POWERTRAX®
Extreme Traction Systems

LOCK RIGHT®

Powertrax.com

Owner's Manual

TABLE OF CONTENTS

To view installation instructions for your specific Lock-Right unit, simply find your model below and go to the page listed.

MODELS ARE LISTED IN ALPHANUMERIC ORDER.

POWERTRAX® Extreme Traction Systems

• Technical Assistance •

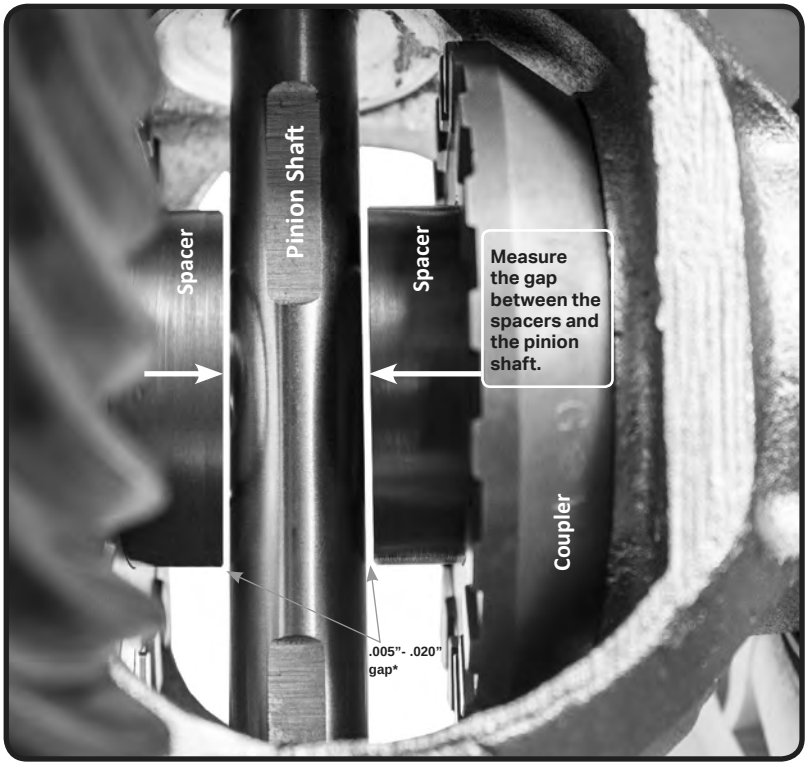
If you have general questions, please contact your local dealer for assistance. If your questions are of a more technical nature, call the Powertrax Tech Line: 1-864-843-9275 for further information between the hours of 8AM - 6PM ET.

IMPORTANT!

If your differential case or thrust washers are excessively worn, your new Lock-Right Locker may not be able to operate as it was designed. Therefore, two easy measurements must be made before final assembly to assure that your new locker will function properly. To make these measurements, proceed as follows:

1) Remove the existing spider gears, side gears and thrust washers from the differential case, and thoroughly clean it.
2) Install both Lock-Right couplers with the existing thrust washers in each end of the case.
3) Place the spacers onto the centers of the couplers (wide side toward the axle splines if not symmetrical), and hold them there.
4) Install the pinion shaft; carefully guide it past the spacers as it is being inserted through the holes in the case.
5) Measure the gap between each spacer and the pinion shaft with a feeler gauge. This gap should be between .005" and .020", with not more than a .008" difference between the two. If your numbers are within the limits specified, remove the parts and begin your installation. If your numbers are not within these limits, check the thrust washers and the differential case. If they are excessively worn or are damaged, they may need to be replaced before installing your new Lock-Right Locker.

***There MUST NOT be more than a .008" difference between the two gap measurements.**



ORIGINAL MANUAL #: 1000701MOA

"UNIVERSAL OWNER'S MANUAL"

Lock-Right part numbers covered in this section: ALL

• Introduction •

Congratulations on your selection of the new LOCK-RIGHT automatic 100% full-locking differential! Just watch—soon it will be getting you and your vehicle into and out of many places that would have been difficult or impossible to reach without it. Better yet, a 4x4 with LOCK-RIGHTs in both ends will give you the most traction that you can get! Also note that a 4x2 with a LOCK-RIGHT in the rear axle will be about as effective as a 4x4 with standard open differentials, and in some situations even better. Because it will make such an amazing difference in how your vehicle performs, we're sure that you'll enjoy belonging to the growing family of LOCK-RIGHT owners. Welcome!

• Important information •

Be sure to have any drivers of your vehicle carefully read and understand the sections in this manual beginning on page XX that describe vehicle operation and on page XX that describe driving precautions. The LOCK-RIGHT produces some minor but noticeable differences on-road while giving your vehicle major increases in traction off-road. It is very important for the driver to read and understand these characteristics! We suggest that you store this manual in the glove compartment for reference.

THE LOCK RIGHT

FUNCTION: The standard "open" differential always divides torque equally between the wheels. If one wheel slips and starts spinning with only a small amount of torque applied, the other wheel also receives only this same small amount—and your vehicle stops. To solve this problem, the LOCK-RIGHT automatically delivers up to 100% of the available engine torque to either wheel—so that the one with the most traction will help keep you moving.

OPERATION: The LOCK-RIGHT **(Figure 1)** consists of two bi-directional over-running dog (toothed) clutches. Each one has a driving member (the driver) and a driven member (the coupler, or in some models, the existing side gear). Both clutches are rotated by the pinion shaft(s) (or the spider). Each driver has special recesses cut in one face that receive the pinion shaft(s), and radial teeth cut in the opposite face. Each driver mates with its coupler to form a fully-locking combination. The coupler also receives the axle shaft to drive the wheels.

When your vehicle is moving straight ahead, both wheels are rotating at the same speed and both clutches are fully engaged (locked). When your vehicle begins to turn, the outside wheel starts to rotate faster than the inside wheel. The two clutches sense this difference in speed and allow the coupler (or side gear) of the outside clutch to unlock so that the wheel can rotate freely. It thus is "ground-driven" faster as the vehicle is turning; power continues to be applied to the slower (inside) wheel. As the vehicle straightens out the wheels again rotate at the same speed, and the outside clutch re-engages. This differentiating action occurs automatically for right and left turns and in both the forward and reverse directions.

FEATURES: Its design is simple and rugged. It is an automatic 100% fully-locking differential that is "all-gears"—no belleville washers, clutch packs or cone clutches to break or wear out. The LOCK-RIGHT simply replaces many of the parts inside the standard differential case.

- It uses your own stock differential case, bearings, spider (where applicable) and thrust washers (and also the side gears in some models) and in a few cases your pinion shaft(s) rather than parts that are all specially made and therefore more expensive.
- It uses stainless steel springs for excellent resistance to high temperatures and fatigue.
- The drivers and couplers are made from

carbon steel aircraft alloy and are heat-treated for toughness and durability.
- It uses standard gear oil rather than a special limited-slip differential lubricant.
- It can be easily installed by anyone familiar with general automotive work. With care, it can be installed without altering the drive pinion and ring gear settings—they do not need to be "set up" again.
- It minimizes the tire wear that is associated with some other lockers and also with limited-slip clutch-pack differentials by allowing free rotation of the outside wheel during a turn.
- It can increase gas mileage off-road in either a 4x4 or a 4x2 because of more efficiency due to increased traction, especially in sand.
- It has been operated extensively off-road in some of the most rugged trucks in the world—military and civilian—and has been triple-checked for proper materials and design. We believe that it will last for as long as would your conventional open differential.
- It provides you with the best off-road traction available. No other type of differential can match it in allowing up to 100% of the engine power to be applied to either wheel even when the other one is off the ground—the reason that the LOCK-RIGHT will allow your vehicle to reach its maximum potential.

• Front axle disconnect operation •

All modern 4x4 vehicles have a way to save wear on the drive train and increase gas mileage by preventing the front differential from spinning in 2WD. Some late vehicles accomplish this feature by disconnecting only one axle shaft in the middle rather than by using free-wheeling front hubs. This design saves cost by eliminating the need for the additional hubs and full-floating axles. However, the differential gears continue to wear. The LOCK-RIGHT can be installed in these axles; however, the front ring and pinion gears will continue

Typical Lock-Right exploded view

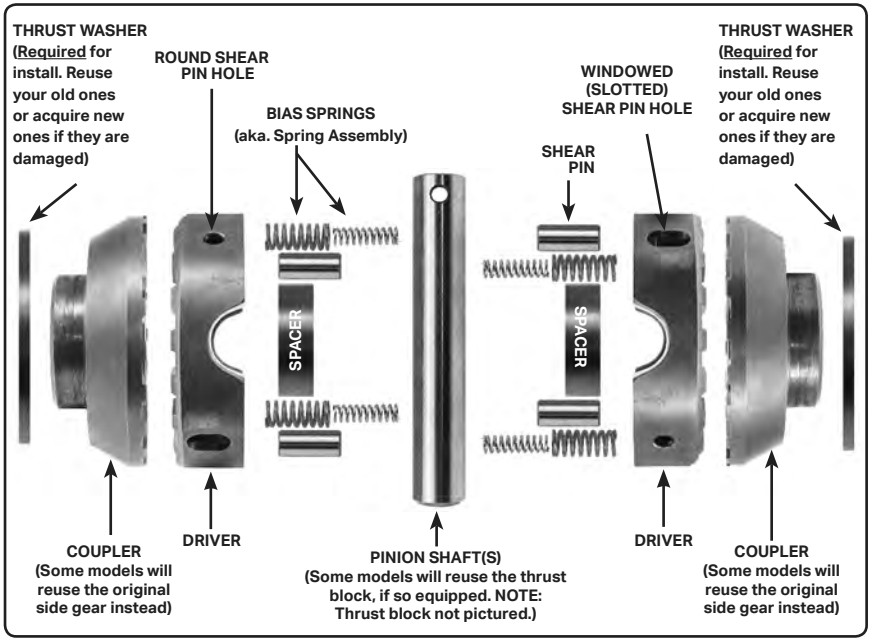


Figure 1: Typical Lock-Right exploded view

to rotate (the same characteristic as most early 4WD vehicles) because of the locking feature of the differential. NOTE: This spinning at high speed on-road can cause vibration if the drive shaft is unbalanced or if the vehicle has a lift and the U-joint angles are not matched. If vibration occurs, carefully check the front end components.

Free-wheeling front hubs cannot be installed in some vehicles because of the axle assembly design. With a locker in the front end and the transfer case in the on-road 2WD position, the only change in vehicle performance will be a slight decrease in gas mileage and a shorter seal life for the drive pinion flange and transfer case front output. The life of the drive gears and the other bearings and seals will remain essentially unchanged.

If the vehicle is to be driven in cold weather, the drag produced by the thick gear oil will cause a slight pull on the steering wheel. A solution for this problem is to engage the disconnect mechanism so that both axle shafts are spinning, or use a lighter oil.

• Verhicle performance •

GENERAL: The first thing that you will notice about the LOCK-RIGHT installed in the rear axle is that it's hard to notice. Unlike some other designs, it is almost inaudible during cornering and operates with hardly any noise or jerking when driven properly. In two-wheel driving around town, your vehicle will behave quite similar to how it did before the LOCK-RIGHT was installed.

TRACTION: A LOCK-RIGHT installed in the rear axle of your vehicle will result in much more traction than ever before because it prevents any wheel spin at all unless both wheels spin. When either wheel begins to slip, the LOCK-RIGHT immediately transfers more torque to the other one to keep you moving instead of getting stuck. Thus, with a LOCK-RIGHT, the wheel with the most traction receives the most power. In a 4x4, this power-distributing characteristic is even more effective with another one in the front axle—giving your vehicle the ultimate in traction. It won't become stuck until all four wheels are spinning!

PAYLOAD: The LOCK-RIGHT increases the effective tractive ability of your vehicle but does not increase its payload rating or its load-carrying capacity.

STEERING: Any effect on steering produced by a LOCK-RIGHT in the front axle is hardly noticeable in rugged off-road use or in 2WD on-road, even with the front locking hubs engaged. However, the vehicle may tend to under-steer if it is in 4WD in a place where 4WD is not required, such as on a hard dirt road, for example. Even so, a vehicle with two LOCK-RIGHTs installed has the best of two worlds—maximum traction in 4WD and normal steering in 2WD.

BACKLASH: The LOCK-RIGHT needs about 25° of free drive shaft rotation to allow it to operate, producing a slight delay when getting on and off the throttle. This delay does not represent any problem with the assembly or with the drive gears. This built-in backlash characteristic is present in all automatic lockers and is completely normal.

• Off-road operation •

The places in which you will notice your new LOCK-RIGHT are off-road. Because your vehicle now will climb better than before, we suggest that you become familiar with its new capabilities slowly. Take it to an off-road area in which several types of terrain are present and try each one carefully to see how well your "new" vehicle performs. Only after becoming thoroughly familiar with its new capabilities should you put it through its paces with serious off-roading.

• Vehicle operation •

APPLYING POWER: During normal driving, either rear wheel or both may be powered, depending on whether or not the vehicle is turning slightly or has just finished turning. Because of these constant small turning movements and minor differences in tire diameters, some of the time either one side or the other may be slightly unlocked. When you get on and off the gas quickly or shift gears, you may notice a momentary slight sway at the rear. This is because acceleration and deceleration will initially be applied at only one wheel rather than at both wheels until the torque equalizes. This effect is easy to become used to but is mentioned for your information.

CORNERING: When turning your

vehicle, try to do so under slight positive throttle. If turning is done with a neutral throttle, it may tend to "buck" because of interaction between the free drive shaft rotation and the engine RPM change due to a varying load. During normal turning movements on the street, you will notice that your new LOCK-RIGHT operates easily.

If you are powering in a turn and then get off the gas, torque transfers from the inside (driving) wheel to the outside (decelerating) wheel. This transfer of torque may tend to change the vehicle direction; when turning on slippery surfaces, be sure to do so smoothly and avoid jerking.

If you are in a turn and accelerate suddenly, the vehicle will tend to straighten out because initially the inside wheel is the only one that is being powered (the outside wheel is free-wheeling during the turn). Be very careful in turns, especially on water or ice!

When a vehicle turns, each wheel follows a slightly different path. This means that each wheel turns at a slightly different rate than the others because of the individual turning radii. In a 4WD vehicle with all wheels engaged, the wheels try to slip a little as the vehicle is turning. On a dirt surface, this action occurs unnoticed. On a paved road, however, the wheels are "locked" to the pavement so that they are unable to slip. Since they are all connected together through the drive train and are turning at different rates, something must give. The result is that all members in the drive train, (drive shafts, U-joints, axles, gears, etc.,) become highly stressed and either something breaks or the parts bind up and the vehicle will not steer or move. This condition is known as "driveline wind-up" and is the reason that the manufacturers' manuals state that the vehicle should never be driven on hard-surfaced roads in 4WD. This especially is true of vehicles with locking differentials because wind-up occurs even more quickly than with standard differentials.

• Two LOCK-RIGHTs in 4WD•

The LOCK-RIGHT in the rear axle produces about 70% of the total difference in traction between two LOCK-RIGHTs and no LOCK-RIGHTs. Therefore, four-wheel drive will be needed less often than before because two-wheel drive now will get you farther. If you are in four wheel drive where it is not needed, the steering will tend to become stiffer than normal because of increased friction in the front axle universal joints and the vehicle also will tend to understeer. This effect is produced by limited driveline wind-up and continues until one of the wheels slips a little to relieve the tension. We therefore recommend that you use 4WD drive only when you need it.

