Undercarriage Basics

Undercarriage Assembly

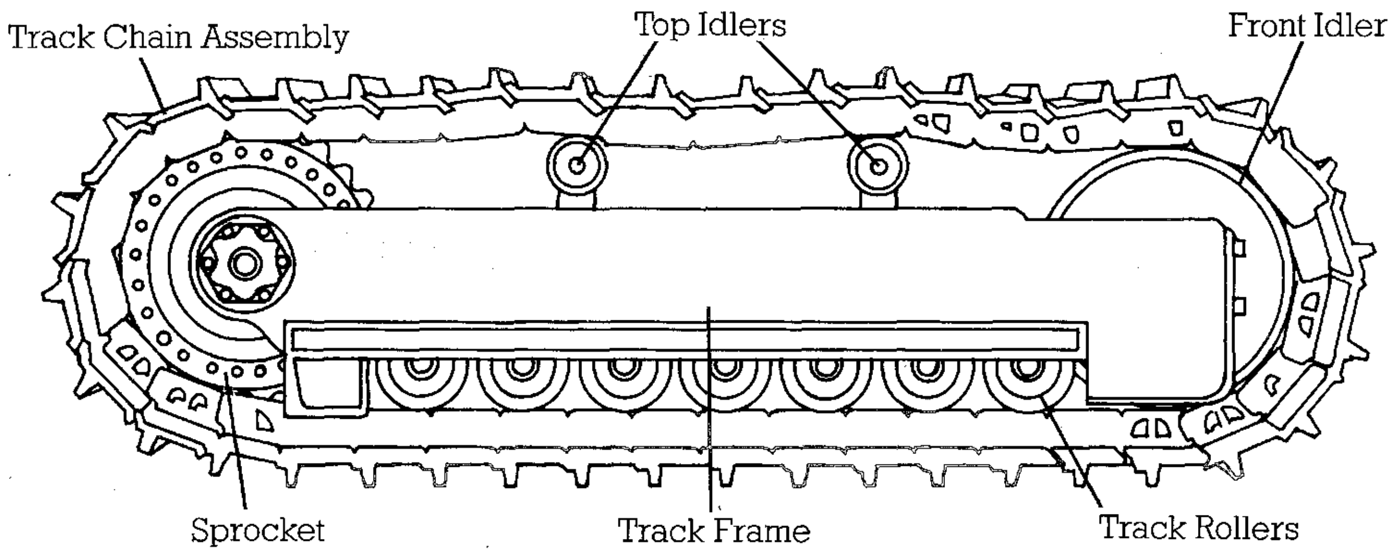
The total undercarriage assembly of a Dresser crawler is made up of components that transfer tractive effort from the tractor to create forward or reverse motion.

Front Idler
A large wheel at the front of the track frame that guides the track chain and absorbs shock loads. It is adjustable for proper track chain tension.

Sprocket
All Dresser crawlers use a "hunting-tooth" design sprocket, which consists of an odd number of sprocket teeth. This design permits each tooth to make contact on every other revolution. The same sprocket is used for the dry-seal and the lubricated track systems (L.T.S.).

Top Idlers
Metal wheels at the top of the undercarriage which support and guide the track chain assembly between the sprocket and front idler.

Track Rollers
Metal wheels mounted to the bottom of the track frame which support the tractor's weight and which roll over the rail portion of the track chain.



Undercarriage Basics

Track Rollers
Roller friction and shock loads transmitted from the track chain create heat in the interior of rollers and on the roller surface, which can cause wear. To withstand this wear, several quality steps are taken in manufacturing the Dresser roller.

■ Roller seals are constructed of long-wearing stellite material supported by rubber load rings (1) that act as seals and springs keeping oil in and dirt out.

■ Highly polished roller shafts (2) and bronze bearings reduce friction to extend roller life.

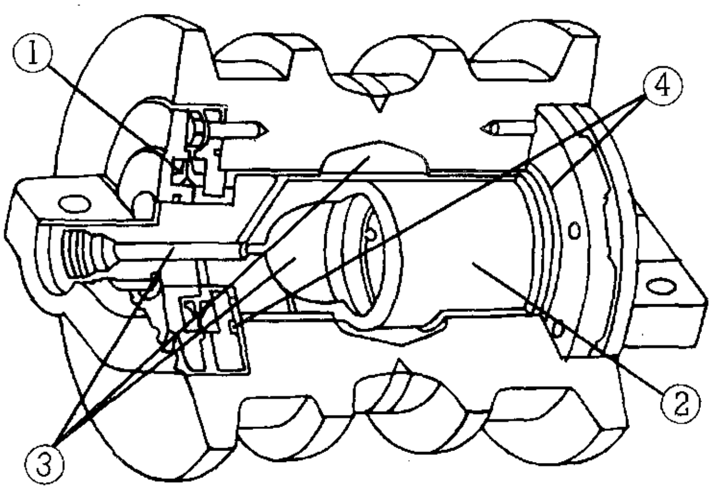
■ Reservoir cavities in the roller shell and the shaft (3) feed lubricant throughout the roller interior and shaft to reduce heat that can cause wear.

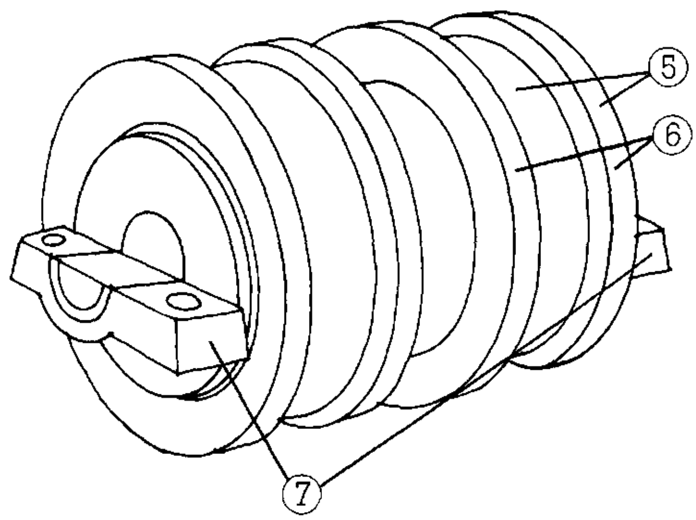
■ Neoprene "o" rings (4) are carefully fitted between the machined grooves at both ends of the shell, providing a perfect bonding of the shell and seal plate to keep lubricant in the roller interior.

■ Outershell hardness (5) at the perimeter reduces friction wear. Hardness decreases toward the inner bore to avoid brittleness and provide for good absorption of shock loads.

■ Flange height (6) is built up to provide longer wear between link rails and rollers and to increase the area of metal-to-track chain contact for maximum track alignment.

■ Heavy-duty brackets (7) lock rollers to track frames more securely to transmit shock throughout the frame, cutting the potential damage to rollers from shock loads.

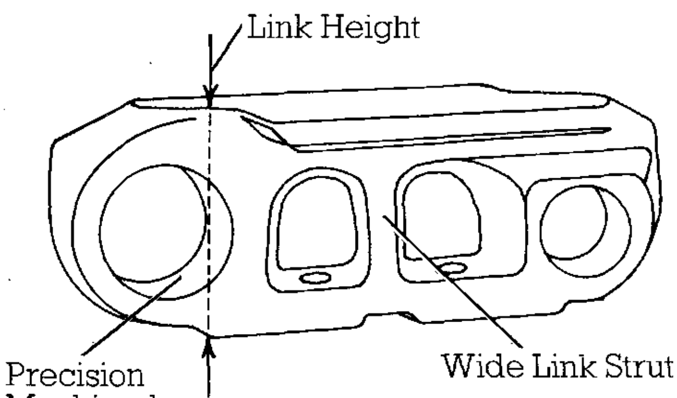




Track Chain Assembly

In any consideration of the wear factors in a crawler undercarriage, the track chain assembly must come first. It is the area of maximum wear and usually dictates undercarriage maintenance.

Dresser offers two types of track chain assembly: the dry-seal track and the lubricated track system (L.T.S.). The difference is in the pins and bushings, which are the two most critical wearing components of an undercarriage.



Link

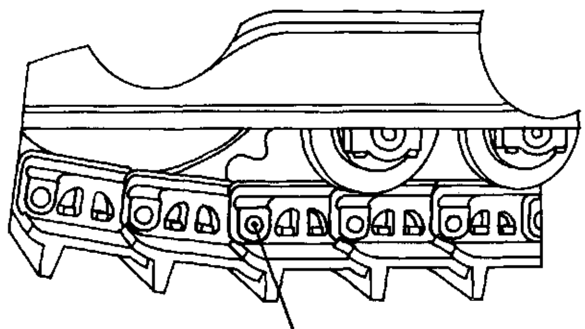
Bushing
A metal cylinder covering the track pin which provides a rotational surface between the track links. In addition, the bushing is the contact area between the track chain and the sprocket. The bushings on the L.T.S. are shorter than the dry-seal track bushings, and the ends are polished.

Link
Metal piece on each side of a chain assembly through which pins and bushings fit. The link also provides the surface to which the track shoes are attached. The same links can be used for either the dry-seal track or L.T.S.

Link Counterbore
A cavity in the track link in which the seals (Belleville washer or L.T.S. seal) fit.

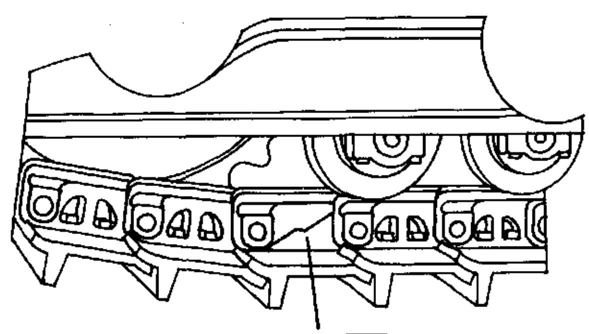
Link Rail
The surface of the link which makes contact with the rollers and idlers.

Master Pin
The portion of a chain which can be disassembled, enabling connection or disconnection of the track chain. Identified by the dimple in the pin end.



Master Pin

SPLIT/LINK
A two-piece link which will separate, enabling connection or disconnection of the track chain. Dresser uses the SPLIT/LINK for both the dry-seal track chain and the L.T.S. A standard shoe is used for the SPLIT/LINK, so a unique master shoe is not necessary.



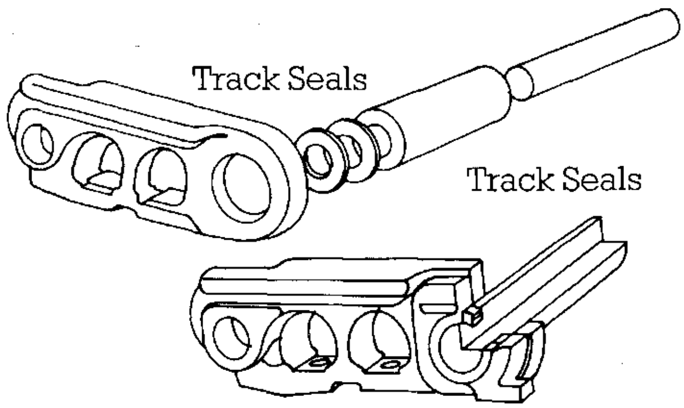
SPLIT/LINK

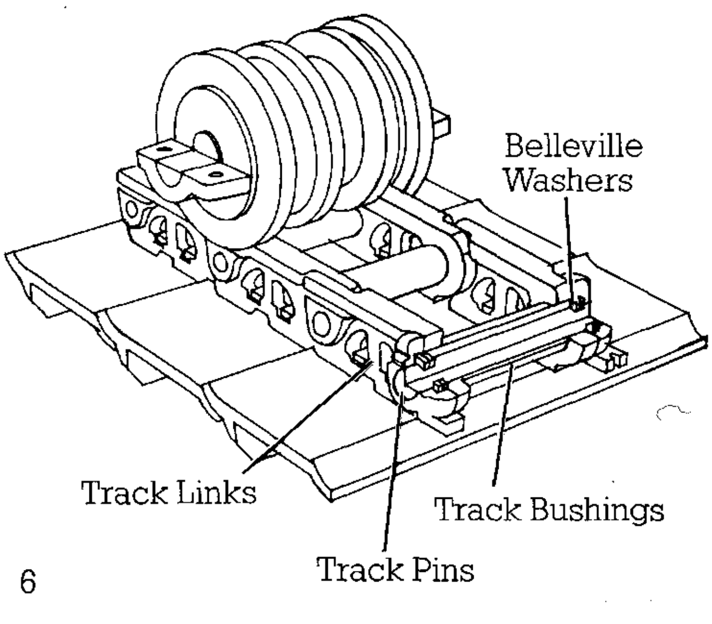
Undercarriage Basics

Pin
A cylindrical hinge pin, connected to a pair of links, rotates inside the bushing, enabling the track chain to pivot. The L.T.S. pins are drilled in the center. This provides a reservoir for lubricant, which is directed to the internal pin and bushing area through a small oil passage.

Pin Boss
A raised area projecting from the outer side of a track link encircling the extreme ends of the pins.

Track Seals (Belleville Washers for the Dry-Seal Track System)
Concave metal washers fitting between the link counterbore and bushing ends that prevent dirt and other abrasive material from entering this area and causing wear.





Track Seals (Lubricated Track System, L.T.S.)
Polyurethane seals that hold in lubricant between the pin and bushing and keep out dirt. The L.T.S. seal has two parts: 1) the inner seal ring, which rides against the bushing end, and 2) the load ring, which is compressed inside the link counterbore to apply pressure against the inner seal.

Thrust Washer (L.T.S.)
The thrust washer fits tightly inside the inner diameter of the track seal and provides it with stability. The cassgrooves on the sides of the washer provide openings for the lubricant to reach the track seal.

End Plug (L.T.S.)
The end plug fits inside the pin bore and holds the lubricant in place.

Track Shoes
Metal plates bolted to links that provide the contact point between the ground and track chain that provide traction and flotation.

Track Shoe Grousers
Raised cleats on the surface of track shoes which penetrate into the ground for traction.

Track Shoe Hardware
Special nuts and bolts that secure track shoes to links.

Track Frame
The track frame is the mounting or housing for all the undercarriage components except the sprocket.

Rock Deflector
A structure bolted to the track frame located in front of the sprocket area. It prevents large rocks from wedging between sprocket teeth and bushings.

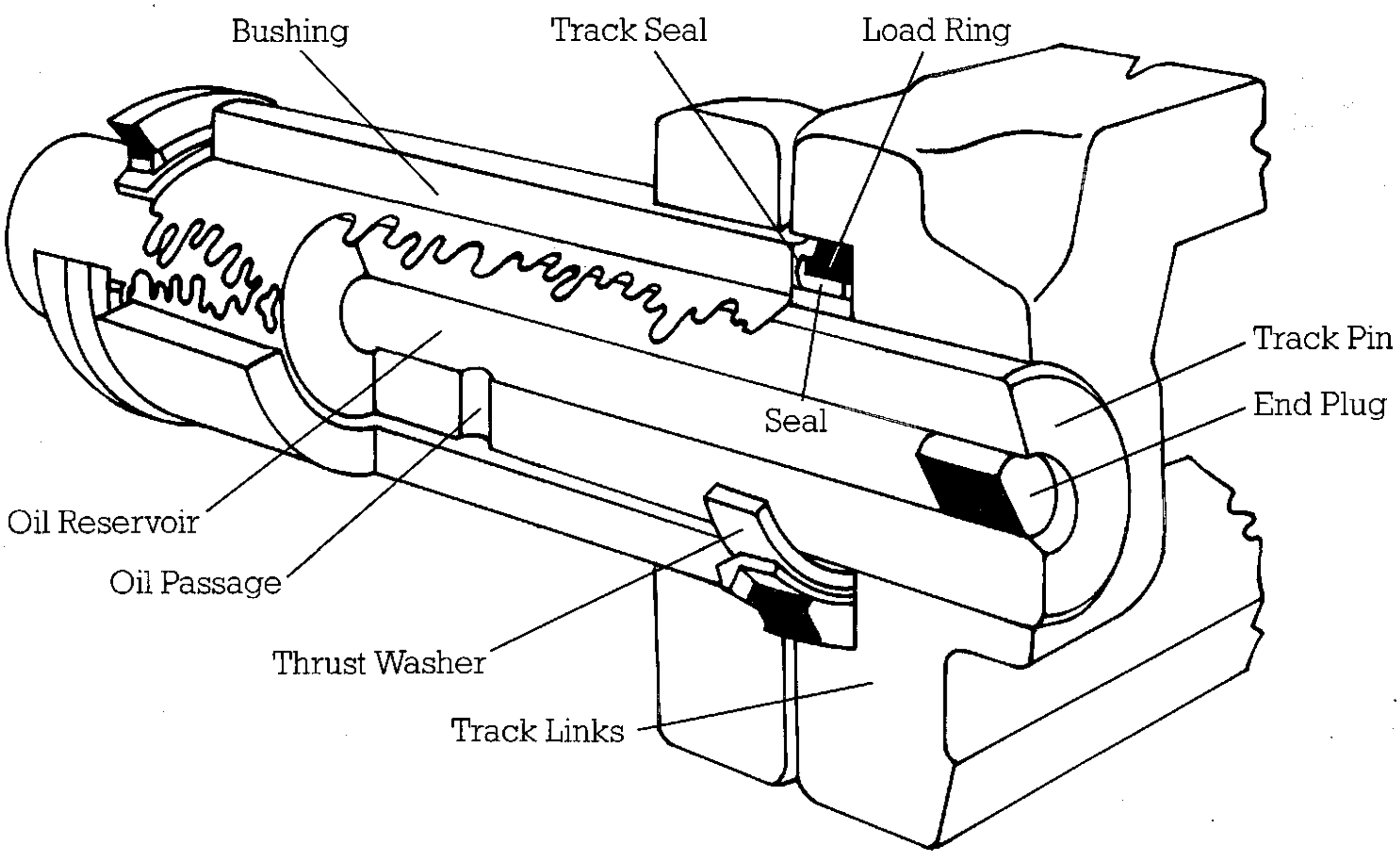
Rock Guards
A structure bolted to the track frame that is located on both sides of the rollers. It provides chain guidance on side hill operations and also serves to minimize accumulation of large materials in the track chains.

