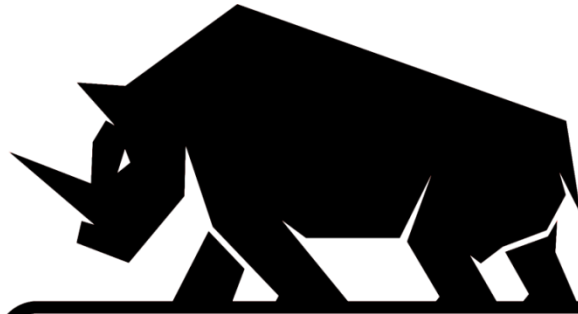


TRE Air Locker



TRE 4X4

AIR LOCKER
LOCKING DIFFERENTIAL

**TRE AIR LOCKING
DIFFERENTIAL
Installation Manual**

TR131

**TOYOTA 8
IFS,50mm BRNG**

CONTENTS

Introduction	3
Installation Preparation	4
A) Tool-Kit Recommendations	4
A-1 Tools	4
A-2 Supplies	4
B) Remove the Original Differential	5
B-1 Support Vehicle by a hoist	5
B-2 Differential Fluid Drain	5
B-3 Removing the axles and Differential	5
B-4 Marking the Bearing Caps	5
B-5 Checking the Current Backlash Amount	6
B-6 Removing the Differential Carrier	7
C) Bench Measurement	7
C-1 Approximate Backlash Shimming	7
C-2 Calculation & Selection of Shims	9
D) Air locking differential installation	10
D-1 Mounting the Ring Gear	10
D-2 Installing the carrier bearings	11
D-3 Calculation & Selection of Pre-Load Shims	11
D-4 Drilling and Tapping the Bulkhead Port	12
D-5 Final Checking the Backlash	16
D-6 Drilling the Diff Housing for Seal Housing Tube	17
D-7 Setting Up the Bulkhead Fitting	19
D-8 Bench Testing the Air locking differential	20
D-9 Reinstalling the Differential and Axles	21
E) Air System Installation	21
E-1 Mounting the Solenoid	21
E-2 Connection to Air Compressor	23
E-3 Running and Securing the 5mm Air Line and Oil Return Line	24
E-4 Connection to the Bulkhead Fitting (5mm Oil return Line)	26
E-5 Connection to the Bulkhead Fitting (4mm Oil return Line)	26
E-6 Mounting the Actuator Switch(es)	27
F) Mounting & Connecting the Electrical System	28
F-1 Mounting the Actuator Switch(es)	28
F-2 Wiring the Actuator System	29
G) Testing & Final Assembly	30
G-1 Leak Testing	30
G-2 Testing the Air locking differential Actuation	30
G-3 Re-Sealing & Filling the Differential	31
G-4 Post-Installation Check List	32
Attention	32
Parts List	34

Introduction

TRE Air locking differential designed for traction assistance. It's a driver-controlled differential when additional traction is required. Driver turn on the control button Locking in both axle deliver equal traction to wheels to providing 100% traction.

TRE Air locking differential tested by various Pro 4x4 Races.

Available Terrain: snow, sand, muddy, rocky, etc.

Common use of TRE Air locking differential

When you need more traction, turn on the air compressor first before get close to extraordinary terrain, then turn on the Air locking differential switch. (ATTENTION: Turn on the rear Air locking differential first, we don't suggest you use front Air locking differential alone) After passing, press the switch again and the Air locking differential will return to normal mode.

Do not turn on the Air locking differential when the wheel is Idling, it will break the locking device.

When you turn off TRE Air locking differential, the Air locking differential is same as Differential, don't worry about any control problem .

Note: Place a ⊗ mark inside each of the ○ symbols as you complete each step. It is very important NOT to miss any of the steps!

Installation Preparation

A) Tool-Kit Recommendations

Below is a list of tools and supplies you may need to complete this installation. Requirements for your vehicle may vary. Please consult our vehicle service manual for additional recommendations.

A-1. Tools

- Standard automotive sizes (metric and/or imperial) of sockets, wrenches, Allan keys, and drills. □
- A dial indicator or other suitable measuring tool for checking ring & pinion backlash. □
- An adjuster-nut pliers
- A razor knife to cut the nylon tubing. •
- A torque wrench (See vehicle service manual for required torque range). □
- A lubricant drain reservoir. •
- An 11.2mm [7/16"] drill and ¼" NPT tap for bulkhead fitting installation. □
- An 8.5mm drill and ⅛" NPT tap for bulkhead fitting installation. □
- An automotive bearing puller or a differential carrier bearing puller. •
- A bearing press or arbor press. •
- A soft hammer (e.g. copper/rawhide/nylon etc.)

A-2. Supplies

- Thread lubricant/sealant compound for pressure fittings. (e.g. LOCTITE #567 Teflon paste) •
- Thread locking compound (e.g., LOCTITE #272) •
- Retaining compound (e.g. LOCTITE #609)
- A gasket sealant or replacement gasket for your third member. •
- A sufficient volume of differential oil to completely refill your housing (see the TRE Air Locker Operating and Service Manual for recommended lubricants) •
- A soap and water mixture to test for air leaks.

B) Remove the Original Differential.

B-1. Support Vehicle by a hoist

B-2. Differential Fluid Drain

This is a good time to check for metal particles in your oil and in the bottom of the housing which may indicate a worn bearing or differential component.

B-3. Removing the axles and Differential

- Remove the axles according to your vehicle's service manual.

HINT : When removing the axles try not to damage the paper gaskets behind the axle flanges.

- Disconnect the drive shaft from the flange of the differential.
- Remove the third member from the differential housing. Refer to your vehicle's service manual.

IMPORTANT:

TRE strongly recommends that you have your axle assembly inspected for concentricity and straightness before installing your Air locking differential.

B-4. Marking the Bearing Caps

- Using a pointed center punch, gently mark the differential housing and the bearing caps in a way that will enable you to correctly position the cap during reassembly. (Fig.1.)



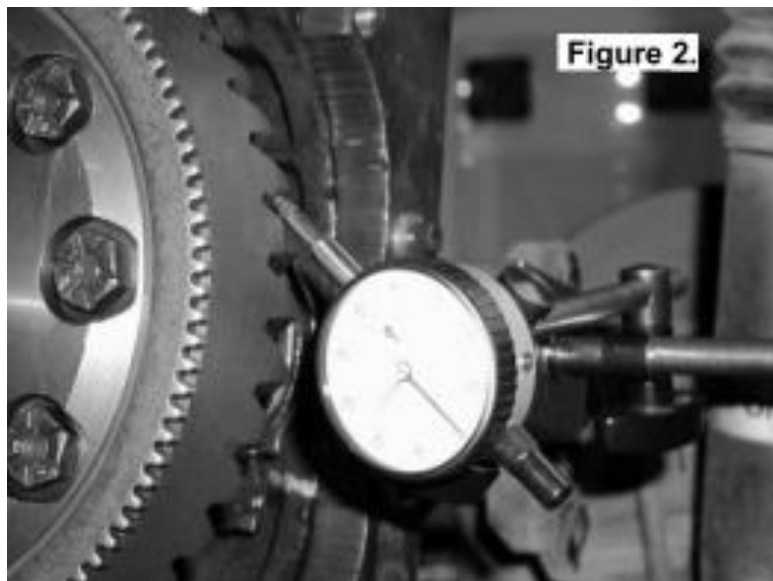
B-5. Checking the Current Backlash Amount

IMPORTANT:

This step is a precautionary measure recommended by TRE due to the fact that some aftermarket ring and pinion sets have been manufactured to run with different backlash settings than those specified by your vehicle manufacturer. Although TRE must recommend you set backlash according to your service manual guidelines, we also advise that you compare the backlash measurements taken here to the recommended backlash settings in your vehicle service manual. Measurements found to be outside of your service manual recommendations may indicate the need to deviate from those settings in order to achieve quiet running with a good contact mark.

Refer to your vehicle service manual or your local authorized TRE installer for more information.

- Set a depth indicator on one of the ring gear teeth as in Figure 2.



- While supporting the pinion gear by holding the drive flange, rotate the differential in both directions while observing the maximum variation in depth from the indicator (i.e., the highest value minus the lowest value). This value is referred to as the ring and pinion backlash. •
- Rotate the differential center 90° and measure again for accuracy. □
- Record the average of all measurements.

B-6. Removing the Differential Carrier •

IMPORTANT:

Spreading the differential housing with a differential case spreader is a step which is critical to set up bearing pre-load when a differential is installed. Improper pre-load will result in undue bearing wear, increased stresses in the differential carrier, increased running noise, and ultimately, ring and pinion gear damage.

