

Pressure Actuated Shutdown Assembly

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

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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.



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Warnings and Notices

Important Definitions



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

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

WARNING

**Overspeed /
Overtemperature /
Overpressure**

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

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

WARNING

**Personal Protective
Equipment**

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

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

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

WARNING

Start-up

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

WARNING

**Automotive
Applications**

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

NOTICE**Battery Charging
Device**

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

Electrostatic Discharge Awareness

NOTICE**Electrostatic
Precautions**

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

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

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

Follow these precautions when working with or near the control.

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

Pressure Actuated Shutdown Assembly

Description

The pressure actuated (air, oil, or water) shutdown assembly (Figure 1) serves to move the governor output shaft to minimum in the event of equipment failure (such as loss of lubrication oil pressure, etc). These units are generally supplied where electrical assemblies cannot be used. They can be incorporated in all models of the PG governor which use hydraulically operated speed-setting servo assemblies.

When actuated, this device initiates a sequence of actions within the governor which results in the governor output shaft being moved to the minimum position. The pressure actuated shutdown device can be arranged to move the governor output shaft to minimum position on either high or low signal pressure. Shutdown assemblies are available to operate with systems using any of three operating pressures: 10 ± 5 psi (69 ± 34 kPa), 20 ± 5 psi (138 ± 34 kPa), or 60 ± 5 psi (414 ± 34 kPa).



WARNING If the governor, for any reason, loses its ability to control the engine or turbine, the pressure shutdown protection is also lost.

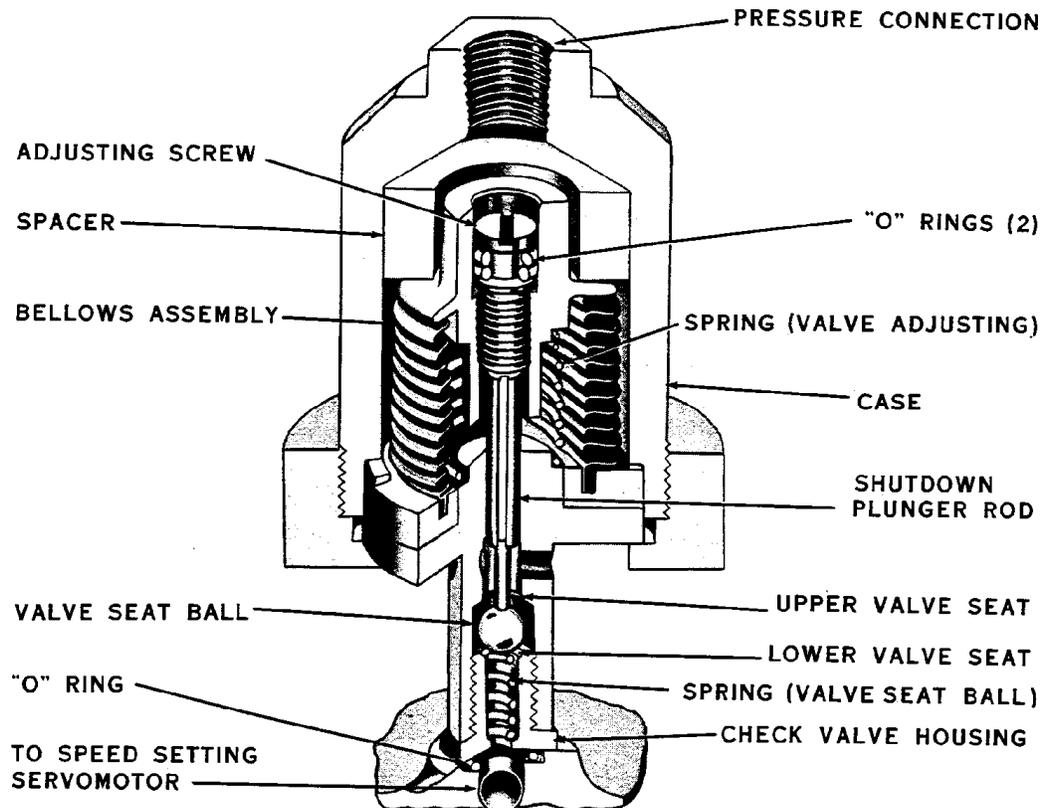


Figure 1. Pressure Actuated Shutdown Assembly

Operation

As shown in the schematic (Figure 2), the shutdown device consists essentially of a check valve and a bellows. It is inserted in the hydraulic circuit between the speed-setting servo assembly and the speed-setting pilot valve plunger and bushing. When the ball in the check valve is unseated, oil above the speed-setting servo piston can escape to sump. This allows the servo piston spring to push the speed-setting servo piston up. When the servo piston moves up sufficiently, the piston rod lifts the shutdown nuts and shutdown rod. The shutdown rod is connected to the governor pilot valve plunger. Lifting the shutdown rod thus lifts the pilot valve plunger. With the pilot valve plunger above center, the governor power piston moves the fuel linkage to the "off" position.

