Martin

SPROCKET & GEAR, INC.

MAINTENANCE & TROUBLESHOOTING GUIDE

WARNING & SAFETY REMINDER

Safety must be considered a basic factor in machinery operation at all times. **Most accidents are the results of carelessness or negligence**. All rotating power transmission products are potentially dangerous and must be guarded by the contractor, installer, purchaser, owner, and user as required by applicable laws, regulations, standards, and good safety practice. Additional specific information must be obtained from other sources including the latest editions of American Society of Mechanical Engineers; Standard A.N.S.I. B15.1. A copy of this standard may be obtained from the American Society of Mechanical Engineers at 345 East 47th Street New York, NY 10017 (212705-7722).

It is the responsibility of the contractor, installer, purchaser, owner, and user to install, maintain, and operate the parts or components manufactured and supplied by Martin Sprocket & Gear, Inc., in such a manner as to comply with the Williams-Steiger Occupational Safety Act and with all state and local laws, ordinances, regulations, and the American National Standard Institute Safety Code.

CAUTION

Guards, access doors, and covers must be securely fastened before operating any equipment.

If parts are to be inspected, cleaned, observed, or general maintenance performed, **the motor driving the part or components is to be locked out electrically in such a manner that it cannot be started by anyone,** however remote from the area. Failure to follow these instructions may result in personal injury or property damage.

WARNING

NOTE: CATALOG DIMENSIONS

Every effort is made to keep all catalog dimensions and styles current; however, from time to time, it is necessary because of manufacturing changes to alter stock products dimensionally.

If any stock product dimension or style shown in this catalog is critical to your application please consult factory for certification.

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Introduction to Martin Sprocket & Gear Indexed Troubleshooting Guide

CHAIN DRIVES

Type Maintenance	What To Do
Lubrication — Type A	Manual Lubrication, oil applied periodically brush or spout can. Drip lubrication, oil applied between link plates edges from a drip lubricator.
Lubrication — Type B	Oil bath or oil slinger, oil level maintained in casing at predetermined height.
Lubrication — Type C	Oil stream, oil supplied by circulating pump inside chain loop on lower span.
Check for Chain Stretch	If elongation is in excess of 3%, replace with new chain. Check length after first 1,000 hours.
Check Sprocket	If teeth have a hooked appearance, replace. Initial inspection 24 hours, second 100 hours, third 500 hours. Periodically thereafter, check chain length, may be elongated.
Check Alignment	If wear is apparent on inner surface of roller link side-bars and on sides of sprocket teeth, there is misalignment. Realign sprockets.

Troubleshooting	Corrective Action
Broken Sprocket Teeth	If cast iron, replace with Martin stock steel sprockets (available hardened in pinion sizes). Reduce shock load or redesign and replace with a larger drive. Correct any misalignment. Replace sprocket, might be excessively hardened. Should be RC40-50.
Wear on Sprockets or Rollers Nonsymmetrical	Realigning nonparallel shafts or shafts not in same plane. Shafts might be bent, or shaft bearings worn.
Wear on Side of Sprocket Teeth or Inside of Roller Plates	Sprockets are offset or not parallel and should be realigned.
Wear on Tips of Sprocket Teeth	Chain elongation is excessive and chain should be replaced.
Chain Climbs Sprocket	Chain does not properly fit sprocket. Check sprocket bottom diameters and replace if necessary. Chain may be stretched more than 3%. If sprocket worn, replace chain and sprocket or replace chain if worn. Redesign drive for more teeth in contact if insufficient chain wrap. Or use Martin chain tighteners. Should have at least 17 teeth in small sprocket. Provide cover for chain drive when material builds up in the tooth pocket of the sprocket. Or "mud reliefs" may be helpful.
Excessive Noise	Check sprocket alignment. Lubricate chain and sprocket drive. Replace chain and/or sprocket(s) if worn. Driver should have hardened teeth. Tighten and align supports, casing, and chain when moving parts contact stationary parts.
Excessive Link Plate Wear and/or Sides of Sprocket Teeth	Realign drive.
Excessive Vibration	Possible broken or missing roller. Replace or repair chain. Check shaft bearing supports, bearings may be worn or broken.

