Workshop Manual

Rolls-Royce Silver Cloud
Rolls-Royce Silver Cloud II
Phantom V

Bentley S
Bentley S2
Bentley Continental S
Bentley Continental S2

Including:-

Supplements for the Series III and 3 cars

Printed in England

PREFACE

This Workshop Manual has been compiled in an endeavour to assist service personnel responsible for maintenance and overhaul, in properly maintaining the high standard of engineering achieved in the production of Rolls-Royce and Bentley motor cars.

The book is copiously illustrated with photographs and orthographic reproductions which are suitably annotated in order to provide quick reference with minimum searching.

Although all information contained in the Manual was correct when going to print, modifications which may subsequently develop will be kept up to date by means of Service Bulletins.

Information given in the latest Bulletin will supersede that given in the Section of the Manual to which it refers, until such times as the Manual is re-issued with the necessary amendments.

Instructions for the maintenance and overhaul of the S2 engine and the Refrigeration Systems fitted to the Rolls-Royce and Bentley cars are contained in individual volumes. Special Workshop Tools referred to in these publications and the Workshop Manual are listed and illustrated in a further publication.

Personnel of Rolls-Royce Service Departments at Hythe Road, Willesden, London N.W.10, and at Pym's Lane, Crewe, are always prepared to answer queries or give advice on individual servicing problems, but it will assist them if queries are accompanied by the chassis number of the car.

Information contained herein applies to the following cars:

Rolls-Royce	**Bentley**
Silver Cloud	S1
Silver Cloud Long Wheelbase	S1 Long Wheelbase
Silver Cloud II	S2
Silver Cloud II Long Wheelbase	S2 Long Wheelbase
Phantom V	Continental S1
	Continental S2

The following publications are available for reference in conjunction with this Manual:

TSD 471	Automatic Gearbox Service Manual
TSD 720	Car Interior Cooling System. Boot Unit
TSD 753	Rolls-Royce Silver Cloud II and Bentley S2 Engine Manual
TSD 723	Air Conditioning System. Underwing Unit
TSD 727	Workshop Tools
TSD 744	Air Conditioning System. O.M.C. Refrigeration Unit

TSD 729

All communications should be addressed to

ROLLS-ROYCE LIMITED
Pym's Lane, Crewe, Cheshire
England

Telegrams: ROYCRU CREWE
Telephone: Crewe 55155
Telex: 3621
London Office: Conduit Street, London, W.1

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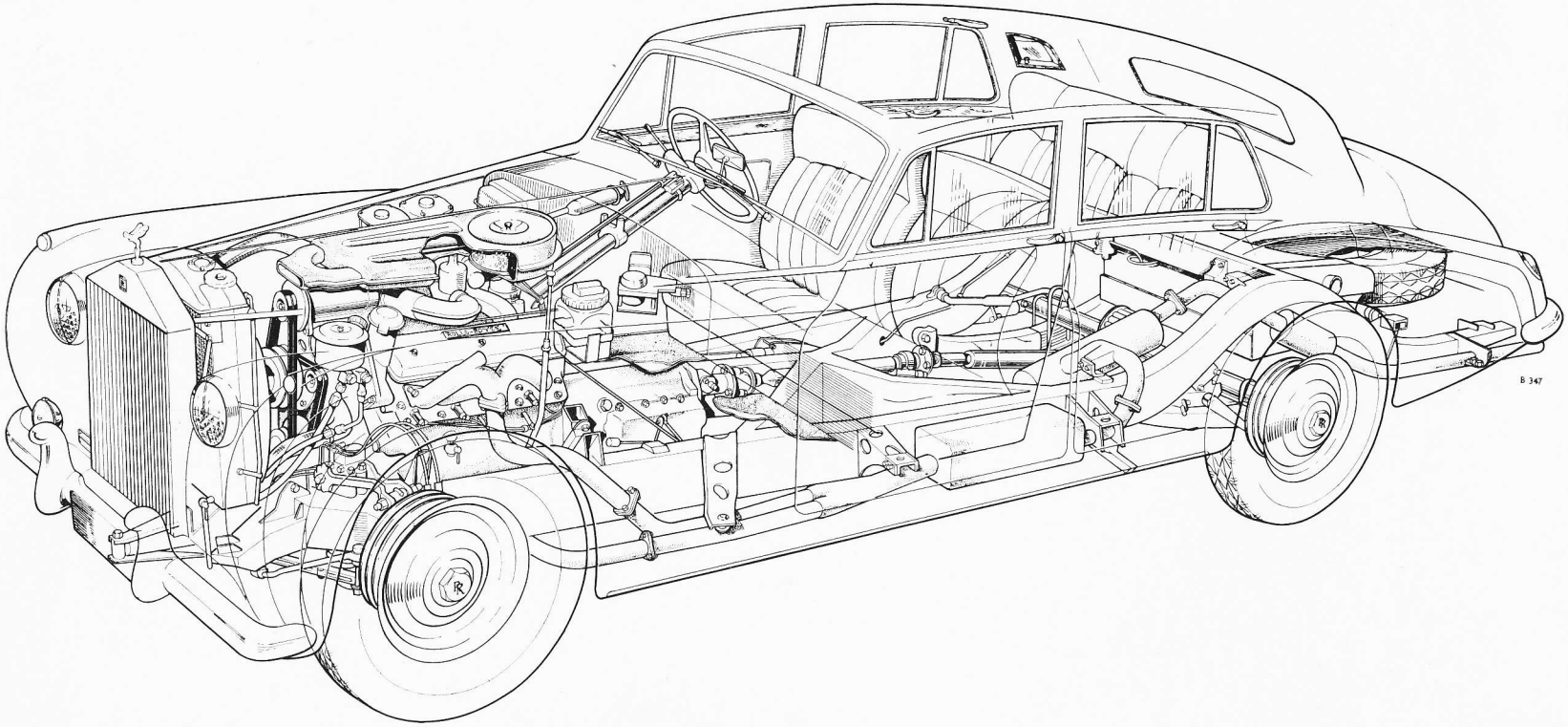

Cut-away of Rolls-Royce Silver Cloud II car

CHAPTER A

GENERAL INFORMATION

Printed in England

CHAPTER A

GENERAL INFORMATION

SECTION A1 SPECIFICATION — S1 CARS

Engine

Type	Six cylinders, in line, with overhead inlet and side exhaust valves.
Bore	3·750 in. (95·3 mm.)
Stroke	4·500 in. (114·3 mm.)
Cubic capacity (piston displacement)	298 cu. in. (4887 c.c.)
Compression ratio	
Standard S1 and Long Wheelbase S1 cars	6·6 : 1 (early) 8·0 : 1 (late)
Bentley Continental S1 cars	7·25 : 1 (early) 8·00 : 1 (late)
Suspension of the engine and gearbox	The engine and gearbox are of unit construction. The unit is flexibly mounted on rubber at three points.