- Unbolt and remove the bearing caps.
- Carefully spread the differential housing just enough to remove the differential carrier (Refer to your vehicles service manual).

NOTE : Never spread the housing more than 0.5mm [0.020"]

- Once the housing has been adequately spread, the differential may be removed by pulling forward on the differential carrier.

C. Bench Measurement

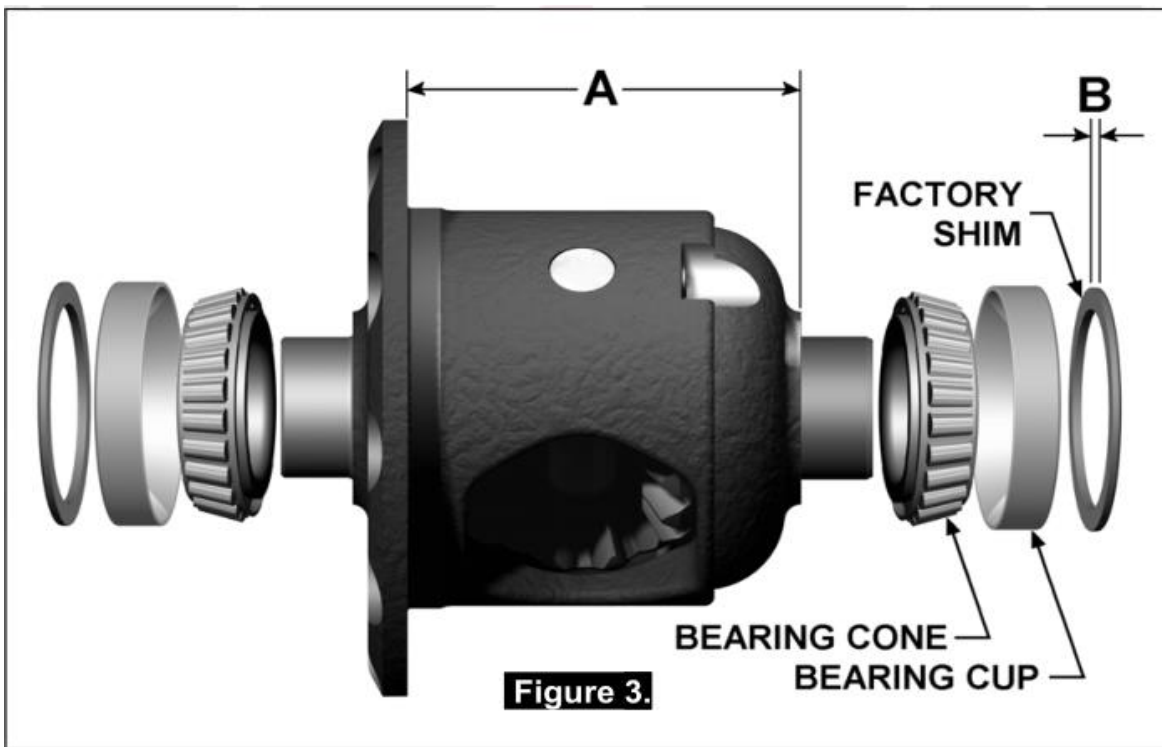
C-1. Approximate Backlash Shimming

In order to reproduce a similar pre-load and ring and pinion backlash in your Air locking differential to that of your original differential, measurements need to be taken so that a shim thickness can be calculated.

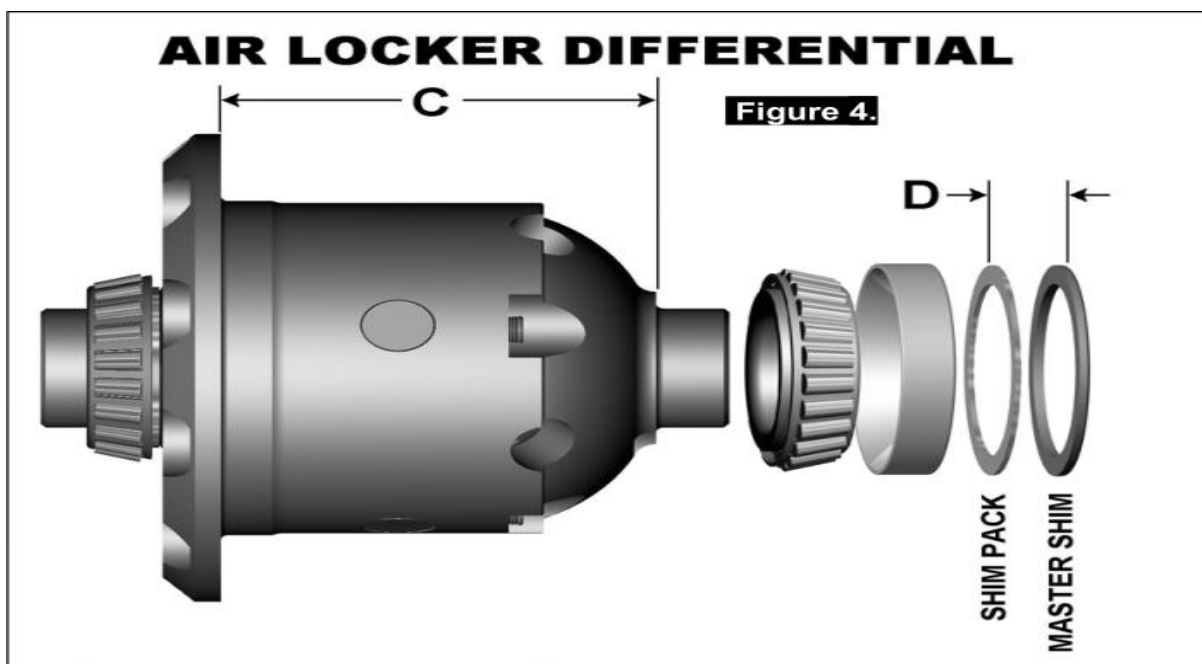
- Secure the original differential to a work bench.
- Remove the bolts that hold the ring gear in place.
- Using a plastic or copper hammer, tap in a circle around the ring gear to separate it from the differential carrier.
- Remove the original bearings and shims from the differential center using a bearing puller.

NOTE : Keep the bearings and shims separated so that they can be identified as to which end of the differential they came from.

- Examine the bearing cups and cones from Fig. 3. for damage or wear and, if necessary, discard them and replace with the same size and type of bearings.



- Using a caliper or similarly accurate measurement method (i.e., able to take accurate measurements within 0.04mm [0.0015"]), measure the distance from the shoulder of the bearing journal to the ring gear mounting face (shown as 'A' in Fig.3.) and record this measurement as 'A'.
- Measure the thickness of the factory shim removed from the end of the differential carrier (shown as 'B' in Fig.3.) and record this measurement as 'B'.



Measure the distance from the Air locking differential bearing shoulder to the ring gear mounting

face (shown as 'C' in Fig.4.) and record this measurement as 'C'.

C-2 Calculation & Selection of Shims

Ideally, the measurement you recorded as 'C' from the Air locking differential differential will closely match 'A' on the existing differential (within 0.1mm [0.004"]) and then the factory shim can be reused on this end, however, quite often these measurements will vary slightly between one factory differential and the next. If this is the case you must create a new shim pack thickness by using

the measurements you recorded earlier to find a desired measurement for 'D' in Fig. 4.

Use the following calculation:

$$A + B - C = D \text{ (Replacement Shim Pack)}$$

HINT: If your calculations are correct then the following equation will also be true:

$$A + B - C - D = \text{ZERO}$$

Create a shim pack to match the thickness calculated as 'D'.

To achieve the desired shim thickness you can:

- Machine down the factory shim thickness.
- Add shims between the factory shim and the bearing cup.

HINT : A selection of shims of this size have been supplied

with your Air locking differential kit.

- Purchase new factory shims at the desired thickness.
- Use a universal shim kit available from most drive train specialists.
- Add small amounts of shim between the bearing cone and the bearing seat.

NOTE : NEVER machine the Air locking differential.

D) Air locking differential installation

D-1. Mounting the Ring Gear

- Apply a thin film of high-pressure grease to the ring gear shoulder of the Air locking differential to prevent seizing.
- Thoroughly clean any thread locking compound or other foreign matter from the holes of the ring gear, the threads of the ring gear bolts, and the mating surfaces of the ring gear and the Air locking differential flange.

NOTE : Rubbing the ring gear mounting face with a flat oil stone before installation will remove any high spots around the threads.

?

- Heat the ring gear to between 80 and 100° C (175- 212° F) in an oven or in hot water to slightly expand the gear and facilitate assembly.

