

Harrop/Eaton Truetrac Differential

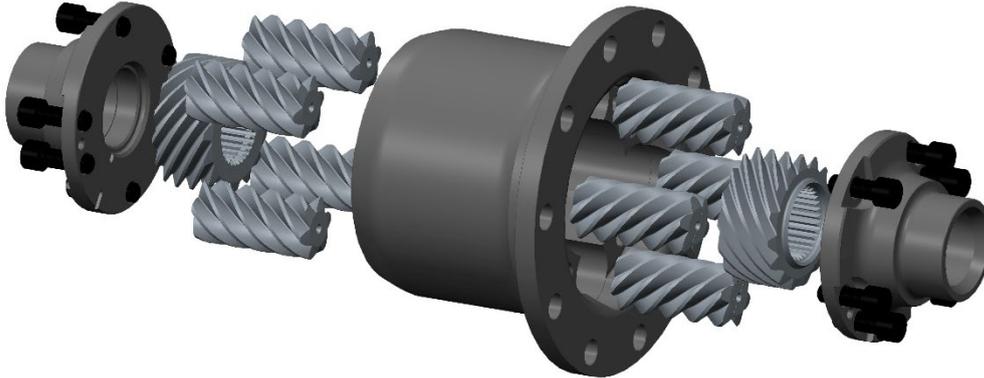
Operating and Installation Instructions



OPERATION

Truetrac Differentials are unique in that they increase traction but do not affect steering or wear out prematurely; these problems are common with limited-slip differentials that use clutch plates and springs.

Truetrac performs like a conventional differential, until there is a loss of traction. Only then will the power transfer occur - when it is needed.



Truetrac-typical

Typical Truetrac differentials are shown above. As with a conventional differential, the Truetrac side gears are interconnected by pinion gears, which allow one wheel to slow down or speed up as required. Truetrac gears have spiral teeth, and the pinions are mounted in pockets in the case.

If one wheel begins to lose traction, the pinions separate slightly from the side gear, and wedge in the pockets. As input torque increases, the separating force increases, thus slowing or stopping the spinout. This allows torque to be distributed to the wheel with the best footing.

Note: Truetrac differentials require a certain amount of resistance at the ground in order to start the power transfer. A Truetrac differential may not transfer power if the spinning wheel is off the ground. If spinning occurs, often a light application of the brakes, while carefully applying power, will slow the spinning wheel enough to allow the Truetrac differential to transfer torque to the other wheel.

APPLICATION

EATON Engineering approval for use of Truetrac differentials in various vehicles is established with the understanding that the vehicle will be operated with approved factory engine and driveline components, as specified for that vehicle will be operated with approved factory engine and driveline components, as specified for that vehicle by the vehicle/axle manufacturer. Any increase in the size of the vehicle's engine, tyres (over 38" diameter), weight, etc: may void the EATON Limited Warranty on page 6. Any such vehicle modification should be reviewed by HARROP Engineering before using the product.

® NoSpin Detroit Locker and Truetrac registered trademarks of EATON Corporation.

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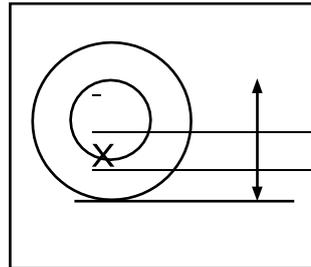


VEHICLE PERFORMANCE

Use extreme caution when accelerating or decelerating on slippery or unstable surfaces. Vehicles/axles equipped with traction differentials are inherently more sensitive to side-slip than vehicles equipped with conventional differentials. Stability can be regained if side-slip occurs by letting off the accelerator.

Distribute the load evenly side-to-side; do not exceed the vehicle's rated payload capacity; keep the diameter of the tyres equal. Failure to observe these measures can create a difference in side-to-side wheel speed which can cause the vehicle to pull to one side.

The diameter of the tyres can be adjusted by varying the air pressure of the tyres. Match the distance from the top of each tyre rim to the pavement.



Note: The Truetrac differential does not increase the load-carrying capacity or payload rating of the vehicle or vehicle combination.

INSTALLATION

The installation procedure presented here applies to all Truetrac differentials used in over-the-road vehicles. However, the procedure will differ slightly depending on the specific axle/vehicle. Therefore, it is essential to consult the vehicle/axle manufacturer's instructions for installing a conventional differential when disassembling and reassembling axle components and when making all final adjustments.

All Truetrac differentials are shipped from the factory completely assembled and ready for installation by replacing the conventional differential and case assembly.

Truetrac differentials are easily installed in the field. However, it is recommended that a certified driveline mechanic do the work in that tools of the trade are required.

