Rex® Drive Chains

INSTALLATION

OPERATION

AND

MAINTENANCE

OF

REX DRIVE CHAINS

Rexnord

INSTALLATION, OPERATION, AND MAINTENANCE OF REX DRIVE CHAINS

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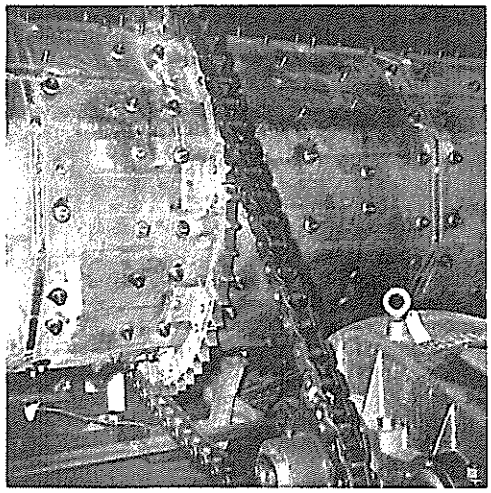
Protect Your Investment



Chains are easier to install and are able to take more abuse, than any other systems for transmitting power from one shaft to another.

Proper installation, lubrication, and maintenance can increase their service life by several times and save you a lot of headaches in the long run.

The faster chains operate, the greater the care that they require to enable you to get the most for your chain drive dollar.

The importance of correct installation, operation, and maintenance of chain drives cannot be emphasized too stongly. You have invested money in the purchase of chain drive equipment. Naturally, you expect a return from that equipment in continuous trouble-free operation, and in long, economical performance.

While chains are built to absorb a lot of punishment, no chain will give complete satisfaction unless it is properly installed and operated, given periodic inspection and adjustment, and properly lubricated. You will get extra dividends in added service life through proper care of your chain drives.

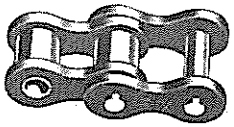
It is the purpose of this handbook to help you get more "carefree mileage" for your drive chain dollar. The degree of care required depends, to a large extent, on the type of installation and the operating conditions. You will profit by carefully observing the lubrication tips and chart. Tests have conclusively proved the importance of chain lubrication in all services.

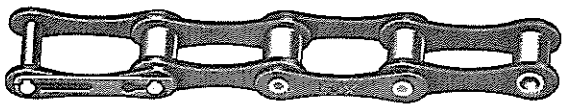
When a chain is properly lubricated, wear life is increased many fold. Even under dusty or abrasive conditions, lubrication is recommended.

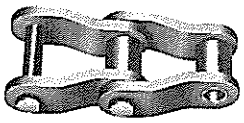
Only when application conditions render lubrication absolutely impossible should a drive chain be operated dry, at a sacrifice in wear life.

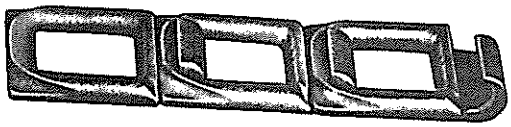
The following pages of this handbook provide valuable data on protecting your chain investment through correct installation, operation, and maintenance... information which will point out how you can get maximum performance and life from your drive chains.

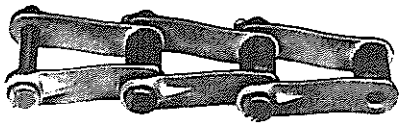
Types Of Rex Drive Chains

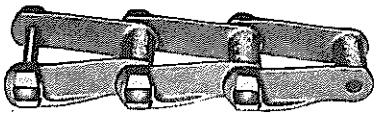


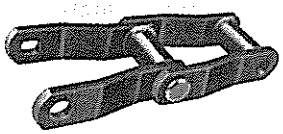












Rex roller chains are for smooth, efficient, high-speed drives of 5000 f.p.m. and over. They also may be used at slow or medium speeds. They are available in single and multiple widths.

Rex double-pitch roller chains are made with the same size rollers, bushings, and pins as standard roller chains, but with link plates twice the pitch. They are for slow to high speed drives up to 3900 f.p.m.

Rex fabricated steel chains are the best choice for high torque drives at slow to medium speeds.

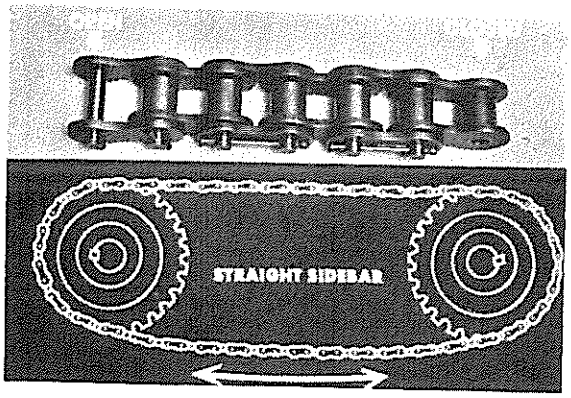
Rex detachable chains are for slow speeds up to 350 f.p.m. and very lightly loaded drives. Available in malleable iron and steel.

Rex Pintle chains are for slow speeds up to 450 f.p.m. and lightly loaded drives.

