Operating and Servicing Manual

for

Ramsey Silent Chain Drives

Engineering Information

DESIGN SUGGESTIONS

Sprockets. For long life, sprockets should have a minimum of 21 teeth. For smoother, quieter drives use a larger number of teeth.

Drive Ratios. Ratios of 12:1 or greater are possible, but above 8:1 it is usually desirable to make the reduction in two steps.

Shaft Center Adjustment. Center adjustment to allow for wear is always desirable. It is particularly important in vertical center drives. Typically the amount of adjustment should equal at least 1% of the center distance.

Shaft Center Distance. The center distance should be great enough that the chain wraps the small sprocket at least 120 degrees. Center distances should generally not exceed 60 pitches.

Chain Length. Whenever possible, chain length should be an even number of pitches so an offset section can be avoided.

Tensioning Devices. An idler sprocket or shoe can often be used to maintain tension on fixed center drives.

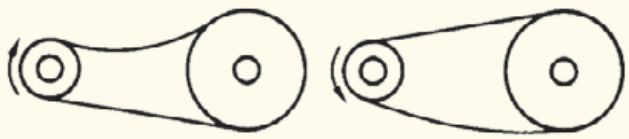
Chain Width. The use of a wider than recommended chain will result in a more rugged drive and improved drive life.

Drive Enclosures. Fully enclosed drives with proper lubrication are desirable for maximum service life and personnel safety.

Non-horizontal And Vertical Shafts. Drives using non-horizontal shafts often work best with side guide chain and an automatic tensioner. Consult Ramsey for specific recommendations.

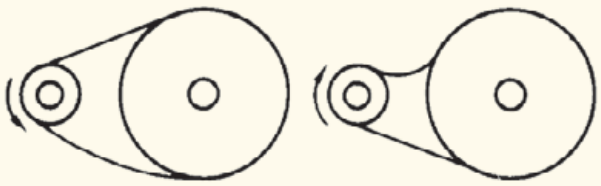
DRIVE POSITIONS

The preferred position for a drive is where a line between shaft centers is horizontal or inclined not more than 45 degrees. Under ordinary conditions the slack strand may be either on the upper or lower side of the drive.



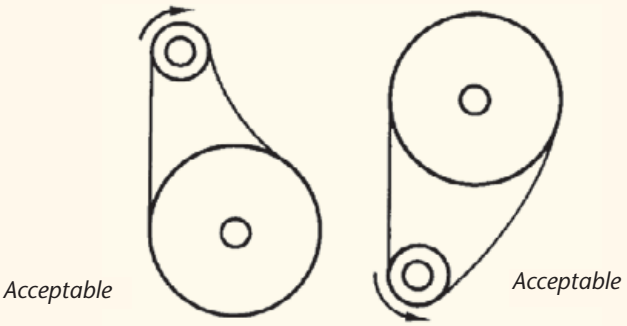
Acceptable *Acceptable*

Where the center distance is comparatively short, slack on the lower strand is preferable. With the slack on the upper strand there is a tendency for the chain to be forced out of proper engagement with the sprockets.



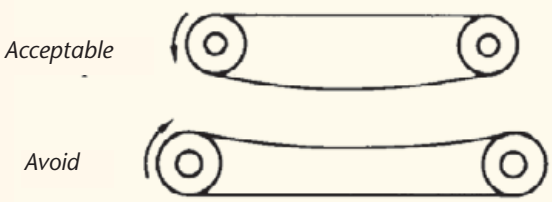
Acceptable *Avoid*

Vertical drives should be avoided if possible. They must be run fairly taut which means frequent adjustment of centers as the chain elongates due to normal wear. Less care and adjustment will be required if the drive can be positioned slightly off the vertical.



Acceptable *Acceptable*

Drives with long center distances and small sprockets should have the slack strand on the bottom. With the slack on top there is danger of the upper strand hitting the lower as the chain elongates.



Acceptable

Avoid

Lubrication

CHOOSE THE PROPER LUBRICANT

Proper drive lubrication is essential for a long service life. In sufficient quantities a lubricant penetrates chain joints to protect against corrosion, dissipate heat, cushion impact, and flush away debris. The chain width equations on page 24 presume that adequate lubrication is used.