NOTE : NEVER HEAT GEARS WITH A FLAME! This could damage the hardened surface of the gear and result in premature wear or failure.

- Dry the ring gear with compressed air (if wet), paying particular attention to the threaded holes. •
- Install the ring gear onto the Air locking differential by aligning the holes in the flange with the tapped holes in the ring gear, then gently tapping it around in a circle with a plastic or copper hammer.

NOTE : Avoid using the bolts to pull down the ring gear as this puts excess strain on the bolts and the differential flange

- Apply a thread locking compound to the thread of each ring gear bolt before inserting it.

NOTE : Do not apply threading compound directly into the threaded hole as this could prevent the bolt from reaching its full depth.

- Tighten the ring gear bolts in a star pattern with a torque wrench according to your

Vehicle manufacturer's specified torque.

D-2. Installing the Carrier Bearings

- With the Air locking differential well supported in an arbor press, apply a thin film of high pressure grease to both bearing journals.
- Press one of the tapered roller bearing cones onto one of the bearing journals of the Air locking differential until the bearing seats firmly against the bearing journal shoulder.
- Invert the Air locking differential and press the second bearing cone onto the opposite bearing journal until the bearing seats firmly against the bearing journal shoulder.

NOTE : Never re-use any bearings which are damaged or worn.

D-3. Calculation & Selection of Pre-Load Shims

In order to pre-load the tapered roller bearings in your Air locking differential, measurements need to be taken so that a value can be calculated for the shim thickness 'E' in Figure 5.

- Hold the bearing cup and shim pack 'D' (Fig.4.) in place, and insert the Air locking differential into the housing.
- Push the Air locking differential hard across against the bearing and shim pack 'D', and measure the gap between the end of the seal housing assembly and the bearing seat of the differential housing with a feeler gauge.

NOTE : This 'end float' measurement determines the shim thickness necessary to achieve 'neutral pre-load'. Adding more shim than this measurement becomes the actual 'pre-load'.

- Consult your vehicle manufacturer's service manual to determine the carrier bearing pre-load amount specified for your vehicle.
- Add the specified pre-load amount to the measurement taken with the feeler gauge to determine a shim amount for 'E' in Figure 5.

PRE-LOAD + END FLOAT = SHIM PACK

- Select suitable shims from the shim kit supplied with your Air locking differential to make up a

shim pack of this thickness. (Refer to section 3.2 for methods of shim adjustment).

- The seal housing will have to be removed in order to add shim pack 'E'. Ensure that the seal housing is re-installed correctly.

D-3-1. Drilling and Tapping the Bulkhead Port For 5mm Air Line

- Mark a spot on the right hand side (opposite the ring gear) toward the top of the differential housing that is in an area well clear of the differential, the ring gear, and any other obstructions that could snag the seal housing tube. (Fig.6.)



- Cover the drive pinion area with a rag to protect it from metal filings. •
- Secure the Differential housing to a work bench. •
- Drill an 11.2mm [7/16] diameter hole through the Tube square to the outside surface.
- Tap the hole from the outside using ¼" NPT thread tap. •
- Remove any sharp edges that may chip off from around the hole and fall into the tube. •
- Thoroughly clean the differential housing to remove any filings from drilling.

D-3-2. Drilling and Tapping the Bulkhead Port For 4mm Oil Return Line

An Oil return line port must be drilled and tapped through the differential housing to mount the bulkhead fitting into Oil return line is designed for protect your air compressor from the differential oil when disengage the Air locking differential, and eliminate the differential loss.(this hole aim to send the differential oil back)

- Mark a spot on the right hand side (opposite the ring gear) toward the top of the differential housing that is in an area well clear of the differential, the ring gear, and any other obstructions that could snag the seal housing tube. This location should be beside the air line hole.



- Cover the drive pinion area with a rag to protect it from metal filings. •
- Secure the Differential housing to a work bench. •
- Drill an 8.6-8.7mm diameter hole(use a 8.5mm drill) through the housing square to the outside surface. •
- Tap the hole from the outside using $\frac{1}{8}$ " NPT thread tap. •
- Remove any sharp edges that may chip off from around the hole and fall into the tube. •
- Thoroughly clean the differential housing to remove any filings from drilling.

D-4. Drilling the Diff Housing for Seal Housing Tube

A hole must be drilled through a tab inside the diff housing to cable tie the seal housing tube to for support.

- Mark a spot on the tab as shown in Figure 7.
- Cover the drive pinion with rags to protect it from any metal filings and drill a 5mm hole through the tab (Fig. 8.)
- Deburr the hole and remove the rags, ensuring not to get any metal filings in the drive pinion.

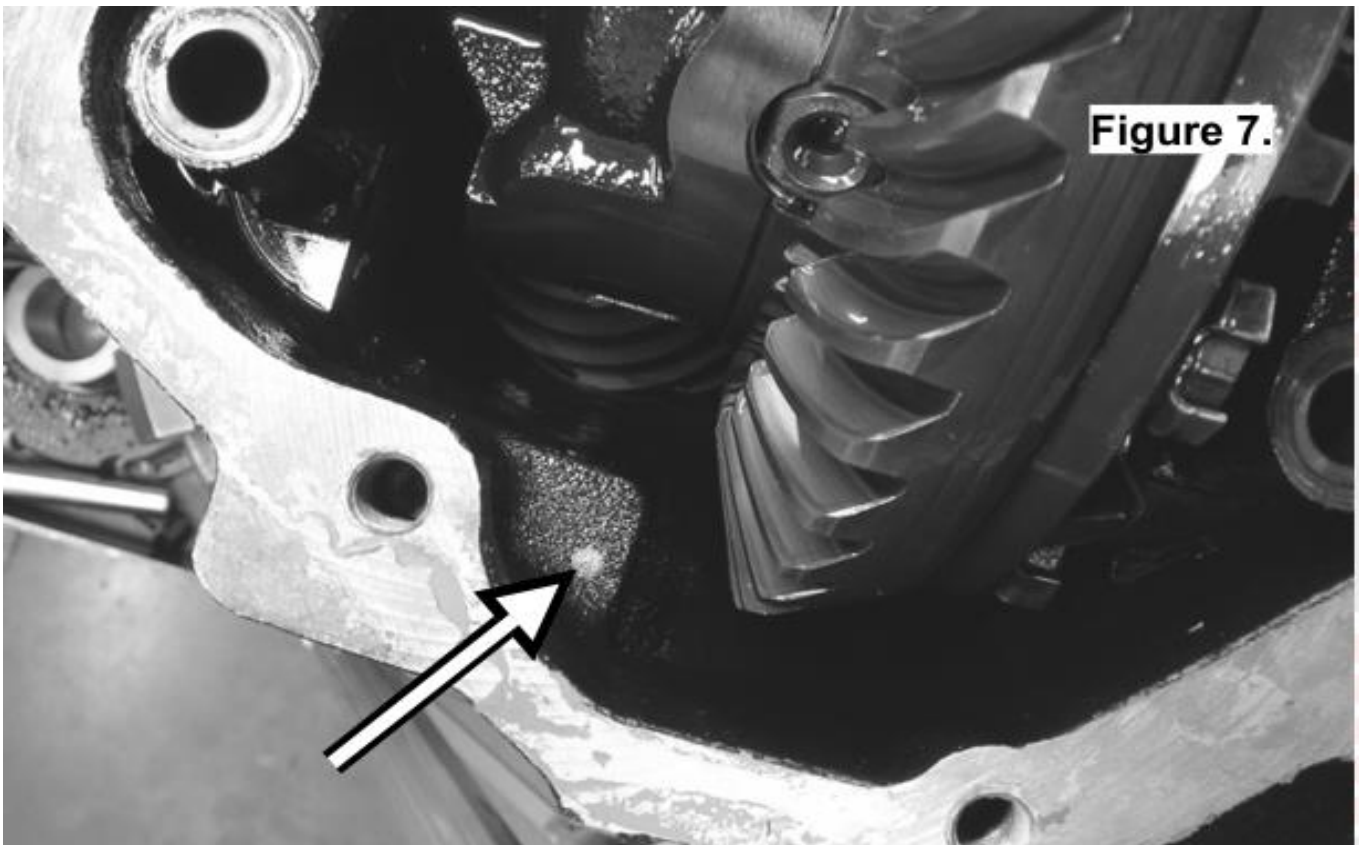


Figure 8.