Cylinder Block

Type	Monobloc casting, integral with crankcase.
Material	Cast iron with full length, high phosphorus iron cylinder liners. Phosphor-bronze exhaust valve guides.

Cylinder Head

Type	Detachable, 6-port type
Material	Aluminium alloy, with nickel chrome steel inlet valve seat inserts and cast iron inlet valve guides.

Crankshaft

Material	Nitride hardened chrome Molybdenum steel. Dynamically balanced.
Number of Journals	Seven
Balance weights	Integral with shaft
Crankshaft vibration damper	Internal. Combined spring-drive and friction-type damper.

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Main Bearings

Number off	Seven
Type	Copper, lead-indium lined thin steel shells with 'pre-sized' bores to suit diameter of crankshaft journals.

Pistons

Material	Aluminium alloy, split skirt.
Number of rings	Three compression and one Duaflex oil scraper. Top compression ring chromium plated.

Connecting Rods

Type	'H' section. Fully machined and balanced.
Material	Chrome Molybdenum steel.
Big-end bearings	Copper, lead-indium lined thin steel shells with 'pre-sized' bores to suit diameter of crankpins.

Camshaft

Material	Case hardened nickel steel
Number of journals	Four
Bearings	Four Babbitt lined steel shells
Thrust taken	Front
Drive	Helical tooth gears

Valve Gear

Inlet valves	Overhead push rod operated. Dual springs. Gland packing to control lubrication.
Exhaust valves	Side. 'Brightray' heat-resisting faces to prolong life.
Valve tappets	Barrel type, flat face.

Lubrication System

General	High pressure feed to crankshaft, connecting rod and camshaft bearings and to the distributor drive skew gearing. Dual oil relief valve providing a positive low pressure oil supply to the engine gears and to the hollow valve rocker shaft from which valve rockers, push rods, tappets and cams are lubricated.
Type	Pressure throughout
High pressure supply	25 lb/sq.in. (approximate)
Low pressure supply	5 lb/sq.in. (approximate)
Sump capacity	2 galls. (Imperial), 2·4 galls. (U.S.A.), 9·1 litres.
Oil pump	Spur gear type with floating intake strainer.
Oil pressure relief valve unit	Dual type, controlling both high and low pressure feeds.
Oil filter	'British' Full-Flow type

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Fuel System

Carburetters	
Early S1 cars	Two S.U. HD 6 diaphragm type. Automatic choke for cold starting.
Late S1 and Bentley Continental S1 cars	Two S.U. HD 8 diaphragm type. Automatic choke for cold starting.
Air cleaner	Mesh or oil bath
Fuel pumps	S.U. twin electric type 'L'
Fuel tank capacity	18 galls. (Imperial), 21·6 galls. (U.S.A.), 81·8 litres.
Fuel strainers	Main fuel strainer mounted on the side frame member in front of the fuel tank. Small gauze strainer at the carburetter inlets and in the fuel pumps.
Fuel gauge	Electric. Registers when the ignition switch is 'ON'.

Cooling System

Coolant capacity	28 pints (Imperial), 33·61 pints (U.S.A.), 15·91 litres.
Pump	Centrifugal
Fan	Five blades
Fan diameter	17¾ in.
Pump and fan drive	'Vee'-belt
Radiator matrix	Film type
Radiator shutters	Fixed
Coolant temperature control	The pressurised system operated at 7 lb/sq.in. applies to S1 refrigerated cars only. The coolant on all S1 cars is circulated by a centrifugal pump. A thermostat valve is fitted to a by-pass flow pipe to direct coolant from the pump back to the engine, by-passing the radiator matrix when the engine is cold.
Temperature indicator	This instrument is mounted on the facia and operates when the ignition is 'ON'.
Coolant	An inhibited solution of Ethylene Glycol (BSS 3150).

Propeller Shaft

Divided type, having a ball and trunnion universal joint. The shaft is supported in the centre by a flexibly mounted ball race.

Rear Axle

Type	Hypoid bevel gears with semi-floating half-shafts.
Final drive	Through a hypoid crown wheel and pinion.
Pinion teeth	Twelve
Crown wheel teeth	Forty-one
Ratio	
Standard S1 cars	3·42 : 1
Bentley Continental S1 cars	2·92 : 1
Oil capacity of casing	1½ pints

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Brakes

Footbrake	Servo-assisted hydrostatic brakes, hydraulic operation on the front wheels, hydraulic and mechanical on the rear wheels.
Handbrake	Operates through a mechanical linkage to the rear wheels.
Brake shoe linings	Mintex M 14 or Ferodo DS2
Friction lining area (4 brakes)	240 sq.in. (1548 sq.cm.)
Handbrake lever	Twist grip barrel type

Servo Motor

	The servo motor operates on the principle of the dry disc clutch. The lined friction plate is driven from the gearbox output shaft at approximately one fifth of the propeller shaft speed.
Lining	Ferodo DM8
Cam angle	S1 cars (early) 52 deg. — single master cylinder. S1 cars (late) 47 deg. — twin master cylinders.

Front Hubs

General	Two taper roller bearings

Wheels and Tyres

Wheels	Bolted on pressed steel wheels with covering discs.
Rim-wheel	Well-base rims, 15·000 in. × 6·000 in.
Tyres	
Standard S1 cars	8·20 in. × 15 in.
Bentley Continental S1 cars (early)	7·60 in. × 15 in.
Bentley Continental S1 cars (late)	8·00 in. × 15 in.

Steering

Type	Power assisted or manual
Steering unit	Cam and roller
Drive	Right-hand or left-hand
Steering wheel diameter	18 in.
Steering box gear ratio	
Standard S1 cars	20·6 : 1
Bentley Continental S1 cars	18·7 : 1
Power assisted S1 cars	18·7 : 1

Suspension

Front	Independent, incorporating coil springs, hydraulic shock dampers and torsion rod stabiliser.
Rear	Semi-elliptic leaf springs in combination with controllable hydraulic shock dampers. An axle control rod is fitted which, together with the road springs, takes the torque and brake reaction.
Front shock dampers	Rolls-Royce hydraulic double acting.
Rear shock dampers	Rolls-Royce hydraulic double acting. Controllable through a switch on the steering column.

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Chassis Frame

Type	Box section throughout, with all welded joints.

