

LCS Series Integrated Speed Control and Direct Drive Actuator

**Retrofit of LCS Control/Pump Cover Assembly
to Stanadyne 'D' Series Pumps**

Installation Manual

IMPORTANT



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.

DEFINITIONS

- **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

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.



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.



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www.woodward.com/publications

The current revision and distribution restriction of all publications are shown in manual **26311**.

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.



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.

NOTICE

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.

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*.

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.

Chapter 1 Installation

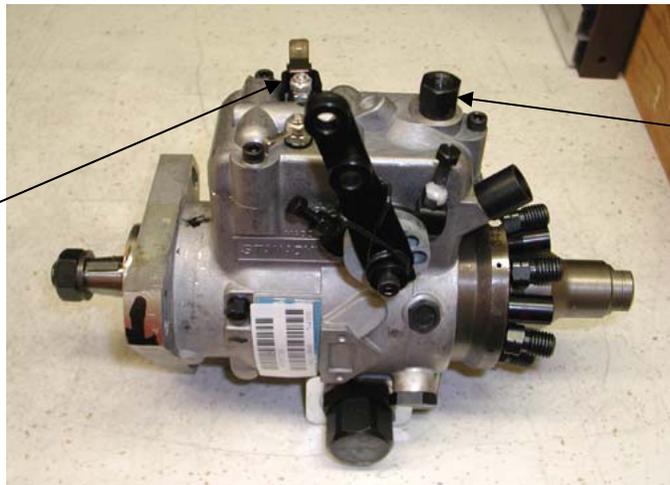
Removing Existing Governor Control Cover

IMPORTANT

Clean the outside of the pump with solvent and dry with compressed air before removing the fuel return line fitting or Stanadyne governor control cover. A suitable container should be placed under the fuel injection pump to catch any fuel that may spill when removing the cover.

Remove the fuel return line from the pump return line connector assembly. Use two wrenches to loosen.

ESO Electrical
Connections

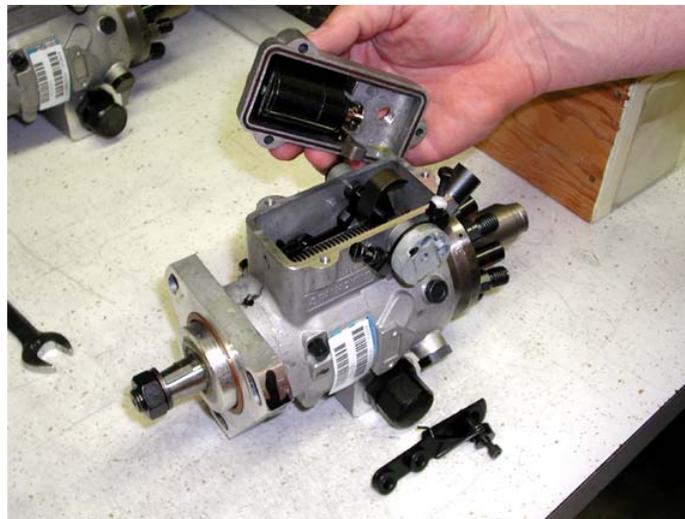


Pressure
Regulator/Fuel
Return Fitting

Disconnect the electric shutoff (ESO) solenoid wire from the governor control cover.