Diagonal Braces (large dozers only)
Steel structures welded to the track frame and bearing mounted to the pivot shafts to provide torsional strength to the track frame.

Equalizer Bars (large dozers only)
A bar mounted to the centerline of the machine spanning the undercarriage assemblies that pivots at the center to allow some independent up and down motion (oscillation) of each track. It also provides support to the front portions of each track frame. Smaller dozers and crawler loader track frames are rigidly mounted to the chassis.

Hydraulic Track Adjuster
A mechanism within the track frame placed between the front idler and the recoil spring. It allows movement of the front idler to provide adjustment of the track chain tension.

Recoil Mechanism
Either a series of conical Belleville spring washers or a large helical coil spring serving as a shock absorber for the front idler.



Lubricated Track System (L.T.S.)

Wear Conditions and Other Terms

Packing Condition
A condition in which materials such as mud, snow/ice, sand, etc., become packed between the sprocket teeth and the track chain, causing abnormal sprocket and bushing wear. (See also Reverse Tip Wear, p. 19.)

Inner Link Wear
Wear to the inside of track links caused by the combination of "back-bending" and the constant snaking of the track chain during normal operation. (See also Link Face Wear, p. 23.)

Internal Pin and Bushing Wear
Wear caused by the contact of the pin o.d. and the bushing i.d. during each revolution of the track chain around the sprocket and front idler. (See also Internal Pin & Bushing Wear, p. 21.)

Link Counterbore Elongation
This is a wear condition resulting from extensive internal pin and bushing wear. This also affects the bushing ends. (See also Link Counterbore Wear, p.23.)

Link Rebuilding
The welding of new metal to the rail portion of the link.

Flotation
The degree to which track shoes sink into the ground. Correct flotation occurs when grousers penetrate fully into the ground without shoe plates sinking beneath the surface. (See also Standard Ground Pressure Chart, p. 25.)

Normal Wear Causers
General operating practices and crawler requirements including: horsepower, weight, speed, shock loads, crawler turning, and soil conditions all result in some type of wear. (See also Wearing Characteristics, p. 10-23.)

Oscillation (large dozers)
The independent movement of the track frames, which provides traction and operator comfort.

Pin Boss Damage
This is a result of the roller flange contacting the pin boss, due to a seized or broken roller, or to a combination of worn rollers and track chain.

Regrousering
The welding of new metal to build up worn track shoe grousers.

Roller, Top Idler and Front Idler Rebuilding
The welding of new metal to the tread area of the track rollers, top idlers and front idler.

Track Wear Specs (PSM 204)
A graduated listing of dimensions for undercarriage components used to determine the actual percentage of wear remaining. (See also p.28-29.)

Turning Pins and Bushings
The term used to denote turning of the track pins and bushings to present a new wear surface and return track pitch back to the original dimensions. (See also p.21.)

Wear Factor
The amount of hardened material engineered into each undercarriage component. (See also p.29.)

Rail Wear
Wear to the track links caused by contacting the track rollers, top idlers and front idlers. (See also p. 22.)

Bushing O.D. Wear
Wear caused by contact with the sprocket in both the forward and reverse drive cycles.

Forward Drive Side Wear
Forward drive side wear is the result of sprocket and bushing contact which propels the crawler forward. (See also p. 16.)

Reverse Drive Side Wear
Normal wear on both the sprocket tooth and bushing o.d. Because of the reverse movement of the sprocket, rotation of the bushing in the sprocket tooth occurs at the top of the sprocket where the load is greatest, causing accelerated wear. (See also p. 17.)

Reverse Rotational Wear
Reverse rotational wear is part of reverse drive side wear and is only evident in extreme conditions of high speed reverse operation. This wear results in a pocket, which is created by the bushing rotating against the reverse drive side of the sprocket tooth. (See also p.17.)

Reverse Tip Wear
Wear on the reverse drive side tip of sprocket teeth and the reverse side of the bushing, caused by packing conditions. In a dry-seal track, wear from packing conditions becomes less severe as internal pin and bushing wear increases. (See also p. 19.)

Root Wear
Wear in the root of a sprocket tooth caused by sliding of the bushing in the sprocket tooth. Also known as radial wear. (See also p.18.)

"Flatted" Rollers or Top Idlers
Flat spots on the treads of the rollers and top idlers, caused either by packing conditions or by seizure of rollers and top idlers due to lack of lubricant. In either case, when rolling of the top idlers or rollers is restricted, the track chain will slide over the treads, causing a flat or "square" condition. This condition will usually occur when a crawler is worked on side hill operations. (See also p. 26.)

Track Pitch
The distance from the center of one pin to the center of an adjacent pin. (See also p. 11.)

Track Snaking
Side-to-side movement of a worn track chain, caused by internal pin and bushing wear in a dry-seal track. With L.T.S., there is no internal pin and bushing wear and so track snaking is eliminated.

Undercarriage Wearing Characteristics

Undercarriage wear can be explained in one simple statement: when two or more components come into rolling or sliding contact, wear will occur. Eventually one or more components will wear to destruction.

This statement is fundamental to understanding undercarriages. As the components and, more importantly, the inter-relationship of one component to another are explained, this will become more evident.

One way of looking at wear is a simple equation:

Motion + Weight + Abrasiveness = Wear

In other words, there are three primary factors responsible for wear:

1. Motion and the resultant friction between components.

2. Weight of the tractor and its contribution to friction during motion.

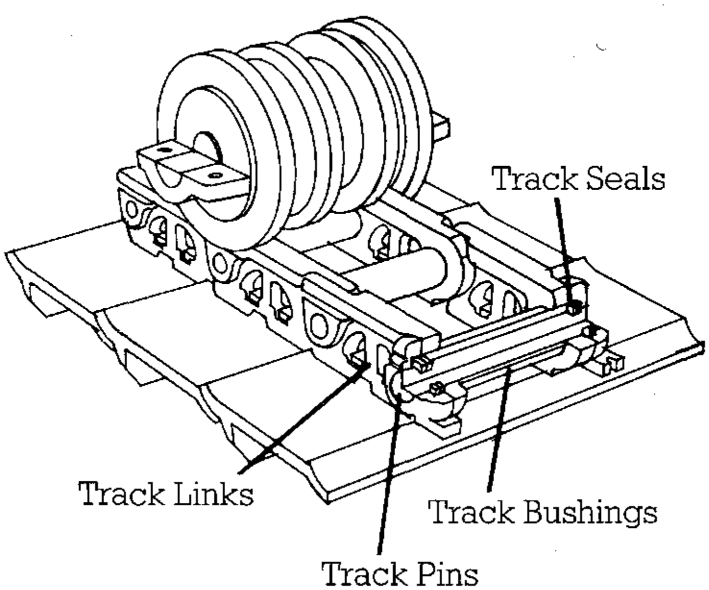
3. Abrasiveness of materials that come between various components during motion.

Each of these factors is variable. The speed and direction of crawler operation, which can vary from operator to operator, affects undercarriage wear differently from one job to another. The differences in size and weight of equipment results in different wear rates. And different ground surfaces and materials affect undercarriage wear differently.

Track Chain Assembly

The track chain is the group of components over which the crawler moves. It is, in other words, the self-laying rail system and road for the crawler to move over, providing the crawler with ground contact, flotation and traction.

Each chain consists of two rows of interlocked links that are connected by pins and bushings. The bushings contact the sprocket, which propels the crawler over the track chain. The links themselves provide the mounting surface for the track shoes that actually make contact with the ground. The number of links in the chain depends on the model. This varies from 35 to 44.



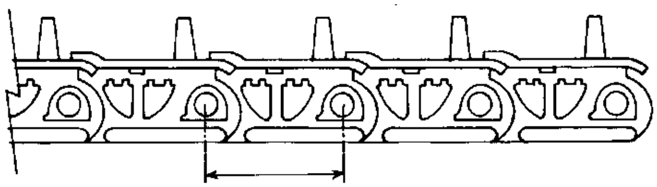
Track Chain Pitch

Track chain pitch can be determined by measuring the distance between pin centers. This distance will become greater with a dry-seal track chain as internal pin and bushing wear increases. Track pitch, or distance between pin centers, never decreases. Track pitch can also be determined by measuring the distance between the first and third sprocket root.

Crawler Model	Pitch	Remarks
T/TD-340	6.00″	
TD-6	6.00″	
500C/E	6.00″	
TD-7C/E-100C/E	6.00″	
TD-7E Wide Track	6.50″	
TD-9B-150B	6.50″	
TD-8C/E-125C/E	6.50″	
TD-8E Wide Track	7.00″	
165	7.00″	
*TD-15B	7.00″	S/N 2511 & Below
*175B/C	7.00″	S/N 3500 & Below
TD-12	7.50″	
*TD-15B/C S.S.	7.50″	S/N 2512 & Up
*175C S.S.	7.50″	S/N 3501 & Up
TD-18	7.50″	
*TD-20B/C	7.50″	S/N 25841 & Below
*250B/C	7.50″	S/N 12448 & Below
*TD-20C S.S.	8.50″	S/N 25842 & Up
TD-20E	8.50″	
TD-25B	8.50″	
TD-25C/E/G	9.86″	
TD-30	9.86″	
TD-40	11.02″	

*NOTE: When ordering replacement undercarriage components for the TD-15B/C, 175B/C, TD-20B/C, and 250B/C, it is imperative to indicate the track pitch of the undercarriage that is being replaced. Each of these crawlers has had a track pitch increase. (When this increased track pitch was introduced, the designation S.S., for severe service, was added to the crawler models.)

Crawler Model		Track Pitch Original	New
TD-15B/C	175B/C	7.00″	7.50″
TD-20B/C	250B/C	7.50″	8.50″



Track Pitch

Undercarriage Wearing Characteristics

Rotation of Pins and Bushings
As the track chain revolves around the sprocket and front idler, the pins and bushings rotate independently of each other. This movement takes place four times per revolution (two times as the chain bends around the sprocket and two times as it bends around the front idler). This movement is the same in both forward and reverse directions.

Forward Drive Cycle
In the forward working/drive cycle, the transfer of torque takes place at the bottom of the sprocket (6 o'clock). The maximum amount of torque transfer takes place as the sprocket root contacts the bushing.

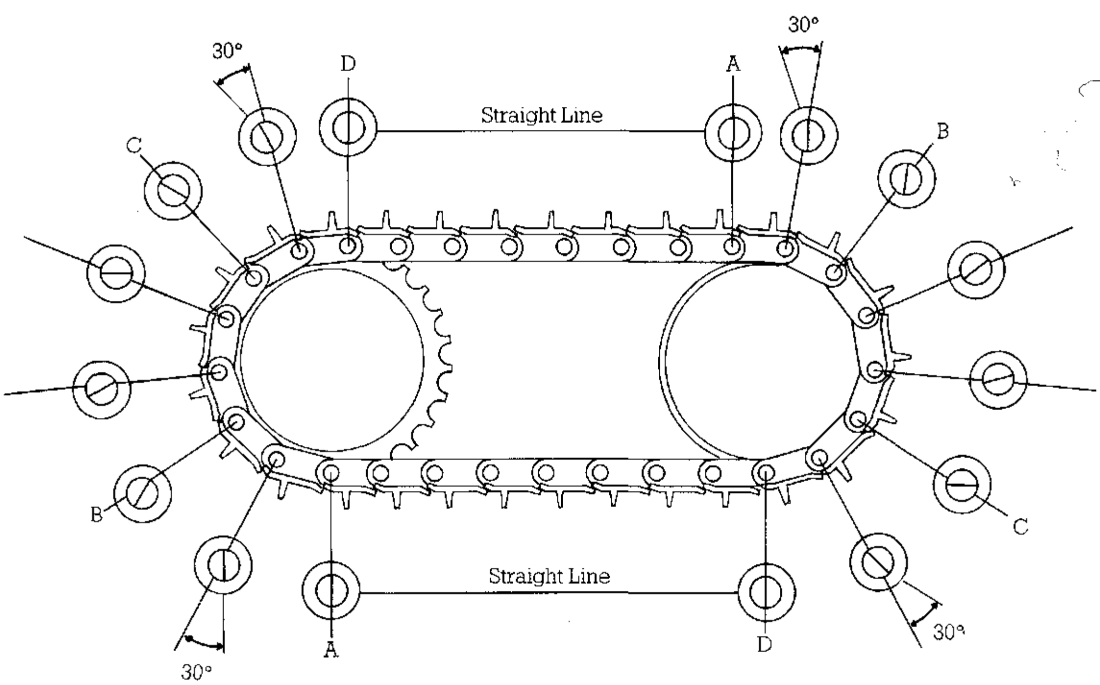
An internal rotation of 30° takes place between point A and point B. (See diagram.) This causes internal pin and bushing wear. As this movement occurs internally, the bushing o.d. rests inside the sprocket root without any movement.

As the chain prepares to leave the sprocket on top and straighten out for the trip to the front idler, an internal rotation of 30° again takes place, between points C and D, causing internal pin and bushing wear. Also between C and D, the bushing o.d. rotates 30° inside the sprocket root. <u>This movement is not critical in forward motion, because the torque transfer takes place on the bottom of the sprocket, not the top.</u>

Reverse Drive Cycle
In the reverse working/drive cycle, the torque transfer takes place at the top of the sprocket (12 o'clock). The maximum amount of torque transfer takes place as the sprocket root contacts the bushing.

Two critical actions result: an internal rotation of 30° between points D and C and a 30° rotation of the bushing o.d. inside the sprocket tooth. This results in accelerated wear on both the bushing o.d. and the sprocket tooth.

As the chain prepares to leave the sprocket at the bottom and straighten out for the rollers to move over it, an internal rotation of 30° takes place between points B and A. This results only in internal pin and bushing wear as the bushing o.d. makes no movement inside the sprocket tooth.



The two most critical wear areas of a track chain assembly are:

- **Bushing o.d. wear**
- **Internal pin and bushing wear**

In any consideration of the many wear factors involved in a crawler undercarriage, the track chain must come first, because it is the area of maximum wear and will usually determine maintenance downtime.

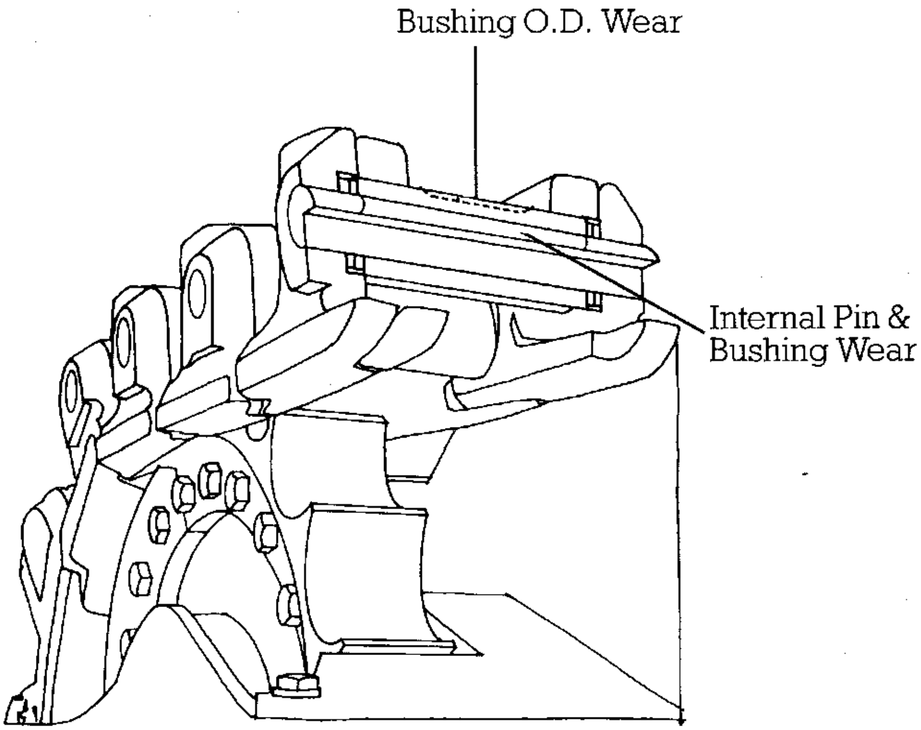
Dresser offers two types of track chain assemblies: the dry-seal track and the lubricated track system (L.T.S.). Both experience bushing o.d. wear. However, the L.T.S. track system, unlike the dry-seal track, virtually eliminates internal pin and bushing wear. The wearing characteristics of the two track systems also vary.