• A word about noise •

During the operation of your LOCK-RIGHT equipped vehicle, you may notice certain noises. They are as follows:

a) CLICK: The LOCK-RIGHT has released the outside wheel in a turn. This means that its coupler (or side gear) rotates faster than its driver so that the teeth passing by each other produce a uniform "click-click-click" that can sometimes be heard during turning. Cold weather and/or thicker oil will decrease the sound. This clicking is completely normal and lets you know that everything is functioning properly (also see the section about trouble-shooting on page 13).

b) CHIRP: During cornering, the faster outside wheel is free-wheeling; the slower inside wheel is under power but is having weight transferred off as the vehicle leans toward the outside. Under a lot of throttle on the street, it may "chirp" on the pavement as it momentarily loses traction and spins a little to catch up with the outside wheel. As soon as it is prevented from rotating any faster by the outside wheel it regains traction. This action may repeat several times in the course of a powered turn. This condition does not result from any tire scuffing or dragging as with some other lockers or limited slip differentials. Applying only a little throttle will eliminate the noise.

c) CLUNK: As mentioned on page 7, the LOCK-RIGHT has about 25° of free drive shaft rotation built into it so that it can operate properly. This backlash may produce a "clunk" in the driveline when letting on and off the gas. This is perfectly normal. This noise is more prevalent with stick shift vehicles than with automatic transmission vehicles, but the operator should be aware that it exists.

Also, be sure that the unit is installed properly before attributing any noise to the locker itself.

• Driving precautions •

WARNING: Failure to observe the precautions in this manual may result in damage to your new LOCK-RIGHT and/or injury to personnel. The manufacturer, wholesalers and distributors who sell the LOCK-RIGHT do so with the express stipulation that the owner and/or operator is responsible for proper LOCK-RIGHT installation and safe vehicle operation (see the warranty for more details).

The following comment is contained in the warranty but also needs to be stated in this section: "Neither manufacturer nor seller will be liable for any injury, loss, damage or inconvenience arising directly or indirectly from the installation or use of these [LOCK-RIGHT] parts or the inability to install or use same." The LOCK-RIGHT gives your vehicle the ultimate in traction but also gives you more responsibility for its careful operation.

Traction-adding differentials, including clutch-pack types, can get you into trouble in three ways:

1. you must take greater care during driving as your vehicle will exhibit somewhat different driving characteristics than before.
2. by getting you farther up a hill before your vehicle stops; getting back down can be more difficult than before.
3. by breaking an axle shaft. This way is more subtle but is potentially more dangerous. We will carefully analyze this situation with you now. (This also holds true for many other types of traction-adding differentials, including clutch-pack limited slip units.)

   a) APPLYING POWER: Because the LOCK-RIGHT can apply twice as much of the available engine torque (100%) to either axle shaft when compared with the standard differential (50%), you must be more careful than before when getting your vehicle out of a rough situation. To avoid breakage, therefore, be sure to apply power smoothly and avoid jerking.

   b) BREAKING AN AXLE: An axle shaft generally will break when it is under a lot of power. When this happens, the wheel on the opposite side will still be powered because of the torque-transferring capability of the differential—and the vehicle will tend to turn quickly toward the side on which the break occurred. When a front axle shaft breaks, the remaining powered wheel will also try to turn around the steering knuckle because its pulling is then no longer balanced through the tie bar by the pulling of the other wheel. Suddenly having only one front wheel powered can jerk the steering wheel right out of your hands. Remember, any traction-adding differential will give your vehicle more capability, but also must be used with more care than a standard differential.

   FULL-FLOATING AXLES: If the broken axle shaft is a full-floating type and the vehicle continues to be driven, after about five minutes of operation check the temperature of the affected axle housing by feel and continue to do so occasionally. This precaution is because in the unlikely event that the axle has broken near the outer end, it can drop down onto the inside of the spindle or housing. Since the differential is of a traction-adding design the axle shaft will keep right on spinning. This rubbing may cause heat build-up that could eventually lead to damage.

   FRONT WHEEL DRIVE: In some emergency situations it becomes necessary to drive a 4x4 vehicle in front-wheel drive only. If the vehicle has a traction-adding differential in the front, steering in a turn will become difficult because the inside wheel will continually try to straighten out. The vehicle can also be operated as a 4x1 if needed, however steering will become even more difficult because accelerating tends to turn the steering wheel in one direction and decelerating tends to turn it in the other direction. Even by holding the steering wheel tightly, the vehicle still will steer from side to side by itself because of play in the drag link, tie rod and steering box. Therefore, be extremely careful if you must drive with only one front axle. Also, if one front axle should break when operating in front-end-only 2WD, the steering would be adversely affected as described above under "Breaking an axle". Again, remember to hold the steering wheel tightly when driving in difficult situations. Also, driving

the vehicle on ice in front-wheel drive is not recommended.

CAUTION: Vehicle control will be affected by a broken axle shaft and further damage can occur. Replace it as soon as possible!

• Driving info summarized •

OPERATION: Your vehicle essentially will operate normally in 2WD on- or off-road. A momentary slight sideways motion at the rear may occur when getting on or off the throttle.

FRONT AXLE: If you have a LOCK-RIGHT in the front axle, steering in 2WD will not be affected, even with the front hubs engaged (also see the next section).

HARD-SURFACED ROADS: Do not drive on hard-surfaced roads in 4WD because driveline wind-up occurs even more rapidly with a locking differential than with a standard differential. With a LOCK-RIGHT in the front axle, driving on hard dirt roads in 4WD also is not recommended because under-steer will occur, and also because it is not needed.

POWER: Be very careful when applying a lot of power. If an axle shaft breaks, the vehicle may turn rapidly to one side and/or the steering will be affected. Also, be careful when driving in an emergency with only one axle shaft.

Your new LOCK-RIGHT equipped vehicle now has much more traction than before. This means that it will climb farther and become stuck less often, so be careful about where you are going and be sure that you can either turn around or back down. On slippery surfaces, especially on ice, accelerating during cornering can make the vehicle tend to straighten out, so drive carefully. When decelerating under slippery conditions, use the engine rather than the brakes to slow down. When on a hill, don't get your vehicle sideways. When parking, be sure to use the emergency brake. Obey all safety precautions outlined in the manufacturer's manuals.

LUBRICATION: The LOCK-RIGHT is designed to operate with any lubricant that is made for use with differential gears. For warmer climates we recommend a weight of 85-140 to provide adequate lubrication and to minimize the normal "clicking" sound around corners. For colder climates we recommend a light oil (such as 75-90) as recommended by the vehicle manufacturer.

• Temperature & moisture •

TEMPERATURE: The LOCK-RIGHT will operate at any temperature that is likely to be encountered in the field. However, if your vehicle has been parked all night in the snow, for example, the gear oil can become as thick as honey and this can cause the parts to move more slowly than normal. We suggest that you drive the vehicle for a few miles on-road to warm up the oil before taking it off-road. If you are already off-road, drive easily for a while before doing difficult climbing.

MOISTURE: The following comments involve the whole power train and we offer them to help assure a long life for your vehicle in general and for your LOCK-RIGHT in particular.

Sustained driving will substantially increase the temperature of the axle housing, transmission, transfer case, etc. If these units are suddenly plunged into cold water, as when crossing a stream, for example, rapid cooling can produce a vacuum. If the housing remains submerged, water can be sucked in past the oil seals and into the gear oil. Until they mix, the water will settle to the bottom; it is important to carefully crack open the drain plug and remove the water as soon as possible to prevent rust and corrosion.

After the oil and water have emulsified (mixed on a microscopic level), high temperatures may not drive the water out as readily as before mixing. Also, the oil-and-water mixture will not lubricate well and will cause corrosion, so replace it with fresh lubricant as soon as possible.

A similar situation can occur with U-joints. After submersion they should be greased as soon as possible to drive out any water.

• Troubleshooting •

Your New LOCK-RIGHT is designed to operate trouble-free. If unusual noises or jerking begin to occur, the assembly should be removed and examined for anything either excessively worn or broken.

Any bad parts should be replaced. Also see the note at the end of the warranty section about increases in horsepower and/or tire size.

The slight clicking sometimes heard during cornering can also aid in troubleshooting. If your vehicle is turning and no clicking sound is heard at all, even in a tight turn, an axle shaft may be broken and further checks should be made (see the installation manual for details). Briefly, block the vehicle, put it in gear (or in park) and release the emergency brake, jack up both tires, rotate and hold one and spin the other one in the opposite direction. Repeat for both tires in both directions.

• Servicing •

The LOCK-RIGHT does not require service other than that normally done on the differential as recommended by the vehicle manufacturer. Use the recommended lubricant and replace it at the proper intervals (also see the section in this manual about temperature and moisture on page 9).

• Important warranty information •

The following information & warranty is in lieu of all others express or implied, whether oral or written, and no person is authorized to make any representation to the contrary.

Your new LOCK-RIGHT is manufactured from carefully selected steel, machined on close-tolerance computer-controlled machinery and heat-treated for maximum durability. The LOCK-RIGHT is the result of detailed engineering, careful manufacture, and most importantly, hundreds of thousands of miles of in-vehicle operation. If any problems occur, we will, of course, do our best to resolve them. However, because we are unable to control either the installation or the use of these parts, our guarantee can only related to their design and manufacture, and is as follows

• Limited warranty •

The manufacturer and seller make no warranty, express or implied, with respect to the installation, use or application of the LOCK-RIGHT locking differential, and assume no obligation with respect thereto, except for a period of TWO YEARS from the date of sale to the original end user and/or retail buyer, to repair or replace only the parts that we supply, if, upon our examination, they appear to have been installed correctly in their intended application, have not been abused, and are defective in material or workmanship. Neither the manufacturer nor seller will be liable for any injury, loss, damage or inconvenience arising directly or indirectly from the installation or use of these parts or the inability to install or use same. It is the purchaser's and/or user's responsibility to properly install and use these parts, and the purchaser and/or user assume all risks and liabilities whatsoever in connection therewith. If these stipulations are not acceptable to the purchaser and/or user, the LOCK-RIGHT should not be installed and should be returned to the supplier. Installation and use of these parts constitutes acceptance of these conditions.

The LOCK-RIGHT is a full-locking differential that operates in both the front and rear. It is a cost-effective design because our parts fit into your own differential case rather than into a specially-manufactured case that would be more expensive. We have carefully designed the LOCK-RIGHT to minimize stresses in the stock differential case; however, tire sizes and/or horsepower increases should be taken into account because the vehicle manufacturer's differential parts may have some limitations. Remember: Our warranty does not cover parts that are not supplied by us and in no situation does it cover abuse caused by high-horsepower engines or large-diameter tires.

INSTALLATION MANUALS SECTION

ORIGINAL MANUAL #: 1000703MIA

Lock-Right part numbers covered in this section:
1620-LR, 1955-LR, 3220-LR

• Background information •

The LOCK-RIGHT is designed to fit into standard open differential cases only, not into limited-slip (clutch-pack) type cases. If your vehicle contains a limited-slip unit you will need to purchase a standard open differential case, thrust washers and pinion shaft before proceeding.

A word about side gear thrust washers: All differentials originally had a thrust washer under each side gear. Thrust washers are large in diameter and between about 1/32" (.031", or 0.76mm) and 1/16" (.062", or 1.52mm) thick. If either one or both are missing from the original differential, obtain new one(s) before proceeding!

The LOCK-RIGHT is designed to be used with a correct thrust washer under each side gear, and failure to use a thrust washer is easy to observe during inspection and will void the warranty. Please see pg. 3 for important information regarding the thrust washers and proper spacing between the LOCK-RIGHT couplers/spacers and the Pinion shaft before proceeding with the installation.

NOTE: The LOCK-RIGHT shown in the various figures is of a typical unit and may not exactly depict your particular model. See **(Figure 1)** on page 5 for an exploded view of a typical LOCK-RIGHT.

• Preliminary steps •

The following steps are only a general guide to preliminary operations used for preparing your vehicle for LOCK-RIGHT installation. For detailed information, refer to your shop manual. In general, the preliminary steps include:

a) Blocking the vehicle, putting transmission in neutral
b) Loosening the wheel lug nuts (Tire removal may be optional. See shop manual)
c) Jacking up the axle; securely resting it on jack stands
d) Removing the tires (if necessary)
e) Disconnecting the brake lines and emergency brake cables (if necessary)
f) Disconnecting drive shaft
g) Pulling out both axles a few inches
h) Removing the 3rd member from the vehicle

SECTION 1:
Removal of the Differential Case From the Carrier

1) Remove the third member from the vehicle as outlined above and described in the shop manual.
2) Check to be sure that the gears are in good condition and that nothing is loose, worn or scored. Rock the ring gear back and forth to get a "feel" for the backlash and check to see that it appears to have been set up properly. If any out-of-spec conditions exist, be sure to correct them before subsequent re-assembly.
3) If you are careful, the differential can be removed and re-assembled without changing the ring and pinion settings. Mark everything with a center punch. Don't touch a bolt until you have done so. We suggest placing the assembly upright (the same position as when in the vehicle), looking at the ring gear end. Mark the carrier and bearing cap on the ring gear side with one punch mark and on the other side with two marks, **(Figure 2)**. The bearing caps are NOT interchangeable! Also, mark each bearing adjuster directly under the lock hole with this same mark to note its side and rotational position. This mark is very important for correct re-assembly!
4) Remove the adjuster locks. Be sure that each adjuster is marked at the lock hole with the correct number of punch marks for each side. The adjusters are NOT interchangeable after they are marked for position! (In general, the adjuster locks themselves are interchangeable.)
5) Remove the bearing caps
6) Slide (tap) the adjuster up and out and remove the bearing race on the ring gear side FIRST and put a very small grind mark on the outside of the race to mark it. Scraping it on a cement floor also works or you can use a tag. Be sure that

you can identify it for proper re-assembly on the same side!

7) Remove the differential case and ring gear assembly from the carrier along with the other adjuster and bearing race.

SECTION 2:
Disassembly of the Differential Case

NOTE: It is important to reassemble the differential case halves in their original relative position. Place punch marks near each other on each half before disassembly. Note that some cases may have already been marked at the factory.

1) Remove the bolts holding the case together. In general, the ring gear will not need to be removed. If it does need to be removed, mark its location so that it may be removed, mark its location so that it may be replaced in the same rotational position.
2) Tap apart the case
3) Remove the internal parts. Note which side gear is located in the top of the case. It will be placed in the bottom of the case upon re-assembly so that the former reverse sides of the teeth (less used) will be the new forward sides.

• Inspection of the parts •

NOTE: These steps are important. The LOCK-RIGHT uses your case, side gears, thrust washers and spider, and they must be in excellent condition. The four spider gears and their thrust washers are not used. If the following inspection shows that anything is bad, buy new parts from your dealer.