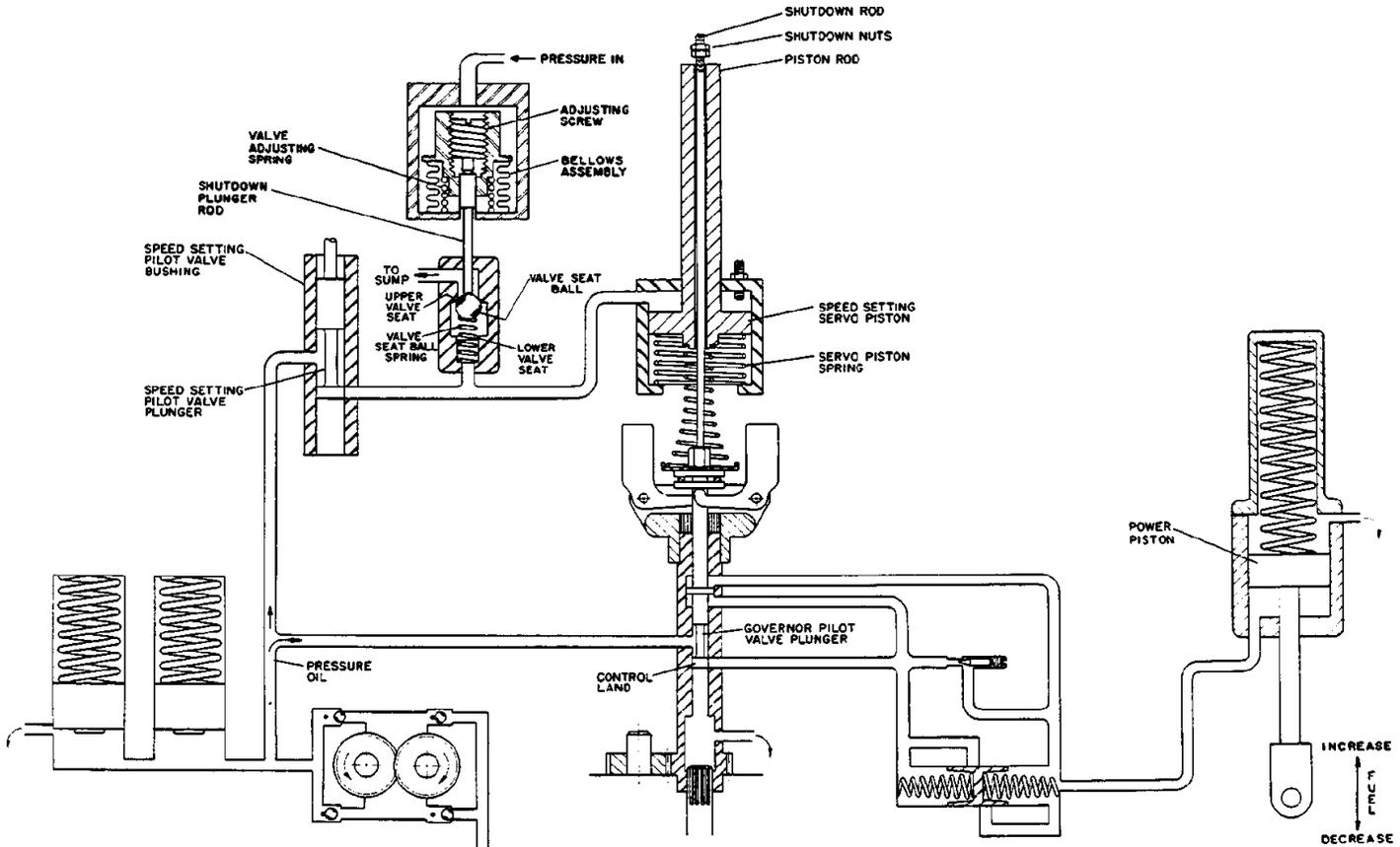


Figure 2. Schematic of Pressure Actuated Shutdown

Refer to the shutdown device shown in Figure 1, which is arranged to permit the unit to run at high inlet pressure and shut down on pressure decline or failure. In this arrangement, the valve seat ball is held on the lower seat by the high pressure which compresses the bellows against the force of the valve-adjusting spring. As the bellows is compressed, the adjusting screw in the bellows assembly pushes the shutdown plunger rod down against the ball. When a drop in pressure occurs, the bellows expands—with the aid of the valve adjusting spring—to normal position, thereby releasing the shutdown plunger rod and allowing the ball to be pushed off the seal. Trapped oil from above the speed setting piston raises the valve seat ball and shutdown plunger and flows through the valve to sump.

The device may also be arranged to shut down at a pre-determined high pressure value. In this instance, the valve seat ball is held against the upper seat by the valve seat ball spring. With an increase in pressure, the bellows is compressed and causes the shutdown plunger rod to move downward, forcing the ball off its seat and allowing oil trapped above the speed setting servo piston to escape to sump.

