WOODWARD

Product Manual 36618
(Revision J, 8/2014)
Original Instructions

PG-200/PG-300
Case, Accumulator, and Power Cylinder

Installation and 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 *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, 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 *26455*, *Customer Publication Cross Reference and Revision Status & Distribution Restrictions*, 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 Out-of-date translations are marked with ⚠.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.

Manual 36618

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Illustrations and Tables

Regulatory Compliance

Other European Compliance:
Compliance with the following European Directives or standards does not qualify this product for application of the CE Marking:

Machinery Directive: Compliant as partly completed machinery with Directive 2006/42/EC of the European Parliament and the Council of 17 May 2006 on machinery.

Special Conditions for Safe Use:
Field wiring must be suitable for at least 95 °C.

Compliance with the Machinery Directive 2006/42/EC noise measurement and mitigation requirements is the responsibility of the manufacturer of the machinery into which this product is incorporated.

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.
General Information

Introduction

This manual describes the PG-200/PG-300 case, accumulator, and power cylinder operation. Information is provided on governor installation, adjustments, and maintenance.

This manual only gives information pertaining to the PGA/PGG-200 and -300, not to any of the combined PGA-EG/PGG-EG units. Refer to manual 36637 for more information.

Description

The PG-200/PG-300 assembly is a PG type governor and an integral, hydraulic amplifier unit. The large accumulator and oil pump supply high pressure oil (1379 or 2482 kPa/200 or 360 psi) to the power servo. The power servo is differential in operation, needing oil pressure to move it in either the increase-fuel or decrease-fuel direction. To control the governor output position of the power servo, oil flow to or from the power servo is controlled by a relay pilot valve. The relay pilot valve consists of a pilot valve bushing and pilot valve plunger.

A pressure reducing valve reduces the high pressure oil (1379 or 2482 kPa/200 or 360 psi) to a lower pressure (758 or 827 kPa/110 or 120 psi) for operation of the control section of the PG governor.

In operation, a centrifugal flyweight head and pilot valve assembly senses speed changes and controls the flow of governor oil to a relay cylinder. The relay cylinder (a 16.3 J/12 ft-lb single-acting piston) positions the relay pilot valve to control the power piston output position.

A compensating system gives stability to the governing system. It includes the compensation needle valve, the compensation land of the pilot valve plunger, a buffer piston, and two buffer springs.

A short description of the setting of governor speed is given in this manual to aid in the understanding of the basic operation.

	PG-200	**PG-300**
accumulator pressure	1379 kPa/200 psi	2482 kPa/360 psi
output shaft diameter	1.125-48 serrated	1.500-60 serrated

Optional Accessories

The PG-200/PG-300 is designed for the PGE, PGA, PGPL, PGG, PGL, and PGD column assemblies to meet a variety of customer requirements. Different methods of setting speeds and optional auxiliary equipment are available on the column assembly for use, by themselves or in combination, with the PG-200/ PG-300. The auxiliary equipment performs a secondary function such as limiting engine load, controlling engine load to maintain constant power output for each speed adjustment, starting fuel limiting, permitting temporary overloads, etc.

Optional accessories used on the PG-200/PG-300 case assembly include:

PG Governor Heat Exchanger (Remote Only)

The heat exchanger is used to lower governor oil temperature when the governor operates in high ambient temperatures. It should be used whenever the governor will go above 93 °C (200 °F) maximum operating temperature. When a governor heat exchanger is needed, it can be added without change or conversion to the PG-200/PG-300.

IMPORTANT

Some PG-200/PG-300 governors (manufactured before 1979) have a pressurizing valve which may have been disabled. If a heat exchanger is added to one of these governors, the pressurizing valve (Figure 6-1, #4) should be disassembled and checked to be sure that it has not been disabled with a cotter pin. If a cotter pin is present, it must be removed before the pressurizing valve is replaced in the governor.

Booster Servomotor

The booster servomotor is used with the governor to help the prime mover start quickly by moving the governor output toward the maximum fuel position at startup. A high output booster having a 1:1 or higher pressure ratio is necessary when used with the PG-200/PG-300 governor. A fuel limiter, an option on the PG column assemblies, is sometimes necessary when the booster servomotor is used.

References

This manual is one of several that must be used to describe a model of the PG-200/PG-300 governor. For help in selecting optional features of the governor, or if field conversion is necessary, write or call one of the Woodward offices shown on the back of this manual.

Manual	Title
25071	Oils for Hydraulic Controls
25075	Commercial Preservation Packaging for Storage of Mechanical-Hydraulic Controls
36036	Starting Fuel Limiter for PG Governors
36052	Magnetic Speed Pickups for PG, UG-8 and UG-40 Governors
36404	Analysis and Correction of PG Governing Troubles
36601	Absolute Manifold Pressure Bias Load Control and Fuel Limiter
36604	PGA Marine Governor
36614	PG Governor Dial Type Speed Setting
36615	PG Governor Lever Type Speed Setting
36621	PG Governor Speed Droop Linkage
36627	PGG Governor
36630	Basic Load Control System for PG Governors
36636	PGA58 and 200/300 Vibration Resistant Governors
36637	Integral EG Actuator for PG Governors
36640	Extensible Tailrod for PG Governors
36641	Governor Oil Heat Exchanger
36650	Solenoid Operated Shutdown Assembly
36651	Pressure Actuated Shutdown Assembly
36652	Automatic Safety Shutdowns and Alarms
36653	Pressure Actuated Shutdown for PGD and PGL Governors
36661	Manifold Gauge Pressure Fuel Limiter
36662	Torque Limit Control with Speed Droop
36684	Booster Servomotor
36685	PG Shutdown Solenoid
36686	Pneumatic Load Balance System for PGA Governors
36691	Electronic Speed Setting for PG Governors (PG-TR)
36694	PG-PL Governors
36695	Manifold Air Pressure Bias Fuel Limiter (Single Barrel Model)

