

Truetrac[®] OWNER'S MANUAL

gear driven limited-slip
traction differential

WITH ⚠ WARNINGS and PRECAUTIONS

Mechanic:

Any increase in the size of the vehicle's engine, tires, weight, etc. may prohibit the use of a TrueTrac differential in a heretofore approved application. Any such modifications should be reviewed by Tractech Engineering before continuing to use the product.

Do not use heat to disassemble drive axles. To do so can destroy heat treat properties and weaken or distort axle components.

Turn the engine off and raise all driving wheels of a TrueTrac differential equipped axle when servicing wheels, brakes, axles or tires to prevent the vehicle from moving.

Operator:

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.

Distribute the load evenly side-to-side; do not exceed the vehicle's rated payload capacity; keep the diameter of the tires equal (max diameter 32 inches). 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.

Turn the engine off and raise all driving wheels of a TrueTrac differential equipped axle when changing tires to prevent the vehicle from moving.

IMPORTANT: RE-READ THE CAUTIONARY NOTICES REFERENCED ABOVE. IN ADDITION TO THE CONSEQUENCES NOTED, FAILURE TO OBSERVE ANY OR ALL OF THESE MEASURES CAN CAUSE PART FAILURE OR RESULT IN A MISHAP WHICH CAN CAUSE PERSONAL INJURY, EVEN DEATH.

**Tractech
Inc.**

11445 Stephens Dr.
P.O. Box 882
Warren, Michigan 48090 U.S.A.
(586) 759-3850
Fax (586) 759-1645

CONTROLLED DOCUMENT
F0452 (0402), REV. A

Printed in U.S.A.
5M (0402)

- 8 -

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.

TRACTECH DIFFERENTIAL LIMITED WARRANTY, AND LIMITATIONS

Tractech (TRACTECH) expressly warrants each TRACTECH differential or part to be free from defects in materials and workmanship under NORMAL USE AND SERVICE:

1. In new vehicles when not used in competition of any type, for the same period (of time, mileage) as the other axle parts are warranted by the axle manufacturer in that vehicle; or
2. In used vehicles when not used in competition of any type for the earlier of one year or 100,000 miles of differential use from the date of delivery to the first user; or
3. For vehicles when used in any type of competition, warranty covers our workmanship and materials, only as shipped and prior to any competitive use.

NORMAL USE AND SERVICE means that:

A. The differential will be applied, installed, operated, inspected and maintained in accordance with the TRACTECH Operation and Maintenance and Owner's Manuals for the specific product;

B. The maintenance of this differential must be equal to or better than that specified by the vehicle manufacturer for the axle and conventional differential; and

C. The differential will be applied and operated within the boundaries of the written TRACTECH APPLICATION APPROVAL by the TRACTECH Engineering Department.

TRACTECH strongly encourages each designer, prospect, customer or user to submit an application approval request using TRACTECH Differential Data form 7003.

There exists specific MANUALS for each TRACTECH traction control differential indicating the appropriate application, installation, operation, inspection and maintenance criteria. IT IS MOST IMPORTANT THAT ANY SELECTOR, PURCHASER, INSTALLER, MAINTAINER OR USER CAREFULLY READ the relevant MANUAL before any application is selected or any operation or maintenance is attempted.

Neither this warranty, nor any implied warranty applies to damage or harm caused by any or all of the following:

- A. Failure or difficulty caused by wear to or failure of other axle parts.
- B. Freight damage.
- C. Damage, difficulty or harm caused by components, parts and/or accessories not obtained from or approved by TRACTECH or which do not meet TRACTECH quality and performance specifications.
- D. Damage due to misuse or abuse.
- E. Normal wear of moving parts or components affected by moving parts.
- F. Repair or alterations which adversely affect the performance or reliability of the TRACTECH differential.
- G. Any consequential or incidental damages, (i.e. broken ring & pinion, axles, bearings, differential covers, towing & labor charges)

- 6 -

Truetrac[®] OWNER'S MANUAL

gear driven limited-slip
traction differential

WITH ⚠ WARNINGS and PRECAUTIONS

PREFACE

Tractech has been a leading manufacturer of premium quality traction-adding differentials for over 50 years. Each step in our manufacturing process, from design to final assembly and inspection, reflects the highest industry standards. This manual is intended to help provide safe and trouble free operation of TrueTrac differentials for the life of the product. **We strongly recommend that all who come in contact with the product read this manual thoroughly.**

GENERAL INFORMATION AND RECOMMENDATIONS

To Contact Tractech Telephone: (586) 759-3850 Fax: (586) 759-1645
Office Hours: 7:30 – 4:30 (ET) Mon. – Fri.
General Assistance, Warranty Assistance, Customer Service Dept.
Printed Matter:
Technical Assistance: Engineering Dept.