1. Bushing O.D. (outside diameter) Wear

Bushing o.d. wear is the result of metal-to-metal contact with the sprocket teeth that is made to propel the crawler in either direction.

There are four individual wears that contribute to bushing o.d. and sprocket wear:

- Forward Drive Side Wear
- Reverse Drive Side Wear
- Root or Radial Wear
- Reverse Tip Wear



Bushing and Sprocket Wear

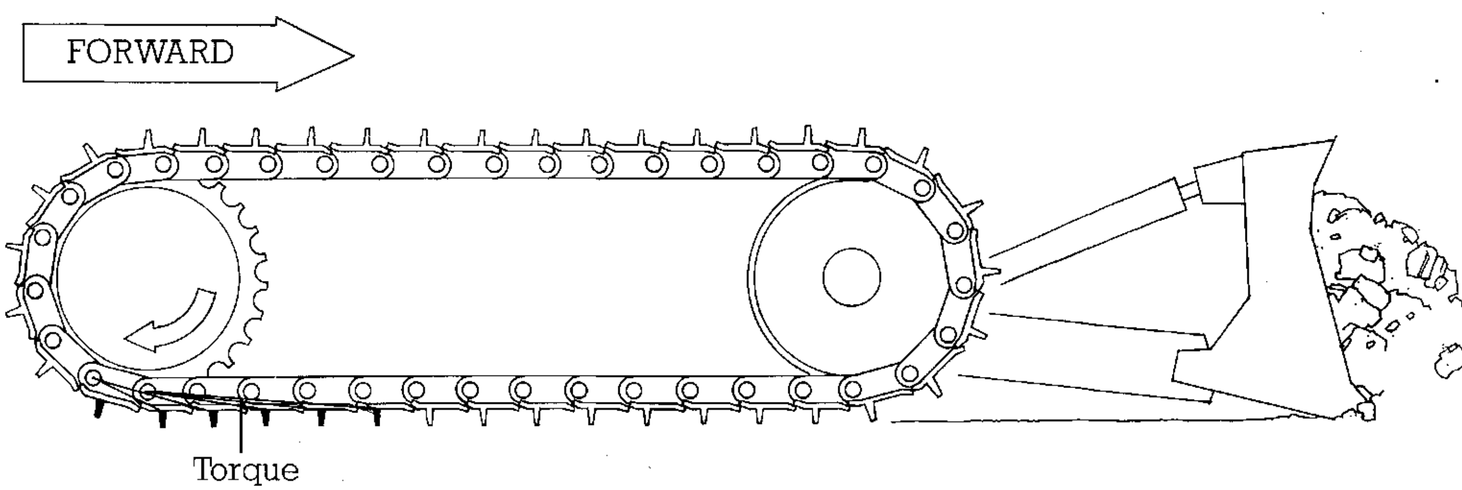
Undercarriage Wearing Characteristics

It must be understood that all the torque needed to move the crawler is transferred through the sprocket. The motion of the crawler is the result of the sprocket teeth coming into contact with the track chain bushings.

In forward gear, the transfer of torque takes place at the bottom of the sprocket, at 6 o'clock. In a dry-seal track, bushing A transfers the majority of torque, with bushing B transferring the remaining torque. The remaining bushings transfer very little torque. As internal pin and bushing wear increases (pitch extension), bushing A will transfer 100% of the torque.

In the L.T.S. system, internal pin and bushing wear is virtually eliminated and torque is transferred equally between all the bushings that contact the sprocket teeth.

Forward Drive Cycle



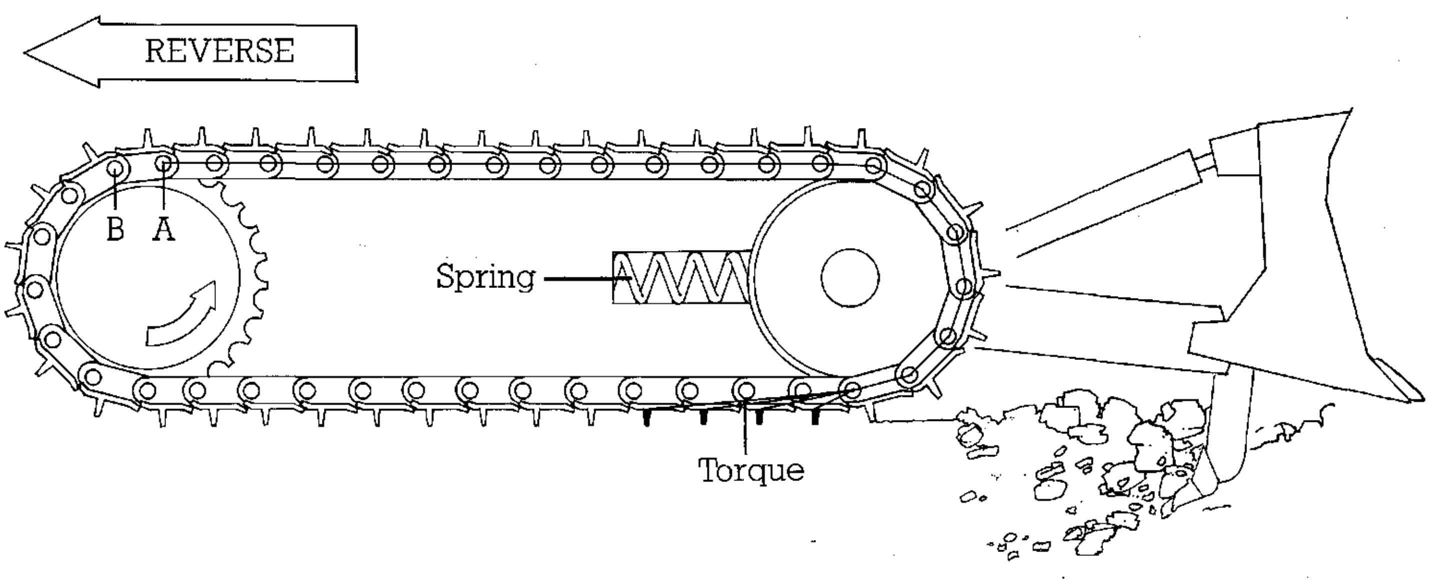
In reverse gear, the transfer of torque takes place on the top of the sprocket, at 12 o'clock. In the dry-seal track, bushing A transfers the majority of torque. Bushing B transfers the remaining torque. The remaining bushings transfer very little torque. As internal pin and bushing wear increases (pitch extension), bushing A will transfer 100% of the torque. In the L.T.S., internal pin and bushing wear is virtually eliminated, and torque is transferred equally between all the bushings that contact the sprocket teeth.

Comparing the two diagrams showing forward and reverse movement makes it clear why a crawler is designed to do most of its work in the forward gear.

It is the resistance of the track chain with its track shoe grousers imbedded in the earth that causes the crawler to move over the track chain in either direction. In forward gear, this resistance is in a straight line, with little or no movement taking place between the bushing o.d. and the sprocket tooth.

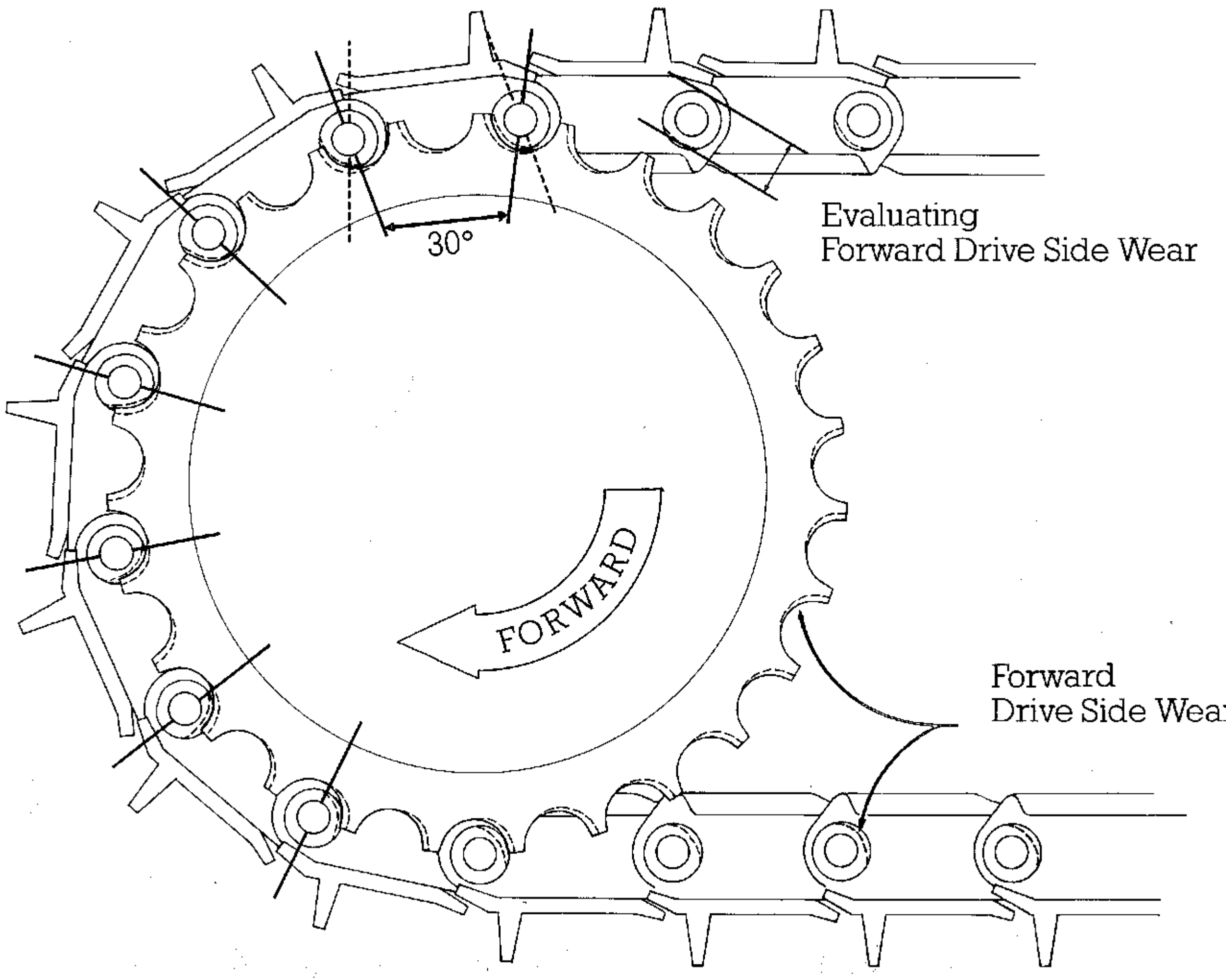
In reverse gear, the line of torque must travel all the way from bushing A, around the front idler and finally to the imbedded track shoes. Excessive wear takes place as the chain is pulled tight against the front idler, resulting in link wear . . . in addition to the internal pin and bushing wear as the chain bends. There is yet another wear factor: As bushing A is transferring 100% of the torque, it does a 30° twist inside the sprocket tooth. This twisting action, as explained in Reverse Drive Side Wear, p. 17, can accelerate bushing wear.

Reverse Drive Cycle



Undercarriage Wearing Characteristics

Forward Drive Side Wear

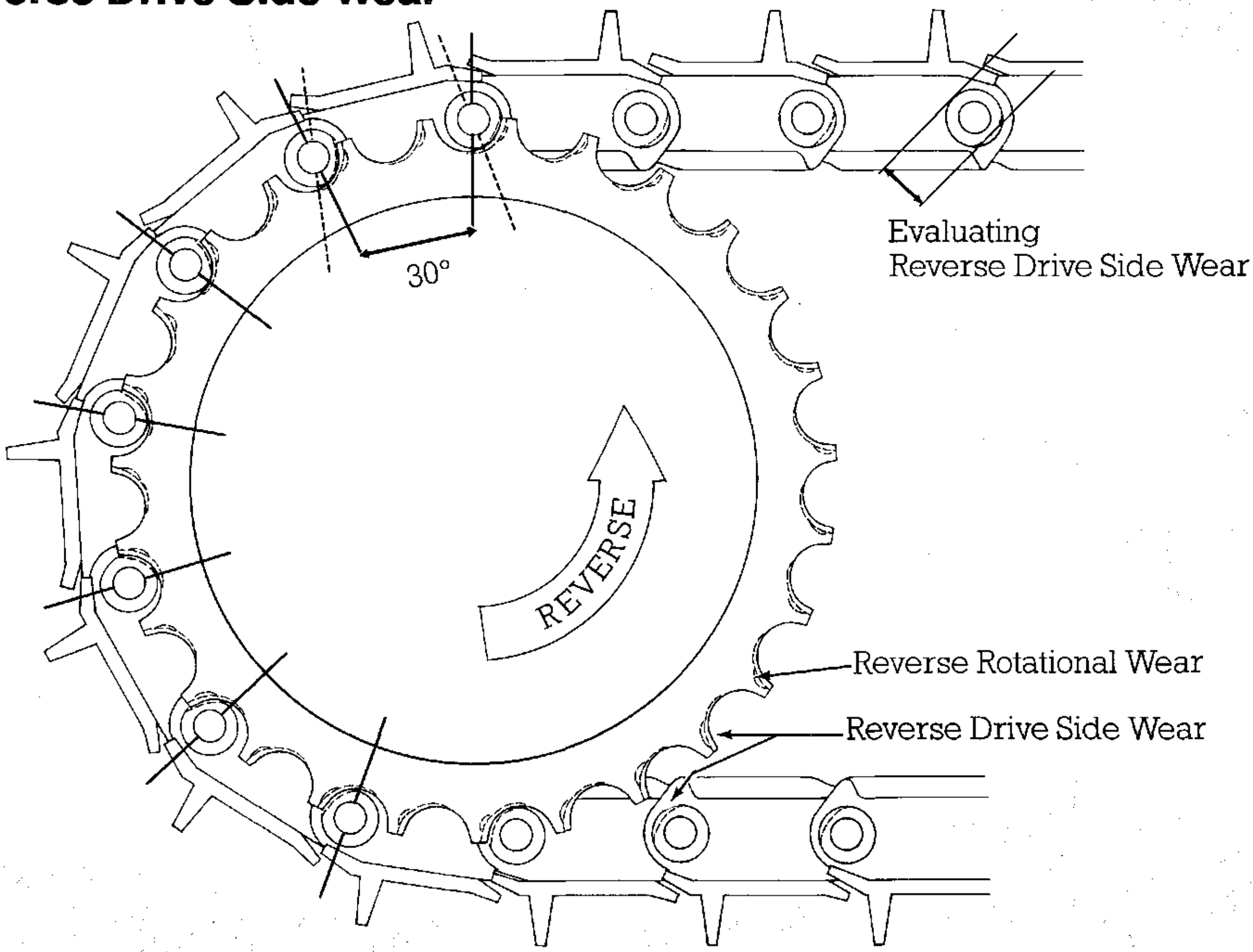


It must be understood that as the bushing o.d. wears, the sprocket teeth also wear.

In forward gear, the sprocket teeth make contact with the bushings on the bottom (6 o'clock). As the sprocket makes contact with the bushing, the majority of torque required to move the crawler is transmitted at this point.

Because of the curvature of the sprocket, the bushing will not move inside the sprocket tooth until it is at the very top, between 11 and 12 o'clock. It then rotates 30°. This movement is not a critical wear factor, because torque is transferred at the bottom. Internal movement of the pin takes place at both the bottom and the top.

Reverse Drive Side Wear



Reverse drive side wear is undoubtedly the most severe of all bushing and sprocket wear. Working and traveling in reverse should be held to a minimum.

