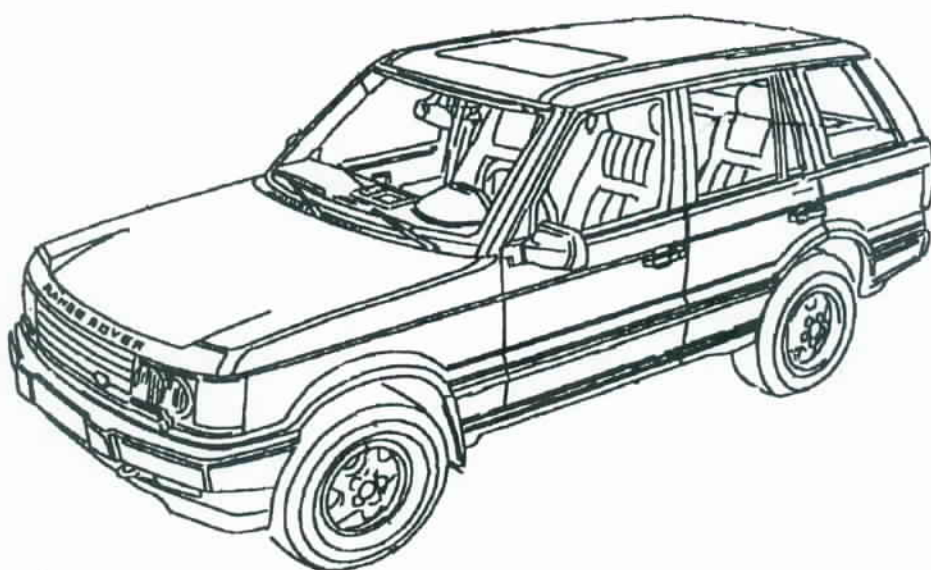


1999 Range Rover 4.6 HSE

CALLAWAY



LIMITED EDITION VEHICLE

PARTS AND SERVICE INFORMATION SUPPLEMENT



1999 Range Rover 4.6 HSE

CALLAWAY

INTRODUCTION

Land Rover and Callaway Cars have undertaken a performance enhancement program on a limited number of 1999 Range Rover 4.6 HSE's. Land Rover engineers, working together with Callaway Cars, have optimized specific powertrain components to deliver a higher level of performance than was previously available. Many aspects of the engine's intake and exhaust system have been optimized to deliver a new level of power and performance. The result is an impressive 240 bhp at 5,000 rpm and 285 lb-ft of torque at 3,500 rpm. The increased power level is achieved while maintaining the 4.6-liter engine displacement, providing 52 bhp/liter, the most powerful production Land Rover V8 ever produced. All of these special Range Rovers were assembled in Solihull, England on the standard Range Rover production line.

Other powertrain changes include a revised gear ratio for the transfer box, revised transmission and torque converter, stronger front axle shafts, and a stronger front axle differential. In addition, the electronic engine (GEMS) and automatic transmission control unit (TCM) software have been revised to accommodate the increased torque and power output for this specification.

The exterior and interior of the vehicles have also been enhanced to visually differentiate the vehicle from other Range Rovers.

- Niagara Gray, Epsom Green or Rutland Red exterior colors
- Ash Black leather upholstery
- Body color front grille, headlamp finishers, front and rear bumpers, side door mirrors
- Specific "Callaway" badges on exterior
- Twin tailpipe exhaust system with T309 stainless steel finishers
- "Proline" 18 inch alloy wheels with Michelin tires
- Leather covered shift knob with de-bossed Callaway logo
- Sequentially numbered vehicle dash plaque
- Soft feel leather center console cubby box cover

This document outlines the unique service or unit repair procedures required for the 1999 Callaway specification Range Rover. This information should be used to supplement service and parts literature applicable to the North American market.

