

INSTALLING THE MODEL DS-B ROAMERDRIVE



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INSTALLATION TIME

A typical installation time is two to three hours to install this overdrive on a Defender Land Rover.

**BEFORE YOU DO IT
YOUR WAY PLEASE
TRY IT OUR WAY**

**FOR
90, 110 and 130
LAND ROVER DEFENDERS**

October 2016

1 GLOBAL ROAMER CORPORATION

Thank you for buying this Model DS-B ROAMERDRIVE.



This overdrive will fit any Defender model 90, 110 and 30 Land Rover fitted with a Suffix C or later 230 transfer case. The upper gear in your transfer case should have 26 teeth and be 33 mm wide.

This ROAMERDRIVE will not fit early 90 and 110 vehicles with four speed gearboxes or Suffix A and B 230 transfer cases or vehicles retrofitted with Discovery transfer cases. Consult our factory if you are in any doubt about your application.

High Power Engines

When this ROAMERDRIVE is fitted to a Land Rover with a non-standard engine or to a Td5 engine with more than normal power output, it is essential that our oil cooling sump cover (Part DS-COV) be fitted to the transfer case (See 14).

2 TOOLS AND LUBRICANT REQUIRED

Check the contents of the box against the parts list and organise some mechanics tools. You will need socket wrenches, flat spanners, screwdrivers and a small funnel. Note that keys to fit the fill and drain plugs are supplied.

If the gearbox in your Land Rover is excessively dirty you may wish to have the transfer case area steam cleaned or pressure washed before you start the installation.

You will need four litres of API-GL4 Manual Transmission Fluid. For a list of suppliers of API-GL4 lubricants see page attached.

Do not use API GL5 or API GL4-5 Hypoid axle oils. These oils are blended for use in hypoid axles and contain additives corrosive to bronze parts in the overdrive. Use of such oils voids your warranty.

IMPORTANT

With the transfer case warm, drain out the old oil before starting to install this overdrive. Check the old oil for metal contamination. Excessive metal shavings on the sump magnet and brass particles on the floor of the drain pan indicate existing problems in the transfer case that should be repaired before the overdrive is installed.

3 REMOVING GEARBOX TUNNEL CARPETS AND COVERS

Remove the carpet from the gearbox tunnel. Unscrew the gear knobs. Slide the rubber gaiter up off the levers. Now remove the Philips head screws that fix the metal or fibreglass cover over the gearbox and lift the cover out over the levers.



REMOVE THIS COVER



Installation may be easier if you open the hatch over the transfer case by removing the centre front seat or cuddy box.

4 REMOVING THE STOCK DRIVE GEAR

Take the round PTO cover off the rear of the transfer case by removing six 10mm bolts.

On older units remove the two slotted countersunk screws. Tap off the second round plate.



REMOVE THIS GEAR

Reach into the aperture and remove the gear visible inside the housing. You will have to put the gearbox and transfer case in neutral and rotate the gear to remove it.

Check that this gear has 26 teeth and is 33 (NOT 27) mm wide otherwise the DS-B model ROAMERDRIVE will not fit.

Remove any gasket residue from the gasket surface. Check that the spline on the main shaft inside the transfer case is not worn as is sometimes the case.

Look for signs of leakage in sump cover, output shafts and brake drum as this is a great opportunity to fix them.

Retain the bolts, gear and cover plates in case you need them in future. A wooden box is provided for this purpose.

5 Using a metal drift, tap the inner bearing race off the front of the old gear. Be careful not to damage the roller cage. Working on a clean bench, remove the drive gear from the overdrive. Put aside the conical crush washer between the gear and the hollow shaft.



Check the bearing for damage or excessive wear. Replace with a new one if needed. A genuine Timken cone part 18790 should be used. This part can be supplied by your dealer.



Press the bearing all the way on to the nose of the gear. Replace the crush washer on the other end of the gear. This washer is cone shaped. The 'dished' side

of the cone goes against the side of the gear with the nose of the cone pointing aft into the overdrive body.

7 Working from above or below, insert the ROAMERDRIVE over the splined shaft and push it into place. It may be necessary to rotate one of the vehicle's rear wheels to get the splines to engage. The ROAMERDRIVE will enter to within a millimetre of the gasket.