Limited Warranty The complete Tractech Limited Warranty appears on pages 6-7. Owners of TrueTrac differentials are encouraged to read this warranty carefully before putting the vehicle into service.

Installation Before installing TrueTrac differentials, read pages 3-5. **Note: Tractech recommends that a certified driveline mechanic perform the installation in that tools of the trade are required. Note: The vehicle/axle manufacturer's instructions for installing a conventional differential must be consulted when disassembling and reassembling axle components and when making all final adjustments.**

Maintenance Refer to pages 5-6 for important information regarding proper maintenance of your TrueTrac differential. Carefully follow the recommended lubrication, service and inspection procedures.

Applications See light truck and performance model list for more applications.

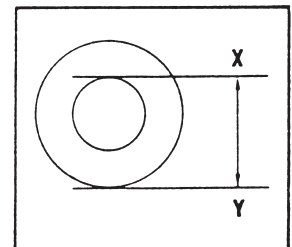
Make, Model	Axle				TrueTrac Model
	Front	Rear	#Splines	Ratio	
Chev./GMC 8-7/8"		X	30	3.73 up	913A315
Chev./GMC 8-1/2"	X		28	2.73 up	913A332
Chev./GMC 8-1/2"		X	28	2.73 up	913A322
Chev./GMC 8-1/2"		X	30	2.73 up	913A309
Dana 30	X		27	3.73 up	912A314
Dana 30	X		27	3.54 dn	912A374
Dana 44	X		30	3.92 up	913A333
Dana 44	X		30	3.73 dn	913A334
Dana 44		X	30	3.92 up	913A313
Dana 44		X	30	3.73 dn	913A312
Ford 9"		X	31	All	913A328
Toyota 7-1/2" large hub	X		27	All	911A342
Toyota 8" small hub	X		30	All	913A318
Toyota 8" small hub		X	30	All	913A348
Toyota 8" large hub		X	30	All	913A321

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 tires 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 tires can be adjusted by varying the air pressure of the tires. Match the distance from the top of each tire rim to the pavement.



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

Important! Read the Warnings and Precautions on the back cover.

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 labor are required, depending on the application. **⚠ CAUTION: IT IS RECOMMENDED THAT SAFETY GLASSES BE WORN WHEN INSTALLING THE PRODUCT.**

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

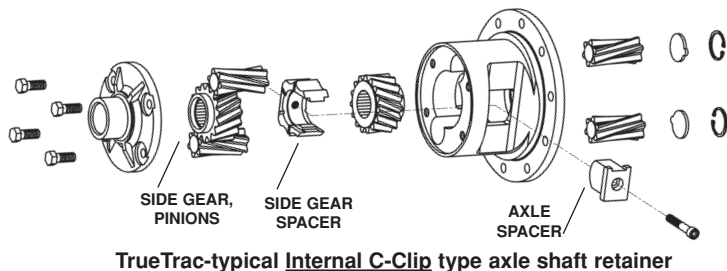
- Removing case cover.
- Removing axle spacer, C-Clips or snap rings (if any).
- Pulling axle shafts.
- Measuring/recording runout.
- Spreading axle carrier.
- Removing ring gear/differential case assembly from carrier.
- Preserving or replacing bearings/shims.
- Measuring distance from ring gear flange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

