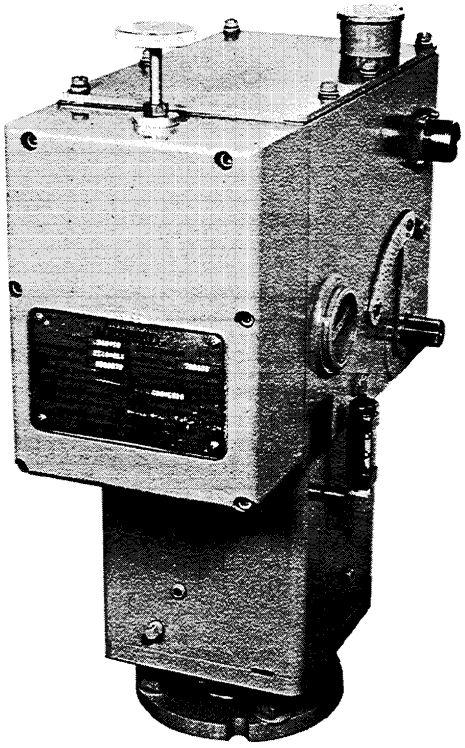
WOODWARD

Product Manual 37741
(Revision NEW)
Original Instructions



EGB-10 Governor/Actuator

New Style Solenoid Speed Setting Mechanism

Operation Manual

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

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

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 *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, 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 Out-of-date translations are marked with ⚠.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.

Contents

Illustrations and Tables

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.
Operation

Description

The EGB-10 Solenoid Speed Setting mechanism permits remote control of the mechanical governor portion of the governor/actuator. The mechanical governor controls the engine when starting and when the signal to the electric actuator fails. The mechanism replaces the standard front panel and dials (speed setting, speed droop, and load limit) used to control the mechanical governor reference speed. It consists of a speed-setting cylinder, manual speed adjustment screw, speed droop bracket, and load limit screw. The speed setting cylinder contains a solenoid operated speed-setting piston, which permits a selection of idle or maximum speed.

The solenoid speed setting system is combined with a solenoid shutdown system that provides positive movement of the terminal shaft to minimum position.

Load limit and speed droop adjustments usually found on the EGB dial are provided through internal governor adjustments.

IMPORTANT

The maximum speed setting of the solenoid speed setting must be higher than the maximum engine speed to be used by the electronic control. The manual speed adjustment will limit the solenoid speed setting if it is not above the maximum solenoid speed setting.

Operation

The schematic diagram (Figure 1-1) illustrates the operation of the solenoid speed-setting mechanism.

In operation, governor operating pressure oil is directed through the pilot-valve bushing to the speed-setting piston when the solenoid is energized. With each rotation of the bushing, a slot in the bushing registers with the pressure oil supply and the supply passage to the speed piston area. Intermittent pressure oil is thus passed to the area. This pressure oil forces the speed piston up at a rate determined by the rotational speed of the bushing and the size of the port. Typically, 15 seconds is required to move the piston from idle to maximum speed. This provides a ramp in speed setting during start-up. Upward movement is stopped by the head of the maximum speed screw.

As the maximum speed piston moves up, it raises the piston link and the left end of the speed lever. As the right end of the speed lever moves down, speeder spring compression increases and the output shaft rotates to the maximum fuel position. Upward movement of the maximum-speed piston stops when it contacts the maximum-speed screw.

The manual speed screw may be turned clockwise to lower the left end of the speed lever, reducing engine speed. The manual speed adjustment is the high speed setting of the mechanical governor and can, if improperly set limit the maximum speed attained by the solenoid speed setting.