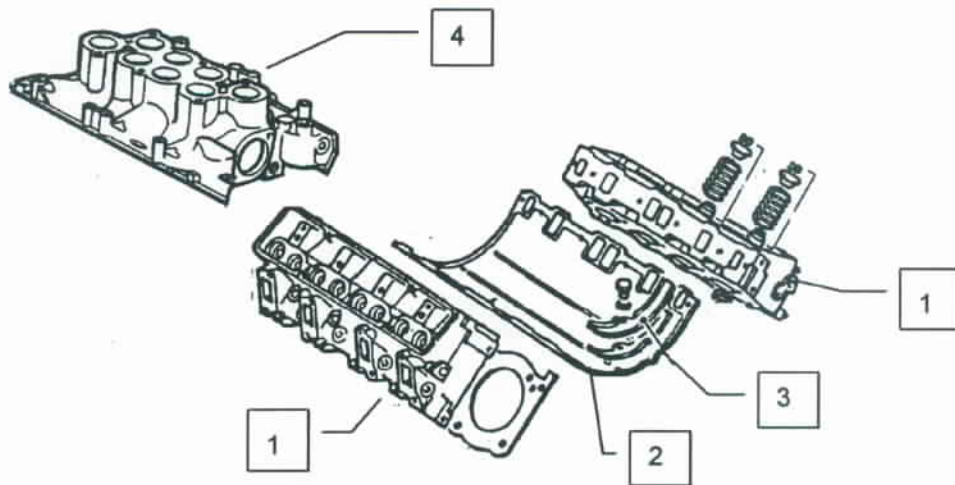
TESTBOOK

There are no new requirements or procedures for using TESTBOOK on the Callaway Range Rover. All test parameters and operating points remain unchanged.

SERVICE TOOLS

No additional service tools are required for the Callaway Range Rover.

1999 Range Rover 4.6 HSE CALLAWAY



MODEL

Range Rover 4.6 - Callaway

III	Part No.	Description	Qty	Remarks
1	LRN4323CAL	Cylinder Head Assembly	2	Rocker shafts not included
2	LRN7306CAL	Inlet Manifold Gasket	1	
3	LRN7282CAL	Front Valley Gasket Clamp	1 1	
4	LRN4886CAL	Inlet Manifold	1	

1999 Range Rover 4.6 HSE

CALLAWAY

4.6 liter V8 ENGINE COMPONENTS

CAUTION: The Rover Callaway 4.6 liter V8 engine requires high-octane fuel. Use a minimum pump octane rating of 92 [(R+N)/2].

NOTE: All fastener torque values remain unchanged for the 4.6 liter Callaway V8.

Callaway Range Rover engine and drive train changes include the unique components described below. Service intervals and requirements are unmodified. Replacement components are listed in the accompanying parts listings.

ENGINE BLOCK

Each Callaway engine block has been stamped with an indicated "9.60:1" compression ratio. The 4.6 liter engine block is otherwise unchanged and should be serviced as an ordinary 4.6 liter engine.

CYLINDER HEADS

CAUTION: Should a cylinder head require servicing due to an out-of-specification surface flatness or require valve refinishing or valve guide service, the cylinder head must be replaced.

- **DO NOT** machine the head gasket face of the cylinder head if it is damaged. Replace the cylinder head.
- **NEVER** fit a standard cylinder head to a Callaway 4.6 liter V8.

The cylinder heads will be treated as **non-serviceable**. Dealers may *not* service heads except for the following components: valve springs, valve spring retainer, valve stem retainers and rocker shaft assemblies.

INLET MANIFOLD

CAUTION: **DO NOT USE** a non-Callaway inlet manifold or engine damage could result.

The inlet manifold used on the Callaway 4.6 liter V8 has been machined to match the cylinder head flange surfaces and intake port geometry. If the inlet manifold requires replacement, a replacement Callaway 4.6 liter manifold must be used.

The engine sensors, fittings and fasteners used on the inlet manifold are unchanged and should be serviced as an ordinary 4.6 liter V8.

INLET MANIFOLD GASKET

CAUTION: **DO NOT USE** any other inlet manifold gasket. Use only a replacement Callaway 4.6 liter V8 inlet manifold gasket.