Jacking System

Type	Smith Bevelift jacks

Battery

Make and type	Either P & R Dagenite — 6HZP 9/GZ or Exide 6XCV 9/L.
Voltage	12 volts
Capacity	57 ampere-hours
Earth	Negative to chassis frame

Ignition Distributor

Make and type	Delco-Remy. Twin contact breaker with synchronised contact breaker arms
Rotation	Clockwise
Advance mechanism	Automatic (centrifugal governor)
Firing order	1, 4, 2, 6, 3, 5

Ignition Coil

Make	Lucas or Delco-Remy
Sparking plugs	
Standard S1 cars (early)	Lodge CLNP or Champion RN 8
Bentley Continental S1 and later S1 cars	Lodge CLNP or Champion N 5

Generator

Make	Lucas
Type	Early cars C47PV Late cars C48
Maximum output	Early cars 30 amperes 13·5 volts Late cars 35 amperes 13·5 volts.
Drive	Adjustable 'Vee'-belt
Voltage regulator and cut-out	Lucas RB 310, current voltage type

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Starter Motor

Make and type	Lucas M-45G. 12 Volt with Rolls-Royce built-in planetary reduction gear. Overall reduction 18·05 : 1.
Cranking speed	80–160 engine r.p.m. (under normal temperature climate conditions).
Rotation	Clockwise
Pinion flywheel ratio	14/115

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Horns

Make and type — Lucas WT 618. Twin Wind-tone

Direction Indicators

Make and type — Lucas FL 5. Flashing type indicators

Headlamps

Make and type — Lucas RL 700

General — The headlamps are controlled by two switches, the master switch on the switchbox and a foot-switch for 'beam' selection. A small red warning lamp, mounted in the speedometer, is illuminated whenever the headlamps are on the DRIVING BEAM (full on).

Fog Lamps

General — Twin fog lamps are fitted which incorporate the front FLASHER element. These are double filament pre-focus type bulbs.

Fuse Box

General — The large fuse box carries eight fuses. Each circuit fuse is one strand of No. 28 S.W.G. tinned copper wire. The small fuse box carries the horn fuse. This is a cartridge type fuse of 25 amp. rating.

Car Heater

Alloy heat exchanger under the right-hand front wing ducted to slots under the scuttle and to an outlet in the floor of the rear compartment at the back of the front seat.

The later S1 and Continental cars were fitted with two manually-operated water taps, and two modified vacuum controlled water valves, in order to provide a more efficient means of interior temperature control.

De-mister and De-icer

Alloy heat exchanger under the left-hand front wing delivering hot or cold air to the windscreen. The rear window is electrically heated, controlled by a switch on the parcel shelf.

Windscreen Washer

Make — Lucas Screen-jet

General — Vacuum operated
Special liquid has a low surface tension and anti-freeze properties.

Windscreen Wipers

Make — Lucas DR 1 (early cars)
Lucas DR 3 (later cars)

General — Electrically operated. Two-speed, self-parking.

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Radio

Make and type	Radiomobile
Early S1 cars	4300. All wave radio 200 × B. Medium and long wave radio 202 × B. Medium wave radio
Late S1 cars	200 RB. Medium and long wave radio 202 RB. Medium wave radio 230 R. Medium and short wave radio

Body

General	Steel and light alloy stressed skin construction, the floor being an integral part of the body, to ensure optimum strength and rigidity consistent with lightness.

Dimensions

Wheelbase	
Standard S1 and Bentley Continental S1 cars	10 ft. 3 in. (312·4 cm.)
Long Wheelbase S1 cars	10 ft. 7 in. (322·6 cm.)
Track, front	
Standard S1, Bentley Continental S1 and Long Wheelbase S1 cars	4 ft. 10 in. (147·3 cm.)
Track, rear	
Standard S1, Bentley Continental S1 and Long Wheelbase S1 cars	5 ft. 0 in. (152·4 cm.)
Overall length (including bumpers)	
Standard S1 cars	17 ft. 8 in. (539·5 cm.)
Long Wheelbase S1 cars	17 ft. 11¾ in. (548 cm.)
Bentley Continental S1 cars	17 ft. 2½ in. (524·5 cm.)
Overall width (over wings)	
Standard S1 cars	6 ft. 2½ in. (189·2 cm.)
Long Wheelbase S1 cars	6 ft. 2¾ in. (189·8 cm.)
Bentley Continental S1 cars	5 ft. 11½ in. (181·6 cm.)
Overall height (unladen)	
Standard S1 and Long Wheelbase S1 cars	5 ft. 4¼ in. (163 cm.)
Bentley Continental S1 cars	5 ft. 4 in. (162·6 cm.)
Turning circle diameter	
Standard S1 cars	41 ft. 8 in. (12·7 m.)
Long Wheelbase S1 and Bentley Continental S1 cars	43 ft. 0 in. (13·1 m.)
Weight, kerbside	
Standard S1 cars	40 cwt. (approximate) (2032 kgs.)
Long Wheelbase S1 cars	41½ cwt. (approximate) (2108 kgs.)
Bentley Continental S1 cars	38 cwt. (This value is approximate to the mean weights of various bodies).

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SECTION A2 SPECIFICATION — S2 CARS

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Engine

Engine data appears in TSD 721

Cooling System

Coolant capacity	21 pints (Imperial), 25·21 pints (U.S.A.), 11·93 litres.
Pump	Centrifugal
Fan	Five blade
Pump and fan drive	Twin adjustable 'Vee'-belts
Radiator matrix	Film type
Radiator shutters	Fixed
Coolant temperature control	Pressurised system working at 7 lb/sq.in. Coolant circulation by centrifugal pump thermostatically controlled by a by-pass thermostat valve.
Temperature indicator	On instrument panel. Electric, registers when ignition switch is 'ON'.
Coolant	An inhibited solution of Ethylene Glycol (BSS 3150).

Propeller Shaft

Divided type, having a ball and trunnion universal joint and two needle roller universal joints. The shaft is supported in the centre by a flexibly mounted ball race.

Rear Axle

Type	Semi-floating
Final drive	Through a hypoid crown wheel and pinion
Pinion teeth	
Standard S2 cars	13
Bentley Continental S2 cars	13
Phantom V cars	9
Crown wheel teeth	
Standard S2 cars	40
Bentley Continental S2 cars	38
Phantom V cars	35
Ratio	
Standard S2 cars	3·08 : 1
Bentley Continental S2 cars	2·92 : 1
Phantom V cars	3·89 : 1
Oil capacity of casing	
Standard S2 cars	1⅝ pints
Bentley Continental S2 cars	1⅝ pints
Phantom V cars	1¾ pints

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Brakes

	Power assistance provided by a servo motor.
Footbrake	Independent twin hydraulic system with additional mechanical linkage to rear shoes.
Handbrake	Mechanical to rear wheels
Brake shoe linings	Ferodo DS2 or Mintex M 14
Friction lining area (4 brakes)	
S2 cars	240 sq.in. (1548 sq.cm.)
Bentley Continental S2 cars	304 sq.in. (1960 sq.cm.)
Handbrake lever	Twist grip barrel type

Servo Motor

General	The servo motor operates on the principle of the dry disc clutch. The lined friction plate is driven from the gearbox final shaft at approximately one-fifth of the propeller shaft speed.
Servo motor lining	Ferodo DM8
Cam angle	
S2 cars	37·5 deg. — twin master cylinders
Bentley Continental S2 cars	47 deg. — twin master cylinders

Front Hubs

General	Two taper roller races

Wheels and Tyres

Wheels	Bolted-on pressed steel wheels with covering discs.
Rim wheels	Well base rims, 6L × 15·00 in.
Tyres	
Standard S2 cars	8·20 in. × 15·00 in.
Bentley Continental S2 cars	8·00 in. × 15·00 in.
Phantom V cars	8·90 in. × 15·00 in.