D-5. Final Checking the Backlash

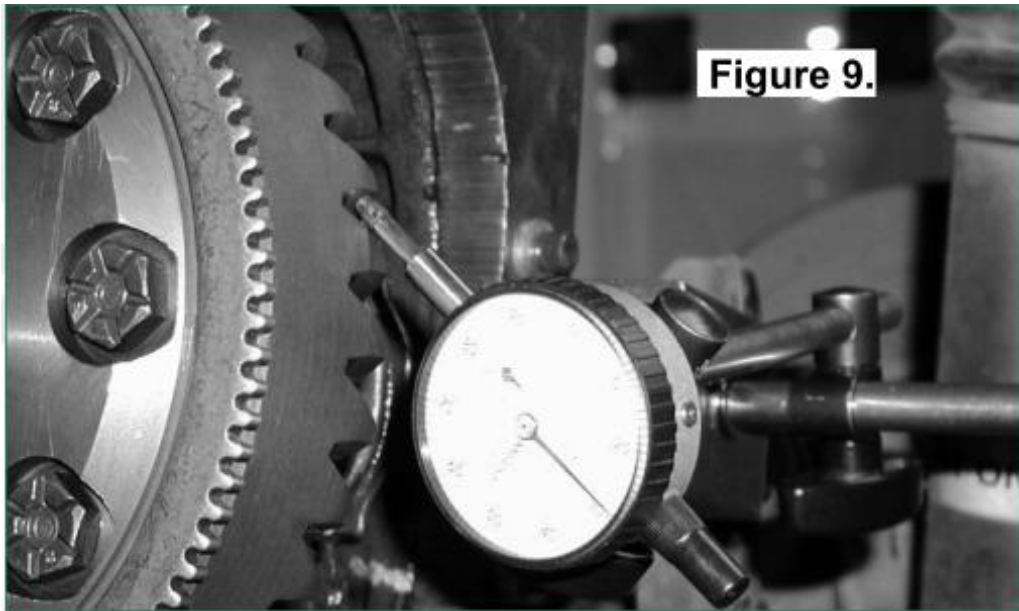
- Spread the differential housing again (Refer to section 2.6).
- Hold shim packs 'D' (Refer to section 3.2) and 'E' (Refer to section 4.4) in position on the Air locking differential.
- Reinstall the Air locking differential into the differential housing, ensuring that the seal housing is positioned so that the tube will clear the bearing cap.

NOTE : If the carrier is too difficult to install with the added shim pack then the spreader tension may need to be increased. Do not spread the housing more than 0.50mm [0.020"].

- Place the bearing caps in place to align the seal housing.
- Relieve all tension on the housing spreader.
- Tighten all bearing cap bolts with a torque wrench to the torque specified in your vehicle manufacturer's service manual.
- Set a depth indicator on one of the ring gear teeth as in Fig. 9.
- While supporting the pinion gear by holding the drive flange, rotate the differential in both

directions while observing the maximum variation in depth from the indicator (i.e., the highest value minus the lowest value). This value is referred to as the ring and pinion backlash.

- Rotate the differential center 90° and measure again for accuracy.



- Refer to your vehicle service manual for the specified maximum and minimum amounts of backlash. If the backlash is not within the specifications then the differential will have to be removed and re-shimmed.

Re-Shimming the Backlash

NOTE : This step is only necessary when adjusting for incorrect backlash.

- Reapply the spreader to the differential housing.
- Remove the bearing caps.
- Remove the differential.
- To increase the amount of backlash, reduce the shim thickness 'D' (Fig.4.) and increase the shim thickness 'E' (Fig.5.) by the same amount. Reverse this step to decrease the backlash.
- Remount the differential as before.
- Release spreader tension.
- Check backlash again as before.

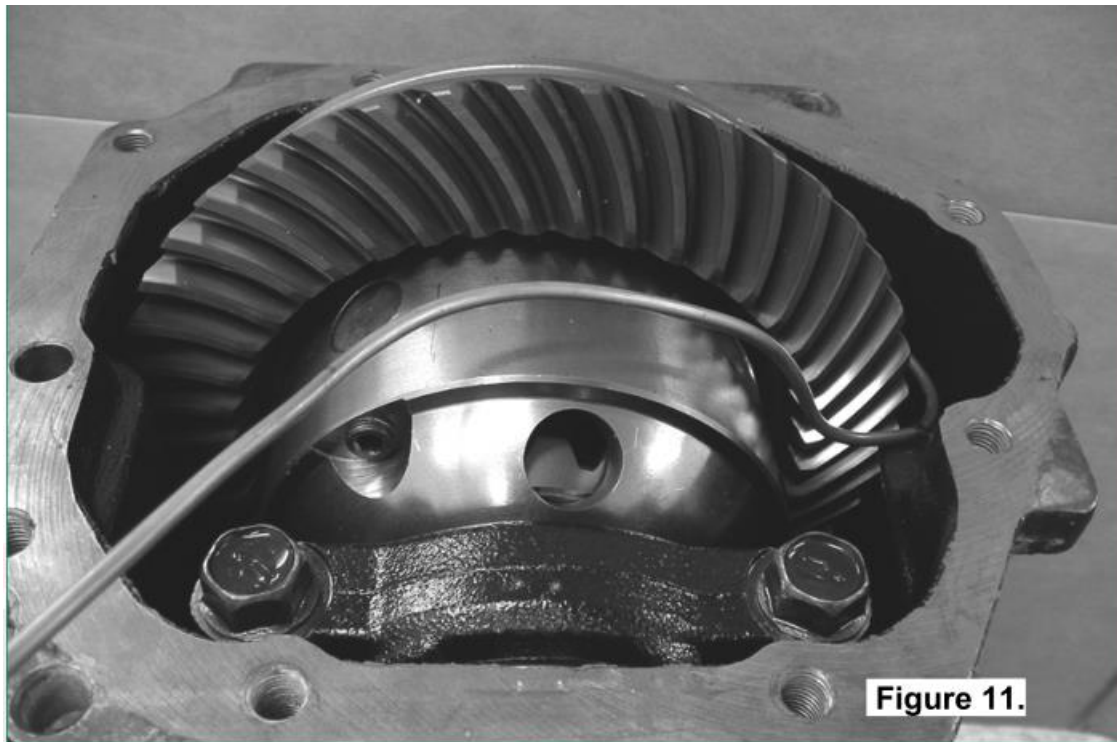
D-6. Profiling the Seal Housing Tube

○ Without using sharp, jagged tools such as pliers (your hands are the best tool for this job), bend the seal housing tube so that it runs between the bearing cap and diff housing, around the ring gear, and points out of the diff inline with the position of the bulkhead port in the cover plate. Assure that the tube adequately clears all moving parts of the differential assembly. Less than 10mm [3/8"] should be considered too little clearance (refer to Figures 10. & 11.

for suggested tube shape).

○ Using the supplied cable tie, attach the seal housing tube to the housing through the previously drilled hole. Trim the cable tie to length. This will support the tube from vibration.





- Install the differential cover plate onto the differential housing using 2 bolts (hand tight only) to hold the cover in place.
- Rotate the differential center a few turns to make sure the tube is not contacting the center at any point.
- Mark a position on the protruding length of tube approximately 8mm [5/16"] from the bulkhead port (Fig. 12.).



- Remove the cover plate.
- Using an automotive brake line tubing cutter, trim the tube at the position marked.