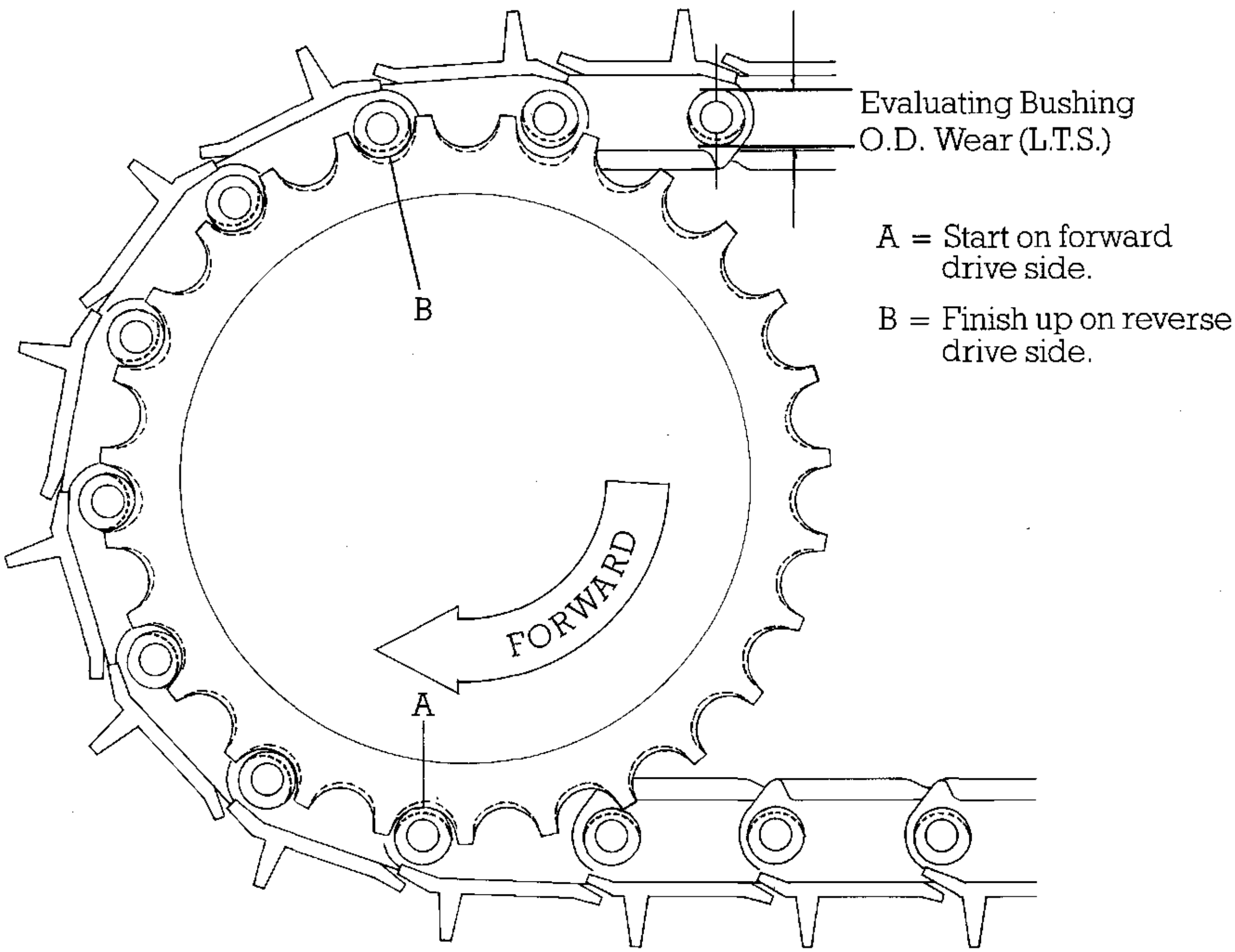
In reverse gear, the sprocket teeth make contact with the bushings at 12 o'clock, and most of the torque required to move the crawler is transferred at this point. And between 12 o'clock and 11 o'clock, the bushing rotates 30° inside the sprocket. The result is severe wear.

Reverse Rotational Wear

Reverse rotational wear takes place at the same time that reverse drive side wear occurs, but it is more evident in high speed reverse operations. A pocket will form on the reverse side of the sprocket tooth where the twisting bushing o.d. makes contact. At high speeds, this contact contributes to accelerated wear on both the sprocket tooth and the reverse side of the bushing o.d.

Undercarriage Wearing Characteristics

Root or Radial Wear

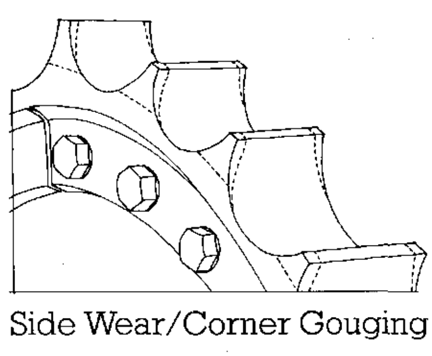


Root or radial wear results as the bushing o.d. slides through the sprocket root. In a dry-seal track, as internal pin and bushing wear increases, track pitch extension occurs. This results in the bushing sliding from the initial contact at A all the way to the other side of the sprocket, at B.

In the L.T.S., which virtually eliminates pin and bushing wear, pitch extension is also eliminated. However, because the transfer of torque is deep in the sprocket root, most of the bushing o.d. wear is at the bottom of the bushing.

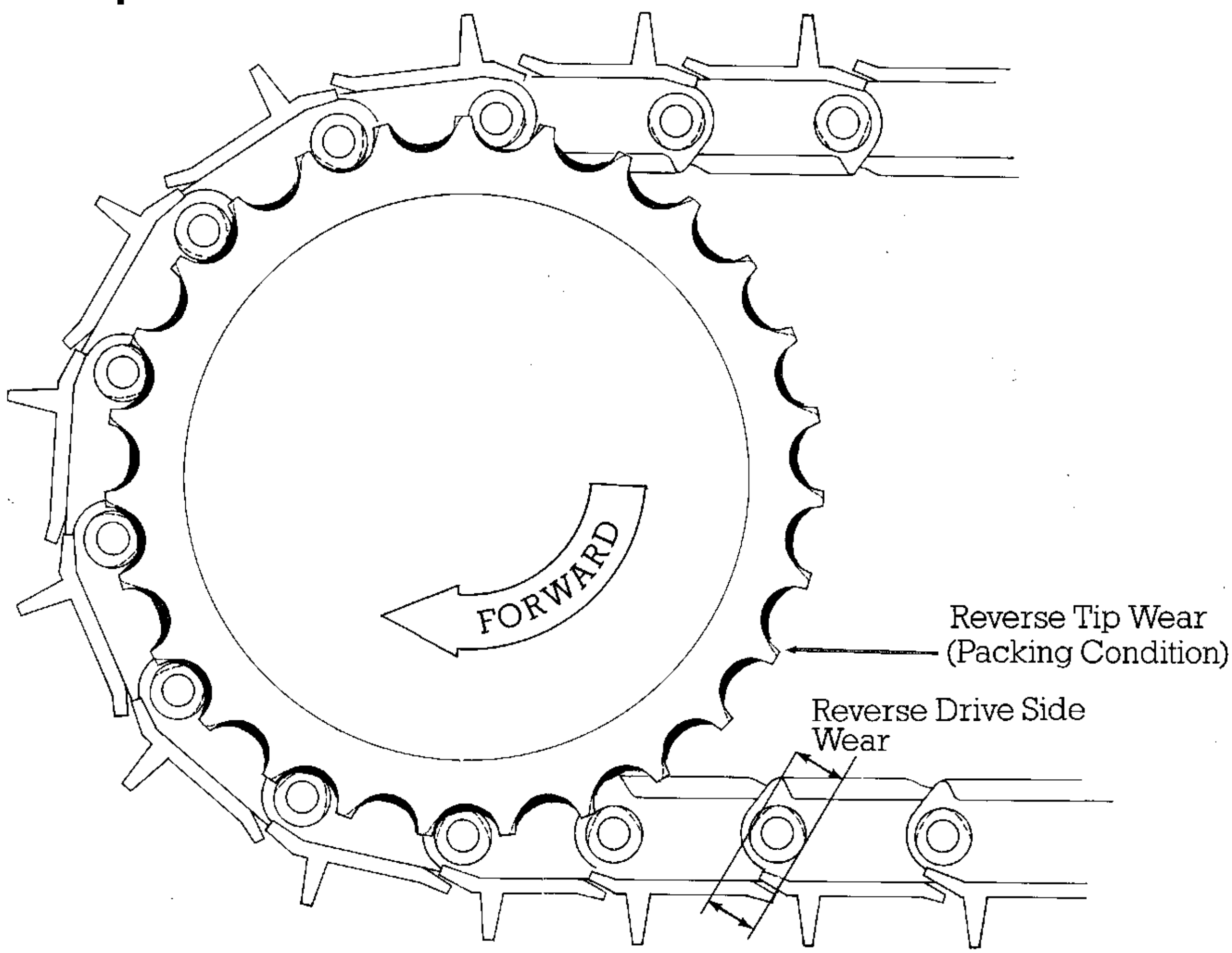
Side Wear/Corner Gouging

Side wear/corner gouging is caused by contact with the sides of the track links and is the result of loose track chain or misalignment of the track frame.



Side Wear/Corner Gouging

Reverse Tip Wear



Reverse tip wear is undoubtedly the most severe of all bushing o.d. wear. And it is by far the most confusing.

Reverse tip wear occurs only in forward motion and is usually due to packing conditions. (Mud, snow, sand, refuse or any loose material gets packed in between the bushing and sprocket root.) Because of packing, the pitch of the track chain no longer matches that of the sprocket, which causes the reverse tip of the sprocket tooth to make contact with the reverse side of the bushing o.d. This condition happens on the bottom of the sprocket, at 6 o'clock, as the sprocket tooth engages the track bushing. The result, unfortunately, is non-productive wear.

This condition can be so severe it will stall a small crawler. "Popping" is another result. This happens when packing causes the sprocket tip to ride on top of the bushing and slip, as the next sprocket tooth makes contact. This action can be seen as the front idler moves back and forth to compensate for packing conditions.

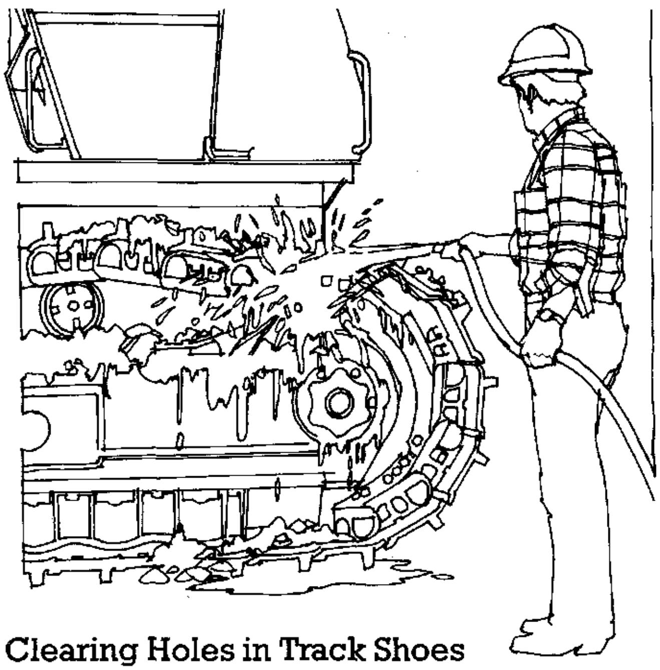
Worst of all, when torque is transferred to the bushing o.d. between 11 o'clock and 12 o'clock, the bushing is twisting 30°, the pin is turning 30° and packing has stretched the chain extremely tight . . . reverse tip wear is accelerated.

Undercarriage Wearing Characteristics

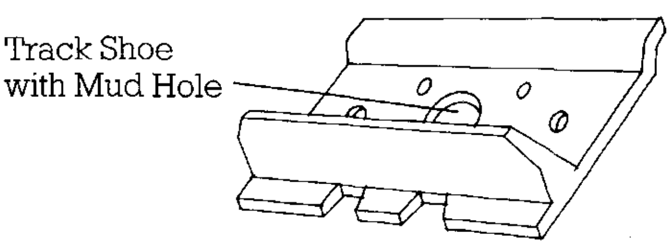
Reverse tip wear cannot be totally avoided. However, a few maintenance options can be considered to lessen a packing condition.

Removal of Rock Guards
Rock guards tend to hold the packing material between the track links. Removing them allows this material to escape.

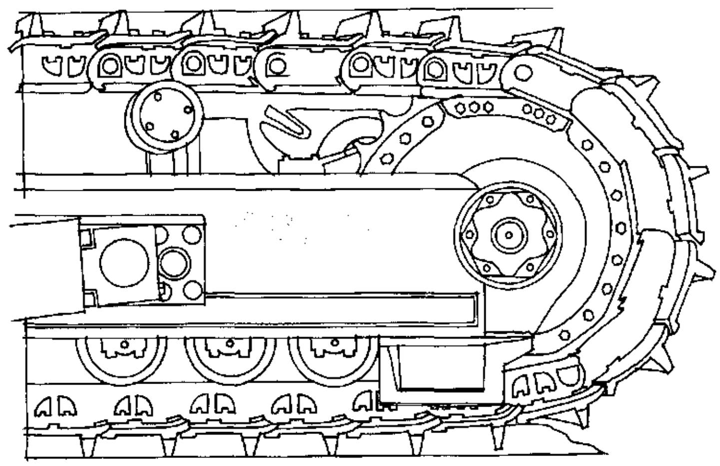
Cleaning the Undercarriage
Materials that build up between the track links can become as hard as the links themselves. Washing the track chain periodically helps eliminate this problem. Material build-up that restricts the rolling of the top idler should also be cleaned out periodically.

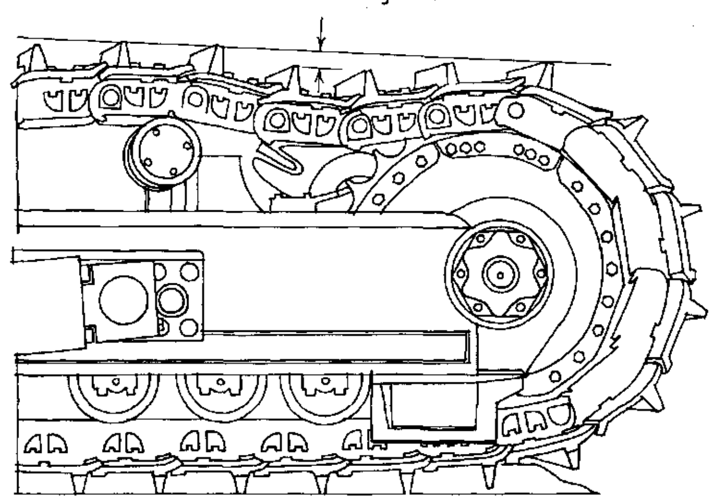


Clearing Holes in Track Shoes
Special track shoes can be obtained with a clearing or mud hole already installed. This hole allows the packing material to escape when the sprocket and bushings come in contact with each other.



Proper Track Tension
The rate of link rail wear can be slowed by loosening track tension on a "too tight" chain. This reduces greater than normal rolling friction between the chain and front idler. On the other hand, if tension is too loose, tightening will eliminate the side-to-side friction of rail tops against the front idler, reducing friction and the wear rate.





2. Internal Pin and Bushing Wear

Track chains are linked together by pins and bushings which move independently of each other. This allows the track chain to rotate around the sprocket and front idler.

The movement of pins and bushings takes place four times per each revolution of the track chain. This movement results in internal pin and bushing wear, and is influenced by dirt or moisture.

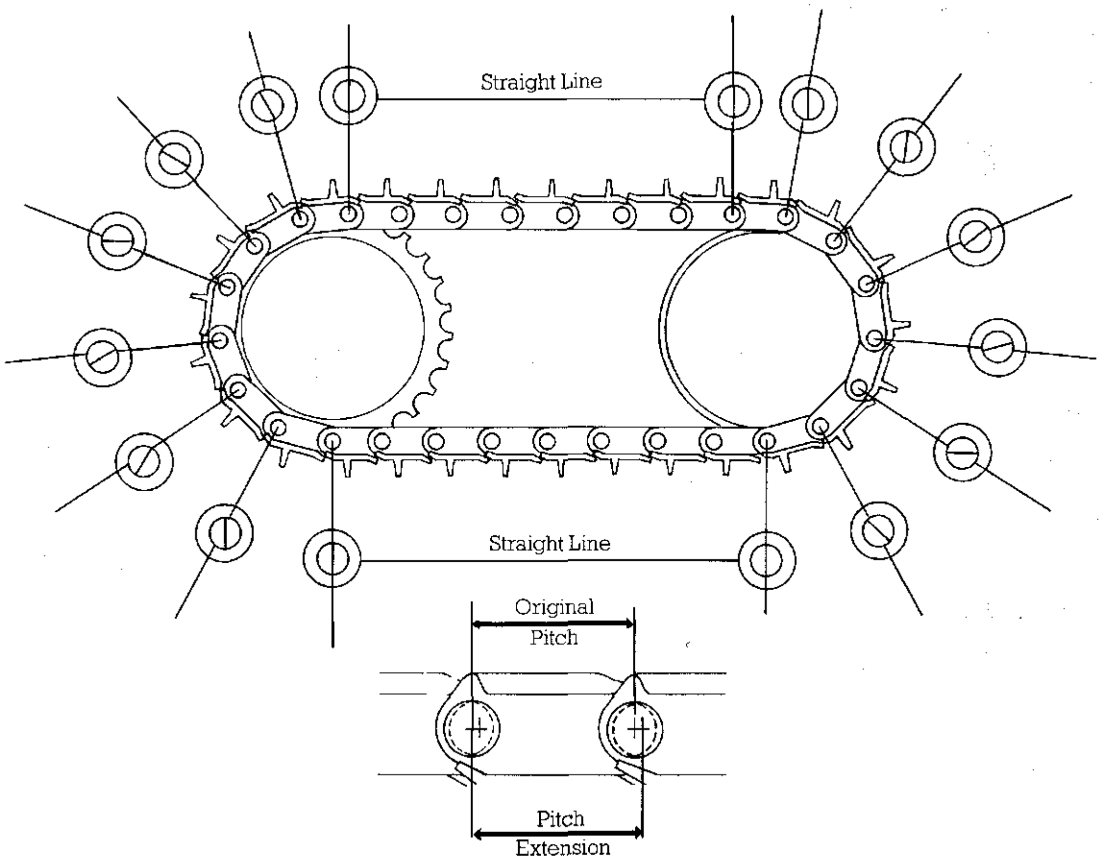
With the L.T.S., internal pin and bushing wear is eliminated by the sealed-in lubricant that prevents metal-to-metal contact.