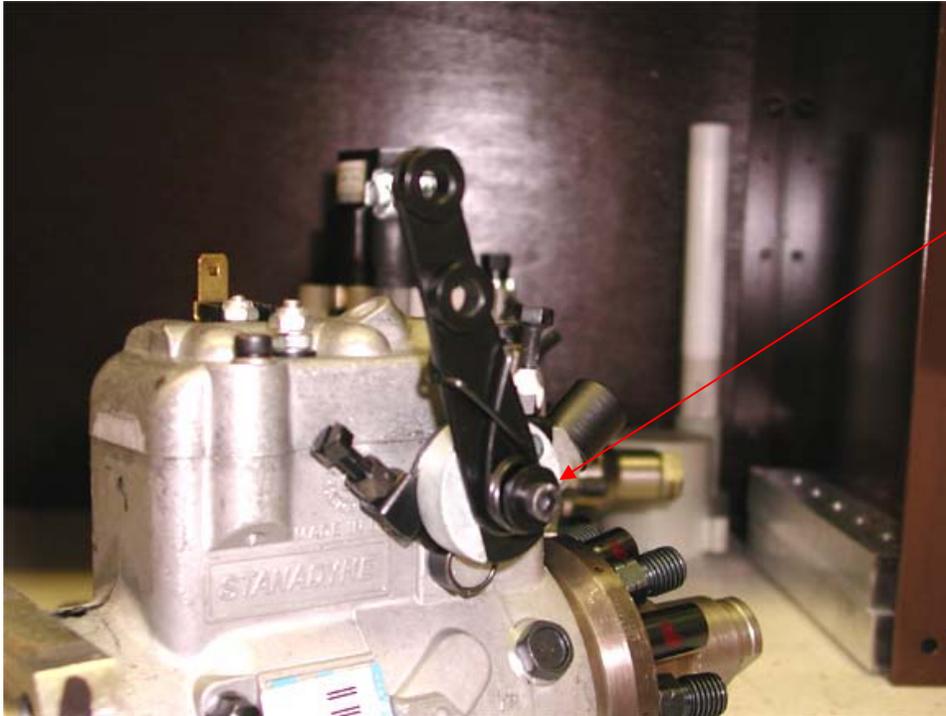
Remove the Pressure Regulator/Fuel Return Fitting. Retain for later use.

Loosen the three cover screws and remove the existing pump cover. A special tamper-proof torx-plus drive tool may be required to remove the current #10-24 socket button head screws.

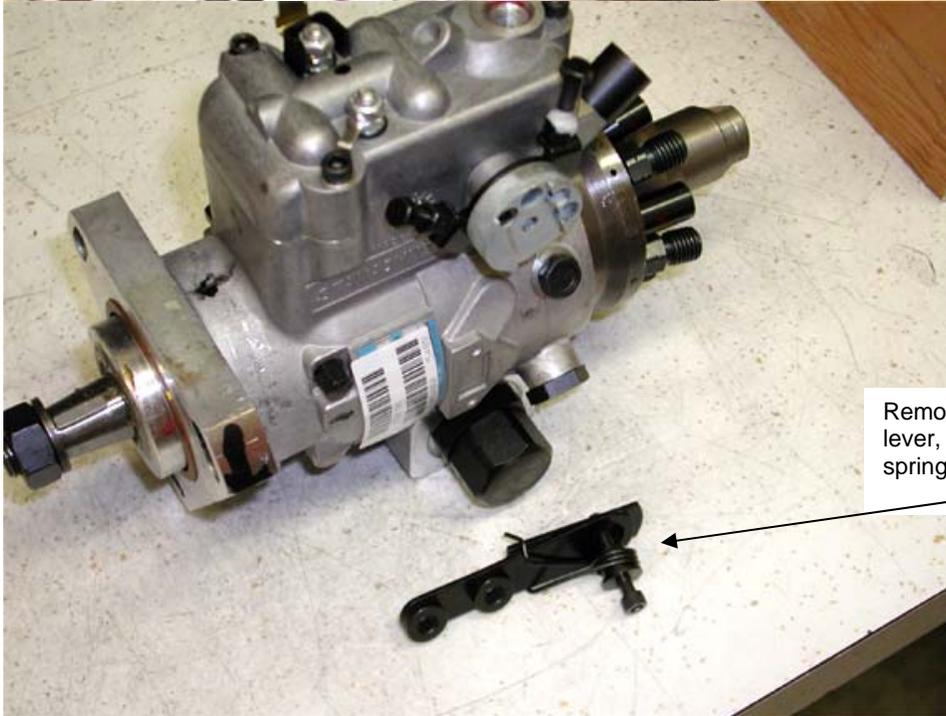


Preparing the Stanadyne Fuel Pump

The old speed setting lever components may require removal if they interfere with the operation of the LCS. If removal is required, remove the speed setting lever screw and then remove the lever, bushing, and over-travel spring.



