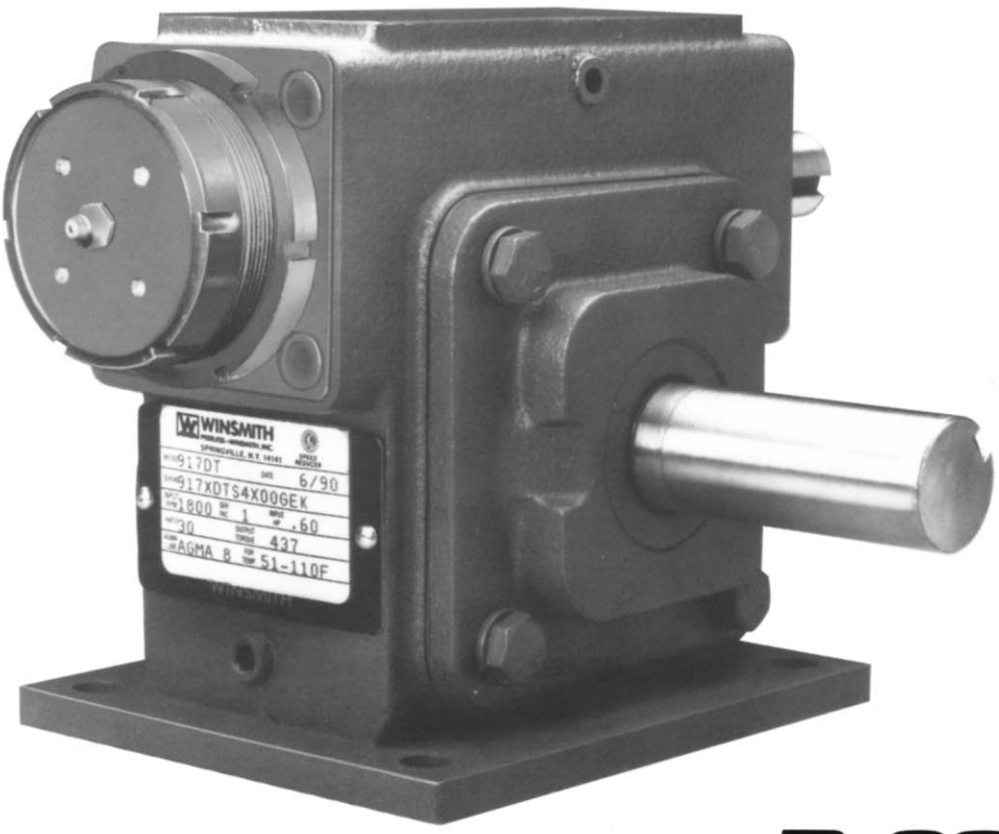
WINSMITH

ENGINEERING SERVICE BULLETIN

C-LINE & D-90® TYPE SE® S-ELIMINATOR

Easy To Adjust Very Low Backlash Worm Gear Speed Reducers



D-90 TYPE SE
SHOWN

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PEERLESS-WINSMITH, INC.

Information & Operation Instructions

This Enginering Service Bulletin is designed to enable users to obtain the best possible performance from their WINSMITH® Speed Reducers.

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INFORMATION

THE S-ELIMINATOR

Very Low Backlash Servo Ready Worm Gear Speed Reducers With Easy Field Adjustment Capability.

The Problem:

1. A motion/position control application has a load inertia that requires a large motor for inertia matching. The cost of the motor and required control and amplifier put the project in jeopardy.
2. A high cycling industrial application causes early failure or reduced system performance because the gearbox has developed too much backlash in the gearing. The cost of replacement and interruption in production is very high.

Both of these problems require a gear product that has very low backlash and is cost effective. Today there are very few products that include backlash below three arc minutes and reasonable costs. The solution today all too often ends up being an oversized product that is meant to insure application performance. These selections result in less than optimal system performance and more expense than is necessary.

