



TIMING SYSTEM TECHNICAL CERTIFICATION TRAINING

Field Engineering | 2010

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Course Objectives

- » Elevation Crosstrainer Timing System:
 - ◆ Theory of operation
 - ◆ Components
 - ◆ Drive ratio
- » Replacement of Generator brake assembly
- » Replacement of Timing belt
- » Replacement of Drive belt
- » Resetting “timing” from one pedal lever to another
- » Common issues and concerns

Elevation Crosstrainer Timing System

Elevation 95X Cross Trainer



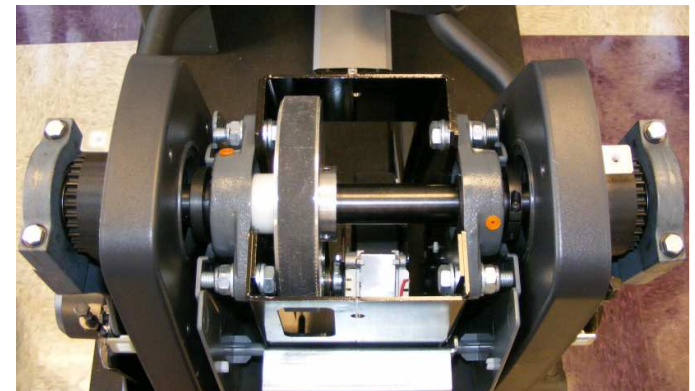
95X

Timing System | Technical Certification Training

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Theory of Operation

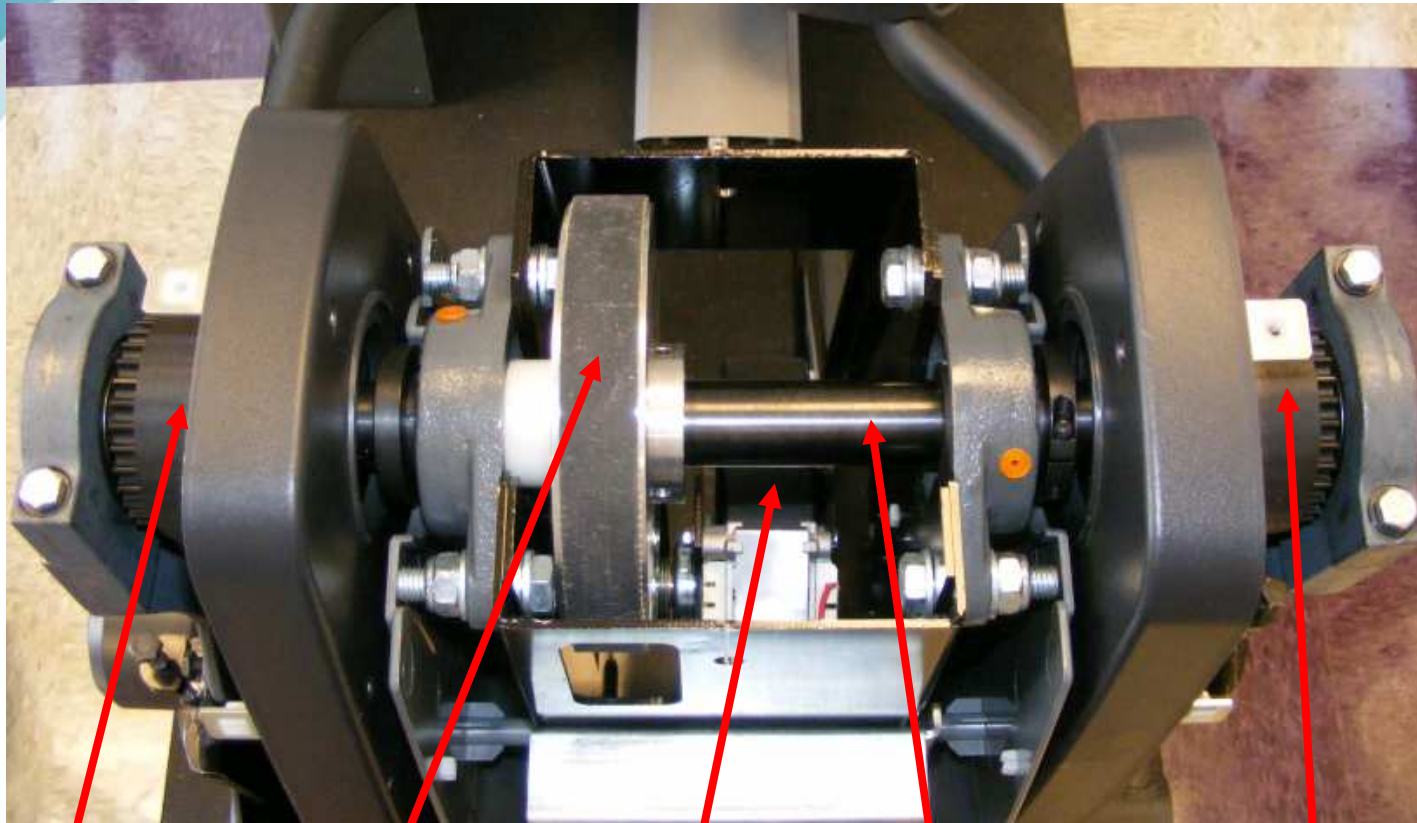
- » Dual stage drive system – Crank (lower timing) pulley, upper timing pulley, drive pulley, and generator brake pulley
- » Pedals are connected to the outer crank arms.
- » When the user pedals, that spins the crank pulley.
- » The crank pulley turns the upper timing pulley by means of a timing belt.
- » The upper timing pulley and drive pulley ride on a common drive shaft and rotate together.
- » The drive pulley turns the Generator pulley thru a poly-v drive belt.