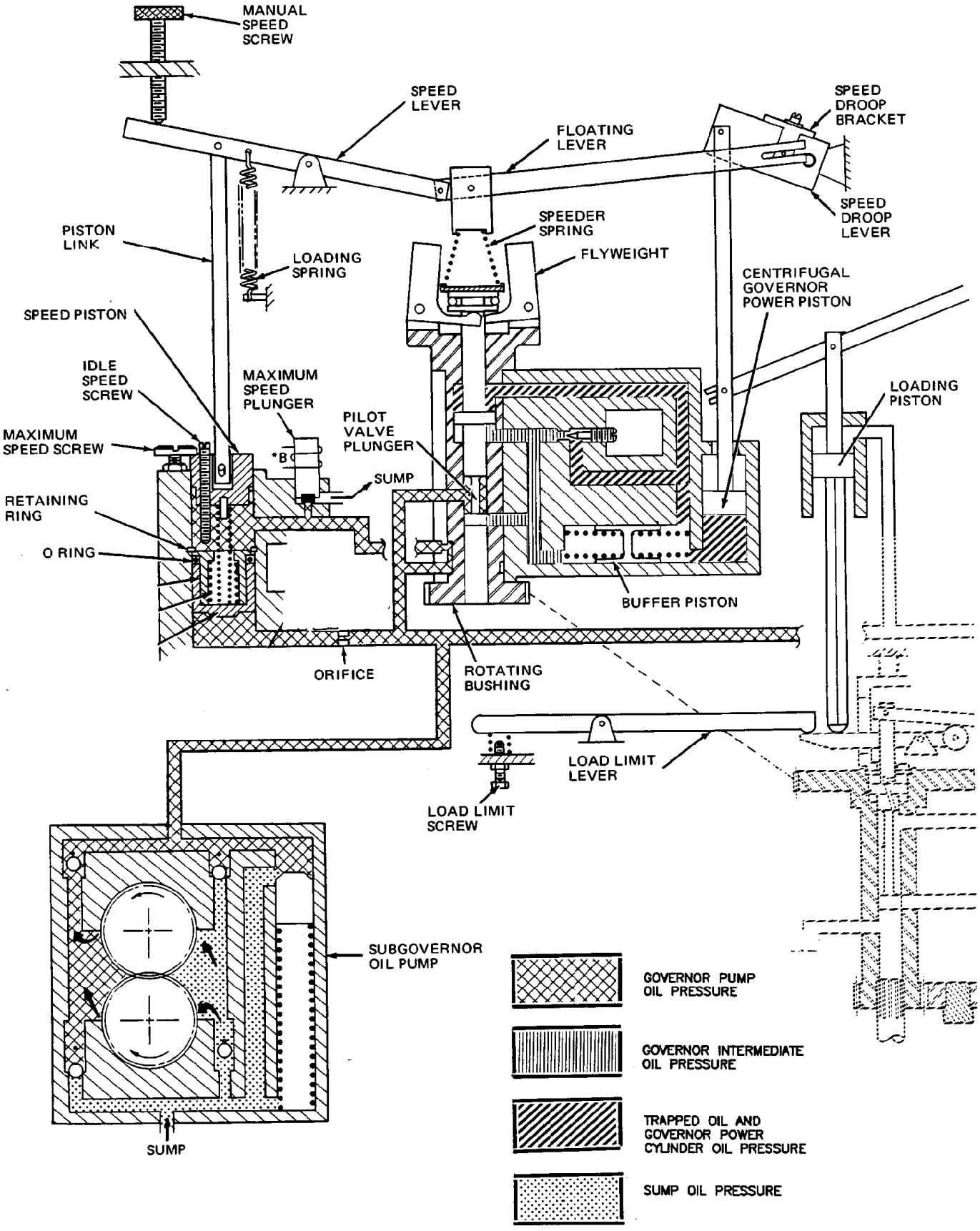


Figure 1-1. New Style Solenoid Speed Setting Schematic

Idle Speed

When the speed setting solenoid is de-energized, oil pressure beneath the speed-setting piston is drained to sump, and the loading spring forces the piston down until the idle-speed screw stops travel.

Under normal oil pressure conditions, either maximum speed or idle speed must be selected for the solenoid speed setting system. Any time the solenoid is energized, speed increases toward maximum. Any time the solenoid is de-energized, the speed setting of the mechanical side of the governor retreats toward minimum. This speed is the minimum speed at which the mechanical governor will control engine speed. This setting will not prevent the electronic governor from controlling at a lower speed.

Pistons below the speed setting piston are present to make sure the system goes to minimum speed setting when oil pressure is not present from the EGB subgovernor oil pump.

