

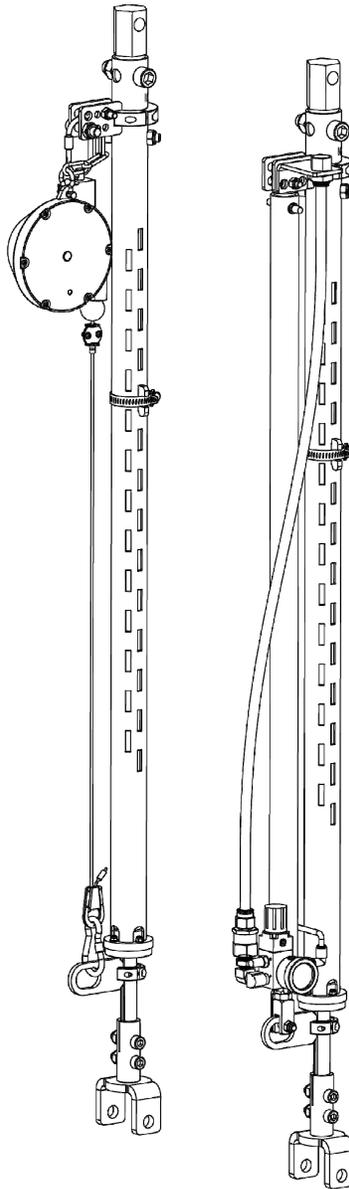


KNIGHT

GLOBAL

Torque Tube

Operation Manual



THIS MANUAL CONTAINS IMPORTANT INFORMATION REGARDING INSTALLATION, SAFETY, MAINTENANCE, AND OPERATION OF KNIGHT GLOBAL PNEUMATIC TORQUE TUBES AND SHOULD BE AVAILABLE TO ALL PERSONNEL RESPONSIBLE FOR USING THE TORQUE TUBE.

This manual provides important information for all personnel involved in the installation, operation and maintenance of the Knight Global Torque Tube. All personnel must read this document before operating the equipment.

Every effort has been made to provide complete and accurate product information in this manual. However, due to product improvements and changes, discrepancies and omissions may be present. Visit our website at knightglobal.com for updated information on all our products.

It is the responsibility of the end user to exercise common sense and judgment when performing the tasks described in this manual. If any procedure seems inaccurate, incomplete or unsafe please put the equipment in a safe condition and contact Knight Global service department for assistance.

Throughout this manual there are steps and procedures that if not performed correctly can result in personal injury or equipment damage. The following signal words are used to identify the level of potential hazard.

	WARNING
	Indicates a hazard which will cause severe injury, death or substantial equipment damage.

	CAUTION
	Indicates a hazard which can or will cause injury or equipment damage.

	NOTE
	Notifies personnel of installation, operation or maintenance information which is important but not hazard related.

Prior to installation, visually inspect the torque arm for signs of damage.

	CAUTION
	Prior to placing this unit into service the owners and users are advised to examine specific local and/or other regulations, including ANSI and OSHA regulations that may apply to the use of this product.

- Follow all procedures for installation and set-up of the torque tube.
- Retain all product information supplied with the product for future reference.

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1. SAFETY

Knight Global recognizes that most companies have a safety program in place at their facility. The Safety Section, Notes, Cautions and Warnings in this manual are intended to supplement and not supersede any existing plant or company safety guidelines or regulations.

Knight Global cannot be aware of or provide for all the procedures by which the torque tube operations or repairs may be conducted and the hazards which may result from each method. If operation or maintenance not specifically recommended by Knight Global is conducted, it must be ensured that product or personnel safety is not endangered by these actions. Personnel should place the torque tube in a safe condition and contact a supervisor and/or Knight Industry's service department for technical support if they are not sure of an operation, maintenance procedure, or step.

A. General Safety Precautions

Safe operating instructions are provided to make the operator aware of hazards to avoid and are not necessarily limited to the following list:

- Only allow personnel trained in, safety and operation on this product to operate and maintain the system.
- When a “**DO NOT OPERATE**” sign is placed on the system, do not operate the unit until the sign has been removed by designated personnel.
- Before each shift, check the unit for wear and damage.
- Never use a unit that inspection indicates is worn or damaged.
- Never exceed the tool capacity of the unit.
- Be certain tool holder and tool extension are properly secured.
- Pay attention to the torque tube at all times when operating unit.
- Make sure everyone is clear of the torque tube travel. Do not lift over people.
- Never use unit for lifting or lowering people, and never allow anyone to stand on a suspended load.
- Never weld or cut on components connected to the unit.
- Ensure safety cable is installed.
- Shut off air supply before performing any maintenance.
- Check air connections for leakage.

