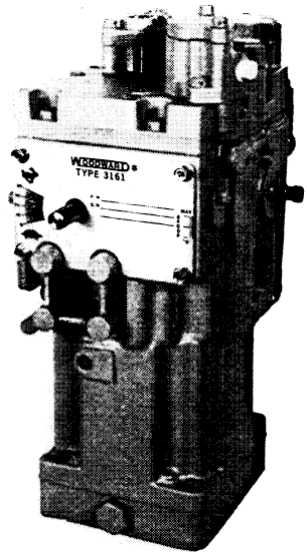
WOODWARD

Product Manual 03104
(Revision NEW)
Original Instructions



Pressure Shutdown Device for the 3161 Governor

Installation and Operation Manual

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

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.

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, be sure to check the *publications page* on the Woodward website:
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*.

Contents

Illustrations and Tables

Chapter 1.
General Information

Introduction

This manual describes the installation and operation of the Pressure Shutdown device available for field installation on the 3161 governor.

Description

The Pressure Shutdown (Figure 2-2) is installed on top of the right front corner of the cover. A pressure line (either air or hydraulic supply) is connected to the 0.438-20 UNJF straight thread port in the side of the shutdown housing (Figure 1-1). The supply pressure must be a minimum of 40 psi (276 kPa) with shutdown occurring if 40 psi (276 kPa) (or above) is applied to the shutdown piston. This pressure moves the piston down, making contact with the shutdown plunger, which in turn presses down on the shutdown rod and limit/shutdown pilot valve, allowing control oil to drain, causing shutdown. The shutdown will reset when pressure drops to 20 psi (138 kPa) and lower.

The Pressure Shutdown can also be used in conjunction with the electric and/or manual shutdown devices as shown in Figures 2-3, 2-4, and 2-5.

Any failure that would cause the governor to be inoperative would also cause the pressure shutdown to be inoperative.

References

03101	3161 Governor
03102	3161 Governor, Product Specification
03103	Manual Shutdown Device for the 3161 Governor
03105	Electric Shutdown for the 3161 Governor
03106	Pneumatic Speed Setting Device (factory installed only)
03107	Speed Adjusting Motor with Manual Speed Adjustment (factory installed only)
03108	Air Pressure Fuel Limiter (factory installed only)
03109	Load Limit Assembly for the 3161 Governor
25075	Storage of Mechanical-Hydraulic Controls

Chapter 2.
Installation

Introduction

Pressure Shutdown Installation and Shutdown Nut Adjustments are covered in this chapter. The 3161 Governor and the Pressure Shutdown Device are precision instruments and should be handled as such.

Shutdown Nut Adjustment

Check the adjustment of the shutdown nut on governors not previously equipped with a shutdown and on governors that have been overhauled. Use the following steps.

1. Remove all dirt, grease, water or any other foreign material from the governor cover.

2. Remove two 3/8 inch hex head 1/4-20 screws (1), shutdown cover plate (2), and gasket (3) from the governor cover (Figure 2-1).

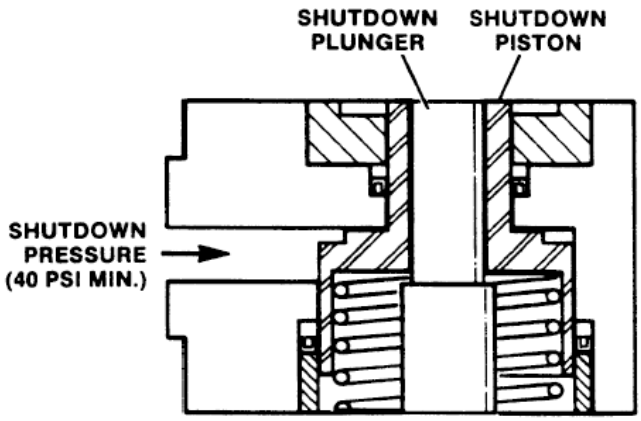


Figure 2-1. Shutdown Cover Plate

3. Remove shutdown device(s) if so equipped.

⚠WARNING **Rotate the output shaft of the governor to the minimum fuel position, and adjust the prime mover linkage to cause shutdown.**

4. Start the operating, opening in prime mover. With the governor place a straight-edge across the cover and the shutdown nut.

⚠WARNING **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.**

5. Turn the nut counterclockwise until the governor just starts to cause shutdown, then turn it one full turn clockwise.

⚠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.