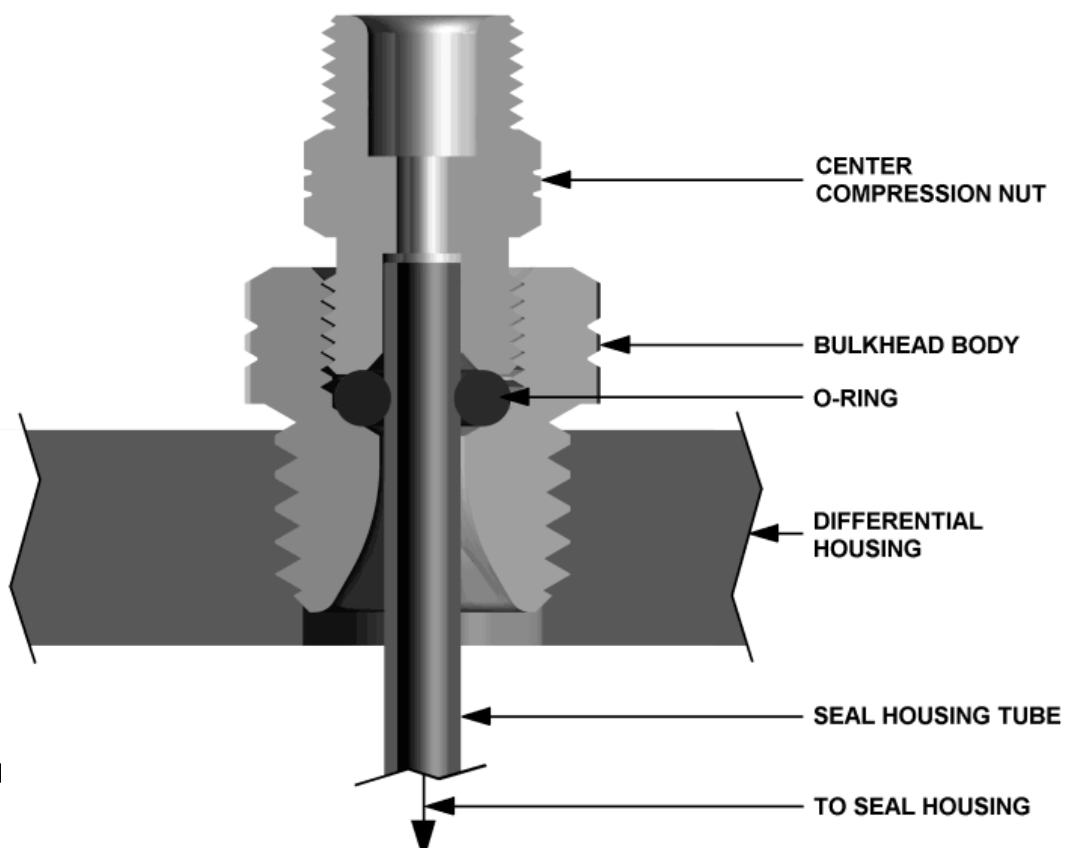
NOTE : Never use a hacksaw for trimming the copper tube as this will leave metal filings in the air system.

- Reinstall the differential cover onto the differential housing by firstly inserting the free end of the seal housing tube through the bulkhead port from the inside. No gasket sealant or gasket is required at this time.
- Install 2 bolts hand tight to hold the cover in place.

D-7. Setting up the Bulkhead Fitting

- Apply thread sealant to the threads of the bulkhead body.🔗
- Screw the bulkhead body into the tapped hole, and tighten.🔗
- Wipe the area clean of any excess thread sealant (inside and outside of the housing).
- Insert the small drilled end of the center compression nut over the extended tube as shown in the assembly diagram (Fig.13.), and screw it into the bulkhead body, and lightly tighten.🔗

NOTE : Be sure to insert the correct end of the center compression nut into the bulkhead body. The thread has been partially relieved on the bulkhead side of the center compression nut to visually identify its orientation. (As shown)



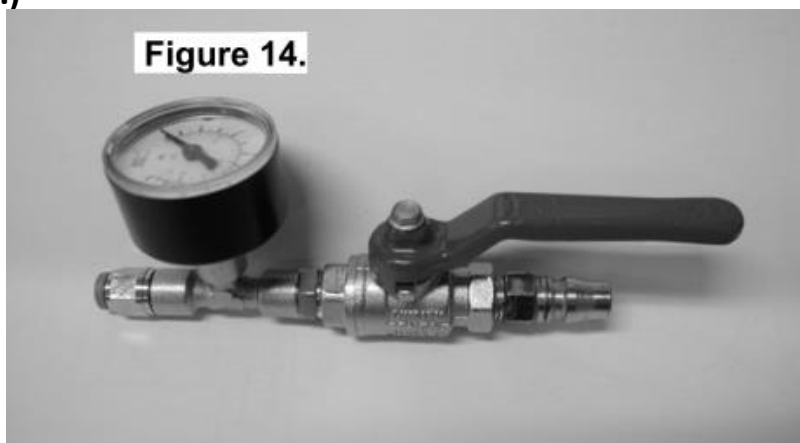
NOTE : Excessive tightening of the center compression nut is not necessary to form a good seal around the tube and may damage the O-ring, the seal housing tube, or the threads of the compression nut.

NOTE : Make sure the seal housing tube is all of the way into the center compression nut while you are tightening it.

D-8. Bench Testing the Air locking differential

- To test the Air locking differential; when 620kPa [90 PSI] shop air is applied to the seal housing tube, the
Air locking differential should engage. •
- Check all fittings and the seal housing for air leaks. •
- Rotate the differential carrier by turning the pinion flange whilst applying air pressure.

NOTE : An accurate way to test for air leaks is to fit a shut-off valve to an air pressure gauge. Once 620 KPA [90 PSI] is reached close the valve, disconnect the air hose, and watch to see if there is any drop in pressure. If so, this will indicate an air leak.(Fig.14.)



- If a leak is found to be present, spray a soap and water mixture onto the bulkhead air fitting.

Bubbles should appear at any leak points.

NOTE : Do not spray this soapy mixture inside the differential.

- Check that leaky fittings have been adequately tightened. •
- Disassemble, clean threads, and reapply thread sealant if leaking persists. •
- If a leak is found at the seal housing, carefully remove the seal housing assembly and examine the O-rings. Be very careful with the O-rings and check for defects, damage, wear, or presence of foreign material in the O-ring grooves. Replace if necessary.

D-9. Reinstalling the Differential and Axles

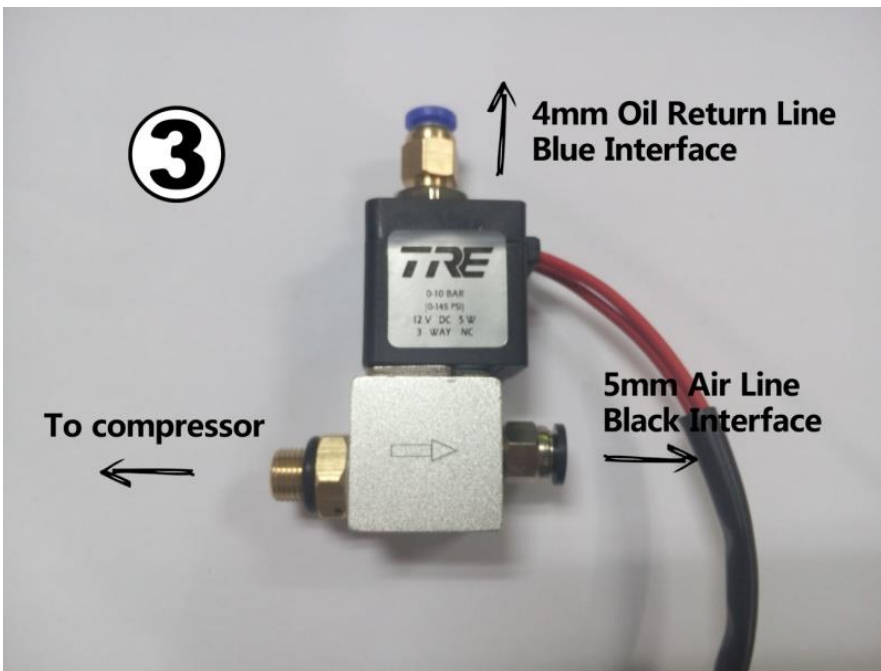
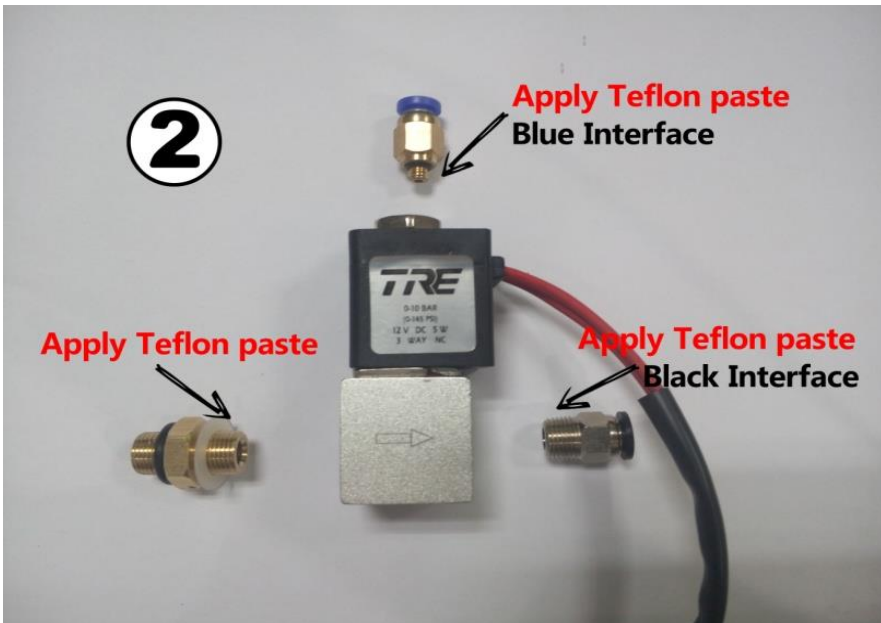
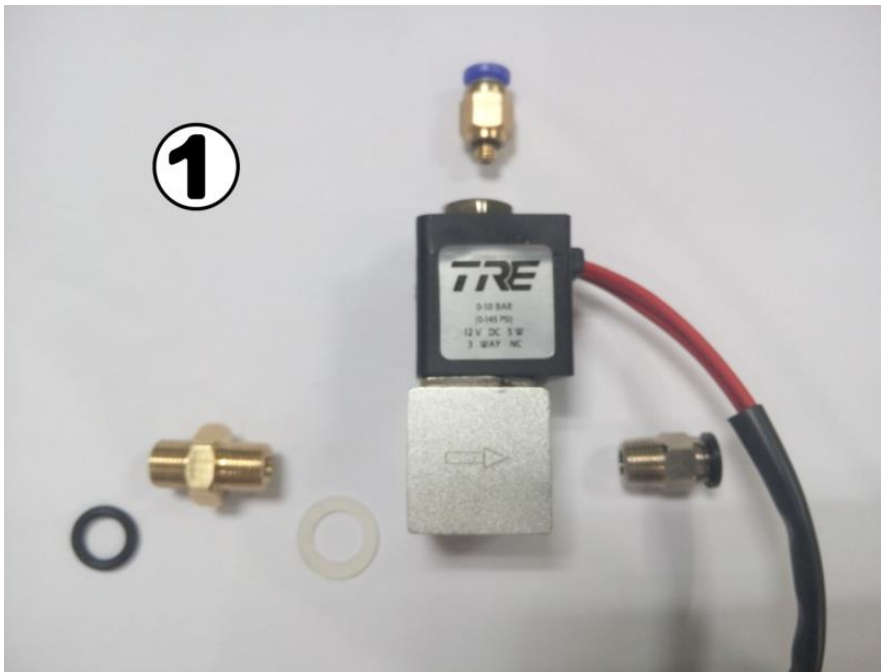
- Apply gasket sealant (or a gasket) to the differential cover plate and reinstall it onto the housing.
- Tighten all cover bolts according to the torque specifications in your vehicle manufacturer's service manual.
- Replace the stub axle seals if necessary.
- Reassemble and reinstall the differential assembly according to your vehicle service manual.