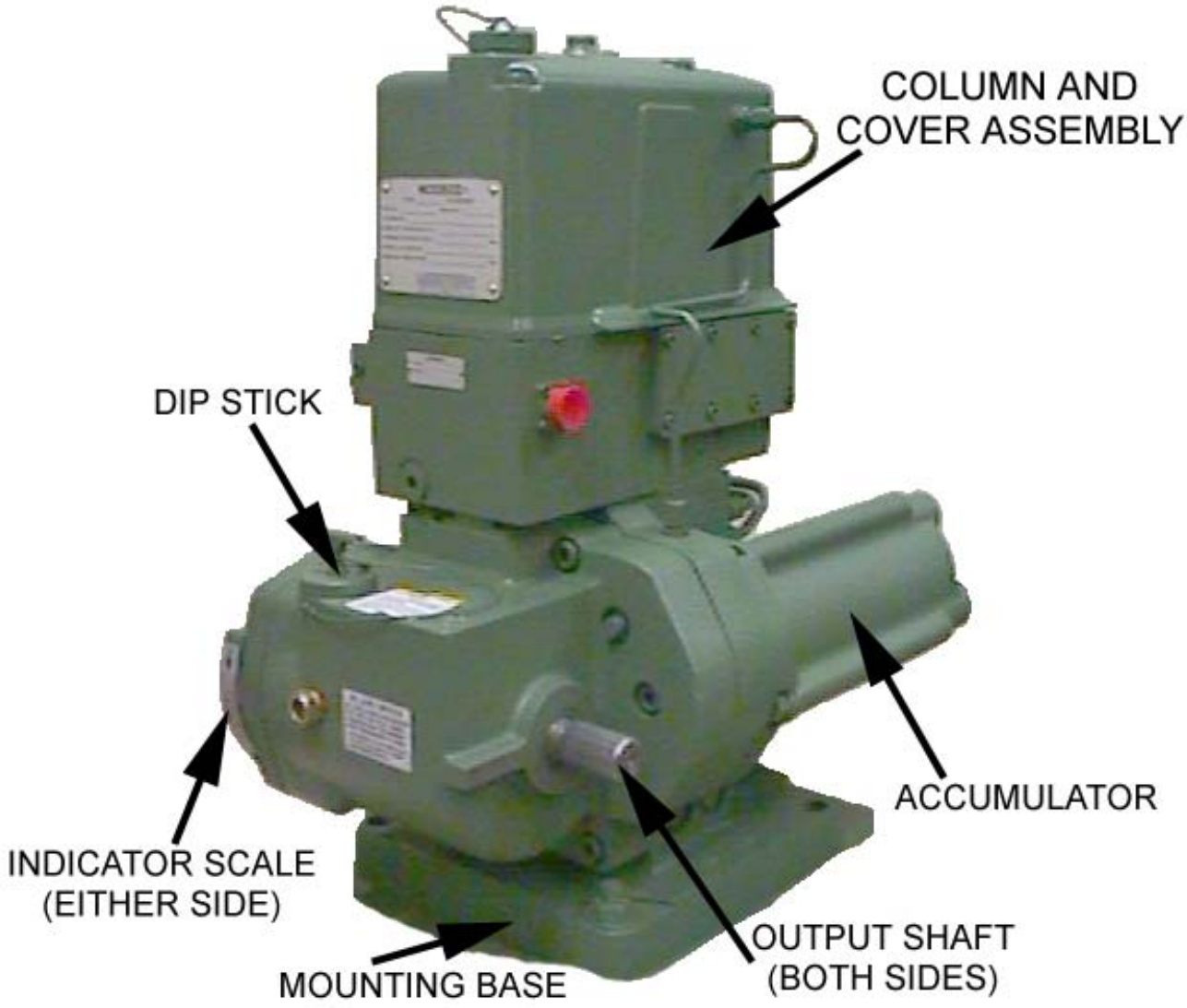

Figure 1-1. Right Front View of PGA-200/300

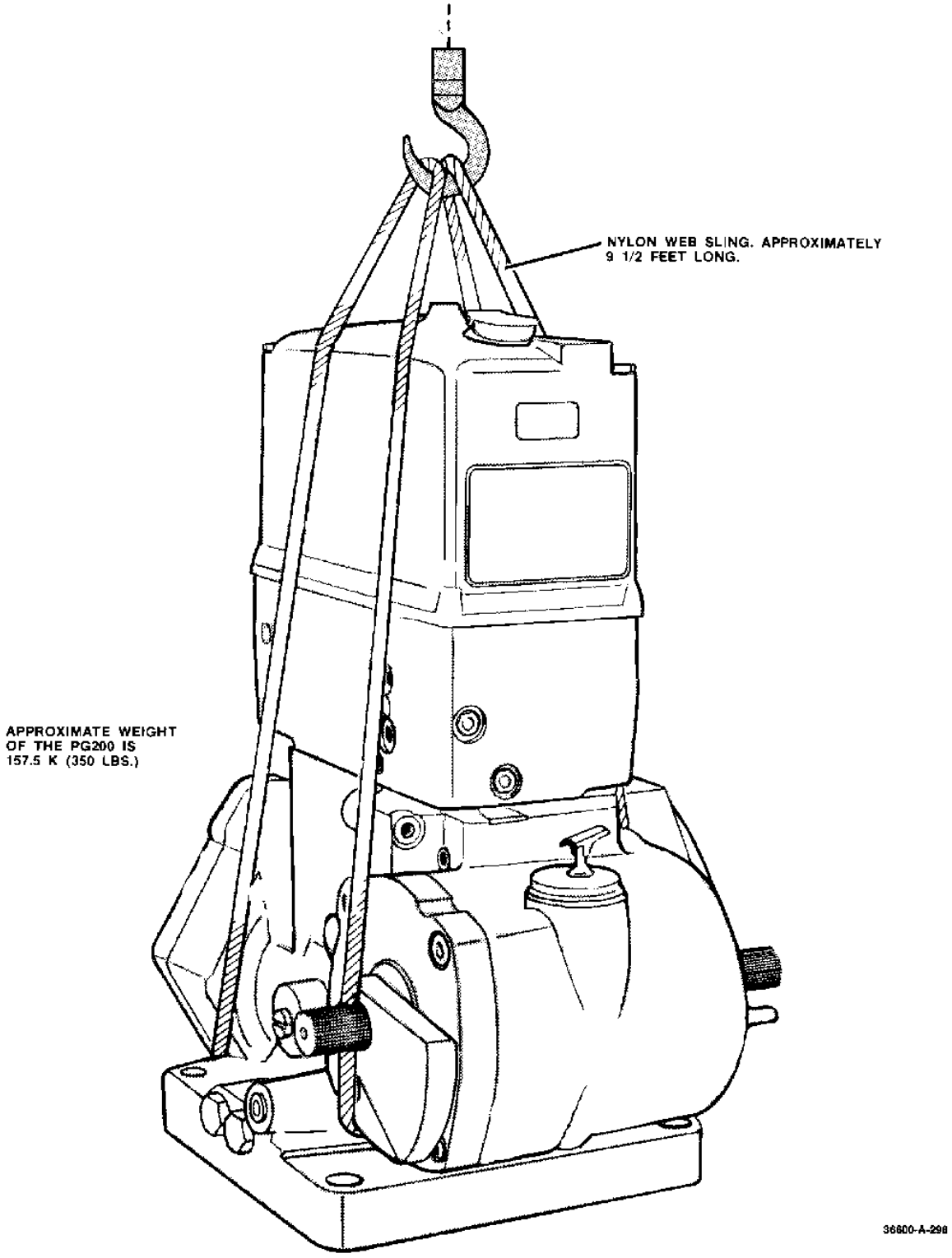

Figure 1-2. Lifting Sling for PG-200/300 Governor

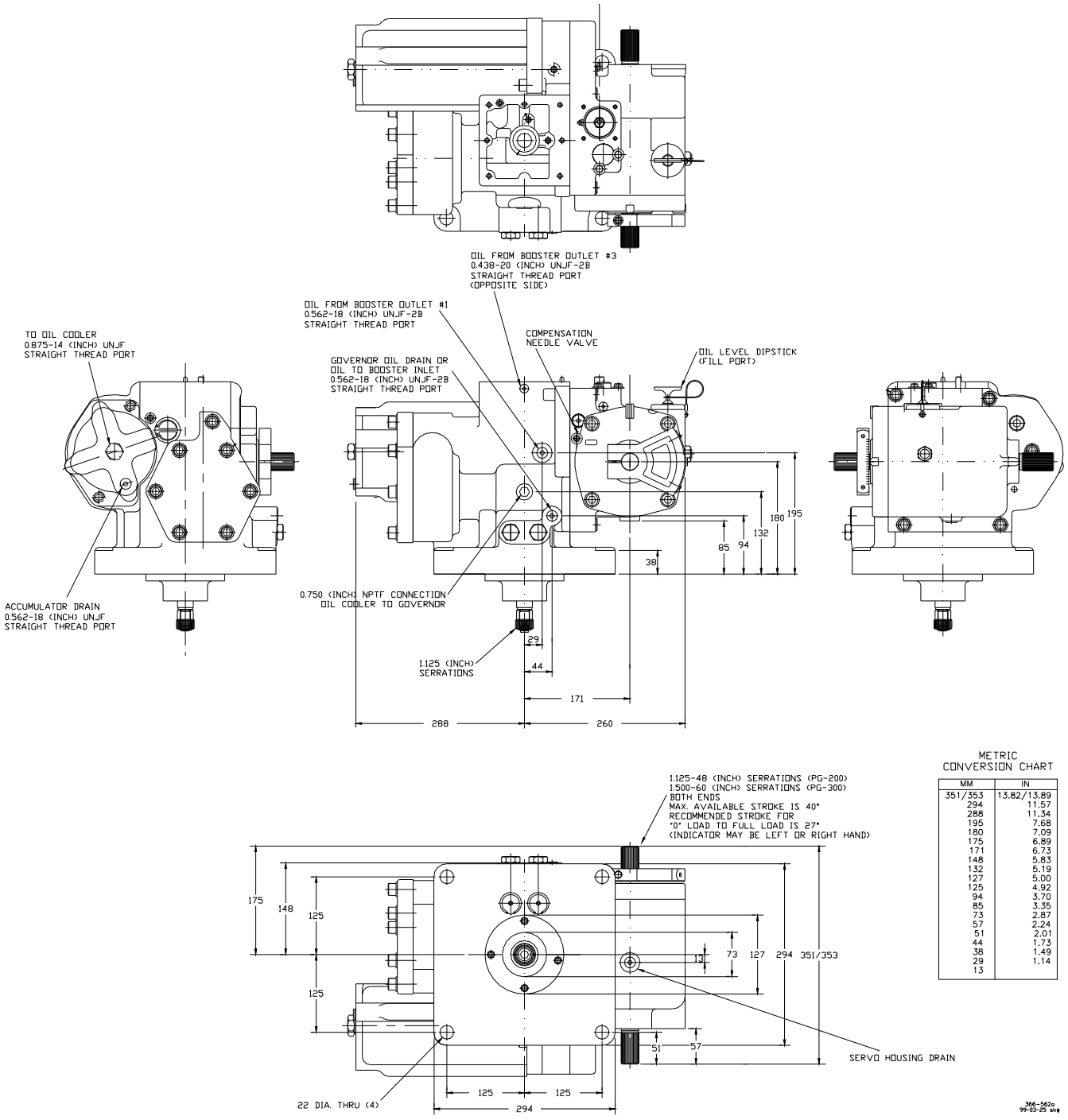

Figure 1-3. Outline Drawing of PG-200/300 Governor

Chapter 2.
Installation

Introduction

This chapter covers receiving, storage, and installation requirements for the PG-200/PG-300 governor (see outline drawing, Figure 1-3).

⚠WARNING

Due to typical noise levels in turbine or engine environments, hearing protection should be worn when working on or around the actuator.

⚠WARNING

The surface of this product can become hot enough or cold enough to be a hazard. Use protective gear for product handling in these circumstances. Temperature ratings are included in the specification section of this manual.

⚠WARNING

Use of a predicted minimum fuel shutdown procedure is highly recommended. Failure to comply with this recommendation can cause personal injury and/or property damage.

NOTICE

Use care while handling and installing the actuator. Be particularly careful to avoid striking the drive shaft, terminal shaft, or the electrical connector. Abuse can damage seals, internal parts, and factory adjustments. Do not set the actuator on its drive shaft.

⚠WARNING

External fire protection is not provided in the scope of this product. It is the responsibility of the user to satisfy any applicable requirements for their system.

Initial Operation

⚠WARNING

Before initial operation of the engine equipped with this actuator, read all of this installation chapter. Make sure that all installation steps have been correctly accomplished and all linkages are secured and properly attached. Carefully review the direction of rotation for the actuator oil pump.

Receiving

The PG-200/PG-300 governor is shipped from the factory in a vertical position, bolted to a wood platform. The governor has been calibrated at the factory to exact specifications, then drained of oil. A light film of oil covers the internal parts to help prevent rust. Calibration or internal cleaning is not needed before installation and operation. The drive shaft and output shafts are covered with a light film of oil, and a soft seal preservative can be applied at the customer's request. The seal preservative is removed before installation with a cloth and mineral spirits.

NOTICE

Use care in handling the governor. Be particularly careful to avoid striking the drive shaft. Do not drop or rest the governor on its drive shaft. Such treatment could damage the gears and bearings in the governor oil pump.

Storage

If the PG-200/PG-300 governor is to be in storage for a period of time, see the Woodward specification procedure, 25075, Commercial Preservation Packaging for Storage of Mechanical-Hydraulic Controls.

Installation Requirements

See Figure 1-3 for overall dimensions, location of installation holes, hydraulic fitting sizes, output and drive shaft dimensions, and adjustment locations.

Enough clearance must be allowed for installation, removal, and servicing of the governor. The governor oil drain should be easily accessible.

Installation

Install the PG-200/PG-300 governor on the engine accessory drive pad. The drive shaft must slip into the accessory drive or mating coupling without force. Be careful not to push the drive shaft into the governor. Improper alignment or too tight a fit between any of the parts can result in wear or seizure. It can also cause jiggle in the governor output.

NOTICE

Damage to the drive shaft, drive shaft seal, or other parts of the governor may occur if the governor is dropped or set on the drive shaft or drive coupling.

Fuel System Linkage

Correctly align and install the linkage between the fuel system and the PG-200/PG-300 governor. The linkage must move freely and not have excessive backlash. Use approximately 2/3 governor output travel (26°) between idle and full fuel. Permit enough overtravel (typically 7°) so the governor can cause complete shutdown and give full fuel at full load. The governor output travel between shutdown position and idle speed must never be less than 5°. Many governors include an optional compensation cutoff and since this option cannot be seen without disassembly of the governor, this caution must be followed:

NOTICE

Due to the location of the compensation cutoff port In the relay servo wall, it is necessary to adjust the governor output linkage to use no less than 5° travel between shutdown and Idle.

Compensation cutoff is more completely described in Chapter 4, Principles of Operation.

Hydraulic and Electrical Connections

Make all other hydraulic and electrical connections, if any, for the particular model PG-200/PG-300 being installed. Use the correct Woodward manuals.