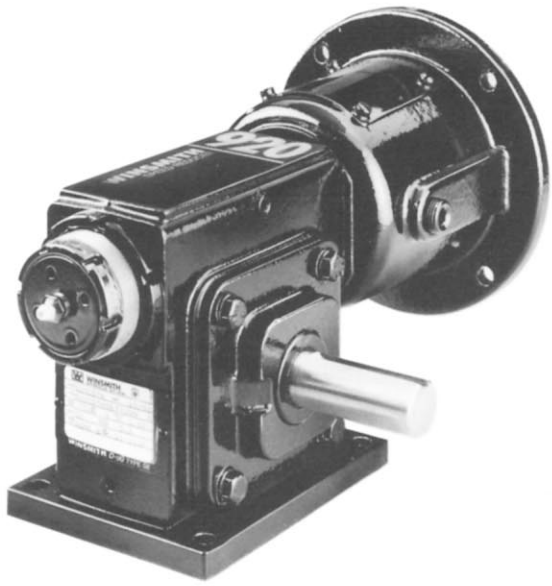
Many problems resulting from excessive backlash could be solved if the backlash could be adjusted out easily. Most of today's products offer a fixed backlash setting that can only be changed through taking the product out of service and replacing parts. This can cause down time and costly repairs.

Solution:

WINSMITH® has developed the very low backlash product, the S-ELIMINATOR, around the flexibility of our D-90® TYPE SE® product. This new S-ELIMINATOR product is shipped with one to two arc minutes of backlash. In addition, the unit backlash can be adjusted in the field very easily to insure the specification desired is maintained over the life of the unit. The product was developed with input flanges that can be easily modified to interface with most servo motor output flanges. This can be done within the normally short unit lead time of the S-ELIMINATOR.

The S-ELIMINATOR can be used to reduce the reflected inertia in a motion/position application at a very competitive price. This will allow a cost reduction in servo motor and related components. The performance of a worm gear product in a motion/position application is superior to most gear products on many critical issues.

The S-ELIMINATOR's low backlash reduces the wear on cyclic applications because of the reduced movement of gear components between cycles. This reduction in start-up backlash will have a dramatic impact on speed reducer life. The adjustability of the backlash allows for maintenance of the conditions that increases unit life. Also, it is not necessary to oversize the unit to add protection to the gear system.



Applications:

- Machine tools
- Indexing operations
- Converting equipment
- Robotic positioners
- Tension control
- Rotary tables
- Servo positioning
- Feed to length

Products:

- Available in D-90® TYPE SE® Center Distances 1.33″ through 3.50″ center distance.
- This special backlash product is also available for our C-Line, in 4.00″ through 9.00″ center distance.

Models:

Non-motorized single reduction units because of the need to have a two bearing system. NEMA C & servo style coupling motor adapters can be used to establish a motorized product.

Ratio:

Range—4:1-80:1.

Backlash:

Units shipped with between 1-2 arc minutes of movement. Units field adjustable to 1-2 arc minutes after wear has developed.

High Speed Bearing End Play:

Virtually none due to the axial control method used to control backlash.

OPERATION INSTRUCTIONS

Backlash adjustment on the S-ELIMINATOR is made possible by a unique worm design with a variable thread thickness. The worm thread begins with a standard thread thickness at one end which gradually increases over its length. By moving the worm axially, the clearance between the gear tooth space can be taken up by this gradually increasing thread thickness, thereby reducing backlash.

