

## **L-Series Actuator Installation Torque Procedure**

**Procedure and Specifications  
for Installing Mounting Screws**



### General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.



### Revisions

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[www.woodward.com/publications](http://www.woodward.com/publications)

The latest version of most publications is available on the *publications* page. If your publication is not there, please contact your customer service representative to get the latest copy.




### Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.



### Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual **26455**, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, to verify whether this translation is up to date. Out-of-date translations are marked with . Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

**Revisions**—Changes in this publication since the last revision are indicated by a black line alongside the text.

Woodward reserves the right to update any portion of this publication at any time. Information provided by Woodward is believed to be correct and reliable. However, no responsibility is assumed by Woodward unless otherwise expressly undertaken.

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## Warnings and Notices

### Important Definitions



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

#### **WARNING**

##### **Overspeed / Overtemperature / Overpressure**

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

#### **WARNING**

##### **Personal Protective Equipment**

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- Eye Protection
- Hearing Protection
- Hard Hat
- Gloves
- Safety Boots
- Respirator

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

#### **WARNING**

##### **Start-up**

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

#### **WARNING**

##### **Automotive Applications**

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

**NOTICE****Battery Charging  
Device**

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

## Electrostatic Discharge Awareness

**NOTICE****Electrostatic  
Precautions**

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).
- Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.
- Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual **82715**, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
  - Do not touch any part of the PCB except the edges.
  - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
  - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

# Chapter 1.

## Torque Procedure

### Description

Woodward has identified an L-Series actuator failure mode in which the mounting ears may crack or break if torque is incorrectly applied during application assembly. This manual specifies the best practice and recommended procedure for applying correct torque to the mounting screws to reduce the risk of actuator ear breakage.

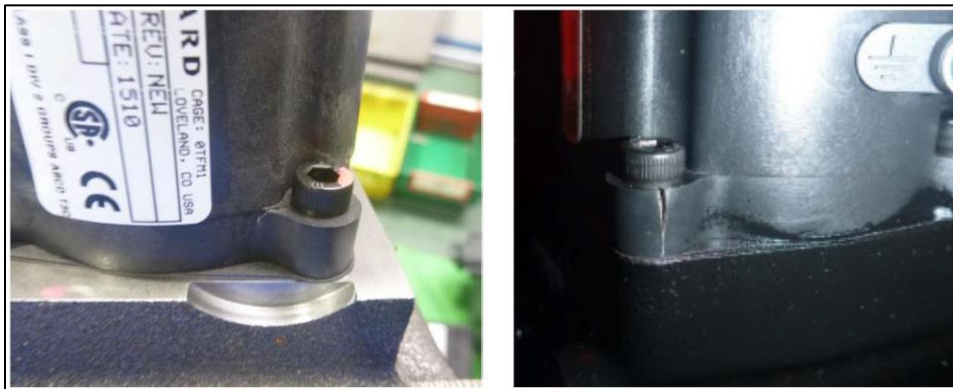


Figure 1-1. Actuator Ear Breakage

### Fixture

The L-Series actuator and associated mounting assembly should be captured in a fixture that holds both pieces stationary during the application of torque. Holding the L-Series and mounting assembly stationary is critical to ensuring that the part does not rotate when torque is applied to the mounting screws. This ensures that the final torque value is accurate and precise.

An example of the fixture used at the Woodward production facility is shown in Figure 1-2.

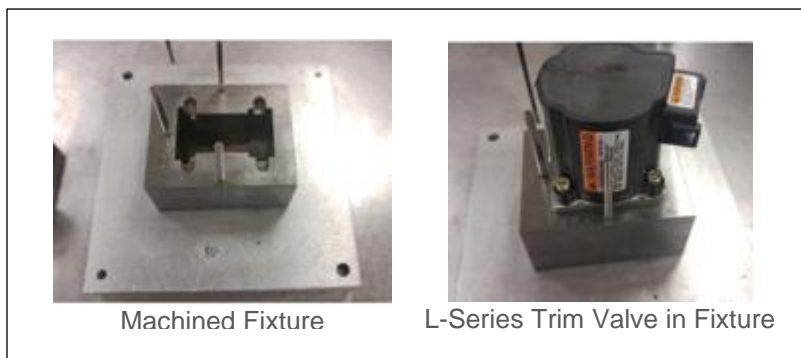


Figure 1-2. Machined Fixture for Capturing Actuator

## Torque Specification

Woodward L-Series installation drawings and product manuals specify a recommended mounting screw torque of 35 in-lb [4 N-m].