Booster Servomotor

The booster servomotor is remotely located from the governor. Make all hydraulic connections from the booster to the governor (see Manual 36684, Booster Servomotor). The booster servomotor is actuated by a starting air pressure of 1034 to 1379 kPa (150 to 200 psi), and pressure oil from the booster moves the servo piston to the maximum fuel position. Make the starting air connection to the booster at the optional air supply inlet (the orificed inlet). Plug the other inlet. The governor fuel position during startup can be controlled by the fuel limiter (if available). Because of the large volume of oil needed to move the PG-200/ PG-300 servo, the booster limit screw should be adjusted to permit maximum booster servo output.

Heat Exchanger

The heat exchanger is remotely located from the governor. Make all hydraulic connections for the heat exchanger to the governor (see manual 36641, Governor Oil Heat Exchanger). If a heat exchanger is added to a governor manufactured before 1979, the pressurizing valve (Figure 6-1, #4) should be removed and checked to be sure that it has not been disabled with a cotter pin. If a cotter pin is present it must be removed before the valve is replaced in the governor.

If a heat exchanger is added to a governor that does not have a pressurizing valve, a pressurizing valve must be installed.

Oil Supply

Until the governor has been run and the accumulator filled, approximately four liters/quarts of oil will fill the governor. Governor oil capacity is 7.1 liters (7.5 quarts), and it is necessary to add oil after the governor is first started in order to restore oil to the full level mark on the dipstick. Check the oil level with the governor running.

Oils for Hydraulic Controls

This information is provided as a guide in the selection of lubricating/hydraulic oil for governor use. Oil grade selection is based on viscosity change over the temperature range of the governor. The information also provides an aid in recognizing and correcting common problems associated with oil used in products manufactured by Woodward. It is not intended to suggest the selection of lubrication oil for the engine, turbine, or other type of prime mover being controlled.

Governor oil lubricates and provides hydraulic power. The oil must have a viscosity index that allows it to perform over the operating temperature range and it must have the proper blending of additives to cause it to remain stable and predictable over this range. Governor fluid must be compatible with seal materials, (i.e., nitrile, polyacrylic and fluorocarbon). Many automotive and gas engine oils, industrial lubricating oils, and other oils of mineral or synthetic origin meet these requirements. Woodward governors are designed to give stable operation with most oils, if the fluid viscosity at the operating temperature span is within a 50 to 3000 SUS (Saybolt Universal Seconds) range. Ideally, at the normal operating temperature, viscosity should be between 100 and 300 SUS. Poor governor response or instability usually is an indication that the oil is too thick or too thin.

Excessive component wear or seizure in a governor indicates the possibility of:

1. Insufficient lubrication caused by:
   A. An oil that flows slowly either when it is cold or during startup.
   B. An oil line restriction, obstructions within or bends in the line.
   C. No oil in the governor or governor oil level too low.
2. Contaminated oil caused by:
   A. Dirty oil containers
   B. A governor exposed to heating and cooling cycles, creating condensation of water in the oil.
3. Oil not suitable for the operating conditions.
4. An improper oil level which creates foamy, aerated oil.

Operating a governor continuously beyond the high limit temperature of the oil will result in oil oxidation, identified by varnish or sludge deposits on the governor parts. To reduce oil oxidation, lower the governor operating temperature with a heat exchanger or other means, or change to an oil more oxidation resistant at the operating temperatures.

⚠WARNING

A loss of stable governor control and possible prime mover overspeed may result if the viscosity exceeds the 50 to 3000 SUS range. Overspeed can damage the engine and cause personal injury or death.

Specific oil viscosity recommendations are given in the chart. Select a readily available good brand of oil, either mineral or synthetic, and continue using it. Do not mix the different classes of oils. Oil that meets the API (American Petroleum Institute) engine service classification in either the “S” group or the “C” group, starting with “SA” and “CA” through “SF” and “CD” is suitable for governor service. Oils meeting performance requirements of the following specifications are also suitable: MIL-L-2104A, MILL-2104B, MIL-L-2104C, MIL-L-46152, MIL-L-46152A, MIL-L-46152B, MIL-L-45199B.

Replace the governor oil if it is contaminated, or if it is suspected of contributing to governor instability. Drain the oil while hot and agitated; and flush the governor with a clean solvent having some lubricity before refilling with new oil. If drain time is insufficient for the solvent to completely drain or evaporate, flush the governor with the same oil it is to be refilled with to avoid dilution and possible contamination of the new oil. To avoid contamination, replacement oil should be free of dirt, water, and other foreign material. Use clean containers to store and transfer oil.

Oil that has been carefully selected to match the operating conditions and is compatible with governor components should give long service between oil changes. Under ideal conditions (minimum exposure to dust and water and within the temperature limits of the oil), changes can be extended. A regularly scheduled oil analysis is helpful in determining the frequency of oil changes.

Any persistent or recurring oil problems should be referred to a qualified oil specialist for solution.

The recommended continuous operating temperature of the oil is 60 to 93 °C (140 to 200 °F). Measure the temperature of the governor or actuator on the outside lower part of the case. The actual oil temperature will be warmer by about 6 °C (10 °F).

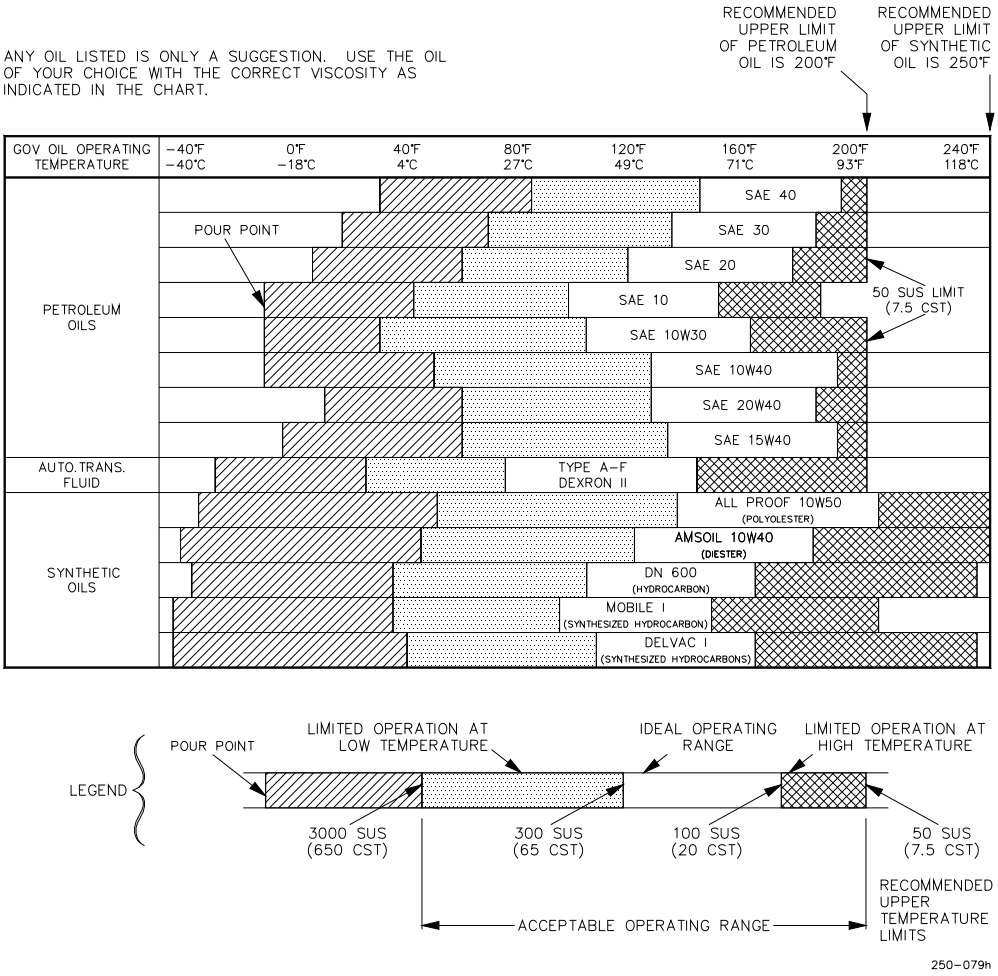

Figure 2-1. Viscosity and Operating Temperature of Oils

VISCOSITY COMPARISONS				
CENTISTOKES (CST, CS, OR CTS)	SAYBOLT UNIVERSAL SECONDS (SUS) NOMINAL	SAE MOTOR (APPROXIMATE)	SAE GEAR (APPROXIMATE)	ISO
15	80	5W		15
22	106	5W		22
32	151	10W	75	32
46	214	10	75	46
68	310	20	80	68
100	463	30	80	100
150	696	40	85	150
220	1020	50	90	220
320	1483	60	115	320
460	2133	70	140	460

250−087
97−11−04 skw

Figure 2-2. Equivalent Viscosities for Lubricating Oils

Chapter 3.
Operation and Adjustment

Introduction

This chapter describes the first startup and the basic adjustments of the PG-200/PG-300 assembly.

Initial Operation

Before the first startup of the PG-200/PG-300, be sure that all steps in Chapter 2 have been done and are correct.

⚠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.

Adjustments

Normally, the only requirements for putting a new or repaired and calibrated governor into service are filling the governor with oil and adjusting the compensation needle valve to get maximum stability. All other operating adjustments are made during factory calibration to manufacturer's specifications. Further adjustment should not be needed. Do not make an internal adjustment of the governor unless completely familiar with the correct procedure.

Compensation Needle Valve Adjustments

The compensation needle valve is an adjustable part of the compensation system. Its setting, which affects governor stability, is made according to the individual characteristics of the prime mover (see Figure 6-1, #12).

To Adjust The Needle Valve:

1 With the prime mover operating at IDLE speed, open the compensation needle valve until the governor begins to hunt. Let the governor hunt several minutes to remove trapped air in the hydraulic circuits.

IMPORTANT

It may be necessary to upset the governor speed momentarily to cause the governor to hunt.

2. Close the compensation needle valve slowly until hunting just stops. Keep the needle valve open as far as possible to prevent slow governor response. The needle valve setting can be from 1/16 to 2 turns open. Do not close the needle valve tight. The governor cannot operate correctly in this condition.

3. Check the governor stability by manually disturbing the governor speed setting. The compensation adjustment is satisfactory when the governor returns to speed with only a small overshoot or undershoot. Once the needle valve adjustment is correct, it is not necessary to change the setting unless there is a large permanent change in temperature that will change oil viscosity. Additional adjustment may be necessary if stability problems exist at full speed/full load conditions.

Pressure

Oil pump pressure in the PG-200 model should exceed 1379 kPa (200 psi) at operating speed. Pressure in the PG-300 model should exceed 2068 (300 psi) at operating speed. To check the internal pressure, attach a pressure gauge in the .562-18 straight-thread port indicated as oil from booster outlet number 1 in Figure 1-3 of this manual.

