

PJ's Off Road

HD Axles & Custom Components

ADAPTOR KIT

Falcon/Territory ZF 6HP26 **2WD** 6 Speed Auto Gearbox
(Turbo/NA)

And Territory ZF 6HP26 **AWD** 6 Speed Auto Gearbox
(Turbo/NA)

To Patrol ZD30/TB/TD/RD28 Auto/Manual Transfer Case

Hello,

Thank you for enquiring about/choosing our adaptor kit for your conversion.

This document is lengthy, but it covers all aspects of the kit from pre-purchase enquiries to installation.

IMPORTANT NOTICE

If you are NOT a qualified mechanic and you do NOT have the relevant knowledge, skills and experience to install this kit, you should engage the services of a qualified mechanic who does have the relevant knowledge, skills and experience to install the kit on your behalf.

Prior to installation, you or your mechanic must read this entire document to ensure you understand what is required, and so that you can arrange to have the relevant tools, accessories, and consumables on hand to successfully complete the installation.

DESIGN

The kits were designed using the ZD30 auto; however, they will also work with the following transfers because they have the same transfer bolt pattern, and the same transfer input shaft -

ZD30 manual; TB auto and manual; TD auto and manual; and RD28 auto and manual.

Please note - the kits do NOT suit the Chinese-made ZF 6HP21 gearbox with 4 bolt holes on the back. Please ensure you have the German-made ZF 6HP26 gearbox with 9 bolt holes on the back. Images of both gearboxes have been included on the last page of this document.

The adaptor kits maintain factory positioning, so no modifications are required to the tail shafts or crossmember; however, **if you have a GQ, you will need to modify or fabricate a bracket for the high/low shifter.**

Some customers, from their experience, have reported that the auto crossmember must be used with auto tail shafts, and the manual crossmember must be used with manual tail shafts; while others have reported using the manual crossmember with auto tail shafts, and even the auto crossmember with auto front tail shaft and manual rear tail shaft. You will need to determine which setup ultimately suits your requirements. The auto crossmember sits the engine approximately 28mm further forward than the manual crossmember. Our kits suit the Boss/Coyote auto gearboxes; however, we are unsure if the engine/gearbox dimensions will result in modifications being required to the crossmember and/or tail shafts, and whether there would be major clearance issues.

KIT SELECTION AND PRICING

There are two kits available for this conversion.

2WD to Patrol (Falcon/Territory ZF6 2WD to Patrol transfer)
\$2,135.00 including GST. Freight and insurance are additional.

AWD to Patrol (Territory ZF6 AWD to Patrol transfer)
\$2,245.00 including GST. Freight and insurance are additional.

To give you an idea on freight pricing, these are the approximate costs for the **2WD** kit to be shipped via Australia Post from Toowoomba, Queensland to each capital City. Please note that Insurance, Tracking, and Signature On Delivery are included in these prices.

Brisbane City, postcode 4000	\$95.00	Adelaide City, postcode 5000	\$114.00
Sydney City, postcode 2000	\$102.00	Darwin City, postcode 0800	\$135.00
Canberra City, postcode 2600	\$107.00	Hobart City, postcode 7000	\$135.00
Melbourne City, postcode 3000	\$112.00	Perth City, postcode 6000	\$135.00

The **AWD** kit is bigger, heavier and dearer, therefore the freight and insurance costs will be slightly dearer. Requests for Express Post will incur additional costs. Both kit prices, and freight and insurance costs are subject to change.

Please note - we cannot advise you of the mechanical pros and cons of the 2WD gearbox vs the AWD gearbox. You will need to speak to a qualified mechanic or 4WD specialist if you require this information; however, there is a physical difference between the two transmissions...the AWD gearbox has two dowels on the back of the box. These assist with alignment, and are utilised via dowel holes which are machined into the AWD adaptor plate. Although we are unaware of any 2WD customers experiencing issues with alignment, we have updated the 2WD kit to assist in minimising any possible misalignment. This is mentioned in more detail in the installation instructions on Page 6. Note - neither gearbox affects 4WD, as this comes from your existing transfer case.

KIT CONTENTS

The kits contain a 6061 Aluminium adaptor plate, a re-splined transfer input shaft, and crossmember mounts. SHCS (socket head cap screws), bolts and spring washers are also included...these are in two separate bags in the AWD kit, and three separate bags in the 2WD kit – these bags are labelled. The mounts are L (Passenger) and R (Driver) side-specific – the mounts are labelled accordingly.

