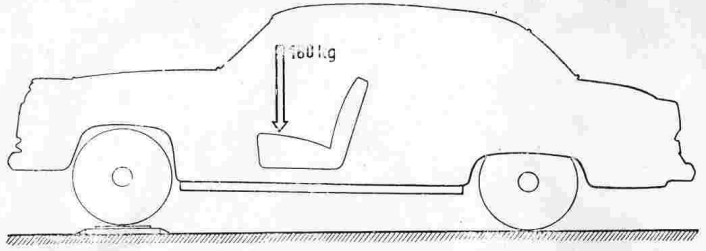
The independent front suspension is of the double wishbone type, each pair being of unequal length, working in conjunction with hydraulic shock-absorbers.

Great care should be taken when attending to the adjustment of thef ront wheels, as on it depends not only the roadholding but the tire wear of the car.

Repairs to the front suspension and the steering can for the most part be carried out without the front suspension unit being removed. If more important repairs become necessary, the whole of the front suspension should be removed together with the steering, engine, clutch and gearbox.

Front Wheel Alignment

When carrying out adjustment to the front wheels, the vehicle must be in it's normal operating trim. This condition is obtained by loading the front seats (e. g. with sandbags) with about $3^1/_4$ cwt (Imp), $3^1/_2$ cwt (US), 160 kg.

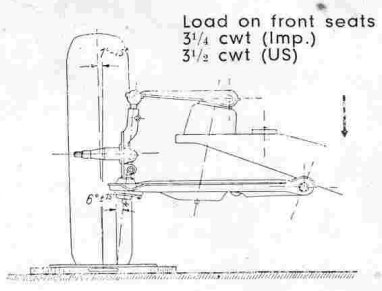


Measured on the horizontal

a) Steering lock

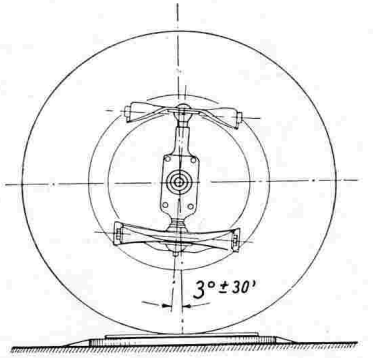
To limit the front wheel lock, stops for the steering arms are fitted on both sides of the main front axle cross-member. On the right-hand lock, the left wheel has a lock of 32^0 and the right wheel of 42^0. On the left-hand lock these figures become reversed.

b) King-pin inclination = $6^0 \pm 15'$



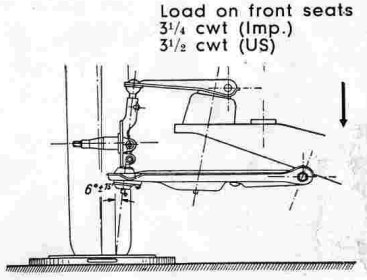
The inclination of the king-pin in relation to the vertical, depends on the correct adjustment of the wheel camber. A check is not necessary in every case.

c) Castor = $3^0 \pm 30'$



The castor angle is fixed before the car leaves the factory. Any deviation from standard must be compensated on the front suspension by the insertion of shims between the centreing cup and the front axle bracket on the body. A .197" shim (5 m/m) will give a correction of 1^0 to the inclination of the king-pin.

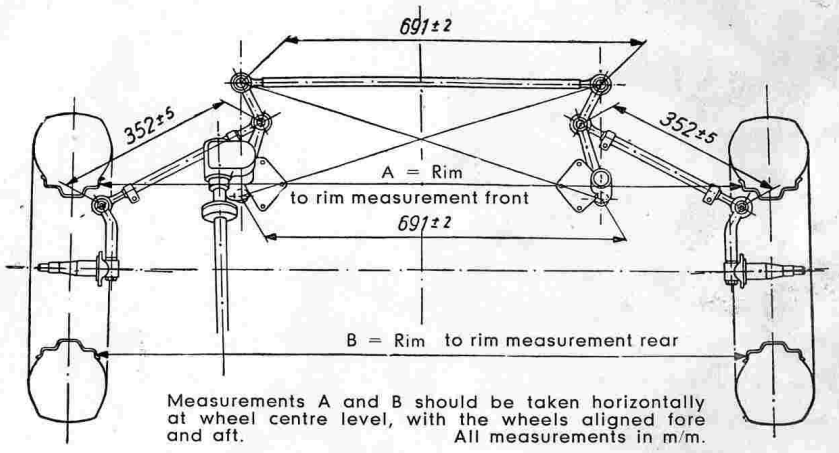
d) Camber = 0—1^0



Camber adjustment is by means of the eccentric upper ball-joint. Turning at through 180^0 gives a full range of adjustment.

e) Toe-in = Nil (Wheels clamped at the rear to eliminate play).

When adjusting for toe-in, the correct position is with the wheels and steering arms aligned fore and aft; the length of the centre track-rod being $27^{13}/_{64}$" (691 m/m). See diagram on page 46. Bent or damaged track-rods must be replaced. During the adjustment for toe-in, the wheels should be clamped together at the rear to a pressure of between $26^1/_2$ and 33 lbs (12—15 kg). This will take up any play in the steering linkage.



Measurements A and B should be taken horizontally at wheel centre level, with the wheels aligned fore and aft. All measurements in m/m.

To check the steering arms which for the purposes of measurement, must be with the wheels aligned fore and aft, a diagonal measurement should be taken from the arm pivots. The distance between the left-hand steering arm pivot and the right-hand centre track-rod joint should be the same as that from the right-hand steering arm pivot to the left-hand centre trackrod joint, allowing a tolerance of $^{5}/_{64}$" (2 m/m).

Now check the fore and aft position of the wheels. The front-wheel geometry can now be accurately adjusted by means of the adjustable track-rods, giving no toe-in, so measurement "A" — measurement "B" = 0 when measured in line with the wheel centres.

In the BORGWARD maintenance manuel checks of the tires are set out at periodic intervals. Do not neglect to carry out these important inspections which are so necessary if the maximum life is to be obtained from the tires.