NOTE : Be careful not to damage the stub axle oil seals when inserting the axles.

- Reinstall the driveshaft.the drive shaft. •

E)Air System

E-1. Mounting the Solenoid



E-2. Connection to Air Compressor

- Remove one of the 1/8 " BSP plugs from its port in the compressor tank. •
- Apply Teflon paste to the nipple (1/8 " X 1/8 " BSP) and insert it into the port and tighten. •
- Apply Teflon paste to the free end of the nipple. •
- Assemble the inlet port side of the solenoid (opposite arrow side) onto the nipple and tighten.

The solenoid should be rotated into a position that does not obstruct any other ports on the compressor tank.

NOTE : The solenoid exhausts compressed air through the center of the black retaining cap when the Air locking differential is disengaged. Make sure this orifice cannot be obstructed

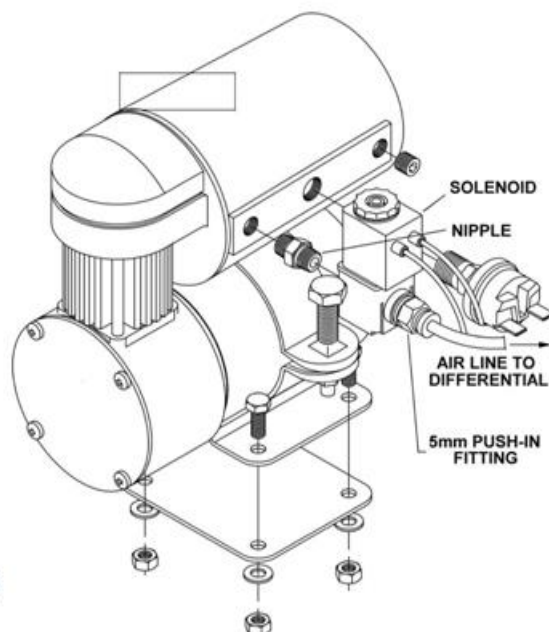
(the TRE equipped 4mm Oil return line should mount into the solenoid black retaining cap hole)

- Apply Teflon paste to the threads of the 5mm push-in fitting and assemble it into the solenoid outlet port (arrow side) and tighten.

Note : Do not screw the plastic black part of the solenoid when mounting the solenoid.

Figure 19.

TRE
Air Compress




IMPORTANT:

TRE cannot warrant your Air locking differential(s) against damage caused as a result of using an alternate air supply. If you have any doubts as to the suitability of your air system to use in an Air locking differential system, consult your TRE distributor.

E-3. Running and Securing the 5mm Air Line and 4mm Oil Return Line

The path taken by the air line from your air compressor to your Air locking differential is unique to your vehicle and the position of your air source. Plan ahead carefully when running the air line and always follow these guidelines:

- Account for axle travel when running the line from the axle to a fixed point on the vehicle. Leave enough slack in the air line to allow for maximum suspension travel in both directions. 
- Avoid leaving large lengths of air line hanging underneath the vehicle where they may get tangled on rocks, sticks, etc.

HINT : Cable tying the air line to one of your flexible brake lines will account for axle travel and should help keep your line from getting snagged.

- Run the air line all the way from the compressor to the differential before trimming either end of the line to length. This will save complications that may arise if the air line has to be removed.
- Make sure the line does not contact sharp edges or abrasive surfaces that may damage the air line over time.
- Do not run the air line around tight bends which may kink the air line and restrict or block the air flow.
- Keep the air line well away from your vehicle's exhaust components. Air lines will melt if subjected to extreme heat.

- Do not run more air line than necessary. Excess line volume created when coiling the left over hose, using unusually large diameter hose, etc., will increase drain on the compressor tank resulting in the compressor running more often than needed.
- Support the air line by tying it back with cable ties wherever possible.
- At the solenoid end of the air line, trim the line to length with a sharp knife.

NOTE : To remove the air line from the push-in fitting; while holding the flange of the fitting out, push the air line into the fitting as far as possible, then press the flange inward, then pull the air line free of the fitting

- To attach the air line to the push-in fitting of the solenoid; insert the line firmly into the fitting, pull outward on the flange of the fitting while holding the line as far into the fitting as possible, and then gently pull outward on the air line to clamp the line in place.

E-4. Connection to the Bulkhead Fitting(5mm Air Line)

- Trim the air line to length using a sharp knife.
- Insert the support spring over the end of the air line - small end first. (Fig. 21.)
- Insert the outer compression nut over the air line.
- Push the air line onto the barb on the center compression nut, ensuring that it is pushed all the way to the end.



HINT : If the tube is too difficult to push on, place the end of the air line into a cup of boiled water to soften the tubing.

- Screw on the outer compression nut and tighten, while supporting the center compression nut with a 3/8" spanner. The airline is now attached to the center compression nut.
- Assemble the support spring over the outside of the outer compression nut. •
- Secure any loose sections of tube with a cable tie

E-5. Connection to the Bulkhead Fitting (4mm Oil return Line)



- Screw the blue interface bulkhead fitting on the mark of differential case and tighten.
- Trim the air line to length using a sharp knife.

HINT : If the tube is too difficult to push on, place the end of the air line into a cup of boiled water to soften the tubing.

- Connect the 4mm air line to the blue interface bulkhead fitting from solenoid.
- Secure any loose sections of tube with a cable tie.

D-6. Mounting the Actuator Switch(es)

Air locking differential actuator switch(es) can be easily panel mounted inside the vehicle in a 21mm x 36.5mm [0.83 " x 1.44 "] rectangular cutout.

NOTE : Only attach the cover plate to the face of the switch once the switch has been mounted and wired correctly as the cover plates are designed to be difficult to remove.

For reasons of safety and for ease of operation, the Air locking differential actuator switch(es) should be mounted in a location picked to best suit the operator. Make sure you have taken the following points into consideration:

- Switch (es) MUST be mounted and should never be allowed to simply dangle from the wiring loom during vehicle use. •
- Switch(es) should be within easy reach of the driver. Ideally, any Air locking differential switch should be able to be operated without physical effort or distraction to the driver. •
- Switch(es) should be mounted within the line of sight of the driver so that switch position (' ON ' or ' OFF ') can be visually determined by the rocker position and the illumination state.
- The position of the switch(es) should best eliminate any possibility of accidental operation by the driver or one of the passengers. •
- Switch cutout position(s) must be located in an area with a minimum of 50mm [2 "] of clearance behind the face of the cutout. •
- Switch(es) should not be mounted where they will be exposed to water (e.g., in the lower section of an inner door panel).