Steering

Type	Power assisted
Steering unit	Cam and roller
Drive	Right-hand or left-hand
Steering wheel diameter	17 in.

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Suspension

Front	Independent coil spring suspension, hydraulic shock dampers and anti-roll stabiliser.
Rear (except Phantom V)	Semi-elliptic leaf springs. Controllable hydraulic shock dampers. A special form of axle control rod is fitted which, together with the road springs, takes the torque and brake reaction.
Phantom V	The Phantom V is as specified above with the exception of the rear axle control rod which is not fitted to the Phantom V chassis.

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Front Shock Dampers

Type and make	Rolls-Royce hydraulic double-acting.

Rear Shock Dampers

Type and make	Rolls-Royce hydraulic double-acting.
General	Controllable through a switch on the steering column.

Chassis Frame

Type	Box section throughout, with all welded joints.

Jacking System

Type	Smith Bevelift jacks

Battery

Make and type	Either P & R Dagenite — 6 HZP 11/9 GZF or Exide — 6 XTHZ 11/L.
Voltage	12 volts
Capacity	67 ampere-hours
Earth	Negative to chassis frame

Ignition Distributor

Make and type	Delco-Remy. Twin contact breakers with synchronised contact breaker arms.
Rotation	Anti-clockwise
Advance mechanism	Automatic (centrifugal governor)
Firing order	A1, B1, A4, B4, B2, A3, B3, A2 1, 5, 4, 8, 6, 3, 7, 2

Ignition Coil

Make	Delco-Remy or Lucas

Sparking Plugs

Make and type	Champion RN 8, Champion RN 13P or Lodge CLNP.

Generator

Make	Lucas
Type	C 48
Maximum output	35 amperes, 13·5 volts
Drive	Twin 'Vee'-belts
Voltage regulator and cut-out	Lucas RB 310, current voltage type

Starter Motor

Make and type	Lucas M-45G. 12 volts
Rotation	Anti-clockwise (from front of the engine)
Flywheel to pinion ratio	18 : 1

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Horns

Make and type — Lucas WT 618. Twin Wind-tone

Direction Indicators

Make and type — Lucas FL 5. Flashing type indicators

Windscreen Wipers

Make and type — Lucas DR 3. Two-speed self-parking

Headlamps

Make and type — Lucas RL 700

General — A small red warning light, mounted in the speedometer, is illuminated whenever the headlamps are on MAIN BEAM.

Fog Lamps

General — Twin fog lamps are fitted which incorporate the front FLASHER element. These are double filament pre-focus type bulbs.

Fuse Box

General — Large box contains eight circuit fuses. Each circuit fuse is one strand of No. 28 S.W.G. tinned copper wire. Spare fuse wire is provided on a special holder within large fuse box.

A small fuse box carries the horn fuse. This is a cartridge type fuse of 25 amp. rating.

Heating, De-misting, De-icing and Ventilation

General — Alloy heat exchanger under right-hand front wing, delivering fresh air, heated or at ambient temperature.

Independently operated recirculatory system utilising lower half of heater matrix. Rear window electrically heated.

Windscreen Washer

Make — Lucas S2J 026

General — Electrically operated. Special liquid has a low surface tension and anti-freeze properties.

Radio

Make — Radiomobile

Type — 501 TA/VT series for use in Belgium, Denmark, Eire, France, Germany, Holland, Norway, Sweden and Switzerland.

The 501 TA/VT series radio has both medium and long wave reception.

502 TA/VT series for use in Spain, Canada, U.S.A, Japan, Australia and New Zealand.

The 502 TA/VT has medium wave reception only.

230 R. radio for use in Africa, Asia, South America, West Indies, Italy and Portugal.

The 230 R. radio has medium and short wave reception.

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Body

General	Steel and light alloy stressed skin construction has been employed, the floor being an integral part of the body, to ensure optimum strength and rigidity consistent with lightness.

Dimensions

Wheelbase	
Standard S2 and Bentley Continental S2 cars	10 ft. 3 in. (312·4 cm.)
Long Wheelbase S2 cars	10 ft. 7 in. (322·6 cm.)
Phantom V cars	12 ft. 1 in. (368·3 cm.)
Track, front	
Standard S2, Bentley Continental S2 and Long Wheelbase S2 cars	4 ft. 10½ in. (148·6 cm.)
Phantom V cars	5 ft. 0⅞ in. (154·6 cm.)
Track, rear	
Standard S2, Bentley Continental S2 and Long Wheelbase S2 cars	5 ft. 0 in. (152·4 cm.)
Phantom V cars	5 ft. 4 in. (162·6 cm.)
Overall length (including bumpers)	
Standard S2 and Bentley Continental S2 cars	17 ft. 7¾ in. (537·8 cm.)
Long Wheelbase S2 cars	17 ft. 11¾ in. (548 cm.)
Phantom V cars	19 ft. 10 in. (624 cm.)
Overall width (over wings)	
Standard S2 and Long Wheelbase S2 cars	6 ft. 2¾ in. (189·8 cm.)
Bentley Continental S2 cars	6 ft. 1 in. (185·4 cm.)
Phantom V cars	6 ft. 7 in. (200·6 cm.)
Overall height (unladen)	
Standard S2, Bentley Continental S2 and Long Wheelbase S2 cars	5 ft. 4 in. (162·6 cm.)
Phantom V cars	5 ft. 9 in. (175·3 cm.)
Turning circle diameter	
Standard S2 and Bentley Continental S2 cars	41 ft. 8 in. (12·70 m.)
Long Wheelbase S2 cars	43 ft. 0 in. (13·1 m.)
Phantom V cars	48 ft. 9 in. (14·86 m.)
Weight, kerbside	
Standard S2 cars	41·5 cwt. (2108 kgs.)
Bentley Continental S2 cars	38 cwt. (1930·5 kgs.)
Long Wheelbase S2 cars	43 cwt. (2184 kgs.)
Phantom V cars	50 cwt. (2540 kgs.)