For most applications a good grade of non-detergent petroleum based oil is recommended. Multiviscosity oils are not recommended. Generally greases and high viscosity oils are too thick to penetrate chain joints and should be avoided.

A chain which does not receive sufficient lubrication will wear prematurely. An early indication is the appearance of a reddish brown, iron oxide deposit on the chain. When this is found the method and/or quantity of lubricant should be improved.

Chain drives should also be covered or enclosed in a manner that will protect the oil from contamination by dirt or moisture. For best results oil should be filtered and cooled when necessary.

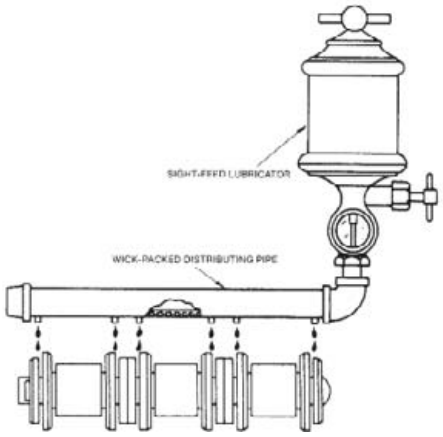
Ambient Temperature (° F)	Recommended Lubricant
< 40	SAE 5*
40-90	SAE 10*
> 90	SAE 20
* Type A or B Automatic Transmission Fluid may be substituted	

LUBRICATION METHODS

Type I - Manual And Drip Lubrication

Oil is applied periodically to the inside of the chain with a brush, drip tube, or oil can. With a drip feed system, one oil drop opening should be provided for each 0.75 inches of chain width. The volume and frequency of lubrication should be enough to prevent chain overheating or discoloration.

This method may be suitable for applications involving low speeds and loads, or short duty cycles. It is not generally recommended for chain speeds exceeding 1,000 ft/min.



Warning: Do not attempt to manually lubricate or service any chain drive while it is operating. Serious injury could result.

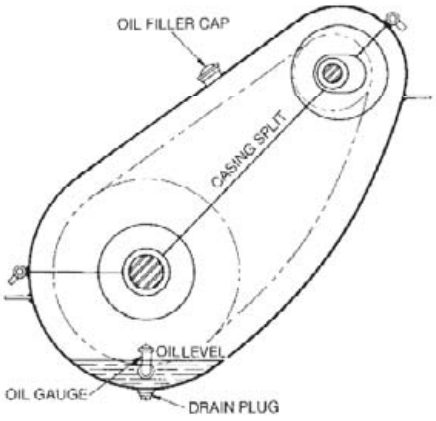
Lubrication

Type II - Bath and Disc Lubrication

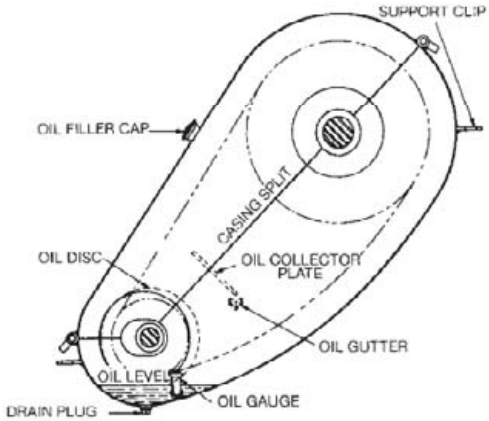
Bath-The lower strand of chain runs through an oil bath. The oil level should be such that the pitch line of the chain is just submerged. Also, to prevent excessive heat generation, only a short section of chain should run through the bath.

Disc-A rotating disc picks up oil from a reservoir and directs it to the chain by means of a baffle or trough.The chain is not submerged in oil. This method requires that the disc rim speed be between 800 ft/min and 8,000 ft/min.

These methods may be suitable for chain speeds up to approximately 2,500 ft/min.