1) Thoroughly wash the differential case and remaining parts in solvent, then dry them.
2) The most important parts are the side gears. Carefully inspect them for chips, cracks, broken teeth, etc. Each tooth must be smooth and without any gouges or other defects. Polishing as a result of normal operation is acceptable as long as the wear is not excessive. If the sides of the teeth near the top are highly polished and rounded over, the gears should be replaced.
3) Inspect the spider for any galled areas or grooves. If it is not in excellent condition, obtain a new one from your dealer.
4) Inspect the side gear thrust washers. They are important in order to obtain

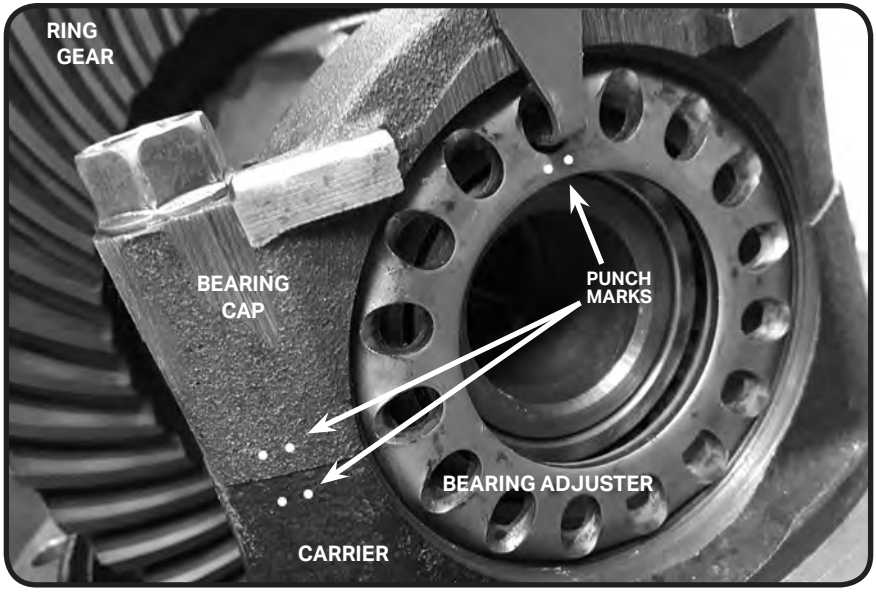


Figure 2

correct positioning for the LOCK-RIGHT. If they are excessively worn or are cracked, obtain new ones. Several thicknesses may be offered; try to obtain the same size as the old ones.

5) Inspect the case for any chips, cracks or other damage. Also inspect the bearings. If the case or bearings look bad, replace them. However, if you do, remember that the marked bearing adjuster positions will no longer be correct. The ring and pinion backlash and bearing preload will need to be reset with a dial indicator as described in the shop manual.

SECTION 3: Assembly of the LOCK-RIGHT Parts Into the Differential Case

NOTE: Coat the teeth of the drivers and side gears and both sides of the thrust washers with medium grease. The grease will help hold things in place and assist with functioning until the gear oil circulates.

1) Place the correct thrust washer into the bottom of the case and install the former top side gear. Note that the smoothest side of the washer is placed next to the side gear.
2) Place one of the drivers on the side gear with the teeth meshed and place a spacer in the center **(Figure 3)**.

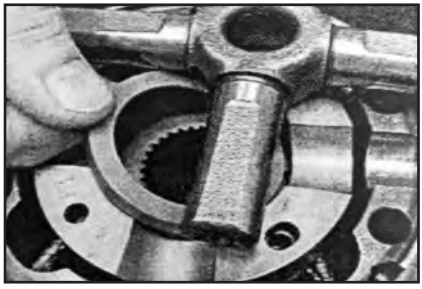


Figure 3

3) Place the spider in the recesses in the case. Tap it lightly to seat it **(Figure 4).**
4) Place the spring assembly into each spring hole and place a pin into each of the round pin holes **(Figure 4)**.
5) Place a small amount of grease into each pinhole of the second driver and then insert a pin.

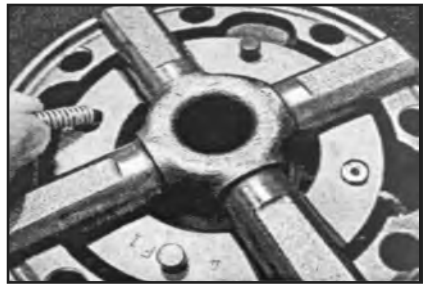


Figure 4

6) Place a small amount of grease into each spring hole of the second driver and then insert a spring assembly. Place a little more grease on the top of each spring to act as "glue" for the next step.
7) Hold the second driver upside-down and carefully place it on top of the first driver so that the pins fit into the spring holes **(Figure 5).**
8) Carefully push the top driver up and down to be sure that the springs and pins are in their proper positions. Use a light to look and make sure everything is in the right place.
9) Place the second spacer into the center of the top driver.
10) Carefully place the former bottom side

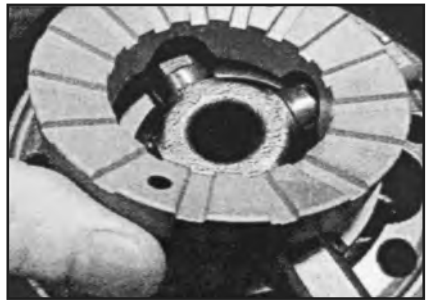


Figure 5

gear on the top driver with the teeth meshed **(Figure 6)**. Be sure not to lift it back up or a spring may become dislodged.
11) Place the second thrust washer on the top side gear with the smoothest side toward the gear **(Figure 6)**.
12) Line up the alignment marks on the top and bottom halves of the case and carefully lower the top half over the side gear hub onto the bottom half **(Figure**

Figure 6

7). Install the bolts. If the bolt holes are in the opposite end of the case. Hold it tightly together and turn it over. Torque the bolts to their correct value. If the ring gear has been moved, also install it in its previously marked rotational position,

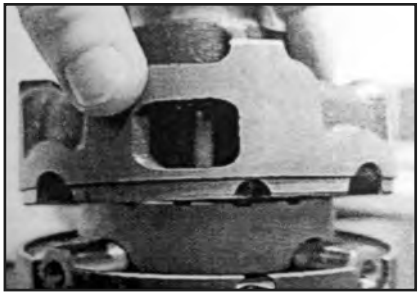


Figure 7

then torque the bolts.

13) Inspect your work. Look for anything that is not correct. BE sure that the drivers rotate back and forth smoothly, stopping at the spider. Use a light to see that the spacers are in place and that the pins and bias springs are in place and functioning properly.

Because of the spacers, the side gears cannot be pushed in to test the springs. However, the drivers may be pushed up and down with a screwdriver by reaching in through any of the holes in the case. At this point, proper operation of all the parts is very important!

NOTE: Because of the many vehicles into which the LOCK-RIGHT can be installed, we do not give exact torque values for the various bolts. Different thread sizes and materials mean that the values for each vehicle will probably be different from the others. However, as a general guide, we will give some TYPICAL values here. Also note that some manufacturers recommend the use of thread locking material where appropriate. For exact torque values, consult the appropriate repair manual for your vehicle.

TORQUE VALUES (lbs-ft.)
1: Ring Gear = 58 - 80
2: Case Bolts = 27 - 49
3: Bearing Caps = 51 - 95
4: Adjuster Locks = 7 - 25
5: Carrier Mounting = 14 - 40
6: Oil Filler Plug = 25 - 50
7: Oil Drain Plug = 29 - 55

SECTION 4:
Third Member Final Assembly

1) Position the carrier vertically, with the driveshaft flange pointing down. It can be held in a vice or even stood on its nose in a coffee can if a vice is not available.
2) Place the bearing races on the differential bearings, making sure to place the marked one on the proper end.
3) Set the differential case (and bearing races) into the carrier. Install it with the ring gear pushed all the way into the pinion gear - that is, with no backlash and with the bearing races pushed all the way onto the bearings.
4) Check the punch marks on the adjusters and determine which one goes on the side nearest the ring gear. Hold it so that the mark is at its final position (where the adjuster lock will be installed, with the mark located away from the carrier.) Push the adjuster against the race and slide it down into the threads of the carrier. They should mesh easily, with no space between the parts.
5) Install the correctly marked cap. Use the bolts as guides by turning them in two threads or so and then sliding the cap down to meet the case. Be sure that the cap threads fit into those of the adjuster. Do not force anything. The cap should slide down very close to the carrier surface. Tighten the bolts until they are snug.
6) Hold the other adjuster so that the mark

is in the same relative position as in the other one (with the mark away from the carrier,) and slide it down the bearing race into the threads. As it meshes, it should shift outward and be positioned slightly away from the race.

7) Install the other cap. Again use the bolts as guides by turning them in two threads or so and then sliding the cap down to meet the case. Turn the bolts until they are barely snug. Be sure that the cap threads fit into those of the adjuster. Do not force anything.
8) Use a spanner wrench or a blunt punch and a hammer to turn the second adjuster (the one away from the ring gear) one turn inward (clockwise) until the marked hole reaches its final position (in the middle of the cap, just below the lock.) The last part of the turning should be difficult because preload is being applied to the bearings by spreading the caps apart as the adjuster is being turned in.
9) Insert an axle shaft or bar into one of the axle shaft holes in the differential case to help with holding the assembly and torque the cap bolts to their correct value (Consult your vehicle's shop manual)
10) Install the adjuster locks and torque the bolts. Be sure that they are located in the marked holes by the adjusters.

•Third member assembly inspection •

When the above steps are completed, all the parts should be in exactly the same positions as they were when the installation began. The backlash and preload settings should therefore be unchanged from before and no further adjustments will be needed. To be certain, rock the ring gear back and forth to see if the backlash appears to be the same as it was prior to the installation. If not, it will need to be reset with a dial indicator as described in the shop manual. Rotate the ring gear one revolution to be sure that nothing is binding.

SECTION 5: Third Member Installation

1) Clean the mating surface of the axle housing and the mounting surface of the differential carrier.
2) Clean the inside of the axle housing to remove all foreign material. This step is very important because metal chips can interfere with the operation of your new LOCK-RIGHT.
3) Remove metal chips from the drain plug if it is magnetic.
4) Install gasket and/or sealant as appropriate.
5) Lift the third member into the axle housing.
6) Install and torque the mounting hardware.

•Vehicle final assembly •

Finish the assembly of the remaining parts by reversing the order of the disassembly. In general, the axles/backing plates, brake lines, emergency brake cables, drive shaft, tires and gear oil. Note that in some designs the last 1/8" or so of the backing plate installation is a light press fit and that the axle shaft may appear to be hitting something. Tap the outside end of the axle shaft and it should go in. If baffles are sued inside the axle housing, check to be sure they are in their correct positions. Refer to the shop manual for specific instructions. Your LOCK-RIGHT installation should now be complete. As a preliminary test, rotate the tires back and forth (transmission out of gear and drive shaft free.) The drivers should randomly unlock and "click" as the tires move. Note that the tires will NOT lock together. This easy-unlocking characteristic is a unique feature of the LOCK-RIGHT and is perfectly normal.

•Tire diameters •

To help assure a long life for your new LOCK-RIGHT, tire diameters should be as nearly equal as possible. Contrary to instructions that you may have read elsewhere, DO NOT change the inflation pressure to vary the rolling radius of the tires! This practice can be dangerous if one of the tires is under-inflated, producing excess heat, faster tire wear and more difficult vehicle control. The best way to equalize the rotation is to measure the circumference of all the tires, including the spare. Choose ones that are within about 3/8" or less to each other (do not change from side to side if they are radials). If one tire is much more worn than the other one, they both should be replaced for general safety reasons.

SECTION 6:
Testing Your Installation

1. Be sure that the vehicle is safely blocked. Leave the axle assembly on the jack stands, with both tires free to rotate and the emergency brake off.
2. Put the transmission and transfer case in gear to lock the drive shaft.
3. Rotate one of the tires in the forward direction with your hand until it stops, then hold it. That side of the LOCK-RIGHT is now locked.
4. Rotate the other tire in the opposite (reverse) direction. The LOCK-RIGHT should "click" as the coupler attached to the axle rotates.
5. Rotate the first tire in the reverse direction and hold it; repeat step 3, rotating the other tire in the forward direction.
6. Repeat steps 2-4, rotating and holding the second tire to lock the second side.

SECTION 7:
Driving Your Vehicle

If the foregoing measurements and tests have been successfully completed, apply the emergency brake and remove the vehicle from the jack stands. Your vehicle should now be ready to drive.

Carefully read and understand the driving information contained in the LOCK-RIGHT Vehicle Owner's Manual! Safe and effective use of your new LOCK-RIGHT-equipped vehicle depends on knowledgeable operation, and this can only be done by understanding its characteristics before you start. Be careful, and have fun!

- END

ORIGINAL MANUAL #: 1000703MIB

Lock-Right part numbers covered in this section:

1220-LR, 1230-LR, 1240-LR, 1250-LR, 1520-LR, 1710-LR, 1820-LR, 1821-LR, 1822-LR, 1830-LR, 1840-LR, 1910-LR, 1920-LR, 1921-LR, 1930-LR, 1931-LR, 1932-LR, 1940-LR, 1950-LR, 2110-LR, 2115-LR, 2210-LR, 2310-LR, 2311-LR, 2410-LR, 2413-LR, 2415-LR, 2510-LR, 2610-LR, 2620-LR, 2710-LR, 2711-LR, 2810-LR, 3210-LR

• Background information •

The differential case is the round housing inside the rear axle assembly to which the ring gear is bolted and which contains the differential spider and side gear assembly. It is installed in the differential carrier, which is the housing that holds the case, drive pinion gear, bearings, etc. The carrier may be removable (as part of a "drop-out" unit, or third member), or it may be integral (as a permanent part of the axle assembly, mounted in the vehicle). This manual covers the integral carrier design, both C-clip and non-C-clip versions.

The LOCK-RIGHT is designed to fit into standard open differential cases only, not into limited-slip (clutch-pack) type cases. If your vehicle contains a limited-slip unit you will need to purchase a standard open differential case, thrust washers and pinion shaft before proceeding.

A word about axle shaft thrust blocks: A few differentials, such as the Jeep® AMC-20 and the older 19-tooth Spicer® 44 axle, use a thrust block between the inside ends of the axle shafts as a part of the end play adjustment. When installing a LOCK-RIGHT, this block is re-used along with the original axles so that the original end play adjustment does not change. However, if the original axles are changed to different original-type axles, the block will continue to be used but the end play must be re-adjusted (see your vehicle' s shop manual for the procedure). If the axle is changed to another type that does not need end-play adjustment, such as a one-piece design, the thrust block may be omitted. (In the Land Cruiser, the block is never used.)

A word about side gear thrust washers: All differentials originally had a thrust washer under each side gear. Thrust washers are large in diameter and between about 1/32-inch (.031, or 0,76-mm) and 1/16-inch (.062, or 1,52-mm) thick. If either one or both are missing from the original differential, obtain new one(s) before proceeding!

The LOCK-RIGHT is designed to be used with a correct thrust washer under each coupler, and failure to use a thrust washer is easy to observe during inspection and will void the warranty. Please see pg. 3 for important information regarding the thrust washers and proper spacing between the LOCK-RIGHT couplers/spacers and the Pinion shaft before proceeding with the installation.

A word about C-clips: Many integral carrier differentials have the axle shafts retained by C-clips. These are semi-circular pieces of hardened steel, similar to a washer with one side cut out, that fit into a groove in the end of the axle shaft and into a pocket in the side gear. The axle shaft is held in place by the pinion (spider gear) shaft. The LOCK-RIGHT is designed for many of these axles, and their installation is covered in this manual. This type of axle is the easiest in which to install a LOCK-RIGHT, typically requiring about one hour for the procedure.

NOTE: The LOCK-RIGHT shown in the various figures is of a typical unit and may not exactly depict your particular model. See **(Figure 1)** on page 5 for an exploded view of a typical LOCK-RIGHT.