Shutdown Solenoid

The shutdown solenoid is completely separate from the speed-setting solenoid (see Figures 1-2 and 2-3). The device can be used for normal shutdown and/or as a backup to the safety shutdown system. The engine or turbine should be equipped with safety systems entirely separate form the governor. However, the safety system may be interfaced with the shutdown solenoid to cause the governor or actuator to go to minimum during safety systems shutdown. As with all safety shutdowns, proper operation should be confirmed periodically. See the engine manufacturer's instructions.

⚠WARNING **The shutdown solenoid must not be used as an overspeed protective device. Overspeed protection must come from a unit completely separate from the EGB control.**

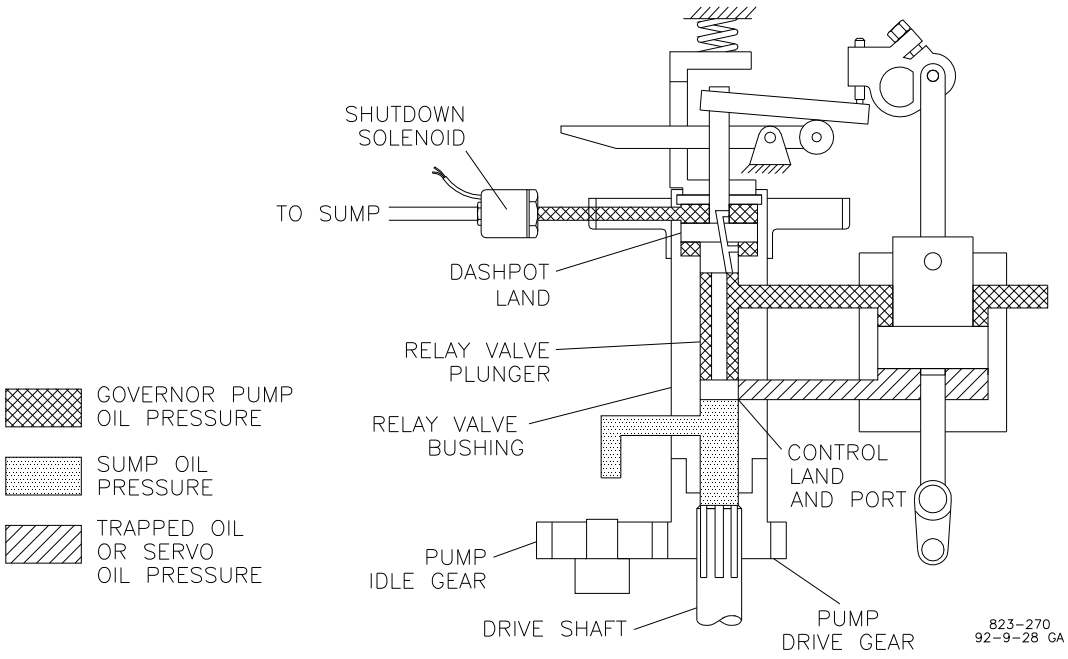


Figure 1-2. Schematic View of Solenoid Shutdown

The shutdown solenoid is mounted internally within the actuator column. It is connected with tubing and internal passageways, to the upper side of the dashpot land on the relay valve plunger in the hydraulic amplifier section of the actuator. When the solenoid is energized, oil pressure on the upper side of the dashpot land is dumped. This allows the oil pressure acting on the under side of the dashpot land to raise the relay-valve plunger which, in turn, dumps the trapped oil under the power piston. The oil pressure acting on top of the power piston then forces the piston to move to the minimum fuel position.

The shutdown solenoid is independent of the upper portion of the EGB-10 governor/actuator, but still relies on governor oil pressure to drive the governor output to minimum.

The shutdown solenoid is available in either an energize-to-shutdown or de-energize-to-shutdown.

Adjustments

The following table describes the function and adjustment procedures for the solenoid speed-setting adjustment components. See manual 37708 or 82340 for complete adjustment information on the EGB-10 governor/actuator.