With the dry-seal track, as internal pin and bushing wear increases, pitch extension takes place, causing the bushing o.d. to contact the sprocket tooth nearer to the top. Turning pins and bushings is a maintenance option that can maximize the life of a track chain.

Turning pins and bushings within recommended wear limits will return the track pitch to its original pitch. If pins and bushings are worn beyond wear limits, chain life on the second time around will be greatly reduced. So it is far better to turn them before, not after, there is 0% wear remaining.

Internal wear on pins and bushings takes place on only a very small portion of the components. Turning them puts un-worn areas to work.

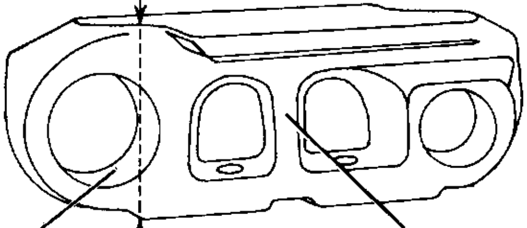
Depending on link height and the condition of the link counterbore, new pins and bushings can be installed to prolong chain life. Any time that track pins and bushings are turned or are replaced, or a new track chain is installed, new sprockets should be considered.



Undercarriage Wearing Characteristics

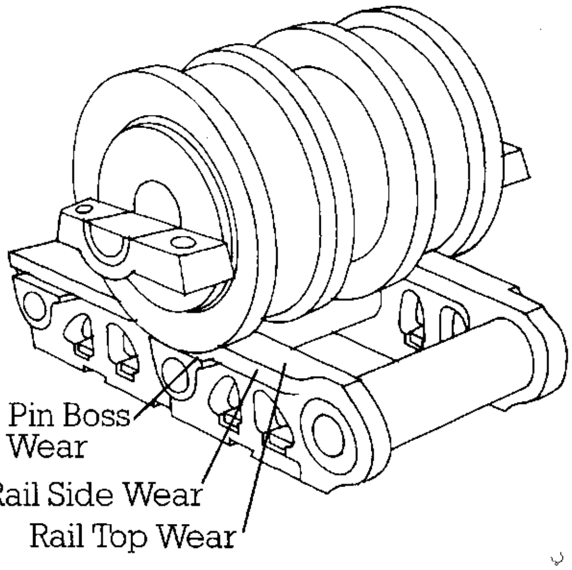
Link

Track links are subjected to tremendous pressure and twisting forces. To withstand the stress, Dresser has designed its links with a wide strut between the bores.



In addition, links are heat-treated and induction hardened to Dresser specifications. Link height also has been increased to provide longer wear.

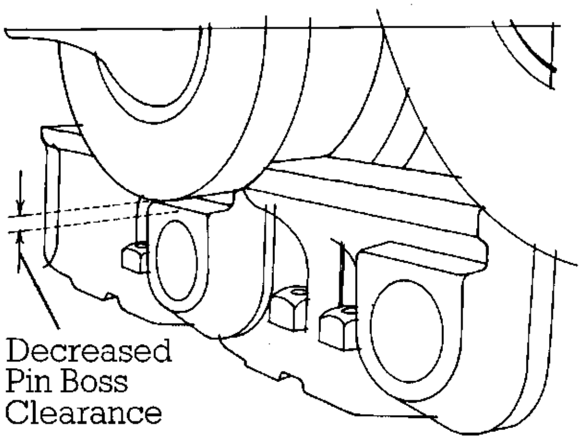
Another cause of link wear is the hinging action of the bushings in the link counterbores. To withstand both the twisting stresses and the friction from this action, the counterbores are precision machined to mate well with the bushings.



■ Rail Top Wear is caused by normal rolling contact with rollers, top idlers and front idlers.

■ Rail Side Wear is caused by contact with roller flanges as the track chain snakes against the side rail.

■ Pin Boss Damage is caused by contact between the roller flange and the link pin boss. Because of the increased link height on Dresser track chains, this condition rarely occurs. Pin boss damage can occur, however, if a roller breaks or seizes, causing the chain to wear quickly through the roller tread.



■ Pin Boss End Wear is caused by sliding contact between pin boss ends and rocks and also rock guards.

■ Link Face Wear is caused by rotative contact between links as the track chain "snakes" or bends (back-bending).

■ Link Counterbore Wear is caused by contact between bushings and counterbores as internal pin and bushing wear increases.

Rebuilding worn link rails and/or roller treads will increase the clearance between flanges and pin boss tops . . . and maximize the life of the components.

Track Chain and Sprocket Wear Review

Bushing o.d. wear and sprocket teeth wear result in the following patterns:

Sprocket

1. Sprocket reverse drive side wear.
2. Sprocket root or radial wear.
3. Sprocket forward drive side wear.
4. Sprocket reverse tip wear.

Bushing

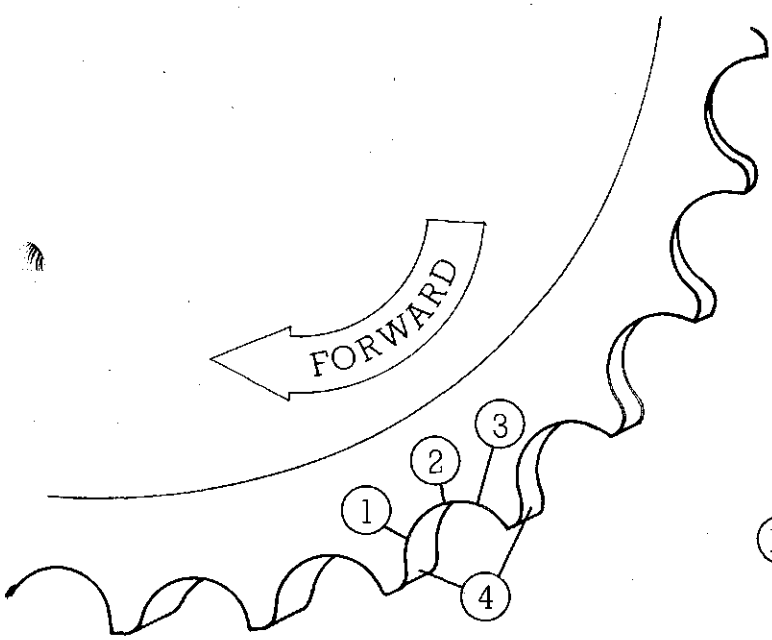
5. Link counterbore wear.
6. Reverse drive side wear.
7. Root or radial wear.
8. Forward drive side wear.
9. Internal pin and bushing wear.

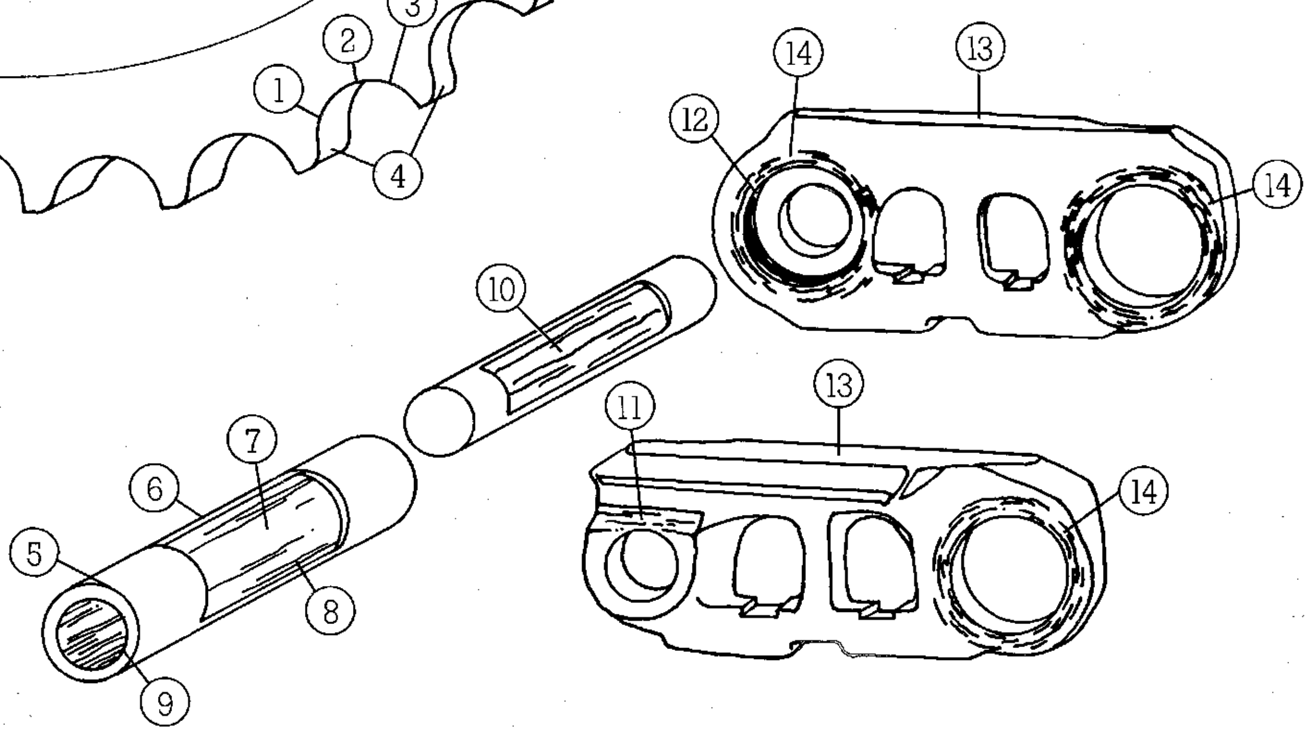
Pin

10. Internal pin and bushing wear.

Link

11. Pin boss damage.
12. Counterbore wear.
13. Rail wear.
14. Face wear.

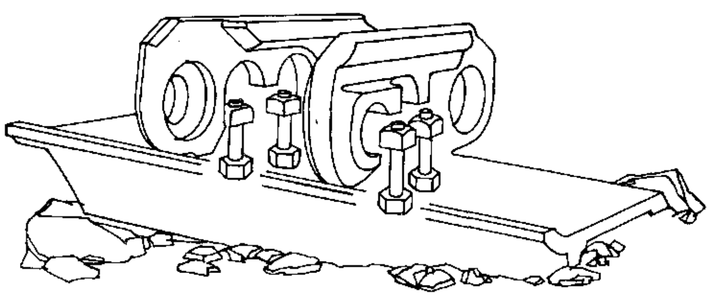




Undercarriage Wearing Characteristics

Generally speaking, a dozer shoe, including the severe service shoe used in high impact conditions, has one grouser. This is designed to penetrate the earth and provide the traction necessary to push or pull.

Loader shoes have double or triple grousers and are lower in profile. They are designed for the slippage required for the constant turning movements of a crawler loader.



Track Shoe/Link Relationship

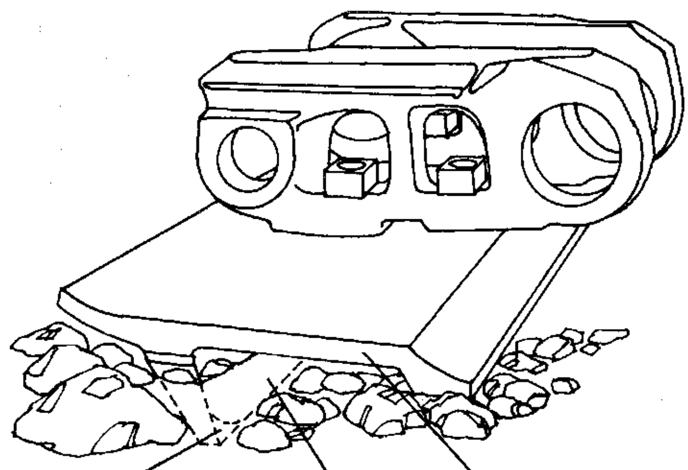
■ Plate Wear is caused by normal contact with the ground. (Occurs mostly as grousers become worn.)

■ Grouser Wear is also caused by ground contact. A fast rate of grouser wear can be expected in rock or other hard ground surfaces. A severe service shoe should be considered for rock or quarry operation.

■ Grouser Corner Wear is caused by sliding contact with the ground. (Occurs usually when wide track shoes are used on rough terrain and during turns.)

Worn shoes can be regrousered. In addition, worn shoes in wear-causing conditions can be replaced with extreme service shoes. These shoes have a thicker plate, a higher and thicker grouser, and deeper-heat treatment for maximum hardness and wear resistance. In particular, they should be considered for ripping operations or work on hard surfaces, such as rock and quarry operations.

Track Shoe Wear



To minimize wear during operation, a simple formula has been developed to help determine the track shoe that will wear the least in various conditions.

The equipment specifications book should be consulted and the centerline dimension from sprocket to front idler recorded. This dimension, multiplied by track shoe width, will yield the ground contact area for the machine. This figure should be multiplied by two to account for both track chains.

When the Gross Vehicle Weight (GVW) of the machine is divided by this ground contact area you will then have the ground pressure per square inch.

Dozers	Standard Shoe Width	Crawler Less Cab Ground Pressure
TD-7E	15″	6.4
TD-8E	16″	6.9
TD-12	16″	9.1
TD-12 L.G.P.	34″	4.3
TD-12 Wide Track	34″	4.7
TD-15C	18″	9.1
TD-15C L.G.P.	37″	4.5
TD-20E	22″	10.1
TD-25G	22″	13.2
TD-40	26″	17.8
Loaders		
100E	13″	8.5
125E	14″	9.5
175C	16″	11.1
250C	18″	11.7

TD-25G Track on Ground Dimension

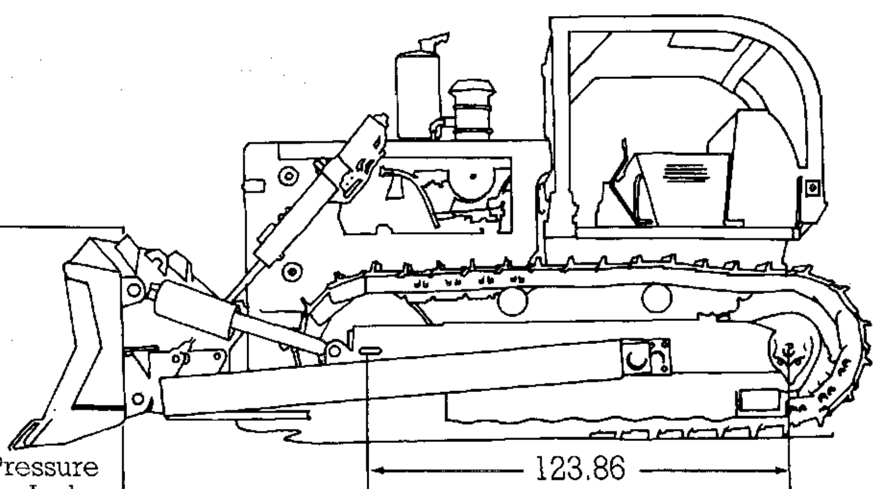
123.86 Track on Ground Dimension
x 22 Standard Track Shoe Width

2724.92

2724.92
x 2 (both track chains)

5449.84 Area on Ground

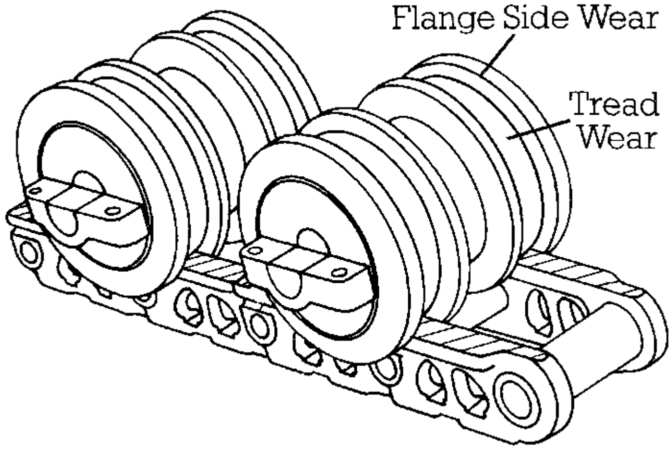
72,858 (GVW) ÷ 5449.84 = 13.36 Ground Pressure Per Square Inch



On soft ground the objective in prescribing shoes should be a smaller or lower ground pressure than the standard pressure, while on hard soils a higher ground pressure is ideal with the effort towards maximum grouser penetration. One simple rule of thumb is to use the narrowest shoe possible that will get the job done.