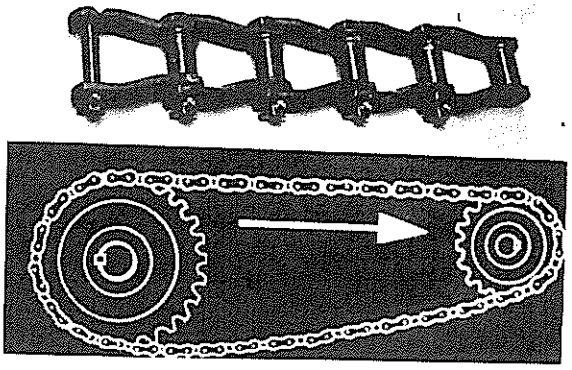
Rex H-type chains are for slow speeds up to 500 f.p.m. and medium loaded drives.

Rex welded steel chains are an economical choice for some light duty cycle drives at slow to medium speeds.

It is important that power drive chains are operated in the proper direction to assure maximum wear life of both chain and sprockets.

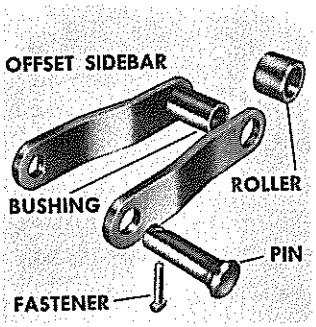


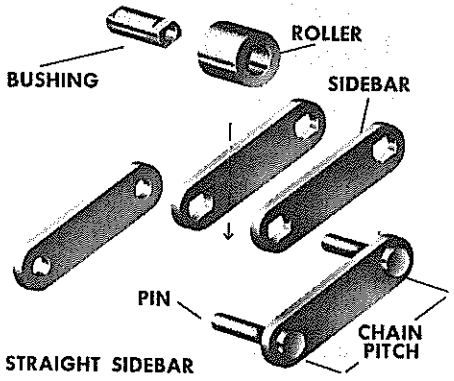
Straight sidebar roller chain can travel in either direction.



All other types of drive chains should travel barrel or closed end toward the smaller sprocket.

Quality Materials, Components, And Processes Improve Performance, Lengthen Life





Drive Chain Design

Rex drive chains consist of pins, bushings, sidebars, and rollers. Pins and bushings provide bearing surfaces for the chain to articulate over sprockets. The pin-bushing bearing area is referred to as the "chain joint". Sidebars connect these bearing surfaces into chain.

A major consideration in the selection of steel used in chain manufacturing is hardenability or how a material will respond to given processes. These considerations are extremely important when designing a chain to meet certain strength and wear resistance requirements.

Sidebars are tensile members of a chain and establish chain pitch, which is the distance between chain joints. Sidebars can be offset or straight construction.

Pins connect chain links. They are locked into sidebars by an interference fit so all relative rotation occurs between the pin and bushing.

Bushing inside diameter provides the bearing surface (live bearing area) for pin rotation. The bushing outer diameter provides the bearing surface for chain rollers.

Rollers serve the function of providing smooth rolling action during engagement with sprocket teeth. Rollers are also designed to accept the high impact loads imposed during drive operation thus reducing chain fatigue and extending chain wear life.

Heat Treating Processes

Rexnord employs several heat treating processes to improve material characteristics. The heat treating process used is determined by the particular requirements of drive applications.

THRU-HARDENING (T.H.)

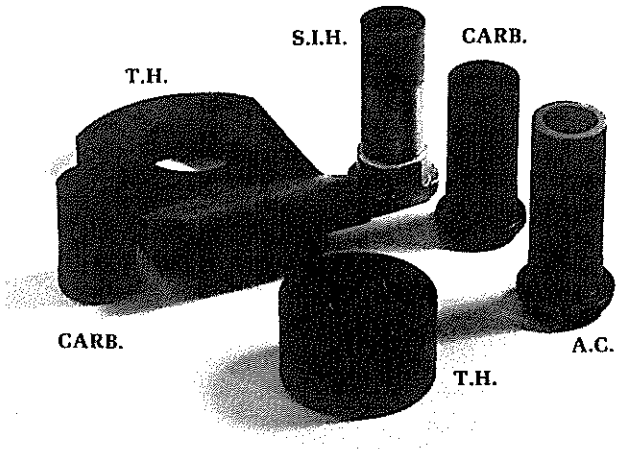
In thru-hardening, the material is hardened through its entire cross-section. Thru-hardening is specified to increase strength, improve fatigue resistance and reliability.

CARBURIZING (CARB.)

Carburizing is a process where components are subjected to a high temperature carbon-rich atmosphere and quenched and tempered to produce very high surface hardness while maintaining a tough, ductile core. Carburizing is specified to produce maximum surface hardness to prolong wear life.

CIRCUMFERENTIAL INDUCTION HARDENING (C.I.H.)

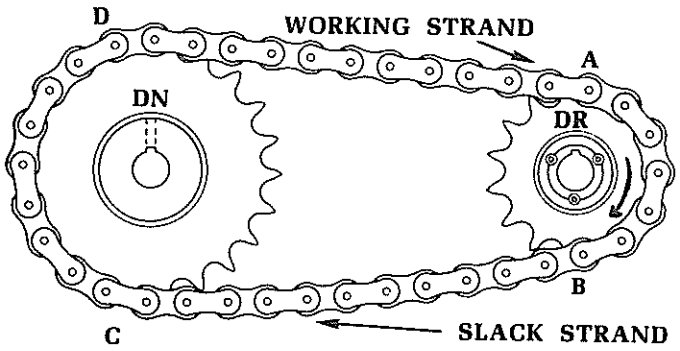
Rex Circumferential Induction Hardening on chain pins produces a deep hard case to a controlled depth around the entire circumference. Case depths are typically twice that of a carburized pin. The benefits of circumferentially induction hardening are increased pin fatigue resistance in corrosive environments and a significant improvement in wear life.



SELECTIVE INDUCTION HARDENING (S.I.H.)