• Preliminary steps •

The following steps are only a general guide to preliminary operations used for preparing your vehicle for LOCK-RIGHT installation. For detailed information, refer to your shop manual. In general, the preliminary steps include:

a) Blocking the vehicle, putting transmission in neutral;
b) Loosening the wheel lug nuts (optional with C-clips and other axles);
c) Jacking up the axle; securely resting it on jack stands;

d) Removing the tires;
e) Disconnecting the brake lines and emergency brake cables;
f) Pulling out one or both axles a few inches.

• Determination of axle type •

1. Remove the differential cover and drain the oil.
2. Inspect to determine axle assembly type. If it is a C-clip design, proceed directly to SECTION 2. If not, continue with step 3.
3. Determine if the ring gear is thin enough to be able to pull the pinion (spider gear) shaft out past the teeth. If so, proceed directly to SECTION 2. If not, continue to SECTION 1.

SECTION 1:
Removal of the Differential Case and Ring Gear Assembly From the Vehicle (Thick ring gear)

1. Perform the operations listed below and as described in your shop manual that apply to your vehicle. The axle shafts should be pulled out about six inches for differential case removal.
2. Using a center punch, mark both the carrier and bearing cap on the ring gear side with one punch mark each and on the other side with two marks. The caps are not interchangeable, because each one is line-bored with the carrier. These marks are very important to correct re-assembly!
3. Rock the ring gear back and forth to get a "feel" for the amount of backlash present. This amount of rotation will be re-checked when the differential case is installed to determine if it has been done correctly.
4. Remove the bearing caps and then the differential case and shims from the carrier as described in the shop manual (some axle designs may require the use of a carrier spreader tool). Be sure to put a small grind mark on each shim or tag them so that they can be replaced on the same side.
5. Remove the differential bearing race from the side with one punch mark first. Put a very small grind mark on the outside of it, or use a tag. Be sure that you can identify it for proper re-assembly on the same side.
6. Remove the other bearing race.
7. Remove the ring gear from the case. It may need to be tapped off with a brass mallet (see the shop manual). Mark it so that it can be re-installed in the same rotational orientation as when removed.
8. Proceed from SECTION 2, "Parts Inspection".

SECTION 2:
Disassembly of the Differential Case With Thin Ring gear, and C-clips (in the vehicle); also with thick ring gear (after case is removed from vehicle)

NOTE: If the axle assembly is a C-clip design or has a thin ring gear, the differential case remains in the vehicle and the ring gear side axle shaft does not need to be disturbed—it simply remains bolted in place and the LOCK-RIGHT installation is done by only partially removing the opposite axle shaft.

1. Remove the pinion shaft retaining pin, using a long punch. In the vehicle, the left bearing cap may need to be removed; for C-clip differentials only, unscrew the pinion shaft bolt.
2. Remove the pinion shaft.
3. For C-clip differentials only: The C-clips are located in a groove in the end of each axle shaft and are held in a pocket in the side gear by the pinion shaft. "Bump" each tire inward slightly to free the clips; they will fall out to free up the internal parts.
4. For installations with the differential case in the vehicle, leave the ring gear side axle bolted in place; pull out only the other axle shaft about two inches.
5. Remove the spider gears, side gears, all washers, and axle shaft thrust block (if used in your assembly).

• Parts inspection •

NOTE: The LOCK-RIGHT utilizes your differential case, side gear thrust washers and pinion shaft (plus the axle shaft thrust block, if used), and they must be in excellent condition. The spider gears and washers are not used. If the following inspection shows that anything is bad, buy new parts from your dealer!

1. Thoroughly clean the differential case and wash remaining parts with solvent, then dry them.
2. Inspect the pinion shaft. Any noticeable grooves or galling may weaken it and can also adversely affect the operation of your new LOCK-RIGHT. If it is not in excellent condition, obtain a new one.
3. Inspect the side gear thrust washers. They are important to the correct positioning of the LOCK-RIGHT parts. If they are excessively worn or are cracked, obtain new ones. If several thicknesses are offered, try to obtain the same size as the old ones. **NOTE:** There should be TWO thrust washers of about equal thickness, one under each side gear. See pg. 3 for important additional information regarding the thrust washers & proper spacing in relation to the pinion shaft.
4. Inspect the thrust block (if used). Be sure that the ends are smooth and not galled.
5. Inspect the case for any chips, cracks or similar damage. Also inspect the bearings, if the case is out of the vehicle. If the case or bearings look bad, replace them. However, if you do, remember that the old shims will no longer be correct; the ring and pinion backlash and bearings preload will need to be reset with a dial indicator as described in the shop manual.

• LOCK-RIGHT installation:
Preparing the parts for assembly •

1. Coat the teeth of the couplers and drivers, the large center holes of the drivers, and both sides of the thrust washers with medium grease. Also place a little grease in each of the two windowed holes in each driver. The grease will help hold things in place and assist with functioning until the gear oil circulates. **NOTE:** For clarity, the images that follow feature assembly without using grease.
2. Place a shear pin into each windowed (slotted) hole. It should be about flush. **(Figure 2).**
3. Place a spacer into the center of each driver, wide end toward the teeth if not symmetrical. **(Figure 2).**
4. Press a thrust washer (with grease added) onto the back of each coupler.
5. Insert a small spring into each of the larger springs and add a little grease to the coils to hold them together. Set them aside.

Driver flats: These flats are to allow the driver to fit into the case opening. May also be found on the couplers. (Flats are not present on all models.)

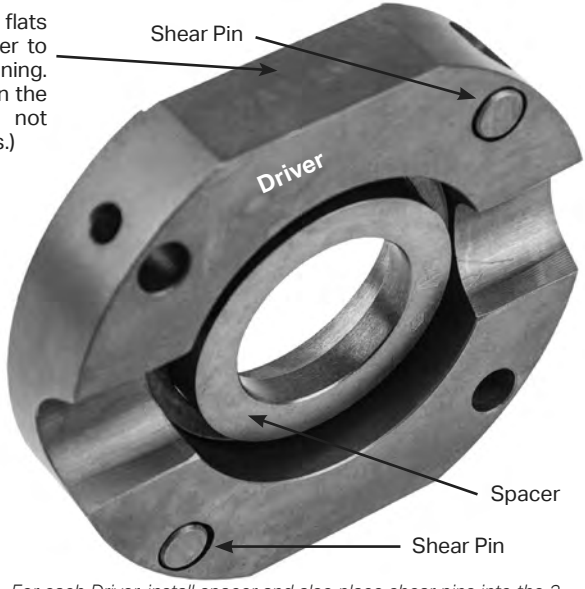


Figure 2: *For each Driver, install spacer and also place shear pins into the 2 windowed (slotted) style holes*

SECTION 3:
Assembly of the LOCK-RIGHT Parts Into the Differential Case

1. Install a coupler and thrust washer assembly in the ring gear end of the differential case and over the axle splines, if in the vehicle. Note that the couplers in some models may have flats for clearance. If an axle shaft thrust block is used, place it in the center of the second coupler now if the installation is being done in the vehicle. If not, it may be installed later.
2. Place the second coupler and thrust washer assembly into the other end of the differential case **(Figure 3)**.

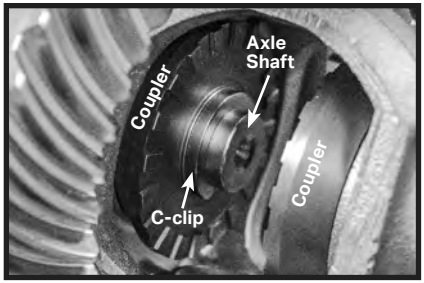


Figure 3: Install couplers (and the left C-clip if so equipped)

3. For C-clip differentials only: Place a C-clip with the ends pointing down into the ring gear side axle shaft end groove and pull the tire out sharply to seat the clip **(Figure 3)**. Then, carefully push the other axle into the second coupler splines until the end of the axle shaft is even with the coupler surface. Keep the coupler seated in the case. **IMPORTANT!** Be sure to have the spacers correctly placed in the drivers before doing the following steps!
4. Pick up one of the driver-and-spacer assemblies. Orient its teeth toward the ring gear flange and hold it so that the flats (if present) will clear the sides of the case. Place it on the teeth of the coupler and press it into the grease **(Figure 4)**. Reach into the center and push the spacer down onto the coupler shoulder (and over the C-clip, if so equipped).
5. For NON-C-clip axles only, repeat step 4 for the other driver & spacer assembly, then proceed to "Differential case assembly completion (All models)" on pg. 22. For C-clip axles only, follow the steps below to install the second C-clip and other driver:

a) Place the other driver assembly in the differential case. Push it to the left, touching the other driver **(Figure 5)**.

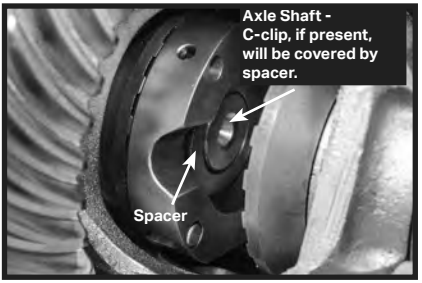


Figure 4:

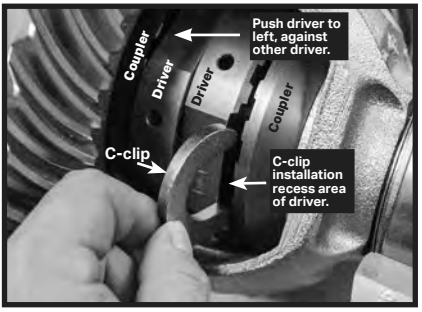


Figure 5: (C-clip axles) Slide C-clip into the C-clip installation recess area of right driver

b) If necessary, use a thin standard screwdriver between the driver & coupler teeth to push its spacer leftward and back into the center of the driver.
c) Rotate both drivers with the left tire until the C-clip installation recess area of the right driver is facing you.
d) Tap the right tire inward to line up the C-clip slot at the end of the axle shaft with the gap between the driver and coupler. Make sure to keep the right coupler fully seated in the case so it doesn't get in the way and close the gap.
e) Slide the C-clip through the recess in the driver's teeth and into the C-clip groove at the end of the axle shaft **(Figure 5)**. If needed, use a thin screwdriver to help

push the C-clip all the way in.

f) Once in, pull the right tire out sharply to seat the C-clip.

g) Rotate the right tire 1/4-turn so that the C-clip ends are pointing downward. This will help prevent it from falling off.

h) Rotate the left tire to position both drivers so that the semi-circular pinion shaft recess in the right driver is facing out.

i) Push the right driver to the right and into the grease in the coupler teeth.

j) Through the pinion shaft recess, push the right spacer to the right, over the C-clip and axle shaft end.

• Differential case assembly completion (All models) •

NOTE: These steps are for the differential case that has been removed from the vehicle and is on the bench, as well as for those remaining in the vehicle.

1. Rotate the right driver until one of its long window holes (containing a shear pin) faces you, and rotate the other driver until one of its empty round shear pin holes lines up with the window hole.
2. Push the shear pin out of the window hole and into the pin hole in the opposite driver with a small pointed tool **(Figure 6).**

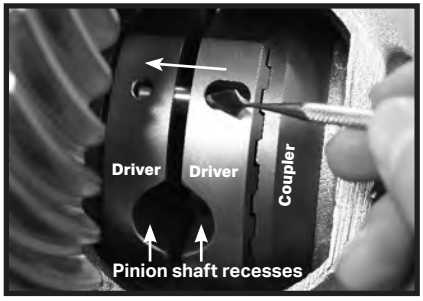


Figure 6: *Push shear pins into opposite driver*

3. Place one end of a spring assembly (small spring inside the large one) into the windowed hole, behind the shear pin **(Figure 7)**. Compress it with a small screwdriver and pop the bottom into the window hole **(Figure 8)**. Push on the bottom coils to be sure that the spring snaps in and is seated all the way. Rotate the drivers and do the same procedure for each of the other three shear pins and springs.

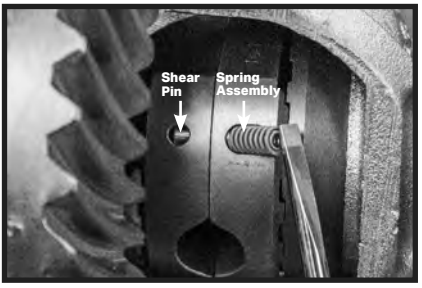


Figure 7: *Install spring assemblies in holes*

Figure 8: *Snap spring assembly into hole*

4. Reach into the driver's pinion shaft recess with your finger and be sure that the spacers are pushed fully outward onto the couplers.
5. Rotate the drivers so that the large recesses line up with the pinion shaft holes in the differential case.
6. If an axle shaft thrust block is being used, push it into the center of the assembly and line up the large hole with the pinion shaft holes. If in the vehicle, push the right axle shaft inward now, into the coupler splines, to move the block to the center.
7. Carefully insert the pinion shaft into the hole and guide it through the drivers, past the spacers (and through the thrust block, if used). It should insert easily by hand. If not, tap it in, being very careful not to get the inner end caught on something. Be sure to orient it so that its retaining pin hole will line up with the hole in the differential case **(Figure 9).** If the pinion shaft will not insert, or is hard to insert, be sure that the correct thrust washers are being used and that the spacers are oriented with the wid-

est side (opening) fitting down over the coupler shoulder. Rotate the drivers and couplers back and forth to be sure that they are not binding.

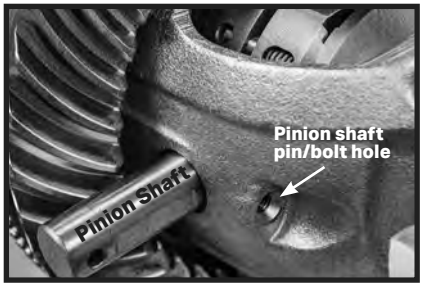


Figure 9: *Install pinion shaft, then pin/bolt*

8. Install the pinion shaft retaining pin. If the pin is solid, as opposed to a roll pin, slightly deform the metal on the side of the hole to help hold it in place (see the shop manual). For C-clip Axles only: Screw in and tighten the bolt.
9. For differential cases out of the vehicle: The case should still be on the bench after the preceding steps install the ring gear now and torque the bolts. Continue to next step.

• Assembly of differential case into vehicle •

(Thick ring gear; differential case was removed from vehicle)

1. Clean the axle housing interior, cover, mounting surface and drain plug.
2. Place the correct bearing races onto each end of the differential case, ready to install.
3. If shims are used, locate them near the correct ends of the case, ready to install.
4. Install the differential case in the carrier as described in the shop manual. Generally, this will involve placing the differential case and correctly-located bearing races with one shim into the carrier and then tapping in the shim on the other side, or pressing the case in if the shims are already mounted under the bearings. In some designs a spreader for the housing may be required.
5. Replace the bearing caps in their marked positions and torque the bolts to their correct value. Consult the shop manual for the exact procedure.
6. Finish the installation of any remaining parts by reversing the order of disassembly—in general, the axles/backing plates, brake lines, emergency brake cables, and tires. If your vehicle uses an axle shaft thrust block, be sure that the correct axle shims are in place at the outer ends of the axle shafts. In these designs there should be little or no end play. Also note that in some designs the last 1/8" or so of the backing plate installation may be a light press fit and the axle shaft may appear to be hitting something; tap the outside end of the axle shaft and it should go in.

• Assembly inspection •

Inspect your work. Look for anything that is not correct. Be sure that the drivers rotate back and forth smoothly, stopping at the pinion shaft.
Use a light to see that the spacers (and thrust block, if used) are in place and that the springs are working properly.