Installation Procedure

Pressure Shutdown

(Figures 2-2 and 4-1)

1. Remove two screws (1) and shutdown cover plate (2) from the governor cover. Do not remove gasket (3) from the cover unless replacement with a new gasket is necessary. Figure 2-1.

2. With gasket (1) in place, install the Pressure Shutdown device on the governor cover with two screws (3). Figure 4-1.

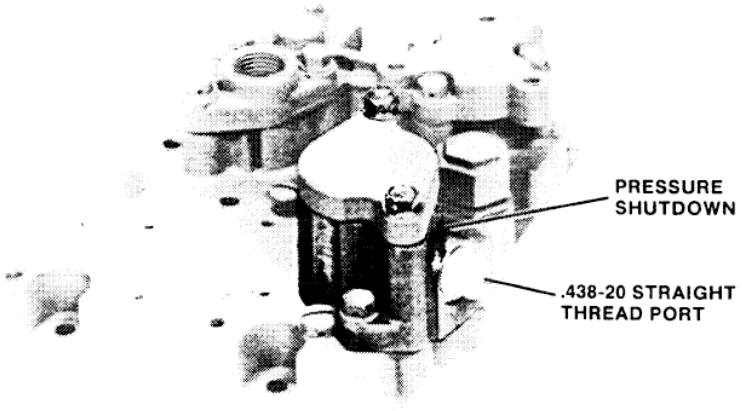


Figure 2-2. Pressure Shutdown Device

3. Install gasket (3) cover plate (2) and two screws (1). Torque all 1/4-20 screws to 90 lb-in (10 N·m). Figure 2-1.

See Test Procedures at the End of Chapter 3.

Pressure Shutdown with Manual Shutdown

Figure 2-3. When installing the Pressure Shutdown on a cover that has a Manual Shutdown already in place:

1. Remove two screws and the Manual Shutdown from the governor cover. Do not remove the gasket unless replacement with a new gasket is necessary.

2. Install the Pressure Shutdown on the governor cover. Secure with two screws (3), Figure 4-1.

3. Place gasket (1), Figure 4-1, on top of the Pressure Shutdown device.

4. Install the Manual Shutdown on top of the Pressure Shutdown. Figure 2-3. Secure the Manual Shutdown with two screws. Torque all 1/4-20 screws to 90 lb-in (10 N·m).

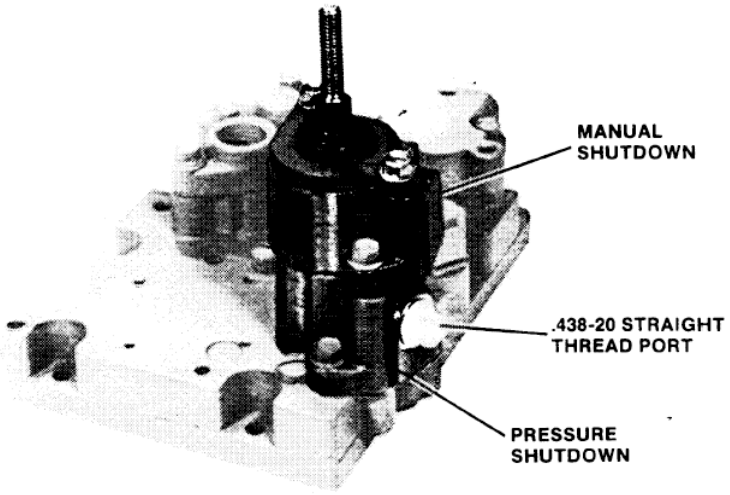


Figure 2-3. Pressure Shutdown with Manual Shutdown

5. Cover plate (2) Figure 2-1, is not used with this installation.

See Test Procedures at the End of Chapter 3.

Pressure Shutdown with Electric Shutdown

See Figure 2-4. When installing the Pressure Shutdown on a cover that has an Electric Shutdown already in place:

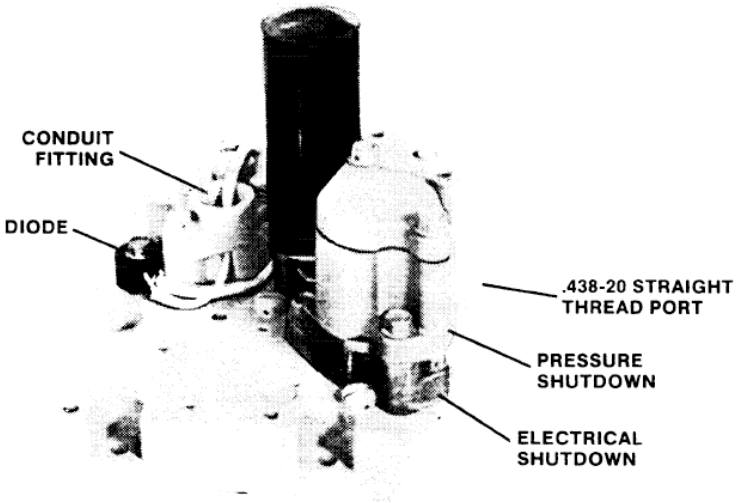


Figure 2-4. Pressure Shutdown with Electric Shutdown

1. Remove two screws and the cover plate from the Electric Shutdown. Do not remove the cover plate gasket unless replacement is necessary.

2. Install the Pressure Shutdown device on the Electric Shutdown. Secure with two screws (3), Figure 4-1.

3. Install gasket (3), cover plate (2), and two screws (1), Figure 2-1. Torque all 1/4-20 screws to 90 lb-in (10 N·m).

See Test Procedures at the End of Chapter 3.

Pressure Shutdown with Manual and Electric Shutdown

See Figure 2-5. When installing a Pressure Shutdown on a cover that has a Manual and an Electric Shutdown already in place:

1. Remove two screws and the Manual Shutdown device. Do not remove the gasket unless replacement is necessary.

2. Install the Pressure Shutdown on the Electric Shutdown and secure it with two screws (3), Figure 4-1.

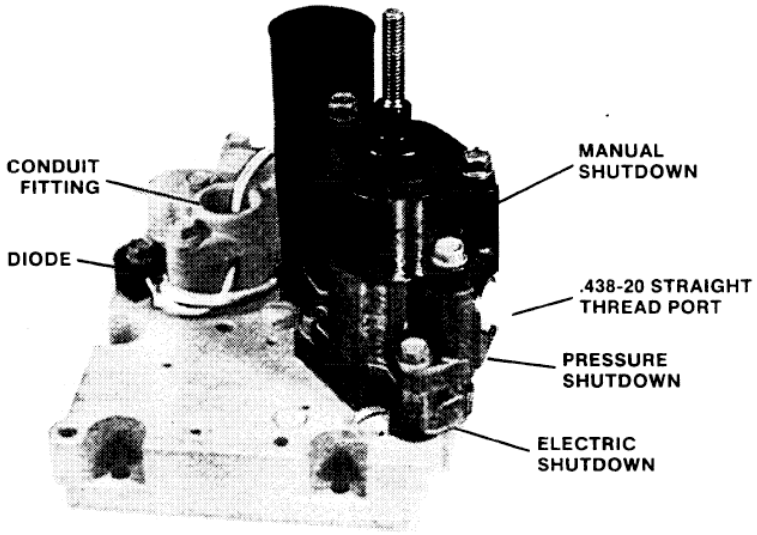


Figure 2-5. Pressure Shutdown with Manual and Electric Shutdown

3. Install a new gasket on the Pressure Shutdown.

4. Install the Manual Shutdown on top of the Pressure Shutdown. Secure it with two screws. Torque all 1/4-20 screws to 90 lb-in (10 N·m).

5. Cover plate (2), Figure 2-1, is not used with this installation.

See Test Procedures at the End of Chapter 3.

Chapter 3.
Repair and Test Procedures

Repair Procedure

Before attempting the disassembly of the Pressure Shutdown device, remove all dirt, grease, water, and other contaminants from the device.

Disassemble the shutdown according to the following instructions. Reference numbers in parentheses are assigned to each part in the exploded view, Figure 4-1.

⚠CAUTION **Wear approved eye protection to prevent possible eye injury during disassembly, cleaning, and assembly of parts.**

Disassembly
(Figure 4-1)

1. Remove two 3/8 inch hex head 1/4-20 screws (3), and lift the shutdown assembly and gasket (1) from the governor cover. Remove shutdown spring (11).

