

# **Pneumatic Load Balance System for PGA Governors**

**(no pressure select transfer valve  
using adaptor plate 3798-067)**

**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.



# Chapter 1.

## General Information

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### Introduction

When two or more engines drive a common load, such as a propeller shaft of a ship, it is desirable to control the engines in unison and have the load on all engines proportionally shared, especially if the speed and load varies over a wide range. This requirement could be met by supplying a common speed-setting signal to all governors from a master speed controller, if the speed setting, the speed droop, and the governor to engine rack relationships were identical. It is difficult to achieve and maintain this identical relationship with mechanical-hydraulic governors. The load-balance system operates in conjunction with the master speed controller to accomplish the desired result.

### PGA Governors

The pneumatic load balance system is designed to operate with the PGA (Pressure Compensated Governor with Air (pneumatic) speed setting). The governor must have a power-piston tail rod to accommodate the load-balance equipment and other auxiliary devices. The principal reference is Manual 36604 for the basic PGA components including the base, power case, differential power servo, and long column.

### Master Speed Controller

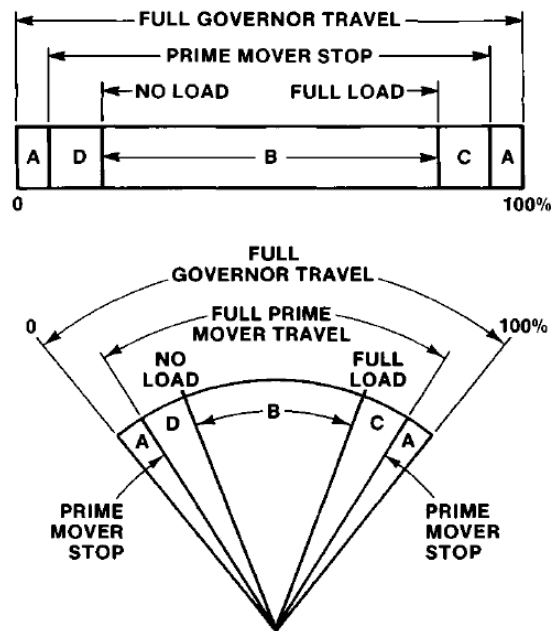
The master speed controller transmits an adjustable pneumatic pressure signal to all bellows speed-setting mechanisms on governors operating in unison. This common speed-setting signal is adjustable from a minimum to a maximum value, corresponding from idle to full speed of the governor.

All governors in the system must be set using about the same amount of output shaft travel from minimum to maximum. This travel should use about 2/3 of the total amount of travel available with the remaining third of the travel divided to provide travel required to accelerate the prime mover and travel required to shut down the prime mover.

### Load Balance System

The load balance system is based on a position comparison principle. The servo or fuel output position of a selected governor, designated the master, is compared with that of the other governors, designated slave.

A differential air receiver for each slave governor does the comparing. Any difference in the signal of the master governor and that of the slave governor results in an error signal. The error signal is used to bias the speed setting of the slave governor and is in a direction to increase or decrease the slave governor servo position to match the servo position of the master governor. In so doing, the error in servo position approaches zero as the error signal approaches zero. Note that the load balance system is only able to balance the servo position. Linkage between the governors and the various prime movers must be almost identical to achieve matched power outputs.



- A - OVERTRAVEL TO INSURE PRIME MOVER STOPS ARE REACHED
- B - NO LOAD TO FULL LOAD TRAVEL — NORMALLY 2/3 OF FULL GOVERNOR TRAVEL IS RECOMMENDED
- C - TRAVEL REQUIRED TO ACCELERATE THE PRIME MOVER
- D - TRAVEL REQUIRED TO DECELERATE OR SHUT DOWN PRIME MOVER

Figure 1-1. Work Load Chart

## Chapter 2.

# Principles of Operation

### Introduction

This chapter covers load-sharing operation, tolerance, selection of master, slave, and isolate modes, and transfer valve operation.

### Load Sharing Operation

Figures 2-1, 2-2, and 2-3 show the schematic diagrams of the load-sharing system. A pneumatic transmitter, mounted on each governor, produces an air pressure proportional to its servo position. A differential diaphragm assembly, or receiver, on each governor is connected through linkage to the speed-setting system. The master governor transmitter feeds its signal to the lower side of all slave governor receivers. The top side of each slave governor receiver receives its own transmitter signal. Differential forces in the receiver will raise or lower the speed setting of the slave governor. If the master governor carries more, or less, load than the slave, the differential force will increase, or decrease, the speed setting of the slave until it carries about the same output position as the master.

The master governor receiver must have both sides of its diaphragm either bled to atmosphere or impressed with its own transmitter pressure, as shown in Figure 1-1. Therefore, if No. 1 Engine is always the chosen master governor, its receiver can be omitted.

On loss of the slave signal but retention of the master signal, the speed setting of the slave governor will increase. A yield spring between the receiver and the speed-sensing system prevents the speed setting from reaching a dangerous level. However, depending on the engine and the linkage, speeds may approach or pass the overspeed-trip set point.

As long as the load-balance system is in operation, all participating governors can be operated either isochronously or with speed droop. Operation with speed droop is recommended to maintain a degree of load division in the event the load-balance system is taken out of service. Refer to manual 36621 for droop load-sharing operation.