GEAR DRIVES

Type Maintenance	What To Do
Proper Lubrication	As recommended by your lubrication supplier, contact for details.
Inspect for Wear and Alignment	Initial inspection 24 hours, second 100 hours, third 500 hours. Once a year thereafter. Check tooth contact pattern for full face contact.

Troubleshooting	Corrective Action
Excessive Gear Wear	Check H.P. requirement for possible replacement with hardened gears of same size. Or replace with gears having greater face width. See Martin Catalog - Gear Section. Possible redesign of drive with more capacity. Check Martin Catalog - Gear Section. Check environmental abrasiveness, provide cover as needed with replacement of hardened gears. Check for proper lubrication.
Excessive Drive Noise	Check gear set for proper backlash. Adjust as necessary. Misaligned drive. Worn gears, replace as necessary. Drive speed too high, check pitch line velocity.
Gear Breakage	Eliminate overload or shock load conditions. Replace drive with wider gears or 20° P.A. gears. Provide adequate cover for environmental material surrounding drive.
Disfiguration of Gear Tooth	Remove overload condition. Replace with hardened gears or wider gears.

CHAIN COUPLINGS

Type Maintenance	What To Do
Lubrication	Check after initial 100 hours for leakage. Change lubricant once per year thereafter.
Check Alignment	Disassemble after initial 100 hours, check for excessive wear. If misaligned, wear patterns will appear very uneven. If necessary, realign shafts and replace worn coupling parts.

Troubleshooting	Corrective Action
Premature Chain Wear	Provide adequate lubrication, provide with sealed cover for longer life. Check for excessive radial misalignment and/or excessive end float. Realign shafts to eliminate most of misalignment. Check for sudden shock loads. If they are present then it may be necessary to change from chain couplings to more flexible type couplings such as Martin "Q.D." Flex or Quadra-Flex.
Chain Breakage	Provide adequate lubrication, provide with sealed cover for longer life. Check for excessive radial misalignment and/or excessive end float. Realign shafts to eliminate most of misalignment. If not provided with cover, check for foreign objects near or in coupling, provide with cover. Check for sudden shock loads, if present go to larger coupling or go to more flexible type couplings such as Martin "Q.D." Flex or Quadra-Flex.
Excessive Noise	Check chain and sprockets to make sure not worn, or have broken pin link. Replace if necessary, chain may be striking inside of cover.

JAW COUPLINGS

Type Maintenance	What To Do
Jaw Breakage	Buna-N Insert failed causing metal to metal contact. Replace with hytrel or urethane spiders. Hytrel withstands oil products better than urethane or Buna-N. Hytrel will not withstand hot water. Urethane withstands water better. Eliminate overload or shock load conditions. Replace drive with new MS jaw coupling. Carries approximately 20% higher capacity.
Rubber Element Failure	Buna-N insert failed due to horsepower applied to coupling greater than insert can withstand. Replace with Hytrel spider, which can withstand 3 times Buna-N horsepower capacity. Check misalignment. Coupling can only handle up to 1° angular misalignment.
Excessive Drive Noise	Check jaw set for proper fit. May have wrong insert in coupling. Misaligned drive. Worn couplings, replace as necessary. Drive speed too high, check shaft rpm.

QUADRA-FLEX COUPLINGS

Type Maintenance	What To Do
Element Failure	Check for alignment. Can handle up to 1° angular and up to .062 parallel offset misalignment. Check for proper installation. May be installed in an application not suited for the coupling; i.e., an internal combustion engine, reciprocating pump, compressor, or fan and propeller blades.
Teeth Worn on One or Both Sides of Sleeve	Caused by excessive misalignment. Realign coupling. Improper service factor. Check design, go to larger coupling.
Sleeve Ruptured	Caused by shock loads. Use a larger coupling. Critical speed. Check for excessive vibrations.
Wire Ring Comes Loose	Caused by overload. Use a larger coupling.
Excessive Compression Set or Permanent Wind-up	Caused by overload. Use a larger coupling.
Crack in Sleeve at 45°	Caused by flex fatigue. Normal mode of failure, if premature use a larger coupling.
Sleeve Thrown Out of Coupling	Caused by shock load. Unjam machine, check for misalignment. Caused by overspeed. Reduce speed of coupling.
Element Deteration	TPR (Thermo-Plastic Rubber) can operate in conditions of extreme temperatures -50°F to +250°F and in oily or wet conditions. Neoprene can operate in temperatures of 0°F to +250°F. Hytrel can operate in temperatures of -65°F to +250°F and oily conditions. Hytrel will not withstand hot water. If elements are deteriorating due to heat or solvents check sleeve chemical resistance from table in Martin catalog #1090 page C8.