EXCHANGE INPUT SHAFT

The Patrol transfer input shaft is re-splined to take the ZF gearbox output shaft directly. The re-splined transfer input shaft works on an exchange system. You can choose one of two options. 1. Pay the kit price + a \$375 (refundable) bond, and we will send you a kit. You then send us your input shaft, and ensure we receive it within 4 months of your kit being despatched. When we receive it, we will refund your \$375 bond if it is in good condition. **Note**, if your input shaft is not received within the 4 month period, or it is in poor condition, you will forfeit your bond. OR 2. You send your input shaft first, and just pay the kit price (as long as your input shaft is in good condition). We will then send you a kit with a re-splined input shaft.

Please note - if you have reduction gears, we will need to re-spline your transfer input shaft and return it to you. In this instance, we will always re-spline it as a matter of priority so that your project has as much minimal delay as possible.

REMOVING YOUR INPUT SHAFT

To remove your transfer input shaft, first remove the 10 x bolts on the face of the transfer case. One of the 10 bolts is indicated below with a **black** arrow. You should then be able to pull/slide out the input shaft quite easily. **Take care that the two-piece needle roller bearing located inside the input shaft does not fall into the transfer when you remove the shaft.**

Please note - if you have reduction gears, you will need to pull your transfer apart to remove the input shaft.



INPUT SHAFT CIRCLIP LOCATION and SPACER

The circlip groove on the input shaft is in one of two locations. If the circlip groove is further along the shaft (further from the gear), it will have a spacer. Both circlip groove locations will work with your transfer case and with our kit, so it does not matter which one you receive in your kit. If we send you an input shaft with the circlip groove further along the shaft, we will ensure that a spacer is included.

Please note - if the re-splined input shaft in your kit has a spacer, please ensure you press the bearing on first, then put the spacer on and then attach the circlip.

The above photo shows the two circlip locations indicated with **black** arrows. The input shaft on the right has a spacer for the circlip location. The spacer is indicated with a **red** arrow.

Remove the circlip and the spacer (if it has one), and press off the bearing. Keep the circlip and the bearing with you for the re-splined input shaft in your kit. Send your input shaft to us, with the spacer (if it has one).

CHECKING YOUR INPUT SHAFT

Before sending your input shaft to us, you need to confirm that it is the correct shaft, as some customers have sent input shafts from Nissan transfers which clearly have not come from a Patrol.

The height of the external gear on the shaft should be 29mm-30mm, and it should have 29 teeth. Please inspect the teeth for wear and damage, check the shaft for grooves created by the seal, and check for internal and external rust/pitting.

We can buff out slight surface rust, and most marks created by the seal, but if there are major issues such as those mentioned in the previous paragraph, we cannot accept the shaft. If this is the case, you can choose to source an acceptable quality input shaft for exchange, or forfeit the \$375 bond.

We will inspect your input shaft when it arrives. If there are any issues, we will contact you.

SENDING YOUR INPUT SHAFT

Remember to keep your bearing and circlip, but send the spacer to us with your input shaft (if it has one).

Our address is PJ's Off Road, PO Box 65, Highfields QLD 4352. Please ensure it is packaged well to avoid damage. Adding tracking to the parcel is recommended.

WHEN YOU RECEIVE YOUR ADAPTOR KIT

All of the contents in your kit will be inspected prior to being packed to ensure they have no dents or damage. Each item is individually wrapped to protect it from damage during transit, but nothing will stop the damage if the box is dropped or thrown, which unfortunately can happen.

If the box appears damaged, please take detailed photos prior to opening it. **Inspect the contents of your kit within 24 hours of receiving it, and report any damage to us immediately.** If there is damage to the contents, please take detailed photos. You will need to lodge a claim with the freight company...we will assist you with this. There are time limits for insurance claims, which is why we ask you to inspect the contents within 24 hours of receipt. All of the packaging, both external and internal, must be submitted to the insurance assessor, along with the damaged contents, so they can assess whether or not the items were sufficiently wrapped. A lot of time and effort is spent on wrapping the components to eliminate damage in the event that the box is dropped.

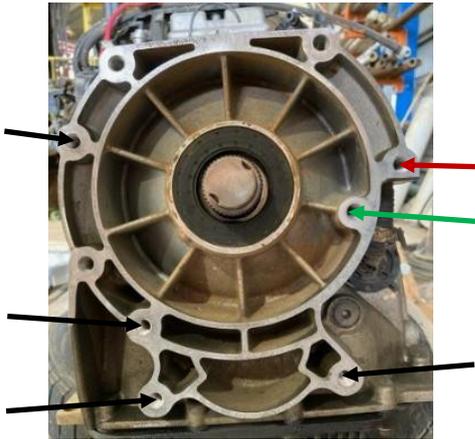
GEARBOX MODIFICATIONS (ALL FALCON/TERRITORY 2WDs, and SOME TERRITORY AWDs)

There are two modifications required to the ZF6 gearbox and output shaft.