Chapter 4.
Principles of Operation

Introduction

This chapter describes the operation of the basic elements of the PG-200/PG-300 case, accumulator, and power cylinder assembly. A schematic drawing (Figure 4-1) shows the working relationship of the various parts. The speed setting is in the column assembly of the PG-200/PG-300 governor, and only a short description is given to aid in understanding the basic operation.

The description of operation is separated into two parts:
- Amplifier section
- Governor section

Amplifier Section

Oil Pump and Accumulator

The PG-200/PG-300 has its own oil sump and oil pump. The drive shaft is driven at a speed proportional to the engine speed by a mechanical connection to the engine, and rotates the pump drive gear and the rotating bushing. As the inner pump drive gear turns the outer gear, oil from the sump is drawn by the gear teeth to the discharge side of the pump. Oil is pushed from the spaces between the gear teeth as the two gears mesh.

Four check valves, two on the suction and two on the discharge side of the pump, permit the drive shaft to rotate in either direction without changing the PG-200/PG-300 operation. If the pump gears were rotated in the opposite direction, the open check valves would close and the closed check valves would open.

Oil on the discharge side of the pump pushes the accumulator piston against the accumulator spring. When piston movement uncovers the bypass port, excess pressure oil from the pump is returned to the sump through the pressurizing valve or heat exchanger. The accumulator is a reservoir for pressure oil and operates as a relief valve to limit maximum pressure in this part of the hydraulic circuit. Pressure is held at a minimum of 1379 kPa (200 psi) in the PG-200, and 2482 kPa (360 psi) in the PG-300.

When the PG-200/PG-300 is used with the optional heat exchanger, oil flows through the heat exchanger from the accumulator bypass. If the oil flow through the exchanger becomes restricted, and the pressure reaches 172 kPa (25 psi), the pressurizing valve opens and directs bypass oil back to sump.

Power Servo

The relay pilot valve controls the flow of 1379 or 2482 kPa (200 or 360 psi) oil to the power servo assembly. The power piston, working through connecting linkage, controls the engine or turbine.

The power piston operates as a differential type, requiring pressure oil to move in either increase fuel or decrease fuel direction. The differential piston has pressure oil continually directed to the small area side. The constant pressure tries to move the piston in the decrease fuel direction, but the piston cannot move to decrease fuel until oil in the passages between the relay piston and the large area side of the servo piston is released to sump. Oil is connected to the sump only when the relay pilot valve plunger is below its centered position.

If the relay pilot valve plunger is above the centered position, oil flows to the control (large area) side of the servo piston. The force that results from oil pushing on the large surface area which is greater than the constant force on the loading (small area) side, moves the piston in the increase fuel direction.

IMPORTANT **The power piston can move only when the relay pilot valve is uncentered and permits oil to flow.**

Governor Section

The governing section of the PG-200/PG-300 has a pressure reducing valve, a ballhead, pilot valve plunger, rotating bushing, a compensating system, and a relay servo.

Pressure Reducing Valve

The pressure reducing valve receives the full output of the oil pump and supplies 690 kPa (100 psi) oil to the governing section and additional speed setting and auxiliary features included in the column assembly. Oil at 1379 or 2482 kPa (200 or 360 psi) enters the pressure reducing valve at the metering piston, where its flow is controlled by movement of the metering piston. Pressure on the metering piston that is greater than 690 kPa/100 psi causes it to move left against a reference spring, closing the pressure reducer to restrict oil flow. Pressure lower than 690 kPa/100 psi permits the reference spring to move the metering piston to enlarge the inlet.

Governing Section

The upper end of the rotating bushing holds the ballhead assembly, giving a direct drive from the prime mover to the flyweights. The thrust bearing on top of the flyweight toes permits the pilot valve plunger to remain stationary while the bushing rotates. This reduces friction between the bushing and plunger.

A spring driven, oil dampened ballhead can be used to filter objectionable input torsionals which could be transferred to the governor control output. These ballheads are more completely described in the Woodward Service Bulletin 50001.

As the ballhead rotates, centrifugal force developed by the flyweights tries to lift the pilot valve plunger and is opposed by the force of the speeder spring pushing down. The greater of the two forces moves the pilot valve plunger.

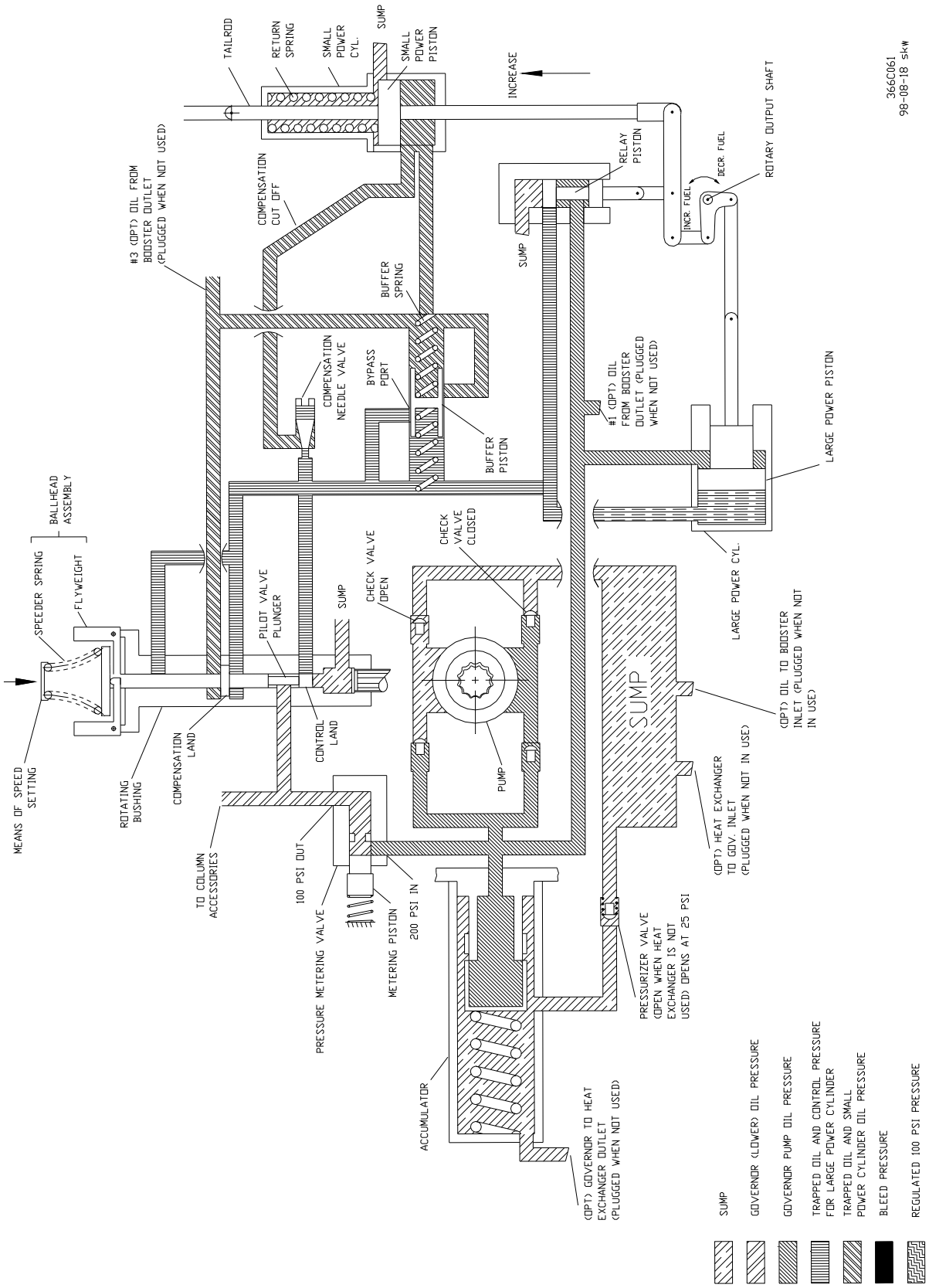

Figure 4-1. Schematic of PG-200/PG-300

When the prime mover is on speed at any speed setting, these forces are equal and the flyweights are in a vertical position. In this position the control land on the pilot valve plunger is centered over the control port in the rotating bushing. No oil, other than normal leakage, flows to or from the buffer compensation system or the relay servo.

A change in either of these two forces moves the plunger from its centered position. The plunger is lowered (1) when the governor speed setting is unchanged but additional load slows the prime mover and governor (decreasing flyweight centrifugal force), or (2) when prime mover speed is not changed but speeder spring force is increased to raise the governor speed setting. In a similar way, the pilot valve plunger is raised (1) when governor speed setting is not changed but load is removed from the prime mover causing an increase in speed (hence an increase in flyweight centrifugal force), or (2) where prime mover speed is not changed but speeder spring force is reduced to lower the governor speed setting.

When there is an underspeed condition, the plunger is lowered and pressure oil is directed into the buffer and compensation system and relay servo to raise the relay pilot valve plunger and cause the power piston to move to increase fuel. In an overspeed condition, the plunger is lifted permitting oil to drain from these areas to the sump. A return spring moves the relay piston to decrease and also lowers the relay pilot valve plunger, releasing oil from the left side of the power servo, allowing movement toward decrease fuel.

A buffer piston-needle valve compensation system which anticipates the inherent lag in acceleration or deceleration between throttle setting and final speed is provided in the PG-200/PG-300 control system.

With the governor acting directly on the fuel setting but sensing only actual engine or turbine speed, extensive overspeed or underspeed would occur at each speed change were it not for the buffer compensation system. The buffer piston, springs, and needle valve in the hydraulic circuit between the pilot valve plunger and the relay servo make up the system.

When the flyweights move the pilot valve off the centered position, oil flow to or from the small power piston causes a pressure differential across the buffer piston and needle valve.

The restriction of flow through the needle valve causes oil to flow through the path that houses the buffer piston and springs and causes the buffer piston to move against the buffer spring on the low pressure side of the piston. The amount of pressure differential across this system is controlled by the combination of needle valve opening and buffer spring scale.

This pressure differential is sensed by the compensation land on the pilot valve, applying a force tending to oppose the change in force of the flyweights and move the pilot valve back to the centered position before the set speed is reached. This negative feedback (droop) reduces overshoot of the set speed and increases the stability of the control loop. The pressure differential gradually equalizes through the needle valve and the negative feedback dissipates, returning speed to the set point.

The rate at which this happens is controlled by the needle valve opening and by buffer spring scale. Stronger buffer springs increase the effect, or gain, of the compensation, and the needle valve opening determines the recovery time. The smaller the opening, the slower the recovery to set speed. The buffer spring scale is predetermined and specified by the prime mover manufacturer or by Woodward.