SYNCHRONOUS DRIVES
HTS DRIVES

Type of Failure	Probable Cause	Corrective Action
Excessive Edge Wear (Exposed Tensile Member)	Misalignment or nonrigid centers.	Check alignment and/or reinforce mounting.
	Bent flange.	Straighten flange.
Jacket Wear on Pressure-Face Side of Belt Tooth	Excessive overload and/or excessive belt tightness.	Reduce installation tension and/or increase drive load-carrying capacity.
Excessive Jacket Wear Between Belt Teeth (Exposed Tension Members)	Excessive installation tension.	Reduce installation tension.
Cracks in Neoprene Backing	Exposure to excessive low temperature (below 30°F).	Eliminate low temperature condition or consult factory for proper belt construction.
Softening of Neoprene Backing	Exposure to excessive heat (+200°F) and/or oil.	Eliminate high temperature and oil condition or consult factory for proper belt construction.
Tensile or Tooth Shear Failure	Small or sub-minimum diameter pulley.	Increase pulley diameter of use next smaller pitch with same P.D.
Indicating Corrosion of Tension Member (rust)	Extreme humidity.	Eliminate humidity or refer to factory for belt construction.
	Acid or caustic atmosphere.	Refer to factory for belt construction.
Excessive Pulley Tooth Wear (On Pressure-Face and/or O.D.)	Excessive overload and/or excessive belt tightness.	Reduce installation tension and/or increase drive load-carrying capacity.
	Insufficient hardness of pulley material.	Surface-harden pulley or use harder material.
Unmounting of Flange	Incorrect flange installation.	Reinstall flange correctly.
	Misalignment.	Correct alignment.
Excessive Drive Noise	Misalignment.	Correct alignment.
	Excessive installation tension.	Reduce tension.
	Excessive load.	Increase drive load-carrying capacity.
	Sub-minimum pulley diameter.	Increase pulley diameter.
Tooth Shear	Less than 6 teeth in mesh (TIM).	Increase TIM or use next smaller pitch with same P.D.
	Excessive load.	Increase drive load-carrying capacity.
Apparent Belt Stretch	Reduction of center distance or nonrigid mounting.	Retension drive and/or reinforce mounting.
Cracks or Premature Wear at Belt Tooth Root	Improper pulley groove top radius.	Regroove or install new pulleys.
Tensile Break	Excessive load.	Increase load-carrying capacity of drive.
	Sub-minimum diameter.	Increase pulley diameters.

Note: When HP rating is adequate, using multiple belts in matched sets rather than a single wide belt will reduce sound emission. Effective noise reduction for power transmission drives can be accomplished by incorporating a flexible noise-absorbing material such as acoustical-grade glass fiber with the protective guard. The guard design must allow a cooling air passage on the top and bottom to prevent overheating the drive.