1. **This should be done with the gearbox standing vertical.** The back of the gearbox has 5 x pilot holes. 4 of these holes are indicated with a **black** arrow in the photo on the following page. **These 4 x holes need to be drilled and tapped to M10 x 1.5 pitch.** To ensure you drill the holes to the correct depth, **measure the pre-drilled holes first** so that you know what depth is required. The 5th hole, indicated with a **red** arrow, is not utilised with our kit, and does not need to be drilled and tapped as it fouls on a bolt hole on the transfer case.

Please note - the hole indicated with a green arrow, may or may not be drilled and tapped on the Territory AWD gearboxes. If not, you will need to include this hole when you drill and tap the others.

Using the tools shown on the following page will ensure the best results - (L to R) 8.5mm drill, M10 taper tap, and M10 bottoming tap. **You MUST ensure that you drill and tap square to the back of the gearbox.**



- Remove the double-hex nut off the gearbox output shaft with a socket or a ring spanner, and then cut off the spigot with a cutting disc on a grinder.** The following photos show the spigot prior to removal, and the gearbox output shaft after the spigot has been removed.



Please note - it is recommended that you replace all the relevant seals while you are doing your conversion. We have been advised that aftermarket Ford transmission seals work well, but the aftermarket Nissan transfer seals have a tendency to fail. Therefore, we highly recommend you buy genuine Nissan transfer seals.

BOLTING THE ADAPTOR PLATE TO THE GEARBOX and TRANSFER CASE

This process needs to be done in the following order, still with the gearbox in the vertical position.

1. **The gearbox output shaft should be lightly lubricated. Black Tak Molyplex Grease by Gulf Western is the only grease we currently recommend. Apply a small amount to the splines, then gently remove any excess with a rag.** It is available direct from Gulf Western (located in most States), and can often be found in automotive stores. The product code for the cartridge for a pistol grip grease gun is #40452, and the product code for the cartridge for the Milwaukee and DeWalt battery operated grease guns is #44452. The cost varies from store to store, but is usually under \$15.
2. Sit the adaptor plate on the gearbox, with the flat side of the adaptor plate meeting the face of the gearbox.

AWD - Line up and utilise the 2 x dowels on the gearbox with the 2 x corresponding dowel holes in your adaptor plate.

2WD - Line up the 2 x holes on the gearbox, indicated in the following diagram, with the 2 x corresponding bolt holes in your adaptor plate.



Please note - the torque specification for these 2 x special SHCS is 45 Nm = 33.19 Ft lbs.

3. The **2WD** kit has 2 x special SHCS because, unlike the AWD gearbox, the 2WD gearbox does NOT have dowels. These SHCS are specifically for the 2 x holes in the above diagram. **Do NOT use spring washers with these**, or the thread will NOT go deep enough into the ZF6. **Please only use Loctite - Blue Medium Strength. Do NOT use Loctite - Red Full Strength.**

Apply 2 x drops only, of Blue Medium Strength Loctite, to the thread of the 2 x SHCS.

Place the 2 x SHCS into the 2 x holes indicated in the above diagram, through the adaptor plate and into the gearbox.

Do NOT fully tighten the SHCS one at a time. Work between the 2 x SHCS, and tighten each one a little bit at a time until you reach the above recommended torque specification.

Please note - **the torque specification for all of the following SHCS is 48 Nm = 35.4 Ft lbs.**

4. **2WD Kit** - The remaining SHCS in the 2WD kit, for securing the adaptor plate to the gearbox, are as follows -

3 x 35mm long SHCS and spring washers, indicated with **red** arrows in the following diagram (M10 1.5, standard, zinc plated).

3 x 50mm long SHCS and spring washers, indicated with **orange** arrows in the following diagram (M10 1.5, standard, zinc plated).

Apply 2 x drops only, of Blue Medium Strength Loctite, to the thread of the 6 x SHCS.

Do NOT fully tighten the SHCS one at a time. Work your way around the 6 x SHCS, and tighten each one a little bit at a time until you reach the above recommended torque specification.