Component	Function	Adjustment
Maximum Speed Screw	Set the speed at which the centrifugal governor assumes control. This speed must be higher (3–5%) than the electric governor speed setting.	Remove front cover, loosen lock nut, turn screw CW to decrease maximum speed, CCW to increase. Tighten lock nut and reinstall front cover.
Manual Speed Screw	Permits manual mechanical speed setting when centrifugal governor is controlling and solenoid speed is at maximum. Can limit maximum solenoid speed setting.	1) Loosen lock nut, turn screw CW to reduces speed. Tighten lock nut. 2) When electric governor is controlling, turn screw CCW to clear the speed lever.
Idle Speed Screw	Set idle speed when centrifugal governor is controlling.	Remove front cover, turn screw CW to increase idle speed,. CCW to decrease.
Speed Droop Bracket	Sets the percent of droop when centrifugal governor is controlling.	Remove top cover. Loosen lock screw. Slide bracket forward to increase droop.
Load Limit Screw	Sets maximum output shaft travel when either centrifugal or electric governor is controlling.	Loosen lock nut. Turn CW to decrease output shaft travel; CCW to increase.

Chapter 2.
Replacement Parts

When ordering replacement parts, include the following information:
1. Manual number (this is manual 37741).
2. Governor serial number and part number shown on the nameplate.
3. Part reference number and part name from parts list.

Parts List for Figure 2-1

Ref. No.	Part Name	Quantity
37741-1	Screw, fil. hd.	6
37741-2	Washer, lock	6
37741-3	Top Cover	1
37741-4	Cover Gasket	1
37741-5	Screw, soc. head	6
37741-6	Washer, lock	6
37741-7	Front Cover	1
37741-8	Cover Gasket	1
37741-9	Nut, hex jam	1
37741-10	Speed Adj. Screw, manual	1
37741-11	Nut, hex, .750-16	1
37741-12	Lock Washer, .750 id	1
37741-13	Sleeve	1
37741-14	Piston Return Spring	1
37741-15	Washer, plain	1
37741-16	Screw, soc. hd.	2
37741-17	Washer, lock	2
37741-18	O-ring	1
37741-19	Not Used	
37741-20	Speed Setting Cylinder Assembly	1
37741-21	Loading Spring (load limit lever)	1
37741-22	Nut, hex, 1/4-28	1
37741-23	Screw, hex hd. drilled	1
37741-24	Washer, copper	1
37741-25	Cotter Pin	1
37741-26	Straight Pin, drilled	1
37741-27	Cotter Pin	1
37741-28	Speed Setting Shaft	1
37741-29	Spring	1
37741-30	Speed Adjusting Lever	1
37741-31	Spacer	1
37741-32	Floating Lever	2
37741-33	Screw, 10-32 x 1/2	1
37741-34	Washer, lock	1
37741-35	Washer, plain	1
37741-36	Droop Adjusting Bracket	1
37741-37	Spacer	2
37741-38	Needle Bearing	2
37741-39	Orifice Plug	2
37741-40	Subgovernor Base	1
37741-41	EGB Column	1
37741-42	Nameplate	1
37741-43	Nameplate Screws	4