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SECTION A3

UNIFIED SCREW THREADS

The need for a common standard of screw threads in the United Kingdom, Canada and the United States of America has led to an agreement between the countries concerned to use UNIFIED THREADS of mutually acceptable form, pitch and diameter.

There are three types of unified thread:

1. Unified Coarse.
2. Unified Fine.
3. Unified Special.

These unified threads are clearly identified by the standard system of markings, as illustrated in Figure A1.

There is little difference between the form of the American national thread and the unified thread; therefore the new threads are largely interchangeable with S.A.E. standards. They are not, however, interchangeable with BSF, and although BSW have the same number of threads per inch as the Unified National Coarse series, interchanging is not recommended due to a difference in the thread form.

The following types of thread are used on nuts, bolts and castings fitted to Rolls-Royce and Bentley cars.

For all sizes below $\frac{1}{4}$ in. diameter, BA threads are used.

For all sizes between $\frac{1}{4}$ in. and $\frac{3}{4}$ in. diameter inclusive, the Unified Fine thread is used.

All sizes above $\frac{3}{4}$ in. diameter have been classified by Rolls-Royce and Bentley Motors as Unified Special and have 16 threads per inch.

The Unified Coarse Thread is not used.

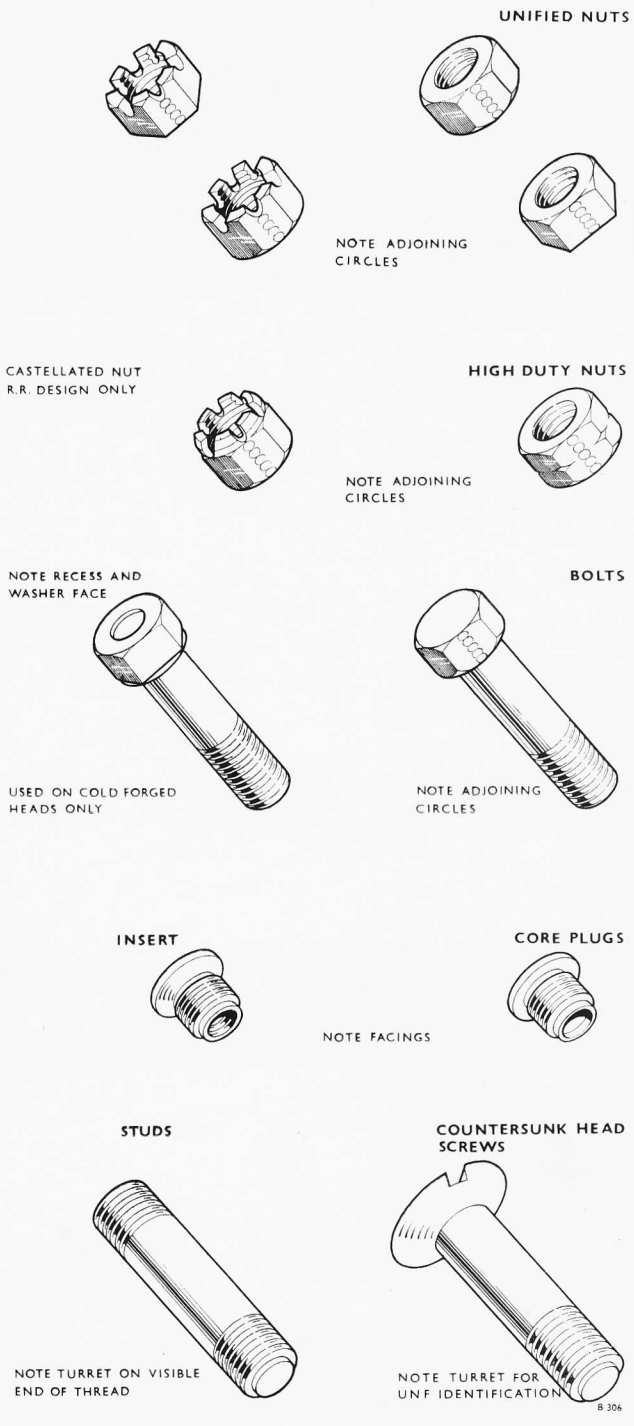

Fig. A1 Identification of unified threads

CHAPTER A

GENERAL INFORMATION

SECTION A1 SPECIFICATION — S3 CARS

Engine

Engine data appears in T.S.D. 2006.

Fuel system

Carburetters	Two S.U. H.D.8. diaphragm type 2·00 in. choke bores. Automatic choke for cold starting.
Air cleaner	Either a Purolator paper type element or an oil wetted wire mesh filter element depending upon which country the engine will be operating in. For details see latest Service Bulletin Section D, dealing with this subject.
Fuel pumps	Twin S.U. electric.
Fuel tank capacity	18 galls. (Imp.) 21·6 galls. (U.S.) 81·8 litres.
Fuel strainers	Main fuel strainer mounted on the frame member in front of the fuel tank. Small gauze strainer at the carburetter inlets and in the fuel pumps.
Fuel gauge	Electric — registers when the ignition is switched on.

Cooling system

Coolant capacity	21 pints (Imp.) 25·21 pints (U.S.) 11·93 litres.
Pump	Centrifugal
Fan	5-blade
Fan diameter	18 in.
Pump and fan drive	$\frac{13}{32}$ in. adjustable 'Vee' belts
Radiator matrix	Film type
Radiator shutters	Fixed
Coolant temperature control	82 C. – 86 C.
Temperature indicator	On instrument panel. Electric, registers when the ignition switch is on.
Coolant	An inhibited solution of ethylene glycol (B.S.S. 3150).

Propeller shaft

Divided type, having a ball and trunnion universal joint and two needle roller universal joints. The shaft is supported in the centre by a flexibly mounted ball race.

Rear axle

Type	Semi-floating
Final drive	Through a hypoid crown wheel and pinion.
Pinion teeth	
Standard S3 cars	13
Long Wheelbase S3 cars	13
Bentley Continental S3 cars	13
Phantom V cars	9
Crown wheel teeth	
Standard S3 cars	40
Long Wheelbase S3 cars	40
Bentley Continental S3 cars	40
Phantom V cars	35
Ratio	
Standard S3 cars	3·08 : 1
Long Wheelbase S3 cars	3·08 : 1
Bentley Continental S3 cars	3·08 : 1
Phantom V cars	3·89 : 1
Oil capacity of casing	
Standard S3 cars	1⅝ pints
Long Wheelbase S3 cars	1⅝ pints
Bentley Continental S3 cars	1⅝ pints
Phantom V cars	1¾ pints