Rex Selective Induction Hardening produces a deep hard case like Circumferential Induction Hardening except that the hardness, rather than being circumferential, is on the live bearing area of the pin only. The back side of the pin is left tough and ductile so that the pin is capable of taking maximum shock and overload without failure. Selective Induction Hardening maximizes wear life while maintaining optimum toughness.

Chain — Sprocket Interaction



For a chain to provide long dependable life, the chain must be properly designed and manufactured and used with sprockets manufactured to ANSI dimensions to resist wear and fatigue.

The greatest amount of flexing occurs at points A, B, C, and D above.

During each complete cycle in a chain drive system, every link of the chain undergoes "cyclic loading." In the working strand, the chain is under full tension. In the slack strand, (catenary) there is minimum tension or load.

The chain tension is absorbed by the sprocket teeth. The ability of the sprockets to absorb this tension is dependent upon the pressure angle of the teeth, the number of teeth encountered with the chain, and the tension in the slack strand (catenary).

As the chain circles around the Driver sprocket (from A to B), the first tooth in contact (at A) absorbs a given percent of the chain tension. The next tooth absorbs the same percent of the tension not absorbed by the first tooth. This repeats at each tooth in contact, with each tooth absorbing a percent of the chain tension not absorbed by the teeth preceding it.

Finally, (at B), there is only a small amount of chain tension not absorbed. This unabsorbed tension must be balanced by the tension in the slack strand if the drive is to function properly. Normally, this balance point occurs before the chain moves into the slack strand (catenary).

From B to C there is relatively little load on the chain. The load increases from C to D until (at D) the chain is once again subject to maximum tension.

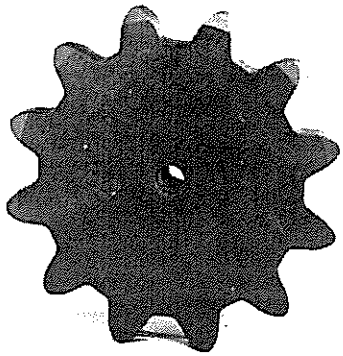
This "cyclic loading" — from load to no-load, back to load — emphasizes the importance of the proper design and manufacture of both the chain and the sprockets. Long service life can only be obtained when the drive is equipped with quality chain and quality sprockets.

Sprocket Tooth Form

To function properly, drive chains must be run over sprockets that have teeth properly designed for the environment in which they operate.

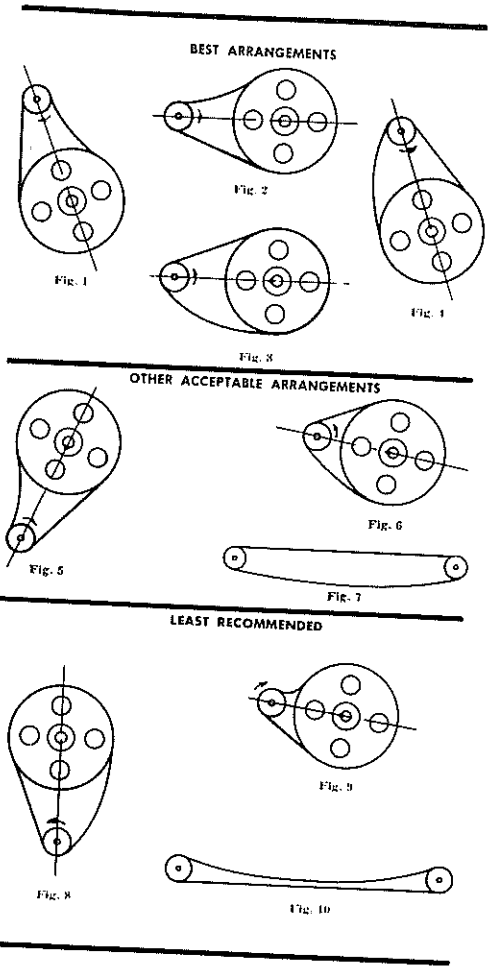
Worn or improperly designed sprockets are one of the causes for premature chain wear or failure. Chain jumping, wedging, or backlash may result if the proper tooth design is not utilized.

Closely inspect the chain and sprocket interaction to insure a smooth and noiseless operation. The chain should easily enter and exit the sprocket without a hitch.



Drive Arrangements

Relative position of sprockets in drives should receive careful consideration. Satisfactory operation can be secured with the centerline of the drive at any angle to the horizontal, if proper consideration is given. Certain arrangements require less attention and care than others and are, therefore, less apt to cause trouble. Various arrangements are illustrated in the diagrams. The direction of rotation of the drive sprocket is indicated.

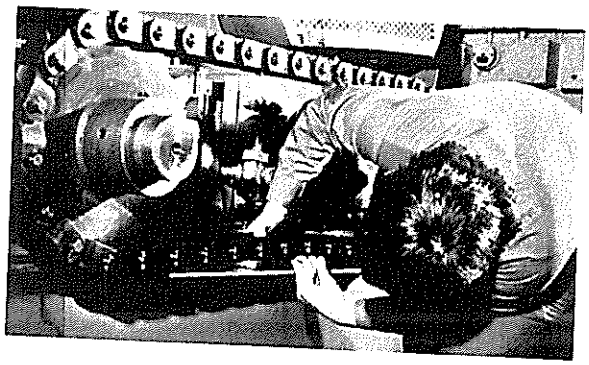


When the large sprocket is directly above the small sprocket, Fig. 8, a drive cannot operate with much chain slack. As the chain wears, shaft-center distance must be adjusted or an idler be placed against the outside of the slack strand (near the small sprocket) to adjust slack and keep the chain in proper contact with the small sprocket.