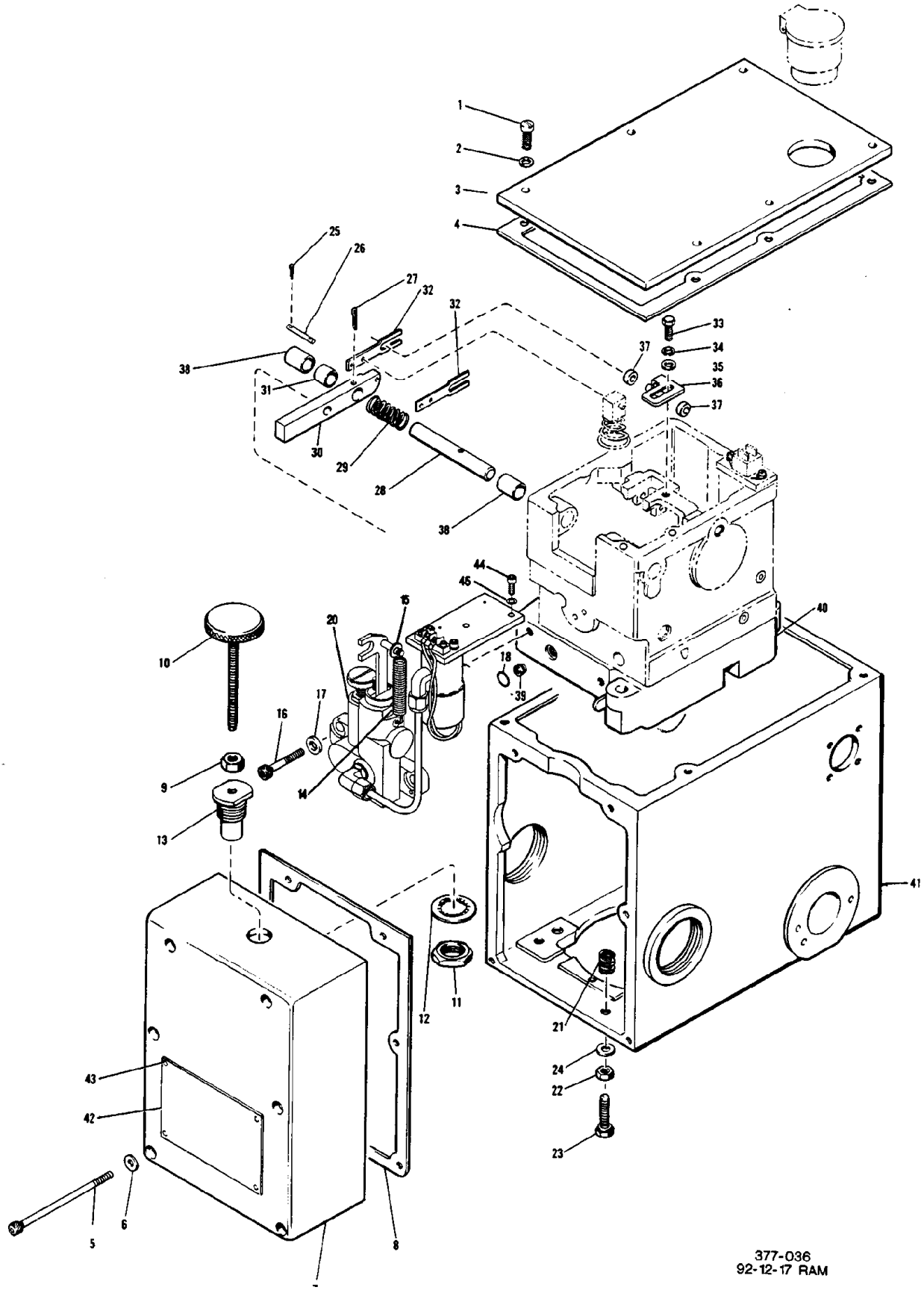


Figure 2-1. New Style Solenoid-Speed-Setting Mechanism

Parts List for Figure 2-2

Ref. No.	Part Name	Quantity
37741-114	Nut, hex., 5/16-24	1
37741-115	Maximum Speed Screw	1
37741-116	Idle Speed Set Screw	1
37741-117	O-ring	1
37741-118	Shoulder Pin	1
37741-119	Piston Link	1
37741-120	Speed Setting Piston	1
37741-121	Headed Pin	1
37741-122	Retaining Ring	1
37741-123	Plug	1
37741-124	O-ring	2
37741-125	Seal Piston	1
37741-126	Seal Spring	1
37741-127	Loading Spring	1
37741-128	Idle Speed Piston	1
37741-129	Retaining Ring	1
37741-130	Not Used	
37741-131	Thread Insert	1
37741-132	Not Used	
37741-133	Solenoid Retaining Screw	2
37741-134	Washer, Flat	2
37741-135	Terminal Block Screw	2
37741-136	Washer, lock	3
37741-137	Terminal Block	1
37741-138	Bracket Attachment Screw	2
37741-139	Washer	2
37741-140	Solenoid Bracket	1
37741-141	Speed Setting Solenoid	1
37741-142	Solenoid Tube	1
37741-143	Right Angle Connector	1
37741-144	Right Angle Connector	1
37741-145	Speed Setting Body	1