PG-200/PG-300

The following two examples show the sequence of events during a speed setting change or load change. The sequence occurs within the governor almost simultaneously rather than the step-by-step method described.

Increase of Speed Setting or Load

Increasing speed setting or increasing load on the prime mover operating at any given speed has an identical effect for the purpose of description. In either of these conditions, the rotating flyweights move in due to an increase in speeder spring force, or by the decrease in centrifugal force caused by the decrease in prime mover speed as load is added. When the flyweights move in, the pilot valve plunger moves down and directs pressure oil into the compensation system, causing the buffer piston to move to the right and forcing the relay servo to move in the increase direction.

As the prime mover accelerates to the set speed, the compensation force gradually reduces to offset the increasing flyweight force. This is done each time by balancing the pressures on both sides of the compensation land through the needle valve. This reduces overshoot to quickly establish stable, on-speed operation.

When large changes in speed setting or load are made, the buffer piston moves far enough to open a bypass port in the buffer cylinder. This permits oil to flow directly to the relay servo and lets the governor respond quickly to large changes in speed setting or load.

Decrease Of Speed Setting Or Load

The results of decreasing the speed setting or load on the prime mover are the same, and cause an action in the reverse of that described above. The flyweights move out, lifting the pilot valve plunger, permitting oil to drain from the compensating system and under the relay servo. The return spring causes the relay piston to move to decrease. The pressure differential across the compensation land this time causes a force down to help the speeder spring center the pilot valve plunger just before the prime mover has completely decelerated. This stops movement of the relay piston when the correct position is reached for the new lower speed setting or load.

Compensation Cutoff

With large decreases in speed setting or large load decreases, the small power piston moves to the minimum fuel position and covers the compensation oil passage between the small servo and the needle valve to prevent normal balancing of the compensation pressures. This holds the buffer piston to the left of center and increases the level of the pressure sent to the upper side of the compensation land.

The increased pressure differential, added to the compression of the speeder spring, temporarily increases the governor speed setting. The governor begins correcting as soon as the engine speed drops below this temporary speed setting and starts the relay piston restoring the fuel supply in time to prevent a large underspeed transient. This action is called compensation cut off. When the relay piston moves up and uncovers the compensation oil passage, normal compensation is again available and the engine keeps steady-state speed at the set speed of the governor.

Chapter 5. Maintenance

Governor Oil

Use NEW OIL to fill the governor. Be sure that all containers used for governor oil storage are clean. Contaminated governor oil will cause early wear of plungers, bushings, gears, bearings, etc., and can cause rust and corrosion on springs and other internal parts.

Under normal operating conditions, oil should be changed every 12 months. Oil must be changed more often if the unit operates under unusual temperature or dirt conditions.

After the governor is put in service, the oil condition should be carefully monitored until a length of service can be established. A careful check of oil condition is suggested at least every three months until length of service is established. Any time the oil looks dirty or appears to be breaking down from contamination or high temperature, drain the governor oil while it is hot, flush with the lightest grade of the same oil, and refill the governor with new oil of the correct viscosity. (See oil viscosity table, Figure 2-1, or refer to Woodward manual 25071, Recommended Oils for Governors, Actuators.)

Troubleshooting

While a governor problem can show up as speed variations of the prime mover, not all speed variations of the prime mover are caused by a malfunction of the governor. When there is a problem, follow these procedures:

1. Check that the load is not beyond the load limit of the prime mover.

2. Be sure the engine cylinders are firing and the fuel injectors are operating and correctly calibrated.

3. Check the linkage from the governor output to the fuel control. There must be no binding and a minimum amount of backlash.

4. Check for fuel or steam pressure changes.

5. Be sure the compensating needle valve is set correctly.

6. Check the governor external speed adjusting devices.

7. Check governor oil pressure at the booster outlet port on the PG-200/ PG-300 case. Pressure in the PG-200 should be 1379 kPa (200 psi). Pressure in the PG-300 should be 2482 kPa (360 psi). Check at operating temperature and speed.

8. Check the governor oil and replace it if it is dirty. Sometimes the malfunction of the governor can be corrected by flushing the governor with fuel oil or kerosene while the governor is operated through a cycle.

9. Check the drive to the governor for any evidence of the governor not being aligned correctly on the installation pad, rough gears, or backlash.

10. Manual number 36404, Analysis and Correction of PG Governing Troubles, covers governor malfunctioning and possible causes and corrective actions.

Repair and Disassembly

A governor can operate several years before it will need an overhaul if the oil is kept clean and the drive from the prime mover is smooth and does not have torsional vibration.

If disassembly and repair become necessary, the work must be done by personnel trained in the correct repair procedures.

⚠WARNING

The accumulator spring (#205 in Figures 6-5 and 6-6) is compressed and held in the accumulator assembly. In old style accumulators (Figure 6-5), careless disassembly of the unit can result in injury to person or damage to equipment. Place the accumulator assembly in an arbor press to permit a controlled rate of spring expansion. This does not apply to the newer-style accumulator (Figure 6-6). If in doubt over which type you have, please check the actual build with the versions depicted in Figures 6-5 and 6-6.

Chapter 6.
Parts Information

Parts Replacement Information

When ordering governor replacement parts, it is essential that the following information be given.

1. Governor serial number and part number as given on the nameplate.

2. Manual number (this is manual 36618).

3. Part reference number as given in the part list, name of part, or description of part.

Parts List for Figure 6-1

Ref. No.	Part Name	Qty
36618-1	Relief valve plunger	1
36618-2	Relief valve spring	1
36618-3	Preformed packing .801 I.D. x .070	1
36618-4	Relief valve plug	1
36618-5	Retaining ring - 1.111 diameter	1
36618-6	Housing	1
36618-7	Preformed packing	4
36618-8	Plug - .438-20 UNF 2A	4
36618-9	Washer- .500 I.D.	4
36618-10	Screw - .500-13 x 2.500	4
36618-11	Oil level gauge assembly	1
36618-12	Needle valve	1
36618-13	Preformed packing .301 I.D. x .070	1
36618-14	Plug - .562-18 UNF 2A	2
36618-15	Preformed packing .468 I.D. x .078	2
36618-16	Screw .500-13 x 2.000 (screw, washers come from inside part 6)	2
36618-17	Washer .500 I.D.	2
36618-18	Washer, split lock	2
36618-19	Dowel pin, .3742 dia. x .625	2
36618-20	Gasket	1
36618-21	Case	1
36618-22	Plug - .062 pipe	1
36618-23	Plug - .750	1
36618-24	Plug - .875-14 UNF 2A	2
36618-25	Preformed packing .755 I.D. x .097	2
36618-26	Plug - .125	4
36618-27	Pin	2

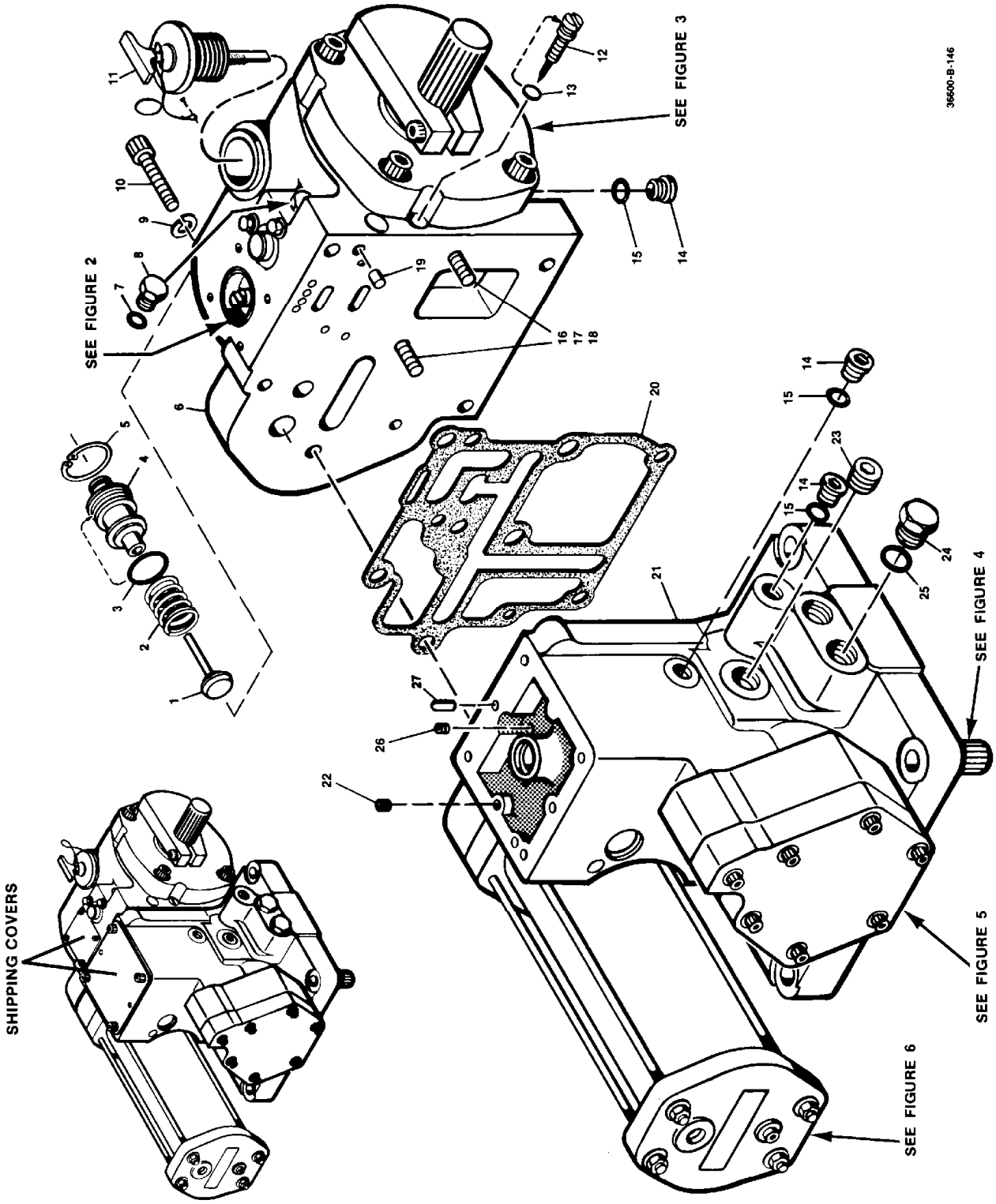

Figure 6-1. Parts for PG-200 Case, Accumulator, and Power Cylinder

Parts List for Figure 6-2

Ref. No.	Part Name	Qty
36618-75	Screw - .250-28 x .500	2
36618-76	Washer - .250	2
36618-77	Washer- .750 O.D. x .266 I.D.	2
36618-78	Spring cover	1
36618-79	Preformed packing 1.239 I.D. x .070	1
36618-80	Loading spring	1
36618-81	Spring seat	1
36618-82	Pilot valve sleeve	1
36618-83	Pilot valve spring seat	1
36618-84	Pilot valve plunger adjuster	1
36618-85	Pilot valve lever assembly	1
36618-86	Cotter pin .062 dia. x .375	2
36618-87	Pin - .1862 dia. x .900	1
36618-88	Pin - .1871 dia. x .531	1
36618-89	Power piston assembly	1
36618-90	Tail rod lift nut	1
36618-91	Washer	1
36618-92	Not used	
36618-93	Pilot valve spring	1
36618-94	Pilot valve plunger assembly	1