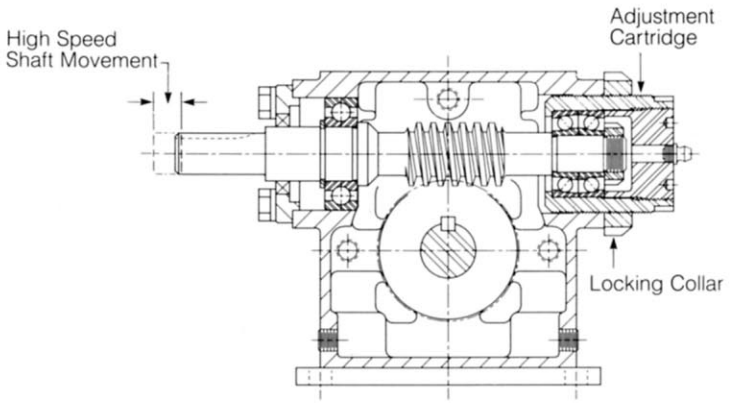
Two angular contact ball or tapered roller bearings are radially and axially clamped to the worm shaft in a threaded cartridge. This cartridge mates with a like thread in the housing. The cartridge is normally located opposite the input shaft (as pictured) but can sometimes be located on the input shaft side as a special. During initial assembly, the worm is axially positioned for the least possible backlash condition and locked in place with a locking collar. A non-hardening sealing compound is applied to the threaded surfaces to prevent oil leakage during storage and operation.

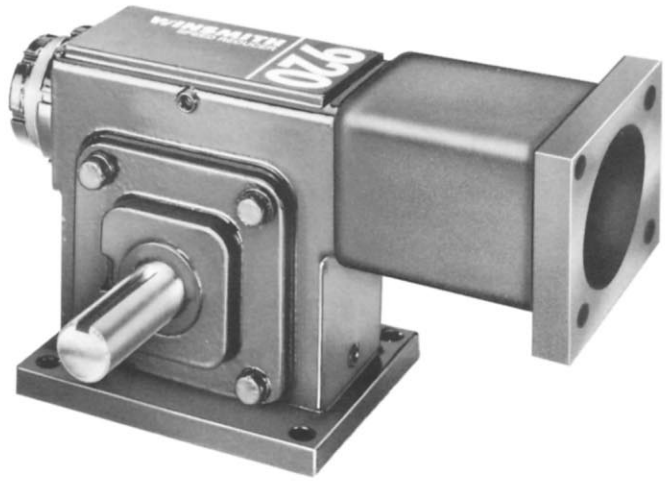
This non-hardening sealant will continue to protect the unit from leakage even after subsequent adjustments. These adjustments are easily accomplished without disassembly or even removal from the installation. First, any coupling attached to the input shaft must be loosened to allow unrestrained axial movement of the worm. Then loosen the locking collar, reposition the worm by rotating the adjustment cartridge clockwise (into the housing) in ¼ turn increments until the desired backlash is achieved and retighten the collar and coupling on the input shaft.

CAUTION: When repositioning the worm, avoid excessive force on the cartridge which could cause binding of the gear mesh and other internal damage.

The minimum amount of backlash that can be achieved is dependent on run-in time, operating conditions and component tolerance variations. During initial assembly, the worm is moved axially to a point where a slight tightness occurs between the worm and gear when manually rotated. In this position, the effects of tolerance variation (including runout of the rotating components) will also create a point of maximum backlash as the gear rotates. After some period of operation, the tighter spots will tend to diminish allowing the worm to be readjusted. After sufficient running time and subsequent adjustments, a condition of relatively uniform backlash will be achieved.

The degree of backlash adjustment will depend somewhat on the operating conditions. Intermittent operation or slow input speeds can accommodate an adjustment close to zero. However, units operating continuously at higher input speeds require some clearance between the worm and gear to allow for thermal expansion. If during operation, the housing temperature rises above 200°F while the unit load is still within the catalog thermal unit capacity, the backlash may be too tight.