The badge should be uppermost and the selector rod in the 10 O'Clock position. The six bolts can now be inserted. Make sure that the 'O' rings are in position under the bolt heads. Lubricate the 'O' rings with oil. The bolts are torqued to 34 N.M. (25 lb.ft.) Tightening the bolts will close the gap between the castings as the crush washer compresses. If you are fitting an oil cooling sump cover (see 14), remove existing cover plate and fit this finned cover now. Coat both sides of the rectangular gasket with sealant and tighten screws firmly.

FILLING WITH OIL

Clean and replace the drain plug in the bottom of the transfer case and tighten firmly. Remove the aft facing filler/level plug adjacent to the emergency brake drum. You will need between 3 and 4 litres of API-GL4 MTF to fill the system. **Make sure you are putting in the correct oil - see lubricants page attached.**

6 CONICAL STEEL CRUSH WASHER



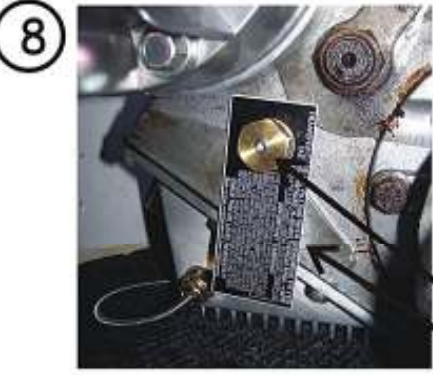
Making sure that the crush washer is in place and correctly orientated insert the gear into the transfer case until the bearing seats. It may be necessary to rotate the gear as you do this. Be careful not to drop the crush washer into the transfer case.

The paper gasket can now be put in place using gasket cement.

Note that one of the six bolt holes is offset so there is only one way this gasket can be positioned correctly as marked. There is also an oil passage between the overdrive and the transfer case that must be kept open. Keep this in mind if you replace this gasket in future - it is Land Rover part FRC5413. The genuine part has all the required holes.



OIL PASSAGE HERE



Fill the transfer case until oil flows from the filler hole.

Replace the original plug using the new hexagonal brass plug supplied, (with a dab of sealant on the threads). The oil information tag should be retained under the head to inform service personnel of the oil required.

NEW OIL LEVEL PLUG
OIL INFORMATION TAG

Using the large hexagon key supplied unscrew the socket filler plug located on the top left hand side of the overdrive and introduce 3/4 litre of oil into the overdrive. Replace the plug. Do not over tighten this plug.

Once the overdrive has been running (and the oil given time to settle) you can check the correct oil level by removing the small plug in the centre of the new brass filler plug. (Key supplied).

At future oil changes, drain oil from both overdrive and transfer case and repeat filling procedure.

9 FITTING THE LEVER

On the left hand side of the gearbox immediately beneath the transfer lever boot is a small diamond shaped casting held in place by two slotted screws.

Remove these screws and tap the casting off the gearbox which will now look as it does in the picture. Grease the end of the shaft.

The overdrive shift lever assembly can now be mounted in place.



Insert the bronze bushing into the gearbox casting and tighten into place using the two 6 mm socket cap screws supplied. The connecting rod can now be assembled by fitting the two rose joints into the ends of the rod. Adjust the two tie rod ends evenly so that the distance from eye to eye is 53 cm.



One rose joint is fitted with an 8mm bolt and a cylindrical spacer. This end is attached to the overdrive as shown.

11 Trim a hole in the foam sound proofing pad to fit the new lever and place the pad in position. Once this is done the new gaiter can be fitted. If the boot is out of position adjust your engine mounts. Be careful not to stress the extra cemented boot when fitting. Replace the carpet. The original lever knobs can be screwed back and the overdrive knob fitted.



CHECK LIST

1. Have you filled the transfer case up to the level of the filler plug with the recommended API-GL4 MTF oil and then added an extra 3/4 litre of this oil into the overdrive housing?
2. Have you tightened the adjuster nuts on the tie rod?
3. Are the six mounting bolts on the ROAMERDRIVE tightened to a torque of 34 NM (25 lb.ft.)
4. Are there any leaks?
5. Have you tied back any wiring close to the tie rod or actuating lever?

10 The front end of the tie rod can now be attached to the lever assembly. Use the upper hole in the lever. By screwing both tie rod ends in or out evenly the angle of the lever can be adjusted. Lock the two adjusting nuts firmly.

No part of the rod or lever should contact any other part of the Land Rover. Tie back any wiring that could rub on moving parts.