AWD Kit - The SHCS in the AWD kit, for securing the adaptor plate to the gearbox, are as follows -

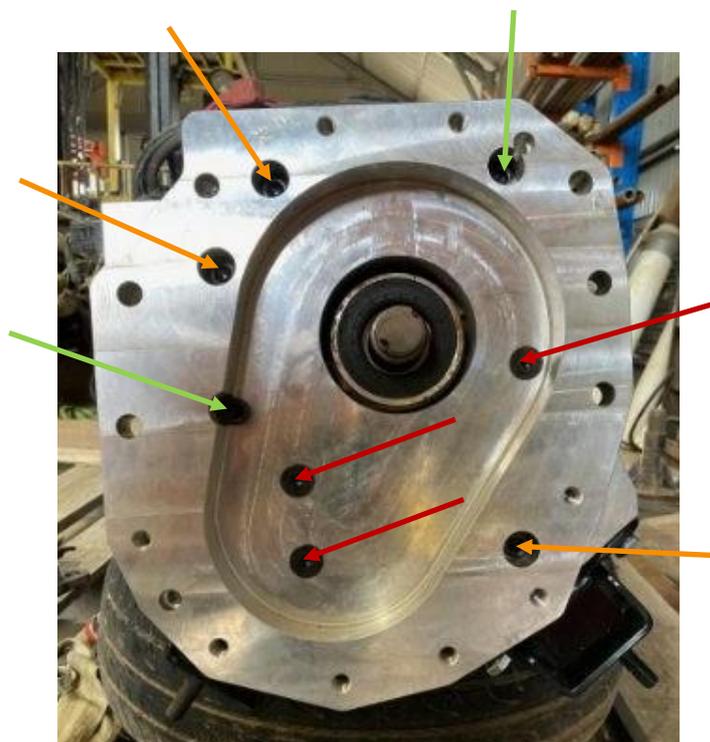
3 x 55mm long SHCS and spring washers, indicated with **red** arrows in the following diagram (M10 1.5, standard, zinc plated).

5 x 65mm long SHCS and spring washers, indicated with 3 x **orange** arrows and 2 x **lime** arrows in the following diagram (M10 1.5, standard, zinc plated).

Apply 2 x drops only, of Blue Medium Strength Loctite, to the thread of the 8 x SHCS.

Do NOT fully tighten the SHCS one at a time. Work your way around the 8 x SHCS, and tighten each one a little bit at a time until you reach the above recommended torque specification.

(The 2 x holes indicated with **lime** arrows for the AWD kit, are the same holes which are utilised in the 2WD kit with the 2 x special SHCS.)



- Attach the transfer case to the other side of the adaptor plate.

Line up and utilise the 2 x dowels on the transfer case with the 2 x corresponding dowel holes in your adaptor plate, indicated with **purple** arrows in the following diagram.

Please note - the torque specification for all of the following SHCS is 48 Nm = 35.4 Ft lbs.

- The transfer case is secured to the adaptor plate with 14 x 45mm long SHCS (M10 1.25, fine, zinc plated) and spring washers. These are identical for both the **2WD and AWD** kits.

Some SHCS are bolted from the transfer case into the adaptor plate, and some are bolted from the gearbox, through the adaptor plate and into the transfer case.

8 x 45mm long SHCS and spring washers - indicated with **blue** arrows.

These are bolted from the transfer case into the adaptor plate.

Apply 2 x drops only, of Blue Medium Strength Loctite, to the thread of the 8 x SHCS.

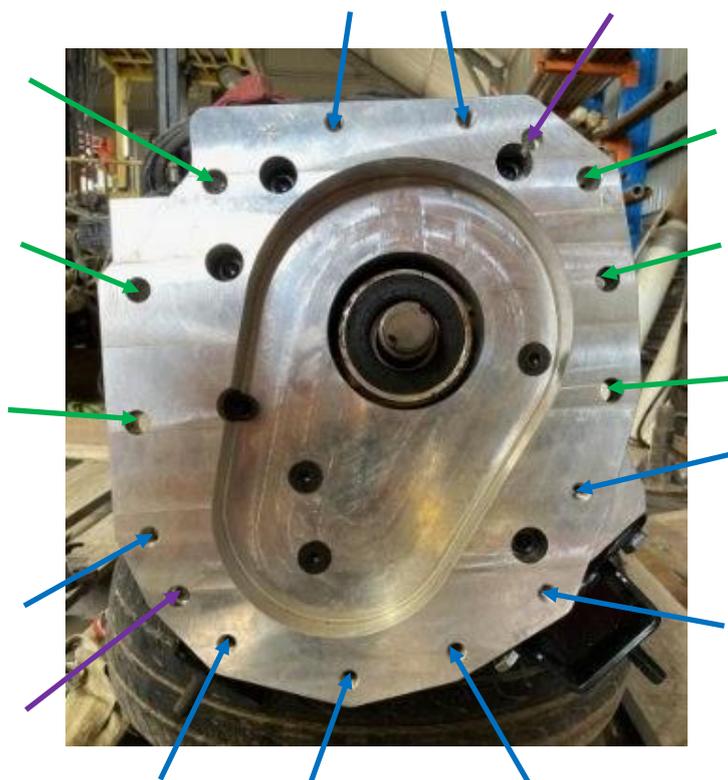
Do NOT fully tighten the SHCS one at a time. Work your way around the 8 x SHCS, and tighten each one a little bit at a time until you reach the above recommended torque specification.