### Tolerances

The yield spring between the receiver and speed-sensing system permits a maximum speed-setting increase of about 90 rpm at 1000 rpm nominal speed and 150 rpm at 450 rpm nominal. Experience has shown that load balancing can usually be adjusted to within 3 percent full-load range of the master governor for the slave governors.

## Transfer Valve Operation

The transfer valve is essentially a remotely-operated pneumatic switch for conveniently switching the load-balance receiver and transmitter air signals and air supply for each governor. The transfer valve enables easy selection of master, slave, and isolate modes for any particular governor.

The valve consists of an upper and lower block with an adaptor plate and diaphragm between them. Applying 60 to 150 psi (414 to 1034 kPa) air to two of the three mode selection connections in the lower block and leaving the third position open to vent selects the function which has been left open to vent.

In the Master Governor mode, 60 to 150 psi (414 to 1034 kPa) air is directed to the Slave and Isolate connection on the transfer block and the master connection is opened to vent. This connection places the 3–15 psi (21 to 103 kPa) output from the load-sharing transmitter on both sides of the load-sharing receiver, effectively making this part of the control inoperative. (See Figure 2-1).

The 3–15 psi (21 to 103 kPa) output from the transmitter is sent to the other governors in the system, which must be in the Slave configuration. These Slave governors will have 60 to 150 psi (414 to 1034 kPa) pressure at the Master and Isolate connection, with the slave connection open to vent. The 3–15 psi (21 to 103 kPa) signal from the master governor load-sharing transmitter will be directed to the lower side of the load-sharing receiver with the 3–15 psi (21 to 103 kPa) signal from the slave governor load-sharing transmitter directed to the upper side. The result of this comparison is transmitted to the shutdown rod and the pilot valve, adjusting the speed of the slave governor (see Figure 2-2).

The isolate connection is vented and 60 to 150 psi (414 to 1034 kPa) air is directed to the Master and Slave connections to isolate a governor. This configuration directs the 3–15 psi (21 to 103 kPa) output of the isolated governor's load-sharing transmitter against both sides of the load-sharing receiver, effectively making this part of the control inoperative. The pressures also seal the Master Governor receiver-transmitter port, isolating the governor from the pneumatic speed-control circuit (see Figure 2-3).