With the drive slightly inclined, Fig. 5, less care will be required, because the weight of the slack chain strand helps to maintain better contact between the chain and sprockets.

Where center distances are short, or drives nearly horizontal, he slack should be in the bottom strand, especially where ake-up adjustment is limited, Fig. 6, rather than Fig. 9. An ccumulation of slack in the top strand may allow the chain to e pinched between the sprockets, Fig. 9.

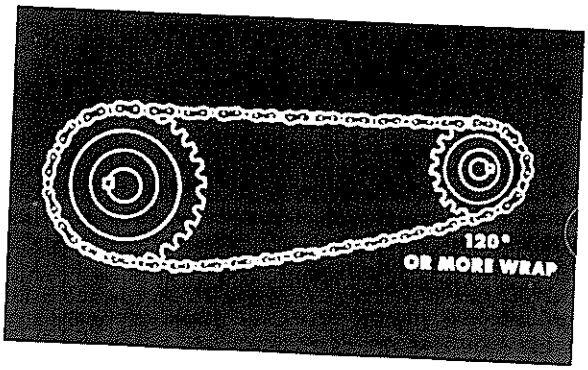
When small sprockets are used on horizontal drives, it is etter to have the slack strand on the bottom, Fig. 7, rather an on the top, Fig. 10. Otherwise with an appreciable nount of slack, the strands may strike each other.



ains should never be run with both strands tight. Tight rands will not only cause the chain to wear rapidly, but ded load will be put on the shafts, and bearings of nnected equipment.

chain strand can be moved a small amount by hand, it is too tight. Obviously, heavy chains require considerable ce just to overcome chain weight when checking for slack ustment.

least 120° wrap on the driver sprocket is desirable to ure proper interaction between chain and sprocket.



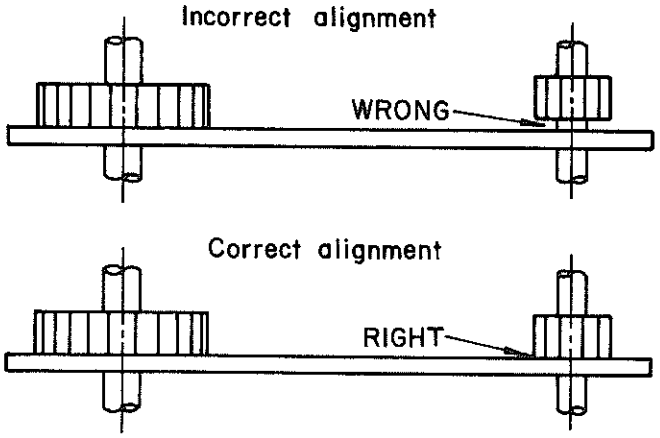
Installation Of Drive Chains

Before beginning any maintenance on chain driven equipment, be certain the power cabinet is locked out.

1. Use as little clearance as practical between the bore of the sprocket and the shaft. Do not drive the sprocket onto the shaft; fit it.

2. Make sure that the keys fit snugly in the keyways in the shafts and sprockets or taper-lock hub.

3. Locate the sprockets as close to the support bearings as practical with the hub away from the bearing.



4. In aligning the sprockets, secure one of the sprockets to the shaft and hold a straight edge against it. A taut wire or string can be used if a sufficiently long straight edge is not available.

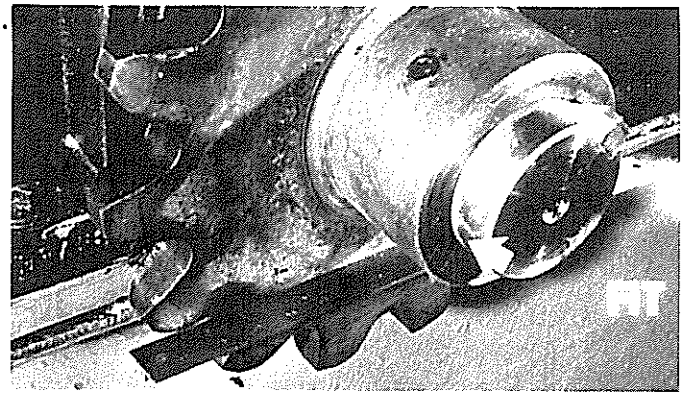
   Then slide the other sprocket against the straight edge and secure it to the shaft.

   If there is a gap, misalignment exists.

5. Rotate the sprocket opposite to the one against which the straight edge is held. If the gap remains constant, then the shafts are not parallel and must be aligned. If the gap *changes*, however, then the bore in the sprocket is not perpendicular to its face. If the resulting misalignment is judged to be severe, then a new sprocket is required.

   Extra care is required here because both misalignment problems can be present simultaneously.

1.