Components & Drive Ratio

- » J type Poly-v non-stretchy drive and timing belts (HTD profile) are used
- » Idler assembly necessary to maintain tension for the timing belts
- » Tension bracket without idler assembly used to maintain tension for the drive belt
- » Final drive ratio = 0.097:1
- » Crank pulley, upper timing pulley, drive pulley, and GB pulley diameters and number of teeth (for timing belt) or ribs (for poly-v belt) can vary depending on final drive ratio at the GB and design parameters

Components – Visual Representation (1)



Timing belt

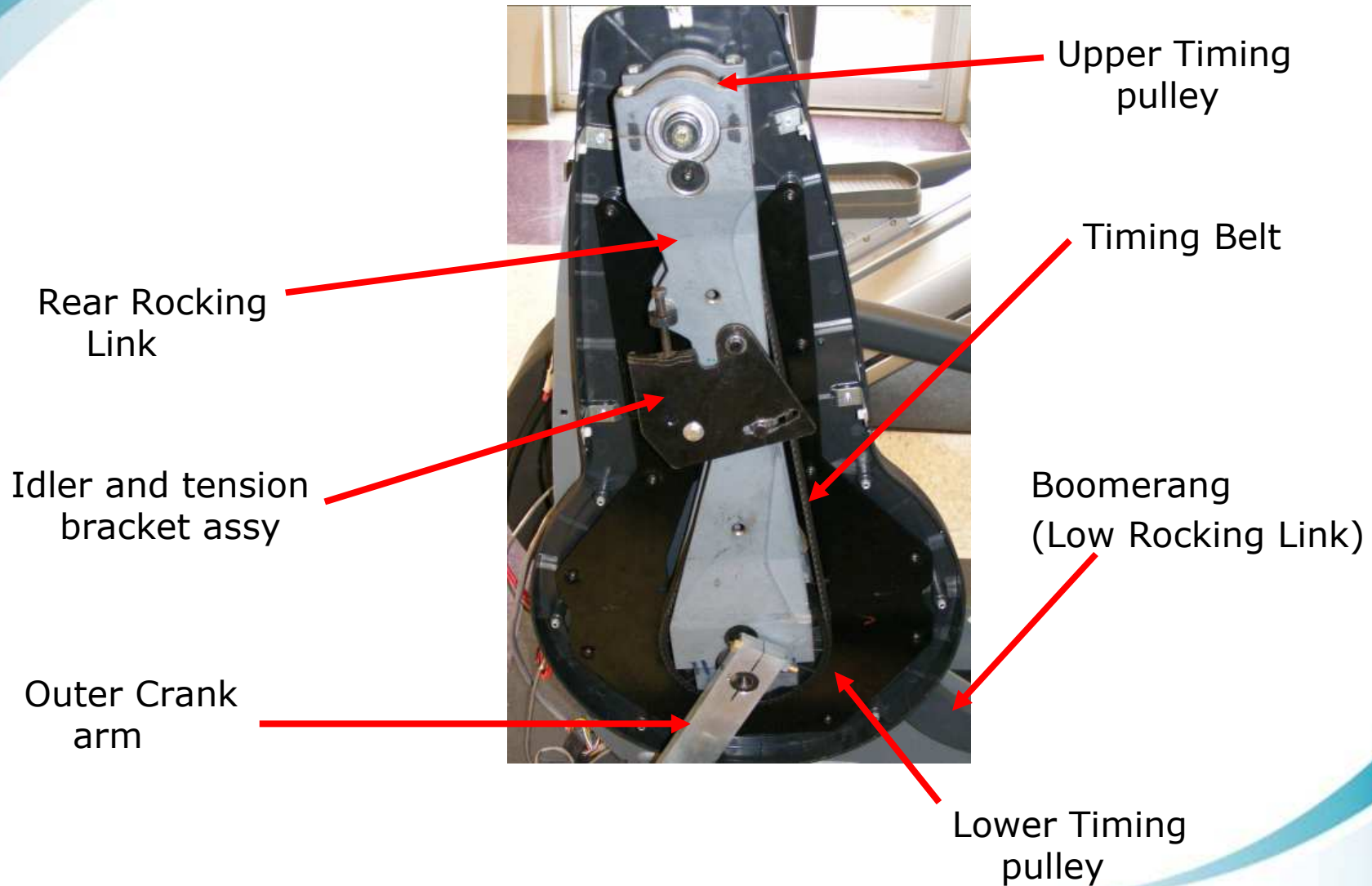
Drive Belt
and pulley

Generator
Brake

Drive shaft

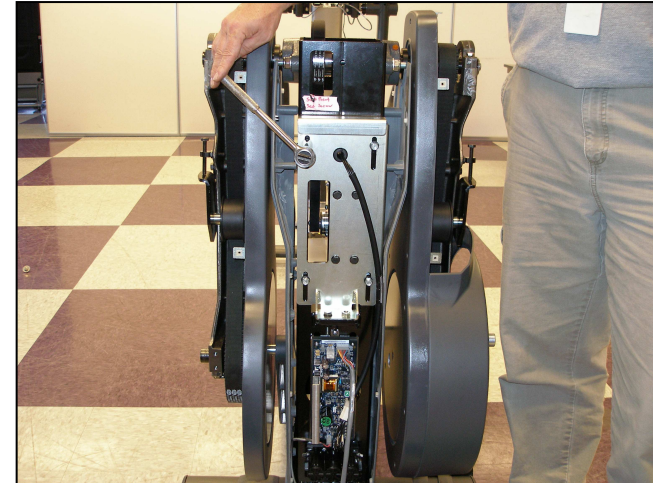
Upper timing
pulley

Components – Visual Representation (2)