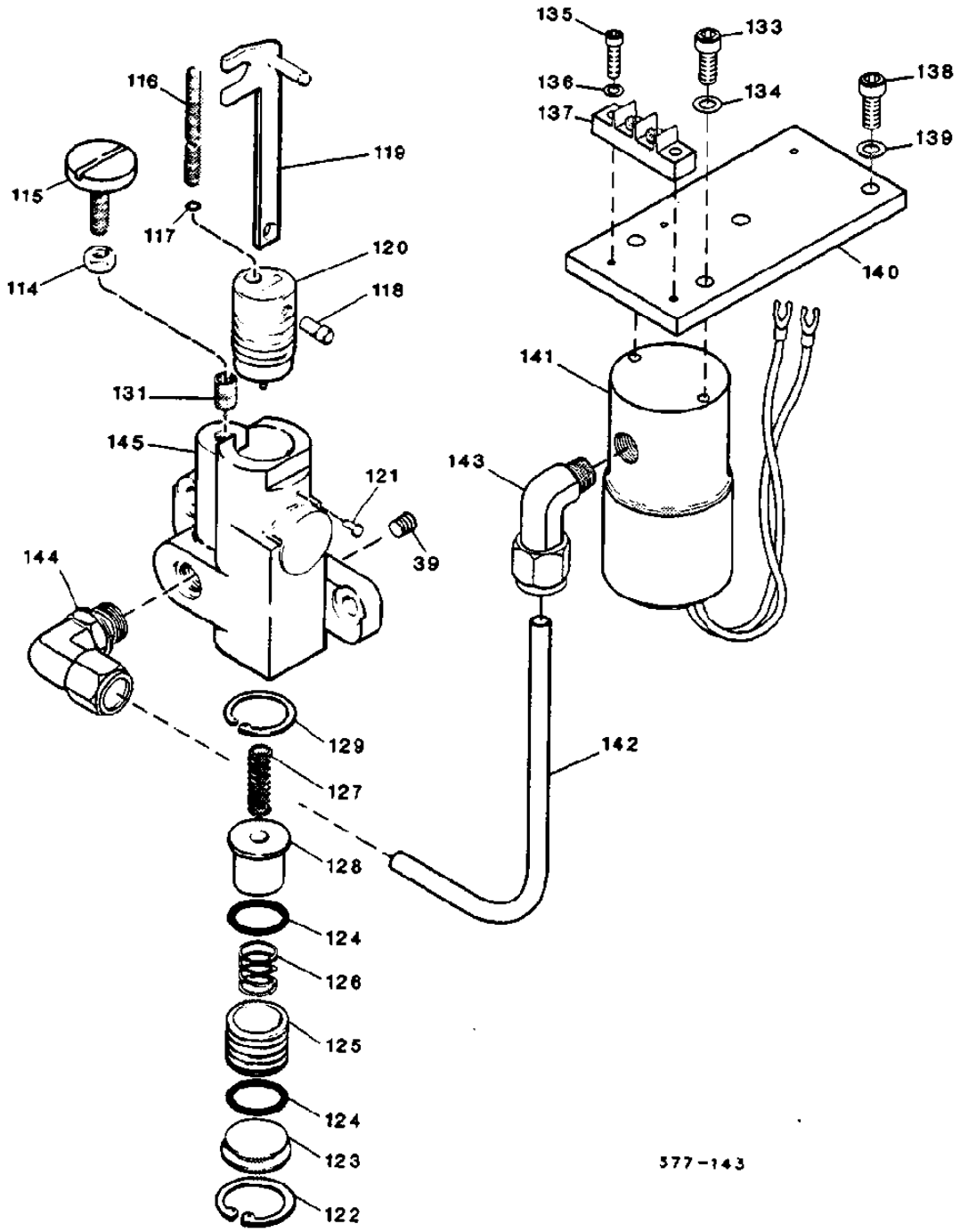


Figure 2-2. Speed Setting Cylinder Parts

Parts List for Figure 2-3

Ref. No.	Part Name	Quantity
37741-501	Bleeder Bolt	1
37741-502	Flat Washer, copper	2
37741-503	Screw, fil. hd., drilled	4
37741-504	Copper Tube, .250 od	1
37741-505	Elbow, 90°	3
37741-505A	Pipe Plug	1
37741-506	Banjo fitting	1
37741-507	Solenoid valve	1
37741-508	Lockwasher, internal	1
37741-509	Terminal lug, insulated	2
37741-510	Screw, fil. hd.	2
37741-511	Lockwasher, internal	2
37741-512	Terminal block	1
37741-513	Solenoid mounting bracket	1
37741-514	O-ring, 0.504 od	3
37741-515	Column	1
37741-516	Power Case	1
37741-517	Nut	1