Brakes

Foot brake	Power assistance provided by a servo motor. Independent twin hydraulic system with additional mechanical linkage to rear shoes.
Hand brake	Mechanical to rear wheels. Warning lamp fitted, operates when hand brake is applied and ignition switched on.
Brake shoe linings	Ferodo DS2 or Mintex M 14
Friction lining area (4 brakes)	
S3 cars	240 sq.in. (1548 sq.cm.)
Early Bentley Continental S3 cars	304 sq.in. (1960 sq.cm.)
Late Bentley Continental S3 cars	240 sq.in. (1548 sq.cm.)
Phantom V cars	240 sq.in. (1548 sq.cm.)
Hand brake lever	Twist grip barrel type

Servo motor

General	The servo motor operates on the principle of the dry disc clutch. The lined friction plate is driven from the gearbox final shaft at approximately one-fifth of the propeller shaft speed.
Servo motor lining	Ferodo DM8
Cam angle	
S3 cars	37·5° — twin master cylinders
Early Bentley Continental S3 cars	47° — twin master cylinders
Late Bentley Continental S3 cars	37·5° — twin master cylinders
Phantom V cars	37·5° — twin master cylinders

Front hubs

General	Two taper roller races

Wheels and tyres

Wheels	Bolted-on pressed steel wheels with covering discs.
Rim wheels	Well base rims, 6L × 15·00 in.
Tyres	
Standard S3 cars	8·20 in. — 15·00 in.
Long Wheelbase S3 cars	8·20 in. — 15·00 in.
Bentley Continental S3 cars	8·00 in. — 15·00 in.
Phantom V cars	8·90 in. — 15·00 in.

Steering

Type	Power assisted
Steering unit	Cam and roller
Drive	Right or left-hand
Steering wheel diameter	17 in.

Suspension

Front	Independent coil spring suspension, hydraulic shock dampers and anti-roll stabiliser.
Rear (except Phantom V)	Semi-elliptic leaf springs. Controllable hydraulic shock dampers. A special form of axle control rod is fitted which, together with the road springs, takes the torque and brake reaction.
Phantom V	The Phantom V is as specified above with the exception of the rear axle control rod which is not fitted to the Phantom V chassis.

Front shock dampers

Make and type	Rolls-Royce hydraulic double-acting.

Rear shock dampers

Make and type	Rolls-Royce hydraulic double-acting.
General	Controllable through a switch on the steering column.

Chassis frame

Type	Box section throughout, with all welded joints.

Jacking system

Type	Smith Bevelift jacks.

Battery

Make and type	Either P & R Dagenite — 6 HZP 11/9 GZF or Exide — 6 XTHZ 11/L.
Voltage	12 v.
Capacity	67 ampere-hours
Earth	Negative to chassis frame

Ignition distributor

Standard S3 cars and Continental S3 cars

Make and type	Lucas 20 D8. Eight lobe cam with double contact breakers.
Rotation	Anti-clockwise
Advance mechanism	Automatic centrifugal advance with built-in vacuum timing control.
Ignition timing	2° B.T.D.C.
Firing order	A1, B1, A4, B4, B2, A3, B3, A2. (1, 5, 4, 8, 6, 3, 7, 2.)
Contact gap	0·014 in. — 0·016 in.
Drive	Through camshaft skew gears

Phantom V

Make and type	Delco-Remy Twin contact breakers with synchronised contact breaker arms.
Rotation	Anti-clockwise
Advance mechanism	Automatic (centrifugal governor)
Ignition timing	2° B.T.D.C.
Firing order	A1, B1, A4, B4, B2, A3, B3, A2. (1, 5, 4, 8, 6, 3, 7, 2.)
Contact gap	0·019 in. — 0·021 in.
Drive	Through camshaft skew gears

Ignition coil

Make	Lucas

Sparking plugs

Make and type	
9 : 1 compression ratio	Champion RN.8
8 : 1 compression ratio	Champion RN.8, Champion RN.13P or Lodge CLNP.
Cars destined for Australia	Champion UN.12 Y
Gap	0·025 in.

Generator

Make	Lucas
Type	C 48
Maximum output	35 amperes, 13·5 v.
Drive	Twin 'Vee'-belts
Voltage regulator and cut-out	Lucas RB 310, current voltage type.

Starter motor

Make and type	Lucas M-45G. 12 v.
Rotation	Anti-clockwise (from front of the engine).
Flywheel to pinion ratio	18 : 1

Horns

Make and type	Lucas WT 618. Twin Wind-tone.

Direction indicators

Make and type	Lucas combined side lamps and flashing indicators, combined rear stop/tail and flashing indicators.

Windscreen wipers

Make and type — Lucas DR 3. Two-speed self-parking.

Headlamps

Make and type — Lucas 5¾ in. twin sealed beam headlamps mounted horizontally in each front wing.

General — A small red warning lamp, mounted in the speedometer is illuminated whenever the headlamps are switched to main beam. A switch for flashing the headlamp main beams is incorporated in the direction indicator switch.

Fog lamps

General — Twin fog lamps with single filament bulbs are fitted.

Fuse box

General — Large box contains eight circuit fuses. Each circuit fuse is one strand of No. 28 S.W.G. tinned copper wire. Spare fuse wire is provided on a special holder within large fuse box.

A small fuse box carries the horn fuse and headlamp flasher relay fuse. These are cartridge type fuses of 25 amp. rating.

Heating, de-misting, de-icing and ventilation

Standard S3 and Long Wheelbase cars — The 'Upper' heat exchanger under the right-hand front wing delivers fresh air which may be heated or at ambient temperature. Additional fresh air at ambient temperature can be obtained from a duct in the left-hand front wing.

The 'Lower' heat exchanger under the right-hand front wing delivers recirculated air to the car interior; this air may be heated or at ambient temperature.

The rear window is electrically heated.

Windscreen washer

Make — Lucas S2J 026

General — Electrically operated. Special liquid has a low surface tension and anti-freeze properties.

Radio

Make — Radiomobile

Type — 620T Medium and long wave radio suitable for the whole of Europe with the exception of Spain, Portugal and Italy.

622T Medium wave radio suitable for the U.S.A., Canada and Japan.

230R Medium and short wave radio suitable for Africa, Asia, South America, West Indies, Italy, Spain and Portugal.

Make — Pye

Type — TCR 2000/E medium wave radio suitable for Australia and New Zealand.

Body

General — Steel and light alloy stressed skin construction has been employed, the floor being an integral part of the body, to ensure optimum strength and rigidity consistent with lightness.