Speed Setting
Lever Screw



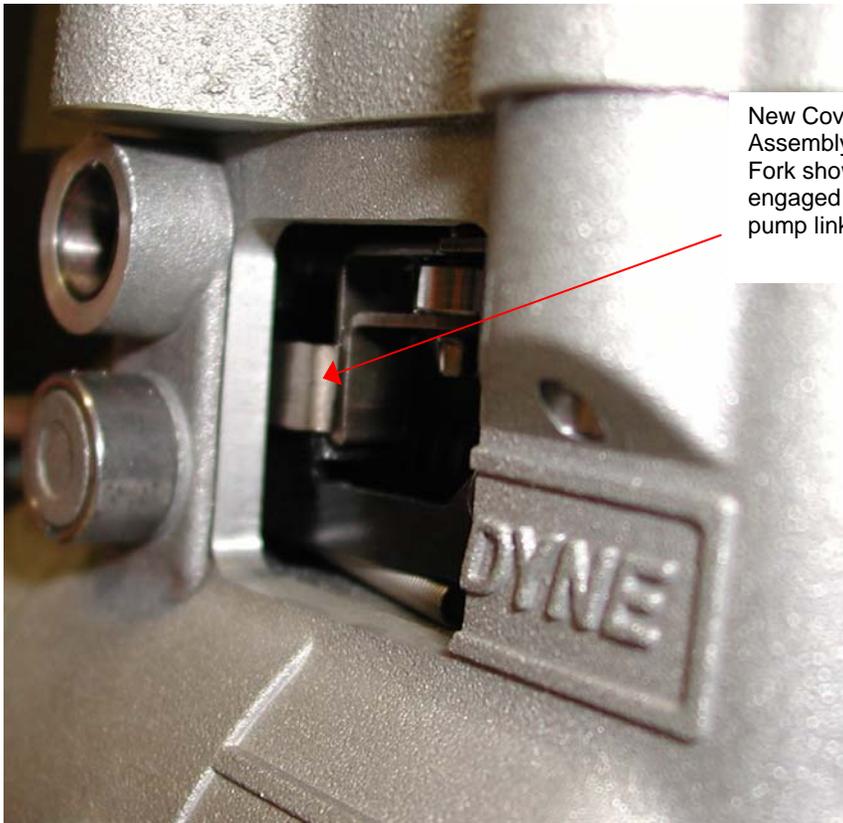
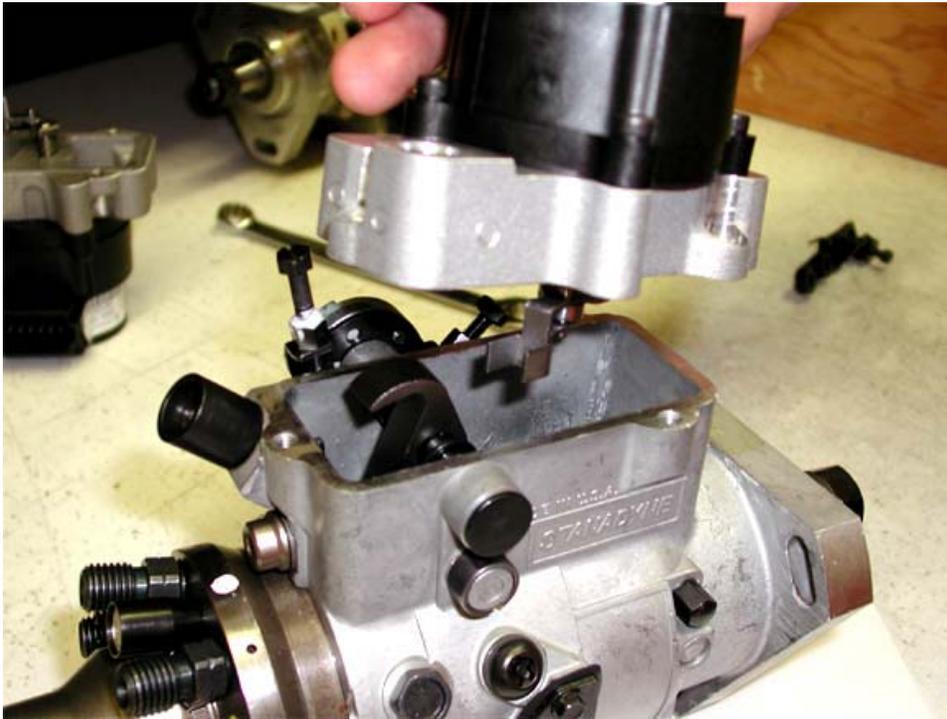
Removed speed setting
lever, bushing, over-travel
spring, and screw

Installation of LCS Control / Cover Assembly

Install the cover gasket (p/n 02-0004-134) onto the LCS Control/cover assembly (Speed Control 8404-563 or Direct Drive 8404-570).