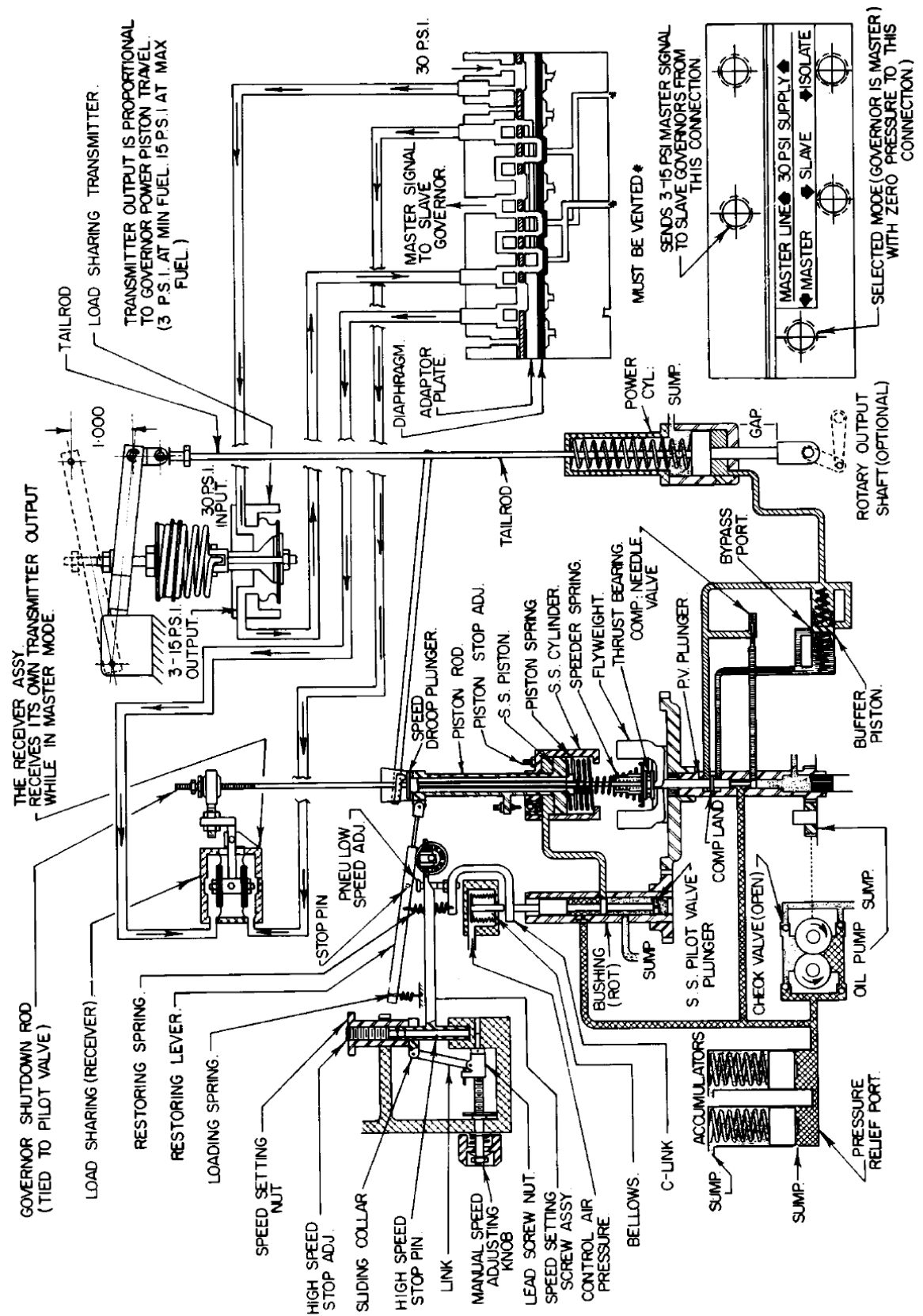


Figure 2-1. Master Governor Operation

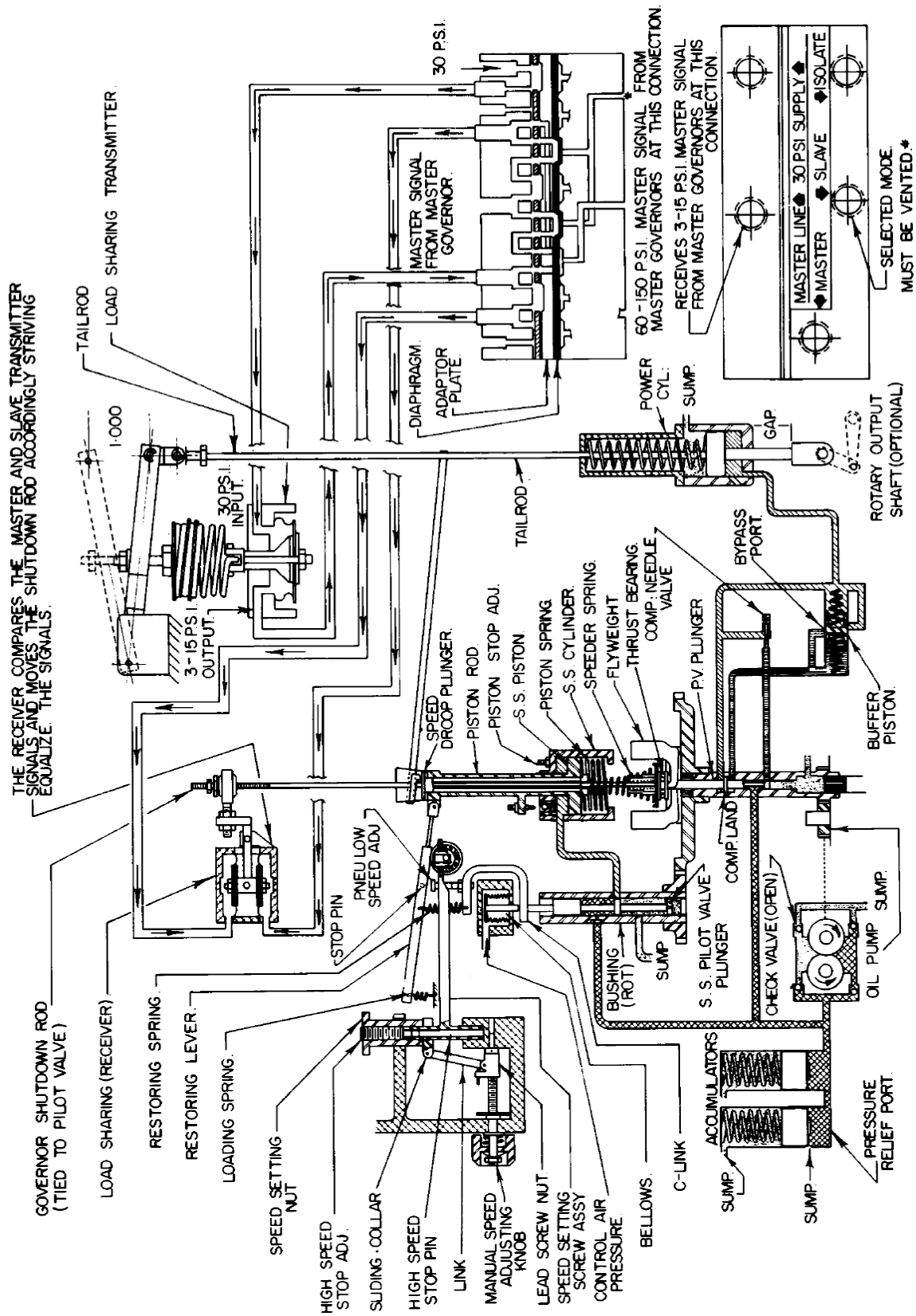


Figure 2-2. Slave Governor Configuration

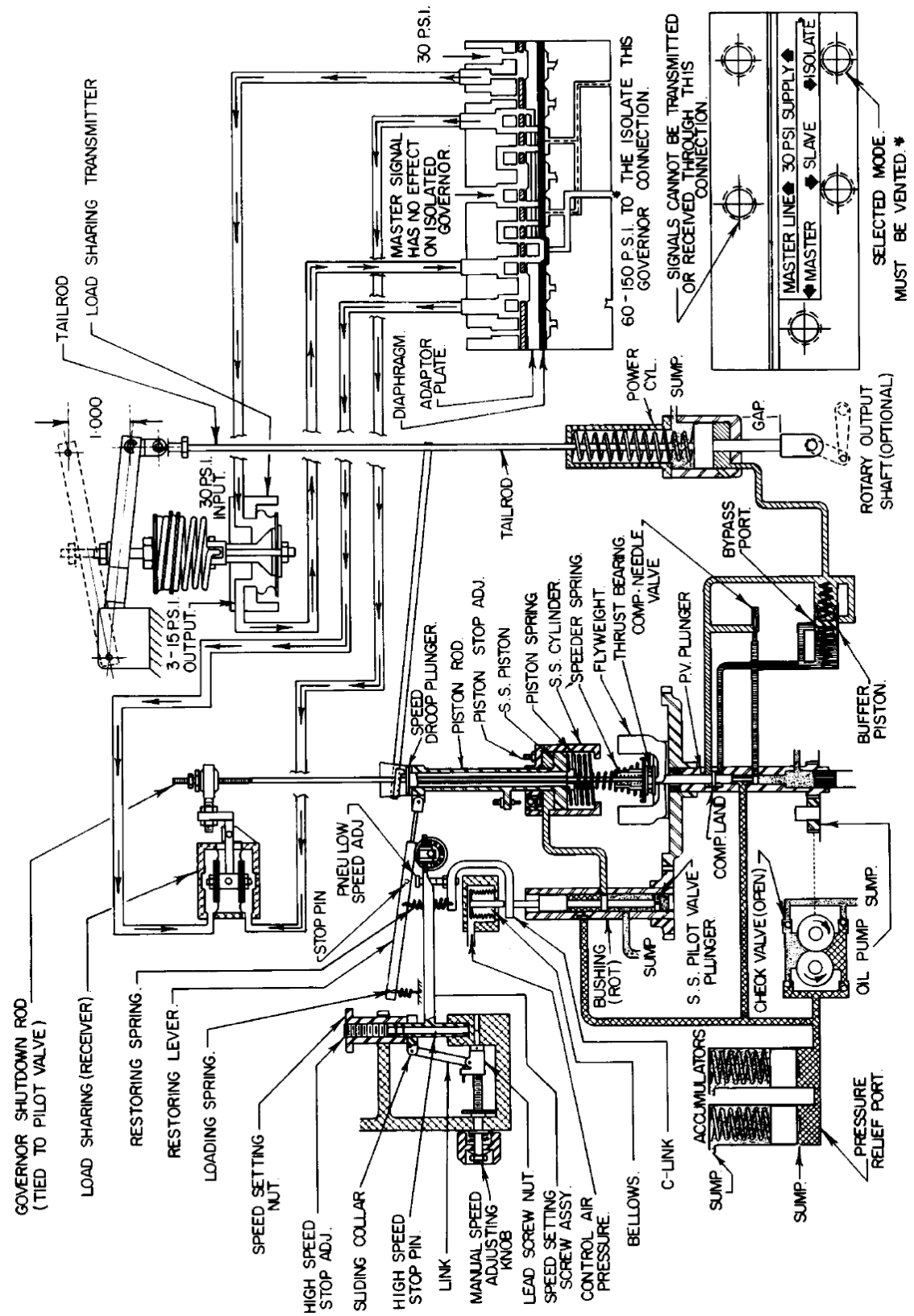


Figure 2-3. Isolated Governor Configuration

## Chapter 3.

# Maintenance and Adjustments

### Introduction

This chapter covers adjustments and checkout procedures for the load-balance system with transfer valve. A troubleshooting chart provides information if trouble occurs. Schematics and drawings are provided to aid in making adjustments. (Refer to Figures 2-1, 2-2, and 2-3, and to Table 3-1.)

With the engines shut down, check the linkage between the governors and the engine fuel racks to be sure they are all the same.

If the fuel-rack linkages are not the same on all engines, adjust the linkage so that each engine uses an equal amount of governor servo travel from minimum to maximum fuel. Be sure the linkage comes against the rack stops at maximum fuel before the entire governor stroke is used.

#### Example:

When using a governor that has a servo indicator scale, zero on the scale should correspond to zero fuel at the fuel pumps. When moving the fuel racks toward maximum fuel, all engines must have the same governor servo to fuel-pump relationship at any given point. When coming against the rack stops, most, but not all, of the governor servo travel should be used.

If the linkage is not adjustable, individual pumps can sometimes be adjusted to equalize the fuel pump to governor relationship.

Proper linkage adjustment is essential for good load division since the load-balance system compares governor servo position, not engine power.

#### To Check the Load Sharing Transmitter Outputs:

- a. Apply 60 to 150 psi (414 to 1034 kPa) to the Slave and Isolate connections on the transfer-valve block, vent the Master connection.
- b. Apply 30 psi (207 kPa) to the Supply connection.
- c. Install a precision 0–30 psi (0–207 kPa) gauge in the Master Line connection of the transfer-valve block. (Use the same gauge to check each governor.)
- d. Transmitter output is proportional to servo travel. For minimum servo travel output is 3 psi (21 kPa) and for maximum servo travel it is 15 psi (103 kPa). (Verify the pressure range with Woodward, as some units in the field have different pressure ranges. All units in the system must have identical pressure ranges.)
- e. When the governor servo is at its minimum stroke, the transmitter output should be 3 psi (21 kPa). When the governor servo is at its maximum stroke, the transmitter output should be 15 psi (103 kPa).

