# APECS® 2500 Linear Actuator for Cummins “B” Series DYNC-10502

## Installation Guide for APECS® Controllers:

DYN1-10704
DYN1-10714
DYN1-10724
DYN1-10734

Manual 36531

## WARNING

**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.**

**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.**

## CAUTION

**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.**

**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.**

## IMPORTANT DEFINITIONS

**WARNING—indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

**CAUTION—indicates a potentially hazardous situation which, if not avoided, could result in damage to equipment.**

**NOTE—provides other helpful information that does not fall under the warning or caution categories.**

**Revisions—Text changes are indicated by a black line alongside the text.**

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# Contents

# Electrostatic Discharge Awareness

All electronic equipment is static-sensitive, some components more than others. To protect these components from static damage, you must take special precautions to minimize or eliminate electrostatic discharges.

Follow these precautions when working with or near the control.

1. Before doing maintenance on the electronic control, discharge the static electricity on your body to ground by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.).

2. 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.

3. Keep plastic, vinyl, and Styrofoam materials (such as plastic or Styrofoam cups, cup holders, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, and plastic ash trays) away from the control, the modules, and the work area as much as possible.

4. 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.

**CAUTION**

**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*.**

# Chapter 1.
# Installation Instructions

This manual provides instructions on the installation of the APECS 2500 linear actuator on a Cummins “B” Series engine with a Bosch A2000 or A3500 pump with an RSV mechanical governor. The DYNC-10502 linear actuator controls the engine through the shut off lever on the fuel pump.

Read all instructions and review layout drawing below before proceeding with this installation.

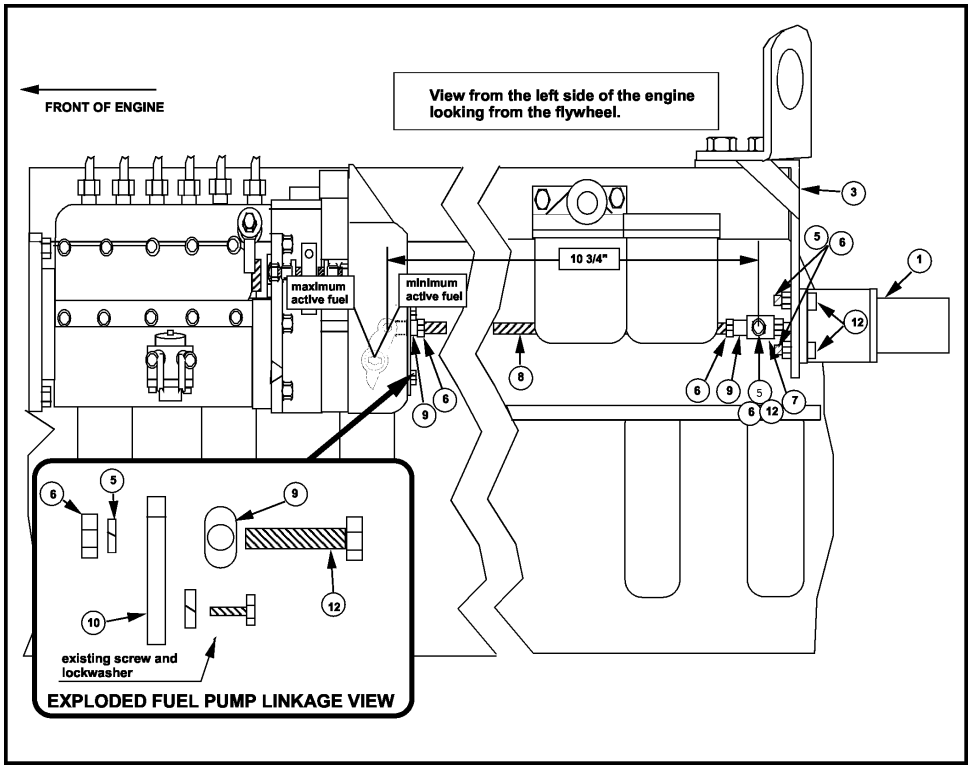


**Figure 1—Layout Drawing**

## Engine Preparation

1. Disconnect the battery.
2. Remove any hardware attached to the shut off lever.
3. Remove the original shut off lever and save the screw and lockwasher for installation of the new shut off lever from the installation kit.
4. The mechanical governor should be set 10% to 12% above the rated speed.