Install the new cover, with the linkage oriented as shown in the following photo. Do not force the cover into place—if the linkage is properly aligned, it will fit without being forced. The second photo, with the side walls removed, show proper cover assembly fork engagement to the pump linkage with the cover in place.



New Cover
Assembly
Fork shown
engaged on
pump linkage

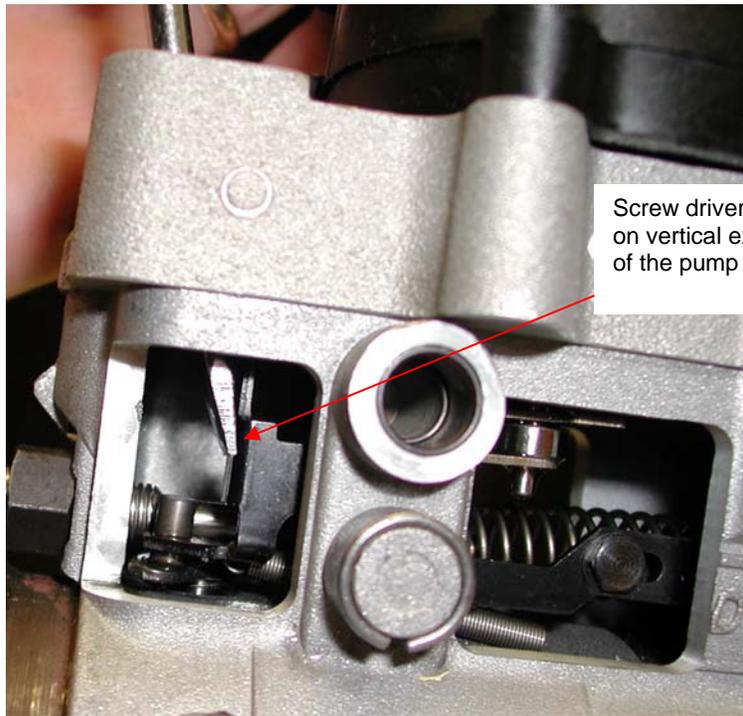
Install 3 new cover screws (190264). Torque to 4.0–5.1 N·m (35–45 lb-in).

Because this is a “blind assembly”, the following photos are included to demonstrate how free movement of the internal pump linkage must be verified after installation of the cover assembly. This is done by moving the pump linkage with a small screw driver. The screw driver can access the internal pump linkage through the new cover fitting port as shown. The screw driver will act against the pump linkage as shown in the cut away view of the pump. Use the screw driver to deflect the internal pump linkage away from the injector side of the pump. Release and assure that the pump linkage returns to the minimum fuel position. Also verify that the internal pump linkage is fully seated in the minimum fuel direction.