It may be necessary to disconnect the fuel-rack linkages from the governor in order to move the servo through its full 1.000 inch (25.40 mm) stroke. In some cases it is easier to leave the servo at minimum position, disconnect the transmitter lever and lift it 1.000 inch (25.40 mm) to simulate the maximum servo position. A tool, shown in Figure 3-1, can be made to make this method of checking the outputs easier.

If the transmitter output pressures are not correct and not identical, check for possible leaks around the tubing connections, on the transmitter and on the transfer-valve block.

If no leaks are found, refer to Table 3-1 and adjust the transmitter as follows:

- a. Turn the 0.250 inch (6.35 mm) self-locking nut located on the bottom of the transmitter clockwise until it is tight, then back it off 1/2 to a full turn.

**NOTICE**

**Overtightening this nut may damage the valve seats in the transmitter.**

- b. Make sure the governor servo is at the end of its stroke (in the minimum fuel position).
- c. Loosen the 7/16-inch (~11.1 mm) lock nut on the transmitter spring assembly and adjust the pressure level to  $3.0 \pm 0.1$  psi ( $21 \pm 0.7$  kPa) by turning the entire spring assembly counterclockwise to increase pressure (as viewed from the top) or clockwise to decrease pressure. Retighten the lock nut and recheck the pressure.

**NOTICE**

**Take care when turning the entire spring assembly that the spring-rate adjustment is not disturbed.**

**Adjust the Transmitter Output**

- a. Move the transmitter lever 1.000 inch (25.40 mm) from minimum servo position to maximum servo position. The transmitter output should be  $15.0 \pm 0.1$  psi ( $103 \pm 0.7$  kPa). If necessary adjust the transmitter spring rate:
- b. Loosen the pressure-level-adjusting lock nut and the spring-rate-adjusting lock nut.
- c. Wind the transmitter-spring coils on or off the rate adjusting nut.

**IMPORTANT**

**The fewer active coils the greater the rate and the wider the pressure range.**

- d. After adjusting the spring rate it is necessary to repeat steps b and c of the transmitter adjustment above. It may also be necessary to repeat the spring-rate adjustment until the correct pressure outputs are achieved. All governors must have the correct transmitter output for good load division.

**NOTICE**

**Tighten all locking devices before accepting final pressure readings.**

To check for possible leaks in the master-line piping between governors reconnect the master-line piping and install the precision gauge in the lower diaphragm pressure tap on the slave governor's receiver. If the air pressures are the same as in the above steps this line does not leak.

Start the engines and apply 60 to 150 psi (414 to 1034 kPa) to the Master and Slave connections of the transfer valve (selecting Isolate) and check the speed settings of all the governors using a reliable tachometer. If possible use the same tachometer on all engines to get an accurate comparison. Also use a precision gauge in the speed-setting air line to check if each governor is receiving the correct speed-setting air signal. The speed of each engine must be as close as possible for the best load balancing.

If the speeds are incorrect, disconnect the spherical rod end from the load-sharing receiver and let it hang on the shutdown rod. Recheck the speeds. If they are still incorrect, refer to the appropriate PGA or PG-PL manual for the correct procedure for resetting the governor speeds to the correct specifications.

Run the engine at any given speed and note the rpm.

Reconnect the spherical rod end to the receiver. Be careful to center the shutdown rod in the clearance hole in the speed-setting servo piston.

**NOTICE**

**The shutdown rod must not touch the interior diameter of the speed-setting servo piston.**

If the engine speed changes after reconnecting the spherical rod end, adjust the threaded bushing up or down on the shutdown rod to obtain the original speed.

**Check the setting:**

- a. Apply 60 to 150 psi (414 to 1034 kPa) to the Master and Isolate connections on the transfer block. Open the Slave connection to vent. (Select Slave operation.)
- b. Attach a line between the top and bottom of the load-sharing receiver using the pipe tapped holes that are normally plugged.
- c. Remove the master line fitting from the transfer valve and plug the hole.
- d. Disconnect the transmitter lever and move it up to increase the pressure output from the transmitter.

**IMPORTANT**

**This action applies an equal pressure to both side of the receiver and tends to center the spherical rod end. When the pressure is increased the speed of the engine should not change.**

- e. If the speed changes, adjust the spherical rod end accordingly until no speed change is noted when moving the transmitter lever up and down.

**IMPORTANT**

**Be sure there are no leaks around the receiver or transfer valve.**

- f. When the spherical rod end is set, remove the jumper line from the receiver and replace the pipe plugs.
- g. Reconnect the master line to the transfer-valve block.