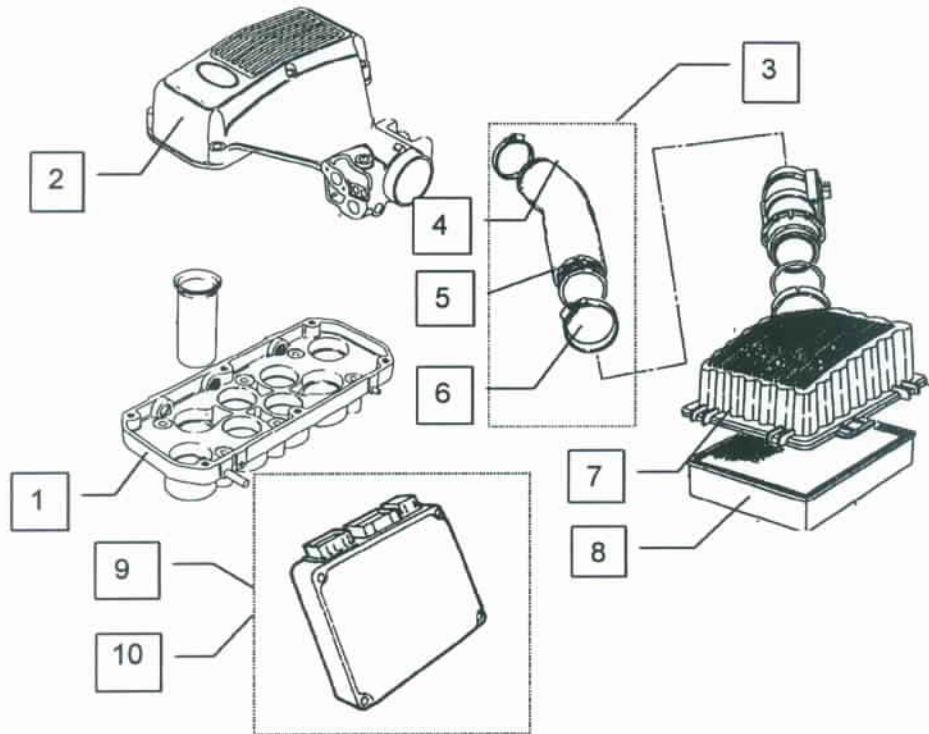
The inlet manifold gasket used on the Callaway 4.6 liter V8 has been matched to the inlet manifold flange geometry.

INLET MANIFOLD GASKET FRONT VALLEY CLAMP

CAUTION: If the clamp requires replacement, only use a Callaway 4.6 liter V8 front valley clamp to avoid heater hose damage.

The front valley clamp used on the Callaway inlet manifold gasket can be identified by its black finish, and a machined relief in the top edge of the clamp to accommodate the heater hose on the bottom of the inlet manifold.

1999 Range Rover 4.6 HSE CALLAWAY



MODEL

Range Rover 4.6 - Callaway

III	Part No.	Description	Qty	Remarks
1	LRN6543CAL	Ram Pipe Housing	1	
2	LRN7188CAL	Upper Plenum	1	
3	LRN3800CAL	Air duct Assembly	1	
4	LRN3850CAL	• Air duct, Carbon Fiber	1	Part of LRN3800CAL
5	LRN3851CAL	• Air duct Bellows	2	Part of LRN3800CAL
6	LRN908CAL	• Carbon Fiber Duct Clamps	4	Part of LRN3800 CAL Can use CN101008L
7	LRN3849CAL	High Flow Air Box	1	
8	LRN4238CAL	High Flow Air Filter	1	Service Replacement Part
9	MSB101160	Callaway GEMS Control Unit	1	
*10	PRM9659	• Callaway PROM Set	1	*Not Shown

1999 Range Rover 4.6 HSE

CALLAWAY

UPPER PLENUM ASSEMBLY

The Callaway 4.6 liter upper plenum assembly is identified by the "CALLAWAY" name machined into the top surface of the plenum casting. The plenum casting uses a larger diameter throttle bore with accompanying throttle plate and throttle plate shaft. It also utilizes a unique fuel vapor purge inlet pipe. If the throttle plate or throttle plate shaft require replacement or service, the plenum should be replaced as a complete assembly.

All other components on the plenum (i.e. sensors, fasteners) can be serviced as an ordinary 4.6 liter plenum.

RAM PIPE HOUSING

The ram pipe housing used on the Callaway 4.6 liter is identified by its black power-coated base and its shorter ram pipes. If the ram pipe housing requires replacement, it should only be replaced with a Callaway-specification ram pipe housing. The fittings and fasteners used on the housing are unchanged and can be serviced as an ordinary 4.6 liter V8.