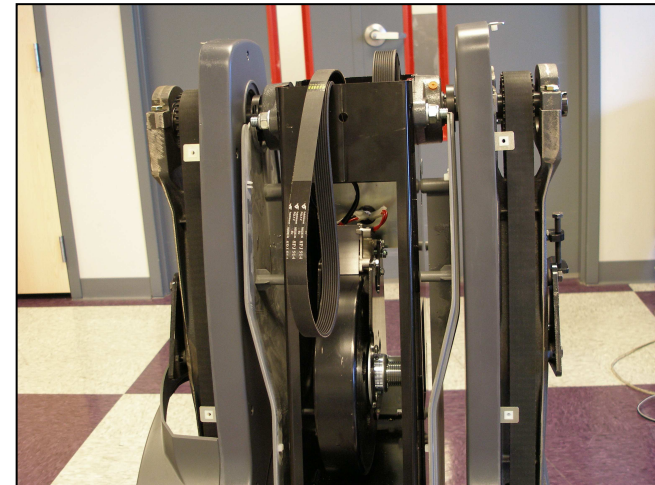
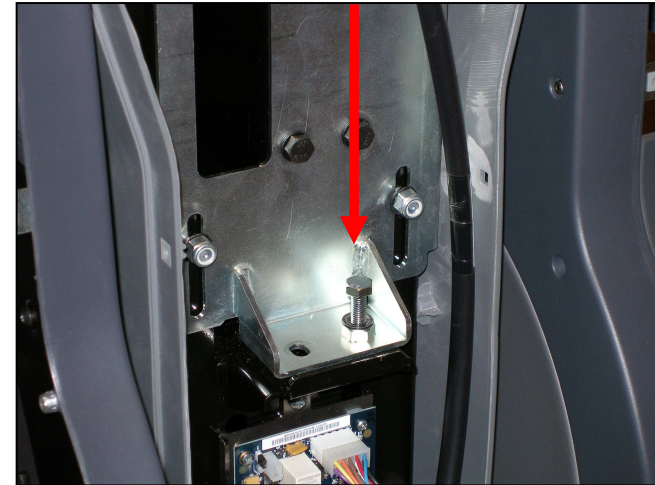
Generator Brake Removal (1)

- » Mark or Scribe line of the original position of the Generator Brake assembly bracket to the tower.
- » Loosen the four generator mounting **8mm** nuts.
- » Remove the **8mm** tension bolt completely from the hole in the left side of the mounting bracket.
- » **Tools required:**
 - » Phillips screwdriver
 - » Wire cutters
 - » 13mm socket and ratchet



Generator Brake Removal (2)

- » Insert the **8mm** tensioning bolt into the hole in the right side of the bracket and turn it clockwise.
- » This procedure tightens the bolt and raises the mounting bracket allowing the technician to easily remove the Poly-V belt from the generator pulley.