Roller Wear

- Tread Wear is caused by normal contact with the link rails.
- Flange Side Wear is caused by contact with link rail sides.
- "Flatted" Rollers is a condition caused by seized rollers or a packing condition.



Roller wear is much like top idler wear. The potential for wear, however, is greater than the top idlers because the rollers carry the weight of the tractor. Roller treads can even wear to a point where the flanges extend far enough down the sides of the link making contact with the link pin boss, causing wear to both the flanges and the link pin boss.

A switch to proper track shoes can reduce flange wear.

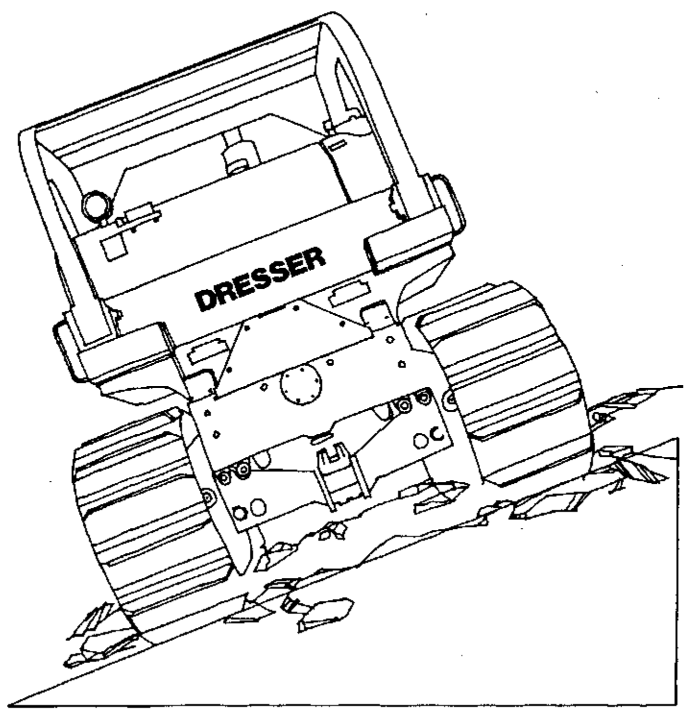
Welding can rebuild worn roller treads.

Tightening of a too-loose track chain can eliminate chain buckling and roller damage.

Extreme flange wear occurs during unnecessary sideways movement along a hill. This puts most of the weight of the tractor on one side of the roller and it is the responsibility of the roller flanges to keep the rollers from sliding off the link rails. This increases the rate of wear on roller flanges.

Track Specialists should advise owners that movement up and down a grade, rather than across it, results in less wear on roller flanges and link railsides. (Of course, other factors may dictate up and down movement as their only choice.)

Track Specialists should also advise equipment owners and operators to watch for leaky rollers and roller seizure which result in rapid wear to the rollers and track chain. Leaky rollers should be replaced. If pin boss damage is evident, it is likely that a roller has seized and replacement is necessary.

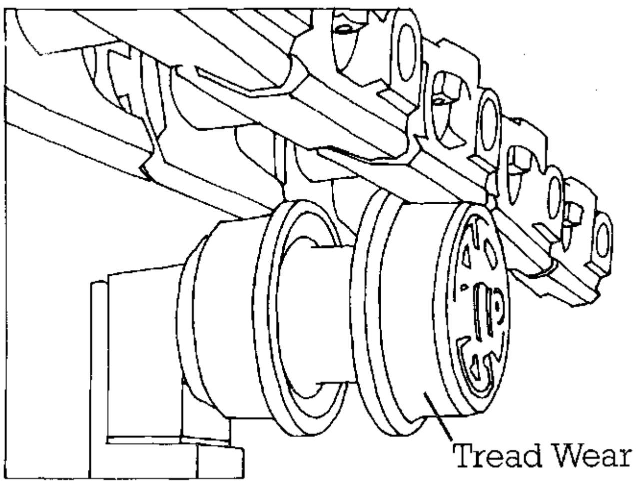


Top Idlers & Front Idlers

Top Idlers

■ Tread Wear is caused by the weight of the chain moving over the top idler.

■ "Flatted" Rollers is a condition resulting from packing or idler seizure due to lack of lubricant, restricting rolling and causing the track chain to slide.



Top Idler Wear

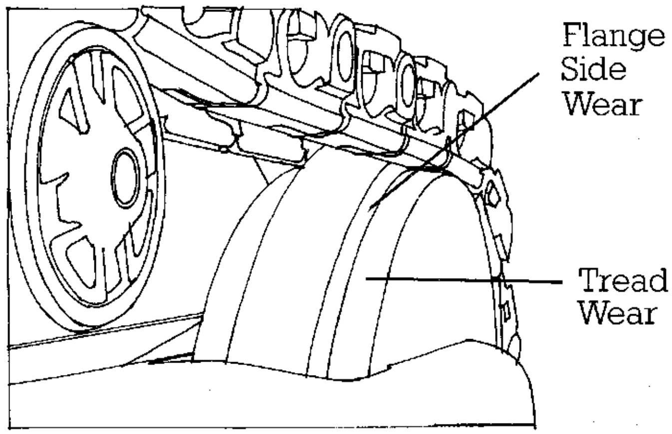
In packing conditions or when lubricant escapes, top idler rolling can become restricted, creating a sliding of the chain over the top idlers, resulting in flat spots or square rollers as with the front idler.

Proper track tension will reduce the rolling friction of the chain moving over the top idlers. Cleaning packed material will help prevent "flatted" rollers; checking for lubricant leaks will help prevent seized rollers.

Front Idler

■ Tread Wear is caused by contact between idler tread and track chain rail surfaces.

■ Flange Side Wear is caused by friction between link side rails and idler flange.



Front Idler Tread Wear

Most wear on the idler tread is caused by abrasive packing conditions of materials that come between the idler tread and link rails.

Also a track that's too tight creates excess friction between the idler tread and link rails causing tread wear. The flange on the idler tread, which guides the chain, also wears from contact with the inner railside on the links.

Reducing track tension will decrease the rolling friction between link and treads, thus slowing the rate of wear. If track tension is too loose, tightening will eliminate any buckling of the chain into the idler causing chipping or other damage.

Greater than normal flange top wear can be corrected by rebuilding.

Undercarriage Evaluation

Now that we know the components, how they relate to each other and how they wear, we will now determine how to evaluate component wear. From this information comes the ability to predict future wear and determine the right maintenance option to maximize component life and performance.

This will provide the equipment owners with three benefits. First of all, owners can dictate when maintenance will be performed so production schedules won't be disrupted. Second, owners can select the maintenance option to best suit their operating budget. Third, many of the maintenance options will result in longer component wear maximizing parts replacement costs for equipment owners.

Track Specialist's Goal

Undercarriage components have a certain dimension when new. As wear occurs, the dimension will decrease (or increase in the case of track pitch and front idler flange height) until a decision must be made whether to rebuild components, replace them or run them to destruction.

It is the wear limits that the Track Specialist must watch. By doing this, and through consultation with equipment owners or operators, maintenance decisions can be made which will maximize the working life of undercarriage components. This is the goal of the Track Specialist.

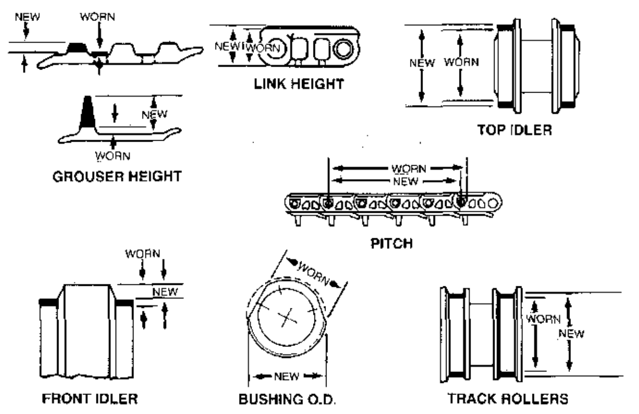
Track Wear Specs (PSM 204)

To enable a Track Specialist to know the progression of component wear, Track Wear Specs have been developed which give the changing dimensions of components as they wear.

TRACK WEAR SPECS

% OF WEAR REMAINING	SEVERE SERVICE GROUSER	STANDARD GROUSER	LINK HEIGHT	BUSHING O.D.	PITCH (4-LINKS)	FRONT IDLER	TRACK ROLLERS	TOP IDLERS
100		2.11	3.37	2.05	26.00	0.69	6.87	5.12
75		1.84	3.32	2.02	26.12	0.74	6.72	5.05
50		1.58	3.27	1.99	26.25	0.79	6.57	4.99
25		1.32	3.22	1.96	26.38	0.84	6.42	4.93
0		1.05	3.17	1.93	26.50	0.89	6.27	4.87
WEAR FACTOR		1.06	0.20	0.12	0.50	0.20	0.60	0.25
	MODEL NO.	TD-8 SERIES A					PITCH	6.50

UNDERCARRIAGE WEARING COMPONENTS:



NOTE: The amount of material that contains the hardening effect indicates the percentage of wear remaining. Once wear drops below the zero percentage level it will accelerate rapidly. The option to recondition is lost

			.05	1.74				
			2.99	1.71				
			2.93	1.68				
W/F		0.44	0.26	0.12	0.50	0.20	0.60	0.50
		100 LOADER SERIES B I & II					PITCH	6.00

W/F = Wear Factor

Page 2 of 2

Doncaster Crawler
Loader & Dozer

The wear specs are contained on cards. Measurements shown are 100th of an inch.

The components and conditions covered by the specs are: Severe Service Shoe Grousers; Standard Grousers; 2 Bar or 3 Bar Grouser Shoes; Links (rail height); Bushing Outer Diameter (o.d.); Internal Pin and Bushing Wear (4 links); Front Idler (flange height); Rollers (outer diameter); and Top Idlers (outer diameter).

For each component or condition, five different dimensions are given. The 100% wear remaining dimension is the dimension of a component when new. The 75%, 50% and 25% dimensions indicate the percentage of wear remaining before a maintenance action should take place.

The 0% wear remaining dimension (wear limit) is the point at which either maintenance must take place or the component run to destruction. This doesn't mean that the component will fall apart tomorrow. It does mean that it has worn through the hardened material and that remaining life is very limited. And that the effect of this on other components should be considered.

PSM 204-1 (1 85)

Procedure for Determining Percentage of Wear Remaining

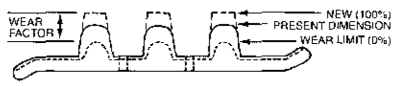
%	2 BAR GROUSER	3 BAR GROUSER	LINK	BUSH. O.D.	(4-LINKS) INT. P/B WEAR	FRONT IDLER	TRACK ROLLERS	TOP IDLERS
100		0.90	4.00	2.36	28.00	0.85	7.75	7.00
75		0.75	3.90	2.33	28.12	0.91	7.58	6.87
50		0.60	3.80	2.30	28.25	0.97	7.42	6.75
25		0.45	3.70	2.27	28.37	1.03	7.26	6.62
0		0.30	3.60	2.24	28.50	1.09	7.10	6.50
* W/F		0.60	0.40	0.12	0.50	0.24	0.65	0.50
		175 B/C					PITCH	7.00

PSM 204 Track Wear Specs 175 B/C

*** WEAR FACTOR:** **THE AMOUNT OF HARDENED MATERIAL CONTAINED ON EACH UNDERCARRIAGE COMPONENT.**

TO DETERMINE WEAR FACTOR:

SUBTRACT NEW DIMENSION (100%): .90"
FROM WEAR LIMIT (0%): .30"
WEAR FACTOR: .60"



FOLLOW THESE PROCEDURES:

A: MEASURE THE COMPONENT:
EX: 175B TRACK SHOE GROUSER.
PRESENT GROUSER HEIGHT: .50" (½ INCH)

B: SUBTRACT PRESENT DIMENSION FROM WEAR LIMIT: (WHICHEVER IS GREATER)
EX: .50" PRESENT DIMENSION
− .30" WEAR LIMIT (0% WEAR REMAINING)
.20" RESULTANT

C. DIVIDE RESULTANT BY WEAR FACTOR:
EX: .20" ÷ .60" − 33% WEAR REMAINING

CUSTOMER: DIGGER SMITH CRAWLER LOCA
CRAWLER MODEL: 175 B S.N. 9676 UNIT NO. #101 RE
DRY SEALED X
TRACK CHAIN TYPE
NO. 1 DATE 1 - 85
TRACK SHOE INFO TRACK PITCH L.T.S. 7.00"
TRACTOR HOURS 3200
2 BAR 3 BAR X
STD SS
WIDTH 16"

	NEW DIMENSION	WEAR LIMIT	WEAR FACTOR (Ref. Note A)	PRESENT DIMENSION LEFT	PRESENT DIMENSION RIGHT	% WEAR REMAINING (Ref. Note B) LEFT	% WEAR REMAINING (Ref. Note B) RIGHT
GROUSER HEIGHT	.90	.30	.60	.55	.50		33
LINK HEIGHT	4.00	3.60	.40	3.85	3.80		

Fill in the blank spaces.

PSM 203 Undercarriage Evaluation Form

Wear Factor (W/F)

The wear factor is the amount of hardened material contained on each undercarriage component. This is shown as W/F in the "Track Wear Specs" chart following the 0% wear limit dimension. The wear factor is determined by subtracting the dimension when new (100%) from the wear limit (0%).

The wear factor is essential in determining the exact percentage of wear remaining.

Determining Percentage of Wear Remaining

To determine the percentage of wear remaining, subtract the present dimension from the wear limit (0%) and divide by the wear factor. The answer is the percentage of wear remaining. For example, follow the procedures shown for a 175B track shoe grouser.

CAUTION: If the present dimension of a component is greater than the allowable limits, the result is -0% wear remaining, and the only option is replacement or running to destruction. Keep in mind the welfare of the related components.

An important fact for the Track Specialist to remember, especially in planning inspections, is that the rate of wear between 25% and 0% is faster than between 100% and 75%. For example, as rollers wear, their diameter decreases, causing them to roll faster and wear faster.

Undercarriage Evaluation

Undercarriage Evaluation Form (PSM 203)

Dimensions during the working life of an undercarriage are recorded on the evaluation form. This form is designed for three evaluations of an undercarriage, allowing the equipment owner to see a wear trend. Most important, it provides a complete evaluation of wear remaining for all components on either the left or right side of the crawler.

The form should be filled out completely . . . beginning with the new dimension for all components, the wear limit or 0% dimension, and the wear factor.

During undercarriage inspections, the evaluation should be filled out following the sequence on the form . . . grouser height, links, etc.

The illustrations on the back of the form help explain certain conditions. There is also room for any remarks you might want to make.

DRESSER
Construction & Mining Equipment

UNDERCARRIAGE EVALUATION FORM

FILE NO. U/C 001

CUSTOMER: DIGGER SMITH **CRAWLER LOCATION:** SMITH PIT

CRAWLER MODEL: 175B S/N: 9697 UNIT NO: 069 **REPORTED BY:** TRACK SPECIALIST

TRACK CHAIN TYPE: DRY SEALED X L.T.S. ☐ TRACK PITCH: 7.00"

TRACK SHOE INFO. 2 BAR ☐ 3 BAR X STD. ___ SS. ___ WIDTH: 16"

					NO. 1 DATE: 6/1 TRACK CHAIN HOURS 3200				NO. 2 DATE: TRACK CHAIN HOURS				NO. 3 DATE: TRACK CHAIN HOURS			
		NEW DIMENSION	WEAR LIMIT	WEAR FACTOR (Ref. Note A)	PRESENT DIMENSION LEFT	PRESENT DIMENSION RIGHT	% WEAR REMAINING (Ref. Note B) LEFT	% WEAR REMAINING (Ref. Note B) RIGHT	PRESENT DIMENSION LEFT	PRESENT DIMENSION RIGHT	% WEAR REMAINING (Ref. Note B) LEFT	% WEAR REMAINING (Ref. Note B) RIGHT	PRESENT DIMENSION LEFT	PRESENT DIMENSION RIGHT	% WEAR REMAINING (Ref. Note B) LEFT	% WEAR REMAINING (Ref. Note B) RIGHT
GROUSER HEIGHT		.90	.30	.60	.77	.74	78	73								
LINK HEIGHT **		4.00	3.60	.40	3.88	3.85	70	62								
BUSHING O.D. *	FWD. DRIVE	2.36 (DRY SEALED)	2.24	.12	2.26	2.25	16	8								
	REV. DRIVE				2.25	2.24	8	0								
PITCH * INTERNAL P/B WEAR		28.00	28.50	.50	28.32	28.35	36	30								
BUSHING O.D. *			L.T.S.	.24												
FRNT. IDLER FLANGE HEIGHT		.85	1.09	.24	.96	1.00	54	37								
TRACK ROLLER ** ROLLING DIAM.	1	7.75	7.10	.65	7.15	7.66	7	86								
	2				7.28	7.32	27	33								
	3				7.39	7.43	44	50								
	4				7.42	7.44	49	52								
	5				7.34	7.36	36	40								
	6				7.26	7.24	24	21								
	7															
TOP IDLER ROLL. DIAM.	FRNT.	7.00	6.50	.50	6.52	6.45	4	-0								
	REAR															

NOTE A: WEAR FACTOR = NEW DIMENSION - WEAR LIMIT = WEAR FACTOR

NOTE B: TO DETERMINE % OF WEAR REMAINING, SUBTRACT PRESENT DIMENSION FROM WEAR LIMIT, DIVIDE DIFFERENCE BY WEAR FACTOR.