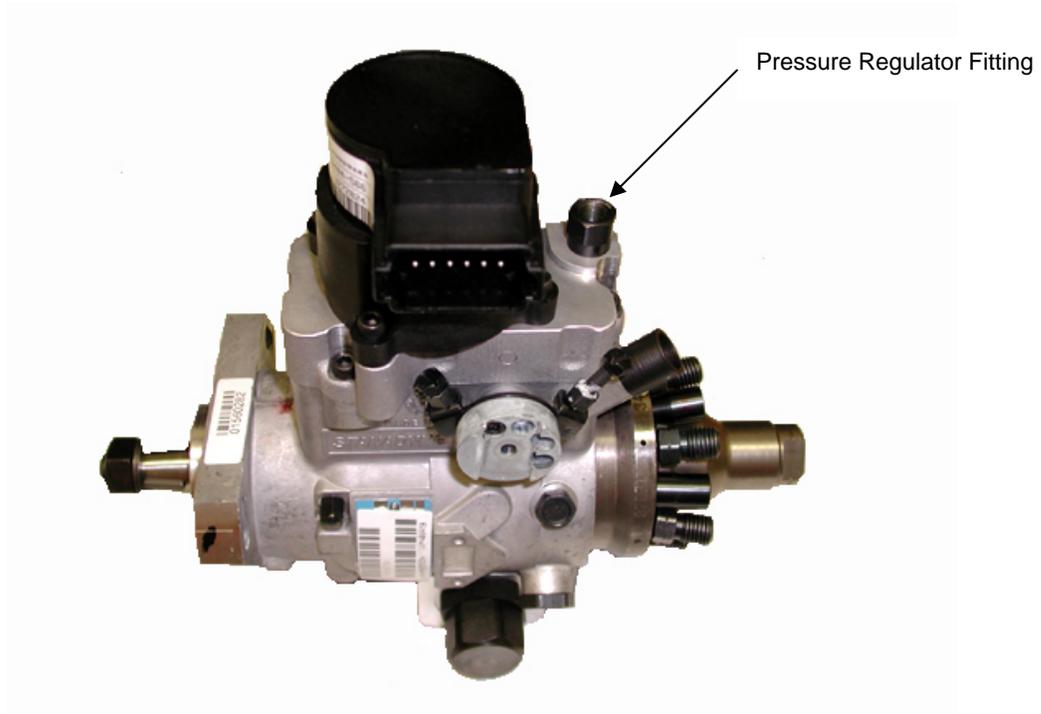
NOTICE

The pump cover must be removed, inspected, and re-installed if free movement to minimum fuel position is not verified as directed above.





Screw driver acting on vertical extension of the pump linkage



Pressure Regulator Fitting

Re-install the pressure regulator fitting from original pump cover. Replace the O-ring with item 1355-197. Lubricate the O-ring before installing it on the fitting and tighten it into the cover with 10.2–12.4 N·m (90–110 lb-in) of torque.

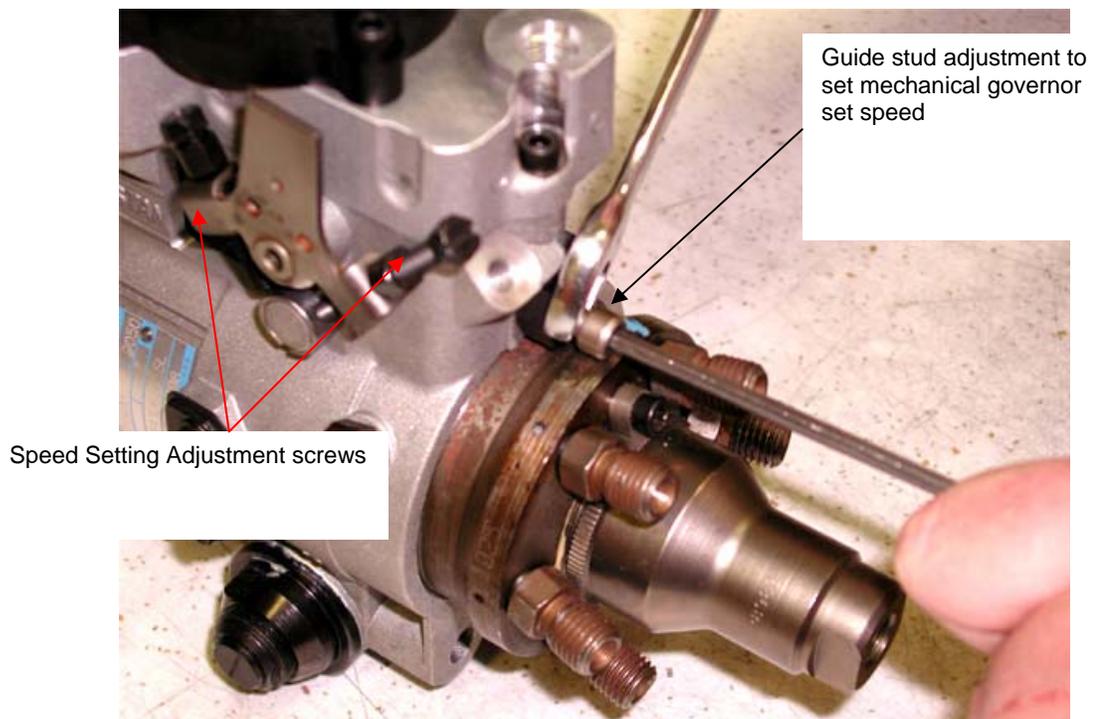
Re-attach the fuel return line to the pressure regulator/fuel return fitting. The fitting position of the fuel return line is only slightly different from before, so the fuel return line should not require any changes other than slight adjustments. Tighten the fuel return line fitting to Stanadyne recommendations.

The ESO solenoid is NOT used with this cover design. Please assure that the ESO wire leads are properly tied off, insulated, and secured. Refer to appropriate engine/fuel pump documentation to ensure that the system functions properly without the ESO.