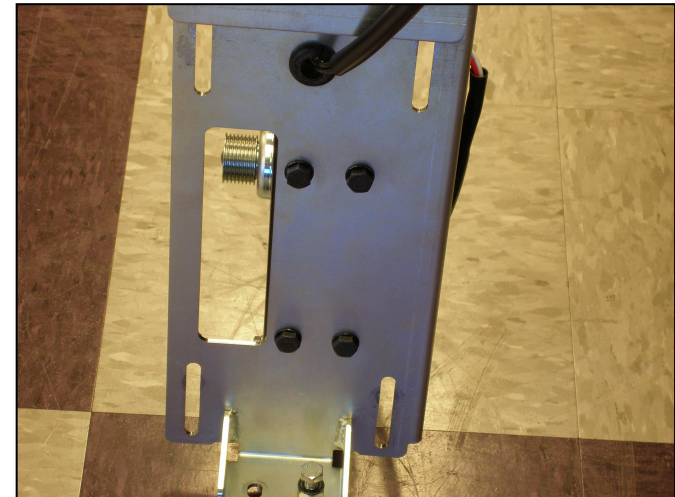
Generator Brake Removal (3)

- » Remove the previously loosened generator mounting nuts.
- » Disconnect the generator cables and remove the grommet from the mounting bracket.
- » Lift the generator/bracket assembly out of the tower.
- » Unscrew the four 8mm bolts securing the generator to the mounting bracket and remove the generator.
- » Caution: The generator brake assembly weighs approximately 35 lbs/16kgs.



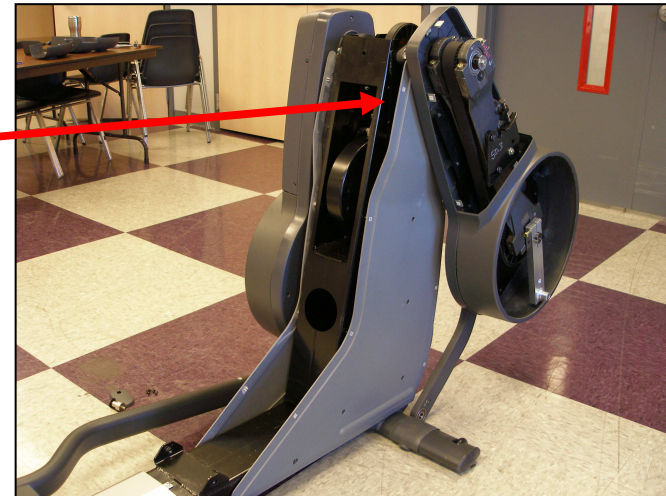
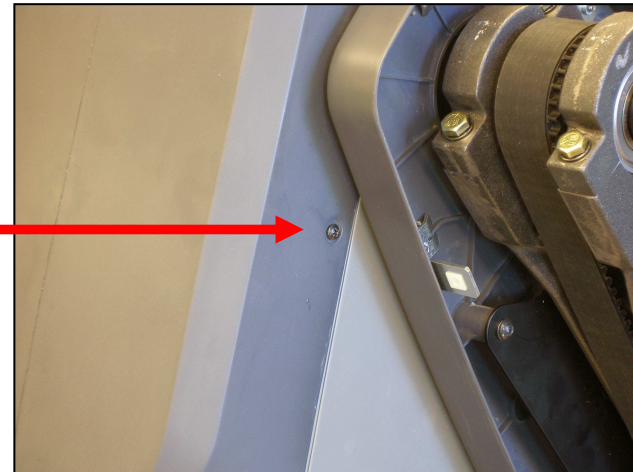
Generator Brake Installation

- » Install the new generator to the mounting bracket and positioning the new generator cables through the grommet before putting the grommet in place.
- » Loosely install the new generator/bracket assembly.
- » Place the Poly-V belt around the generator pulley.
- » Remove the tension bolt from the right bracket hole, put it into the left bracket hole and tighten the bolt until the generator assembly returns to its' previously marked position.
- » Tighten generator assembly mounting bolts, reconnect generator cables and install remaining components.



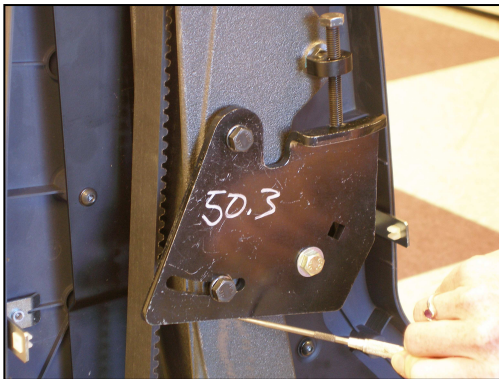
Removal of the Top Rear Tower Cover

- » Remove and save the (10) Phillips screws securing the top **Rear Tower Cover** to the frame and tower.
- » The Rocker Assemblies will have to be swung backwards slightly to allow access to some of the mounting screws.