When the above installation steps are completed, all the parts should be in exactly the same positions as they were when the installation began. If the differential case has been removed from the vehicle, the backlash and preload settings should be unchanged from before and no further adjustments will be needed. To be certain, rock the ring gear back and forth to see if the backlash appears to be the same as it was prior to the installation. If not, it will need to be reset with a dial indicator as described in the shop manual. Rotate the ring gear one revolution to be sure that nothing is binding.

Your LOCK-RIGHT installation should now be complete. As a preliminary test only, prior to the final test on the next page, rotate the tires back and forth (transmission out of gear and drive shaft free). The drivers should randomly unlock and "click" as the tires move. Note that the tires will NOT lock together.

This easy-unlocking characteristic is a unique feature of the LOCK-RIGHT and is perfectly normal. Watch to be sure that both sets of teeth engage and disengage. If they do, your installation has probably been done correctly and your LOCK-RIGHT is ready for its final test, described in Section 5 on page 32. Note that

the clicking sound is much louder now than what you will hear during driving because the cover is off and no oil is present.

As an additional check to be sure that everything has been installed correctly, use a small ruler, vernier caliper or blade-type feeler gauge. The distance between the halves of the LOCK-RIGHT, that is, between the two drivers, should be about 5/32" (.152", or 3.86mm). The tolerance limits are between .145" (3.68mm) and .170" (4.32mm). If this distance is much over .170", either the case is quite worn or the thrust washers are missing or are too thin and the problem should be corrected before proceeding further.

SECTION 4:
Vehicle Final Assembly

When everything is correct, clean the axle housing gasket surface and install the cover using a gasket and/or sealant as appropriate, and torque the bolts.

Add the proper amount of gear oil. Note that we suggest using medium-to-heavy oils as recommended by the manufacturer, unless the vehicle will be used in very cold weather. Thicker oil, such as 85-140, reduces the "clicking" noise sometimes heard during tight turns and provides adequate lubrication when the assembly becomes hot. Also see the section in the Vehicle Operator's Manual regarding temperature.

• Tire diameters •

To help assure a long life for your new LOCK-RIGHT, tire diameters should be as nearly equal as possible. DO NOT change the inflation pressure to vary the rolling radius of the tire! This practice can be dangerous if one of the tires is under-inflated, resulting in excess heat, faster tire wear and more difficult vehicle control. The best way to equalize the rotation is to measure the circumference of all the tires, including the spare. Choose ones that are within about 3/8" or less of each other (do not change from side-to-side if they are radials). If one tire is much more worn than the other one, they both should be replaced for safety reasons.

SECTION 5:
Testing Your Installation

1. Be sure that the vehicle is safely blocked. Leave the axle assembly on the jack stands, with both tires free to rotate and the emergency brake off.
2. Put the transmission and transfer case in gear to lock the drive shaft.
3. Rotate one of the tires in the forward direction with your hand until it stops, then hold it. That side of the LOCK-RIGHT is now locked.
4. Rotate the other tire in the opposite (reverse) direction. The LOCK-RIGHT should "click" as the coupler attached to the axle rotates.
5. Rotate the first tire in the reverse direction and hold it; repeat step 3, rotating the other tire in the forward direction.
6. Repeat steps 2-4, rotating and holding the second tire to lock the second side.

SECTION 6:
Driving Your Vehicle

If the foregoing measurements and tests have been successfully completed, apply the emergency brake and remove the vehicle from the jack stands. Your vehicle should now be ready to drive.

Carefully read and understand the driving information contained in the LOCK-RIGHT Vehicle Owner's Manual! Safe and effective use of your new LOCK-RIGHT equipped vehicle depends on knowledgeable operation, and this can only be done by understanding its characteristics before you start.

SECTION 7:
Subsequent Disassembly

If something is not correct now or if you need to disassemble your LOCK-RIGHT in the future, we will briefly describe the procedure here. We will assume that the case has a thin ring gear and remains in the vehicle, or that it has a thick ring gear and has been removed from the vehicle and is on the bench.

• NON-C-clip Axles •

1. If the case will remain in the vehicle (thin ring gear), pull out only the right axle shaft about two inches. Otherwise, re-

move the differential case from the vehicle and place it in the bench.
2. Remove the pinion shaft retaining pin and the pinion shaft.
3. Rotate the drivers until one of the right window holes faces out. Push under the spring with a small sharp-pointed pick and pry the end up. Push a small screwdriver or bent piece of small wire (a paper clip works well) under the spring and pop the bottom out. Push the shear pin out of the pin hole and into the window hole. Repeat for the other three springs and pins.
4. Position the case horizontally and push in the spacers so that they are in the middle of the drivers. If a thrust block is used, push it into the right coupler splines.
5. Remove the driver and spacer opposite the ring gear flange first and then remove the second driver.
6. Remove the couplers.

• C-clip Axles •

1. Remove the pinion shaft retaining bolt and the pinion shaft.
2. Rotate the drivers until one of the right window holes faces out. Push under the spring with a small sharp-pointed pick and pry the end up. Push a small screwdriver or bent piece of small wire (a paper clip works well) under the spring and pop the bottom out. Push the pin out of the pin hole and into the window hole. Repeat for the other three springs and pins.
3. Move the right driver to the left, touching the left driver.
4. Move the right spacer to the left, into the center of the left driver with a thin standard screwdriver or similar item.
5. Rotate the left tire and both drivers until the C-clip installation recess in the teeth of the right driver is pointing down.
6. Tap the right tire inward to release the C-clip so that it falls down, through the recess.
7. Rotate the left tire to rotate both drivers and allow the C-clip to drop out of the case.
8. Pull the right tire out about one inch.
9. Push the spacers into the centers of the drivers.
10. Remove the driver and spacer opposite the ring gear flange first and then remove the second driver.
11. Remove the left C-clip.
12. Remove the couplers.

- END

ORIGINAL MANUAL #: 1000703MIC
Lock-Right part numbers covered in this section:
1810-LR, 9010-LR

• Background info •

The differential case is the round housing inside the rear axle assembly to which the ring gear is bolted and which contains the differential spider and side gear assembly. It is installed in the differential carrier, which is the housing that holds the case, drive pinion gear, bearings, etc. The carrier may be removable (as part of a "drop-out" unit, or third member), or it may be integral (as a permanent part of the axle assembly, mounted in the vehicle). This manual covers both types of Differential and Carrier Assembly, but note that the pictures are of a removable third memeber.

The LOCK-RIGHT is designed to fit into standard open differential cases only, not into limited-slip cases. If your vehicle contains a limited-slip unit you will need to purchase a standard open differential case, side gears, thrust washers and long pinion shaft (and also the two short shafts if it is a four-pinion unit) before proceeding.

A word about side gear thrust washers: All differentials originally had a thrust washer under each side gear. Thrust washers are large in diameter and between about 1/32" (.031", or 0.76mm) and 1/16" (.062", or 1.52mm) thick. If either one or both are missing from the original differential, obtain new one(s) before proceeding!

The LOCK-RIGHT is designed to be used with a correct thrust washer under each side gear, and failure to use this washer is easy to observe during inspection and will void the warranty.

NOTE: The parts shown in the various figures are typical and may not exactly depict your particular model.

See **(Figure 1)** on page 5 for an exploded view of a typical LOCK-RIGHT.

• LOCK-RIGHT installations covered in this manual •

Capped case differentials, both removable third member axles and integral carrier axles. Typical of these are those in Ford® 9-inch rear axle-equipped vehicles; similar other applications, such as VW® 091, 002, etc.

• Preliminary steps •

The following steps are only a general guide to preliminary operations used for preparing your vehicle for LOCK-RIGHT installation. For detailed information, refer to your shop manual. In general, the preliminary steps include:

a) Blocking the vehicle, putting transmission in neutral
b) Loosening the wheel lug nuts (tire removal may be optional; see shop manual)
c) Jacking up the axle; securely resting it on jack stands
d) Removing the tires (some axles)
e) Disconnecting the brake lines and emergency brake cables (some axles)
f) Pulling out both axles a few inches

SECTION 1:
Differential Case Removal

1. Remove the third member or differential case from the vehicle as outlined above and described in the shop manual. Follow all safety precautions.
2. Check to be sure that the gears are in good condition and that nothing is loose, worn or scored. Rock the ring gear back and forth to get a "feel" for the backlash and check to see that it appears to be set up properly. If any out-of-spec conditions exist, be sure to correct them before subsequent re-assembly.
3. The differential can be removed and re-assembled without changing the ring and pinion settings if you are careful. Mark everything with a center punch! Don't touch a bolt until you have done so. We suggest placing the whole assembly upright (the same position as shown in the vehicle). Remove the differential case and ring gear assembly from the carrier along with the other adjuster and bearing race.

SECTION 2:
Disassembly of the Differential Case

1. Remove the ring gear bolts and then the ring gear. It may need to be tapped off

with a brass mallet. Mark it so that it can be re-installed in the same rotational position as when removed. Also mark the cap and case so that they can be re-assembled together in the same position **(Figure 2)**.

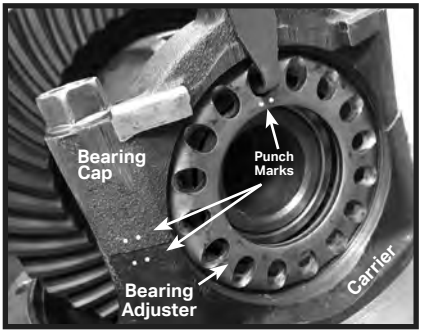


Figure 2: *Thrust washer goes to bottom of the case, shiny side up, followed by the side gear.*

2. Remove the case cap. It may be pressed into position; carefully pry it up if necessary.
3. Remove the pinion shaft(s), spider gears, side gears, all washers, and the pinion shaft block.
4. Mark the side gear in the top of the case with a tag or put it in a separate location so that it can be identified later. It will be placed in the bottom of the case during assembly.

• Inspection of the parts •

NOTE: The LOCK-RIGHT differential assembly utilizes your case, side gears, all washers, pinion shaft(s), and they must be in excellent condition. The spider gears and washers are not used. If following inspection shows that anything is bad, buy new parts from your dealer!

1. Thoroughly wash the differential case and remaining parts with solvent, then dry them. Be sure to keep the side gears separate.
2. Inspect the side gears. They are very important to the proper operation of your new LOCK-RIGHT. The following three figures show various levels of wear on the teeth.

- New side gears **(Figure 3)**. Note that the gear surface is rough and that machining marks are present on the top side of the tooth. Naturally, these gears are ideal.

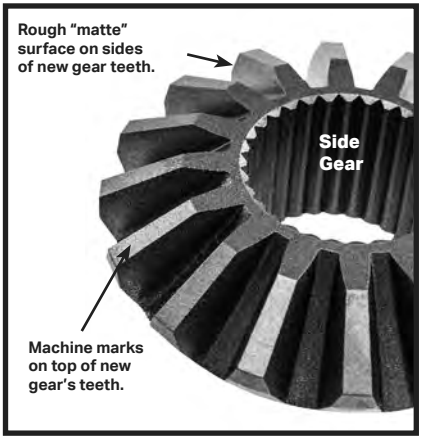


Figure 3: *New side gear*

- Moderately used side gears **(Figure 4).** Note that some polishing is evident and that some machining marks are still present. These should function properly.

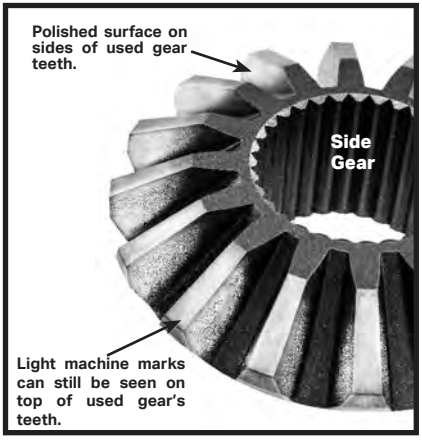


Figure 4: *Moderately used side gear*

- Heavily used side gears, those more worn that what is shown in **(Figure 4),** must be replaced to guarantee best performance.

3. Inspect the pinion shaft(s) for any galled areas or grooves. If they are not in excellent condition, obtain new ones if your kit does not already include them.

4. Inspect the side gear thrust washers. They are important to the correct positioning of the LOCK-RIGHT parts. If they are excessively worn or are cracked, obtain new ones.
5. Inspect the case for any chips, cracks or similar damage. Also inspect the bearings. If the case or bearings look bad, replace them. However, if you do, remember that the marked bearing adjuster positions no longer will be correct; the ring and pinion backlash and bearings preload will have to be reset with a dial indicator as described in the shop manual.

• Preparing the parts for assembly •

Coat the teeth of the side gears and both sides of the thrust washers with medium grease. Also place a little grease in each of the four holes in each driver. The grease will help hold the parts in place later and assist with functioning until the gear oil circulates.

SECTION 3: Assembly of the LOCK-RIGHT Parts Into the Differential Case

1. Place a thrust washer into the bottom of the case, smoothest side up if the thrust washer is used, then place a side gear into the bottom **(Figure 5).**

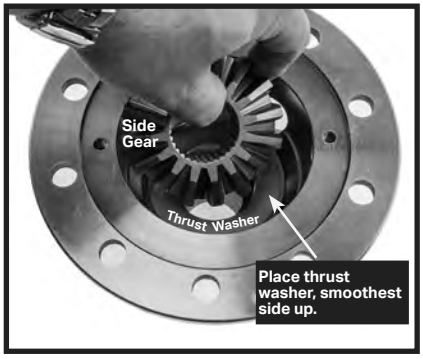


Figure 5

2. Place a driver onto the side gear in the case with the teeth meshed.
3. Install the pinion shaft block and the pinion shafts (see sections "a" and "b" that follow). Be very careful to not let the shafts become caught on the driver or the block or on each other as they come through! Keep the retaining pin holes in the shaft(s) lined up with those in the case and finish driving them in. If they are hard to insert, use a brass or plastic mallet to drive them to avoid damaging the ends. If the shafts will not insert all the way because the block appears to be too thick, thinner thrust washers will be needed. Either purchase them from your dealer or reduce them in thickness with a surface grinder. Only a few thousandths of an inch may need to be removed.

a) Four-pinion case: Place the pinion shaft block into the center of the driver. (The two stub shafts in your kit will not be used.) Drive the two short shafts part way into the block first to help hold it and then drive in the long shaft

b) Two-pinion cases: Place the two stub shafts in your kit into the pinion shaft block, and place the assembly into the center of the driver. Spread the shafts apart with a screwdriver **(Figure 6)**. Drive in the long shaft past the two stub shafts **(Figure 7).** The case will hold the shafts in place.