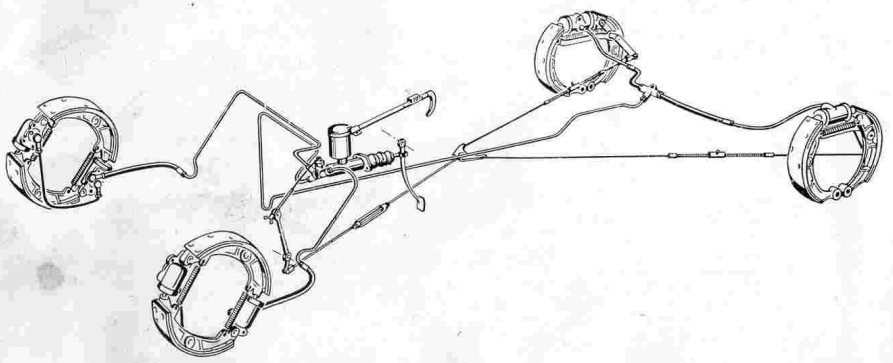
Steering

The oil level in the steering box must always be kept topped up. Check all the nuts and locking devices on the steering linkage, together with the fit of the ball joints every 2,500 miles (4,000 km).

At the same time, check the steering for backlash when the car is being driven in a straight line.

The track-rod linkage needs no special attention.

HYDRAULIC BRAKE SYSTEM

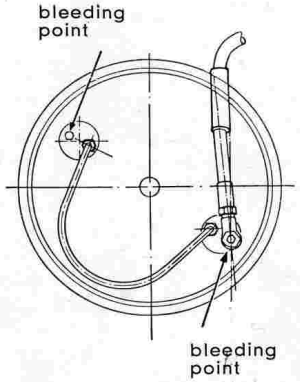


The "Isabella" is equipped with two independent braking systems.

a) The pull-out type **handbrake** serves only as a parking brake. It operates on the rear wheels only by way of cables from the handbrake lever. It is released by turning it to the left and allowing it to return to the "off" position.

b) The **four-wheel, internally-expanding hydraulic brakes** operate on all four wheels. They come into operation when the foot-brake pedal which is connected to the brake master cylinder, is depressed. When the brake pedal is pressed down, the piston in the brake master cylinder forces fluid along the brake hoses to the brake cylinders located on the four wheels, where it forces the brake shoes against the brake drums.

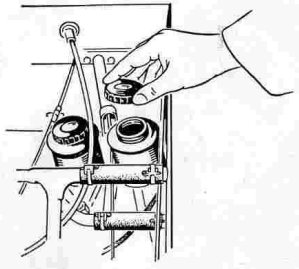
A slight pressure on the brake pedal is generally sufficient to operate the brakes. If the brake shoes are not correctly adjusted, then there will be too much backlash in the travel of the brake pedal. Under these conditions, the brakes should not be considered as safe. If there is too much play in the brake pedal, you would be well advised to put your car into the nearest BORGWARD service station to have the brakes adjusted and bled.



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 300—600 miles (500—1,000 km). Always ascertain that there is sufficient fluid in the reservoir. Only approved hydraulic fluid should be used. Even a small quantity of mineral oil can cause damage to the rubber fittings of the system.



Bleeding the brakes

First ascertain that the reservoir of the brake master cylinder contains enough fluid; it should be at least $^3/_4$ full. Then remove the rubber dust cap from the wheel brake cylinder.

Fit the rubber bleeding tube provided in the tool kit to the bleed valve and through the box-spanner supplied with it.

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

Unscrew the bleed valve screw with the box-spanner supplied; not completely, a turn or so is sufficient. Operate the brake pedal quickly and firmly, 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 it's 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 shoes until the shoe just rubs on the drum. Turn back the adjuster until 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 operations will be sufficient.)

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

The **front wheel brakes** (2 leading shoe) are fitted with one eccentric adjuster for each shoe. Adjustment after on overhaul does not differ from the normal procedure.

Adjustment

(Rear brakes)
Slacken off lower eccentric.

Then undo upper eccentric until wheel locks.

Adjust lower eccentric until wheel spins freely.

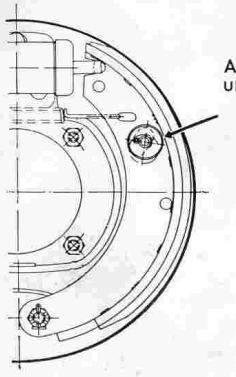


Figure 1

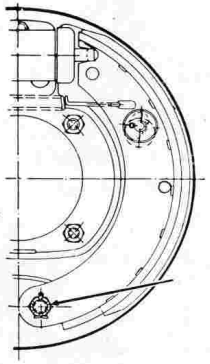


Figure 2

Use botton adjuster until shoe lifts on top

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

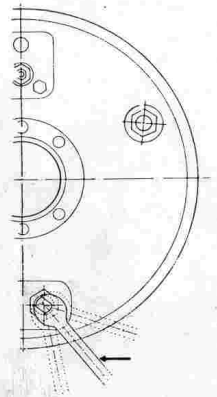


Figure 3

Lock adjuster when in central position

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

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

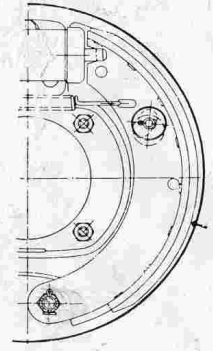


Figure 4

Shoe correctly adjusted Wheel revolves freely

Handbrake adjustment

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

The handbrake is correctly adjusted when a noticeable braking effect is felt when it is pulled 1/3 of the way out.

ELECTRICAL SYSTEM

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

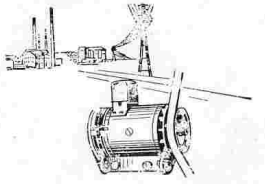
a) Supply = Generator
b) Storage = Accumulator

and the consumers of current which are: —

c) Lights and signalling equipment
d) Starter and ignition

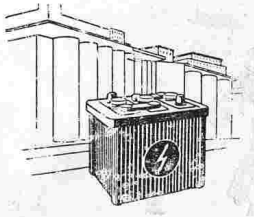
The vehicle is wired on the single pole system, i. e. current (+) is led to the individual units by single wiring, the return (—) being by the metal parts of the car (earth).

Generator LJ GEG 180/6-2300 R 22 m R



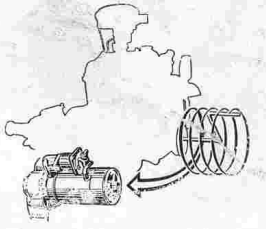
The generator which is driven by a "V" belt from a pulley on the nose of the crankshaft, supplies current to the consumer units and to the accumulator which is charged automatically when the engine is running.