- 3 -

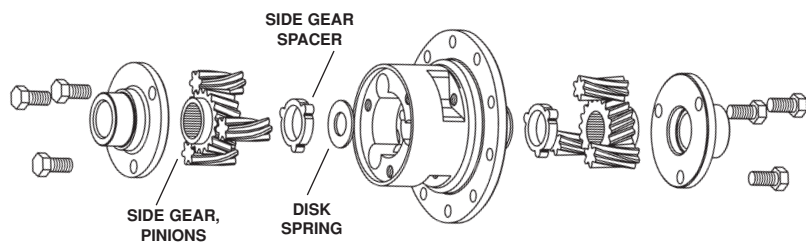
OPERATION

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 internal C-clip type axle shaft retainer



TrueTrac-typical external type axle shaft retainer

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

Tractech 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 by the vehicle/axle manufacturer. **Any increase in the size of the vehicle's engine, tires (over 32" diameter), weight, etc. may void the Tractech Limited Warranty on page 6.** Any such vehicle modification should be reviewed by Tractech Engineering before using the product.

© NoSpin, Detroit Locker and TrueTrac registered trademarks of Tractech, Inc.

- 2 -

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

⚠ 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.

2. 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.

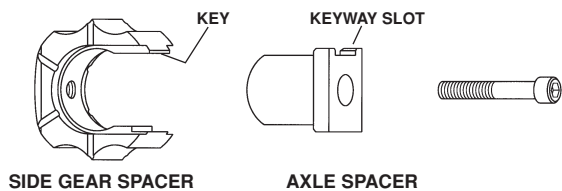
3A. For axles with internal C-clip shaft retainers, two types of spacers are used.

1. Tombstone Shaped Axle Spacer Type

- Chev./GMC - all vehicles and TrueTrac models and Dana 44 in front axle Ford vehicle applications.

Note that the TrueTrac axle shaft spacer and assembly screw must be removed from the TrueTrac assembly before installing the C-Clips.

- After inserting axle shafts and installing C-Clips (not supplied by Tractech), pull both axle shafts outboard.
- Assemble axle shaft spacer into side gear spacer correctly per this illustration:

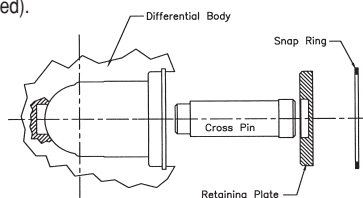


- Insert spacer retaining screw and thread into side gear spacer tapped hole. Torque to 20 - 25 ft.-lbs. (27 - 34 Nm.). Note that the screw is supplied with a Drilok® patch. If the screw is removed after tightening, a Locktite® thread compound must be used before reinstalling the screw. Be sure to remove any Drilok® residue with a wire brush prior to applying Locktite®.
- Go to Step 4.

2. Plate and Pin Style Type

- Dana 35 and Visteon (Ford) 8.8 - All vehicles and TrueTrac models. These units are completely assembled at the Tractech, Inc. factory.

- Remove snap ring, retaining plate and cross pin from differential body.
- After inserting axle shafts and installing C-Clips (not supplied by Tractech, Inc.), pull both axle shafts outboard.
- Insert cross pin into differential body. Assure that pin has seated in hole at back of body.
- Insert retaining plate and snap ring. Assure that snap ring has seated into groove fully (snap ring should be able to be rotated).
- Go to Step 4.



- 4 -

including but not limited to loss of use, loss of profits, loss of sales, increased costs or any other special or indirect damages other than injury to the person arising from the use of any TRACTECH differential except in those states which do not allow the exclusion or limitation of incidental or consequential damages.

The liability of TRACTECH under the foregoing warranty is limited to repair or replacement, at TRACTECH'S option, without charge for materials, of any TRACTECH product returned within the warranty period that is finally determined to have been defective in material or workmanship. The complete differential must be returned, freight prepaid.

TRACTECH expressly warrants its differentials and other products only as stated above. No person, including any dealer or representative of TRACTECH is authorized to make any representation or warranty concerning TRACTECH products on behalf of TRACTECH or to assume for TRACTECH the obligation contained in this warranty. This warranty gives you specific legal rights and you may also have other rights which vary from state to state. **THIS WARRANTY EXCLUDES ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY PURPOSE.**

LIMITATIONS

TRACTECH reserves the right to make changes in design, manufacturing and other changes, modifications, alterations or improvements to any of its products without there existing any obligation upon TRACTECH to furnish or install the same upon its existing products, any products previously sold and delivered or then in process, manufacture or distribution.