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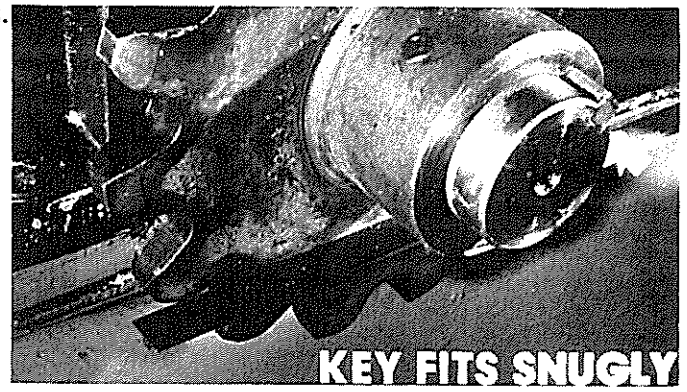

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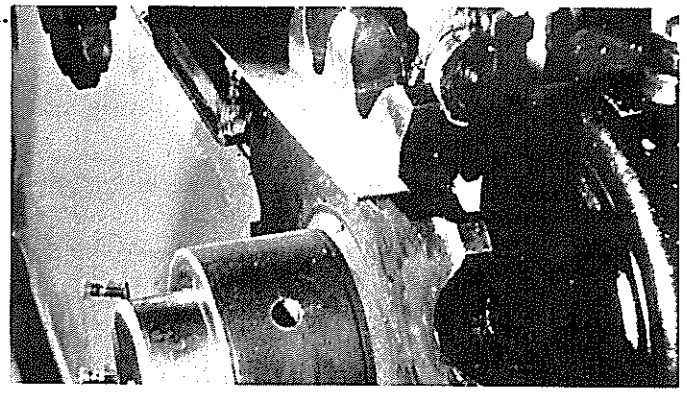

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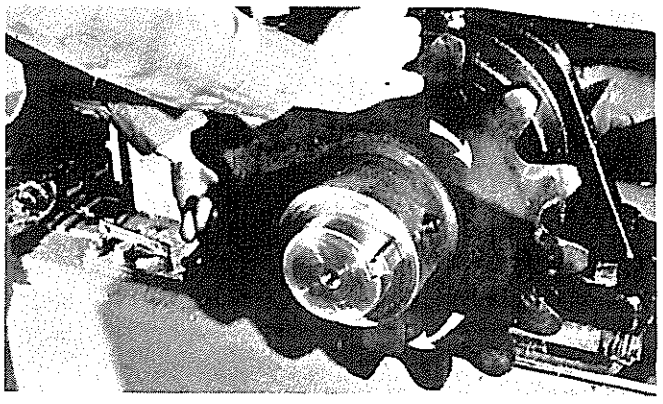


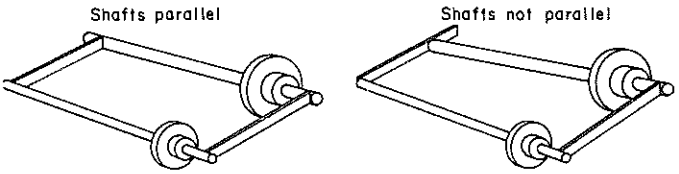
Installation Of Drive Chains (cont'd)

As a final step, hold the straight edge against the opposite sprocket and rotate the other one to determine whether its bore is perpendicular to its face.

6. After aligning the sprockets, recheck all setscrews to make sure that they have been tightened as securely as possible.

   It is good practice to recheck the setscrews again shortly after the drive has been put into operation. If they have loosened, retighten them and recheck again shortly thereafter.

7. Proper alignment of sprocket and shaft is necessary for maximum wear life. Rapid wear will result from misalignment due to rubbing of chain parts against sides of sprocket teeth and excessive friction wear in the joints caused by racking and twisting of chains.



8. Always use the sprockets as a "fixture" when connecting the chain strand. The sprocket teeth act as wedges to facilitate forcing the links together against the weight of the chain. Further, the sprocket teeth hold the links in position for maximum ease of inserting the pin.

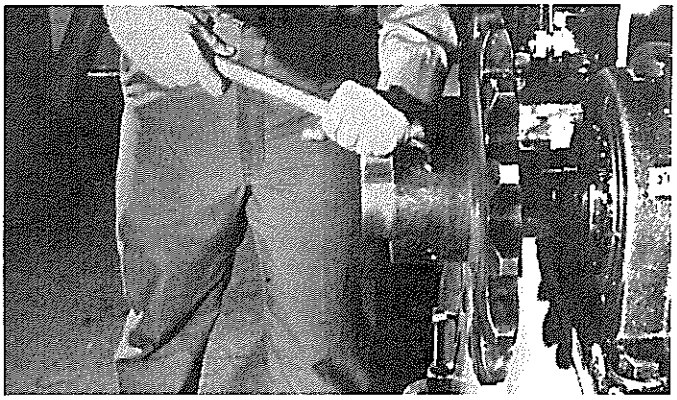
   On large fixed center drives, move one of the shafts toward the other to loosen the chain while it is being coupled. It may be possible to loosen the drive motor or engine, allowing it to tip toward the other sprocket. This should develop enough slack to enable coupling the chain easily. If this is not possible, it may be necessary to use a come-along to pull the loose ends of the strand together.

9. When chains are connected using press-fit pins, always "back-up" the strand when driving the pin through the sidebars. The "back-up" should be at least as heavy as the hammer used to drive the pin.

10. Always wear safety glasses when assembling or disassembling chains to protect your eyes.

    With the chain installed, now check for the correct tension. Chains should never be run with both strands tight. In addition to causing the chain to wear rapidly, added load is put on the shafts and bearings of the connected equipment.

6.