Accumulator 6 V 84 amp/hr



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

Starter EGD 0.6 / 6 AR 2

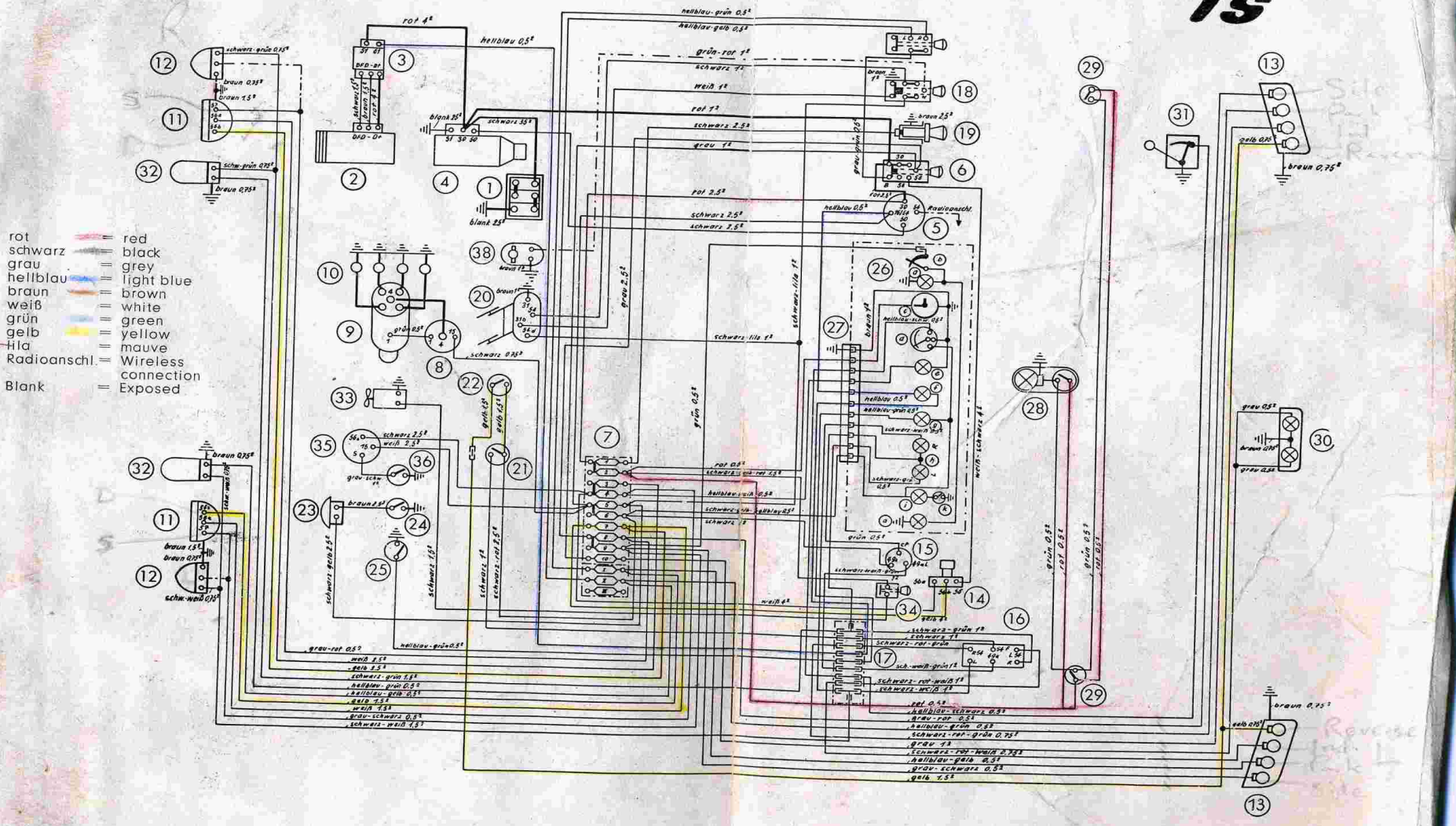


The starter turns over the engine when you wish to start. When the starter is engaged, a sliding pinion moves along the starter-pinion shaft and engages with the starter ring on the flywheel.

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

BORGWARD "ISABELLA TS" WIRING DIAGRAM

Isabella TS



rot	= red
schwarz	= black
grau	= grey
hellblau	= light blue
braun	= brown
weiß	= white
grün	= green
gelb	= yellow
lila	= mauve
Radioanschl.	= Wireless connection
Blank	= Exposed

1. Accumulator
2. Generator
3. Regulator
4. Starter
5. Combined ignition & starter switch
6. Lights switch
7. Fuse boxes
8. Coil
9. Distributor
10. Sparking plugs
11. Headlamps
12. Indicators
13. Tail, brake, indicators, parking and reverse lights
14. Dip-switch
15. Flasher unit
16. Flasher return switch
17. Terminal connectors
18. Windscren wipers & washers switch
19. Cigarette lighter
20. Wiper motor
21. Brake lights switch
22. Reversing light switch
23. Horn
24. Horn control (ring)
25. Oil pressure control switch
26. Multi-instrument unit
27. Switch box
28. Interior light & switch
29. Courtesy light switch
30. Number plate light (2 bulbs)
31. Fuel tank unit
32. Side & indicator lights on front wings
33. Fan
34. Fan switch
35. Headlamp flasher
36. Headlamp flasher switch
37. Parking lights switch
38. Windscreen washer motor (de Luxe only)

Instruments & lights in multi-instrument unit

a. Instrument illumination bulbs
b. Rheostat for instrument illumination
c. Electric clock
d. Fuel gauge
e. Mainbeam warning light
f. Ignition warning light
g. Oil pressure warning light
h. Indicators warning lights (2) (left & right)
i. Coolant temperature warning light
k. Contact for coolant temperature warning light

Fusebox layout

1. Cigarette lighter
2. Interior light, fan & clock
3. Headlamp mainbeam, right
4. Headlamp mainbeam, left & warning light
5. Horn & wiper
6. Indicators, reversing light & fuel gauge
7. Headlamps dipped
8. Tail & parking lights, right
9. Tail & parking lights, left & instrument lighting
10. Numberplate lamp

I. Parking light, left
II. Parking light, right
III. Available for later use

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 warn, 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 $^1/_4$—$^3/_8$" (5—10 m/m) 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 1.285.
6. When working on the electrics, 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"