See reference notes below from L-Series Manual 26250 Chapter 2, Mechanical Installation:

NOTES:

1. MOUNTING HARDWARE TO BE SOCKET HEAD CAP SCREWS – #10 (.190)–24, M5 OR EQUIVALENT.  
NO WASHERS TO BE USED.  
RECOMMENDED SCREW TORQUE = 35 IN-LB. [4 N-M].
2. FOR BRACKET-MOUNT APPLICATION, A BRACKET OUT-OF-FLATNESS OF .010 [0.25] MAXIMUM IS RECOMMENDED.

## Mounting Hardware

Use M5 or #10 fasteners torqued to 35 in-lb (4 N-m) to attach the L-Series control to the mounting bracket. The bracket and attaching hardware must be designed to hold the weight and to withstand the vibration associated with prime mover mounting. Use the appropriate fasteners for securing the mounting bracket to the engine.

## Torque Procedure

In order to achieve an accurate and precise final torque value without damaging the actuator mounting ears, torque should be applied to the fasteners in a two-step process.

*Step 1:*

The preliminary torque should first apply the smallest amount of torque in a cross pattern sequence which can achieve full engagement with the mounting ear. (Note: Full engagement is the point where contact occurs just between the shoulder of the screw and the top of the mounting ear). It is critical that all 4 mounting screws are fully engaged with the mounting ears before full torque is applied in Step 2 (see Figure 1-3).

Woodward has empirically determined that 10 in-lb (1.13 N-m) is sufficient to achieve full engagement of the mounting screws. This value should be determined empirically by the end user for each specific application, as variables such as mounting block material or use of lock patch on the mounting screw thread can change this value.

*Step 2:*

In the second step, mounting screws should be tightened to the final torque value using the same cross-pattern sequence. This ensures that an even preload distribution is achieved in the joint and minimizes the potential of cracking the mounting ears (see Figure 1-4).

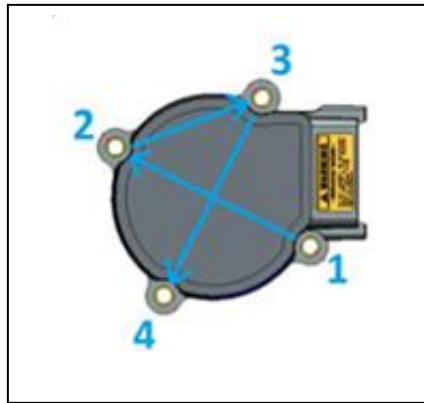


Figure 1-3. Preliminary Torque – All Four Screws to Full Engagement

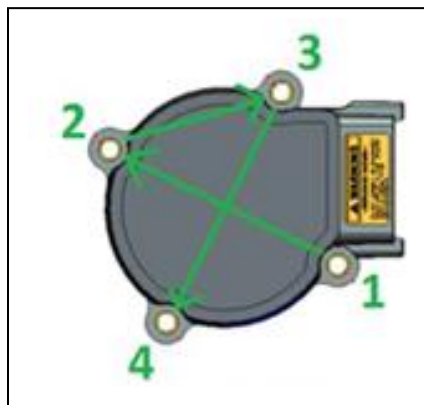
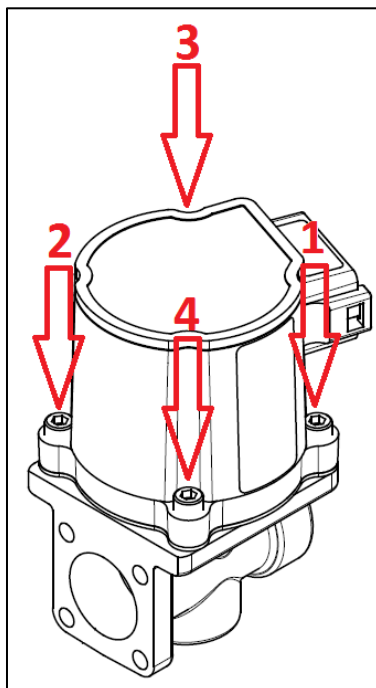


Figure 1-4. Final Torque – 36 in-lb (4 N-m)





## Chapter 2.

# Product Support and Service Options

### Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

1. Consult the troubleshooting guide in the manual.
2. Contact the **OE Manufacturer or Packager** of your system.
3. Contact the **Woodward Business Partner** serving your area.
4. Contact Woodward technical assistance via email ([EngineHelpDesk@Woodward.com](mailto:EngineHelpDesk@Woodward.com)) with detailed information on the product, application, and symptoms. Your email will be forwarded to an appropriate expert on the product and application to respond by telephone or return email.
5. If the issue cannot be resolved, you can select a further course of action to pursue based on the available services listed in this chapter.