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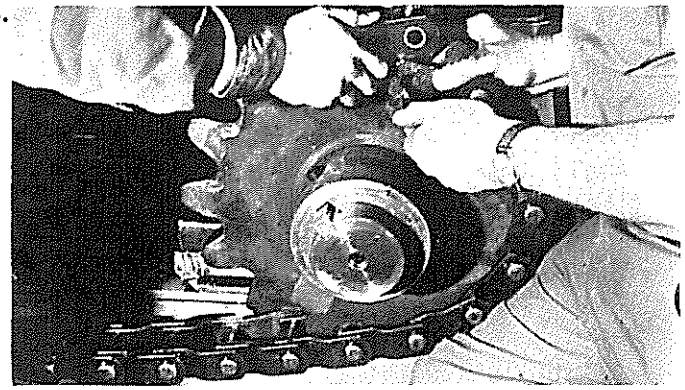

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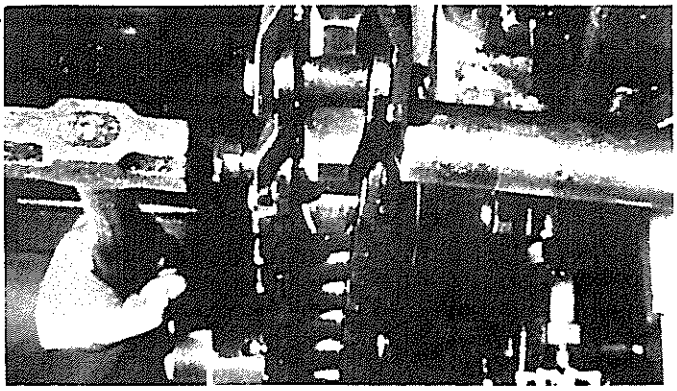

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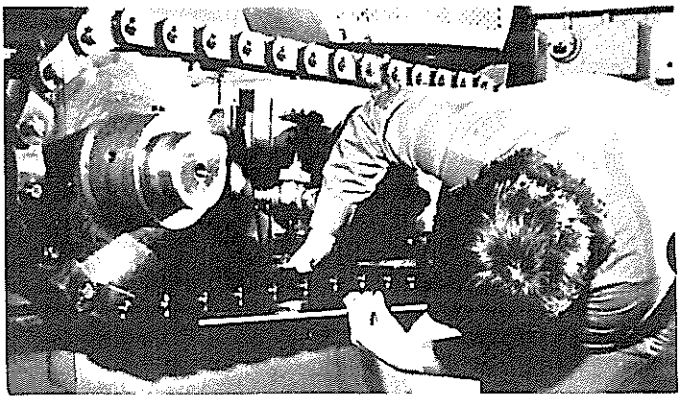
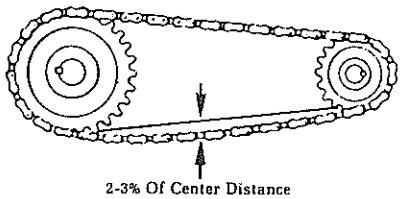
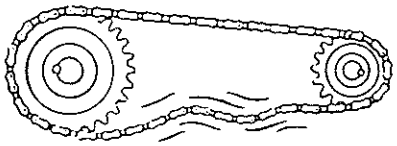


Chain Slack (Catenary)

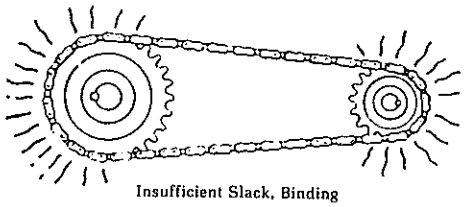


2-3% Of Center Distance

CORRECT SLACK



Excessive Slack



Insufficient Slack, Binding

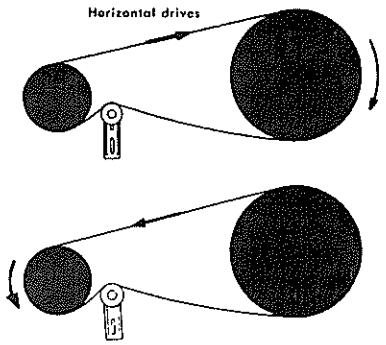
The correct amount of slack is essential to the proper operation of chain. Unlike belts, chain requires no initial tension and should not be tightened around the sprockets. Properly adjusted chain drives should permit slight flexure by hand in the slack strand of abut 2 - 3% of the center distance.

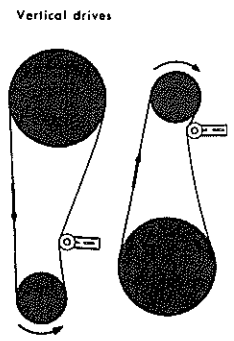
Too much slack is also harmful. On long centers particularly, too much slack will cause vibration and chain flexure materially reducing the life of the chain. On long centers, it is recommended that the slack strand be supported or taken up by idler sprockets or strip guides of hardwood or brass. The strip is simply a continuous support for the chain which prevents it from sagging too much.

When chain is too tight, the working parts carry a much heavier load than is necessary and work much harder without delivering any more power than properly installed chain. This causes rapid chain wear because of increased pressures in the joints. In addition, this condition overloads and accelerates wear in the shaft bearings.

Recommended Locations Of Chain Take-Ups

On drives where it is not practical to have adjustable centers, or where longer center distances might cause the slack side of the chain to strike an obstruction or "whip", the installation of a chain take-up is recommended. The sketches shown here illustrate proper locations for most efficient operation.





Chain Elongation

Wear on the pin outside diameter and bushing inside diameter causes chain elongation. Once the chain has elongated or worn past acceptable limits, jumping of sprocket teeth and/or improper chain-sprocket interaction can be expected. Typical allowable elongations are 3 - 5% of chain pitch for drive chains used with sprockets having up to 60 teeth. After the chain has elongated or worn past acceptable limits, it should be replaced.