Adjustment

The adjusting screw in the bellows assembly may be adjusted to contact the shutdown plunger rod at the desired pressure value. This screw may be turned with a screw driver inserted through the pressure connection opening at the top of the valve body. To adjust a valve which shuts down with a decrease in pressure, turn the screw “in” to raise the shutdown point. To adjust a valve which shuts down with an increase in pressure, turn the screw “out” to raise the shutdown point.



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.

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Replacement Parts Information

When requesting additional information concerning governor operation, or when ordering replacement parts, it is essential that the following information accompany the request:

- Governor serial number (shown on nameplate); needed since the manual reference numbers do not identify the exact part number required for any one governor
- Manual number (this is manual 36651)
- Part reference number, name of part, or description of part

Ref. No.	Part Name	Quantity
36651-1	O-ring	1
36651-2	Shutdown Valve Seat	1
36651-3	Valve Seat Ball Spring	1
36651-4	Valve Seat Ball	1
36651-5	Check Valve Housing	1
36651-6	Valve Adjusting Spring	1
36651-7	Shutdown Plunger Rod	1
36651-8	Bellows Assembly	1
36651-9	Spacer	1
36651-10	Gasket	1
36651-11	Adjusting Screw	1
36651-12	O-ring	2
36651-13	Case	1
36651-14	Tube Fitting (Straight)	1
36651-15	Tube	1
36651-16	Tube Fitting (Elbow) & Nut	1
36651-17	Plate	1
36651-18	Screw	4
36651-19	Gasket	1

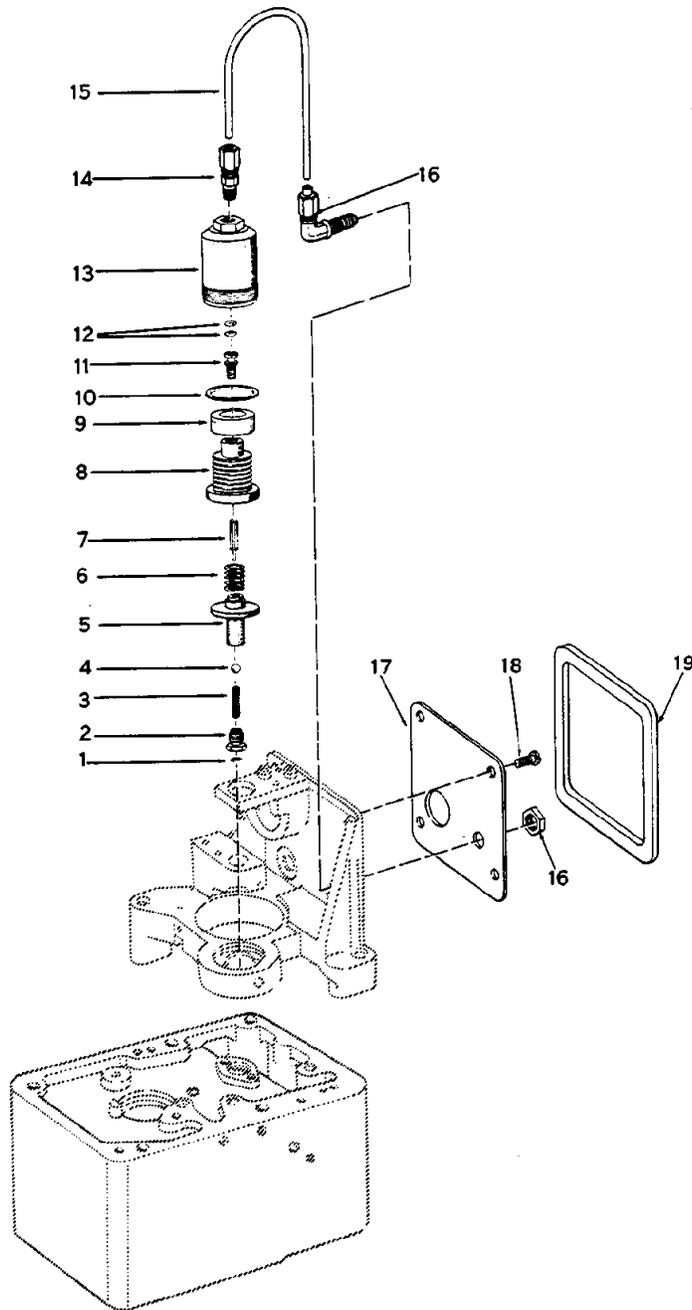


Figure 3. Parts Illustration of Pressure Actuated Shutdown

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Please reference publication **36651E**.



PO Box 1519, Fort Collins CO 80522-1519, USA
1000 East Drake Road, Fort Collins CO 80525, USA
Phone +1 (970) 482-5811 • Fax +1 (970) 498-3058

Email and Website—www.woodward.com

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