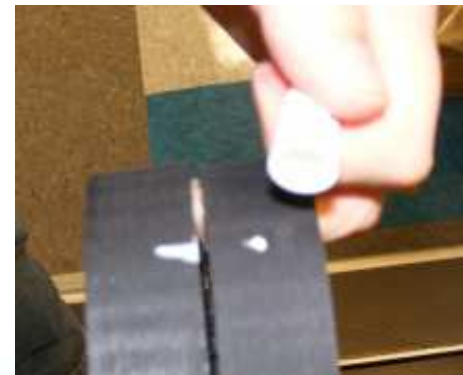
Timing Belt Removal (1)

- » Using Phillips screwdriver remove top and bottom shrouds at the back of the pedal lever.
- » With a 13mm socket remove the pedal lever from the crank.
- » Use 4mm Allen key to remove the pizza pan.
- » With a Phillips screwdriver remove the rear rocker top and bottom shrouds.
- » Using paint marker, mark position of tension bracket on casting.
- » Loosen the two idler pulley tension assembly mounting screws.
- » Do not loosen 3rd pulley screw or the idler will fall off- highlighted in yellow.



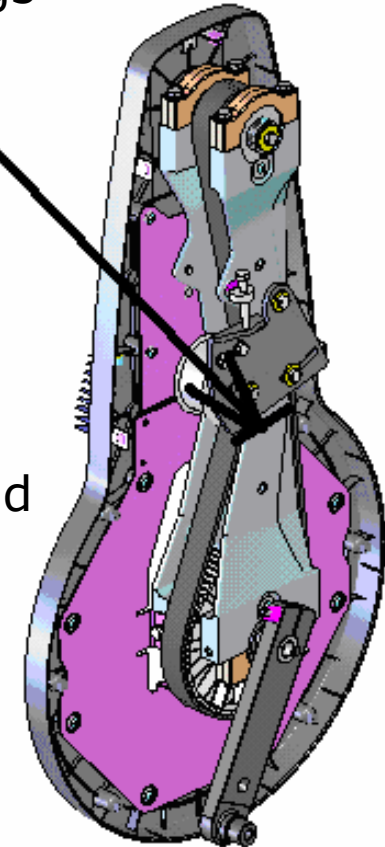
Timing Belt Removal (2)

- » Using paint marker, mark belt's edge and pulley at top and bottom at any tooth, as long as the top and bottom pulley can be repositioned after the belt has been replaced.
- » Using 13mm socket, remove tension bracket/idler assembly.
- » Remove belt.
- » Copy marked lines from original belt to new belt, make sure to pull both belts tight so they lay flat. (this will ensure proper timing when the machine is reassembled).
- » Install belt, aligning markings on belt with markings on top and bottom pulley.



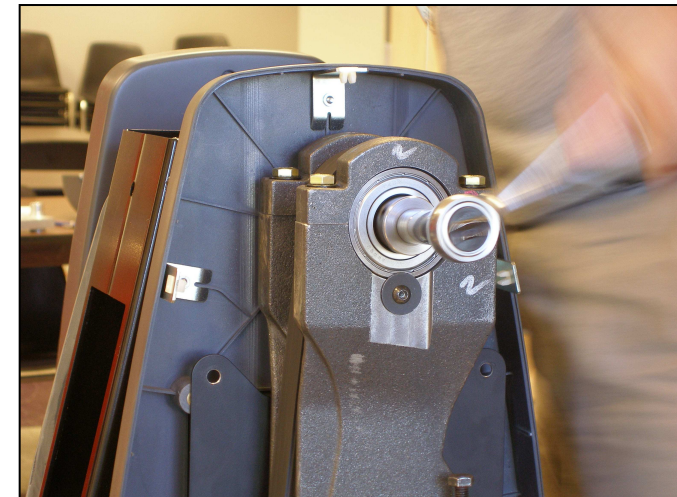
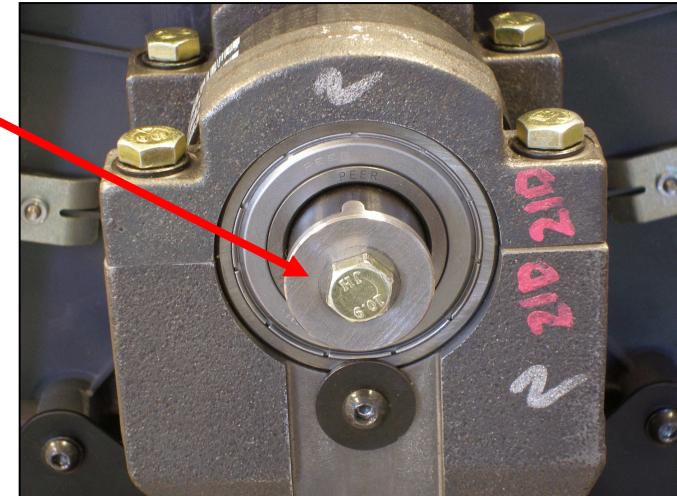
Timing Belt Removal (3)

- » Install Belt, aligning markings on belt with markings on top and bottom pulley.
- » Tighten the timing belt tension bolt until the idler pulley assembly returns to its mark on the casting position.
- » Tighten idler pulley assembly mounting bolts to 25 foot pounds (34 N.m).
- » Reinstall Shrouds, pizza pan and pedal lever.
- » **Note:** Tension and special “eye-bolt” are only found on user left side.