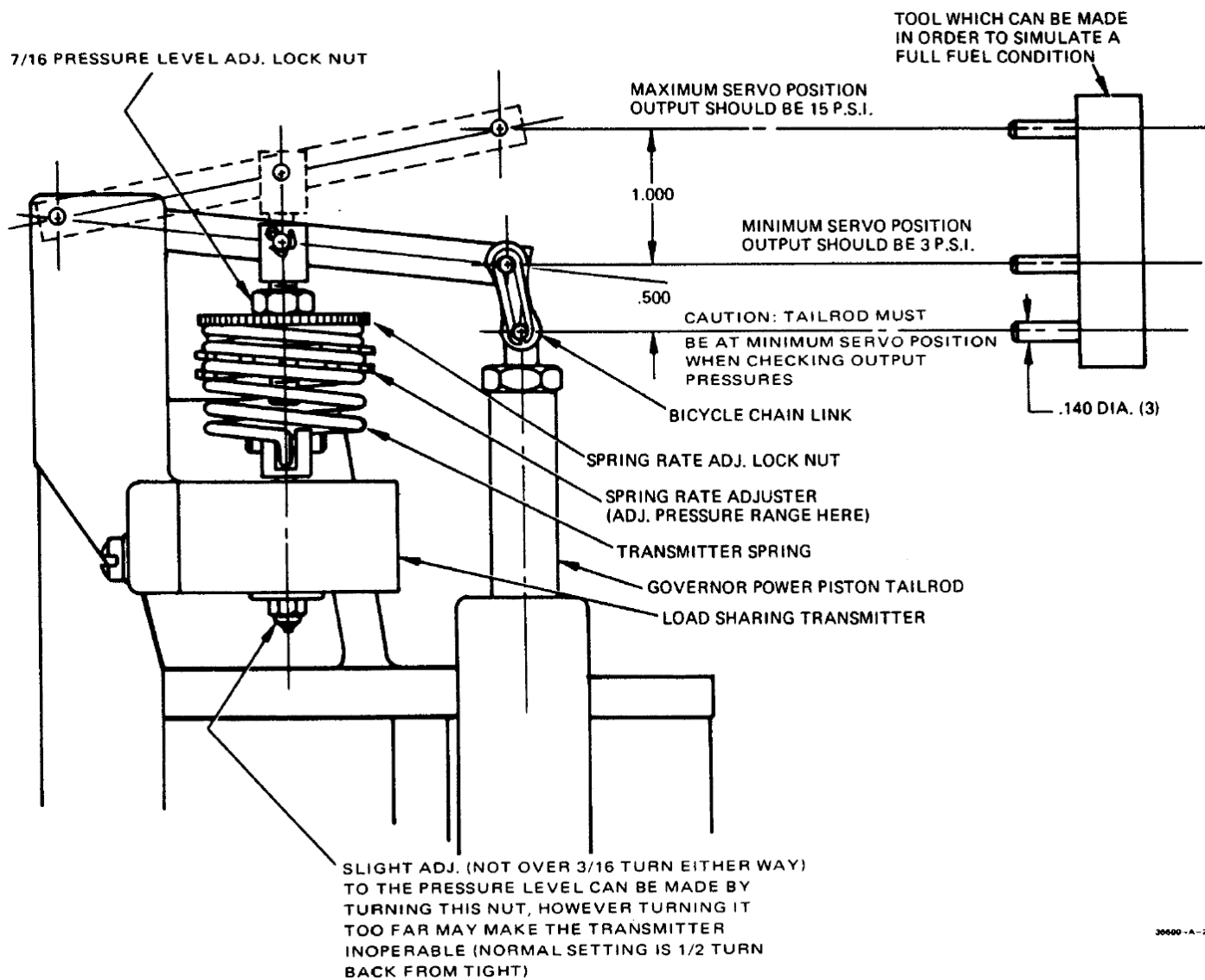
**Check for equal load division:**

- a. Check the servo position on each governor. If the positions are identical, then any difference in load division is due to improperly adjusted fuel rack linkages. Remember, the load-balance device only compares governor servo positions.
- b. If the servo positions are not the same, check for possible leaks at all the master signal connections. Also check to see if the correct mode selection has been made at each governor. Only one governor is master, all others are slaves.
- c. Check that the mode selection is correct. Check that the fuel linkage is identical on all units. Check that there are no pneumatic leaks. If proper load division is still not achieved, recheck the governor calibration. Make slight adjustments to the transmitters while the system is running to correct minor errors in load division.

It may be necessary to make adjustments while the system is running, if a precision gauge is not available and the transmitters cannot be easily set to the tolerance specified. Take extreme care and have a full understanding of the system before attempting to adjust the transmitters in this manner.

Table 3-1. Troubleshooting

<b>Trouble</b>	<b>Probable Cause</b>	<b>Correction</b>
Sudden total loss of load balance.	Improper mode selection.	Check other parts of control system.
	Bad leak or restriction in master piping.	Repair leaks if any.  Blow through line to check for possible restriction.
	Blown receiver diaphragm in slave governor.	Replace diaphragm.
	Master receiver not venting properly.	Disassemble and check transfer valve for dirt or oil accumulation. Clean and reassemble.
	Loss of transmitter signal on either master or slave.	Check 30 psi supply to transmitters.
		Check transmitter outputs using procedure outlines in this manual.
		0.010 orifice may be clogged in transmitter block.
Engines not sharing load equally but governor servo scales are equal.	Improperly adjusted fuel rack linkage.	Readjust linkage to be the same on all engines.
Engines not sharing load equally and governor servo scales also indicate an imbalance.	Leak in the master line.	Check all fittings or connections which the master signal passes through.
	Improper calibration of the load sharing transmitter on either slave or master governors.	Recheck calibration.  Slight adjustments may be necessary to the transmitters or fuel rack linkage to achieve perfect load division.
Load balance system does not work under any circumstances.	No spare parts, or problems cannot be resolved.	Isolate or disconnect the load balance system and run the engine on droop load sharing. See bulletin 36606 for explanation of this type of operation.