For LCS Speed Control Applications: Install the mating Deutsch electrical connector on the wiring harness but do not connect it to the LCS control. Start the engine on the mechanical governor and adjust the guide stud until the mechanical governor's target speed is 5% to 10% higher than the intended LCS control's target speed. Tighten the guide stud nut to 6.8–7.9 N·m (60–70 lb-in) and shut down the engine.

IMPORTANT

See the LCS speed control or direct drive manuals for wiring and other functional information.



For LCS Speed Control Applications: In some applications, the speed setting adjustment screws can be used instead of the guide stud adjustment. In these cases, adjust the speed setting adjustment screws to obtain the mechanical governor set speed as described above. If the guide stud adjustment is used, the speed setting adjustment screws should be used to secure the shutoff lever at maximum counterclockwise position. Tighten the speed setting adjustment screw lock nuts to 4.0–4.5 N·m (35–40 lb-in).

IMPORTANT

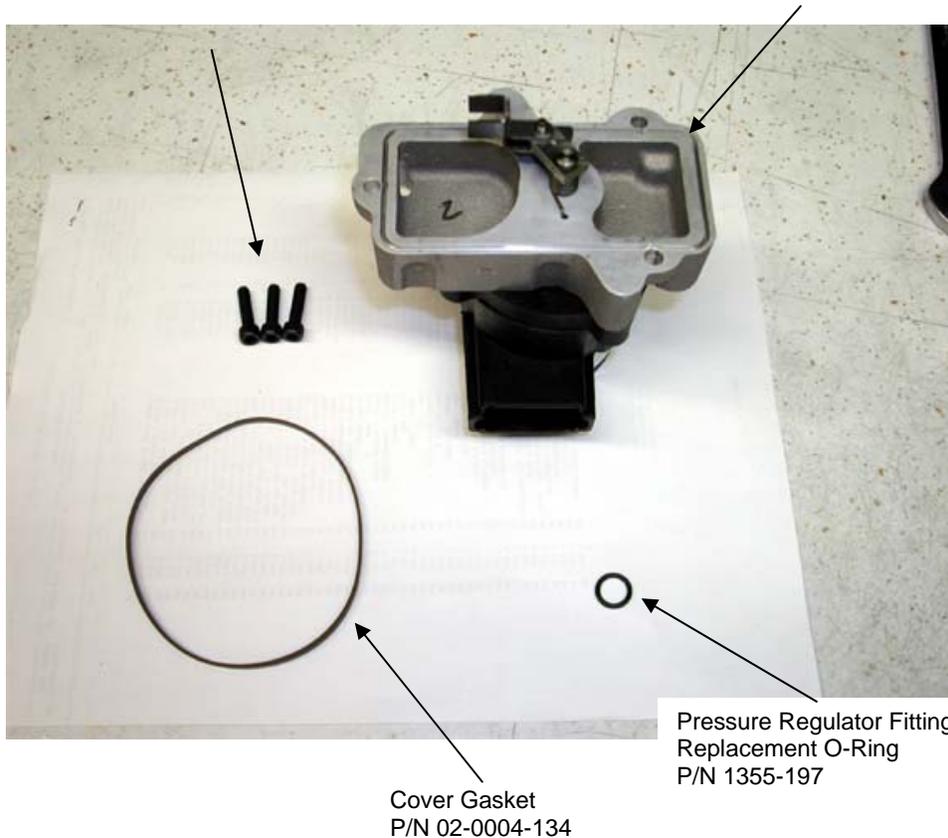
It is possible that both the guide stud and speed adjustment screws will require adjustment to assure the mechanical speed governor is set 5–10% above the desired LCS control target speed. For direct drive application, please consult the appropriate LCS manual.

Connect the wiring harness to the LCS control and start the engine. Disconnect the power to the LCS to test that the cover return spring is capable of shutting down the engine.

Installation Kit Parts

Attachment Screws
3x P/N 190264

LCS Cover Assembly
Speed Control: P/N 8404-563
Direct Drive: P/N 8404-570



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) 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.

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.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory published at www.woodward.com/directory.

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 Electrical Power Systems	Products Used In Engine Systems	Products Used In Industrial 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
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Poland-----+48 12 295 13 00		
United States----+1 (970) 482-5811		

For the most current product support and contact information, please visit our website directory at www.woodward.com/directory.

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 _____

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.) _____

Control/Governor Information

Control/Governor #1

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number _____

Control/Governor #2

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number _____

Control/Governor #3

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number _____

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.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication **26187**.



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