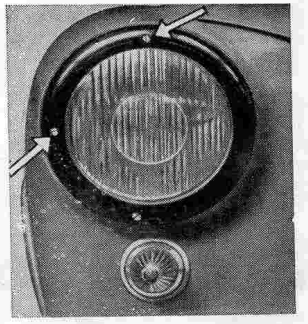
Headlamps Bilux	6 V	35/35 W
Double filament bulb asym. dipping	6 V	45/40 W
Side light bulbs	6 V	2 W
Bulb for indicators, front	6 V	18 W
Bulbs for brake lights and indicators, rear	6 V	18 W
Tubular lamp for interior light	6 V	5 W
Tubular bulb for tail lights	6 V	5 W
Oil pressure warning light	6 V	2 W
Mainbeam warning light	6 V	2 W
Indicator warning lights	6 V	2 W
Dash lighting	6 V	2 W
Ignition warning light	6 V	3 W
Parking light ("TS" only)	6 V	2 W
Reserving light	6 V	18 W

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

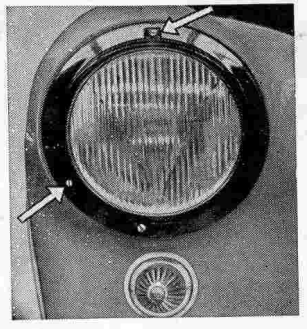
Never touch headlamp bulbs with greasy fingers as this may cause deterioration of the reflectors. Always use a clean rag!

If a headlamp bulb has to be replaced on the road, it is advisable to realign it with the other. Two adjusting screws inset on the headlamp rim enable it to be adjusted both vertically and horizontally.

Bosch Headlamp

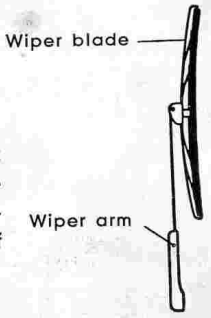


Hella Headlamp



GENERAL NOTES

Windscreen wipers



Because of it's curved windscreen, your BORGWARD "Isabella" car is fitted with special wipers. The blades of these are less robust than those used on normal flat screens and are more susceptible to damage. Careless 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 built-in 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 "1". (See also page 10.)

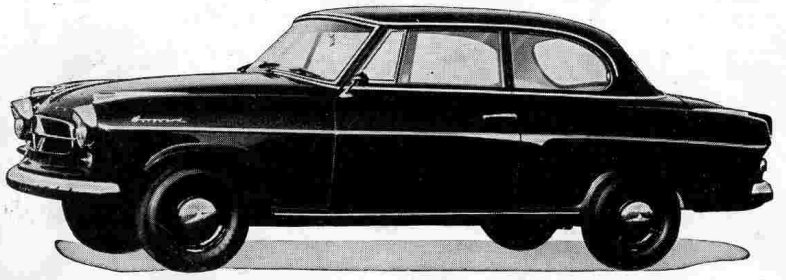
Precautions in Winter

In addition to the usual tool-kit, you are advised to carry the ilowing additional equipment: —

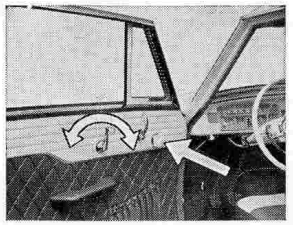
1. Shovel, in case the car has to be dug out of the snow.
2. Small bag of sand to get the car on the move on icy roads.
3. Block on which to stand the jack.
4. Snow chains or "town and country" tires.

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

COACHWORK

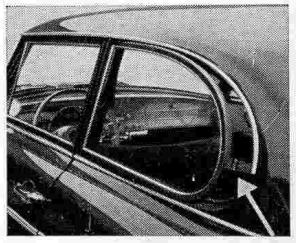


A special feature of your BORGWARD "Isabella" car is it's all-steel integral body-cum-chassis. It's rigid construction using box-shaped side members and the central transmission tunnel ensures that it possesses the necessary torsional rigidity. The body is mounted on the front and rear cross-members with soft rubber mountings to keep it free of road shocks and vibrati[illegible] The front wheels are mounted independently on double wish-bones of unequal length and the rear wheels independently on swing axles. Coil springs working in conjunction with telescopic shock-absorbers are fitted front and rear and endow the car with excellent suspension and outstanding roadholding.

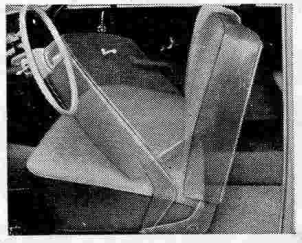


Doors and Windows

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

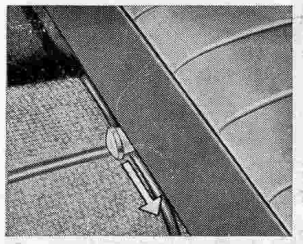


Both doors are fitted with wind·· windows and these in conjunction with the pivoted rear windows provid· adequate and draught-free ventilation.

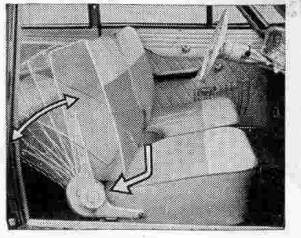


Seats

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

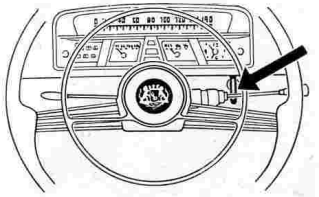


The seat release is actuated by a button in front of the seat, allowing it to be moved either backwards or forwards. As soon as the button is released, the lock is engaged and the seat remains firmly fixed.



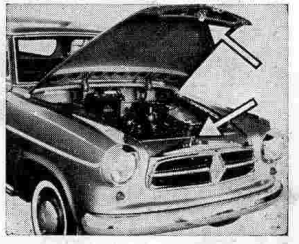
The Isabella "TS" is fitted with fully reclining front seats, which can be folded back for sleeping. The se· backrest is adjusted by a hand control on the outside of the seat.

Bonnet



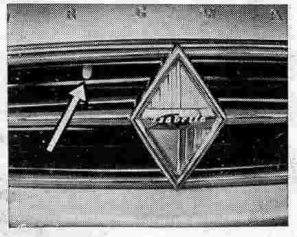
A "T" type lever situated under the dash operates the mechanism to release the bonnet. It should be pulled smartly backwards when the lock should open quite audibly.