**OEM or Packager Support:** Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

**Woodward Business Partner Support:** Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full-Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A **Recognized Engine Retrofitter (RER)** is an independent company that does retrofits and upgrades on reciprocating gas engines and dual-fuel conversions, and can provide the full line of Woodward systems and components for the retrofits and overhauls, emission compliance upgrades, long term service contracts, emergency repairs, etc.

A current list of Woodward Business Partners is available at [www.woodward.com/directory](http://www.woodward.com/directory).

### Product Service Options

Depending on the type of product, the following options for servicing Woodward products may be available through your local Full-Service Distributor or the OEM or Packager of the equipment system.

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

**Replacement/Exchange:** Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime.

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

**Flat Rate Repair:** Flat Rate Repair is available for many of the standard mechanical products and some of the electronic products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be.

**Flat Rate Remanufacture:** Flat Rate Remanufacture is very similar to the Flat Rate Repair option, with the exception that the unit will be returned to you in “like-new” condition. This option is applicable to mechanical products only.

## Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:

- return number;
- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part number(s) and serial number(s);
- description of the problem;
- instructions describing the desired type of repair.

## Packing a Control

Use the following materials when returning a complete control:

- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

### NOTICE

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

## Replacement Parts

When ordering replacement parts for controls, include the following information:

- the part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- the unit serial number, which is also on the nameplate.

## Engineering Services

Woodward's Full-Service Distributors offer various Engineering Services for our products. For these services, you can contact the Distributor by telephone or by email.

- Technical Support
- Product Training
- Field Service

**Technical Support** is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact.

**Product Training** is available as standard classes at many Distributor locations. Customized classes are also available, which can be tailored to your needs and held at one of our Distributor locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

**Field Service** engineering on-site support is available, depending on the product and location, from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact one of the Full-Service Distributors listed at [www.woodward.com/directory](http://www.woodward.com/directory).

## Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory at [www.woodward.com/directory](http://www.woodward.com/directory), which also contains the most current product support and contact information.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

| Products Used in<br>Electrical Power Systems |                     | Products Used in<br>Engine Systems |                     | Products Used in Industrial<br>Turbomachinery Systems |                     |
|--|---------------------|------------------------------------|---------------------|---|---------------------|
| <u>Facility</u>                              | <u>Phone Number</u> | <u>Facility</u>                    | <u>Phone Number</u> | <u>Facility</u>                                       | <u>Phone Number</u> |
| Brazil -----                                 | +55 (19) 3708 4800  | Brazil -----                       | +55 (19) 3708 4800  | Brazil -----  | +55 (19) 3708 4800  |
| China -----                                  | +86 (512) 6762 6727 | China -----                        | +86 (512) 6762 6727 | China -----   | +86 (512) 6762 6727 |
| Germany:                                     |                     | Germany -----                      | +49 (711) 78954-510 | India -----   | +91 (129) 4097100   |
| Kempen----                                   | +49 (0) 21 52 14 51 | India -----                        | +91 (129) 4097100   | Japan-----  | +81 (43) 213-2191   |
| Stuttgart -                                  | +49 (711) 78954-510 | Japan-----                         | +81 (43) 213-2191   | Korea-----  | +82 (51) 636-7080   |
| India -----                                  | +91 (129) 4097100   | Korea-----                         | +82 (51) 636-7080   | The Netherlands--                                     | +31 (23) 5661111    |
| Japan-----                                   | +81 (43) 213-2191   | The Netherlands--                  | +31 (23) 5661111    | Poland -----  | +48 12 295 13 00    |
| Korea-----                                   | +82 (51) 636-7080   | United States-----                 | +1 (970) 482-5811   | United States-----                                    | +1 (970) 482-5811   |
| Poland -----                                 | +48 12 295 13 00    |                                    |                     |   |                     |
| United States-----                           | +1 (970) 482-5811   |                                    |                     |   |                     |

## Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

### General

Your Name \_\_\_\_\_

Site Location \_\_\_\_\_

Phone Number \_\_\_\_\_

Fax Number \_\_\_\_\_

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### Prime Mover Information

Manufacturer \_\_\_\_\_

Engine Model Number \_\_\_\_\_

Number of Cylinders \_\_\_\_\_

Type of Fuel (gas, gaseous, diesel,  
dual-fuel, etc.) \_\_\_\_\_

Power Output Rating \_\_\_\_\_

Application (power generation, marine,  
etc.) \_\_\_\_\_

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### Control/Governor Information

#### Control/Governor #1

Woodward Part Number & Rev. Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

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#### Control/Governor #2

Woodward Part Number & Rev. Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

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#### Control/Governor #3

Woodward Part Number & Rev. Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

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### Symptoms

Description \_\_\_\_\_

*If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.*

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**We appreciate your comments about the content of our publications.**

**Send comments to: [icinfo@woodward.com](mailto:icinfo@woodward.com)**

**Please reference publication **51558**.**



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