AIR INDUCTION SYSTEM

The air induction system components used on the Callaway 4.6 HSE Range Rover have been optimized to provide a higher air flow rate to the engine. The mass air flow sensor (MAFS) is **unchanged** for the Callaway 4.6 liter engine.

NOTE: Only replace a Callaway air filter with the same type high-flow filter.

The air cleaner assembly and air inlet duct components are Callaway specific, but are serviced in the same manner as a standard 4.6 liter.

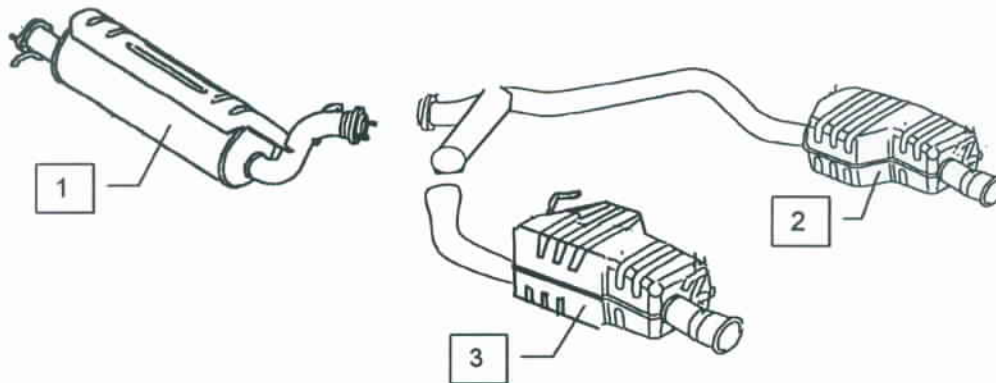
- A "panel style" high-flow air filter element is mounted in a revised air cleaner assembly base. The filter element is serviced in the same manner and at the same intervals found in the Owner's Handbook for a standard Range Rover air filter.
- The air inlet duct assembly used on the Callaway 4.6 liter engine is constructed from carbon fiber. The air duct uses flexible silicon rubber bellows at each end. Should the air inlet duct assembly require servicing, the components that make up the assembly are available separately. The torque specification for the air inlet clamps are 2.3 Nm (20 lbf.in.) for the end clamps and 0.9 Nm (8 lbf.in.) for the clamps on the carbon fiber air duct.

ENGINE MANAGEMENT SYSTEM (GEMS)

The GEMS ECU is calibrated specifically for the Callaway 4.6 liter engine. The ECU is serviced in the same manner as a standard GEMS ECU. Replacement ECU's are available through Land Rover North America.

The Callaway GEMS units calibration can be identified by the unique ECU and PROM numbers. The service replacement part number for the GEMS ECU is **#MSB101160**. The PROM set can be identified by the number **PRM #9659**.

1999 Range Rover 4.6 HSE CALLAWAY



MODEL

Range Rover 4.6 - Callaway

III	Part No.	Description	Qty	Remarks
1	LRN3195CAL	High Flow Exhaust Silencer	1	
2	LRN100160CAL	RH Tailpipe Assy with SS Tip	1	Tip not available separately
3	LRN100150CAL	LH Tailpipe Assy with SS Tip	1	Tip not available separately
*	ESR4120	Heat Shield, Body	1	Spare wheel well
*	ESR4121	Heat Shield, Body	1	Tool storage
*	ESR2928	Clip, Heat Shield	10	