RECOMMENDATIONS (List on reverse side)

* Pitch increase or external bushing wear of 0.12 (1/8; 3,04 mm) is an acceptable limit for turning pins and bushings for all applications. On less severe operations, where structural strength of the bushings is not critical, wear of 0.19 (3/16; 4,82 mm) in both cases, may be allowed before turning. If turning is not desired, these components may be used until destruction, keeping in mind the welfare of the other undercarriage components. The type of operation and soil in which the unit is running, are factors for determining which wear figure is acceptable. Your experience with your customers will determine whether the maximum limit of 0.19 (3/16; 4,82 mm) could be used, but when in doubt, always use 0.12 (1/8; 3,04 mm) as the limit for turning pins and bushings: (This wear measurement figure of 0.12 (1/8; 3,04 mm) or 0.19 (3/16; 4,82 mm) is obtained by subtracting the present dimension from the new dimension.)

** Keeping in mind the welfare of other undercarriage components, these wear limits may be exceeded so long as the roller flange is not hitting the link pin boss.

PSM203-85

Lubricated Track System (L.T.S.) Evaluation Procedure

Most of the same specifications apply in the evaluation of a lubricated track system (L.T.S.) as in a dry-seal track system. These include grouser height, link height, front idler, track rollers and top idlers. Not the same are bushing o.d. and internal pin and bushing wear.

Track Specialist Kit

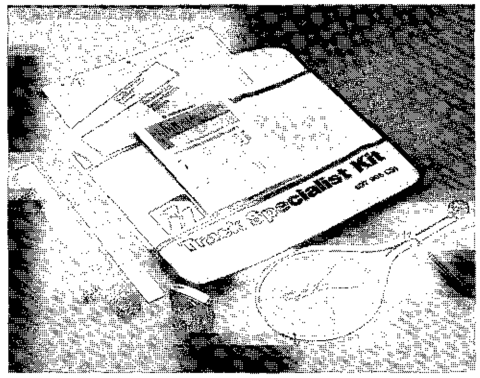
The tools to measure the dimensions of undercarriage components are included in the Track Specialist Kit, part number 637 985 C91, available through the Parts Distribution Center. These tools are:

12″ Outside Caliper
4″ Outside Caliper
10′ Tape Measure
12″ Straight Edge (Decimal and Fractions)
Squeeze Bar
PSM 203 Evaluation Forms
PSM 204 Track Wear Specs
PSM 205 Track Specialist Manual
PSM 206 Undercarriage Cross-Reference

In addition to the tools in the kit, a wire brush, rags, putty knife and flashlight should also be carried by the Track Specialist, for use during inspections.

PSM 204-1 (1-85)

Keep Your Crawlers on Track with a Track Specialist Kit



Track Specialist Kit 637 985 C91 contains the following:

One each: **12″ Outside Caliper**
4″ Outside Caliper
10′ Tape Measure
12″ Straight Edge (Decimal & Fractions)
Squeeze Bar
PSM 203 Evaluation Forms
PSM 204 Track Wear Specs
PSM 205 Track Specialist Manual
PSM 206 Undercarriage Cross-Reference

Kits are available at a nominal cost through regular Parts Distribution Channels.

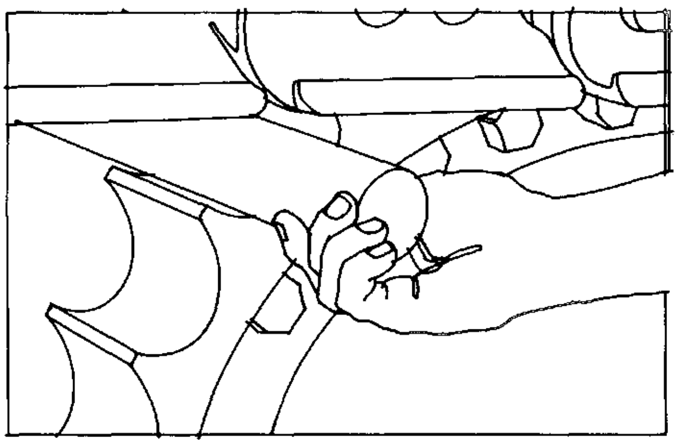
Component Evaluation

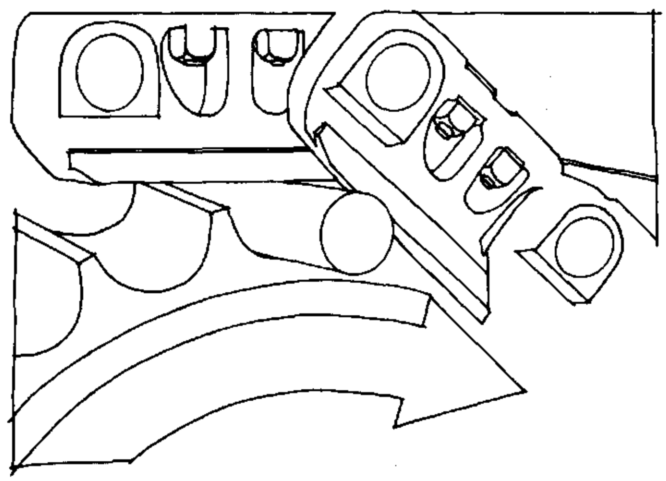
Before inspecting an undercarriage and before a crawler is shut down, the track tension on both sides must be tightened. To do this, blocks of wood or metal (track pins from a TD-25 undercarriage are ideal) should be placed in the sprocket tooth under the track chain. The crawler should then be moved backward so the sprocket can grab the block or pin and tighten the chain. This pulls the chain tight and up off the top idlers.

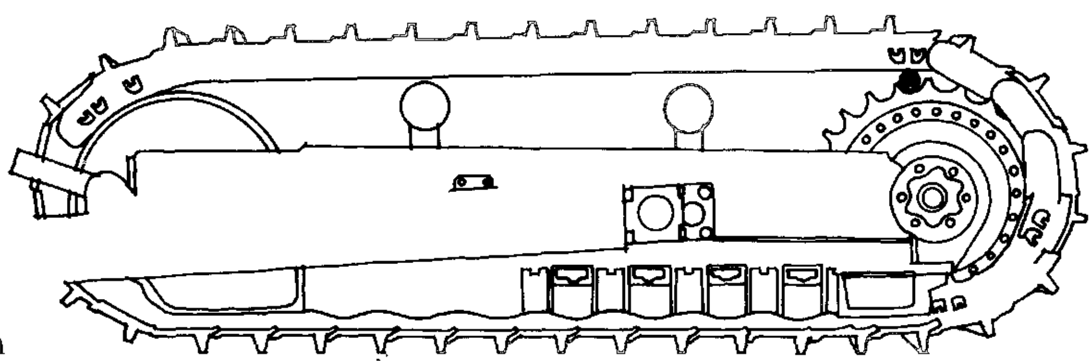
CAUTION: Back up only enough to tighten the track chain. Do not bottom out the front idlers.

Also, to avoid including the master pin and bushing in your inspection, make sure that it is on the bottom of the track chain. After doing this, the dozer blade, bucket and/or ripper should be positioned on the ground.

NOTE: Tightening the track chain is not necessary for a crawler equipped with L.T.S., as internal pin and bushing wear is eliminated.







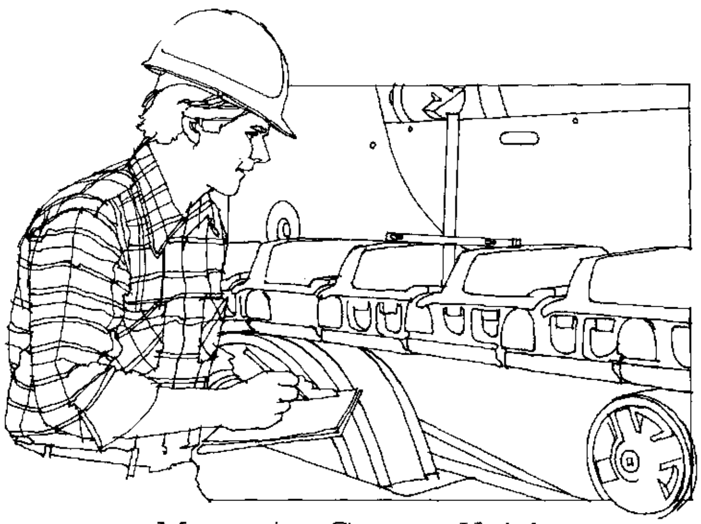
Tightening Track Tension

Undercarriage Evaluation

Grouser Height

Tools to measure 12″ squeeze bar
12″ scale

Lay the squeeze bar across grousers ¼ distance from the end of the shoes. Insert the 12″ scale between the bars perpendicular to it so the scale is against the top of the track shoe plate. Measure two or more shoes to get an average and record your figure on the evaluation form.



Measuring Grouser Height

Make sure the grouser tops are not chipped or tipped with materials when placing the squeeze bar in position and clean off all materials on the shoe plate where the 12″ scale will be placed. Compare your measurement with the Track Wear Specs or subtract the present dimension from the wear limit (0%) and divide by the wear factor (W/F). The answer is the percentage of wear remaining. Record the percentage of wear remaining on the evaluation form.

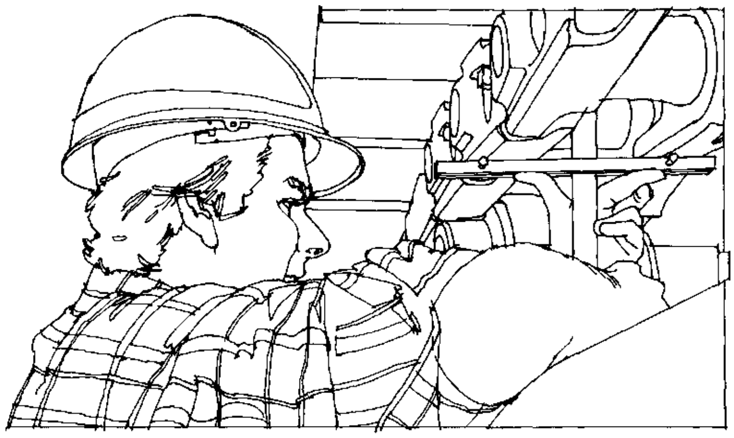
Links

Tools to measure: 12″ squeeze bar
12″ scale

Place the squeeze bar across the track links in the center of the links and place the 12″ scale between the bars perpendicular to the squeeze bar. Push the scale until it bottoms against the track shoe plate.

Make sure the 12″ scale is bottomed against the track shoe plate and not compacted dirt.

Again take a couple of readings, determine an average and record it on the evaluation form. Compare your measurement with the Track Wear Specs or subtract the present dimension from the wear limit (0%) and divide by the wear factor (W/F). The answer is the percentage of wear remaining. Record the percentage of wear remaining on the evaluation form.

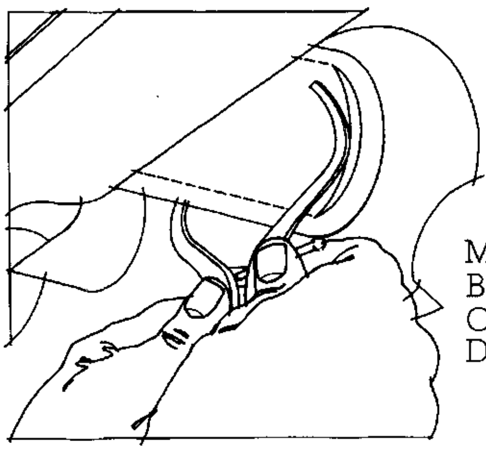


Measuring Link Height

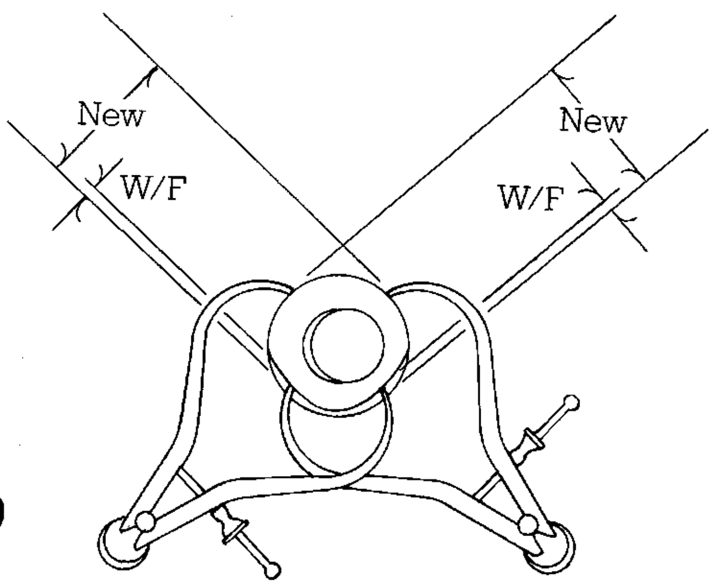
Bushing Outside Diameter

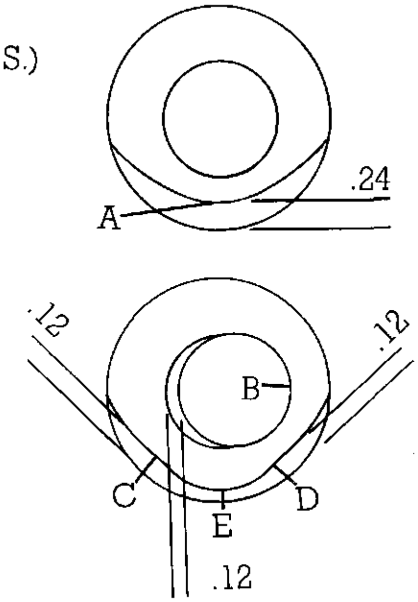
Tools to measure: 4″ outside caliper
12″ scale

You must measure wear on both the forward and reverse drive sides of the bushing. The caliper should be closed around the center of the bushing with a minimum amount of drag, making certain that one of the caliper tips is positioned in an area of wear. Whichever wear is greater, forward or reverse, determines undercarriage maintenance.



Measuring Bushing Outside Diameter





A = Bushing O.D. Wear (L.T.S.)
B = Internal Pin and Bushing Wear (Dry)
C & D = Forward and Reverse Drive Side Wear (Dry)
E = Root or Radial Wear (Dry)

The above illustration shows the difference in wearing characteristics between the lubricated track system (L.T.S.) and the dry-seal track system.

The lubricated track system (L.T.S.) eliminates internal pin and bushing wear, so forward and reverse drive wear of the bushing o.d. is concentrated at one point (A), where the bushing is in constant contact with the sprocket.

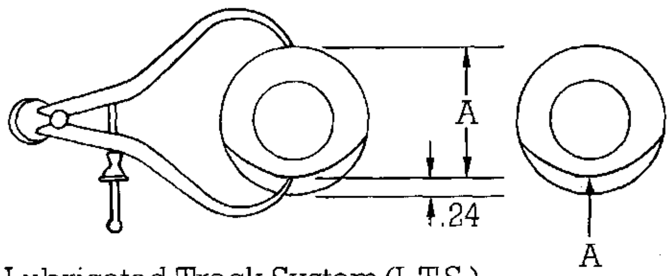
With a dry-seal track system, internal pin and bushing wear (pitch extension, B) is constantly increasing, causing the bushing o.d. to develop two distinct wear patterns: forward and reverse side wear (C & D).

When evaluating a dry-seal track system, it is necessary to evaluate all three wears: forward and reverse drive side wear (C & D) and internal pin and bushing wear (B). Whichever reaches 0% wear remaining first will dictate track maintenance.

Undercarriage Evaluation

Bushing O.D. Wear (L.T.S.)

With a lubricated track system (L.T.S.) internal pin and bushing wear (pitch extension) is virtually eliminated, resulting in a thicker bushing which allows for the extended wear factor of .24″, twice as much as the dry-seal wear factor of .12″. Use the bushing outside diameter wear specs as below.



Lubricated Track System (L.T.S.)

Bushing O.D. (Outside Diameter)

	TD-12		TD-15C/175C		TD-20E		TD-25C/E/G		TD-40	
%	DRY	L.T.S.	DRY	L.T.S.	DRY	L.T.S.	DRY	L.T.S.	DRY	L.T.S.
100	2.36	2.36	2.61	2.61	2.86	2.86	3.24	3.24	3.72	3.72
75	2.33	2.30	2.58	2.55	2.83	2.80	3.21	3.18	3.69	3.66
50	2.30	2.24	2.55	2.49	2.80	2.74	3.18	3.12	3.66	3.60
25	2.27	2.18	2.52	2.43	2.77	2.68	3.15	3.06	3.63	3.54
0	2.24	2.12	2.49	2.37	2.74	2.62	3.12	3.00	3.60	3.48
W/F	.12	.24	.12	.24	.12	.24	.12	.24	.12	.24

W/F = Wear Factor

CAUTION: Once pins and bushings have been turned on a dry-seal track chain or bushings on a L.T.S., bushing o.d. measurements are no longer obtainable.

