



Quaife BMW

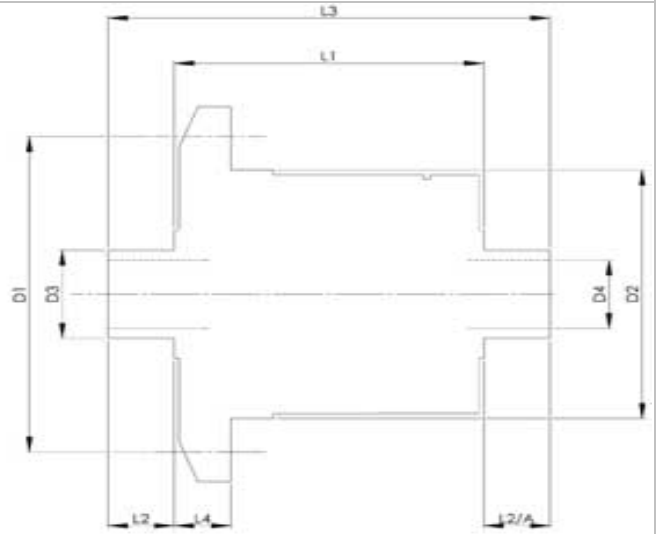
Tuning BMW

Service BMW

Before You Start

Due to the extensive list of different final drives installed, particularly across different countries, there may be instances where the Quaife differential offered differs dimensionally with the differential installed in the vehicle concerned. It makes good sense, therefore, to check the gearset installed in the car at the earliest possible time. In most cases, it is possible to remove the rear cover of the final drive to check the critical dimensions before committing to the conversion.

The critical dimension is the crownwheel to bearing dimension, marked L4. This can be checked visually by offering the Quaife up to the existing open differential. If there is doubt about the configuration, then check the differential number as below.



Part references, location on differentials



On an "open" differential, the last 7 digits of the part number are located on the rear of the crownwheel flange. (1 216 158)



On a LSD, the BMW part number is located on the clutch drum. (1 117 242)

These numbers are the only absolute references that can enable a match to a Quaife differential. In most cases these numbers can be observed by removal of the rear cover. In some cases, however, it may be necessary to remove the entire final drive.

If in doubt, please contact your supplier with the following information

Open differential part number.

Chassis/VIN Number

Transmission Type
(Manual/Auto/SMG)

Kevin Bird Garages Limited

2, The Ridgeway, Iver, Buckinghamshire, Great Britain, SL0 9HW
Tel 01753 657 444, Fax 01753 655 963, Web www.BirdsAuto.com



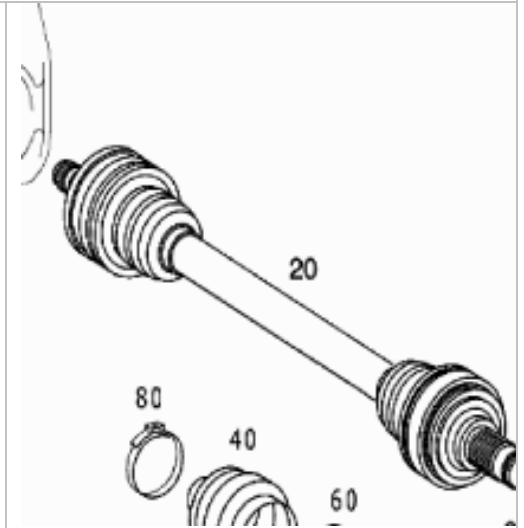
Issues with Output Shafts

There is a distinctive difference between the two principal fixing methods used by Mercedes Benz for securing the output shafts into the differential

Plug-In Shaft.

This is by far the most common method of shaft fitting, and is fully compatible with Quaife ATB differentials. There is a "Snap-Ring" mounted onto the inner end of the shaft. This is designed to easily compress into the groove in the shaft for installation, and expands outwards into a groove inside the Quaife differential. Installation pressure is moderate, because the lead-in chamfer in the splined bore of the Quaife ATB is machined at 30 degrees from the axis.

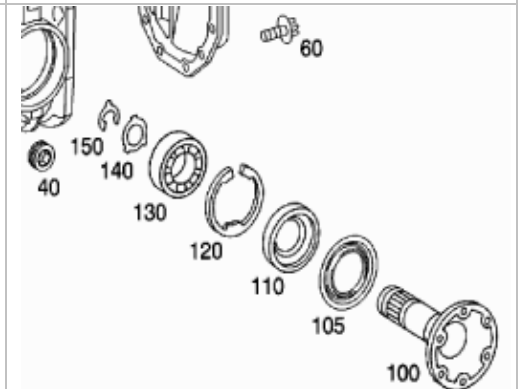
When withdrawing the shaft, perhaps for reasons of seal replacement, the pressure required to remove is higher, due to the lead-out chamfer in the splined bore of the Quaife being machined at 45 degrees from the axis. Extraction pressure has been measured at 30 Kg Force.



Bolted Shaft Flange.

This type is secured inside the original differential with a snap ring. Given the Quaife design cannot allow for re-installation of this component, additional work has to be done in order to fix the shaft flanges in place.

We supply both technical drawings and all of the tools and parts to complete this modification under a separate part number. The tools are re-useable, so once purchase, all subsequent installs only require the bolt, bush and sealing plug.



Method

The left hand shaft is bored to a depth of 20mm, and tapped with a $\text{Ø } 12 \times 1.5$ thread. The tap should allow for an Interference fit with the supplied bolt.

The right hand shaft is bored and counter-bored to allow insertion of the bolt and sealing plug.

The shafts can then be mounted onto the differential, and the bolt passed through the right hand shaft to engage into the threaded hole on the left hand shaft.

It is important to install the bolt with the correct end clearance. When the bolt has been fully tightened by hand, it should be then backed off by 120 degrees, thereby allowing axial float in the drive flanges of 0.5mm.



Installation.

Heat the crownwheel to 100 degrees (immerse in boiled water), and place it onto the new Quaife differential, taking care to align the bolt holes. Ensure no water remains in the bolt holes prior to installing the bolts. (risk of hydraulic locking)

Install the original crownwheel bolts using loctite 270. Torque specification for bolts is 100Nm, then torque angle 30 degrees.

It may be necessary to reduce the flange diameter of the crownwheel bolts to 22mm in order to clear the LSD cap head screws.

Press on bearing inner races to Quaife differential.



Install Quaife differential assembly into the final drive housing. Lubricate bearings with gear oil.

Lubricate with gear oil and carefully push in bearing outer races. Do not tap into position. If the bearing is correctly aligned, it will fall into place. Reinstall circlips in original positions, and install new output shaft seals.



Crownwheel tangential clearance (drive pinion backlash) should be checked with a dial gauge according to manufacturers procedure. It should not be necessary to adjust with shims. Tolerance for a new differential backlash is 0.06 to 0.14mm. (0.0024 to 0.0055in.). However, it is possible to run a differential with backlash of up to 0.20mm, but this may produce driveline shunt in manual transmission vehicles.



Lubricate the inside diameter of the differential with a small amount of anti-seize compound. Lubricate drive flange shaft with gear oil. Push in drive flange by hand and turn slightly until wire snap ring is heard to engage.

Clean the faces and install rear cover using sealant or gasket as appropriate.

Reinstall differential into car and fill with oil. Use manufacturer recommended 75w 90 synthetic gear oil, but not LSD oil. Do NOT use additives or any other fluids designed to reduce gear friction.

Test the final drive by running the car gently between full left and right turns to ensure oil is fully circulated. Drive the car normally for 10 miles before any aggressive use. No further running in is necessary.