Before replacing the tunnel cover it is a good idea to check and adjust the HI/LOW lever actuating mechanism on the right hand side of the gearbox while you have access to this area. You might also wish to grease the internal workings of the transfer lever - to do this remove the cover under the transfer lever gaiter. Make sure the transfer lever engages in all four positions or adjust linkage accordingly. Replace the tunnel cover. Replace the seat or cuddy box. Make sure all seams are airtight as a surprising amount of drive line noise can pass into the cab through poorly sealed panels. Gaffer or duct tape along the seams is a good idea.

12 RUNNING TEST

With the vehicle standing on the ground and the emergency brake applied put the transfer case lever in neutral and the overdrive lever in the aft position.

Start the engine and engage first gear carefully as if you were going to drive away. The vehicle will not move as the transfer case is not engaged but you should hear the gearbox running. Now depress the clutch and engage the overdrive by moving the engagement lever forward. The action should be smooth and precise. Allow the overdrive to run like this for ten minutes and try engaging it in other gears and at different engine speeds.

There should be no unusual noises during the test.

After you stop the engine check for any oil leaks on the overdrive and transfer case.

Note that the teeth on the main output gear of the overdrive have a surface treatment and finish that encourage bedding in with the mating gear. If there is any gear whine on installation it will greatly reduce over the first 10,000 Km.

After the running test give the oil time to settle and check the level using the small plug in the centre of the new filler plug.

13 USING YOUR GLOBAL ROAMER OVERDRIVE

The ROAMERDRIVE is a versatile tool that will enable you to get the best out of your Land Rover.

When the lever is in the aft position your vehicle will have exactly the same gear ratios as before giving lots of grunt for towing and other hard work.

The overdrive is most useful on motorways. To engage, wait until you are cruising in fifth gear, then depress your clutch and move the overdrive lever forward. On releasing the clutch you will immediately feel the engine revs drop and cab noise decrease. As traffic conditions change, simply shift the main gear lever into other gears. You do not have to disengage the overdrive unless you come to a complete stop.

In practice the gear ratio of overdrive fourth gear is similar to normal fifth. The stubby ROAMERDRIVE shift lever is more convenient to use than the main gear lever. In non-motorway conditions you can drive for miles in fourth gear shifting in and out of overdrive when needed as gradient and traffic conditions dictate.

You will also find the ROAMERDRIVE very useful in low-range as it allows you to gain more speed without making the slower change between low and high range.



The pictures show the same Defender 110 in high range overdrive on the Gunbarrel highway (left) and in low range climbing 'Big Red' a major dune in the Simpson Desert. (above) Momentum accrued between dunes allows the Land Rover to gain ground up the dune face where it might otherwise bog down in sand. Pictures are from a test expedition in Australia.

14 ACCESSORIES

Part DS-COV our finned sump casting increases oil capacity and lowers operating temperature. Essential when the overdrive is driven by a modified TD5, International 2.8 or other more powerful engine.

Part DX-T is an accurate mechanical temperature gauge kit. Easily installed with the sensor in the DS-COV sump casting. This gauge enables you to monitor transfer case temperature and is essential if your Land Rover has an enhanced performance engine.



The gauge is fitted with a copper tube that connects to the DS-COV sump. 12v dial illumination is included.



15 CAUTION We can not determine how much power you modify your Land Rover to achieve or how fast you drive. This overdrive will handle increased power output provided that the operating temperature of the transfer case oil is kept below 110° C. If you drive your modified Land Rover at continuously high speeds in hot weather, transfer case oil temperature should be monitored especially if there is no oil cooler fitted to the adjoining R380 gearbox. **Your overdrive warranty is void if the unit fails due to overheating.**

16 WARRANTY

Your GLOBAL ROAMER OVERDRIVE is warranted for one year from date of purchase. Please retain your proof of purchase for warranty purposes.

We will repair or replace (at our discretion) any overdrive that malfunctions during the warranty period. The warranty does not cover the costs of transporting the overdrive nor does it cover any other costs incurred relating to the installation.

Note that the warranty will be invalid if the overdrive is damaged by overheating. (See 15) We will also not warrant an overdrive that has been returned to us with damage caused by use with insufficient or improper lubricant.

Quote overdrive serial number in correspondence.