2. INSTALLATION

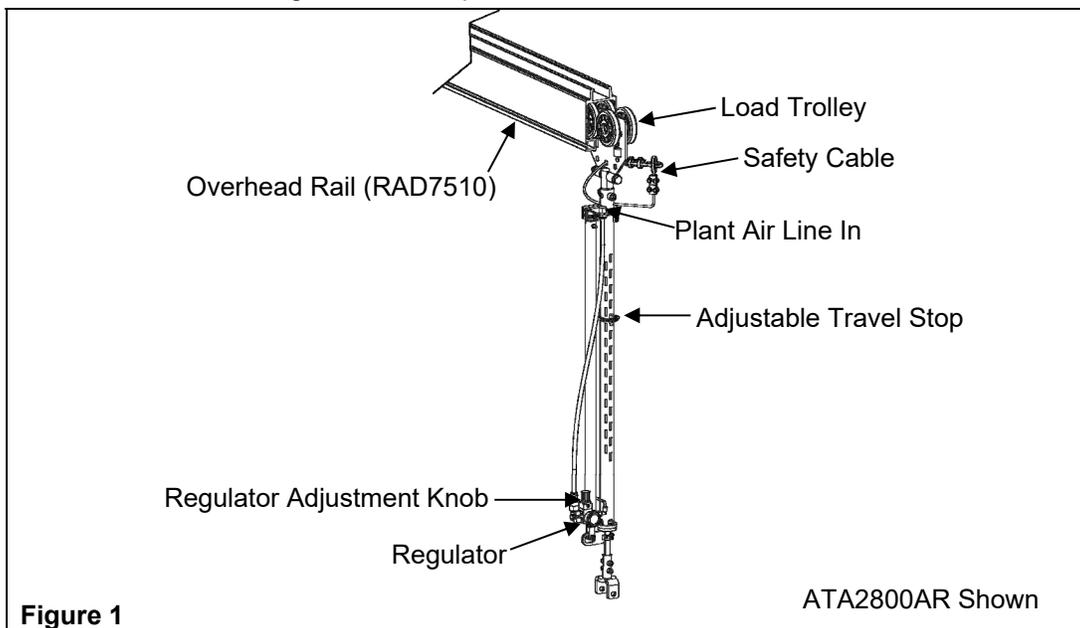
Prior to installation, visually inspect the torque tube for signs of damage.

	CAUTION
	<p>Prior to placing this unit into service the owners and user are advised to examine specific local and/or other regulations, including ANSI and OSHA regulations that may apply to the use of this product.</p>

	WARNING
	<p>A falling load can cause injury or death. Before installing this tool read the "Safety" section of this manual.</p>

Follow the appropriate steps below to install the torque tube for a rail system (refer to Figure 1):

- Step 1. Remove end caps from the rails.
 - Step 2. Lift the torque tube with trolley assembly to proper rail height.
 - Step 3. Roll trolley(s) into rail.
 - Step 4. Replace end caps.
 - Step 5. Install safety cable(s). (refer to Safety Cable Installation)
 - Step 6. Adjust travel stop(s) to position if necessary.
- [Skip steps 7 thru 10 if using the ATA2800SB and ATA2900SB with a spring balancer]*
- Step 7. Purge the air lines.
 - Step 8. Ensure regulator is at lowest setting by turning the adjustment knob counterclockwise until it stops.
 - Step 9. Connect the air line to the plant air supply.
 - Step 10. Adjust the air regulator to desired operating pressure (60 to 100psi) by turning the adjustment knob clockwise.
 - Step 11. Ensure torque tube raises and lowers smoothly by applying upward or downward pressure on the fixture or tooling at end of torque tube.



A. Safety Cable Installation

- Step 1. Slide thimbles together as shown (Figure 2).
- Step 2. Slide two (2) cable clamps onto cable.
- Step 3. Loop end of cable around thimble and run end through cable clamps as shown (See Figure 3). The cable saddle (forged part) rests on the “live” (longer) end of the cable. The U-bolt rests on the “dead” (shorter) end of the cable.
- Step 4. Tighten nuts on clamps, alternating sides.
- Step 5. Trim excess cable and tape ends of cable to prevent fraying.