The product is designed to fit the components in the vehicle. No machining is required. The procedure is the same as it is for installing a conventional or clutch-type differential. Three to four hours of labour are required, depending on the application. **CAUTION: IT IS RECOMMENDED THAT SAFETY GLASSES BE WORN WHEN INSTALLING THE PRODUCT.**

Read and follow the vehicle/axle manufacturer's instructions for removing the differential assembly from the axle:

- Removing case cover
- Removing axle spacer, C-Clips or snap rings (if any).
- Pulling axle shafts
- Measuring/recording runout
- Spreading axle carrier
- Removing ring gear/differential case assembly from carrier
- Preserving or replacing bearings/shims
- Measuring distance from ring gear flange to bearing shoulders, and between bearing shoulders
- Separating ring gear from differential case
- Inspecting and washing all parts to be re-used

P Caution: Read and comply with the manufacturer's Safety Warnings and Cautions.

P Caution: Do not use heat to disassemble drive axles. To do so can destroy heat treat properties of the material, weaken or distort axle components or result in a mishap which can cause injury, even death.

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Follow the manufacturer's instructions for assembling the differential case to the ring gear and re-installing the differential assembly:

- Cleaning the axle housing of any contamination such as metal particles
- Pressing bearing cones
- Adjusting bearing shim pack to match the dimension recorded in Step 1
- Torquing ring gear bolts to the proper specification
- Inserting the assembly into the axle housing
- Checking spacing: shimming as required
- Torquing bearing caps.

Follow the manufacturer's instructions for re-installing the differential assembly:

- Sealing and torquing the housing cover and axle end covers if required
- Re-filling with manufacturer's recommended lubricant

Final Inspection

To verify that the Truetrac differential is properly installed, restrict the rotation of the pinion shaft (by placing the gear shift lever in park for automatic transmissions), and raise the axle so that both wheels are off the ground. When one wheel is turned by hand, the other wheel should rotate freely in the opposite direction. Check in both directions (Fig. 1)

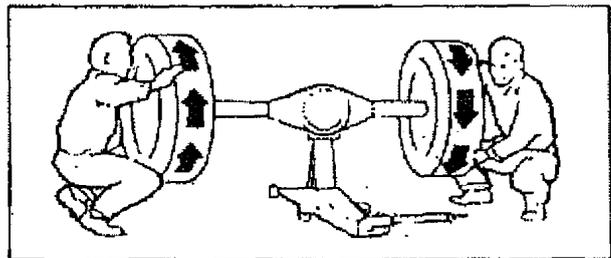


Fig. 1

To verify that the Truetrac differential is operating properly: Pull the vehicle off to the side of the road – the left wheels on dry pavement, the right wheels on loose gravel, dirt etc. – any safe place where the traction surfaces (ground friction coefficients) are different. (Fig 2). As you accelerate, the wheel with the least traction (right wheel) should spin momentarily.

(Fig. 3) The spinning wheel should then slow down and synchronize with the opposite wheel as the Truetrac differential transfers power from the low traction wheel to the high traction wheel.

(Fig 4) **CAUTION: PERFORM THIS TEST IN AN ISOLATED AREA TO PREVENT POSSIBLE INTERFERENCE WITH ONCOMING TRAFFIC.**

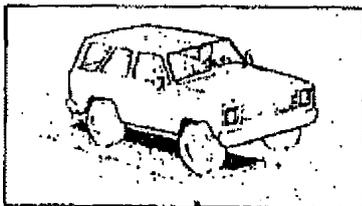


Fig. 2

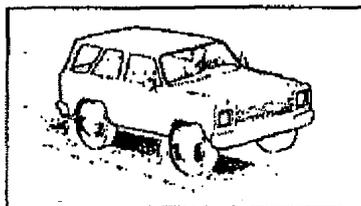


Fig. 3

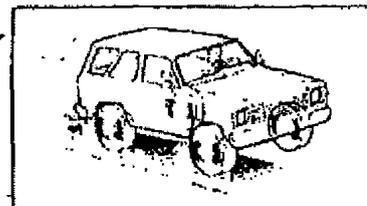


Fig. 4

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MAINTENANCE

⚠ CAUTION: TURN THE ENGINE OFF AND RAISE ALL DRIVING WHEELS OF A TRUETRAC DIFFERENTIAL EQUIPPED AXLE WHEN SERVICING WHEELS, BRAKES, AXLES OR TYRES. FAILURE TO OBSERVE THESE CAUTIONARY MEASURES MAY CAUSE THE VEHICLE TO MOVE WHICH CAN RESULT IN A MISHAP WHICH CAN CAUSE PROPERTY DAMAGE, PERSONAL INJURY, EVEN DEATH.

Lubrication

The Truetrac differential is designed to operate in those lubricants recommended by the vehicle/axle manufacturer for conventional differentials.