2. Remove two screws and the shutdown cover.

3. Remove piston guide (5) and guide ring (7).

4. Push shutdown piston (9) with shutdown plunger (10) from housing (2).

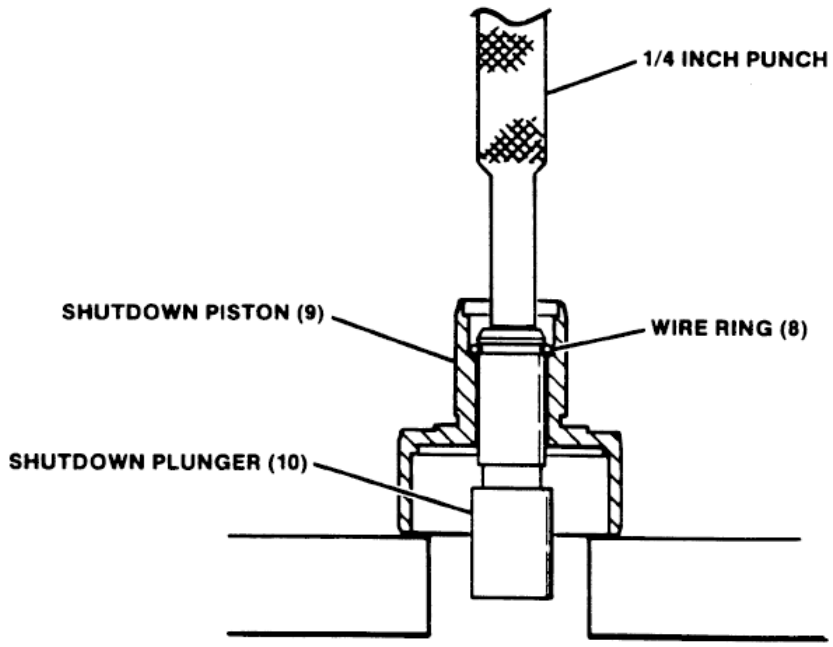


Figure 3-1. Setup to Remove Wire Ring (8) from Shutdown Plunger (10)

5. Remove wire ring (8) from shutdown plunger (10). Refer to Figure 3-1. Use a 1/4 inch (6 mm) punch and arbor press to push the shutdown plunger (10) through wire ring (8) and piston (9).

NOTICE

Support shutdown piston (9) high enough while being pressed out of shutdown plunger (10) to pass beyond wire ring (8).

6. Remove Teflon seals (4 and 6). Seals can be removed by hand (no tool required).

Cleaning

Clean parts with sharp corners and smooth finishes separately with solvent and a stiff brush to avoid nicks and scratches. Clean other parts by agitation in solvent, or in an ultrasonic cleaner.

⚠CAUTION

Observe manufacturer's Instructions or restrictions regarding the use of solvents. If no instructions are available, handle with care. Use the cleaning solvent In a well ventilated area away from fires or sparks.

Dry parts with clean, lint free wipes, or blow dry with clean dry air.

Handle parts that have been machined to a close tolerance carefully, to prevent damage caused by contact with other parts or objects.

Part Inspection

Shutdown Housing (2).
Inspect seal and gasket area for nicks and scratches to avoid leakage when new seals and gaskets are installed.

Piston Guide (5).
Inspect for nicks and scratches. Piston must move freely through guide.

Guide Ring (7)
Remove burrs (if any) from ring.

Wire Ring (8).
Replace the wire retaining ring.

Shutdown Piston (9).
Inspect all corners for nicks. Inspect piston for wear.

Shutdown Plunger (10).
Inspect plunger for nicks and scratches. Plunger must move freely through piston (9).

Shutdown Spring (11).
Inspect spring for rust and corrosion. Replace spring if any damage is found.

Assembly

To prepare to assemble the Pressure Shutdown, lay the parts in an orderly fashion on a clean dry work surface.

Use only new seals and gaskets. Careful and precise assembly methods will save time and help to ensure correct operation of the shutdown.

Torque all 1/4-20 screws to 90 lb-in (10 N·m).

Assembly Procedures

(Figure 4-1)

1. Install shutdown plunger (10) in shutdown piston (9).
2. Install wire ring (8) on shutdown plunger (10). For stability, place piston and plunger upright on the bench and slip wire ring (8) into the retainer groove on the plunger.

NOTICE

Do not distort Teflon seals (4 and 6) when installing them in shutdown housing (2). Install seals with open sides facing the pressure.

3. Carefully start Teflon seal (4) in the top of shutdown housing (2). Be sure the seal is completely started before pushing it all the way down. DO NOT try to push the seal in with piston guide (5).
4. Carefully start Teflon seal (6) in the bottom of shutdown housing (2). Be sure the seal is completely started before pushing it all the way down.
5. Install guide rings (5 and 6) in the shutdown housing.
6. Install the piston and plunger assembly in the shutdown housing.
7. Place gasket (1) and the shutdown assembly on the cover. Use two 1/4-20 screws to secure the shutdown assembly to the cover.
8. Install the shutdown cover and gasket on the shutdown assembly.