Figure 2

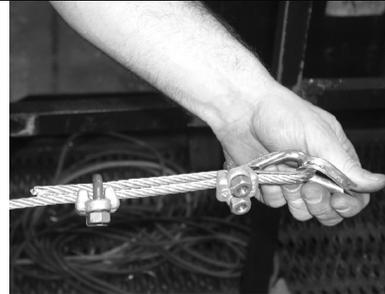


Figure 3

B. Connecting Main Air

[This procedure does not apply for the ATA2800SB and ATA2900SB Spring Balancer Torque Tubes.]

The air supply is to be connected after the torque tube is installed to the supporting structure.

Knight Global recommends at least 1/2 in.[12.7mm] I.D. hose to supply to the torque tube controls. Standard hose size is 1/2 in.[12.7mm] I.D. Adequate flow and pressure are also required. A minimum supply of 16 scfm at 100 psi [10.3 bar] or 10.4 scfm at 60 psi [4.1 bar], depending on the torque model, is required for optimal operation. Inadequate flow will cause sluggish performance.

	WARNING
	Do not exceed 150 psi [10.3 bar] inlet pressure.

- Step 1. Purge air lines and ensure they are free of all contaminants before connecting to the torque tube.
- Step 2. Connect a clean, filtered, oil free air supply to the air inlet on the regulator.
- Step 3. Open air supply valves and/or lockout valves.
- Step 4. Set air regulator to at least 60 psi [4.1 bar].
- Step 5. Inspect system for loose fittings or leaks. Repair as necessary.
- Step 6. Follow operation adjustment procedures in the Maintenance Section of this manual to adjust the torque tube for proper operation.

3. OPERATION

A. Principle of Operation

The torque tube is designed to allow vertical operational control within a specific range of motion. The trolley provides horizontal movement when inserted into/onto a rail system. Vertical raising or lowering of the torque tube is achieved by exerting downward or upward force on the attached fixture/tool.

B. Operation Adjustments

	WARNING
	Before performing operational adjustments, ensure air supply is off and the torque tube is not under load.

Regulator Adjustments [for ATA2800AR and ATA2900AR only]

Adjusting the regulator will establish the “zero gravity” effect for the operator to manipulate the tool with minimal force.

- Step 1. Turn the adjustment knob counterclockwise until it stops.
- Step 2. Attach tool to unit. The tool being used in the application is required to be installed in the tool holder.
- Step 3. Turn on air supply.
- Step 4. Turn adjustment knob clockwise until tool begins to move. Regulator is set correctly when equal force is required to raise and lower tool.
- Step 5. Tighten locknut on regulator stem to lock the adjustment in place.

Spring Balancer Tension Adjustment [for ATA2800SB and ATA2900SB only]

Increase Tension

- Step 1. Allow cable to retract as far as possible
- Step 2. Place wrench on flats of shaft. Turn shaft counter-clockwise until cable stop reaches guide.

Decrease Tension

- Step 1. If reel is so equipped, turn ratchet lock to “OFF” (knob is located on side of reel).
- Step 2. Place wrench on flats of shaft.
- Step 3. Hold shaft firmly with wrench. Depress spring on opposite side of reel.
- Step 4. Allow shaft to turn SLOWLY in clockwise direction until desired tension is achieved. If shaft will not turn in clockwise direction UNASSISTED, reel is at minimum tension and further reduction should not be attempted.

	WARNING
	DO NOT attempt to remove spring motor from its canister. Doing so can result in damage to reel or personal injury.



WARNING

Before performing operational adjustments, ensure air supply is off and the torque tube is not under load.

Adjustable Travel Stop(s)

Custom travel distances can be achieved by moving the travel stop(s) upwards or downwards along the torque arm. A single stop or an UP stop and a DOWN stop can be set on the torque tube.

- Step 1. Remove strap clamp(s) from travel stop.
- Step 2. Pull travel stop(s) from torque tube.
- Step 3. Raise or lower torque tube to desired position. The cylinder has a stop puck, it is visible through the slots on the side of the torque tube.
- Step 4. Insert travel stop to desired location. (Stop can be inserted into left or right slotted stop locations)
- Step 5. Install strap clamp(s) and tighten onto travel stop.
- Step 6. Move torque arm upwards and downwards to test movement and location of stops. If not satisfied, repeat steps 1-6.