17 MAINTENANCE and CRUSH WASHER INFORMATION

Change oil diligently as scheduled by the vehicle manufacturer. The overdrive should be drained using the small plug in the bottom and 3/4 L of oil should be added to the top of the overdrive when transfer case oil is changed. Re-tighten plugs securely.

When a used Roamerdrive is removed from the transfer case a new crush washer kit (part JX03B) should be fitted before re-installation. A new crush washer kit must also be fitted if the overdrive is fitted to a different vehicle.

Crush washer kit JX03B contains a new crush washer and a new mounting gasket.

OILS FOR USE IN ROAMERDRIVE OVERDRIVES

The correct oil to use in your transfer case is an API GL4 75-90 as specified in the installation manual packaged with your Roamerdrive. The following is a list of suitable oils. Not all oils are found in every country.

For most applications a standard GL4 oil is suitable and inexpensive. Synthetic GL4 oils are best if you have a high-powered non-standard engine.

API-GL4 OILS SUITABLE FOR USE IN ROAMERDRIVES

| | |
|-----------------|---|
| AMSOL | Amsol Gearlube 75-90 GL4 |
| BARDAHL | Gear oil GL4 90 (Europe) |
| CALTEX | Caltex Thubon GL4 |
| CASTROL | Castrol 80 EP4 gear oil, Castrol SMX gear oil Castrol Syntrax FE75WGL4, Castrol Syntrax Multivehicle 75-90 GL4 |
| CHAMPION | Champion gear oil 75-90 GL4 |
| ESSO | Esso gear oil GP90 GL4 |
| FUCHS | Titan Supergear 75w85 GL4 |
| GEARTEX | Geartex S475-90 |
| GULF PETROLIUM | GulfGear SAE 80-90 EP GL4 |
| MILLER | EP Gear Oil 80w90GL4 |
| MOBIL | Mobilube GX-A 80w GL4 |
| MORRIS | 75-90 GL4 (U.K.) |
| MOTROL | Motorol EP80 GL4 |
| PENZOIL | Penzoil EP Gear Lubricant 90 GL4 |
| P.M. LUBRICANTS | PM103, PM104 (AUSTRALIA) |
| RED LINE | Red Line MT90GL4 |
| SHELL | Spirilax S3 GL4 Gear Oil |
| STALUBE | SL24239 (U.S.A.) |
| RED LINE | Redline MTL70w80GL4 |
| TEXACO | Texaco MTF94 |
| TOTAL | Total EP80w85 Total EPw90 Total EPFE 80w90 |
| UNIPART | Unipart MTF94 |
| VALVOLENE | Valvolene Duragear 75-85 GL4 |