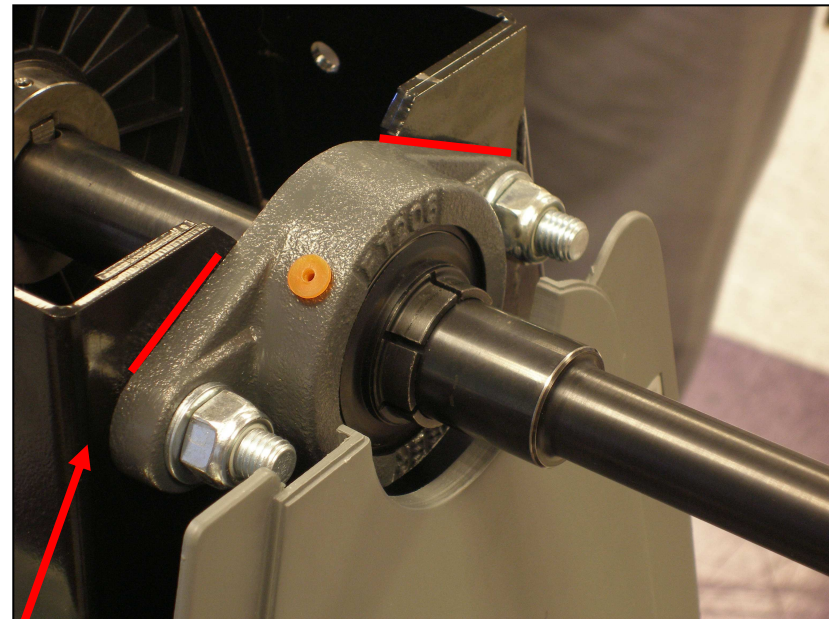
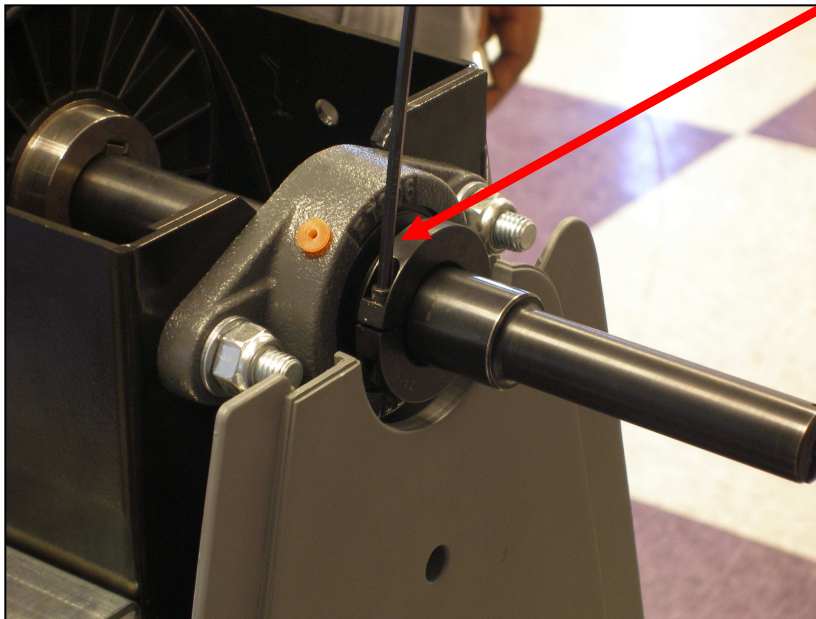
Keyed Washer and Drive Shaft

- » Remove the **8mm** bolt and keyed washer securing the user right rocker assembly to the shaft.
- » Carefully slide the rocker assembly off of the main shaft.



Right Side Flange Bearing Removal (1)

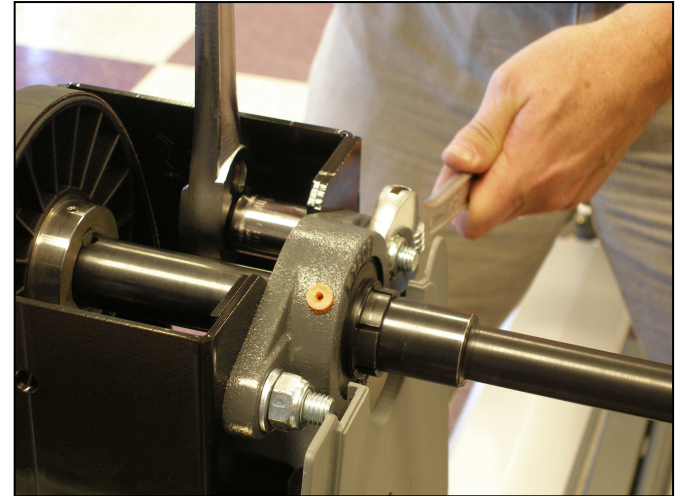
Loosen the **9/64** Allen shaft collar and slide it off of the main shaft.
FYI: only screw that is standard (English) on entire machine