Test Procedures

⚠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.

Connect the pressure line (either air or hydraulic supply) to the Pressure Shutdown device.

⚠WARNING

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.

With the overspeed shutdown devices correctly installed and operational, start the prime mover.

1. Increase the pressure supply to a minimum of 40 psi (276 kPa). The governor output shaft must rotate to the minimum fuel position causing prime mover shutdown.

   If shutdown does not occur, check the following:

   a. Shutdown nut adjustment.

   b. Correct installation of the Pressure Shutdown device.

   c. Correct adjustment of the fuel linkage from the governor output shaft to the prime mover.

   d. Correct installation and /or adjustment of other shutdown devices used on the governor (if any).

2. If the governor was equipped with other shutdown devices (electric and/or manual) prior to the installation of the Pressure Shutdown, check these devices to be sure they are operational.

Chapter 4.
Replacement Parts

When ordering replacement parts, include the following information:

- Manual number (this is manual 03104)
- Governor serial number and part number shown on the nameplate
- Part reference number and part name from parts list

Ref. No.	Part Name	Quantity
03104-1	Gasket	1
03104-2	Shutdown housing	1
03104-3	Screw 0.250-20 x 1.0	2
03104-4	Seal 0.625	1
03104-5	Piston guide	1
03104-6	Seal 1.250	1
03104-7	Guide ring	1
03104-8	Wire ring	1
03104-9	Shutdown piston	1
03104-10	Shutdown plunger	1
03104-11	Shutdown spring	1