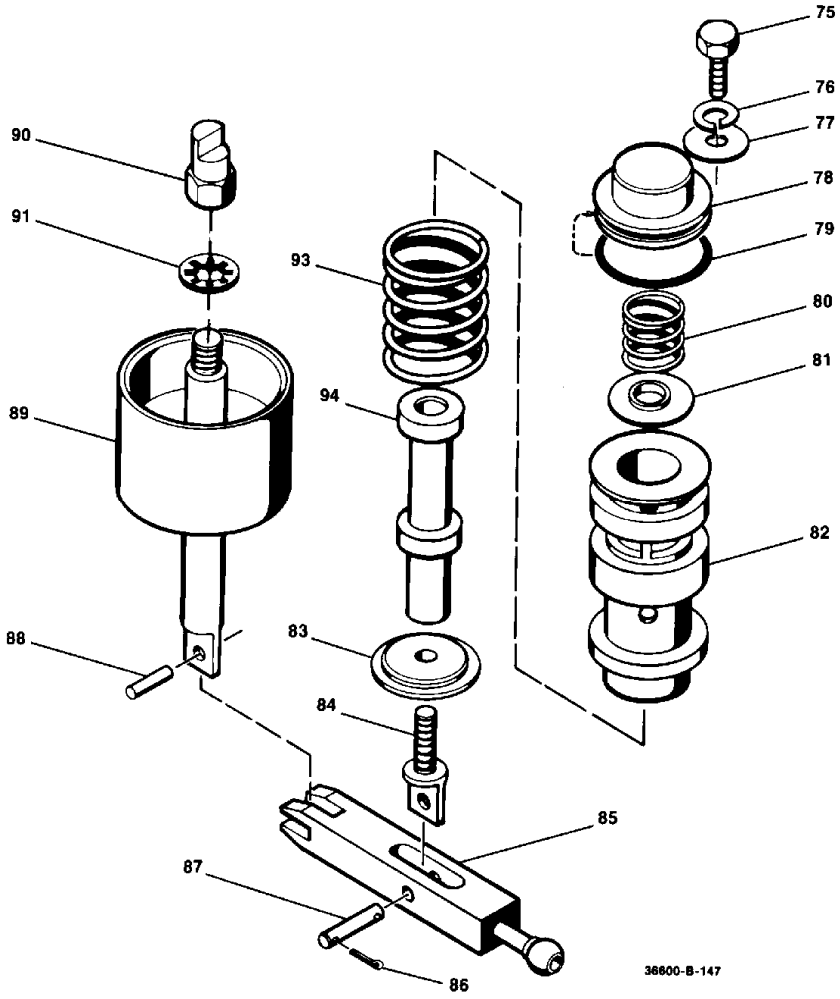

Figure 6-2. Parts for Power Piston Assembly and Pilot Valve Assembly

Parts List for Figure 6-3

Ref. No.	Part Name	Qty
36618-100	Oil seal 1.125 x 1.562	2
36618-101	Bearing	2
36618-102	Gasket	1
36618-103	Screw - .500-13 x 2.500	2
36618-104	Washer - .500	6
36618-105	Output lever	1
36618-106	Output shaft	1
36618-107	Cover	1
36618-108	Screw - .312-18 x 1.500	1
36618-109	Washer-.312 I.D.	1
36618-110	Drive screw	2
36618-111	Scale	1
36618-112	Indicator	1
36618-113	Screw - .500-13 x 1.250	4
36618-114	Retaining ring .971	2
36618-115	Pin - 3.750 x .874	1
36618-116	Retaining ring -.971	1
36618-117	Plug	1
36618-118	Preformed packing .614 I.D. x .070	1
36618-119	Retaining ring - .620	2
36618-120	Spring seat	1
36618-121	Spring	1
36618-122	Retaining ring-.207	1
36618-123	Reducing valve plunger	1
36618-124	Reducing valve sleeve	1
36618-125	Washer, flat	6

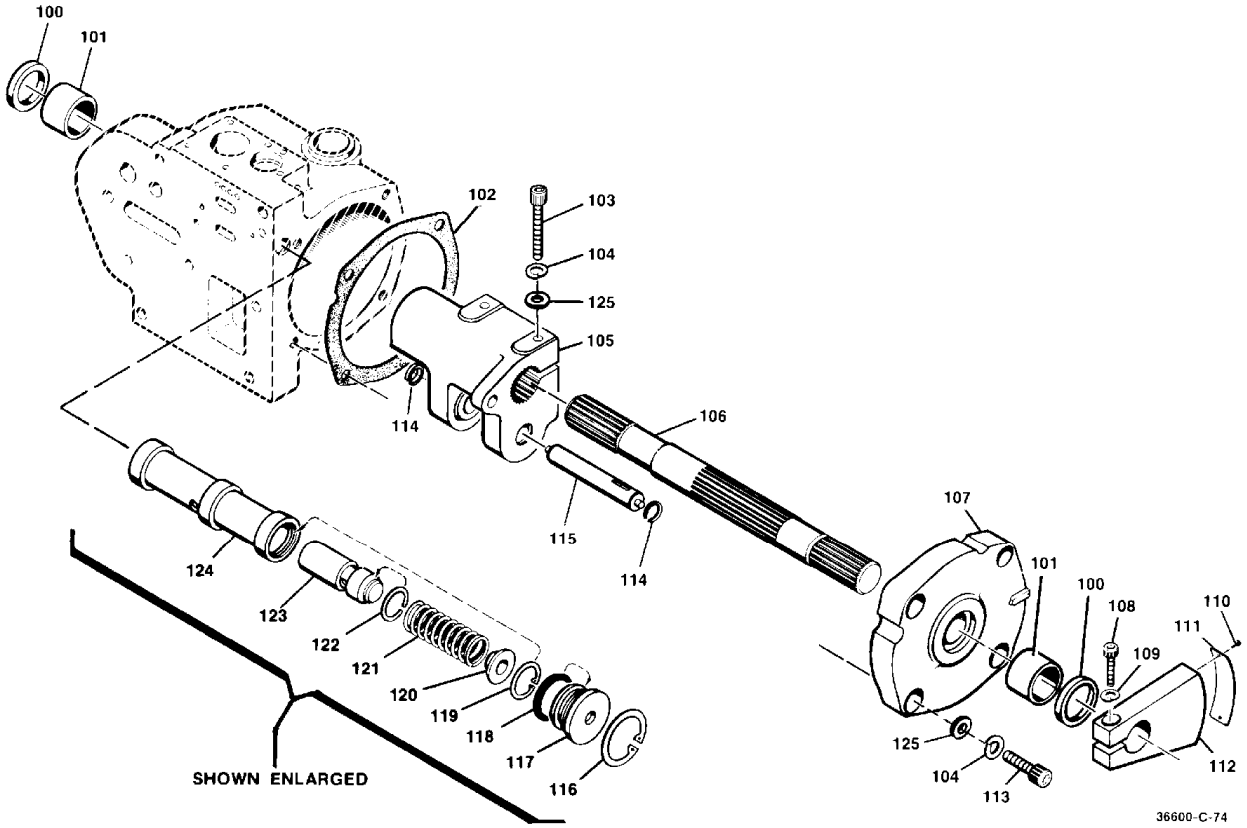

Figure 6-3. Parts for Output Assembly and Reducing Valve Assembly

Parts List for Figure 6-4

Ref. No.	Part Name	Qty
36618-175	Preformed packing	4
36618-176	Check valve assembly	4
36618-177	Retaining ring - 1.526	4
36618-178	Pin - 3.188 x .875	1
36618-179	Gasket	1
36618-180	Washer .500	7
36618-181	Screw - .500-13 x 2.000	7
36618-182	Servo cover	1
36618-183	Servo piston	1
36618-184	Connecting rod	1
36618-185	Retaining ring 1.804	1
36618-186	Buffer plug	1
36618-187	Preformed packing 1.296 x .139	1
36618-188	Buffer spring	2
36618-189	Buffer piston	1
36618-190	Buffer spring seat	1
36618-191	Retaining ring	2