Oil bath lubrication



Slinger disc lubrication

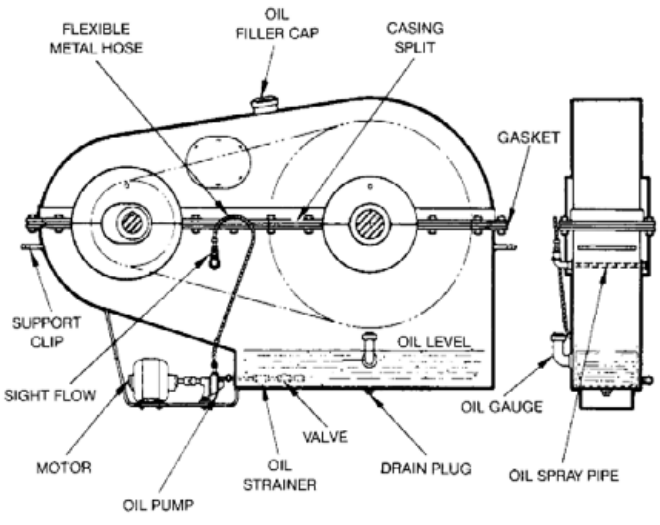
Type III - Force Feed Lubrication

Lubricant is supplied in a continuous stream by a circulating pump and distribution pipe. The oil should be directed to the inside of the slack strand with one oil stream for each 1 inch of chain width. This is the preferred method of lubrication, particularly for drives with heavy loads or speeds greater than 2,500 ft/min Recommended oil flow rates will vary depending on the application. The equation below lists minimum recommended flow rates based on the power transmitted. In general, oil flow rates should be 1 gallon per minute, for every 1 inch of chain width.

Minimum Flow Rates

$$F = \frac{Pw + 0.5}{200}$$

Where:
F = Flow rate in gallons per minute
Pw = Power transmitted in horsepower

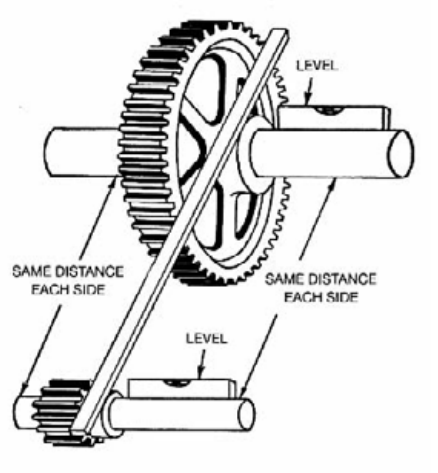


Installation Guidelines

DRIVE INSTALLATION

Shaft Parallelism

Shaft parallelism should be checked before installing sprockets. Typically shafts should be parallel to within 0.005 inches per foot. Ramsey should be consulted for applications where shafts are not horizontal.



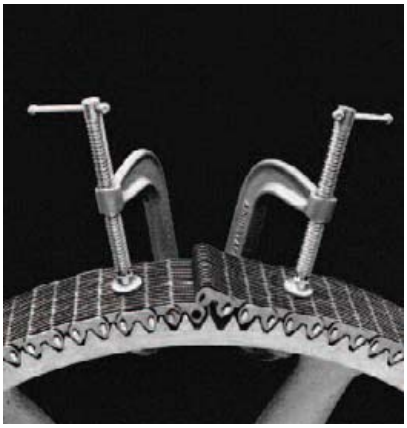
Sprocket Alignment

Sprockets should be aligned on the shafts so there is little or no lateral offset between sprocket faces. Excessive wear will result if the sprockets are not properly aligned.

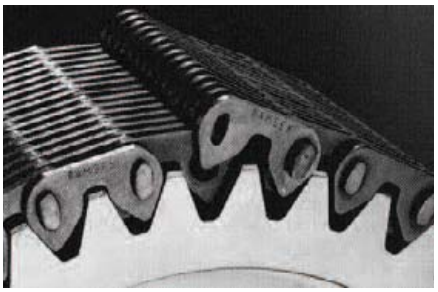
Chain Connection

A variety of connector styles are used in Ramsey chain, depending on the chain type and customer preference. See page 29 for illustrations of the most common styles.

During connection, It is very important that the ends of the chain be properly laced together and that the pins be inserted with their convex surfaces facing one another.



Chain clamped to the sprocket to simplify connection.