*Not Shown

1999 Range Rover 4.6 HSE

CALLAWAY

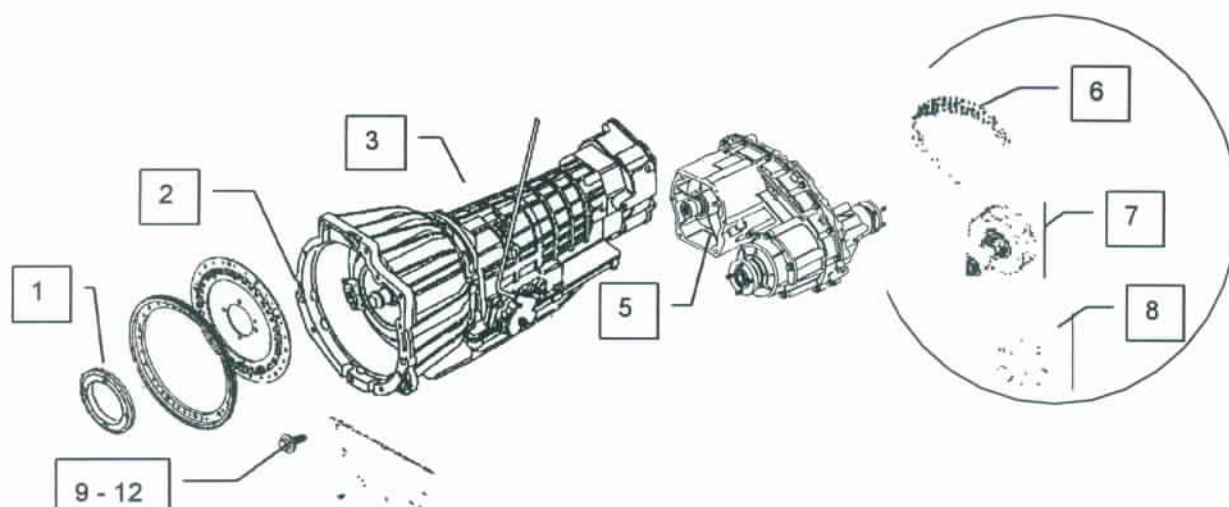
EXHAUST SYSTEM

The exhaust system used on the Callaway 4.6 HSE Range Rover is vehicle-specific from the "Y" catalyst down-pipe assembly rearward. The center silencer is a smaller diameter, stainless steel, low back pressure design. It has been specially tuned for the Callaway 4.6 liter HSE Range Rover.

The stainless steel exhaust tips are welded to the twin tailpipe resonator boxes and are *not* serviceable separately. Should a left or right tailpipe finisher or resonator require replacement, a complete side must be ordered through Land Rover North America.

1999 Range Rover 4.6 HSE

CALLAWAY



MODEL

Range Rover 4.6 - Callaway

III	Part No.	Description	Qty	Remarks
1	FTC4608	Spacer Ring	1	12mm
*2	LRN6194CAL	Lambda Cable Bracket	1	
*	FN110047	Nut	1	Lambda bracket
*	FB110081L	Bolt	1	Lambda bracket
3	TGD101100	Transmission	1	With Torque Converter
*4	TRG24456	Transmission Control Module	1	*Not shown
5	LRN4745CAL	Transfer Gearbox	1	
6	LRN3238CAL	• Transfer Gearbox Chain	1	
7	LRN3233CAL	• Intermediate Sprocket	1	
8	LRN3239CAL	• Differential/Sprocket	1	
9	FB106091	Bolt	2	6mm x 45mm
10	FB106101L	Bolt	2	6mm x 50mm
11	4898	Spacer	2	3.0mm thick
12	FN106041	Nut	4	6mm

*Not shown

1999 Range Rover 4.6 HSE

CALLAWAY

POWER TRAIN COMPONENTS

ENGINE DRIVE PLATE SPACER

CAUTION: Should the drive plate spacer need servicing, refit only a special spacer of the same size (12mm). Transmission FAILURE will result from the use of a standard 4.6-liter V8 drive spacer.

The Callaway 4.6 liter V8 uses a 12mm thick engine drive plate spacer. This spacer has a different dimension from the standard 4.6 liter spacer because of the unique torque converter and transmission components used in the Callaway 4.6 HSE Range Rover.

ZF AUTOMATIC 4-SPEED TRANSMISSION

The Callaway 4.6 HSE Range Rover utilizes a unique bell housing, torque converter, and torque converter pump assembly mated to the standard 4-speed 4.6 liter HSE transmission. The transmission is serviced as a complete assembly.

The service intervals and requirements for the Callaway 4.6 liter transmission are unchanged from the current maintenance schedule. The Callaway 4.6 HSE transmission retains the dipstick and dipstick tube.

TRANSMISSION CONTROL MODULE (TCM)

CAUTION: NEVER use a standard 4.6 HSE control unit in a Callaway 4.6 HSE Range Rover or visa versa. Transmission damage will result if an incorrect TCM is used.