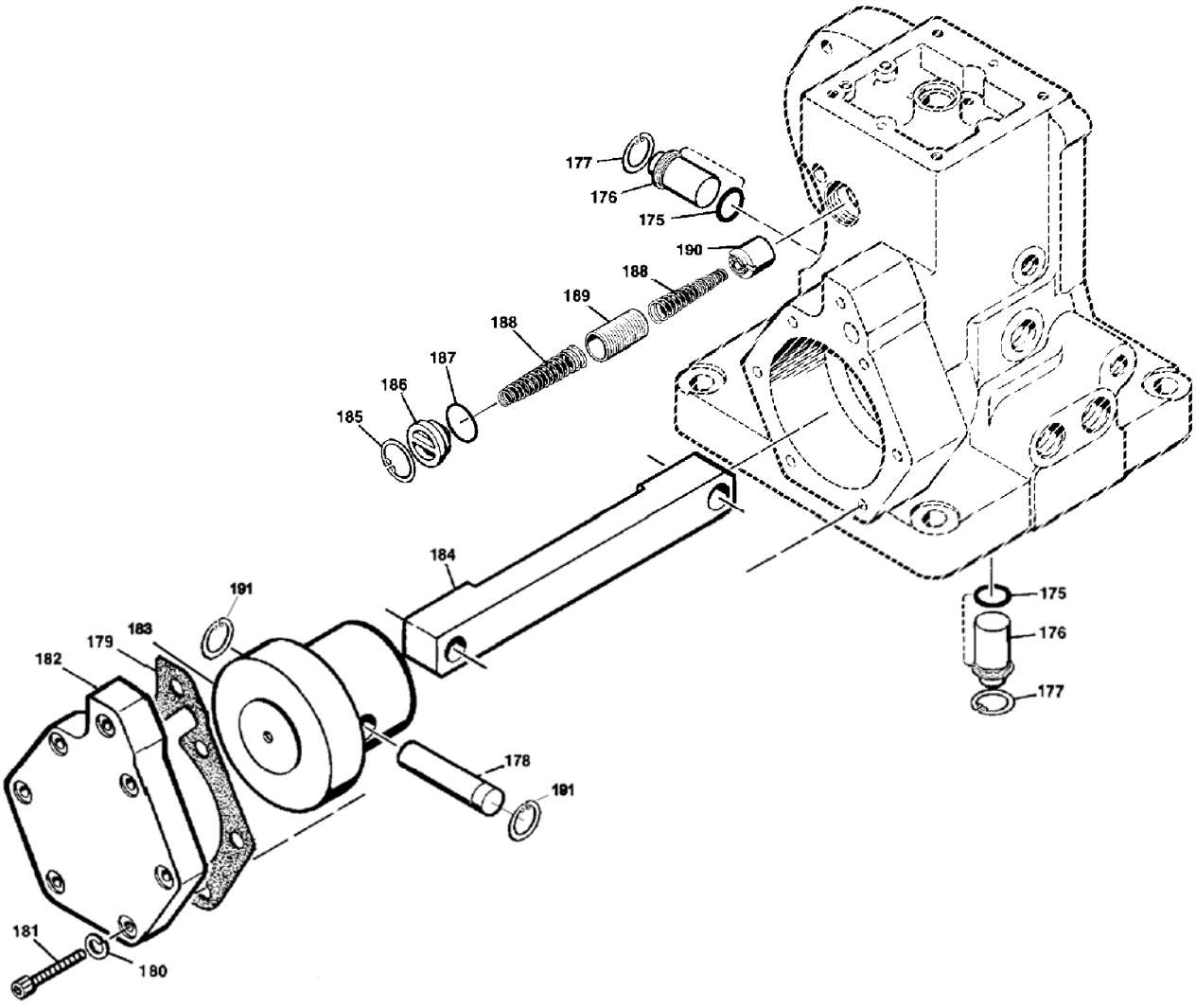

Figure 6-4. Parts for Servo Assembly

Parts List for Figure 6-5

Ref. No.	Part Name	Qty
36618-201	Preformed packing 1.114 I.D. x .070	2
36618-202	Accumulator plate	1
36618-203	Stud - 13.000 x .500	2
36618-204	Accumulator cylinder	1
36618-205	Accumulator spring	1
36618-206	Accumulator tube	1
36618-207	Preformed packing	2
36618-208	Accumulator end	1
36618-209	Washer - .500	4
36618-210	Nut	4
36618-211	Plug - .750	1
36618-212	Warning plate	1
36618-213	Drive screw - #2 x .125	2
36618-214	Plug - .562-18 UNF 2A	1
36618-215	Preformed packing .468 x .074	1
36618-216	Stud - 14.000 x .500	2

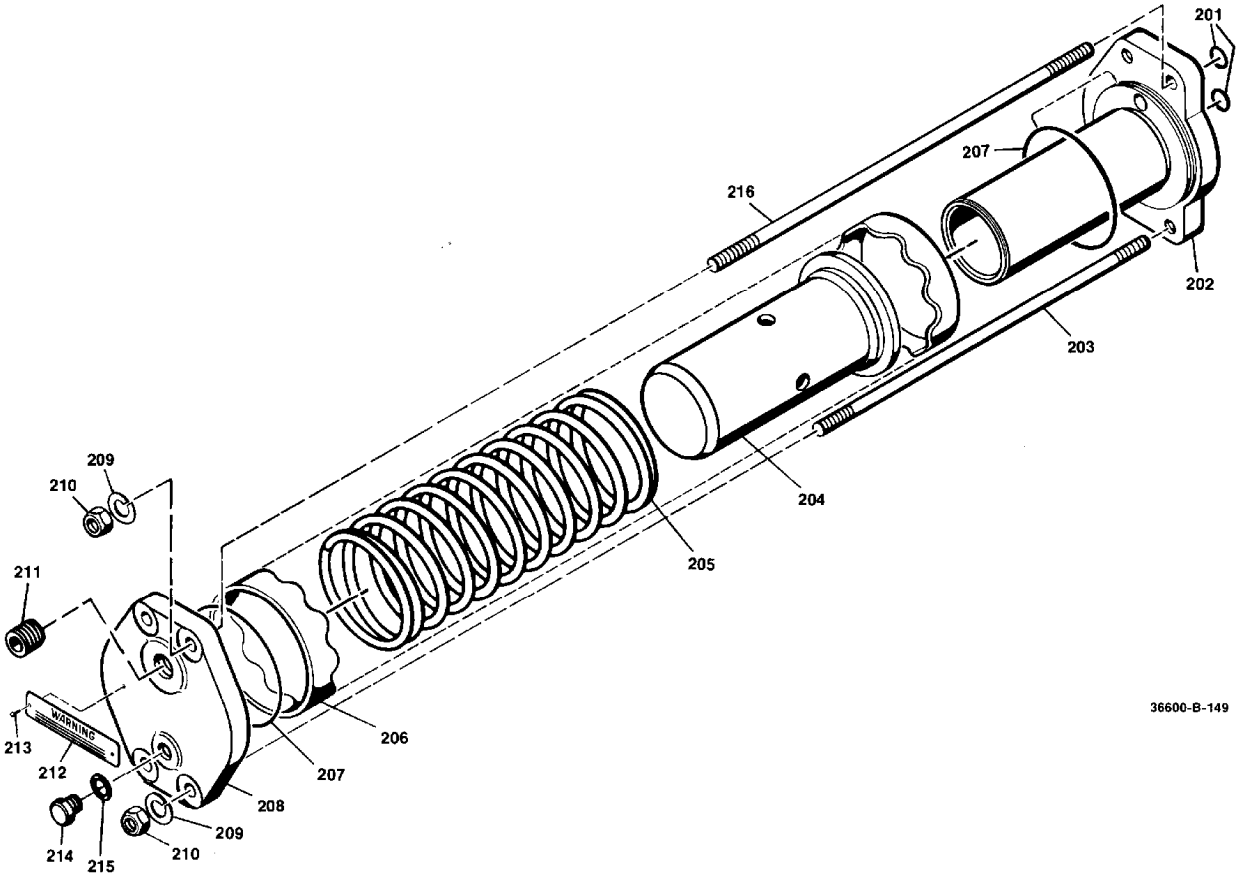

Figure 6-5. Parts for Accumulator Assembly (old style)

Parts List for Figure 6-6

Ref. No.	Part Name	Qty
36618-201	Preformed packing	2
36618-204	Accumulator cylinder	1
36618-205	Accumulator spring	1
36618-207	Preformed packing	1
36618-211	Plug	1
36618-211A	Preformed packing	1
36618-214	Plug	1
36618-215	Preformed packing	1
36618-226	Accumulator plate	1
36618-227	Flat washer	3
36618-228	Bolt, .500-13 x 8.8 inches	3
36618-229	Soc. hd. screw, .500-13 x 1.750	2
36618-230	Accumulator housing	1

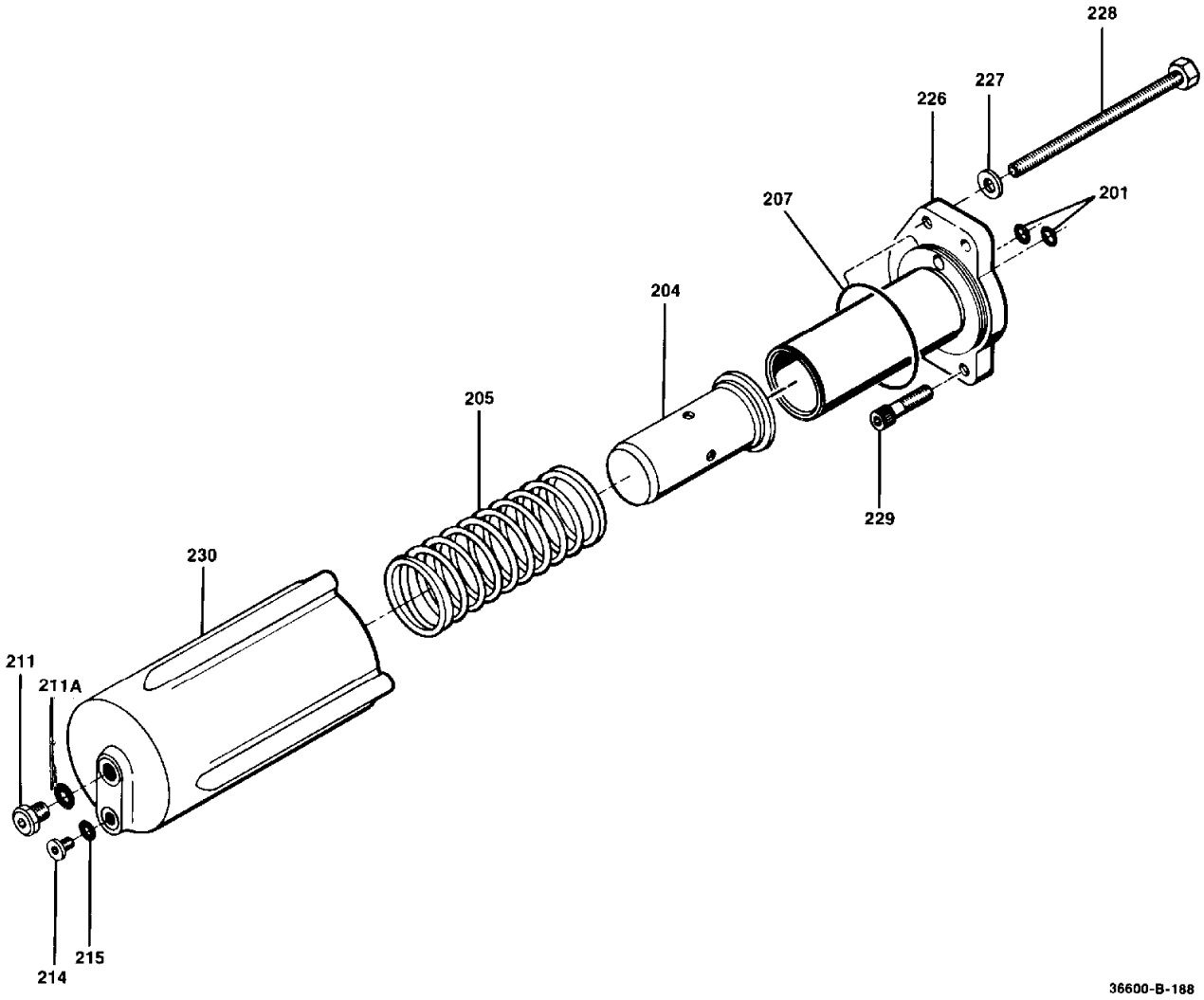

Figure 6-6. Parts for Vibration Resistant Accumulator Assembly (new style)