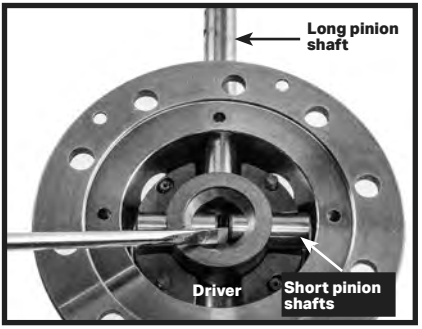


Figure 6

4. Place a bias spring assembly into each deep hole in the bottom driver and place a pin into each of the two other holes. The grease placed in the holes earlier will help hold things in place **(Figure 7).**
5. Place a bias spring assembly into each deep hole in the other driver and place a pin into each of the other holes. Use grease to help hold them in place **(Figure 8).**

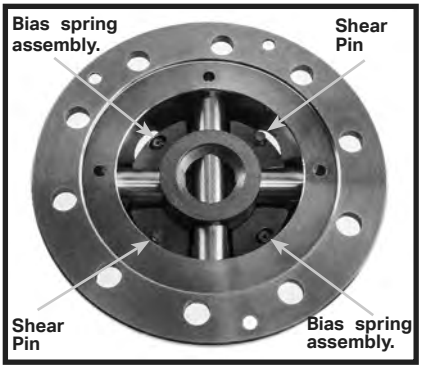


Figure 7

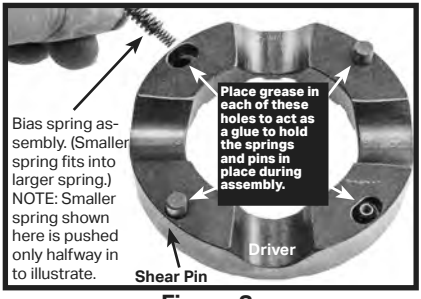


Figure 8

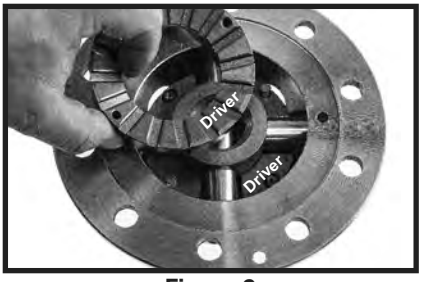


Figure 9

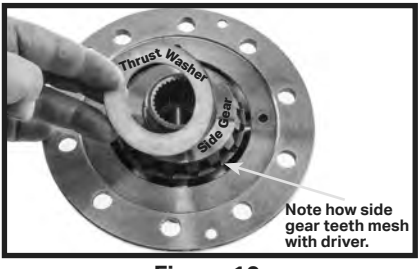


Figure 10

6. Turn the top driver over and hold it so that the stop pins line up with the springs in the lower driver. Carefully lower it until the pins rest on the discs **(Figure 9).** Push it up and down to be absolutely sure that all springs and pins are in place and are functioning properly. Proper operation of the parts at this point is very important!
7. Place the other side gear (the one that formerly was in the bottom of the case) onto the top driver with the teeth meshed and then place the thrust washer on it **(Figure 10).** The smoothest side of the washer is placed facing the side gear.
8. Place the case cap onto the case in its marked rotational position. Line up the ring gear holes and tap it to seat it.
9. Install the ring gear in its proper marked rotational position and then torque the bolts to their proper values.
10. Inspect your work. Look for anything that is not correct. Reach in through each end with two fingers into the splines and be sure that the drivers rotate back and forth smoothly, stopping at the pinion shafts, and are not binding.

SECTION 4:
Differential Final Assembly

NOTE: Integral carrier differentials use steps similar to those for third member differentials when installing the bearing caps and adjusters. Install the case as described below except for the positioning of the carrier vertically.

1. Position the carrier vertically, with the drive shaft flange pointing down. It can be held in a vise or even stood on its nose in a coffee can if a vise is not available.
2. Place the bearing races on the differential bearings. Be sure to place the marked one on the proper end.
3. Set the differential case (and bearings) into the carrier. Install it with the ring gear pushed all the way into the drive pinion—that is, with no backlash, and with the bearing races pushed all the way onto the bearings.
4. Check the punch marks on the adjusters and determine which one goes on the side nearest the ring gear. Hold it so that the mark is at its final position (where the

lock will be installed, pointing away from the carrier). Push the bearing adjuster against the race and slide it down into the threads in the carrier. They should mesh easily, with no space between the parts.

5. Install the correctly-marked cap. Use the bolts as guides by turning them in two threads or so and then sliding the cap down to meet the case. Be sure that the cap threads fit into those in the adjuster. Do not force anything. The cap should slide down very close to the carrier surface. Tighten the bolts until they are snug.
6. Hold the other adjuster so that the mark is in the same relative position as the first one (with the mark away from the carrier) and slide it down the bearing race into the threads. As it meshes it should shift outward a little and be positioned slightly away from the race.
7. Install the other cap. Again, use the bolts as guides by turning them in two threads or so and then sliding the cap down to meet the case. Turn the bolts until they are barely snug. Be sure that the cap threads fit into those in the adjuster. Do not force anything.
8. Use a spanner wrench or a blunt punch and a hammer to turn the second adjuster (the one away from the ring gear) one turn inward (clockwise) until the marked hole reaches its final position (in the middle of the cap just below the lock). The last portion of the turn should be difficult because preload is being applied to the bearings by spreading the caps apart as the adjuster is being turned in.
9. Insert an axle shaft or bar into one of the axle shaft holes in the differential case to help with holding the assembly or place it in a large vise, and torque the cap bolts to their correct value (see the shop manual).
10. Install the adjuster locks and torque the bolts. Be sure that they are located in the marked holes.

• Differential assembly inspection •

When the above steps are completed, all the parts should be in exactly the same positions as they were when the installation began. The backlash and preload settings should therefore be unchanged and no further adjustments will be needed. To be certain, rock the ring gear back and forth to see if the backlash feels the same as it was prior to the installation. If not, it will need to be reset with a dial indicator as described in the shop manual. Rotate the ring gear one revolution to be sure that nothing is binding.

SECTION 5:
Third Member Installation

1. Clean the mating surface of the axle housing and the mounting surface of the differential carrier.
2. Clean the inside of the axle housing to remove all foreign material. This step is very important because metal chips can interfere with the operation of your new LOCK-RIGHT
3. Remove metal chips from the drain plug if it is magnetic.
4. Install a gasket and/or sealant as appropriate.
5. Lift the third member into the axle housing
6. Install and torque the hardware.

• Vehicle final assembly •

Finish the assembly of the remaining parts by reversing the order of disassembly—in general, the axles/backing plates, brake lines, emergency brake cables, drive shafts, tires. Note that in some designs the last 1/8-inch or so of the backing plate installation is a light press fit and the axle shaft may appear to be hitting something. Tap the outside end of the axle housing, check to be sure that they are in their correct positions. Refer to the shop manual for specific instructions. Your LOCK-RIGHT installation should now be complete. As a preliminary test, rotate the tires back and forth (transmission out of gear and drive shaft free). The drivers should randomly unlock and "click" as the tires move. Note that the tires will NOT lock together—this easy-unlocking characteristic is a unique feature of the LOCK-RIGHT and is perfectly normal.

Add gear oil. Note that we suggest using medium-to-heavy oils as recommended by the manufacturer, unless the vehicle will be used in very cold weather.

Thicker oil, such as 85-140, reduces the "clicking" noise sometimes heard

during tight turns and provides adequate lubrication when the assembly becomes hot. Also see the section in the Vehicle Operator's Manual regarding temperature.

• Tire Diameters •

To help assure a long life for your new LOCK-RIGHT, tire diameters should be as nearly equal as possible. Contrary to instructions that you may have read elsewhere, DO NOT change the inflation pressure to vary the rolling radius of the tire! This practice can be dangerous if one of the tires is under-inflated, producing excess heat, faster tire wear and more difficult vehicle control. The best way to equalize the rotation is to measure the circumference of all the tires, including the spare. Choose ones that are within about 3/8-inch or less of each other (do not change from side-to-side if they are radials). If one tire is much more worn than the other one, they both should be replaced for safety reasons.

SECTION 6:
Testing Your Installation

1. Be sure that the vehicle is safely blocked. Leave the axle assembly on the jack stands, with both tires free to rotate and the emergency brake off.
2. Put the transmission and transfer case in gear to lock the drive shaft.
3. Rotate one of the tires in the forward direction with your hand until it stops, then hold it. That side of the LOCK-RIGHT is now locked.
4. Rotate the other tire in the opposite (reverse) direction. The LOCK-RIGHT should "click" as the coupler attached to the axle rotates.
5. Rotate the first tire in the reverse direction and hold it; repeat step 3, rotating the other tire in the forward direction.
6. Repeat steps 2-4, rotating and holding the second tire to lock the second side.

SECTION 7:
Driving Your Vehicle

If the foregoing measurements and tests have been successfully completed, apply the emergency brake and remove the vehicle from the jack stands. Your vehicle should now be ready to drive.

Carefully read and understand the driving information contained in the LOCK-RIGHT Vehicle Owner's Manual! Safe and effective use of your new LOCK-RIGHT-equipped vehicle depends on knowledgeable operation, and this can only be done by understanding its characteristics before you start. Be careful, and have fun!

NOTE: If an axle snaps repeatedly under power when driving on the street (as opposed to lightly clicking in a turn), the teeth on the used side gears may be too worn to function properly. Sustained operation under these conditions is quite easy to observe and will void the warranty. Replace the side gears immediately to eliminate the problem or contact your dealer for assistance.

- END

ORIGINAL MANUAL #: 1000703MID
Lock-Right part numbers covered in this section:
1510-LR, 1512-LR, 1520-LR, 1530-LR, 1532-LR

• Background info •

The differential case is the round housing inside the rear axle assembly to which the ring gear is bolted and which contains the differential spider and side gear assembly. It is installed in the differential carrier, which is the housing that holds the case, drive pinion gear, bearings, etc. The carrier may be removable (as part of a "drop-out" unit, or third member), or it may be integral (as a permanent part of the axle assembly, mounted in the vehicle). This manual covers the removable third member, technically known as the Differential and Carrier Assembly.

The LOCK-RIGHT is designed to fit into standard open differential cases only, not into limited-slip (clutch-pack) type cases. If your vehicle contains a limited-slip unit you will need to purchase a standard open differential, thrust washers and pinion shaft before proceeding.

A word about pinion shafts: Some models of differentials use shafts with circumferential oil grooves for oil distribution, while others use shafts with flats. The shafts with flats are re-used, while those with grooves are not. If new shafts are provided in your kit, use them. If no shafts are provided, use the existing shafts.

A word about side gear thrust washers: All differentials originally had a thrust washer under each side gear. Thrust washers are large in diameter and between about 1/32-inch (.031, or 0,76-mm) and 1/16-inch (.062, or 1,52-mm) thick. If either one or both are missing from the original differential, obtain new one(s) before proceeding! The LOCK-RIGHT is designed to be used with a correct thrust washer under each coupler, and failure to use this washer is easy to observe during inspection and will void the warranty.

NOTE: The parts shown in the various figures are typical and may not exactly depict your particular model.

• LOCK-RIGHT Installations Covered in This Manual •

Removable third member axles. Typical of these are all rear and some front axles in various models of Suzuki 4x4 vehicles. The LOCK-RIGHT is designed to function in 4-pinion differentials only, not in 2-pinion design; to install a LOCK-RIGHT in these differentials, a suitable 4-pinion rear differential may be substituted.

• Preliminary Steps •

The following steps are only a general guide to preliminary operations used for preparing your vehicle for LOCK-RIGHT installation. For detailed information, refer to your shop manual. In general, the preliminary steps include:

a) Blocking the vehicle, putting transmission in neutral
b) Loosening the wheel lug nuts (tire removal may be optional; see shop manual)
c) Jacking up the axle; securely resting it on jack stands
d) Removing the tires (some axles)
e) Disconnecting the brake lines and emergency brake cables (some axles)
f) Pulling out one or both axles a few inches.

SECTION 1: Differential Case Removal

1. Remove the third member from the vehicle as described in the shop manual. Follow all safety precautions.
2. Check to be sure that the third member is in good condition and that nothing is loose, worn or scored. Rock the ring gear back and forth to get a "feel" for the backlash and check to see that it appears to be set up properly. If any out-of-spec conditions exist, be sure to correct them before subsequent re-assembly.

NOTE: The third member itself can be disassembled and re-assembled without changing the ring and pinion settings if you are careful. Follow these steps in detail.

SECTION 2:
Disassembly of the Differential Case

Mark everything! Don't touch a bolt until you have done so. The easiest tool to use is a center punch. We suggest placing the whole assembly upright (the same position as when in the vehicle), looking at the ring gear end. Mark the carrier and bearing cap on the ring gear side with one punch mark and on the other side with two marks **(Figure 2).** The caps are not interchangeable! Also mark each bearing adjuster directly under the lock with this same mark to note its side and rotational position. This mark is very important for correct re-assembly!

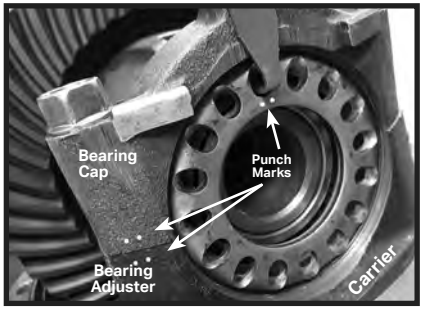


Figure 2: *Thrust washer goes to bottom of the case, shiny side up, followed by the side gear.*

1. Remove the adjuster locks. Be sure that each adjuster is marked at the lock with the correct number of punch marks for each side. The adjusters are not interchangeable after they are marked for position! (In general, the adjuster locks themselves are interchangeable.)
2. Remove the bearing caps
3. Slide (tap) the adjuster up and out and remove the bearing race on the ring gear side first and put a very small grind mark on the outside of the race to mark it. Scraping it on a cement floor also works, or you can use a tag. Be sure that you can identify it for proper re-assembly on the correct side!

• Inspection of the parts •

NOTE: The LOCK-RIGHT utilizes your case, side gear thrust washers, pinion shaft and axle shaft thrust block, (if used), and they must be in excellent condition. The spider gears and washers are not used. If the following inspection shows that anything is bad, buy new parts from your dealer!

1. Thoroughly wash the differential case and remaining parts with solvent, then dry them. Be sure to keep the side gears separate, because the side gear in the top of the case will be installed in the bottom of the case during assembly.
2. Inspect the side gears. They are very important to the proper operation of your new LOCK-RIGHT. The following three figures show various levels of wear on the teeth.

a) New side gears **(Figure 3)**. Note that the gear surface is rough and that machining marks are present on the top side of the tooth. Naturally, these gears are ideal.

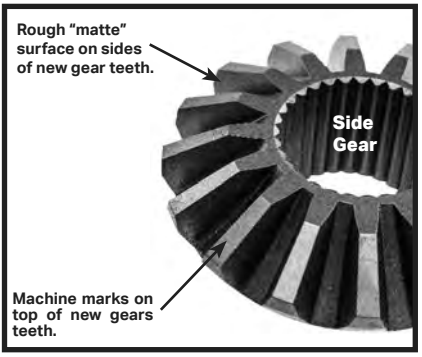


Figure 3: *New side gear*

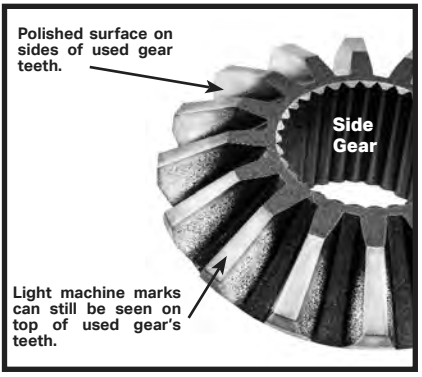


Figure 4: *Moderately used side gear*

b) Moderately used side gears **(Figure 4).** Note that some polishing is evident and that some machining marks are still present. These should function properly.

c) Heavily used side gears, those more worn that what is shown in **(Figure 4),** must be replaced to guarantee best performance.