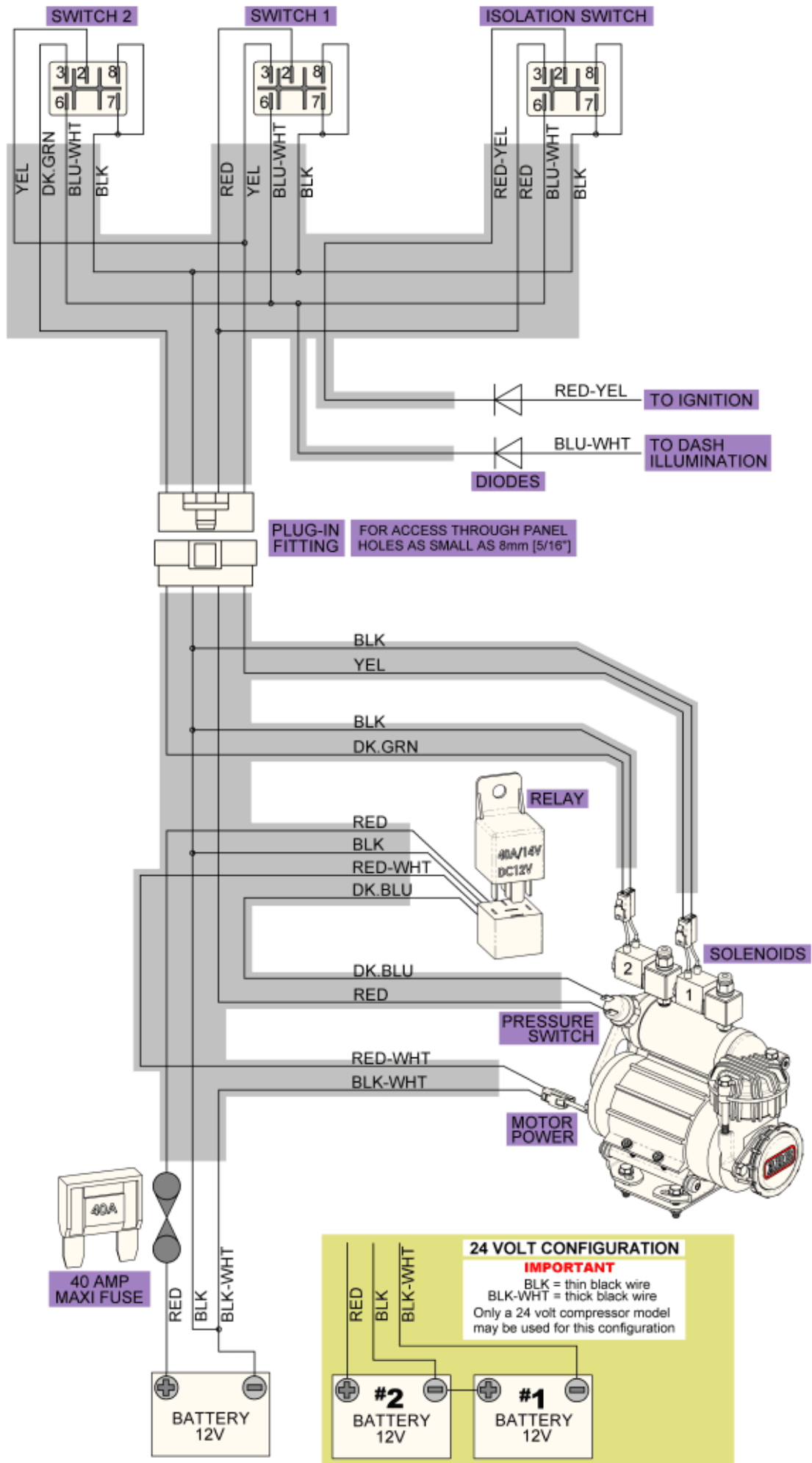
F)Mounting & Connecting the Electrical System

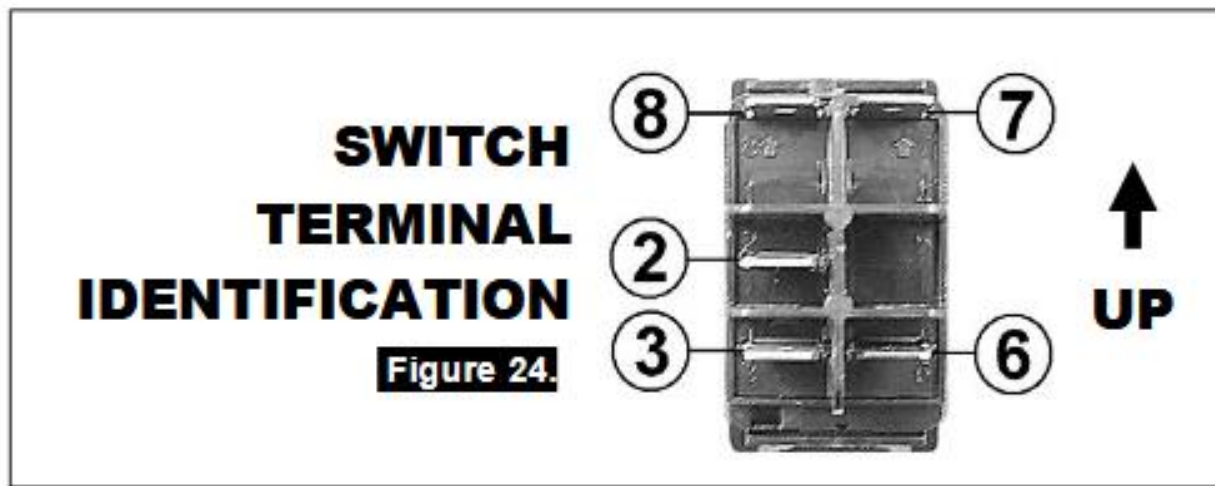
F-1. Wiring the Actuator System

F-2. Connection to an Air Compressor

When wiring the Air locking differential actuator switch(es) and solenoid(s) to an TRE Air Compressor, all

connections can easily be set up directly from the supplied wiring loom





G) Testing & Final Assembly

G-1. Leak Testing

- With the vehicle parked and the engine off, turn the compressor on and wait until the air system is fully charged.

NOTE : With the Air locking differential(s) disengaged, the air compressor should not have to recharge

over time. Intermittent recharging without Air locking differential use usually indicates a leak

at the solenoid fittings or at the compressor tank O-ring seal.

- Actuate the Air locking differential(s).²
- The compressor should not come on again for a rapid period. Air system recharging within that time period would indicate that a leak is present in the system.

NOTE : If an alternate air source (e.g., an air cylinder or a belt driven air pump) is used instead of a compressor, the air system will have to be leak tested with a pressure gauge and a shut-off valve in series before the solenoid input. (Fig.19.)

- If a leak is found to be present, spray a soap and water mixture onto all air fittings in the system while the compressor is fully charged. Bubbles should appear at any leak points. •

- Check that leaky fittings have been adequately tightened. •
- Disassemble, clean threads, and reapply thread sealant if leaking persists.

G-2. Testing the Air locking differential Actuation

To test that your air system, electrical system, and your Air locking differential differential is functioning correctly: •

- Support the vehicle such that the wheels are free to rotate (e.g., on axle stands , a chassis hoist, etc.) •
- Leave the parking brake off, the transmission in neutral, and the Air locking differential switch ' OFF ' .
- Turn the ignition to the ' ON ' position (leaving the motor off). The large illuminating symbol on the Air locking differential switch cover should be ' OFF ' .
- Turn the compressor (or alternate air source) on to charge the air supply up to its maximum pressure.
- Rotate one wheel by hand.
- The wheel should rotate freely and the opposite wheel should be turning in the opposite direction without any resistance or mechanical noise from within the differential.
- Turn the Air locking differential switch to the ' ON ' position. The illuminated symbol on the switch cover should light up.
- Rotate the same wheel again.
- Both wheels should rotate together.
- Turn the switch off again.
- Rotate the same wheel.
- The wheels should again rotate in opposite directions

G-3. Re-Sealing & Filling the Differential

NOTE : Consult the TRE Air locking differential Operating & Service Manual for recommendations on differential lubricant specifications.