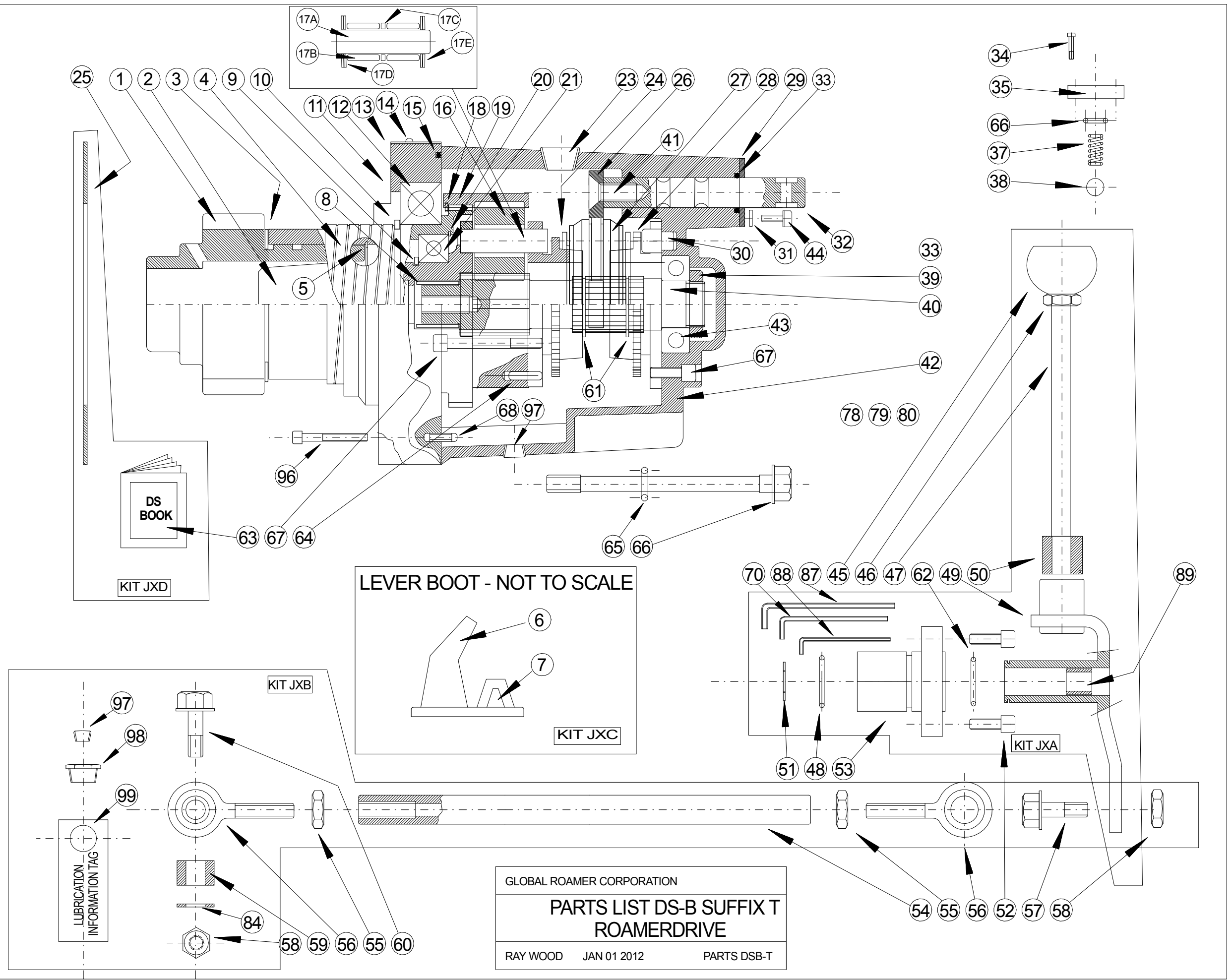
WARNING

IT IS IMPORTANT TO NOTE THAT ANY OIL WHICH MEETS API-GL-5 SPECIFICATION SHOULD NOT BE USED IN THE ROAMERDRIVE.

API-GL5 oils are formulated specifically for hypoid axles not gearboxes and are often laced with chemicals that are corrosive to copper based alloys. Use of these oils may cause corrosion that will shorten the life of the overdrive and void the warranty.

Do not become a victim of a salesperson who tells you a GL5 oil is better than a GL4. This may be the case in an axle but is not the case in a gearbox or overdrive application.