3. Inspect the side gear thrust washers. They are important to the correct positioning of the LOCK-RIGHT parts. If they are excessively worn or are cracked, obtain new ones.
4. Inspect the pinion shaft block for any damage or excessive looseness. If it is not in excellent condition, obtain a new one.
5. Inspect the case for any chips, cracks or similar damage. Also inspect the bearings. If the case or bearings look bad, replace them. However, if you do, remember that the marked bearing adjuster positions no longer will be correct; the ring and pinion backlash and bearings preload will need to be reset with a dial indicator as described in the shop manual.

• LOCK-RIGHT installation: preparing the parts for assembly •

Coat the teeth of the drivers and both sides of the thrust washers with medium grease. Also place a little grease in each of the two window holes in each driver. The grease will help hold things in place and assist with functioning until the gear oil circulates.

NOTE: For clarity, parts used in the assembly pictures were NOT coated in grease.

SECTION 3: Assembly of the LOCK-RIGHT Parts into the Differential Case

1. Place a thrust washer into the bottom of the case, smoothest side up, then place the gear that formerly was in the top of the case into the bottom **(Figure 5)**.
2. Place a driver onto the side gear in the case, with the teeth meshed, and place one of the spacers in the middle **(Figure 6).**
3. Install the pinion shaft block and pinion shafts **(Figure 7)**. Note that the pinion shaft block is not a precision part and that the holes may be drilled off-center such that the block is thicker on one side than on the other. The spacer may tend to bind between that side of the block and its corresponding side gear.

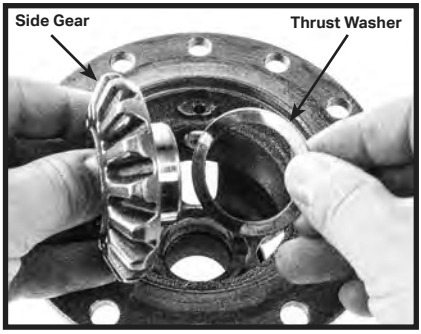


Figure 5: *Thrust washer goes to bottom of the case, shiny side up, followed by the side gear.*

Figure 6: *Driver goes onto the side gear, teeth meshed, then spacer is set in middle.*

Figure 7: *Set pinion shaft block in center, install pinion shafts. Then install small parts into driver using some grease to help hold them in place.*

To check for this condition, place a spacer in the center of the driver and install the pinion shaft block using the long shaft. Wiggle the block to get a "feel" for the gap between it and the spacer; turn the block over and do the same test for the other side. Install the block with the side down where the gap between the block and spacer is the least. This will assure that when the top spacer and gear are installed

the amount of space will be adequate.

If the block is too tight and the long shaft will not insert, use a belt sander or grinder to carefully remove about .005" from the tight side of the block until the shaft inserts easily. If the removal of any more material is needed, obtain a thinner thrust washer from your dealer or surface grind your present one. Re-install the block with the ground side down and continue with your installation.

4. Insert a small spring into a large spring and place the assembly into one of the large holes in the bottom driver **(Figure 7)**. Repeat for the other hole. **NOTE:** Placing some grease in the holes will help keep things in place.
5. Place a spring assembly into each hole in the other driver. Place a little more grease on top of the springs to help hold them in place.
6. Turn the other driver over and hold it so that the stop pins line up with the springs in the lower driver. Carefully lower it until the pins rest on the springs. Push it up and down to be absolutely sure that everything is in place that all springs are functioning properly. Proper operation of the parts at this point is very important!
7. Place the other spacer in the middle of the top driver **(Figure 8)**.
8. Place the other side gear (the one that formerly was in the bottom of the case) onto the top driver with the teeth meshed and then place the second thrust washer on it **(Figure 9)**. The smoothest side of the washer is placed next to the gear.

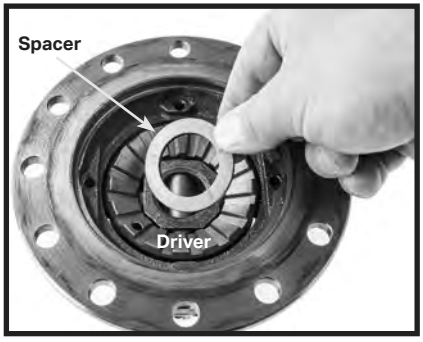


Figure 8: *With second driver now installed, set second spacer into center.*

9. Place the case cap onto the case in its marked rotational position. Line up the holes and install the bolts. Torque them to their proper value.
10. Install the ring gear in its proper marked rotational position and then tighten the bolts.

Figure 9: *Set second side gear onto driver, making sure to mesh teeth with driver. Set second thrust washer shiny side down so it rests against side gear.*

11. Inspect your work. Look for anything that is not correct. Reach in through each end with two fingers into the splines and be sure that the gears and drivers rotate back and forth smoothly, stopping at the pinion shafts.

SECTION 4:
Third Member Final Assembly

1. Position the carrier vertically, with the drive shaft flange pointing down. It can be held in a vise or even stood on its nose in a coffee can if a vise is not available.
2. Place the bearing races on the differential case bearings. Be sure to place the marked one on the proper end.
3. Set the differential case (and bearing races) into the carrier. Install it with ring gear pushed all the way into the drive pinion—that is, with no backlash, and with the bearing races pushed all the way onto the bearings.
4. Check the punch marks on the adjusters and determine which one goes on the side nearest the ring gear. Hold it so that the mark is at its final position (where the lock will be installed, pointing away from the carrier). Push the adjuster against the race and slide it down into the threads in the carrier. They should mesh easily, with no space between the parts.
5. Install the correctly-marked cap. Use

the bolts as guides by turning them in two threads or so and then sliding the cap down to meet the case. Be sure that the cap threads fit into those in the adjuster. Do not force anything. the cap should slide down very close to the carrier surface. Tighten the bolts until they are snug.

6. Hold the other adjuster so that the mark is in the same relative position as the other one (with the mark away from the carrier) and slide it down the bearing race into the threads. As it meshes, it should shift outward a little and be positioned slightly away from the race.
7. Install the other cap. Again, use the bolts as guides by turning them in two threads or so and then sliding the cap down to meet the case. Turn the bolts until they are barely snug. Be sure that the cap threads fit into those in the adjuster. Do not force anything.
8. Use a spanner wrench or a blunt punch and a hammer to turn the second adjuster (the one away from the ring gear) one turn inward (clockwise) until the marked hole reaches its final position (in the middle of the cap just below the lock). The last portion of the turn should be difficult because preload is being applied to the bearings by spreading the caps apart as the adjuster is being turned in.
9. Insert an axle shaft or bar into one of the axle shaft holes in the differential case to help with holding the assembly or place it in a large vise, and torque the cap bolts to their correct value (see the shop manual).
10. Install the adjuster locks and torque the bolts. Be sure that they are located in the marked holes **(Figure 2) on pg. 33.**

• Assembly Inspection •

Inspect your work. Look for anything that is not correct. Be sure that the drivers rotate back and forth smoothly, stopping at the pinion shaft. Use a light to see that the spacers (and thrust block, if used) are in place and that the springs are working properly.

When the above installation steps are completed, all the parts should be in exactly the same positions as they were when the installation began. The backlash and preload settings should be unchanged from before and no further adjustments will be needed. To be certain, rock the ring gear back and forth to see if the backlash appears to be the same as it was prior to the installation. If not, it will need to be reset with a dial indicator as described in the shop manual. Rotate the ring gear one revolution to be sure that nothing is binding.

SECTION 5:
Third Member Installation

1. Clean the mating surface of the axle housing and the mounting surface of the differential carrier.
2. Clean the inside of the axle housing to remove all foreign material. This step is very important because metal chips can interfere with the operation of your new LOCK-RIGHT.
3. Remove metal chips from the drain plug if it is magnetic.
4. Install a gasket and/or sealant as appropriate.
5. Lift the third member into the axle housing and shove it into the studs.
6. Install and torque the hardware.
7. Re-install the axle shafts and finish the remaining vehicle re-assembly steps.

• Vehicle final assembly •

Add gear oil. Note that we suggest using medium-to-heavy oils as recommended by the manufacturer, unless the vehicle will be used in very cold weather. Thicker oil, such as 85-140, reduces the "clicking" noise sometimes heard during tight turns and provides adequate lubrication when the assembly becomes hot. Also see the section in the Vehicle Operators Manual regarding temperature. Your LOCK-RIGHT installation should now be complete. As a preliminary test, rotate the tires back and forth (transmission out of gear and driveshaft free). The drivers should randomly unlock and "click" as the tires move. Note that the tires will NOT lock together—this easy-unlocking characteristic is a unique feature of the LOCK-RIGHT and is perfectly normal.

• Tire Diameters •

To help assure a long life for your new LOCK-RIGHT, tire diameters should be as nearly equal as possible. Contrary to

instructions that you may have read elsewhere, DO NOT change the inflation pressure to vary the rolling radius of the tire! This practice can be dangerous if one of the tires is under-inflated, producing excess heat, faster tire wear and more difficult vehicle control. The best way to equalize the rotation is to measure the circumference of all the tires, including the spare. Choose ones that are within about 3/8-inch or less of each other (do not change from side-to-side if they are radials). If one tire is much more worn than the other one, they both should be replaced for safety reasons.

SECTION 6:
Testing Your Installation

1. Be sure that the vehicle is safely blocked. Leave the axle assembly on the jack stands, with both tires free to rotate and the emergency break off.
2. Put the transmission and transfer case in gear to lock the drive shaft.
3. Rotate the other tires in the forward direction with your hand until it stops, then hold it. That side of the LOCK-RIGHT is now locked.
4. Rotate one of the tires in the opposite (reverse) direction. The LOCK-RIGHT should "click" as the coupler attached to the axle rotates.
5. Rotate the first tire in the reverse direction and hold it; repeat step 3, rotating the other tire in the forward direction.
6. Repeat steps 2-4, rotating and holding the second tire to lock the second side.

SECTION 7:
Driving Your Vehicle

If the foregoing measurements and tests have been successfully completed, apply the emergency brake and remove the vehicle from the jack stands. Your vehicle should now be ready to drive.

Carefully read and understand the driving information contained in the LOCK-RIGHT Vehicle Owner's Manual! Safe and effective use of your new LOCK-RIGHT-equipped vehicle depends on knowledgeable operation, and this can only be done by understanding its characteristics before you start.

- END

ORIGINAL MANUAL #: 1000708MIF

Lock-Right part numbers covered in this section:
1610-LR, 1611-LR, 1615-LR, 3211-LR

• Background information •

The differential case is the round housing inside the rear axle assembly to which the ring gear is bolted and which contains the differential spider and side gear assembly. It is installed in the differential carrier, which is the housing that holds the case, drive pinion gear, bearings, etc. The carrier may be removable (as part of a "drop-out" unit, or third member), or it may be integral (as a permanent part of the axle assembly, mounted in the vehicle). This manual covers the removable third member, technically known as the Differential and Carrier Assembly.

The LOCK-RIGHT is designed to fit into standard open differential cases only, not into limited-slip (clutch-pack) type cases. If your vehicle contains a limited-slip unit you will need to purchase a standard open differential case, thrust washers and pinion shaft before proceeding.

A word about axle shaft thrust blocks: A few differentials use a thrust block between the inside ends of the axle shafts as a part of the end play adjustment. When installing a LOCK-RIGHT, this block is re-used along with the original axles so that the original end play adjustment does not change. However, if the original axles are changed to different original-type axles, the block will continue to be used but the end play must be re-adjusted (see the shop manual for the procedure). If the axle is changed to another type that does not need end-play adjustment, such as a one-piece design, the thrust block may be omitted.

A word about side gear thrust washers: All differentials originally had a thrust washer under each side gear. Thrust washers are large in diameter and between about 1/32-inch (.031, or 0,76-mm) and 1/16-inch (.062, or 1,52-mm) thick. If either one or both are missing from the original differential, obtain new one(s) before proceeding! The LOCK-RIGHT is designed to be used with a correct thrust washer under each coupler, and failure to use this washer is easy to observe during inspection and will void the warranty.

NOTE: The parts shown in the various figures are typical and may not exactly depict your particular model.

• LOCK-RIGHT installations covered in this manual •

Removable third member axles. Typical of these are Toyota® 4-cylinder engine vehicles, both front and rear; similar applications in Nissan®, Isuzu®; certain domestic applications, etc.

• Preliminary steps •

The following steps are only a general guide to preliminary operations used for preparing your vehicle for LOCK-RIGHT installation. For detailed information, refer to your shop manual. In general, the preliminary steps include:

a) Blocking the vehicle, putting transmission in neutral
b) Loosening the wheel lug nuts (the removal may be optional; see shop manual)
c) Jacking up the axle; securely resting it on jack stands
d) Removing the tires (some axles)
e) Disconnecting the brake lines and emergency brake cables (some axles)
f) Pulling out one or both axles a few inches

SECTION 1:
Removal of the Differential Case from the Carrier

1. Remove the third member from the vehicle as described in the shop manual. Follow all safety precautions.
2. Check to be sure that the third member is in good condition and that nothing is loose, worn or scored. Rock the ring gear back and forth to get a "feel" for the backlash and check to see that it appears to be set up properly. If any out-of-spec conditions exist, be sure to correct them before subsequent re-assembly. **NOTE:** The third member itself can be disassembled and re-assembled without changing the ring and pinion settings if you are careful. Follow these steps in detail.

3. Mark everything! Don't touch a bolt until you have done so. The easiest tool to use is a center punch. We suggest placing the whole assembly upright (the same position as when in vehicle), looking at ring gear end. Mark carrier and bearing cap on the ring gear side with one punch mark and on the other side with two marks **(Figure 2)**. The caps are not interchangeable! Also mark each bearing adjuster directly under the lock hole with this same mark to note its side and rotational position. This mark is very important to correct re-assembly!

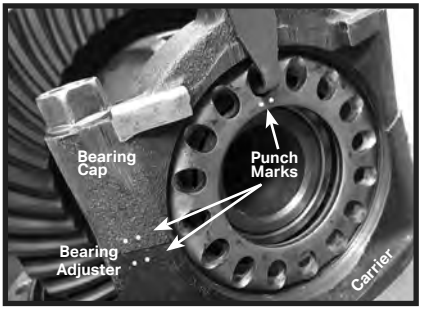


Figure 2: *Thrust washer goes to bottom of the case, shiny side up, followed by the side gear.*

4. Remove the adjuster locks. Be sure that each adjuster is marked at the lock with the correct number of punch marks for each side. The adjusters are not interchangeable after they are marked for position! (In general, the adjuster locks themselves are interchangeable.)
5. Remove the bearing caps
6. Slide (tap) the adjuster up and out and remove the bearing race on the ring gear side first and put a very small grind mark on the outside of the race to mark it. Scraping it on a cement floor also works, or you can use a tag. Be sure that you can identify it for proper re-assembly on the correct side!
7. Remove the differential case and ring gear assembly from the carrier along with the other adjuster and bearing race.

SECTION 2:
Disassembly of the differential case

1. Remove the ring gear if it interferes with the removal of the pinion shaft. It may need to be tapped off with a brass mallet. Mark it so that it can be re-installed in the same rotational orientation as when removed. Note: If the pinion shaft can be slid out past the ring gear teeth, the ring gear does not need to be removed.
2. Remove the pinion shaft retaining pin with a long punch or by unscrewing it as appropriate.
3. Remove the pinion shaft, spider gears, side gears, all washers, and the pinion shaft block (if used in your assembly).

• Inspection of the Parts •

NOTE: These steps are important. The LOCK-RIGHT utilizes your case, side gear thrust washers, pinion shaft and axle shaft thrust block, (if used), and they must be in excellent condition. The spider gears and washers are not used. If following inspection shows that anything is bad, buy new parts from your dealer!