Dimensions

Wheelbase	
Standard S3 and Bentley Continental S3 cars	10 ft. 3 in. (312·4 cm.)
Long Wheelbase S3 cars	10 ft. 7 in. (322·6 cm.)
Phantom V cars	12 ft. 1 in. (368·3 cm.)
Track, front	
Standard S3, Bentley Continental S3 and Long Wheelbase S3 cars	4 ft. 10½ in. (148·6 cm.)
Phantom V cars	5 ft. 0⅞ in. (154·6 cm.)
Track, rear	
Standard S3, Bentley Continental S3 and Long Wheelbase S3 cars	5 ft. 0 in. (152·4 cm.)
Phantom V cars	5 ft. 4 in. (162·6 cm.)
Overall length* (including bumpers)	
Standard S3 and Bentley Continental S3 cars	17 ft. 6¼ in. (534·0 cm.)
Long Wheelbase S3 cars	17 ft. 10¼ in. (544·2 cm.)
Phantom V cars	19 ft. 8½ in. (620·2 cm.)

*Cars destined for America will be approximately 1½ in. longer

Overall width (over wings)	
Standard S3 and Long Wheelbase S3 cars	6 ft. 2¾ in. (189·8 cm.)
Bentley Continental S3 cars	6 ft. 1 in. (185·4 cm.)
Phantom V cars	6 ft. 7 in. (200·6 cm.)
Overall height (unladen)	
Standard S3, Bentley Continental S3 and Long Wheelbase S3 cars	5 ft. 4 in. (162·6 cm.)
Phantom V cars	5 ft. 9 in. (175·3 cm.)
Turning circle diameter	
Standard S3 and Bentley Continental S3 cars	41 ft. 8 in. (12·70 m.)
Long Wheelbase S3 cars	43 ft. 0 in. (13·10 m.)
Phantom V cars	48 ft. 9 in. (14·86 m.)
Weight, kerbside	
Standard S3 cars	41·5 cwt. (2108 kgs.)
Bentley Continental S3 cars	38 cwt. (1930·5 kgs.)
Long Wheelbase S3 cars	43 cwt. (2184 kgs.)
Phantom V cars	50 cwt. (2540 kgs.)

SECTION A2 — CHASSIS TORQUE TIGHTENING CHART

TORQUE FIGURES — CADMIUM PLATED STANDARD PARTS

Size			Full Nut Torque		Half Nut Torque	
2 B.A.			48 lb. in.	to 60 lb. in.	30 lb. in.	to 36 lb. in.
¼ in.	UNF	$\frac{7}{16}$ in. A.F.	8 lb. ft. (0·97 kg.m.)	to 10 lb. ft. (1·39 kg.m.)	5 lb. ft. (0·69 kg.m.)	to 10 lb. ft. (1·39 kg.m.)
$\frac{5}{16}$ in.	UNF	½ in. A.F.	16 lb. ft. (2·21 kg.m.)	to 18 lb. ft. (2·49 kg.m.)	13 lb. ft. (1·80 kg.m.)	to 15 lb. ft. (2·07 kg.m.)
⅜ in.	UNF	$\frac{9}{16}$ in. A.F.	29 lb. ft. (4·01 kg.m.)	to 32 lb. ft. (4·42 kg.m.)	22 lb. ft. (3·04 kg.m.)	to 25 lb. ft. (3·46 kg.m.)
$\frac{7}{16}$ in.	UNF	⅝ in. A.F.	42 lb. ft. (5·80 kg.m.)	to 45 lb. ft. (6·22 kg.m.)	33 lb. ft. (4·56 kg.m.)	to 36 lb. ft. (4·98 kg.m.)
½ in.	UNF	¾ in. A.F.	60 lb. ft. (8·30 kg.m.)	to 65 lb. ft. (9·00 kg.m.)	48 lb. ft. (6·63 kg.m.)	to 52 lb. ft. (7·19 kg.m.)
⅝ in.	UNF	—	85 lb. ft. (11·75 kg.m.)	to 90 lb. ft. (12·44 kg.m.)	73 lb. ft. (10·10 kg.m.)	to 78 lb. ft. (10·80 kg.m.)

Setscrews

All setscrews are to be torque tightened to the appropriate figures quoted in the above table for **full** nuts, unless otherwise specified

Important

In order to ensure correct torque tightness figures are obtained for plated parts, all burrs and foreign matter e.g. grit, grease and paint must be removed from the abutment faces of the nuts, setscrews, washers and components.

Non-Plated Parts

The following non-plated parts are to be torque tightened to the appropriate figures quoted in the above table for cadmium plated parts.

Rear spring 'U' bolts.
Exhaust downtake pipe.

The torque loadings for non-plated nuts and bolts apply when engine oil is smeared on the threads and the bolt or nut faces.

For SPECIAL TORQUE TIGHTNESS FIGURES, see overleaf

SPECIAL TORQUE TIGHTNESS FIGURES

	Torque
Bumpers — Front and Rear	
$\frac{3}{8}$ in. dia. UNF nut — Output flange	10 lb. ft. (1·39 kg.m.) to 12 lb. ft. (1·66 kg.m.)
Dampers — Front	
$\frac{7}{16}$ in. dia. UNF nut — Piston actuating lever	60 lb. ft. (8·30 kg.m.) to 70 lb. ft. (9·68 kg.m.)
$\frac{7}{16}$ in. dia. UNF filler plug	12 lb. ft. (1·66 kg.m.) to 15 lb. ft. (2·07 kg.m.)
$\frac{5}{16}$ in. dia. UNF solenoid control plug	10 lb. ft. (1·38 kg.m.) to 12 lb. ft. (1·66 kg.m.)
$\frac{7}{8}$ in. dia. UNF rear plug	30 lb. ft. (4·15 kg.m.) to 45 lb. ft. (6·22 kg.m.)
Dampers — Rear	
$\frac{7}{16}$ in. dia. UNF nut — Piston actuating lever	60 lb. ft. (8·30 kg.m.) to 70 lb. ft. (9·68 kg.m.)
$\frac{7}{16}$ in. dia. UNF filler plug	12 lb. ft. (1·66 kg.m.) to 15 lb. ft. (2·07 kg.m.)
$\frac{5}{16}$ in. dia. UNF solenoid control plug	10 lb. ft. (1·38 kg.m.) to 12 lb. ft. (1·66 kg.m.)
$\frac{7}{8}$ in. dia. UNF rear plug	30 lb. ft. (4·15 kg.m.) to 45 lb. ft. (6·22 kg.m.)
$\frac{1}{2}$ in. dia. UNF nut — Damper links	45 lb. ft. (6·22 kg.m.) to 60 lb. ft. (8·30 kg.m.)
Drag Link and Track Rods	
$\frac{3}{8}$ in. dia. nut securing ball pins	35 lb. ft. (4·84 kg.m.) to 40 lb. ft. (5·53 kg.m.)
$1\frac{1}{4}$ in. dia. UNF ball pin socket plug	45 lb. ft. (6·22 kg.m.) to 50 lb. ft. (6·91 kg.m.)
Frame and Fittings	
$\frac{7}{8}$ in. dia. nut — Rear spring front anchorage	150 lb. ft. (20·73 kg.m.) to 180 lb. ft. (24·88 kg.m.)
Front Suspension	
B $\frac{3}{4}$ in. dia. UNF fulcrum pin — Upper	150 lb. ft. (20·73 kg.m.)
B $1\frac{1}{4}$ in. dia. UNF threaded bushes — Lower triangle levers	250 lb. ft. (34·57 kg.m.)