Parts List for Figure 6-7

Ref. No.	Part Name	Qty
36618-301	Key, PG200 pump	1
36618-302	Pilot, base	1
36618-303	Washer, thrust (1.000 x 1.562)	1
36618-304	Washer, thrust (1.000 x 1.750)	1
36618-305	Bearing, thrust, needle	2
36618-306	Oil Seal	1
36618-307	Shaft, PG200 drive, serrated	1
36618-308	Washer, flat	1
36618-309	Ring, external retaining	1
36618-310	Coupling, 3199 PG drive	1
36618-311	Ring, internal retaining	1
36618-312	O-ring, Viton	1
36618-313	Pump, Gerotor	1
36618-314	Screw, socket head cap	4
36618-315	Shaft, PG200 drive, keyed	1
36618-316	Spacer	1
36618-317	Sleeve, shipping (not shown)	1
36618-318	Nut, .625-18 castellated	1
36618-319	Key	1
36618-320	Cotter pin	1
36618-321	Bearing, needle	2
36618-322	Coupling drive	1

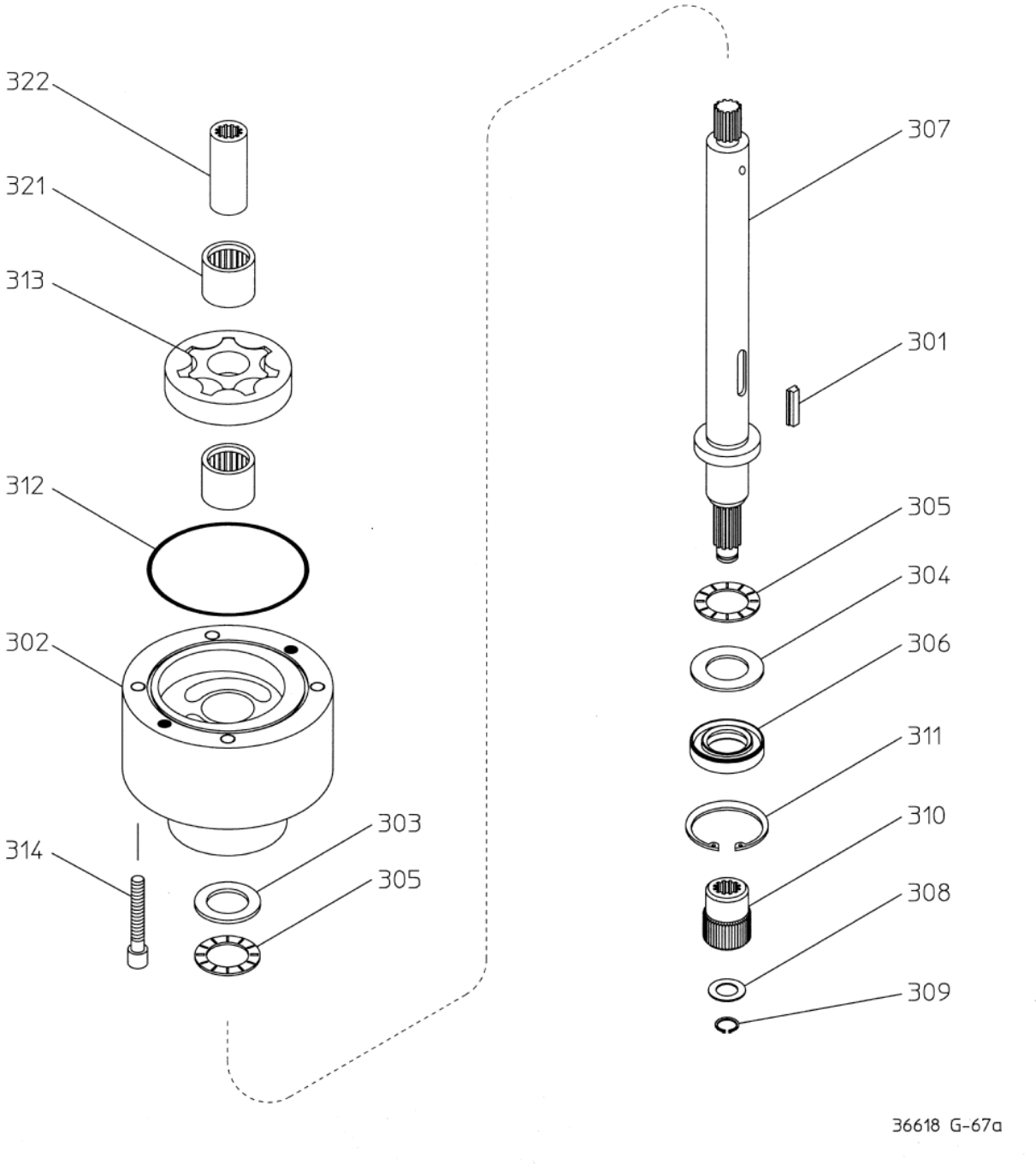

Figure 6-7a. Drive Shaft Assembly, Serrated Drive

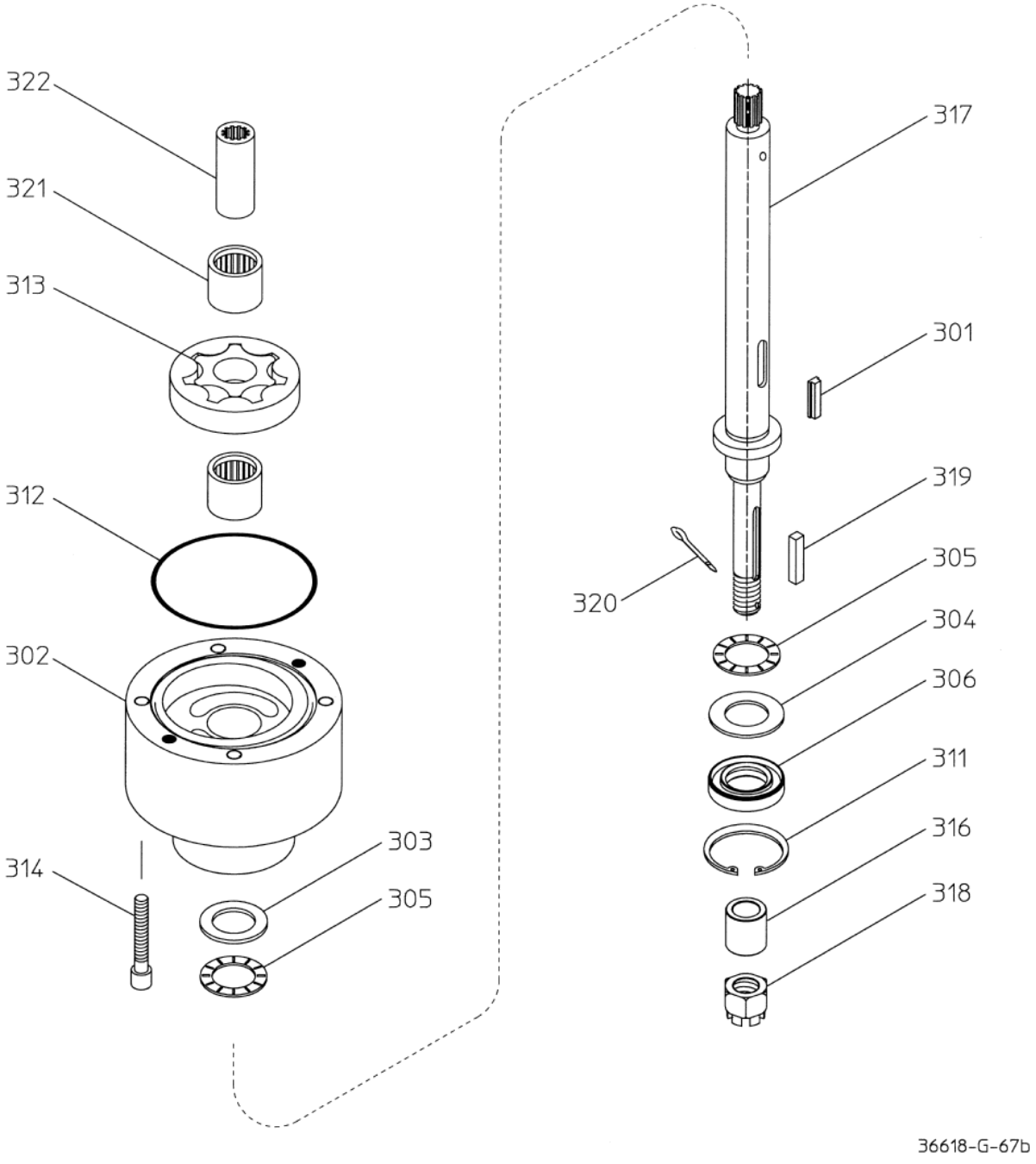

Figure 6-7b. Drive Shaft Assembly, Keyed Drive

Chapter 7.
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 at **www.woodward.com/directory**, which also contains the most current product support and contact information.

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

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.

Revision History

Changes in Revision J—

- Updated Declaration of Incorporation

Changes in Revision H—

- Added Regulatory Compliance information
- Added installation information and warnings to Chapter 2
- Added Declaration of Incorporation

Declarations

DECLARATION OF INCORPORATION
Of Partly Completed Machinery
2006/42/EC

Manufacturer's Name:	WOODWARD, INC
Manufacturer's Address:	Building A ,Ditiantai Industrial Park, Huaihedao, Beichen High-Tech Industrial Park, Tianjin, China
Model Names:	PG58/PG200/PG300
This product complies, where applicable, with the following Essential Requirements of Annex I:	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7

The relevant technical documentation is compiled in accordance with part B of Annex VII. Woodward shall transmit relevant information if required by a reasoned request by the national authorities. The method of transmittal shall be agreed upon by the applicable parties.

The person authorized to compile the technical documentation:

Name: Dominik Kania, Managing Director at Woodward Poland Sp. z o.o
Address: Woodward Poland Sp. z o.o., ul. Skarbowa 32, 32-005 Niepolomice, Poland

This product must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of this Directive, where appropriate.

The undersigned hereby declares, on behalf of Woodward Governor Company of Loveland and Fort Collins, Colorado that the above referenced product is in conformity with Directive 2006/42/EC as partly completed machinery:

MANUFACTURER

Signature

Christopher Perkins
Full Name

Engineering Manager
Position

WGC, Fort Collins, CO, USA
Place

07 - Aug - 2014
Date

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