SYNCHRONOUS DRIVES
TIMING BELT DRIVES

Type of Failure	Probable Cause	Corrective Action
Teeth Wearing Unevenly	Shafts might not be parallel causing belt to pull one side. Abrasion material may be on teeth or enmeshed into belt.	Check alignment of shafts.
Belt Breakage	Improper sized for torque loading.	Check proper sizing procedures.
	Too much load.	May be severe shock load, may need to go to chain drive instead of belt drives.
	Underdesigned drive.	Redesign drive.
	Sharp bend damaged tensile cord.	Follow proper storage and handling procedures.
	Belt was pried or forced on the drive.	Follow proper installation procedures.
	Foreign object in drive.	Shield drive.
	Belt runs onto pulley flange.	Align pulleys.
Apparent Belt Stretch	Reduction of center distance or nonrigid mounting.	Retension drive and/or reinforce mounting.
	Pulley teeth poorly machined or worn.	Replace pulleys. Install cover if drive is dusty.
	Sudden equipment stops.	Increase deceleration time or redesign drive.
	Belt does not engage pulley teeth.	Retension drive.
Tooth Shear	Less than 6 teeth in mesh.	Redesign drive, install back side idler, or use next smaller pitch.
	Excessive load.	Redesign drive.
Tensile or Tooth Shear Failure	Pulley diameter too small.	Increase pulley diameter or use next smaller pitch.
	Exposure to acid or caustic atmosphere.	Protect drive or ask Martin about special construction belt.
Excessive Pulley Tooth Wear (On Pressure Face and/or O.D.)	Drive overload and/or excess belt tension.	Reduce installation tension and/or increase drive load carrying capacity.
	Insufficient hardness of pulley material.	Use harder material or surface-hardened pulley.
Excessive Jacket Wear Between Teeth, Exposed Tensile Cord	Excessive installation tension.	Reduce installation tension.
Excessive Noise	Misalignment.	Realign drive.
	Excessive installation tension.	Reduce tension.
	Excessive load.	Increase drive load carrying capacity.
	Pulley diameter too small.	Increase pulley diameter.
Cracks in Belt Backing	High temperatures.	Improve ventilation, remove heat source, or check with Martin for special construction belt.
Softening of Backing	Excess heat (over 200°F) and/or oil.	Lower ambient temperature, protect from oil, or ask Martin about special belt construction.
Excessive Edge Wear	Misalignment or nonrigid centers.	Realign drive and/or reinforce mounting.
	Bent flange.	Straighten flange.
Unmounting of Flange or Flange Wear	Incorrect flange installation.	Install flange correctly.
	Misalignment.	Realign drive.

V-BELT DRIVES

V-BELTS — Short Belt Life

Type of Failure	Probable Cause	Corrective Action
Rapid Failure With No Visible Reason	Worn sheave grooves (Use groove gauge to check).	Replace sheaves.
	Tensile cord damage through improper installation.	Replace all belts with a new set, check for proper installation.
	Drive is underdesigned.	Redesign drive.
	Wrong type or cross section belt.	Replace all belts with correct type, check for proper installation.
	Sheave diameter too small.	Redesign drive.
	Foreign substance caught between belts and sheave.	Shield the drive with drive guard.
Soft, Sticky, Swollen Sidewalls Low Adhesion Between Plies	Oil or grease on belt or sheave.	Clean belts and sheave with degreasing agent or detergent and water. Remove source of oil or grease.
Dry, Hard Sidewalls. Use Low Adhesion Between Plies. Cracked Belt Bottom	Excessive high temperature.	Remove heat source. Improve ventilation.
Deteration of Rubber	Belt dressing being used.	Don't use belt dressing. Clean belts and sheaves with degreasing agent or detergent and water. Tension belts properly.
Rapid Sidewall Wear	Worn or damaged sheaves.	Replace sheaves.
Broken Belts	Foreign object in drive.	Shield drive with drive guard.
Spin Burns	Belts slip under starting or stalling load.	Check belt tension — retension drive if necessary.
	Sheave diameter too small.	Redesign drive.
	Load miscalculated — drive underdesigned.	Redesign drive.
Cut Bottom	Improper installation.	Replace all belts with a new set, check for properly installation.
	Foreign object in drive.	Shield drive with drive guard.
	Belt was run off sheave.	Check for proper tension and alignment.
Cracked Bottom	Excessive high temperature.	Remove heat source. Improve ventilation.
	Back side idler too small.	Replace with an inside idler on slack side, or redesign.
	Sheave diameter too small.	Redesign drive. Use cogged belts.
	Slippage.	Retension drive.
Extreme Cover Wear, Worn Corners	Sheaves rusted, sharp corners or burrs on sheaves.	Repair or replace sheaves.
	Dirt on belt.	Clean belt, shield drive.
	Sheaves misaligned.	Realign sheaves.
	Belts rub against guard or other obstruction.	Remove obstruction or check drive alignment.
	Improper tension.	Retension drive.