Note: mark bearing location prior to removal

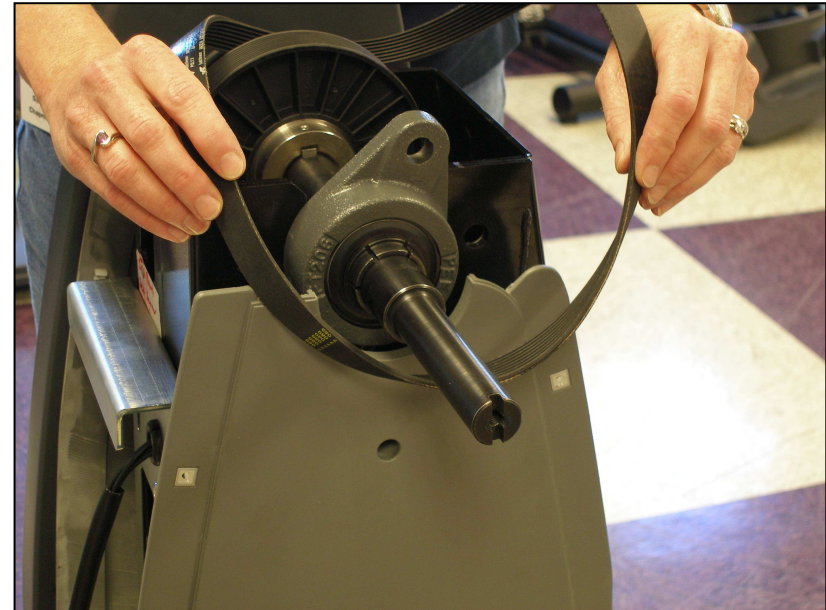
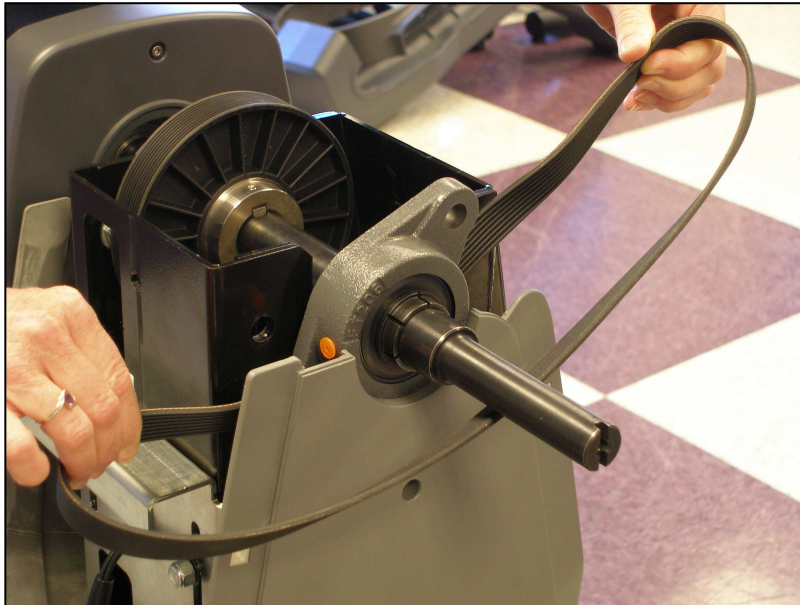
Right Side Flange Bearing Removal (2)

- » Remove and save the **12mm** bolts and nuts securing the right side pillow block bearing to the tower.
- » Slide the pillow block to the right but not completely off of the main shaft.