| | | | |
|------|----------------------|------------|-----|
| 1 | OUTPUT GEAR | M JX01 | 1 |
| 2 | PLANET CARRIER | M JX02 | 1 |
| 3 | CRUSH WASHER | P JX03B | 1 |
| 4 | OUTPUT SHAFT | M JX04 | 1 |
| 5 | RETAINING RING | P JX05 | 1 |
| 6 | LEVER BOOT LRG | M JX06 | 1 |
| 7 | LEVER BOOT SML | M JX07 | 1 |
| 8 | NEEDLE ROLLER | P SXJX08 | 1 |
| 9 | RETAINING RING | P SXJX09 | 1 |
| 10 | RETAINING RING | P SXJX10 | 1 |
| 11 | FRONT COVER | M SSDS11 | 1 |
| 12 | BALL BEARING | P SXJX12 | 1 |
| 13 | NAME PLATE | M SXJX13 | 1 |
| 14 | DRIVE SCREW | P SXJX14 | 2 |
| 15 | 'O' RING | P SXJX15 | 1 |
| 16 | PLANET GEAR | M SXJX16 | 3 |
| 17A | PLANET SHAFT | M SXJX17A | 6 |
| 17B | PLANET ROLLER | P SXJX17B | 120 |
| 17C | ROLLER SPACER | P SXJX17C | 3 |
| 17D | THRUST WASHER | P SSDS17D | 6 |
| 17E | DOG WASHER | P SSDS17E | 6 |
| 18 | RETAINING RING | P SXJX18 | 1 |
| 19 | ANNULUS GEAR | P SXJX19 | 1 |
| 20 | RETAINING RING | P SXJX20 | 1 |
| 21 | BALL BEARING | P SXJX21 | 1 |
| 23 | FILLER PLUG | P SXJX23 | 1 |
| 24 | BAULK RING | P SXJX24 | 2 |
| 25 | MOUNTING GASKET | P JX25 | 1 |
| 26 | SELECTOR FORK | M SSDS26 | 1 |
| 27 | SYNCOMESH | M SXJX27 | 1 |
| 28 | SYNCO CONE | M SXJX28 | 2 |
| 29 | SEAL RETAINER | M SSDS29 | 1 |
| 30 | STEP DOWEL | M SSDS30 | 3 |
| 31 | LOCK WASHER 4mm | M SSDS31 | 3 |
| 32 | SELECTOR SHAFT | M SSDS32 | 1 |
| 33 | 'O' RING | P SXJX33 | 1 |
| 34 | S.H.C. SCREW | P SXJX34 | 2 |
| 35 | DEDENT SLEEVE | M SXJX35 | 1 |
| 37 | DEDENT SPRING | P SXJX37 | 1 |
| 38 | STEEL BALL 3/8 | M SXJX38 | 1 |
| 39 | SUN SHAFT NUT | M SXJX39 | 1 |
| 40 | SUN SHAFT | M SSDS40 | 1 |
| 41 | CSK SCREW 3/8NF X 1 | P SSDS41 | 1 |
| 42 | REAR COVER | M SSDS42 | 1 |
| 43 | BALL BEARING | P SSDS43 | 1 |
| 44 | SHCS 4mm x 10mm | M SXJX44 | 3 |
| 45 | SHIFT KNOB | P SXJX45 | 1 |
| 46 | LOCKNUT | P SXJX46 | 1 |
| 47 | LEVER | M JX47 | 1 |
| 48 | OUTER O RING | P JX48 | 1 |
| 49 | LEVER BOSS | M JX49 | 1 |
| 50 | VIBRATION DAMPER | P JX50 | 1 |
| 51 | RETAINING RING | P JX51 | 1 |
| 52 | S.H. CAP SCREW | P JX52 | 2 |
| 53 | PIVOT BLOCK | M JX53 | 2 |
| 54 | TIE ROD | M JX54 | 1 |
| 55 | LOCK NUT.RH | P SXJX55 | 1 |
| 55 | LOCK NUT.LH | P SXJX55LH | 1 |
| 56 | ROSE JOINT RH | P SXJX56RH | 1 |
| 56 | ROSE JOINT LH | P SXJX56LH | 1 |
| 57 | HEX HD BOLT | P SXJX57 | 1 |
| 58 | LOCK NUT | P SXJX58 | 2 |
| 59 | SPACER | M SXJX59 | 1 |
| 60 | HEX HEAD BOLT | P SXJX60 | 1 |
| 61 | RETAINING RING | P SXJX61 | 2 |
| 62 | INNER 'O' RING | P JX62 | 1 |
| 63 | INSTRUCTION BOOK | M JX63 | 1 |
| 64 | DOWEL | P SXJX64 | 3 |
| 65 | BOLT | P JX65 | 6 |
| 66 | 'O' RING | P SXJX66 | 7 |
| 67 | SHCS 1/4 NF x 1.75 | P SXJX 67 | 6 |
| 68 | HOLLOW DOWEL | P SXJX 68 | 3 |
| 70 | 5mm HEX KEY | P JX70 | 1 |
| 83 | GRUB SCREW 5mm | P SXJX 83 | 3 |
| 84 | SPACER WASHER | P SXJX84 | 2 |
| * 85 | SHIPPING BOX WOOD | P SXJX85 | 1 |
| * 86 | BOX COVER CARTON | P SXJX86 | 1 |
| 87 | 5/16 HEX KEY | P SX87 | 1 |
| 88 | 5/32 HEX KEY | P SX88 | 1 |
| 89 | OILITE BUSHING | P JX84 | 1 |
| 96 | SHCS M5 X 45 | P JX96 | 3 |
| 97 | 1/16 NPT PLUG | P SXJX97 | 2 |
| 98 | 3/4 NPT HEX PLUG | P DS98 | 1 |
| 99 | LUBRICATION INFO TAG | P DS99 | 1 |



GLOBAL ROAMER CORPORATION
PARTS LIST DS-B SUFFIX T
ROAMERDRIVE
 RAY WOOD JAN 01 2012 PARTS DSB-T

* NOT SHOWN ON DRAWING