6 x 45mm long SHCS and spring washers - indicated with **green** arrows.

These are bolted from the gearbox, through the adaptor plate and into the transfer case.

Apply 2 x drops only, of Blue Medium Strength Loctite, to the thread of the 6 x SHCS.

Do NOT fully tighten the SHCS one at a time. Work your way around the 6 x SHCS, and tighten each one a little bit at a time until you reach the above recommended torque specification.

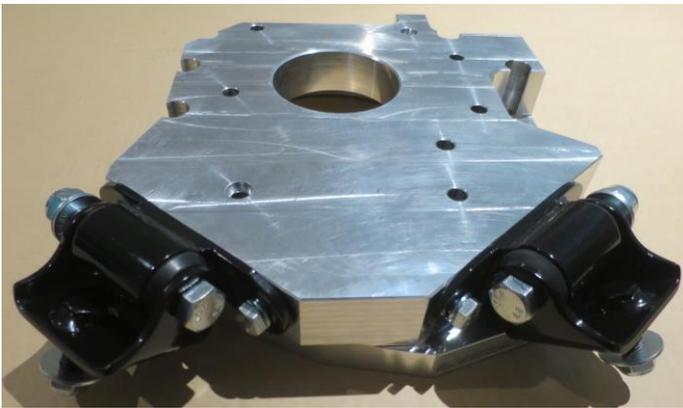


Please note - if you need to remove the SHCS in the future, the easiest way to do this is to apply a small amount of heat to the head of the SHCS using a small blow torch. Do not overheat the head or you may cause damage. If you are not confident in doing this, please have a qualified mechanic do it for you. Further, you must ensure that you do NOT use Loctite - Red Full Strength, as you will NEVER be able to remove the SHCS if the need arises.

INSTALLING THE CROSSMEMBER MOUNTS

The 4 x bolts and spring washers for the mounts are in a small clear bag. The mounts are L (Passenger) and R (Driver) side-specific.

Please note - the offset welded bolts, indicated with red arrows, must be towards the outer edge.



ORDERING YOUR KIT

We endeavour to have kits in stock at all times, but this is not always possible. **To place your order, please email the following information – 1. Which kit you require (as per the description at the top of Page 2); 2. The name you would like your invoice made out to; 3. Your shipping address and mobile phone number; 4. Will you be paying the \$250 bond, or sending your input shaft first.** I will obtain a freight and insurance quote, and will email you the invoice. Please note that payment options are by funds transfer or cash deposit at the bank.

WE ARE HERE TO HELP

If you have any additional questions, please do not hesitate to call me on mobile **0490 852 658**. I am generally available from 10am to 10pm, Sunday to Thursday, and 10am to 3pm on Friday. I am unavailable from 3pm Friday to 10am Sunday.

Thank you for your support.

Pamela

Owner/Manager

PJ's Off Road - contact@pisoffroad.com.au - PO Box 65, Highfields QLD 4352.

ADDITIONAL INFORMATION - We were advised by an ex-Ford Engineer that the Chinese-made ZF 6HP21 gearboxes were installed in some Falcon/Territory 2WDs from 2014 onwards. However, Wikipedia (if you can trust it) states that the 6HP21 was installed in some vehicles as early as 2011. Regardless of the year of manufacture, we recommend you confirm 100% that you have/are buying the German-made ZF 6HP26 gearbox with 9 bolt holes on the back, **NOT** 4 bolt holes as shown in the below photo on the right.

If you cannot inspect the back of the gearbox, the body should be stamped with either "Germany" and/or "6HP26" OR "China" and/or "6HP21".



Please note - **our kits do NOT suit the ZF6 or ZF8 from the BMW M57.**

If you feel that this document is not clear or complete, can you please provide your feedback as I am more than happy to make adjustments.