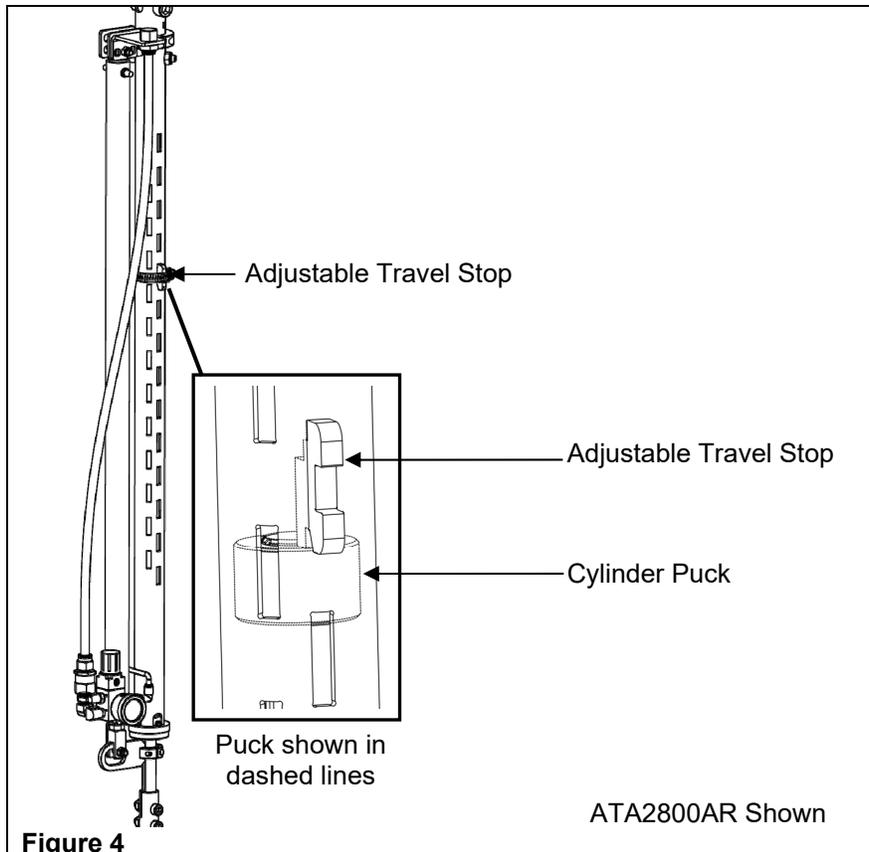


Figure 4

4. MAINTENANCE

A. Inspection Record Requirements

Duty Rating

Inspection frequency should be determined by a qualified person and is based duty service as defined below. Each torque tube should be rated individually and inspections performed in accordance with rating.

Inspections can be performed by the operator or qualified personnel.

Duty Service

Normal - Operation with uniform loads less than 65% of rated load for not more than 25% of the time.

Heavy - Operation within the rated load limit, which exceeds normal service.

Severe - Service that involves normal or heavy service with abnormal conditions.

Frequency of Documentation

Frequent Inspection (Non-Documented):

- Beginning of each shift

Periodic Inspection (Documented):

- Normal Service - annually.
- Heavy Service – semi-annually.
- Severe Service - quarterly.

Documentation should be made available to personnel for review.

B. Inspections

Frequent Inspections

Additionally, the operator should check the system continually during operation to ensure that no malfunctions are occurring.

Torque Tube:

- Visually inspect the torque tube, ensure that it is in good general working order. Repair or replace any broken or missing parts.
- Ensure fasteners are secure. Tighten any loose fasteners or replace any broken fasteners.
- Optional Tool Extension: Check for wear and damage. Repair or replace if necessary.

Pneumatic System: [Does not apply for the ATA2800SB and ATA2900SB Spring Balancer Torque Tubes.]

- Visually inspect all connections, fittings, hoses, valves, regulators and filters. Verify connections are intact without leaks.

Periodic Inspections (Documented)

Perform the items listed in the Frequent Inspection section in addition to the items listed below. All findings from this inspection should be recorded.

If any of the conditions listed below are evident, the torque tube should be placed out of service and corrective actions can be taken.

Supporting Structure:

- Check for distortion, wear and continued ability to support the load. Refer to manufacturers' instructions for overhead rail systems.

Rail Trolley (if applicable):

- Ensure wheels and side rollers run smoothly and are not excessively worn. Replace the wheels and side rollers as necessary.
- Check all fasteners, ensure they are intact and properly tightened.
- Visually check the nylon at the bearing and along the face of the wheel for cracks.