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

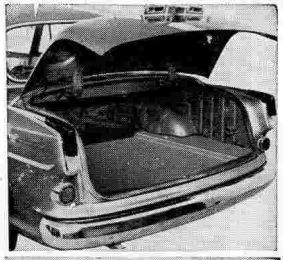


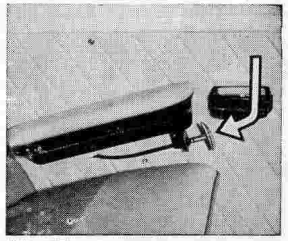
Ensure that the lock is released ·udibly, otherwise the device may not work properly and the lock remains open. If the "T" handle is pulled half-heartedly, the bonnet may be released as far as the retaining hook but it is possible that it may lock itself again.

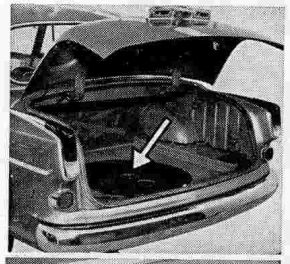
Drivers should ascertain for themselves that the bonnet is efficiently secured. It is **NOT** sufficient that the "T" handle returns to it's original position and the bonnet should be inspected to ensure that it is securely pressed down and locked.

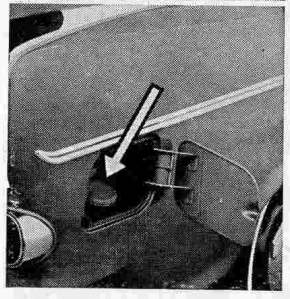


If the lock has sprung back with the bonnet up, it can only be re-set with the aid of a screwdriver or similar tool.









Luggage compartment

In addition to the baggage normally carried in the car, the boot provides ample space for the necessary tool-kit which is provided. To open the boot, first pull the release lever which is to be found under the armrest on the lefthand side of the rear seat. The lid will then spring clear of the lock so that it can be lifted up. To close the lid again simply press it down lightly on to the catch when it should lock without difficulty. Make sure that the release cable has returned to it's original position.

Spare Wheel

The spare wheel is located in a compartment under the luggage boot floor. After removing the retaining screw, the spare wheel cover can be lifted off and the wheel removed from it's bracket.

Refuelling

The fuel tank is located in the back part of the right hand rear wing, the filler being accessible through a special flap. Care must be taken when refuelling that no dirt gets into the tank.

BODY UNDERSURFACES

The body has a smooth underside which can be easily cleaned It is advisable to clean it regularly and from time to spray all metal parts with penetrating oil as a defence against rust. It is best if this work is left to an authorized BORGWARD dealer w'_ is fully equipped with the most modern equipment to carry it out promptly and efficiently.

CARE OF THE COACHWORK

To preserve the appearance of your vehicle, regular cleaning and attention to the paintwork is essential; it will also preserve the finish.

Washing the car

1. In the case of new vehicles in particular, frequent washing improves the durability and finish of the paint. In any case, the vehicle should be washed down whenever it becomes either dirty or dusty. The longer it is allowed to remain, the more will be the adverse effect upon the paintwork. Particles of dirt damage the surface of the paintwork chemically, often scratching it if not regularly washed off.

2. A large sponge should be used for washing down the body-work, a fairly stiff brush for the wheels and a stiff brush for the chassis. A clean chamois leather and a soft cloth should be used to finish off after washing.
   Mud and dirt should be cleaned from the underside and the chassis with the aid of a brush and a powerful hose.

3. The painted surfaces of the bodywork and the wheels should be washed down with a fine spray of water until the dirt is removed. Under no circumstances should the water be turned onto the bodywork at full force. The dirt should be washed off with the sponge using plenty of water and wringing it out frequently so that it does not scratch the highly finished paint-work. Wash off the surplus water with the sponge well wrung out and finally go over it all with a large washleather so that no particles of water remain on the surface.

4. Washing in bright sunlight should be avoided as the water dries on the surface too quickly causing spots. These spots are particularly difficult to remove if the water is at all chalky and may cause considerable cracking of the paintwork at a later date.

Periodical polishing of the bodywork should be carried out at an authorized BORGWARD dealer to restore lustre to the surface and increase the life of the paintwork. Later or as may be necessary, the car should be washed down with clean water and dried, then finished off with a suitable polish and a soft cloth, polishing with a circular motion. A final rub being given with a clean soft cloth to abtain a high gloss finish.

It may not always be possible to remove tar, grease, insects and the pollen from lime trees from the bodywork by washing alone. This sort of matter should always be removed as soon as possible as failure to do so may cause lasting damage to the surface. Particularly at night time in the warmer month of the year, innumerable insects become stuck to the wings, headlamps and the front of the car generally.

A lukewarm soap solution of not more than 1—2% should be used to sponge off these spots. A more concentrated solution should not be used as it may attack the paint. When the insects have been removed from the affected surfaces, wash down using plenty of clean water to remove all traces of the soap solution and then rub down with a leather.

Owners are advised to polish their cars every month or two with a suitable proprietary brand of polish, using a soft cloth or cotton waste which must be free of lumps or knots.

Tar spots give an unpleasant effect particularly on light coloured cars. They occur frequently when driving in hot weather on newly tarred roads. These spots should be removed at once using a suitable cleaner.

N. B. Care should be taken that car polish does not come into contact with any of the windows particularly the windscreen. The same applies to cleaning rags. Cleaning agents and polishes sometimes contain ingredients that impair the clarity of the glass!

Care of the chromium

After sponging down with water, all chromium-plated parts should be dried with a soft cloth and tar spots removed with a proprietary cleaner. On no account should knives or sharp-edged

tools be used for this purpose as it will only cause damage to the plating. Finally, it should be cleaned with a proper chrome cleaner which should be thinly applied and allowed to dry before being given a final polish with a clean soft cloth. This will close any porous spots in the chromium plating and protect it against corrosion and deterioration. This procedure should be carried out with particular care after washing the car during the winter months.

Care of the Leathercloth Upholstery

The artificial leather which is used for the upholstery and interior trim needs no especial attention. Wax-based preparations should be avoided as they will soil the material and prematurely age it. Similarly, proprietary brands of dry cleaner should not be used as they may contain harmful ingredients that might destroy the leatherette. Even mild spiritbased solvents may affect the colour. Lukewarm water with the addition of pure soapflakes only should be used, finishing by sponging over with clean water and a saft cloth.

Real leather should be treated in the same way, taking care that it is not allowed to become too wet.