The transmission control module (TCM) in the Callaway 4.6 HSE Range Rover is specifically calibrated to the vehicle. If the TCM requires replacement, it is serviced in the same manner as other 4.6 HSE Range Rovers.

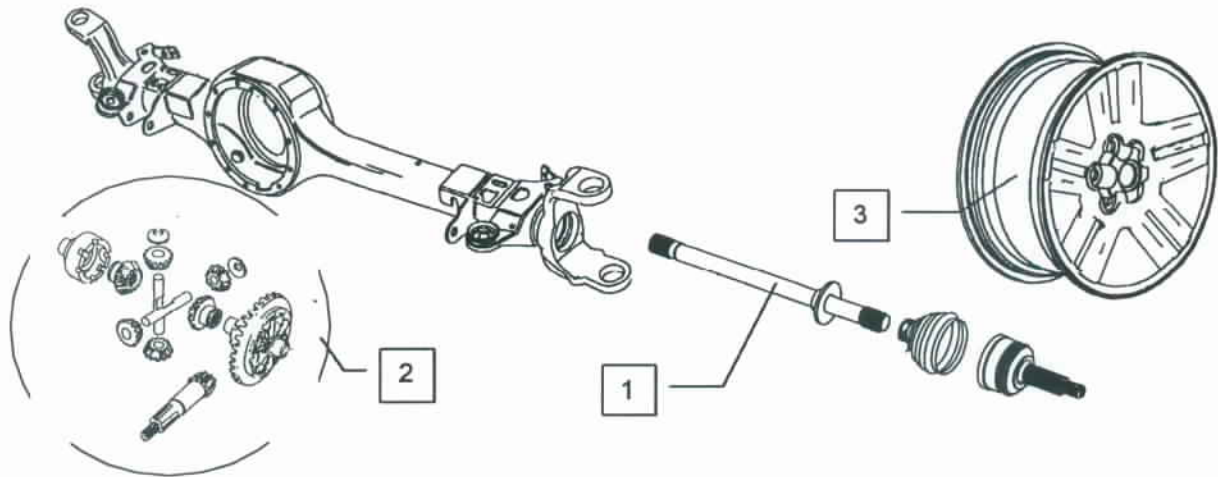
BORG-WARNER ELECTRONIC SHIFT TRANSFER GEARBOX

The Callaway 4.6 HSE Range Rover uses a different gear ratio in the transfer gearbox. The drive chain and corresponding sprocket set is unique to the Callaway 4.6 HSE Range Rover. **This is the only change** to the transfer gearbox used in the Callaway 4.6 HSE Range Rover.

The chain and chain sprockets are serviceable. Spare components are available through Land Rover North America. The transfer gearbox can be identified as a Callaway 4.6 HSE unit by the *RED serial number plate* riveted to the exterior of the case behind the parking brake drum backing plate. All other components for the transfer gearbox are the same as the standard Range Rover.

The fluid maintenance intervals are the same as the standard Range Rover transfer gearbox.

1999 Range Rover 4.6 HSE **CALLAWAY**



MODEL

Range Rover 4.6 - Callaway

III	Part No.	Description	Qty	Remarks
1	TDB104080	Front Axle Shaft	1	RH
1	TDB104090	Front Axle Shaft	1	LH
2	FTC3483	Front Differential Assy.	1	4-pin type
3	ANR4849MNH	Wheel, 18 inch	5	"Proline"

1999 Range Rover 4.6 HSE

CALLAWAY

FRONT AXLE HALF-SHAFTS

The front axle half-shafts used on the Callaway 4.6 liter HSE have been manufactured from a harder material for improved strength. Other than a material change, there are no changes to either the left or the right shaft. The constant velocity joints used on the Callaway 4.6 HSE are standard Range Rover components.

FRONT AXLE DIFFERENTIAL

The Callaway 4.6 HSE front axle utilizes a 4-pin differential section. It is the same 4-pin differential used in the rear axle on electronic traction control (ETC) equipped Range Rovers. All service procedures specified for the rear differential should be followed should servicing be required on the front differential of a Callaway 4.6 HSE Range Rover.