30500-A-223

Figure 3-1. Load Sharing Transmitter Pressure Adjustment

## Chapter 4. Replacement Parts

When ordering replacement parts, it is essential to include the following information:

- Governor serial number and part number shown on nameplate
- Manual number (this is manual 36679)
- Part reference number in parts list and description of part or part name

The illustrated parts breakdown list all the replaceable parts for the load-balance system. The numbers assigned are used as reference numbers and are not specific Woodward part numbers. Woodward will determine the exact part number for your particular governor.

Ref. No.	Part Name .....	Quantity
36679-1	Column case .....	1
36679-2	Speeder spring piston assy.....	1
36679-3	Droop plunger cap .....	1
36679-4	Nut .....	1
36679-5	Droop cam .....	1
36679-6	Power piston .....	1
36679-7	Droop lever .....	1
36679-8	Screw.....	1
36679-9	Lockwasher.....	1
36679-10	Elastic hex nut .....	1
36679-11	Transmitter valve plunger .....	1
36679-12	O-ring.....	1
36679-13	Transmitter valve seat .....	1
36679-14	Transmitter bellows assy .....	1
36679-15	Transmitter stem.....	1
36679-16	Cotter pin .....	4
36679-17	Pin .....	2
36679-18	Fitting clamp .....	1
36679-19	O-ring.....	1
36679-20	Orifice disc.....	1
36679-21	Filter element.....	1
36679-22	Lockwasher.....	1
36679-23	Fil. screw.....	1
36679-24	Link spring .....	1
36679-25	Rate adjuster nut assembly .....	1
36679-26	Rate adjuster lock .....	1
36679-27	Jam nut.....	1
36679-28	Jam nut.....	1
36679-29	Pivot screw .....	1
36679-30	Connecting link .....	1
36679-31	Load divider cover .....	1
36679-32	O-ring.....	1
36679-33	Transmitter lever.....	1
36679-34	Transmitter link .....	1
36679-35	8-32 nut .....	1
36679-36	Shutdown bushing .....	1
36679-37	Screw.....	1
36679-38	10-32 screw .....	1
36679-39	Lockwasher.....	1
36679-40	Tube clamp .....	1
36679-41	Rod end .....	1
36679-42	Jam nut.....	2
36679-43	Cotter pin .....	1
36679-44	Pin .....	1
36679-45	Lockwasher.....	4
36679-46	10-32 screw .....	4

Ref. No.	Part Name .....	Quantity
36679-47	0.125 pipe plug.....	1
36679-48	O-ring .....	1
36679-49	10-32 nut .....	1
36679-50	Washer.....	1
36679-51	Diaphragm.....	1
36679-52	Diaphragm.....	1
36679-53	Diaphragm crosshead .....	1
36679-54	Headed pin .....	1
36679-55	Cotter pin .....	1
36679-56	Transmitter cylinder.....	1
36679-57	Diaphragm.....	1
36679-58	Diaphragm plate .....	1
36679-59	Washer.....	1
36679-60	10-32 nut .....	1
36679-61	Load divider cover .....	1
36679-62	O-ring .....	1
36679-63	Transmitter bracket .....	1
36679-64	0.125 pipe plug.....	1
36679-65	O-ring .....	1
36679-66	Lockwasher .....	2
36679-67	10-32 screw.....	2
36679-68	Cotter pin.....	1
36679-69	Headed pin .....	1
36679-70	Pivot pin link .....	1
36679-71	Floating lever.....	1
36679-72	Headed pin .....	1
36679-73	Cotter pin.....	1
36679-74	Not used	
36679-75	Not used	
36679-76	Transfer valve body.....	1
36679-77	Transfer valve gasket .....	1
36679-78	Valve adapter plate .....	1
36679-79	Valve diaphragm .....	1
36679-80	Valve block.....	1
36679-81	Valve assembly (parts 76–80) .....	1
36679-82	10-32 screw.....	5
36679-83	Lockwasher .....	5
36679-84	1/16 pipe plug.....	3
36679-85	Valve gasket.....	1
36679-86	O-ring .....	2
36679-87	Tube assembly .....	
36679-88	Tube assembly .....	1
36679-89	Tube assembly .....	1
36679-90	Tube assembly .....	1
36679-91	Valve clamp.....	1
36679-92	0.250-20 nut .....	2
36679-93	0.250-20 stud .....	2
36679-94	Actuating lever.....	1
36679-95	Needle bearing.....	2
36679-96	Speeder spring power cylinder.....	1
36679-97	Valve spring.....	1
36679-98	Tailrod .....	1
36679-99	Screw .....	1
36679-100	Cotter pin.....	1
36679-101	Spacers .....	2
36679-102	Pin .....	1
36679-103	Knurled knob .....	1
36679-104	Spring.....	1
36679-105	Fulcrum pin .....	1
36679-106	Pilot valve link.....	2
36679-107	Eccentric .....	1
36679-108	Cotter pin.....	1
36679-109	Adjust. block .....	1
36679-110	Screw .....	1