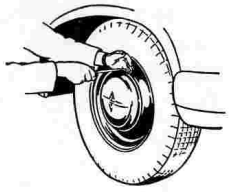
TIRES

The tires require a little more attention than simply ensuring that they are maintained at the recommended pressures. It is also important that the tires should be inspected for uneven wear after they have been in use for some time. By changing the wheels around from time to time, wear is equalized and a longer tire life is ensured. Tires should not be explosed for any lenght of time to the direct rays of the sun, or the rubber may become brittle and crack.

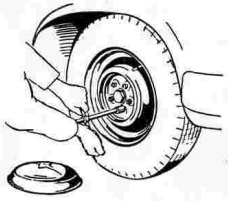
Always have the best tires on the front wheels, as a burst tire at the front is far more dangerous than one at the rear.

At least once a year, or whenever a tire is changed, the rims should be inspected for rust or damage to the paint.

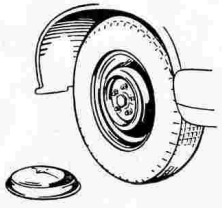
WHEEL CHANGING



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.

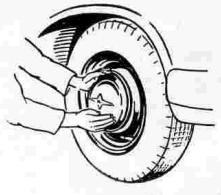


Remove the wheel disc with the pull-off hook which will be found in the tool-kit.



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 seatings of the wheel nuts. Tighten the nuts diagonally with the wrench and lower the jack. Finally tighten diagonally with a torque wrench set at 87 ft/lb (12 mkg).



Replace 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—3% 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 frost. It should be put on charge at least once every four weeks.

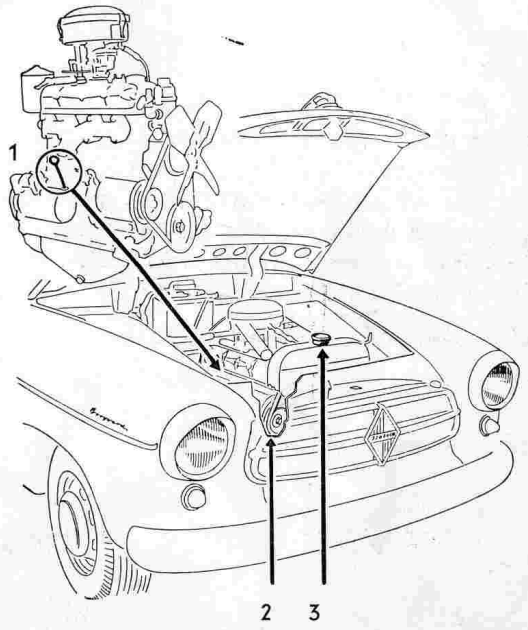
7. Remove tires. Sprinkle inside of tires and the inner tubes with French Chalk and store in a dark place. If the tires are not to be removed, the vehicle must be jacked up on supports to take the weight off the tires.

8. Grease all greasing points.

9. Clean body and all mechanical parts.

10. Grease all chromium plated parts with pure vaseline.

11. If possible, cover the vehicle with a tarpaulin.



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 fan belt tension (It must not slip.)

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

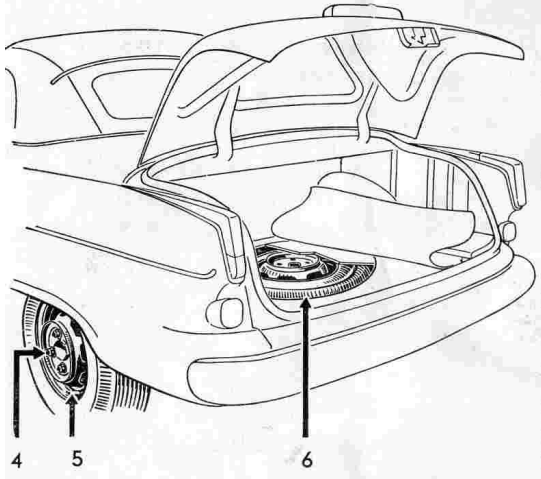
4. Check wheel nuts for tightness, especially after a wheel change.

5. Check tire pressure.

   Tires 5.90-13. —
   Front 21 psi = 1.5 atm
   (24 psi = 1.7 atm)
   Rear 26 psi = 1.7 atm
   29 psi = 1.9 atm)

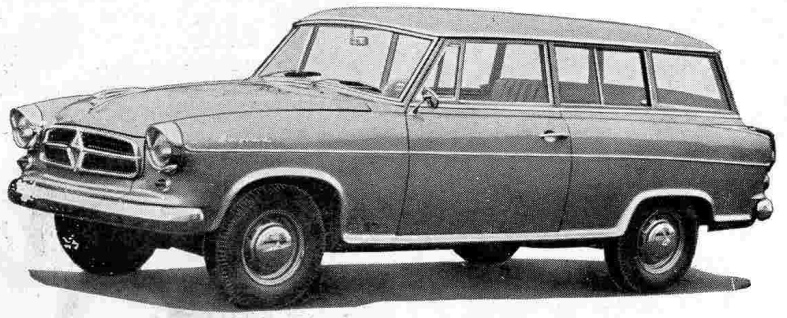
6. Do not omit spare wheel, tool-kit, spare bulbs and fuses.

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



Important

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



BORGWARD

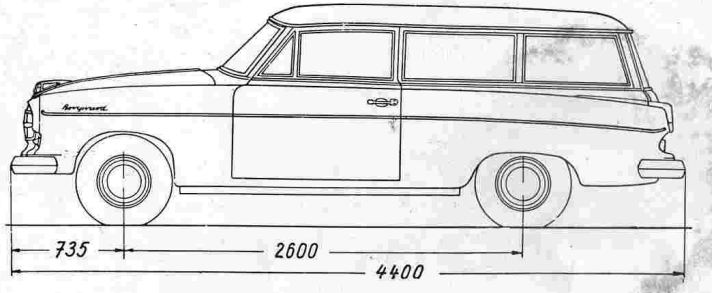
Isabella combi

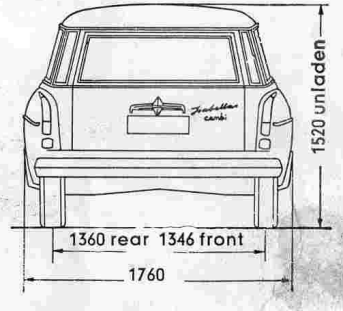
Station Waggon

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



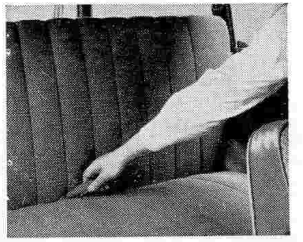


All dimensions in m/m

Weights:

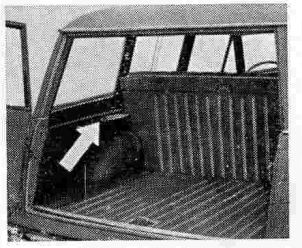
Unladen weight approx.	2.657 lbs	(c. 1.205 kg)
Permissible all-up weight approx.	3.638 lbs	(c. 1.650 kg)
Permissible load	981 lbs	(445 kg)
Permissible rear axle loading	2.205 lbs	(1.000 kg)
Permissible front axle loading	1.500 lbs	(680 kg)
Max: roof load	220 lbs	(100 kg)
Permissible trailer load (with brakes)	1.764 lbs.	(800 kg)
(without brakes)	1.323 lbs	(600 kg)

VARIATIONS FROM THE STANDARD "ISABELLA" SALOON

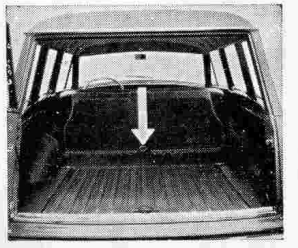


Rear seat and loading space

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 detatch backrest brackets and fold backrest forward until it locks into position.

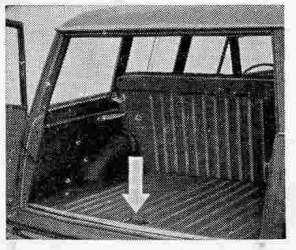


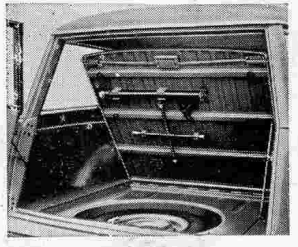
To raise the backrest, turn the locking ring to the right.



Spare wheel

The spare wheel, jack and multi-purpose wrench are located underneath the rear floor. When the floor can if unimpeded by goods, be easily lifted. To remove the spare wheel undo retaining screw and lift clear of it's holder.





VARIATIONS FROM STANDARD "ISABELLA" SALOON

Engine:

4 M 1.5 II K

Max. output:

55 b. h. p. (PS) at 4.200 rpm

Climb:

1st	gear	36%
2nd	gear	18%
3rd	gear	11%
4th	gear	7%

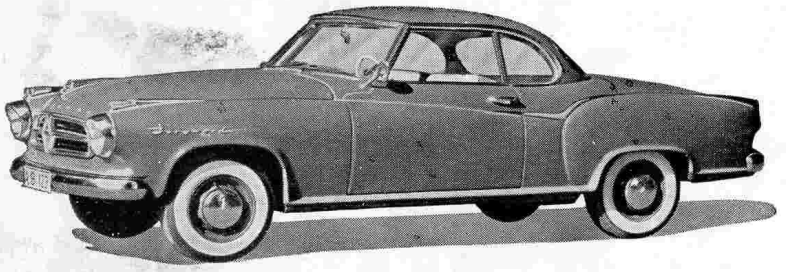
Tires:

6.40-13

Tire pressures:

Front 21 psi = 1.5 atm
(27 psi = 1.9 atm for motorway driving)

Rear 27 psi = 1.9 atm
(35.5 psi = 2.5 atm loated and at max.mum speed)



BORGWARD

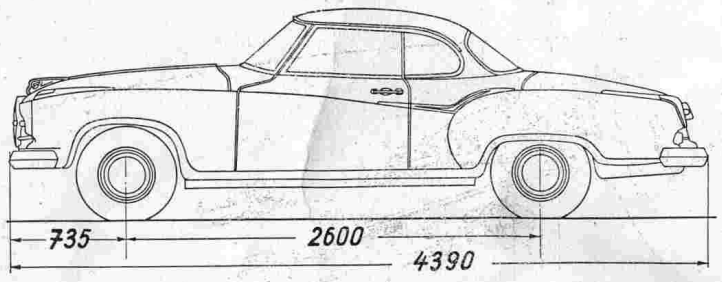
Isabella

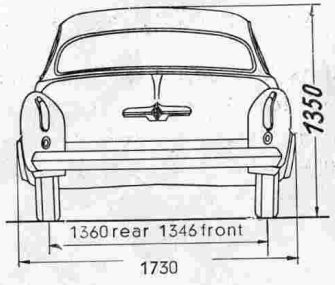
coupé

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

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

DIMENSIONS AND WEIGHTS



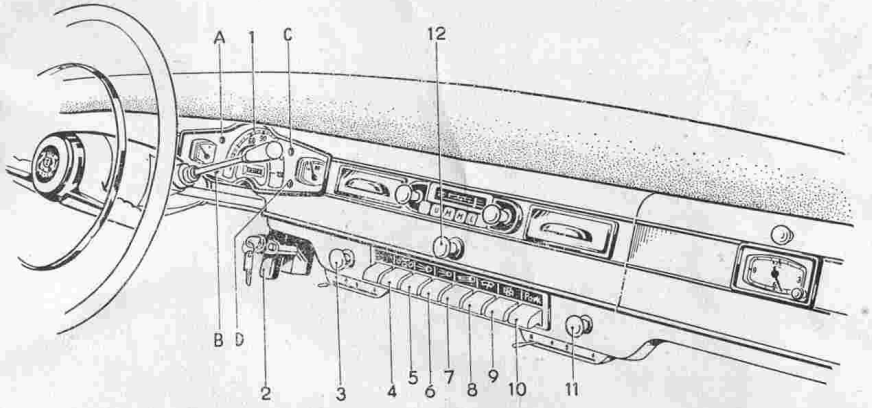


All dimensions in m/m.

Weights:

Unladen weight	21⅝ cwt (1,100 kg)
Permissable all-up weight . . .	27⅜ cwt (1,395 kg)
Permissable load	4 persons + 1 cwt of luggage
Permissable axle loading, back	15¼ cwt (780 kg)
Permissable axle loading, front	13¾ cwt (680 kg)

VARIATIONS FROM THE STANDARD "ISABELLA" SALOON



1. 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 shew the operating temperature of the coolant.

   In addition to the instruments, you will find the following warning lights: —

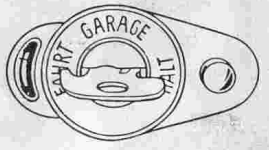
   A — lights if the oil pressure falls below the minimum permissable figure.

   B — is inoperative on cars fitted with a manually operated gearbox.