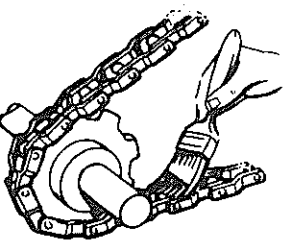
Drive Chain Maintenance Procedures

Lubrication

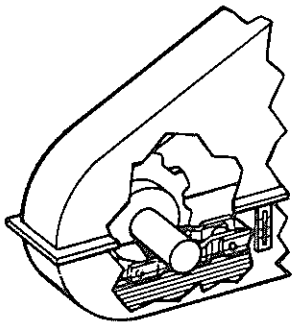
Lubrication is essential for maximum chain & sprocket life. Drive chains can and should be lubricated.

Lubrication effectiveness will vary with the amount of lubricant used and frequency of application. Ideally, a lubricant film should constantly be maintained between working parts.

Where manual lubrication is the approach of choice, lubrication should be applied once a week when the chain is not under load. It is important to get the lubrication between the pin and the bushing and between the roller and the bushing. The chain is under the least load after it leaves the driver sprocket. This area will contain a catenary sag and this is the area to which manual lubrication should be applied



MANUAL LUBRICATION



OIL BATH LUBRICATION

Chains operating at relatively high speeds should be completely enclosed in an oil case. The lower strand of the chain should just dip into the oil when the chain is running. Maintain the proper oil level. Excess oil causes churning and heat.

For best results clean chain and sprockets periodically.

Type Of Lubricant

Greases will not penetrate the bearing areas and are not recommended for lubricating.

Oil should be used. The viscosity must be high enough to allow the lubricant to work into the chain. SAE 30 is considered a good general chain lubricant.

Temp. Deg. F.	Lubricant
20 - 40	S.A.E. 20
40 - 100	S.A.E. 30
100 - 120	S.A.E. 40
120 - 140	S.A.E. 50

Chain Cleaning

Perodic cleaning of chain and sprockets to remove caked lubricants and trapped dirt and grit will add substantially to sprocket and chain life.

The method of cleaning will depend on the application environment.

Several suggested methods are:

— Removal and washing of chain and sprockets in a suitable cleaning solution.

— Brush chain and sprockets manually or with automatic equipment to remove debris.

— Steam cleaning.

After cleaning, allow adequate time for chain to dry. Cleaning frequency will depend on service conditions.
After cleaning, always relubricate chain and sprockets thoroughly.

When cleaning, always check chain and sprockets for signs of wear and corrosion.

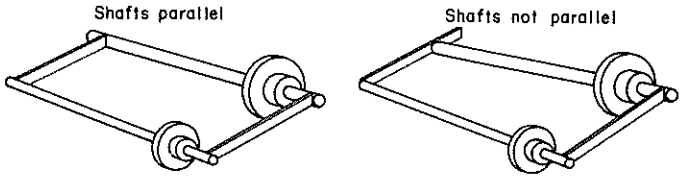
CAUTION

A chain guard or other protection should be installed where dust, dirt, abrasives, corrosion, or elevated temperatures are present.

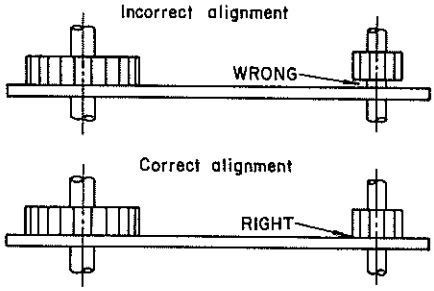
Danger Of Worn Sprockets

Chains cannot be efficient or durable if used with worn or faulty sprockets. It is, therefore, important to inspect sprockets regularly for wear and alignment.

1. Chains and sprockets must mate, with each having exactly the same pitch.
2. Be sure shafts are set parallel and level in rigidly supported bearings.



3. Sprockets must be mounted squarely and securely on their shafts.



4. Never run new chain over sprockets with worn or "hooked" teeth. This practice reduces chain life very rapidly by increasing internal chain loads. Excessive wear and even breakage results.

5. Never run badly worn chain on new sprockets. In this case, the sprocket pitch is shorter than the chain pitch, and correspondingly just as worn sprockets hurt good chains, worn chain will cause premature wear and reduce wear life of new sprockets.

6. On single direction drives only one side of the tooth wears. If not too badly worn, the sprockets can be reversed to put the unworn tooth face to work. This is practical, since sprocket teeth are symmetrically designed. **However, we recommend caution in reversing sprockets on high-speed drives. Do not reverse when the back sides of teeth show any signs of wear.**

7. It is recommended that the driver sprocket have hardened teeth for maximum wear life.

Maintenance Check Chart For Rex Drive Chains

A. Excessive Noise

Possible Causes

1. Misalignment of sprockets
2. Too little or too much slack
3. Inadequate lubrication
4. Loose casings or bearings
5. Chain or sprocket worn out
6. Too large a chain pitch size

What To Do

1. Check alignment and correct
2. Adjust centers for proper slack, or idler take-up
3. Lubricate properly ... check lubricating mechanism to be sure oil is reaching all moving parts
4. Draw up all bolts, and brace casings if necessary
5. Replace chain and/or sprocket (some sprockets can be reversed — see page 11.
6. Check chain drive recommendation chart

B. Wear On Chain Side Bars Or Link Plates And Sides Of Sprocket Teeth

Possible Causes

1. Misalignment

What To Do

1. Remove chain and correct alignment of sprockets and shafts

C. Chain Climbs Sprockets

Possible Causes

1. Poor fitting of chains on sprockets
2. Chain worn out
3. Insufficient chain wrap
4. Excessive chain slack
5. Material build-up in sprocket tooth pockets

What To Do

1. Make sure sprocket bottom diameters are not oversize
2. Replace chain and sprockets (some sprockets can be reversed — see page 11)
3. Revise driver arrangement to get more sprocket teeth in contact with chain, or use idler take-up to increase wrap
4. Adjust centers or take-up for proper slack
5. Remove material build-up ... protect drive from contact with foreign material, or use sprockets with mud relief, pitch line clearance