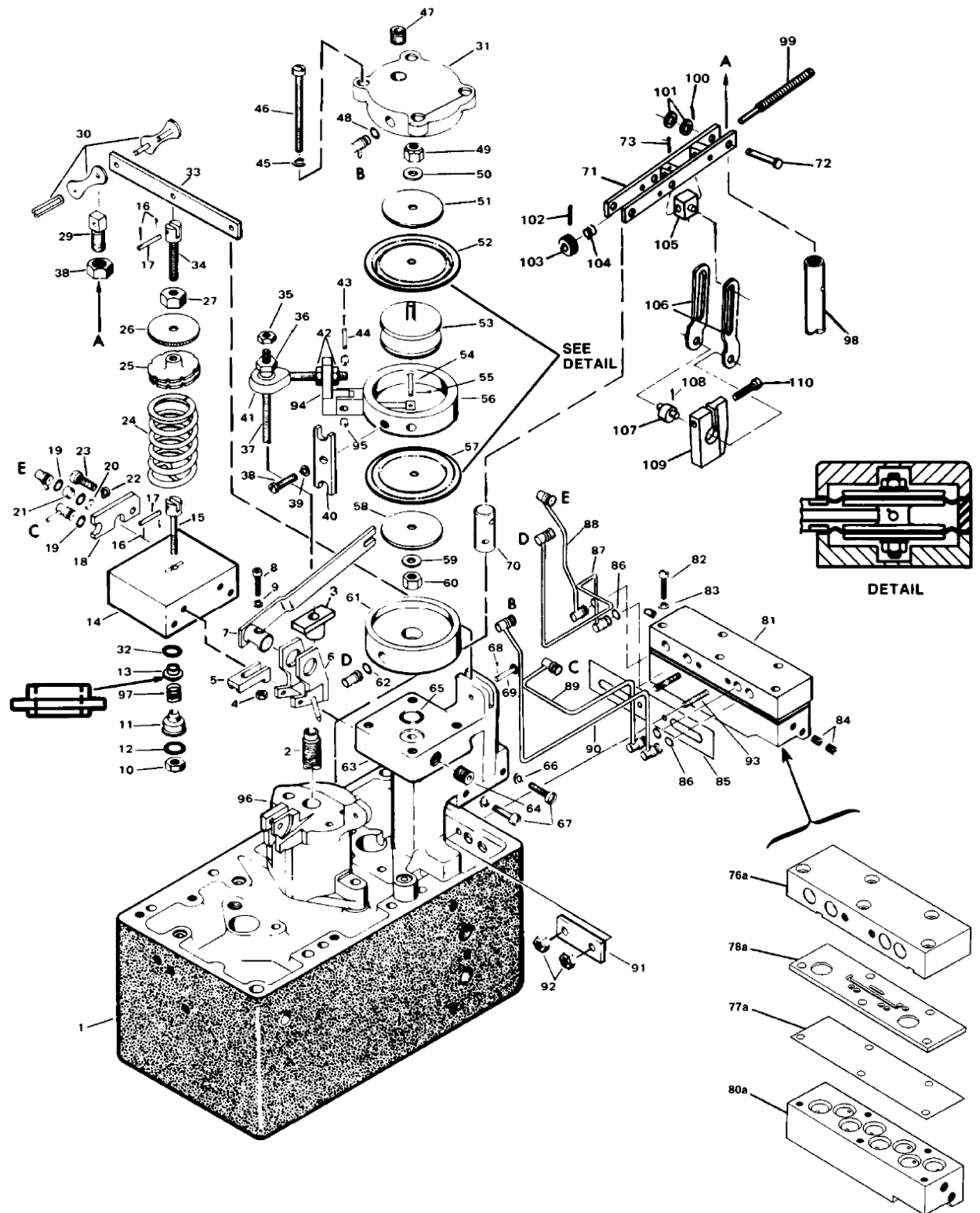


Figure 4-1. Exploded View of the Load Balance System

## Chapter 5.

# Product Support and Service Options

### Product Support Options

If you are experiencing problems with the installation, or unsatisfactory performance of a Woodward product, the following options are available:

1. Consult the troubleshooting guide in the manual.
2. Contact the **OE Manufacturer or Packager** of your system.
3. Contact the **Woodward Business Partner** serving your area.
4. Contact Woodward technical assistance via email ([EngineHelpDesk@Woodward.com](mailto: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](http://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](http://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](http://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

<u>Facility</u> -----	<u>Phone Number</u>
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

<u>Facility</u> -----	<u>Phone Number</u>
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

<u>Facility</u> -----	<u>Phone Number</u>
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](http://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 \_\_\_\_\_

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### 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.) \_\_\_\_\_

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### Control/Governor Information

#### Control/Governor #1

Woodward Part Number & Rev. Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

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#### Control/Governor #2

Woodward Part Number & Rev. Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

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#### Control/Governor #3

Woodward Part Number & Rev. Letter \_\_\_\_\_

Control Description or Governor Type \_\_\_\_\_

Serial Number \_\_\_\_\_

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### 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](mailto:icinfo@woodward.com)**

**Please reference publication 36679.**



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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.**