Symmetric chain lacing during connection

Tensioning

Chains must be properly tensioned at installation and checked periodically. Chain life will be shortened both by running too tight and running too loose. A chain which is too tight has an additional load imposed on it which will accelerate wear and increase noise. A chain which is loose enough to whip or surge can be subjected to shock loads and excessive wear.

On drives where the line between shaft centers is horizontal or inclined as much as 60 degrees from horizontal, the chain should be tensioned to allow a sag in one strand equal to approximately two percent of the shaft center distance. The chain should be taut in vertical or fixed center drives, and on drives subject to shock loads, reversing, or dynamic braking.

Chain Connection

CONNECTION

Once the links in each end are properly laced together, chain connection is completed by first inserting the longer pin and then the shorter pin. Position the pins so that the convex surfaces contact one another. Complete the connection by putting a washer or side link on the long pin where appropriate and then fasten with a spirol pin or cotter. Optional annealed connecting pins are available that are secured by peening over the pin end. The illustrations show the most common connection methods; other methods are available upon request.

For RPV and RP chains 3/8"- 1/2"pitch

Bring the ends of the chain together so the holes are aligned

Insert longer pin through the chain.

Insert short pin so convex pin surfaces are in contact

Install spirol roll pin

For RPV and RP chains 5/8"- 2" pitch

Bring the ends of the chain together so the holes are aligned

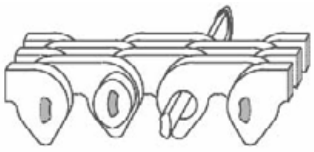
Insert longer pin through the chain.

Insert short pin so convex pin surfaces are in contact

Put washer on pin and install cotter or spirol roll pin

For SC Chains 3/8"- 1"pitch

Bring the ends of the chain together so the holes are aligned



Insert longer pin through the chain.

Insert short pin so convex pin surfaces are in contact

Put washer on long pin and install cotter.

Other chain connections are available

Warranty

Ramsey Products Corporation Warranty

Ramsey Products Corporation warrants its products to be free from defects in material and workmanship. If, within one year after shipment, a product of our manufacture is shown to have been defective when shipped, we will at our option refund the purchase price or replace the item with freight prepaid at lowest rate. Ramsey will in no event be liable for consequential damages, cost, or losses. A more complete warranty statement is available upon request.

Drive Maintenance

Inspection

Periodic drive inspection and adjustment will often result in increased service life and lower costs. An inspection should include sprocket alignment, tension, lubrication, and the general condition of chain and sprockets.

Tensioning and Elongation

As a chain wears, its pitch will elongate and the chain will wrap an increasingly larger pitch circle. Re-tensioning of the chain will normally eliminate problems associated with excess chain slack Also, with Ramsey chains this elongation occurs uniformly throughout the length of the chain so efficient, smooth operation is maintained.

However, when elongation becomes excessive the chain can skip teeth and damage the sprocket. It is best to replace the chain before this happens. The size of the large sprocket will limit the allowable elongation of the chain. In general, a chain will not properly wrap sprockets when it has elongated by 200/N % where N = the number of teeth in the larger sprocket. Other application related considerations may further limit the amount of acceptable elongation

Alignment

Sprocket alignment must be maintained for optimum drive performance and chain life. Examine the sides of the chain guide links for excessive wear or gouging; these are often symptoms of misaligned sprockets.

Periodically check that sprockets are securely fastened. If sprocket position has changed since installation go through the alignment procedure used during installation.

ENGINEERING FORMULAS

p = pitch in inches
Z = number of teeth in sprocket
V = chain speed in feet per minute
W = power in horsepower
N = revolutions per minute
P_d = pitch diameter in inches
L = working load in pounds
T = torque in inch pounds

$$W = \frac{TN}{63{,}025} \qquad L = \frac{396{,}000W}{pZN} \qquad T = \frac{LP_d}{2}$$

$$W = \frac{VL}{33{,}000} \qquad L = \frac{33{,}000W}{V} \qquad T = \frac{63{,}025W}{N}$$

$$P_d = \frac{p}{\sin(180/Z)} \qquad V = \frac{pZN}{12}$$

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