Drive Belt Removal

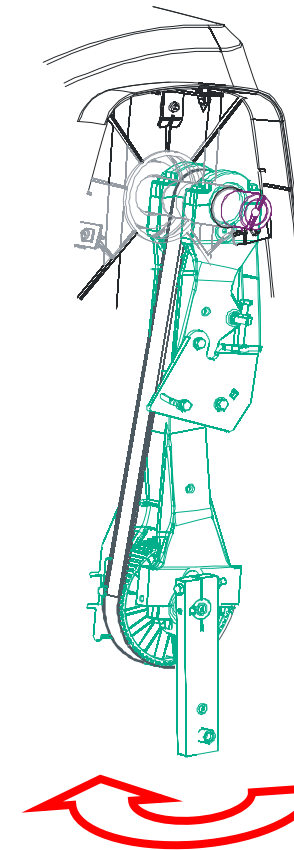
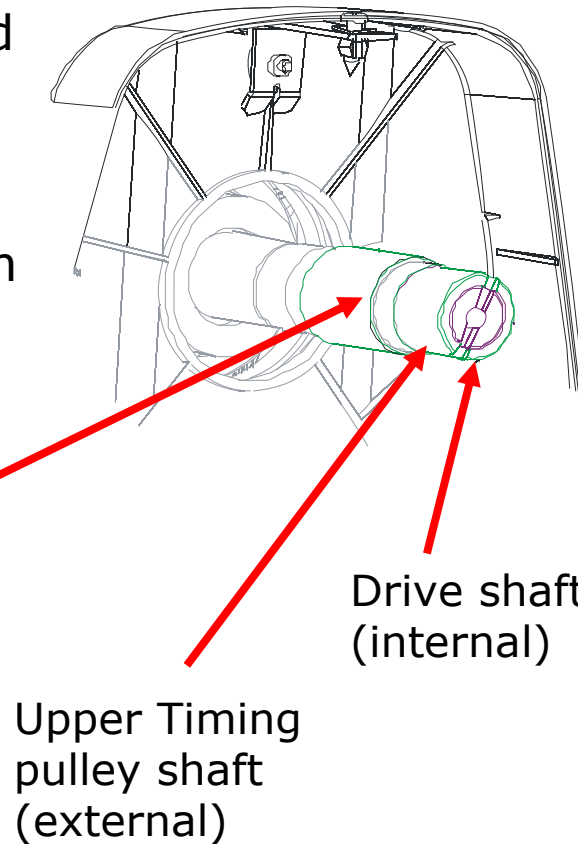
Work the old Poly-V belt off of the main shaft



Pedal Levers Timing Resetting

To line up the two shafts you will need to start with each crank arm 180 degrees out and rotate crank arm on one side until the two shafts line up again

Note: Upper timing Pulley removed for clarity



Summit and Stairclimber timing System: Included in the Linkage and Pedal Systems

Common Issues

Timing Belts Squeaking Noise

- » Issue:
 - ◆ Squeaking noise
- » Root cause:
 - ◆ Timing belt is rubbing on edge of the idler
- » Temporary solution:
 - ◆ Apply silicon, Lithium Grease, Bees Wax, Paraffin Wax, belt dressing or baby powder.
 - ◆ **Do not** use WD-40.
 - ◆ Cross-trainer design team is working on other options.



Timing Belts Vibration - Buzzing Noise

- » Issue:
 - ◆ Buzzing noise
- » Root cause:
 - ◆ Timing belt teeth are engaging and disengaging the timing pulleys grooves causing vibration. Vibration is inherent with the mechanism.
- » Solution:
 - ◆ Belt will has a “wear or break-in” period – from few weeks to few months depending on use.
 - ◆ If noise or vibration is objectionably loud, replace the original 30mm belts:
 - > Different type 30mm belt – part number: 0K69-01041-0001;
 - > 25 mm belt - part number: 0K69-01041-0002;
 - ◆ This will reduce the buzzing noise by approximately 30%.

Seals Fall Off Bearings

» Issue:

- ♦ Non-gripping seals of the Self aligning ball bearings pop off when servicing the joint connections. Self aligning ball bearings are used on the front end of the boomerang and the rear hub of the pedal lever.
- ♦ *Non-gripping* seals on the outside of the bearings are used to keep dirt, debris and other contaminants out of the bearings and keep the grease in.
- ♦ Seals ride (low friction) in-between inner and outer bearing raceways.

» Root cause:

- ♦ Self aligning bearings can take $\pm 3.0^\circ$ of angular misalignment without seals and only $\pm 1.5^\circ$ with the seals installed.

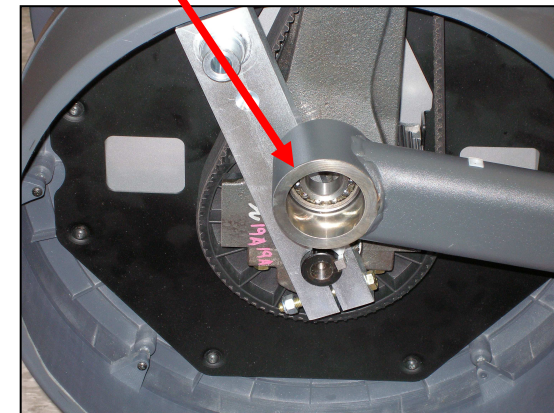
» Solution:

- ♦ Use a flat bladed screw driver to gently push the seals back into the bearing until it is seated.

Boomerang
Front-end



Pedal Lever
Rear-end



Seal



Summary

- » What can you do to eliminate the need of resetting the timing on an Elevation Cross-trainer if a timing belt replacement is needed?
- » What is the solution for the Squeaking noise coming from the rear of the unit?
- » What can reduce the buzzing noise of the Cross-trainer timing system?

Questions





THANK YOU!

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