I-Beam Trolley (if applicable):

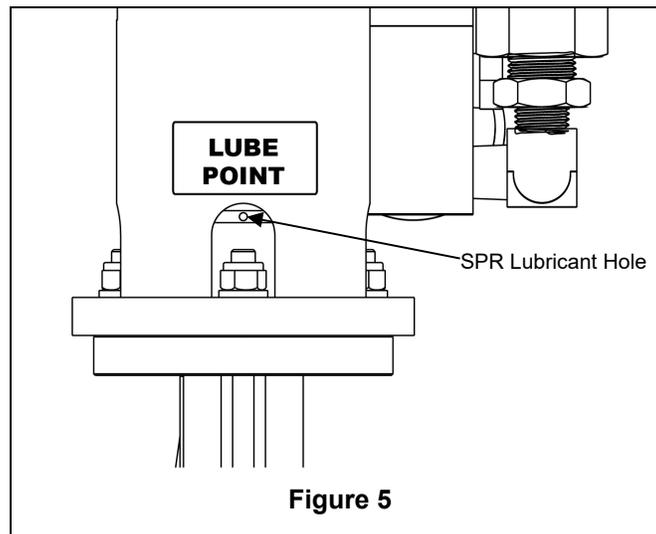
- Ensure wheels run smoothly and are not excessively worn. Replace as necessary.
- Ensure the wheels track the beam properly.
- Check the side plates for spreading. Repair or replace the trolley as required.

Torque Tube:

- Check cylinder for leaks or damage. Replace or repair. [Does not apply for the ATA2800SB and ATA2900SB Spring Balancer Torque Tubes.]
- Check all fasteners for security. Torque fasteners to recommended torque levels.
- Bushings and Bearings: Check for smooth operation. Replace if damaged or binding occurs.
- Tool Holder

Lubrication:

- Ensure torque arm moves freely and smoothly. Lubricate as needed depending on the operating conditions.
- The spline nut is pre-lubricated with lithium soap based grease prior to shipment. The lubrication point is indicated with a yellow/black label. Knight recommends Mobil MOBILUX EP 1 641282-00 grease or equivalent.



5. SPARE PARTS LIST

Because Knight is continuously improving and updating its products, all product drawings and spare parts lists for the torque tubes can be found on the Knight website @ http://knightglobal.com/torque_tubes.htm.

6. DECOMMISSIONING A TORQUE TUBE

Knight Torque Tubes contain various materials which, at the end of the service life, must be disposed of or recycled (where appropriate), in accordance with statutory regulations.

A. Decommissioning Pneumatic Torque Tubes:

	WARNING
	Knight Torque Tubes must only be dismantled by qualified personnel.

- Ensure there is not a load on the tube
- Depressurize air line(s).
- Detach the control hose(s) from the torque tube.
- Remove any safety cabling. (Reverse steps in Installation section for Safety Cable)
- Remove torque tube from rail by removing end caps and rolling tube out of rail.

B. Decommissioning ATA2800SB and ATA2900SB Spring Balancer Torque Tubes:

	WARNING
	Knight Torque Tubes must only be dismantled by qualified personnel.

- Ensure there is not a load on the tube
- Remove any safety cabling. (Reverse steps in Installation section for Safety Cable)
- Remove torque tube from rail by removing end caps and rolling tube out of rail.

7. KNIGHT'S PERFORMANCE WARRANTY

Knight warrants that its products and parts shall meet all applicable specifications, performance requirements, and be free from defects in material and workmanship for one year, (Servo Systems for (2) two years, Pneumatic Lift Tables for (5) five years), from the date of invoice, unless otherwise noted.

Knight warrants the Servo Hoist, Arms, and Tractors to be free from defects in material or workmanship for a period of two years or 6000 hours use from the date of shipment.

On design and build jobs, the customer is the owner of the equipment once they authorize shipment. The purchased equipment cannot be returned for reimbursement or credit.

Exclusions

This warranty shall not cover the failure or defective operation caused by inadequate training provided by customer regarding the operation and/ or maintenance of the tool, misuse, negligence, misadjustment, or any alteration not approved by Knight Global. Knight's obligation is limited to the replacement or repair of Knight's products at a location designated by Knight Global. Buyer is responsible for all associated internal removal and reinstallation costs as well as freight charges to and from Knight Global. Knight's maximum liability shall not in any case exceed the contract price for the products claimed to be defective.

Any field modification made to Knight Products or Systems without the written authorization by Knight Global shall void Knight's warranty obligation.

Any purchased components not manufactured by Knight Global and their specific individual warranties are not covered. Paint defects, scratches and marring from shipping are also excluded on all Knight Global products and products not manufactured by Knight Global.

Knight Distributors/ Agents are not authorized to circumvent or change any of these terms and/ or conditions of this warranty unless prior approval is received in writing by Knight Global Management. Verbal statements made by Knight Distributors/ Agents do not constitute warranties.

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