   C — shews a blue light when the headlamps are on "main-beam".

   D — lights up if the coolant temperature exceeds the maximum limit.

2. The built-in **steering/ignition lock** locks the steering when the key is turned to the "Halt" 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 "Halt" 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 follow: —

3. **Choke control.**

4. **Dash lighting.**

5. **Headlamps.**

6. **Side & tail lights.**

7. **Fog lamp.** This switch is provided so that additional foglamps can be fitted.

8. **Windscreen wipers.** The wiper switch has two positions. When When fully pushed home, both wipers and windscreen washers are switched on; in the halfway position only the wipers are operative.

   The electrical windscreen washer 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.

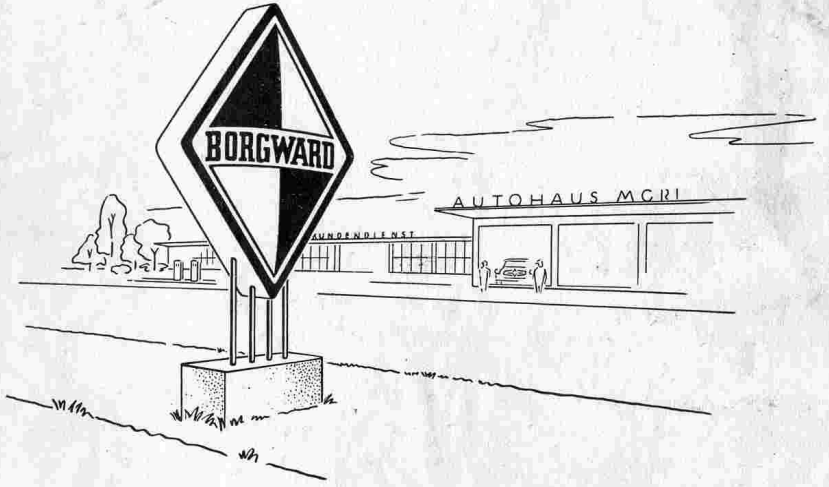
9. **Stationary heater.** A fan which is installed in the lefthand heater conduit can be switched on to provide interior heating when the car is parked. With the control lever in position "2", the fan can be used for concentrated defrosting of the windscreen.

10. **Parking lights.** This switch has two positions which enables the left or right-hand parking lights to be selected.

11. The switching over of the **air conditioning system** from cold air to hot effected by a Bowden control.

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

12. The cigarette lighter is mounted 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 therefor, repairs should be carried out at one of our appointed workshops which can easily be recognized by the "Borgward Service Station" sign outside. You will find a comprehensive list of authorized Borgward dealers in our dealers' list. The workshops are staffed by trained engineers and equipped with special tools specificly developed for use with our vehicles. They alone are in a position to handle any kind of problem carefully, expertly and at once.

appointed workshops can supply you with genuine spares off the shelf.

EXPLANATION OF THE LUBRICATION CHART

On the lubrication plan opposite, all the greasing points are clearly shewn. However, where more than one greasing point of a kind exist, only one of them is shewn, but the actual number is clearly set out in the text to the diagram.

The greasing points underneath the car can be reached with the car on a lift or over an inspection pit; the others can be reached from ground level.

When carrying out any particular service, you should therefor follow the appropiate blue line, attending only to those points scheduled and marked for service.

The meaning of the various abbreviations is clearly set out below.

Servicing symbols:

○	**Grease** or replenish with grease (also battery maintenance)
□	**Check oil level** — trop-up if decessary
2 / 1.75	**Oil change** — quantities in pints US / Imp.

Lubricant:

E	**HD Engine oil** (for petrol engines) above 86° F (30° C)	SAE 30
	18—86° F (—8—30° C)	SAE 20 W/20
	under 18° F (—8° F)	SAE 10 W
	All the year raund	Multi-grade oil 10 W/30
G 90	**Gearoil**	SAE 90
G 140	**Gearoil**	SAE 140
HG 90	**Hypoid gearoil**	SAE 90
A	**Chassis grease**	or General-purpose grease
BG	**Ball-race grease**	
TG	**Terminal grease**	
BF	**Brake fluid**	

Nature of work to be carried out	Free Inspection mileage 300	Free Inspection mileage 600	Service No. 1 mileage 2,500	Service No. 2 mileage 7,500
23. Check all **screws, nuts and bolts on the chassis** for tightness and inspect split-pins where appropriate. Including: steering linkage, wheel suspension, spring and shock-absorber anchorages, transmission, braking system as well as all other points of attachment of front axle, back axle and gearbox.	○	○	○	○
24. Check all **screws etc on the coachwork** for tightness. These include: doors, bonnet, luggage boot lid, bumpers, radiator grill, chromium-plated fittings, fuel tank and items of equipment such as mirror, sun visors etc.	○	○	○	○
25. Check **braking system** for leaks. (Pipelines, cylinders, connections). Check **brake hoses** for positioning and condition.	○	○	○	○
26. **Maintenance of „Saxomat" automatic clutch:** Inspect seating of return spring. Grease the joints on the linkage.		○	○	○
Inspect and clean faces of gear lever contact switch.				○
27. Test run. (Acceptance test).	○	○	○	○

Greasing Service

In between the individual servicings, the car should be greased **every 1,250 miles** (2,000 km). Details are set out in the lubrication chart on page 77. In addition, items 14, 15, 18, 19 and 25 of the servicing schedule should be carried out. For further details, you should refer to the maintenance manual.

Recommended Items of Maintenance

All the necessary measures to keep your car in first class condition will be found in the servicing schedule. These include a series of checks and inspections to keep it in the safest possible state. Should therefor, an inspection reveal any damage, you should immediately entrust the repair to an authorized BORGWARD agent and thereby prevent possible further trouble.
In addition to the regular servicing, we recommend that at the following intervals, you should request your agent to carry out the following:-

Every 15,000 — 19,000 miles (24—30,000 km):

1. Check tappet clearances and re-set if necessary.
2. Clean out the carburettor and check inlet manifold for leaks.
3. Remove, astrip and clean fuel pump. Check diaphram and valve and re-new if necessary.
4. „Saxomat" only: check and re-set play of withdrawal mechanism.

Every 30,000 — 40,000 miles (50—60,000 km):

1. Dismantle front hubs, clean and re-pack with ball-race grease. Check the bearing for play
2. Remove, clean and test generator and starter motor. Replace the brushes if required. Inspect bearings and commutators.

OPERATING INSTRUCTIONS

BORGWARD

Isabella