1. Thoroughly clean the differential case and remaining parts with solvent, then dry them.
2. Inspect the pinion shaft. Any grooves or galling that can be felt may weaken it and can also adversely affect the operation of your new LOCK-RIGHT. If it is not in excellent condition, obtain a new one.
3. Inspect the side gear thrust washers. They are important to the correct positioning of the LOCK-RIGHT parts. If they are excessively worn or are cracked, obtain new ones. Several thicknesses may be offered; try to obtain the same size as the old ones. **NOTE:** There should be TWO thrust washers of about equal thickness, one under each side gear.
4. Inspect the thrust block (if used). Be sure that the ends are smooth and not galled.
5. Inspect the case for any chips, cracks or similar damage. Inspect the bearings as well. If the case or bearings look bad, replace them. However, if you do, remember that the marked bearing adjuster positions no longer will be correct; the ring and pinion backlash and bearings preload will to be reset with a dial indicator as described in the shop manual.

• LOCK-RIGHT Installation
Preparing the Parts for Assembly •

1. Coat the teeth of the couplers and drivers, the large center holes of the drivers and both sides of the thrust washers with medium grease. Also place a little grease in each of the two window holes in each driver. The grease will help hold things in place and assist with functioning until the gear oil circulates.
2. Place a shear pin into each window hole. It should be about flush **(Figure 3)**.
3. Place a spacer into the center of each driver **(Figure 3)**, wide end toward the teeth if the spacer is not symmetrical.
4. Press a thrust washer (with grease added) onto the back of each coupler **(Figure 4).**
5. Insert a small spring into each of the large springs and add a little grease to the coils to hold them together. Set them aside.

SECTION 3:
Assembly of the LOCK-RIGHT Parts into the Differential Case

1. Install a coupler and washer assembly in the ring gear end of the differential case, **(Figure 5)**. Note that the couplers in some models may have flats for clearance.
2. Place the second coupler and washer assembly into the other end of the differential case **(Figure 5)**.
3. Important! Be sure to have the spacers correctly oriented and placed in the drivers before doing the following steps!
4. Pick up a driver-and-spacer assembly. Orient its teeth toward the ring gear flange and hold it so that the flats (if present) will clear the sides of the case. Place it on the teeth of the coupler **(Figure 6)**
5. Repeat this step for the other driver-and spacer assembly.

• Differential Case Completion •

1. Rotate the right driver until one of its long window holes containing a pin faces out,

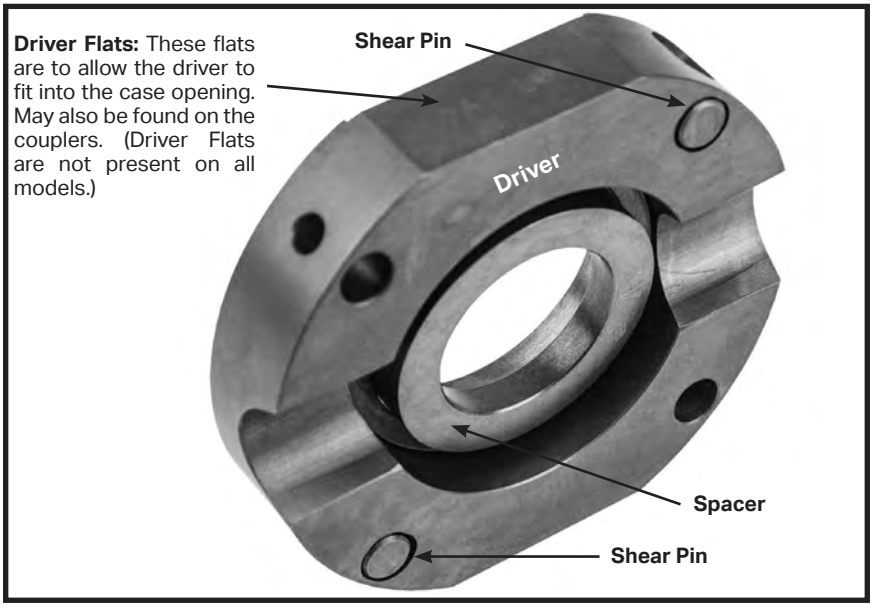


Figure 3: For each Driver, install spacer and also place shear pins into the 2 windowed (slotted) style holes.

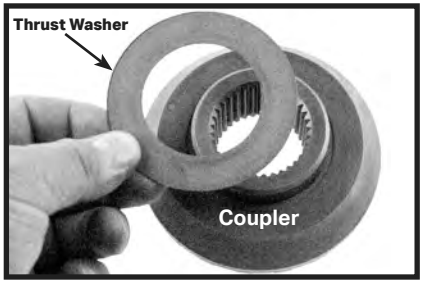


Figure 4: For each Driver, install spacer and also place shear pins into the 2 windowed (slotted) style holes

Figure 5: Install thrust washer/coupler assemblies into case

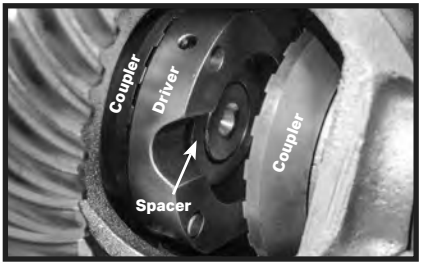


Figure 6: Place driver assembly onto coupler, meshing the teeth of the two. Grease on the teeth can help to hold the driver to the coupler if needed.

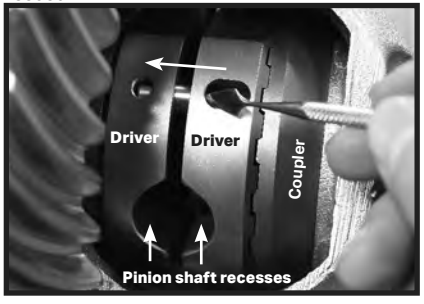


Figure 7: Push the pin from the oval window hole over to the round pin hole with a pointed tool.

then rotate the other driver until one of its empty pin holes lines up with the first window hole.

2. Push the pin out of the window hole and into the pin hole in the opposite driver with a small pointed tool **(Figure 7)**.
3. Place one end of a spring assembly into the window hole, behind the pin **(Figure 8).** Compress it with a small screwdriver and pop the bottom into the window hold **(Figure 9)**. Push on the bottom coils to be sure that the spring snaps in and is seated all the way. Rotate the drivers and do the same procedure for each of the other three pins and springs.

Figure 8: Install dual spring assembly.

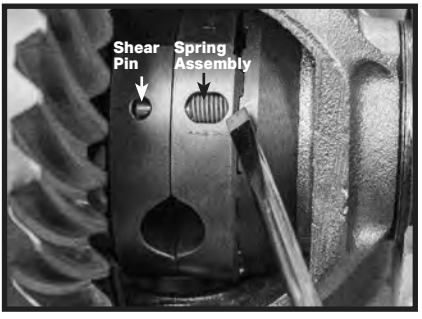


Figure 9: Compress spring assembly and push into oval windowed hole

4. Reach in through the recesses with your fingers and be sure that the spacers are pushed outward, onto the couplers.
5. Rotate the drivers so that the large recesses line up with the pinion shaft holes in the differential case.
6. If an axle shaft thrust block is being used, push it into the center of the assembly through one of the couplers and line up the large hole with the pinion shaft holes.

7. Carefully insert the pinion shaft into the hole and guide it through the drivers, past the spacers (and through the thrust block if used). It should insert easily by hand. If not, tap it in, being very careful not to get the inner end caught on something! Be sure to orient it so that its retaining pin hole will line up with the hole in the differential case **(Figure 10)**. If the pinion shaft will not insert, or is hard to insert, be sure that the correct thrust washers are being used and that the spacers are oriented with the widest side (opening) fitting down over the coupler shoulder. Rotate the drivers and couplers back and forth to be sure that they are not binding.

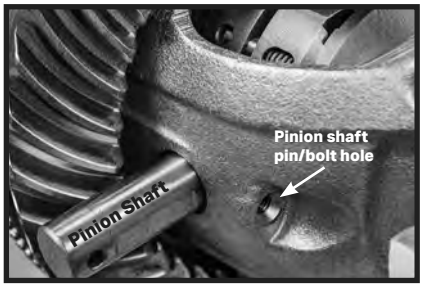


Figure 10: Install pinion shaft, then pin/bolt

8. Install the pinion shaft retaining pin. If the pin is solid, as opposed to a roll pin, slightly deform the metal on the side of the hole to help hold it in place (see shop manual).
9. Install the ring gear and torque the bolts.
10. Inspect your work. Look for anything that is not correct. Be sure that the drivers rotate back and forth smoothly, stopping at the pinion shaft. Use a light to see that the spacers (and thrust block, if used) are in place and that the springs are working properly.

SECTION 4:
Third Member Final Assembly

1. Position the carrier vertically, with the drive shaft flange pointing down. It can be held in a vise or even stood on its nose in a coffee can if a vise is not available.
2. Place the bearing races on the differential bearings. Be sure to place the marked one on the proper end.
3. Set the differential case (and bearing races) into the carrier. Install it with ring gear pushed all the way into the drive pinion—that is, with no backlash, and with the bearing races pushed all the way onto the bearings.
4. Check the punch marks on the adjusters and determine which one goes on the side nearest the ring gear. Hold it so that the mark is at its final position (where the lock will be installed, pointing away from the carrier). Push the adjuster against the race and slide it down into the threads in the carrier. They should mesh easily, with no space between the parts.
5. Install the correctly-marked cap. Use the bolts as guides by turning them in two threads or so and then sliding the cap down to meet the case. Be sure that the cap threads fit into those in the adjuster. Do not force anything. The cap should slide down very close to the carrier surface. Tighten the bolts until they are snug.
6. Hold the other adjuster so that the mark is in the same relative position as the other one (with the mark away from the carrier) and slide it down the bearing race into the threads. As it meshes, it should shift outward a little and be positioned slightly away from the race.
7. Install the other cap. Again, use the bolts as guides by turning them in two threads or so and then sliding the cap down to meet the case. Turn the bolts until they are barely snug. Be sure that the cap threads fit into those in the adjuster. Do not force anything.
8. Use a spanner wrench or a blunt punch and a hammer to turn the second adjuster (the one away from the ring gear) one turn inward (clockwise) until the marked hole reaches its final position (in the middle of the cap just below the lock).The last portion of the turn should be difficult because preload is being applied to the bearings by spreading the caps apart as the adjuster is being turned in.
9. Insert an axle shaft or bar into one of the axle shaft holes in the differential case to help with holding the assembly or place it in a large vise, and torque the cap bolts to their correct value (see shop manual).
10. Install the adjuster locks and torque the bolts. Be sure that they are located in the

marked holes.

11. As an additional check to be sure that everything has been installed correctly, use a small ruler, vernier caliper or blade-type feeler gauge. The distance between the halves of the LOCK-RIGHT, that is, between the two drivers, should be about 5/32" (.152", or 3.86mm). The tolerance limits are between .145" (3.68mm) and .170" (4.32mm). If this distance is much over .170", either the case is worn or the thrust washers are missing or are too thin and the problem should be corrected before proceeding further.

• Assembly Inspection •

Inspect your work. Look for anything that is not correct. Be sure that the drivers rotate back and forth smoothly, stopping at the pinion shaft. Use a light to see that the spacers (and thrust block, if used) are in place and that the springs are working properly.

When the above installation steps are completed, all the parts should be in exactly the same positions as they were when the installation began. The backlash and preload settings should be unchanged from before and no further adjustments will be needed. To be certain, rock the ring gear back and forth to see if the backlash appears to be the same as it was prior to the installation. If not, it will need to be reset with a dial indicator as described in the shop manual. Rotate the ring gear one revolution to be sure that nothing is binding.

SECTION 5:
Third Member Installation

1. Clean the mating surface of the axle housing and the mounting surface of the differential carrier.
2. Clean the inside of the axle housing to remove all foreign material. This step is very important because metal chips can interfere with the operation of your new LOCK-RIGHT.
3. Remove metal chips from the drain plug if it is magnetic.
4. Install a gasket and/or sealant as appropriate.
5. Lift the third member into the axle housing and shove it into the studs.
6. Install and torque the hardware.
7. Re-install the axle shafts and finish the remaining vehicle re-assembly steps.

• Vehicle Final Assembly •

Add gear oil. Note that we suggest using medium-to-heavy oils as recommended by the manufacturer, unless the vehicle will be used in very cold weather. Thicker oil, such as 85-140, reduces the "clicking" noise sometimes heard during tight turns and provides adequate lubrication when the assembly becomes hot. Also see the section in the Vehicle Operator's Manual regarding temperature.

Your LOCK-RIGHT installation should now be complete. As a preliminary test, rotate the tires back and forth (transmission out of gear and driveshaft free). The drivers should randomly unlock and "click" as the tires move. Note that the tires will NOT lock together—this easy-unlocking characteristic is a unique feature of the LOCK-RIGHT and is perfectly normal.

• Tire Diameters •

To help assure a long life for your new LOCK-RIGHT, tire diameters should be as nearly equal as possible. DO NOT change the inflation pressure to vary the rolling radius of the tire! This practice can be dangerous if one of the tires is under-inflated, producing excess heat, faster tire wear and more difficult vehicle control. The best way to equalize the rotation is to measure the circumference of all the tires, including the spare. Choose ones that are within about 3/8-inch or less of each other (do not change from side-to-side if they are radials). If one tire is much more worn than the other one, they both should be replaced for safety reasons.

SECTION 6:
Testing Your Installation

1. Be sure that the vehicle is safely blocked. Leave the axle assembly on the jack stands, with both tires free to rotate and the emergency brake off.
2. Put the transmission and transfer case in gear to lock the drive shaft.
3. Rotate one of the tires in the forward direction with your hand until it stops, then hold it. That side of the LOCK-RIGHT is

now locked.
4. Rotate the other tire in the opposite (reverse) direction. The LOCK-RIGHT should "click" as the coupler attached to the axle rotates.
5. Rotate the first tire in the reverse direction and hold it; repeat step 3, rotating the other tire in the forward direction.
6. Repeat steps 2-4, rotating and holding the second tire to lock the second side.

SECTION 7:
Driving Your Vehicle

If the foregoing measurements and tests have been successfully completed, apply the emergency brake and remove the vehicle from the jack stands. Your vehicle should now be ready to drive.

Carefully read and understand the driving information contained in the LOCK-RIGHT Vehicle Owner's Manual! Safe and effective use of your new LOCK-RIGHT-equipped vehicle depends on knowledgeable operation, and this can only be done by understanding its characteristics before you start. Be careful, and have fun!

• Subsequent Disassembly •

If something is not correct now or if you need to disassemble your LOCK-RIGHT in the future, we will briefly describe the procedure here. We will assume that the case has a thin ring gear and remains in the vehicle, or that it has a thick ring gear and has been removed from the vehicle and is on the bench.

1. Remove the pinion shaft retaining pin and then the pinion shaft.
2. Rotate the drivers until one of the window holes faces out. Push under the spring with a small sharp-pointed pick and pry the end up. Push a small screwdriver or bent piece of small wire (a paper clip works well) under the spring and pop the bottom out. Push the shear pin out of the pin hole and into the window hole from which the spring was removed. Repeat for the other three springs and pins.
3. Position the case horizontally and push in the spacers so the middle of the drivers. If a thrust block is used, push it out through either coupler.
4. Remove the driver and spacer opposite the ring gear flange first and then remove the second driver.
5. Remove the couplers.

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