Routine Inspection

Carefully follow the recommended lubrication, preventative maintenance and inspection procedures of the vehicle/axle manufacturer. Maintenance, inspection and lubrication requirements of Truetrac differential equipped vehicles are the same for vehicles with conventional differentials.

Adjustments

No adjustments should be made to the Truetrac differential. Refer to the vehicle/axle manufacturer's instructions for adjustments to other parts in the axle. When making brake adjustments, the wheels on both sides of the vehicle must be raised and the transmission placed in neutral so that the ring gear and opposite wheels are free to rotate with the wheels on the side being adjusted.

Repairs

The Truetrac differential should not be disassembled. The units are final machined after assembly to assure proper concentricity and may not retain factory tolerances when reassembled without special tooling. Repairs, if required, must therefore be made at the factory.

HARROP DIFFERENTIAL, LIMITED WARRANTY AND LIMITATIONS

This Warranty is given by Harrop Engineering Australia Pty Ltd ACN 134 196 080 (Harrop) of 96 Bell Street, Preston Victoria 3072. Telephone: +61 3 9474 0900. Email: sales@harrop.com.au

1. Definitions

In this Warranty:

1.1. Differential means:

1.1.1. Differential and internal lubricated parts.

1.2. Customer means the original purchaser of the Truetrac and owner of the Vehicle and, provided that a transfer of Warranty form is given to Harrop in accordance with this Warranty, any subsequent owner of the Vehicle;

1.3. Truetrac means the Truetrac differential installed in the Vehicle and having the serial number set out in the Confirmation of Harrop Warranty or other warranty document issued to the Customer on installation;

1.4. Vehicle means the motor vehicle in which the Truetrac is installed having the vehicle identification number set out in the Confirmation of Harrop Warranty or other warranty document issued to the Customer on installation;

1.5. Harrop Dealer means registered Harrop Dealer. Please contact Harrop for a full registered dealer listing (see clause 7).

2. Differential Warranty Scope

2.1. Harrop warrants in favour of the Customer that the Differential will under normal use be free from defect or damage caused by the proper installation, operation or performance of the Truetrac for the period from the date of purchase of the ELocker until the earlier of:

2.1.1. 36 months from the date the purchase of the Truetrac;

2.1.2. The distance travelled by the vehicle (as determined by its odometer) exceeding 100,000 km's from the installation odometer km's;

2.1.3. The expiry of any express warranty against defects in respect of the Vehicle given by the manufacturer of the Vehicle.

2.2. This Warranty will not apply unless the defect or damage is caused solely by defective materials or manufacturing workmanship of the Truetrac. In particular, the warranty will not apply where:

2.2.1. There is any defect in materials or workmanship in the Differential or in the installation of the Driveline Components; Or

2.2.2. There is any defect in materials or workmanship in the Vehicle (excluding the Truetrac) This causes or contributes to the defect in or damage to the Driveline Components.

2.3. This Warranty does not apply to fair wear and tear of the Truetrac or any Differential (being the gradual and normal reduction in performance and or operation having regard to age and usage) or to any normal or routine maintenance, calibrations, alignments and other adjustments which may be required during the Warranty Period.

2.4. This Warranty will not apply where:

2.4.1. The original purchaser does not purchase the Truetrac directly from Harrop or a Harrop Dealer;

2.4.2. The Truetrac is not installed in the Vehicle by Harrop, a Harrop Dealer or a suitably Qualified Technician;

2.4.3. The serial number on the Truetrac is removed or tampered with;

2.4.4. The Truetrac or any Differential component are altered or modified after installation.

2.5. If within the Warranty Period a defect in the operation of the Truetrac or Differential is discovered Harrop will, at Harrop's option, repair or replace the defective parts at its cost in accordance with this Warranty. If defective parts are repaired or replaced under this Warranty, the repaired or replacement parts will be covered by this Warranty only for the remainder of the Warranty Period.

2.6. No employee of Harrop or a Harrop Dealer or other agent of Harrop has authority to vary the terms of this Warranty.

3. Customer Responsibilities and Limitations on Warranty

The Customer is responsible for the proper use, service, maintenance and repair of the Vehicle. This Warranty will not apply if:

- 3.1. The Vehicle is serviced, maintained or repaired by any person other than a qualified motor mechanic or technician;
- 3.2. the Vehicle is not properly serviced in accordance with the Vehicle manufacturer's instructions or specifications at least once every 12 months or 15,000 kms (whichever occurs first);
- 3.3. Lubricants or coolants other than those recommended or approved by the manufacturer of the Vehicle are used in the Vehicle or are used otherwise than in accordance with the Vehicle manufacturer's instructions or specifications;
- 3.4. The Vehicle is stored, handled, maintained or repaired in any way contrary to the manufacturer's instructions or specifications;
- 3.5. The Vehicle is handled, maintained or repaired in any way contrary to Harrop's instructions or specifications (as outlined in the operating instructions);
- 3.6. The Vehicle is otherwise improperly stored, handled, maintained or repaired;
- 3.7. The Vehicle is exposed to any abnormal climate conditions or operating circumstances;
- 3.8. The Vehicle is subjected to misuse, neglect, accidental or deliberate damage or destruction, or act of God;
- 3.9. The Vehicle is used for transporting livestock or in stunt activity or motor sports (including rallying, or racing or other competitive driving, practising or testing for the same);
- 3.10. The Vehicle is used after any defect in the Vehicle (including the Truetrac and Driveline Components) becomes apparent or would have become apparent to a reasonably prudent operator or user.

4. Claiming Under Warranty

- 4.1. In order to make a claim under this Warranty, the Customer must strictly within 14 days of becoming aware of the apparent defect, contact Harrop (see clause 7 below) to obtain a Warranty Claim Form to complete and submit directly to Harrop. Harrop will then communicate and nominate a suitable Harrop dealer or workshop which the vehicle should be delivered for vehicle inspection/diagnosis.
- 4.2. If a fault with the Truetrac is suspected, the unit may require delivery to Harrop Engineering for subsequent diagnosis report and repair.
- 4.3. The Vehicle must be delivered to the location notified by Harrop strictly within 14 days together with a properly completed Warranty Claim Form.
- 4.4. Harrop will not accept any warranty claims made otherwise than strictly in accordance with this Warranty.

4.5. If the Truetrac is found to be working satisfactorily, the Customer must pay all reasonable costs of testing the Vehicle, ELocker or Differential before the Vehicle will be released to the Customer.

4.6. The Customer will be responsible for all costs of delivering the Vehicle to the location notified by Harrop and for collection of the Vehicle from such location and any other expenses of the Customer in claiming under this Warranty.

4.7. Harrop's determination as to the existence of any defect or the cause of any defect is conclusive.

4.8. Any parts which are replaced under this Warranty become the property of Harrop.

5. Harrop's Responsibilities on Claims under Warranty

5.1. Harrop will within a reasonable period after delivery of the Vehicle under clause 4.2:

5.1.1. Assess the Customer's warranty claim and determine whether Harrop accepts the claim; and

5.1.2. Notify the Customer whether it accepts the Customer's warranty claim.

5.2. Harrop will at its discretion carry out or arrange the repair or replacement of the defective parts with new or refurbished parts or the replacement of the defective parts with alternative parts with the same or similar specifications.

5.3. Harrop will ensure that all repairs and replacements under clause 5.2 are carried out:

5.3.1. Within a reasonable time after the Customer is notified of the acceptance of the Customer's warranty claim; and

5.3.2. by an appropriately qualified motor mechanic or technician.

5.4. Harrop will liaise with the Customer and the person carrying out the relevant repairs or replacements and ensure that the Customer is fully informed as to the progress and nature of the repairs and replacements carried out.

5.5. Harrop will be responsible for the cost in repairing or replacing defective Truetrac parts under this clause and the Customer will not be issued any invoice for such costs.

5.6. Harrop will not be responsible for:

5.6.1. Any loss of profits or other indirect or consequential loss whatsoever arising from any defect including associated labour, incidentals and consumables incurred to remove and install the ELocker;

5.6.2. Any loss or damage to the Vehicle occurring while the Vehicle is in transit (i.e. either on delivery to or collection from the location notified by Harrop);

5.6.3. Any loss or damage caused by any delay in assessing the Customer's claim or in repairing or replacing defective parts.

5.6.4. Any loss or damage caused by racing and or competition use of the vehicle



6. Change of Ownership of Vehicle

The Customer must strictly within 14 days of any change of ownership of the Vehicle, notify Harrop of such change in ownership by completing the Transfer of Warranty Form at www.harrop.com.au/warrantytransfer.

7. Contacting Harrop

The Customer may contact Harrop to obtain a Warranty Claim Form

7.1. by telephone: (03) 9474 0900

7.2. by facsimile: (03) 9474 0999

7.3. by post or in person: 96 Bell Street, Preston Victoria 3072; or

7.4. by email: warranty@harrop.com.au

8. Application of Consumer Laws

8.1. The benefits of this Warranty are in addition to any other rights and remedies available to the Customer under the law.

8.2. Nothing in this Warranty is intended to have the effect of contracting out of any applicable provision of the Australian Consumer Law

8.3. The Australian Consumer Law requires the inclusion of the following statement in any warranty in respect of goods supplied to a consumer as defined under the Australian Consumer Law:

“Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