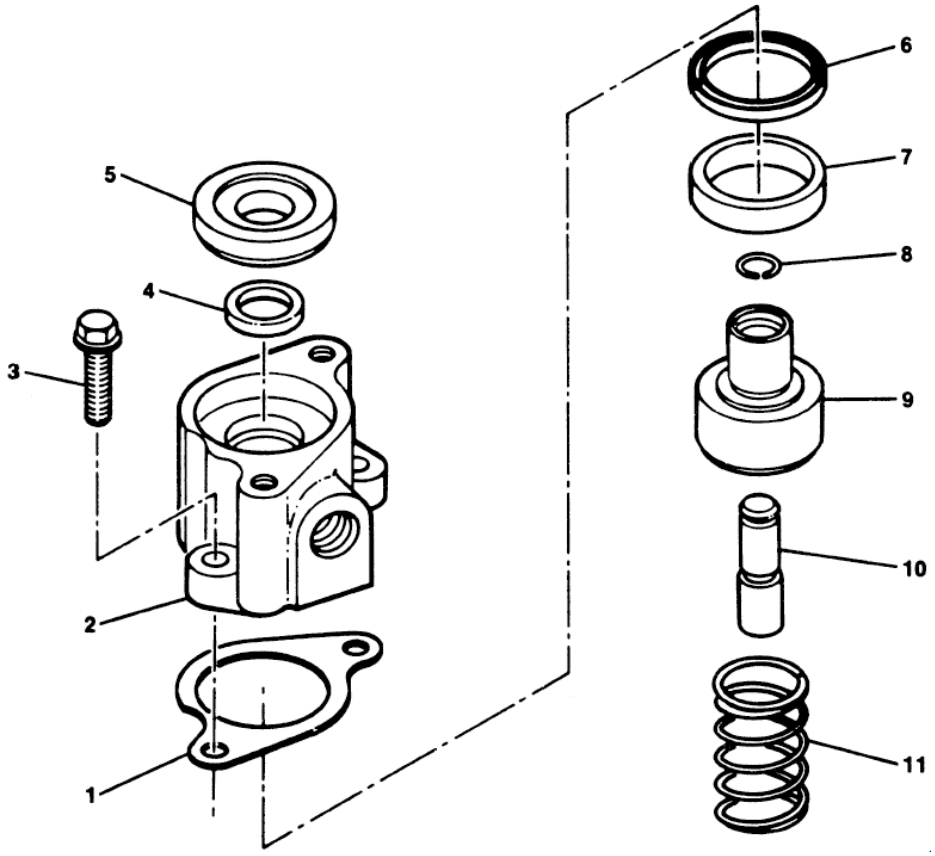


Figure 4-1. Parts for Pressure Shutdown Device

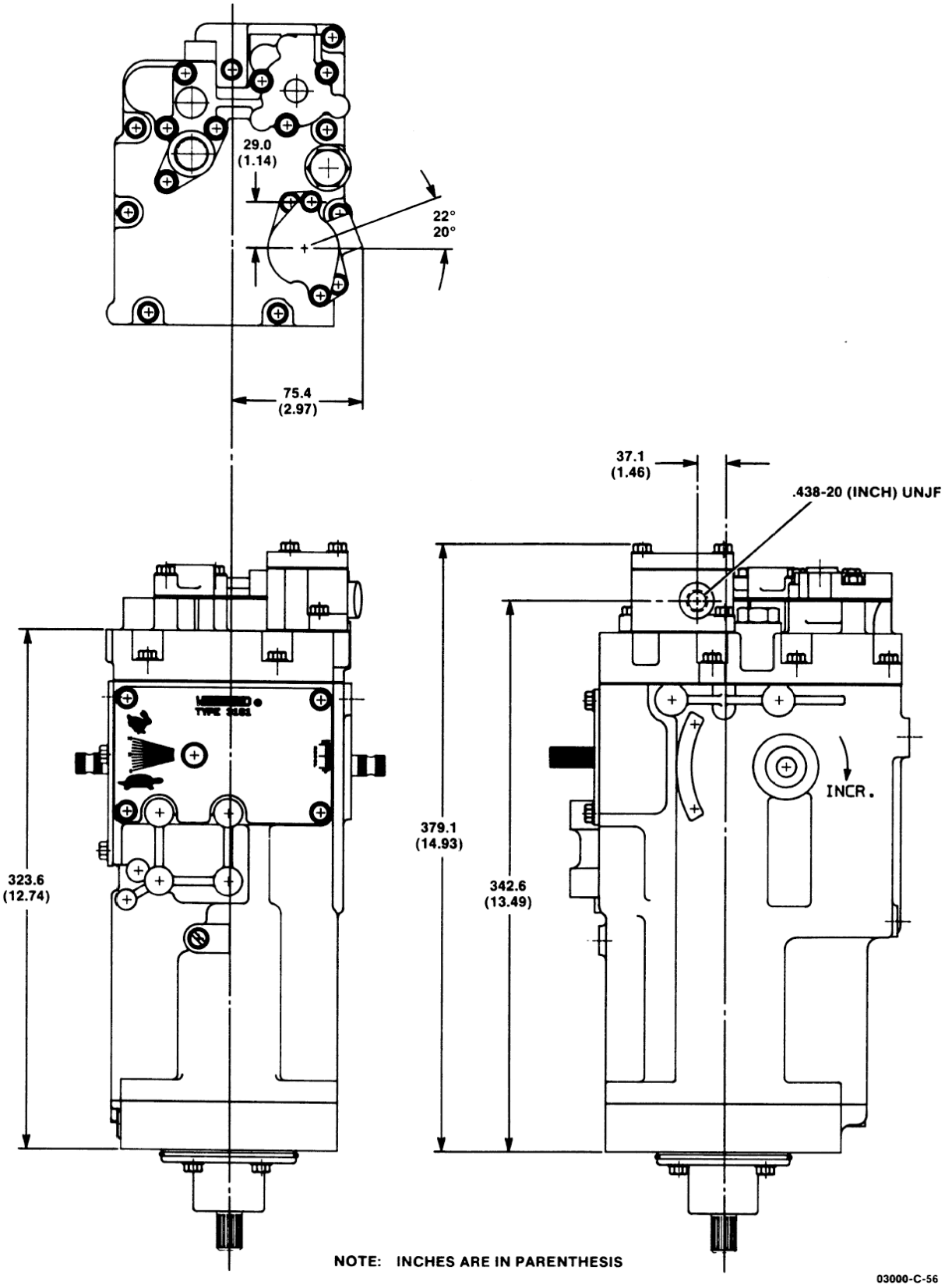


Figure 4-2. Outline Drawing of 3161 Governor with Pressure Shutdown Device

Chapter 5.
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

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany:	
Kempen	+49 (0) 21 52 14 51
Stuttgart	+49 (711) 78954-510
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

Products Used In Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany	+49 (711) 78954-510
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
United States	+1 (970) 482-5811

Products Used In Industrial Turbomachinery Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
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 03104.

WOODWARD

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Email and Website—www.woodward.com

**Woodward has company-owned plants, subsidiaries, and branches,
as well as authorized distributors and other authorized service and sales facilities throughout the world.**

Complete address / phone / fax / email information for all locations is available on our website.

2012/9/Colorado