V-BELT DRIVES

V-BELTS — Short Belt Life

Type of Failure	Probable Cause	Corrective Action
Belts Stretch		
Belts Stretch Equally	Overloaded or under-designed drive.	Redesign drive.
	Insufficient take-up allowance.	Check take-up and follow guidelines.
Belts Stretch Unequally	Tensile cord broken from improper installation.	Replace all belts with a new set, check for proper installation.
	Misaligned drive.	Realign drive.
Belt Turnover	Misaligned sheaves.	Realign sheaves.
	Belt undertensioned.	Retension drive.
	Severe vibration and shock loads.	Use Combo belts.
	Incorrectly placed flat pulley.	Position idler on slack side of drive, as close as possible to driveR sheave.
	Worn sheave grooves (Use groove gauge to check).	Replace sheaves.
	Foreign material in grooves.	Shield drive with drive guard.
	Tensile cord broken from improper installation.	Replace all belts with a new set, check for proper installation.
Belt Noise	Belt slip.	Retension.
	Misaligned sheaves.	Realign sheaves.
	Wrong belt type.	Replace cut edge with wrapped belt.
Belt Vibration	Shock loads.	Use Banded or Combo belts.
	Incorrectly placed flat idler pulley.	Position idler on slack side of drive, as close as possible to driveR sheave.
	Distance between shafts too long.	Install idler.
	Belt lengths uneven.	Replace all belts with a new matched set.
	Belt too loose.	Retension drive.
Severe Slippage	Spin burns.	Retension drive.
	Too few belts.	Redesign drive.
	Arc of contact too small.	Install back side idler on slack side, or use timing belt.
	Oil or water on belt.	Clean belts and sheave, shield drive with drive guard.
Installation Problems		
Belts Too Long or Short at Installation	Design and/or belt selection error.	Check catalog for proper design and selection.
Belts Mismatched at Installation	Worn sheave grooves.	Replace sheaves.
	Mixed used and new belts.	Replace all belts with new belts.
	Mixed belts from different manufacturers.	Replace belts from the same manufacturer.
Hot Bearings		
Drive Overtensioned	Worn sheave grooves, belts bottom out.	Replace sheaves.
Sheave Diameter Too Small	Design error.	Redesign drive.
Sheaves Too Far Out On Shaft	Design error or obstruction.	Place sheaves as close to bearing as possible.
Improper DriveN Speed		
Incorrect DriveR to DriveN Ratio	Design error.	Redesign drive.

SCREW CONVEYOR — Product Failure

Type of Failure	Probable Cause	Corrective Action
Premature Trough Failure	Gauge too light.	Increase thickness. Consult Martin catalog materials table/component series for recommendation.
	Screw deflection.	Eliminate excessive deflection. Consult Martin catalog for calculation procedure to determine proper pipe size and screw length.
	Bent screw.	Straighten or replace. Check before operation.
Accelerated Flight Tip Wear	Gauge too light.	Increase thickness. Consider hardfacing.
	RPM too high.	Slow conveyor down. Consult Martin catalog engineering section to determine proper trough loading.
Coupling Shaft Breakage	Torque capacity insufficient.	Increase torque capacity or use larger shaft. Check motor amp demand for torque requirements.
Shaft Hole Elongation	Insufficient number of bolts.	Increase number of bolts.
	Conveyor subject to "jogging" or too frequent stop/start, or frequent overloads.	Cease jogging or frequent stop/start or overload. If this is not possible increase bearing capacity of shaft and/or increase number of bolts.
Drive Shaft Breakage	Excessive torque.	Recalculate HP requirements.
	Insufficient torque capacity.	Increase torque capacity.
	Obstruction in conveyor.	Check screw alignment.
Motor/Heaters Overload	Amp. demand excessive for motor.	Recheck horsepower calculations. Check material characteristics. Check capacity. Regulate feed.
Inlet Trough End Bearing Failure	Material getting into bearing.	Add or upgrade seal to keep material out of bearing. Change to outboard bearing.
	Insufficient lubrication.	Lubricate properly.
	Shaft slope.	Align screw. Check for excessive screw deflection and for bent screw.
Discharge Trough End Bearing Failure	Material getting into bearing.	Add or upgrade seal. Change to outboard bearing. Cut off flight at center of discharge.
Hanger Bearing Failure	Incorrect alignment.	Align hanger.
	Heat due to hot material being conveyed.	Use appropriate bearing material.
	Heat due to insufficient lubrication.	Properly lubricate.
	Thrust due to pipe pressing on bearing insert.	Check coupling bolts and holes for elongation and wear. Replace as necessary. Readjust screw/hanger assembly to get proper clearances.
	Improper material causing premature wear.	Consult Martin catalog for proper material due to temperature, trough loading, and speed. Check to ensure coupling shaft material and bearing material are compatible.

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