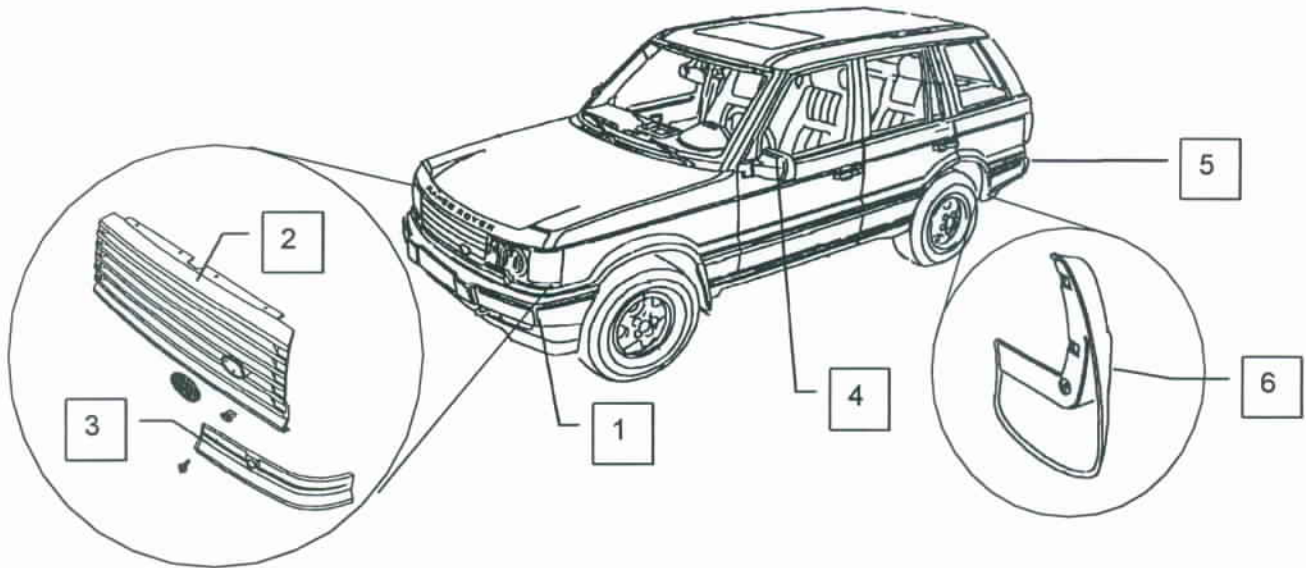
The axle fluid-fill level remains the same for the Callaway 4.6 HSE front axle assembly as for other Range Rovers.

WHEELS

Proline 18 inch wheels are used with Michelin tires.

1999 Range Rover 4.6 HSE

CALLAWAY



MODEL

Range Rover 4.6 - Callaway

III	Part No.	Description	Qty	Remarks
1	DPB103830	Front Bumper	1	
2	STC60178LML/HAF	Front Grill	1	Niagara/Epsom
3	STC60180LML/HAF	Headlamp Finisher	1	LH Niagara/Epsom
3	STC60179LML/HAF	Headlamp Finisher	1	RH Niagara/Epsom
4	STC60176LML/HAF	Door Mirror	1	LH Niagara/Epsom
4	STC60177LML/HAF	Door Mirror	1	RH Niagara/Epsom
5	STC60175LVD	Rear Bumper	1	Twin Exhaust
6	AWR3329	LH Rear Mud Flap	1	Twin Exhaust
*	STC60181	Gearshift Knob	1	
*	FJB100330LNF	Cubby Box Lid	1	
*	LRN1334CAL	Label, "Callaway"	1	Tailgate location
*	LRN18697CAL	Label, Octane	1	Gas Door location
*	BAC103650	Label, Emissions	1	Radiator support

* Not Shown

1999 Range Rover 4.6 HSE

CALLAWAY

UNIQUE BODY COMPONENTS

PAINTED BODY COLOR COMPONENTS

NOTE: When the initial inventory of pre-painted components is exhausted, body color components will be supplied by Land Rover North America in primed condition for final preparation and finish coating.

The Callaway 4.6 HSE Range Rovers have the following exterior body components painted to match the body shell color:

- Front bumper
- Front grill
- Left front headlamp finisher
- Right front headlamp finisher
- Rear bumper
- Door mirror casings

Should these components require replacement or re-painting in service, the appropriate Land Rover recommended paint repair procedures must be followed.