Fuel Pumps

$\frac{3}{8}$ in. dia. cone adaptors (light alloy)	17lb. ft. to 20 lb. ft	(2·35 kg.m.) (2·77 kg.m.)

Fuel Tank

$\frac{3}{8}$ in. dia. adaptor	17 lb. ft. to 20 lb. ft.	(2·35 kg.m.) (2·77 kg.m.)
1 in. dia. drain plug	35 lb. ft. to 40 lb. ft.	(4·84 kg.m.) (5·53 kg.m.)

Generator

C47 — Nut — Retaining fan and pulley	50 lb. ft.	(6·91 kg.m.)
C48 — Nut — Retaining fan and pulley	40 lb. ft.	(5·53 kg.m.)

Hubs — Front

$\frac{1}{4}$ in. dia. UNF screw — Drum	30 lb. in. to 35 lb. in.	
$\frac{1}{2}$ in. dia. UNF wheel nuts	45 lb. ft. to 50 lb. ft.	(6·22 kg.m.) (6·91 kg.m.)

Hubs — Rear

$\frac{1}{2}$ in. dia. UNF wheel nuts	45 lb. ft. to 50 lb. ft.	(6·22 kg.m.) (6·91 kg.m.)

Lamps and Body Electrical Fittings

$\frac{5}{8}$ in. dia. nut — Fog lamps	27 lb. ft. to 30 lb. ft.	(3·73 kg.m.) (4·15 kg.m.)

Pipes and Fittings

$\frac{1}{8}$ in. British standard pipe fitting — fuel filter drain plug	7 lb. ft. to 9 lb. ft.	(0·97 kg.m.) (1·24 kg.m.)
Brake hose lock-nuts	10 lb. ft. to 12 lb. ft.	(1·39 kg.m.) (1·66 kg.m.)
All brake pipe nuts are to be torque tightened	10 lb. ft. to 12 lb. ft.	(1·39 kg.m.) (1·66 kg.m.)
All Bijur pipe nuts are to be torque tightened	5 lb. ft. to 8 lb. ft.	(0·69 kg.m.) (1·11 kg.m.)
$\frac{3}{8}$ in. dia. cone adaptors — Filter	17 lb. ft. to 20 lb. ft.	(2·35 kg.m.) (2·77 kg.m.)
$\frac{3}{8}$ in. dia. sleeve — Fuel pipes	12 lb. ft. to 14 lb. ft.	(1·66 kg.m.) (1·94 kg.m.)

Propeller Shaft

1 in. dia. UNF nut propeller shaft flange	150 lb. ft. to 180 lb. ft.	(20·73 kg.m.) (24·88 kg.m.)
A $\frac{7}{16}$ in. dia. UNF nut — Detroit joint to flange	45 lb. ft. to 50 lb. ft.	(6·22 kg.m.) (6·91 kg.m.)
B $\frac{9}{16}$ in. dia. UNF nut — Detroit joint to flange	70 lb. ft. to 75 lb. ft.	(9·68 kg.m.) (10·37 kg.m.)

Rear Axle

1 in. dia. UNF ventilator plug	30 lb. ft.	(4·15 kg.m.)
	to 35 lb. ft.	(4·84 kg.m.)
1 in. dia. UNF filler and drain plug	45 lb. ft.	(6·22 kg.m.)
	to 50 lb. ft.	(6·91 kg.m.)
1 in. dia. UNF nut — Pinion flange	195 lb. ft.	(27·00 kg.m.)
	to 215 lb. ft.	(29·43 kg.m.)
1⅜ in. dia. UNF nut — Pinion bearing	150 lb. ft.	(20·73 kg.m.)
	to 180 lb. ft.	(24·88 kg.m.)
$\frac{5}{16}$ in. dia. UNF setscrews — Axle tube to end plate	22 lb. ft.	(3·04 kg.m.)
	to 24 lb. ft.	(3·32 kg.m.)
$\frac{3}{8}$ in. dia. UNF setscrews — Axle tube to wheel bearing housing	38 lb. ft.	(5·26 kg.m.)
	to 40 lb. ft.	(5·53 kg.m.)
$\frac{5}{16}$ in. dia. UNF nuts — Securing end plate to centre casing	22 lb. ft.	(3·04 kg.m.)
	to 24 lb. ft.	(3·32 kg.m.)
$\frac{3}{8}$ in. dia. UNF nuts — Crown wheel to differential casing	45 lb. ft.	(6·22 kg.m.)
	to 50 lb. ft.	(6·91 kg.m.)

Side Steering Lever

$\frac{3}{8}$ in. dia. UNF setscrew (non waisted and no identification mark)	As torque figure for standard parts	
$\frac{7}{16}$ in. dia. UNF setscrew (non waisted and no identification mark)	As torque figure for standard parts	
$\frac{3}{8}$ in. dia. UNF setscrew (waisted and vee cuts on corners of hexagon for identification)	37 lb. ft.	(5·11 kg.m.)
	to 42 lb. ft.	(5·81 kg.m.)
$\frac{7}{16}$ in. dia. UNF setscrew (waisted and vee cuts on corners of hexagon for identification)	54 lb. ft.	(7·47 kg.m.)
	to 57 lb. ft.	(7·88 kg.m.)

Wiring and Fittings

2 B.A. nut — Starter motor solenoid, tighten lightly (because of pulling on to rubber), fit and tighten lock-nut	24 lb. in. to 30 lb. in.	

Yoke and Cross Steering Pivots

A	$\frac{3}{4}$ in. UNF adaptor with $\frac{1}{8}$ in. reducing adaptor for yoke lubrication	35 lb. ft.	(4·84 kg.m)
		to 40 lb. ft.	(5·53 kg.m)

Miscellaneous

All cheesehead screws including those of worm-drive clips are to be torque tightened to 20 lb. in.

ITEMS WHICH ARE NOT TORQUE TIGHTENED

1. Nuts which are locked by riveting
2. 3 $\frac{9}{16}$ in. dia. UNF nut — Oil seal housing retaining — Rear axle
3. Woodscrews
4. Bearing end float adjustment nuts — Front stub axles
5. The $\frac{1}{4}$ in. dia. screws in door striker plates
6. All threads less than 2 B.A.
7. Front door private locks $\frac{3}{4}$ in. dia. nuts

A S1 Series
B S2 Series onwards

Torque tightening figures for the threads of the **engine** and **gearbox** interior components are not included