- Replace the differential cover using gasket sealant or a new standard differential cover gasket for your make of vehicle.
- Refill the differential until level with the filler hole.
- Rotate the differential center 2 full turns.
- Check the oil level and add oil if necessary.
- Replace filler plug (apply thread sealant to filler plug before inserting if it is a threaded type plug).
- Wipe differential housing clean of any oil or grease which may collect dirt or other abrasive particles.

G-4. Post-Installation Check List

Now that the Air locking differential installation has been completed, TRE recommends that you take the time to complete the following check list just to insure that you haven't missed any of the vital steps.

- The air system has been leak tested. •
- Thread locking compound was used on the ring gear bolts. •
- All torque settings comply with the vehicle manufacturer's specs and were set with an accurate torque wrench. •
- Differential fluid complies with TRE recommendations and has been filled to the correct level.
- All air lines and wiring have been securely cable tied to resist snagging.☒
- Switch(es) have been securely mounted within operator reach, yet well away from danger of accidental engagement. •
- Switch(es) function properly and illuminate to indicate that Air locking differential(s) are engaged. •
- All operators who are to use the Air locking differential have read, and fully understand the TRE Air locking differential Operating & Service Manual. •

ATTENTION

For the safety of vehicles and occupants, there are several points that must be understood and complied with:

- 1、 When driving at high speed on high traction pavement (IE: dry pavement, cement pavement, asphalt pavement, gravel pavement, etc.)The differential locking device has great damage to the transmission components and may cause an accident. The locking device can only be turned on when the road surface with high traction is required.
- 2、 Turn on the differential lock will affect the steering. User should cost time to understand how the differential will affect the steering. Otherwise, if you don't understand it, you can not use it rashly, which may put you and the occupants at risk.
- 3、 The switch should be installed in the proper range of the driver, but must ensure that the switch will not be accidentally touched by the driver, the occupant or the object loosened in the car, accidental turn on, or turn off will cause the vehicle out of control.
- 4、 When in use, the independent switch can avoid the unnecessary work of the air pump. To avoid accidental turn on the differential locker , the differential locker switch should be turned off when not in use. Do not use a independent air pump switch to simultaneously control the locking device. The air pump switch must be used separately.
- 5、 Although the stable and quality of the TRE differential lock is very strong, the locking device should not be turn on when the wheel is idling. Otherwise, the impact force generated when the two wheels are suddenly forced to rotate at the same speed may cause the half shaft be damaged , locking part worn. When turning on the locking device, make sure that the vehicle in a stopped state , is not activated or decelerated. Do not turn on the locking device when turning, do not turn on the locking device while braking.
- 6、 In order to reduce the damage to the vehicle transmission system and reduce the risk of

vehicle control, the speed should be reduced when turning on the locking device, slowly and skillfully off-road driving to achieve the best years of vehicle use

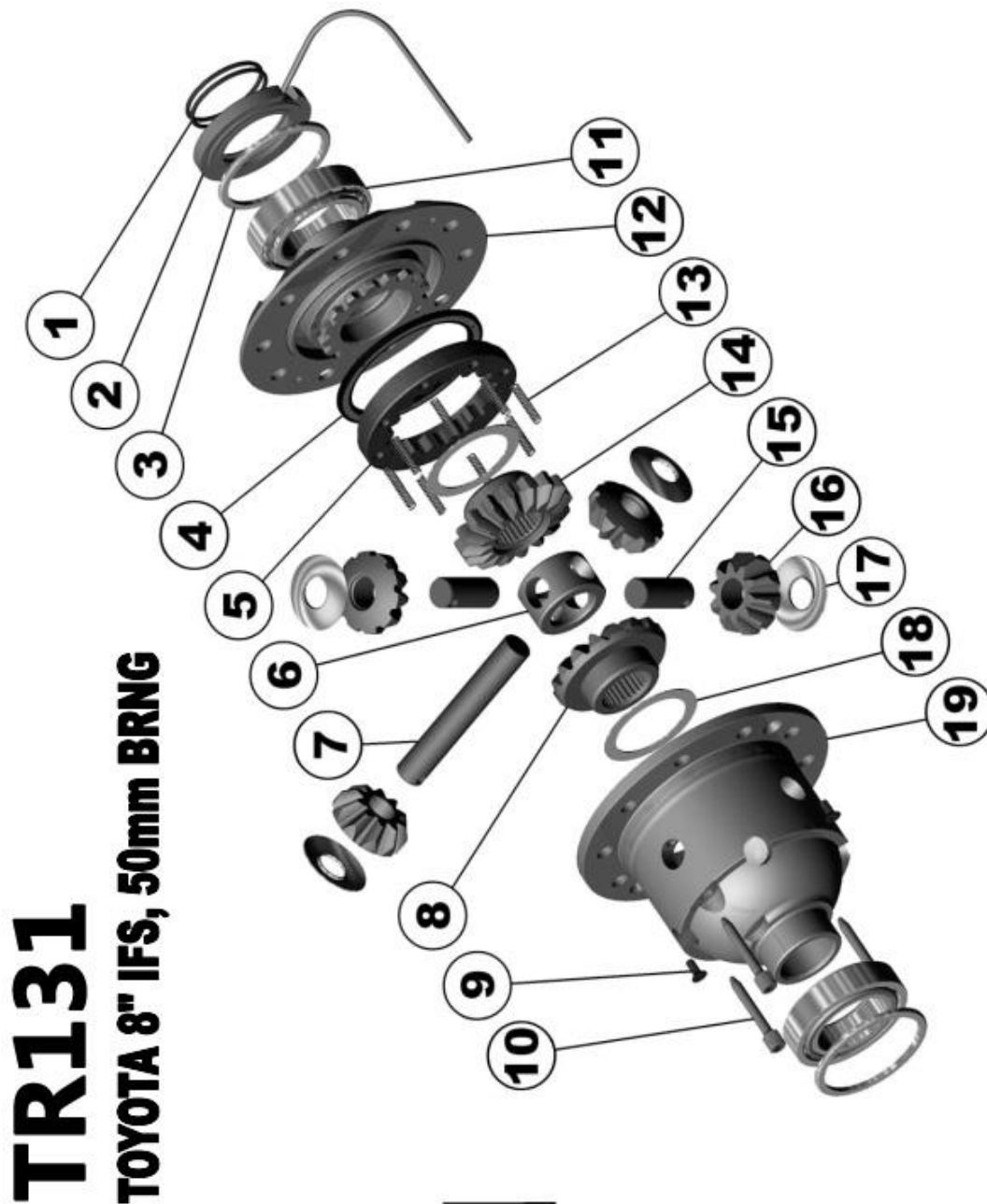
- 7、 Do not make sharp turns after locking the differential . Especially when the front and rear locks are locked at the same time, keep the straight line as much as possible. Otherwise, it is easy to twist the half shaft or Differential.

- 8、 If the locking device is not used frequently, it will produce oil film. Please test it .

PART LIST

Air locking differential model: TR 132 TOYOTA 8" , 50mm CARRIER BEARING

1. Exploded Assembly diagram



2. Component List

MODEL No. : TR131			
ITEM #	QTY	DESCRIPTION	NOTES #
01	2	SEAL HOUSING O-RING	
02	1	SEAL HOUSING ASSEMBLY	
03	1	SHIM KIT	
04	1	BONDED SEAL	
05	1	CLUTCH GEAR	
06	1	SPIDER BLOCK	
07	1	LONG CROSS SHAFT	
08	1	SIDE GEAR	
09	2	COUNTERSUNK SCREWS	
10	3	CROSS SHAFT RETAINING PIN	
11	2	TAPERED ROLLER BEARING	NOT SUPPLIED
12	1	FLANGE CAP ASSEMBLY	
13	8	RETURN SPRING	
14	1	SPLINED SIDE GEAR	
15	2	SHORT CROSS SHAFT	
16	4	PINION GEAR	
17	4	PINION THRUST WASHER	
18	2	SIDE GEAR THRUST WASHER	
19	1	DIFFERENTIAL CASE	
*	1	NYLON AIR LINE (5mm Dia X 6m long)	
*	1	NYLON AIR LINE (4mm Dia X 6m long)	
*	1	BULKHEAD KIT, 3.5mm O-RING TYPE	
*	1	PUSH-IN FITTING,5mm (R1 5 1/8")	
*	1	SOLENOID VALVE (12V)	
*	10	CABLE TIE	
*	1	NIPPLE (1/8" to 1/8" BSPT)	
*	1	SWITCH COVER (FRONT)	
*	1	RHINO STICKER	
*	1	TRE 4X4 BROCHURE	
*	1	WARRANTY CARD	
*	1	INSTALLATION MANUAL	