All purchasers of TRACTECH products, equipment or goods waive subrogation on all items covered under their own or any other insurance.

It is expressly agreed that the liability of TRACTECH to anyone involved in a commercial, industrial or rental use or exposed to the consequences of such use, is limited, and TRACTECH

does not function as an insurer. If TRACTECH should be found liable to anyone on any theory (except any express warranty where the exclusive remedy is set forth in the above Warranty), the liability of TRACTECH shall be limited to the amount of the purchase price of the involved TRACTECH product when sold to the first user. This liability is exclusive and regardless of cause or origin resulting directly to any person, organization, entity or property from:

- A. The performance or nonperformance of any obligation set forth in the warranty.
- B. Any agreement between TRACTECH and its customer or the user.
- C. Negligence, active, passive or otherwise of TRACTECH or any of its agents or employees.
- D. Breach of any judicially imposed warranty or covenant.
- E. Misrepresentation.
- F. Strict liability.

When adjustment is sought under this warranty, a claim should be made as follows:

IN NORTH AMERICA

1. If the differential was purchased through a distributor of TRACTECH products, supply the distributor with the history of the product and have the distributor phone TRACTECH Customer Service Department and ask for a Returned Goods Authorization number. Tag the differential with the authorization number and ship the entire differential (freight prepaid) to our Warren, Michigan factory. Evaluation of claims takes 2 -3 weeks from the time the unit is received, or

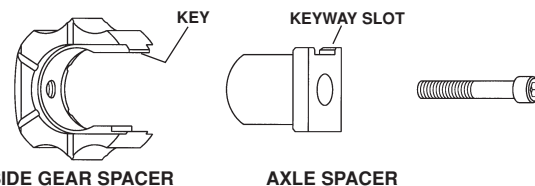
2. If the differential was purchased installed by the axle/vehicle manufacturer (or its dealer), follow the manufacturer's procedures for warranty claims.

OUTSIDE NORTH AMERICA

3. Follow the procedure in Paragraphs 1 and 2 immediately above but do not return the differential. You will be contacted regarding your claim.

3B. For axles with external shaft retainers and tombstone shaped axle spacer type.

- Dana 44
 - Assemble axle shaft spacer into side gear spacer correctly per this illustration:



⚠ Caution: Installer must tighten screw to 20 - 25 ft.-lbs. (27 - 34 Nm.). Note that the screw is supplied with a Drilok® patch. If the screw is removed after tightening, a Locktite® thread compound must be used when the screw is re-installed. Be sure to remove any Drilok® residue with a wire brush prior to applying Locktite®.

- Go to Step 4.

3C. For axles with external shaft retainers and no spacers.

- Dana 30 ■ Ford 9" ■ Toyota 7 1/2" & 8"
- Go to Step 4.

4. 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.

5. 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, or in **reverse** for manual 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)

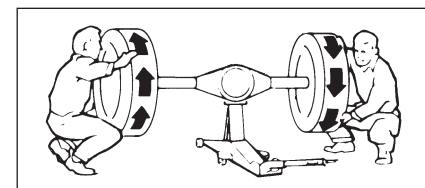


Fig. 1

* For TrueTrac models built with pre-load, the rotation will be restricted (approx. 100 lb. ft. torque required to rotate). Pre-load units are all models for Toyota and Dana 30 axles, and for the Ford 9"-913A328 model only.

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.**

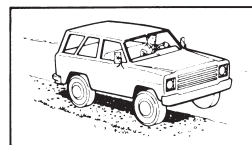


Fig. 2

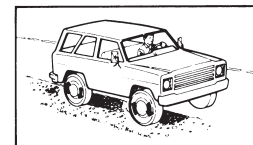


Fig. 3

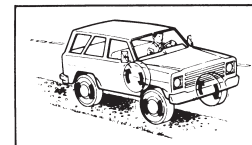


Fig. 4

MAINTENANCE

⚠ CAUTION: TURN THE ENGINE OFF AND RAISE ALL DRIVING WHEELS OF A TRUETRAC DIFFERENTIAL EQUIPPED AXLE WHEN SERVICING WHEELS, BRAKES, AXLES OR TIRES. 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.

- 5 -