## Actuator Installation

1. Remove the engine lifting eye from the left rear of the engine.
2. Refer to Figure 1 and install the actuator mounting bracket (item 3) underneath the lifting eye using the original mounting screws.
3. Mount the actuator (item 1) onto the mounting bracket with four hex head cap screws, four lockwashers, and four hex nuts (items 12, 5 & 6).

## Linkage Installation

1. Referring to Figure 1, install the clevis (item 7) onto the actuator shaft and tighten the M6 nut against the back side of the clevis.
2. Install the fuel shut off lever (item 10) onto the fuel pump using the original screw and lockwasher that were previously removed.
3. Run the engine by hand and rotate the shut off lever until the engine shuts down. Record the location of the shut off lever for use later.
4. Assemble the linkage rod by placing one hex nut (item 6) and one rod end bearing (item 9) to each end of the threaded rod (item 8).
5. Connect one rod end bearing to the shut off lever using one screw (item 12), one lockwasher (item 5) and one hex nut (item 6).
6. Adjust the length of the rod so the stop lever is in the shut down position recorded in Step 3. The opposite end of the rod should line up with the hole in the clevis on the actuator shaft.
7. When the length of the rod is correct, turn the rod end bearing on the rod clockwise one full turn. Install the free rod end bearing in the clevis using one screw one lockwasher, and one hex nut.
8. Tighten both rod jam nuts against the rod end bearing while holding the clevis in the correct position as shown in Figure 1.

**NOTE: Make sure the full fuel position can be achieved.**
**Set the mechanical governor 10% to 12% above rated speed.**

## Magnetic Pickup Installation

Observe that in the engine bell housing, a 3/4 - 16" hole has been drilled and threaded for the magnetic pickup (item 11). Install the pickup. Back out one-quarter turn and tighten nut.

## Controller

1. Wire the controller as shown in Figure 2.
2. DC power leads and actuator leads should be 14 gauge minimum. It is recommended that the leads be twisted pairs.
3. DC supply leads to the controller can be connected where the large battery cables connect to the engine.
4. Calibrate the controller according to specifications.

*Installation of the governor is now complete.*

# Chapter 2.
# Parts List

## Governor Assembly

| ITEM | DESCRIPTION | PART NUMBER | QTY. |
|---|---|---|---|
| 1 | Governor actuator | DYNC-10502 | 1 |
| 2 | Controller | See Notes a or b | 1 |

Notes:

(a) Magnetic Pickup frequency 2500 to 5000 Hz - DYN1-10704

(b) Magnetic Pickup frequency 5000 to 9500 Hz - DYN1-10706

## Installation Kit DYNK-10400

| ITEM | DESCRIPTION | PART NUMBER | QTY. |
|---|---|---|---|
| 3 | Actuator mounting bracket | DYNK-138-74 | 1 |
| 4 | (intentionally blank) | | |
| 5 | Lockwasher (1/4) | CYRD-558 | 6 |
| 6 | Hex nut (1/4 - 28) | DYRF-293 | 8 |
| 7 | Clevis | DYNK-218-1 | 1 |
| 8 | Threaded rod (1/4 - 28) (11.0”) | GYRF-42-27 | 1 |
| 9 | Rod end bearings (1/4 - 28) | DYNZ-47-1 | 2 |
| 10 | Shut off lever | DYNK-138-71 | 1 |
| 11 | Magnetic pickup | DYNT-13200 | 1 |
| 12 | Hex head screw (1/4 - 28 x 1) | BYRF-1346 | 6 |

## Optional Control Components

| ITEM | DESCRIPTION | PART NUMBER | QTY. |
|---|---|---|---|
| 13 | Controller | DYN1-10754 | 1 |
| 14 | Remote speed pot - 5K | DYNS-10000 | 1 |

# Chapter 3.
# Wiring & Calibration

## Wiring Instructions

Figure 2 illustrates basic wiring for all four controllers:

- DYN1- 10704
- DYN1- 10714
- DYN1- 10724
- DYN1- 10734

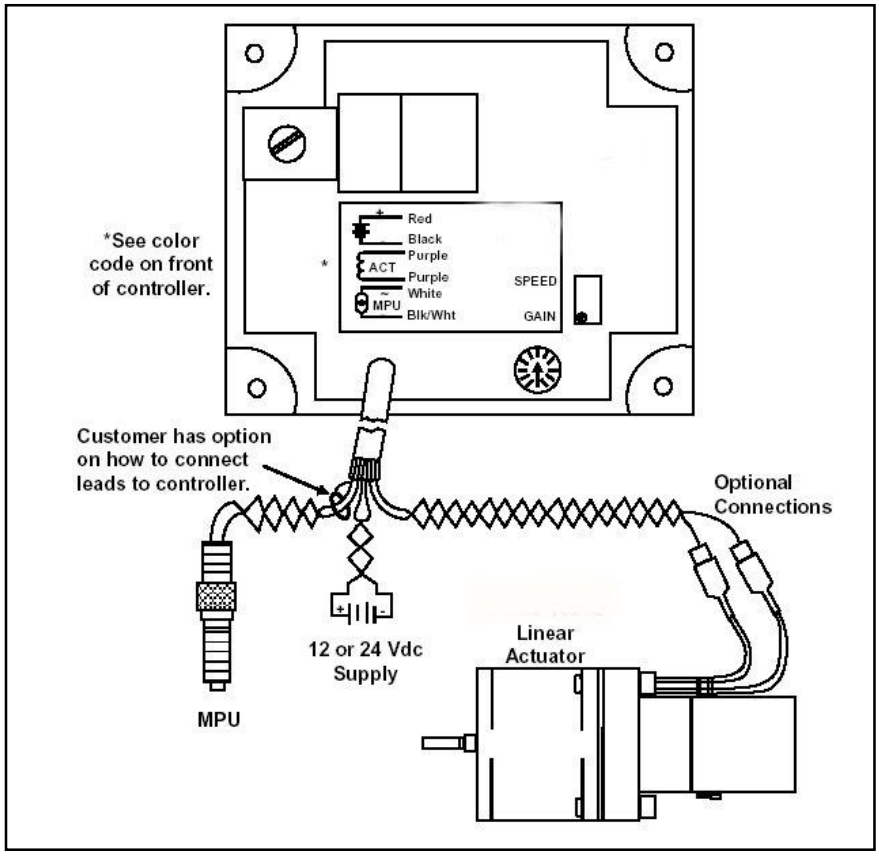


**Figure 2—Basic Wiring Diagram**

1. Red to battery positive
2. Black to battery negative
3. Purple to the actuator, no polarity
4. White to one side of the magnetic pickup
5. Black and white to the other side of the magnetic pickup connected with the shield drain wire

Contact factory for CE wiring.

# Calibration Instructions

1. With no power to the governor, adjust the GAIN to 9:00 o'clock.
2. Start the engine and adjust the speed by turning the speed pot clockwise to desired speed.

   NOTE: Controllers are factory adjusted to minimum RPM.However, for safety, one should be capable of disabling the engine if an overspeed should occur.

3. At no load, turn the GAIN potentiometer clockwise until the engine begins to hunt. If the engine does not hunt, physically upset the governor linkage.
4. Turn the GAIN potentiometer counterclockwise until stable.

**CAUTION:**
**As a safety measure, the engine should be equipped with an independent overspeed shutdown device in the event of failure which may render the governor inoperative.**

# Chapter 4.
# Service Options

## Product Service Options

The following factory options are available for servicing Woodward equipment, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is purchased from Woodward or the service is performed:

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

If you are experiencing problems with installation or unsatisfactory performance of an installed system, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In most cases, your problem can be resolved over the phone. If not, you can select which course of action you wish to pursue based on the available services listed in this section.

### 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 is also a flat rate structured program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

This option allows you to call 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 Woodward facility as explained below (see "Returning Equipment for Repair" later in this chapter).

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned to Woodward within 60 days, Woodward will issue a credit for the core charge. [The core charge is the average difference between the flat rate replacement/exchange charge and the current list price of a new unit.]