D. Broken Pins, Bushings, Or Rollers

Possible Causes

1. Chain speed too high for pitch and sprocket size
2. Heavy shock or suddenly applied loads
3. Material build-up in sprocket tooth pockets
4. Inadequate lubrication
5. Chain or sprocket corrosion
6. Poorly fitting sprockets

What To Do

1. Use shorter pitch chain of equivalent or greater strength and/or check number of sprocket teeth to be sure it is within recommended limits for speed involved. Select a sprocket with increased number of teeth, if necessary
2. Reduce shock loads (easy starts assure longer life)
3. Remove material build-up (see C-5)
4. Lubricate properly
5. Protect from corrosion
6. Check sprockets for wear and correct bottom diameter

E. Chain Clings To Sprockets

Possible Causes

1. Incorrect application or badly worn sprockets
2. Heavy or tacky lubricants
3. Material build-up on driver sprocket tooth pockets

What To Do

1. Replace chain and sprockets (some sprockets can be reversed - see page 11)
2. Clean and lubricate properly
3. Remove material build-up (see C-5)

F. Chain Whip

Possible Causes

1. Excessive chain slack
2. High pulsating loads
3. One or more stiff chain joints

What To Do

1. Install chain take-up or idler, or adjust centers
2. Reduce load where possible or replace chain with one of suitable strength
3. Remove stiff links, or drive back on pins to provide proper clearance between side plates (also see G-1 to G-6)

G. Chain Gets Stiff

Possible Causes

1. Misalignment
2. Inadequate lubrication — causes wear
3. Corrosion
4. Excessive overloads
5. Material build-up in chain joint
6. Peening of side plate edges

What To Do

1. Check sprocket and shaft alignment (see C-1)
2. Remove chain if dirty or corroded ... clean and lubricate properly
3. Protect chain from corrosion
4. Reduce excessive overloads
5. Protect chain with case ... clean and lubricate more often
6. Check for chain interference and correct

H. Broken Sprocket Teeth

Possible Causes

1. Obstructions, or foreign material in chain cases
2. Excessive shock loads, especially with small, cast iron sprockets
3. Chain climbing sprocket teeth

What To Do

1. Check chain and sprocket clearances ... remove foreign material
2. Reduce excessive shock loads, or use steel sprockets
3. (See C-1 to C-5)

I. Cotters Come Out

Possible Causes

1. Vibration
2. Obstruction striking cotters
3. Cotters not installed properly (should be properly spread and drawn back snugly against side plate)

What To Do

1. Reduce vibration
2. Eliminate obstruction, or tap in ends back until cotter fits snugly against side plates, or use riveted chain
3. Correct faulty installation

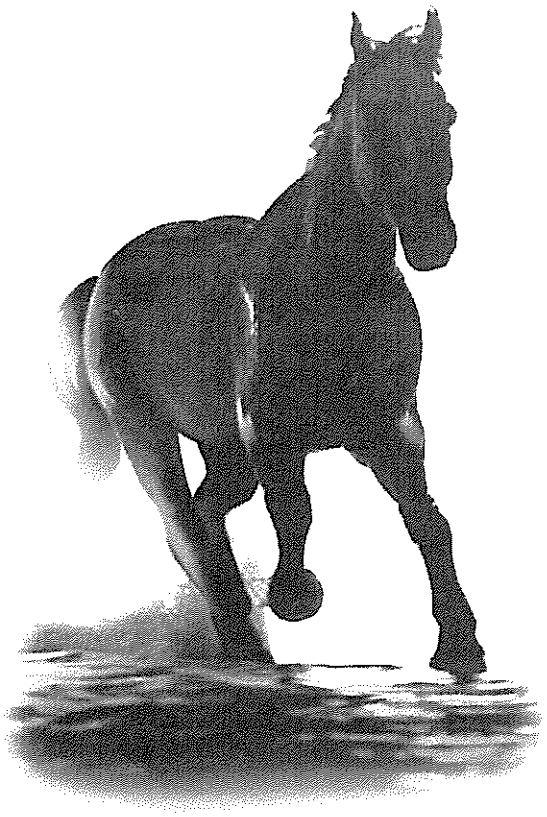
J. Chain Drive Runs Too Hot

Possible Causes

1. Operating in excess of recommended maximum speed
2. Insufficient amount of lubrication
3. Chain operating too fast for bath lubrication
4. Chain immersed too deeply in oil in bath lubricated drive
5. Chain or shafts rubbing against an obstruction or seal drag

What To Do

1. Check drive for recommended maximum speed for type of lubrication used
2. Increase volume of oil and/or cool oil in reservoir
3. Use oil stream system of lubrication
4. Adjust oil level to proper height
5. Remove obstruction against which chain rubs



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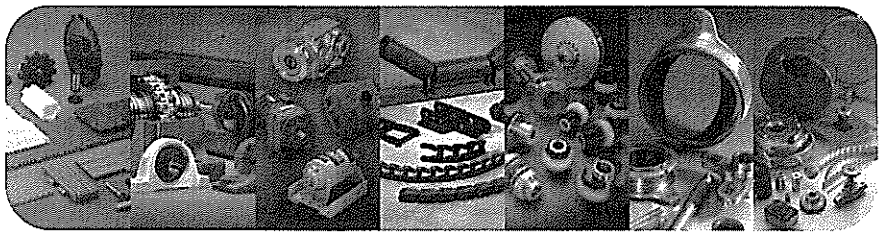

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