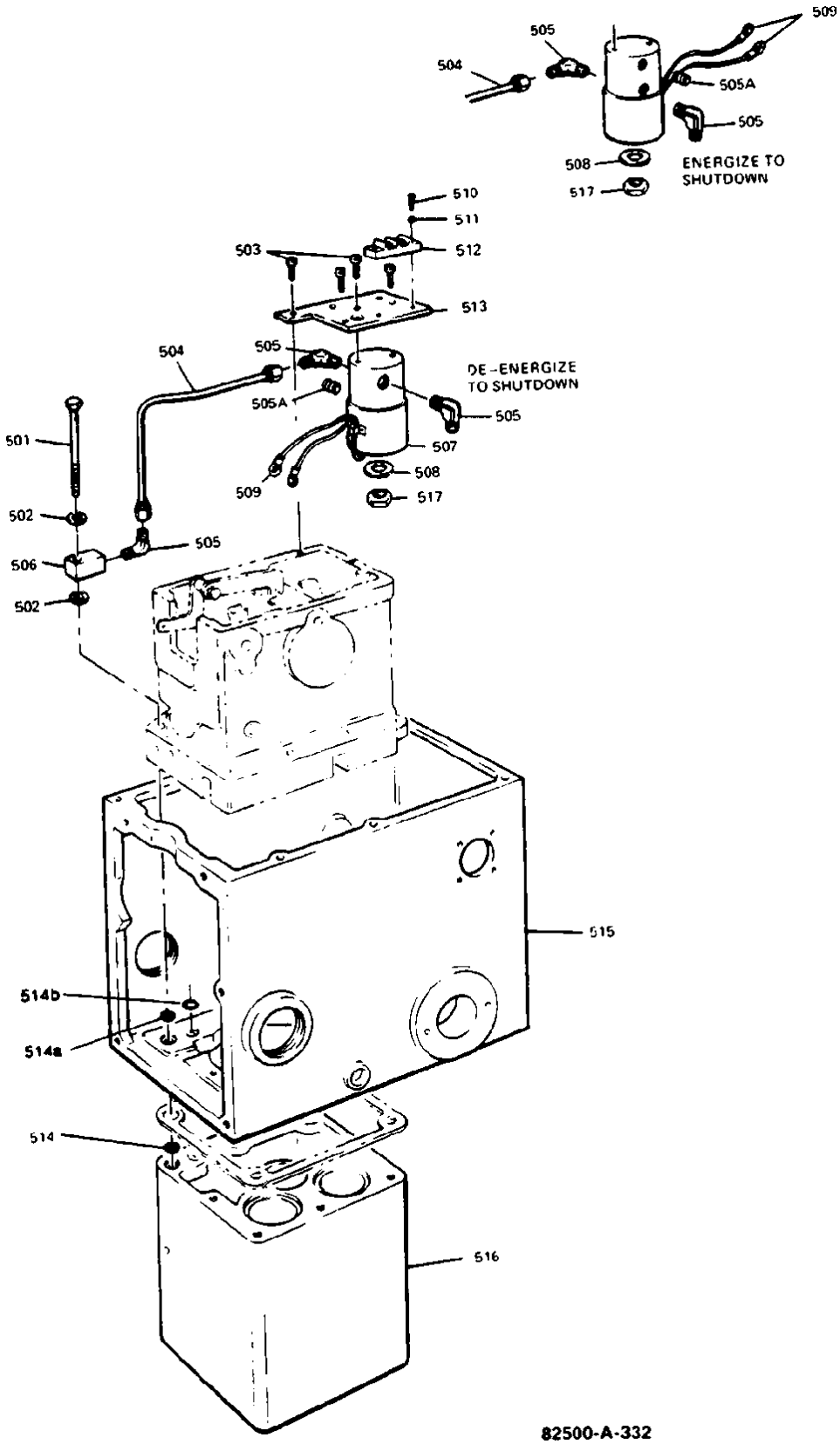


Figure 2-3. Solenoid Shutdown Exploded View

Chapter 3.
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 37741.

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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.

2012/11/Colorado