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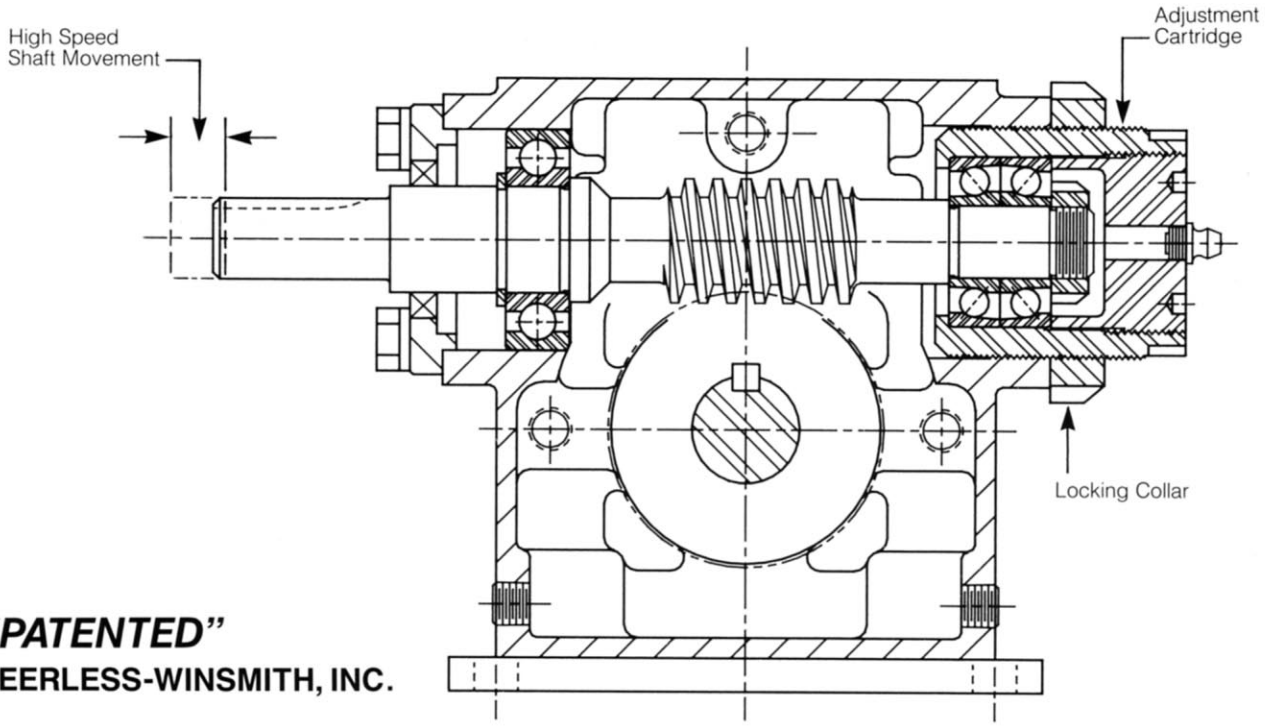
SPECIFICATIONS

THE S-ELIMINATOR SPEED REDUCER



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Description and Operation:
Worm gear speed reducer with the high speed end modified to allow for axial movement of the high speed shaft. One end of the housing high speed section includes an adjustable cartridge. The cartridge is used to hold the high speed shaft in mesh with the slow speed gear at a specific location in the axial plane of the high speed shaft.

The worm position is adjusted by loosening the locking collar and rotating the cartridge to achieve a new gear mesh location. Position is held by re-tightening the locking collar.

Specifications:
Center Distances:
1.33″, 1.75″, 2.00″, 2.625″, 3.00″, and 3.50″.

Backlash Adjustment:
Adjustable to 1-2 arc minutes maximum.

Axial Adjustment Movement:
3/8″ on smaller units up to 3/4″ on larger sizes.

Adjustment Precision:
Continuous movement as determined by setting.

High Speed Bearing End Play:
Virtually none.

PEERLESS-WINSMITH, INC.
SUBSIDIARY OF HBD INDUSTRIES, INC.
172 EATON STREET
SPRINGVILLE, NEW YORK 14141-1197
PHONE: 716/592-9310
FAX: 716/592-9546
WEB SITES: www.winsmith.com • www.hbdindustries.com
E-MAIL: winsmith@winsmith.com

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