On a dry-seal track chain, internal pin and bushing wear will determine track maintenance.

On a L.T.S. the amount of hours obtained prior to turning bushings will determine track maintenance.

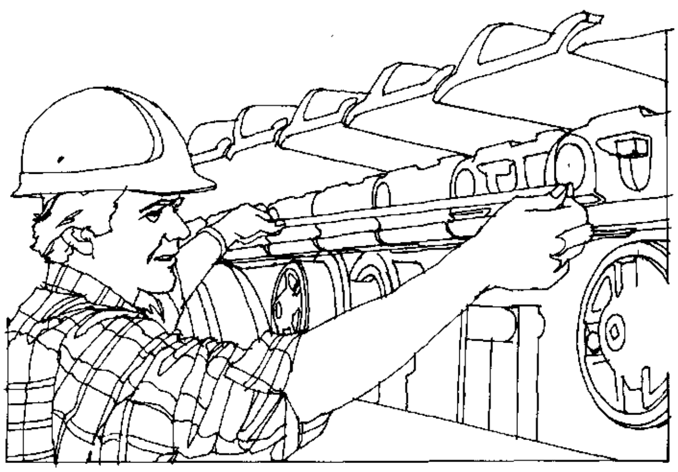
Internal Pin and Bushing Wear (4 Links)

Tools to measure: 10′ tape measure

To measure track pitch, you must measure a tight chain.

Place the end of the 10′ tape on the front of one track pin and measure back to the front of the fifth track pin, making sure four links are included in the measurement.

Record the measurement on the evaluation form. Compare your measurement with the Track Wear Specs or subtract the present dimension from the wear limit (0%) and divide by the wear factor (W/F). The answer is the percentage of wear remaining. Record the percentage of wear remaining on the evaluation form.



Measuring Track Pitch

(NOTE 1: A pitch increase or external bushing wear of 0.12 is an acceptable limit for turning pins and bushings for all applications. On less severe operations, wear of 0.19 may be allowed before turning. Refer to the bottom of the evaluation form for further information.)

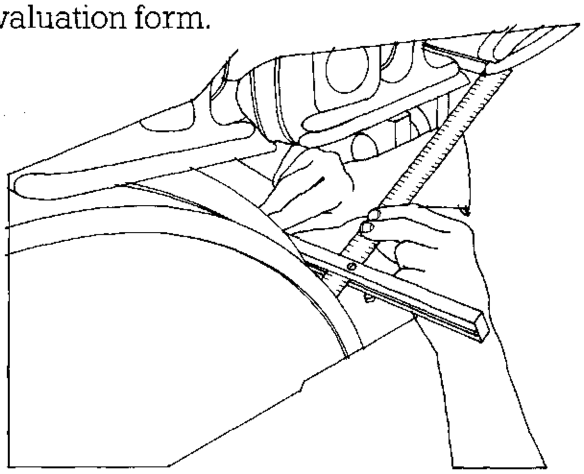
(NOTE 2: This measurement is not necessary for a crawler equipped with L.T.S., because there is no pin and bushing wear.)

Front Idler Flange Height

Tools to measure: 12″ squeeze bar
12″ scale

To measure, insert the 12″ scale between the squeeze bar and rest the squeeze bar on top of the flange. Push the scale down until it makes contact in the middle of the tread area.

Consult the Track Wear Specs for percentage of wear remaining or subtract the present dimension from the wear limit (0%) and divide by the wear factor. The answer is the percentage of wear remaining. Record the percentage of wear remaining on the evaluation form.

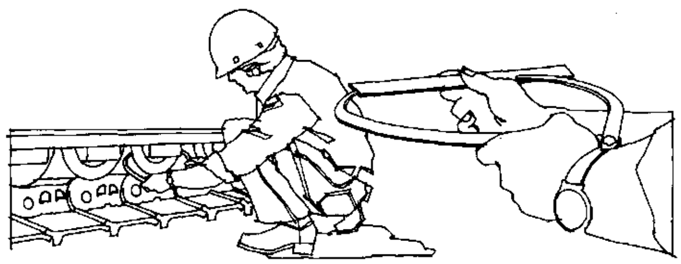


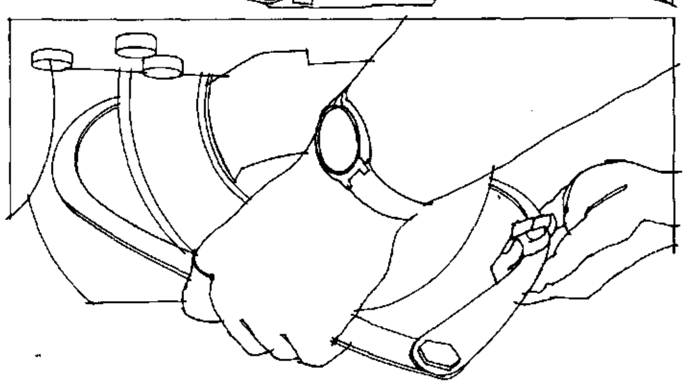
Roller Rolling Diameter

Tools to measure 12″ outside calipers
12″ scale

Place the 12″ caliper ends with a slight drag against the tread area of the rollers and slowly pull the calipers down. A slight drag should be present to obtain a good measurement.

Place caliper tips alongside the 12″ scale and record your measurement on the evaluation form. Measure each roller. Again, using the Track Wear Specs, determine the percentage of wear remaining or subtract the present dimension from the wear limit (0%) and divide by the wear factor. The answer is the percentage of wear remaining. Record the percentage of wear remaining on the evaluation form.



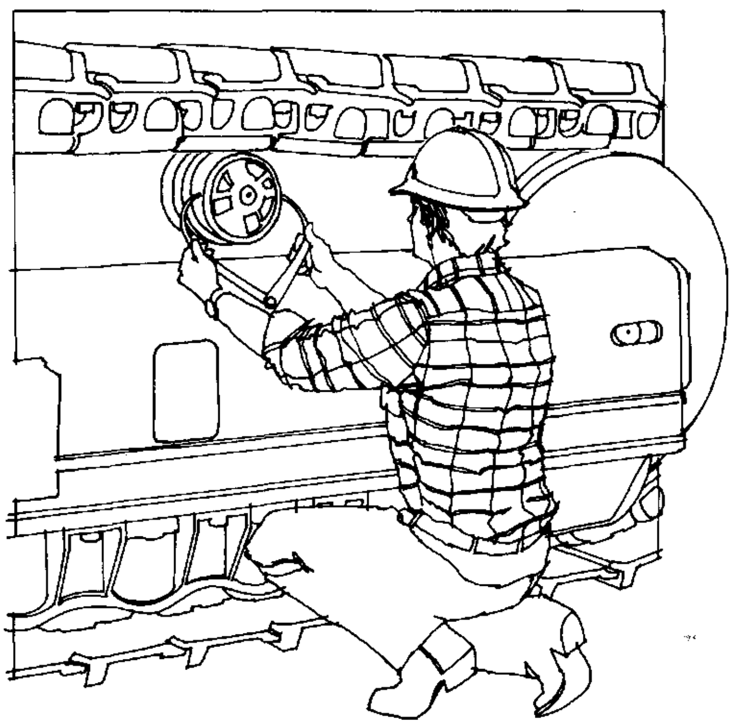


Top Idler Rolling Diameter

Tools to measure 12″ caliper
12″ scale

To measure, close the 12″ caliper snugly around the tread area and pull the caliper tips down.

Place the tips alongside the 12″ scale and record your measurement on the evaluation form. Also compare against the Track Wear Specs or subtract the present dimension from the wear limit (0%) and divide by the wear factor. The answer is the percentage of wear remaining. Record the percentage of wear remaining on the evaluation form.



Other Checkpoints

After measuring undercarriage wear, check for the following conditions: track tension, loose or missing track shoe hardware, cracked or broken track shoes, leaky rollers, flat spots on rollers and top idlers, loose master pin, dozer blade or bucket teeth condition, ripper tip condition and crawler conditions in general.

Track Specialist/Equipment Owner Consultation

After recording all the necessary measurements, the evaluation form should be made in duplicate and one copy left with the owner.

All recommendations, estimates or findings should be recorded on the back of the evaluation form.

Once this is completed, confer with the owner, discuss your evaluation with him, and offer your recommendation. His options include:

a. Turning bushings (L.T.S.)
b. Turning pins and bushings (dry-seal track)
c. Replacing pins and bushings
d. Rebuilding track links
e. Replacing sprockets
f. Switching rollers
g. Rebuilding roller and top idler
h. Regrousering track shoes
i. Rebuilding front idlers
j. Recommending a L.T.S. system for future replacement
k. Running to destruction

Turning Bushings (L.T.S.)

Since internal pin and bushing wear is eliminated in an L.T.S. system, turning the bushings will maximize track life and justify the initial expense.

Turning Pins and Bushings (Dry-Seal)

As has been noted, the two most critical areas of wear of a track chain are bushing outside diameter wear and internal pin and bushing wear.

The advantages of turning pins and bushings are simple. Equipment owners will receive more life out of pins and bushings and maximize track chain life.

Replacing Pins and Bushings

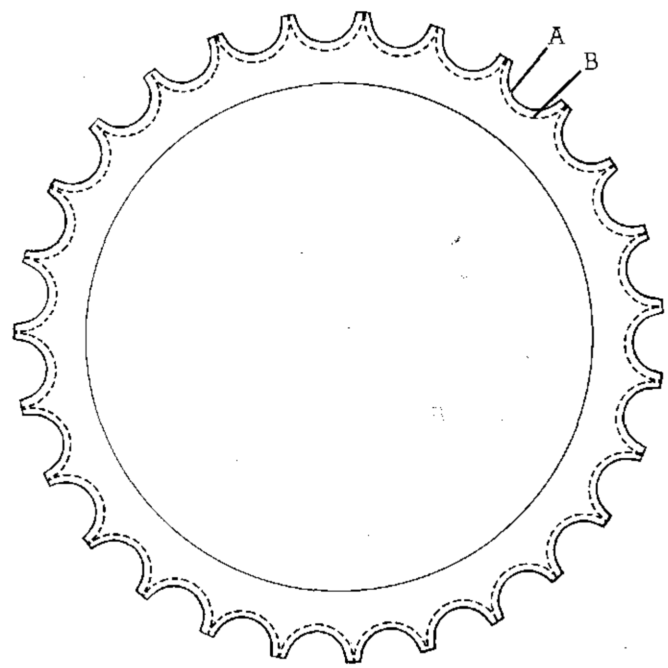
Replacement of pins and bushings after they have been turned and run to destruction does not mean a new track chain is needed. This is something owners need to be made aware of. If link rail height is sufficient, the old chain can be used with new pins and bushings and more work gained from the track chain.

Rebuilding Track Links

By eliminating internal pin and bushing wear, the lubricated track system (L.T.S.) eliminates "snaky" track. The links stay in a like-new condition longer and simply rebuilding the rail surface maximizes the life of the track chain.

Replacing Sprockets

When a new chain is installed, or pins and bushings are turned, sprocket replacement should be considered, because sprockets and bushings wear together. Turning the pins and bushings restores the track pitch to that of a new track chain. By not replacing the sprockets at the same time, the worn tooth pattern will subject the bushings to unnecessary wear.



A = New Tooth Pattern

B = Worn Sprocket Tooth Pattern

Rebuilding Roller and Top Idler

Rebuilding is good maintenance because of new methods used in reconditioning. While these components are being rebuilt, a coolant is circulated through the cavity in the roller shaft and shell which prevent warping. The coolant is also under pressure, so the condition of the seals is tested. If rollers leak, then it becomes obvious that seal replacement is necessary.

Regrousering

Grousers may be rebuilt back to original specifications for better traction. Track shoes, like the front idler, are very rarely replaced.

Rebuilding Front Idlers

Front idlers can be rebuilt a number of times with no problem before replacement is necessary.

Switching Rollers

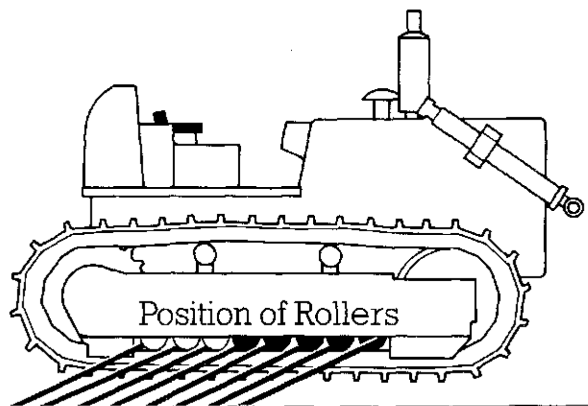
Switching rollers from one position to another can even out the working life of these components.

In dozing, the front rollers usually wear faster than the back rollers. Therefore, a switch of the front rollers to the rear and vice-versa can increase overall life of all rollers.

With loaders, the wear usually occurs faster on the front rollers. Again, a switch of front rollers to the rear and vice-versa can increase roller life.

In ripping, the rear rollers wear faster and the middle ones the least. A rearrangement of rollers can prolong overall roller life.

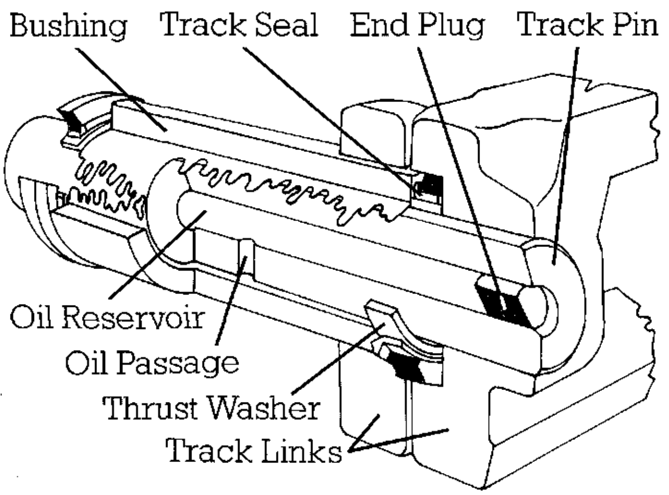
Recommended Positioning of Rollers on Dresser Crawler Tractors



8	7	6	5	4	3	2	1	CRAWLER MODEL	NO. OF ROLLERS
			S	S	S	S	S	TD7C & E - 100C & E TD8C & E - 125C & E	5
			S	D	S	D	S	TD9 - OSCILLATE	5
		D	S	S	D	S	D	TD9 - RIGID 150 LOADER TD12	6
		S	D	S	D	S	D	165 LOADER	6
		D	S	D	S	D	S	TD15B & C - 175 LOADERS TD20B, C & E	6
	D	S	D	S	D	S	D	TD20B SIDEBOOM 250 LOADERS, TD12 LGP	7
	S	D	S	D	S	D	S	TD15C - LGP TD20E - LGP	7
	S	D	S	D	S	D	D	TD25B & C & E & G	7
	S	D	D	D	D	D	D	TD30	7
	S	D	D	S	D	D	S	TD40	7
S	D	S	D	S	D	S	D	TD25B SIDEBOOM	8

Conclusion

The Dresser lubricated track system (L.T.S.) represents a significant advance in undercarriage technology. Not since International introduced its first crawler in the early 1920's has there been such a milestone in undercarriage design.



The lubricated track system (L.T.S.) was designed specifically for use on Dresser crawler tractors. This system was announced only after years of field testing, customer evaluation and implementation of advanced quality control procedures.

The system's most important benefit is a major reduction of internal pin and bushing wear. This is accomplished with a patented seal assembly which retains lubricating oil within the pin, bushing and link counterbore wear surfaces.

The Dresser L.T.S. design, combined with continued use of thick-walled bushings, permits the introduction of this improved system without changing bushing outside diameters or sprocket design. Compatibility is thus maintained between existing sprockets and the new track system, aiding in standardization of replacement parts.

The Dresser L.T.S. extends track life, and in most applications, lowers the hourly undercarriage cost.

As a result of this innovation, track pitch extension is eliminated, providing the following benefits under most operating conditions:

- Sprocket and external bushing wear is reduced because pitch extension is eliminated, allowing the bushing to constantly drive in the sprocket root.
- Link counterbore wear and resultant snaky-track is eliminated which results in increased link rail life due to a straighter-running track chain.
- Track roller and idler life is also increased due to the elimination of snaky-track.
- Links, rollers and idlers are more easily rebuilt as a result of truer running tracks.
- Track chain operates more quietly since the major friction surfaces are now lubricated.
- Available horsepower is increased as a result of reduced internal pin and bushing friction.

PSM 205 Track Specialist Manual

The Track Specialist Manual is the result of gathering a vast amount of knowledge and experience from a great many persons involved in operating and servicing Dresser equipment.

There is no basic answer to all the different aspects of undercarriage wear and this manual does not offer a simple short-cut to becoming an expert Track Specialist. It is the purpose of this manual to offer guidelines that, along with experience and the desire to learn, will help you become a qualified and respected Track Specialist.

HOW'S YOUR OLD UNDERCARRIAGE?