**Return Shipment Authorization Label.** To ensure prompt receipt of the core, and avoid additional charges, the package must be properly marked. A return authorization label is included with every Replacement/Exchange unit that leaves Woodward. The core should be repackaged and the return authorization label affixed to the outside of the package. Without the authorization label, receipt of the returned core could be delayed and cause additional charges to be applied.

### Flat Rate Repair

Flat Rate Repair is available for the majority of standard 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. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

### 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 and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). 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 to Woodward for repair, please contact Woodward in advance to obtain a Return Authorization Number. When shipping the item(s), attach a tag with the following information:

- 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.

**CAUTION**

**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*.**

### 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.

### Return Authorization Number

When returning equipment to Woodward, please telephone and ask for the Customer Service Department [1 (800) 523-2831 in North America or +1 (970) 482-5811]. They will help expedite the processing of your order through our distributors or local service facility. To expedite the repair process, contact Woodward in advance to obtain a Return Authorization Number, and arrange for issue of a purchase order for the item(s) to be repaired. No work can be started until a purchase order is received.

**NOTE**

**We highly recommend that you make arrangement in advance for return shipments. Contact a Woodward customer service representative at 1 (800) 523-2831 in North America or +1 (970) 482-5811 for instructions and for a Return Authorization Number.**

## 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.

## How to Contact Woodward

In North America use the following address when shipping or corresponding:

Woodward Governor Company
PO Box 1519
1000 East Drake Rd
Fort Collins CO 80522-1519, USA

Telephone—+1 (970) 482-5811 (24 hours a day)
Toll-free Phone (in North America)—1 (800) 523-2831
Fax—+1 (970) 498-3058

For assistance outside North America, call one of the following international Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

| Facility | Phone Number |
|---|---|
| Brazil | +55 (19) 3708 4800 |
| India | +91 (129) 230 7111 |
| Japan | +81 (476) 93-4661 |
| The Netherlands | +31 (23) 5661111 |

You can also contact the Woodward Customer Service Department or consult our worldwide directory on Woodward's website (**www.woodward.com**) for the name of your nearest Woodward distributor or service facility. [For worldwide directory information, go to **www.woodward.com/ic/locations**.]

# Engineering Services

Woodward Industrial Controls Engineering Services offers the following after-sales support for Woodward products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- Technical Support
- Product Training
- Field Service

Contact information:

Telephone—+1 (970) 482-5811
Toll-free Phone (in North America)—1 (800) 523-2831
Email—icinfo@woodward.com
Website—**www.woodward.com/ic**

**Technical Support** is available through our many worldwide locations or our authorized distributors, depending upon the product. This service can assist you with technical questions or problem solving during normal business hours. Emergency assistance is also available during non-business hours by phoning our toll-free number and stating the urgency of your problem. For technical support, please contact us via telephone, email us, or use our website and reference ***Customer Services*** and then ***Technical Support***.

**Product Training** is available at many of our worldwide locations (standard classes). We also offer customized classes, which can be tailored to your needs and can be held at one of our locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability. For information concerning training, please contact us via telephone, email us, or use our website and reference ***Customer Services*** and then ***Product Training***.

**Field Service** engineering on-site support is available, depending on the product and location, from one of our many worldwide locations or from one of our authorized 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 field service engineering assistance, please contact us via telephone, email us, or use our website and reference ***Customer Services*** and then ***Technical Support***.

# Technical Assistance

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

## General

Your Name_____
Site Location_____
Phone Number_____
Fax Number_____

## Prime Mover Information

Engine/Turbine Model Number_____
Manufacturer_____
Number of Cylinders (if applicable)_____
Type of Fuel (gas, gaseous, steam, etc)_____
Rating_____
Application_____

## Control/Governor Information

Please list all Woodward governors, actuators, and electronic controls in your system:

Woodward Part Number and Revision Letter

_____

Control Description or Governor Type

_____

Serial Number _____

Woodward Part Number and Revision Letter

_____

Control Description or Governor Type

_____

Serial Number _____

Woodward Part Number and Revision Letter

_____

Control Description or Governor Type

_____

Serial Number _____

*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.*

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

**Send comments to: icinfo@woodward.com**

**Please include the manual number from the front cover of this publication.**

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04/5/M