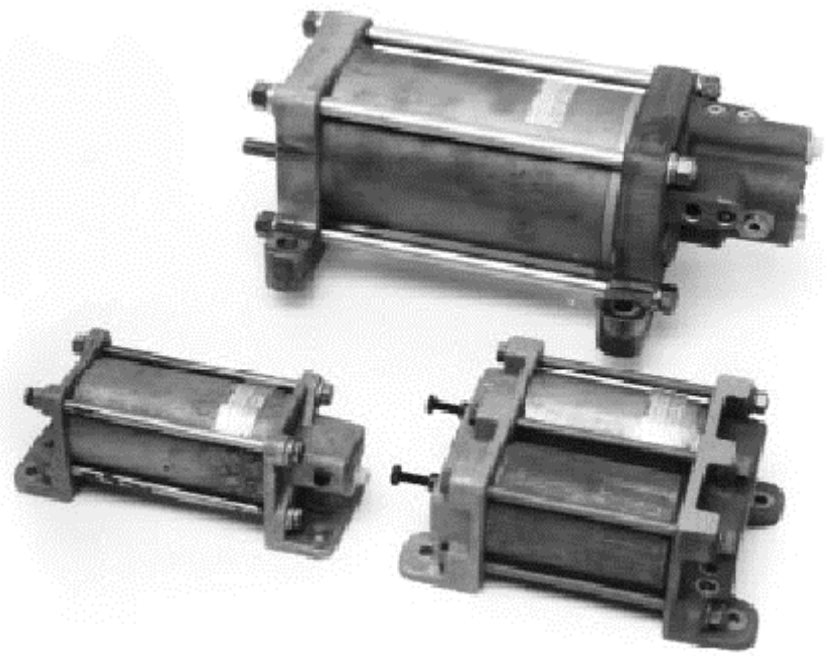
WOODWARD

Product Manual 36684
(Revision M)
Original Instructions



Booster Servomotor

Single Cylinder (8901-037, -043, -051)
Tandem (8901-065, -067)
Two-Stage (8901-091, -103)

Installation and Operation Manual

IMPORTANT

DEFINITIONS

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

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

WARNING

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

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

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

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

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If your publication is not there, please contact your customer service representative to get the latest copy.

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

NOTICE

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

NOTICE

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

Revisions—Text changes are indicated by a black line alongside the text.

Contents

Illustrations and Tables

Regulatory Compliance

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

Machinery Directive:	Compliance as a component with 98/37/EC COUNCIL DIRECTIVE of 23 July 1998 on the approximation of the laws of the Member States relating to machinery.
Pressure Equipment Directive:	Compliant as “SEP” per Article 3.3 to Pressure Equipment Directive 97/23/EC of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment.

Chapter 1.
General Information

Introduction

This manual covers the three types of Woodward booster servomotor:

- Low-volume, single-cylinder booster
- Medium-volume, double-cylinder (tandem) booster
- High-volume, two-stage booster

Description

A booster servomotor supplies pressurized oil to mechanical-hydraulic governors and electro-hydraulic actuators at the instant starting air reaches the engine. This instant oil pressure eliminates the time required for the rotary gear pump in the governor to build up enough oil pressure to move the linkage. This produces a faster start, which conserves starting air, and in vessels with direct reversible engines, improves maneuverability.

When the booster is inactive, a piston is held at one end of a cylinder by a spring. The cylinder is full of oil supplied from a line from the governor's sump.

Compressed air applied to the side of the piston opposite this oil forces the piston against the oil, which flows through ports at the other end of the cylinder to the governor.

When air is removed from the piston, the spring returns the piston to its rest position. Reduced pressure in the cylinder causes oil to flow into it from the sump.

Check valves at all oil ports allow oil to flow in only one direction. This prevents oil in the booster from flowing back to the governor's sump when the booster operates, and prevents oil in the booster outlet lines from flowing back into the booster when it is inactive.

Types of Boosters

Boosters are available with different air-to-oil pressure ratios, making them suitable for both high and low air pressure applications:

Model	Type	Pressure Ratio (Oil Out to Air In)
8901-037, -043	single-cylinder	1:1
8901-051	single-cylinder	2:1
8901-065	tandem	1:1
8901-067	tandem	2:1
8901-091	two-stage	2:1
8901-103	two-stage	3:1

Single-cylinder boosters supply enough oil for governors with small and medium work outputs, such as UG-8/-40, EGB-10/-13, 3161, and PG governors with outputs of 16 and 23 J (12 and 17 ft-lbs).

Tandem boosters, with larger volumes of oil and three oil outlets, are appropriate for PG-29/-58, EG-29/-58, and PG-TM 58 governors (39/79 J; 29/58 ft-lb).

Two-stage, high-volume boosters meet the boost oil requirements for PG, EGB, and PG-TM governors with 271, 407, and 678 J (200, 300, and 500 ft-lb) power cases.

Single-Cylinder Booster (Figures 1-1 and 1-3)
Single-cylinder boosters have two oil outlets: one is unrestricted, and one has a built-in orifice-type restriction. Outlet #1 (unrestricted) is connected directly to the governor's oil pressure system. Outlet #2 (restricted) can be used to pressurize the speed setting servo, which compresses the speeder spring of PGA, PGPL, and PGG governors equipped with any shutdown feature.

A single-cylinder booster has two air inlets, one restricted and one unrestricted. Using the restricted air inlet results in slower movement of the fuel rack.

Tandem Booster (Figures 1-2 and 1-4)
Tandem boosters have two cylinders and three oil outlets. Outlet #1 is unrestricted. The other two outlets are restricted by an adjustable needle valve.

Oil outlet #1 is connected to the governor's accumulator. Outlet #2 is connected to the speed setting servo (of PGA, PGPL, and PGG governors equipped with any shutdown feature). Outlet #3 is connected to a point directly under the power piston.

If outlet #2 is used, its needle valve determines the rate at which the speeder spring is compressed. The needle valve in outlet #3 controls the rate at which the power piston moves.

Two-Stage Booster (Figures 1-5, 2-4, and 3-3)
Two-stage boosters have three oil outlets, but a two-stage feature allows oil to flow through outlet #2 before it flows through the other two outlets.

In most applications, outlet #1 supplies oil to the power piston in the governor. Outlet #2 supplies oil to the speed setting servo (of PGA, PGPL, and PGG governors equipped with any shutdown feature). Outlet #3 supplies oil to the relay piston.

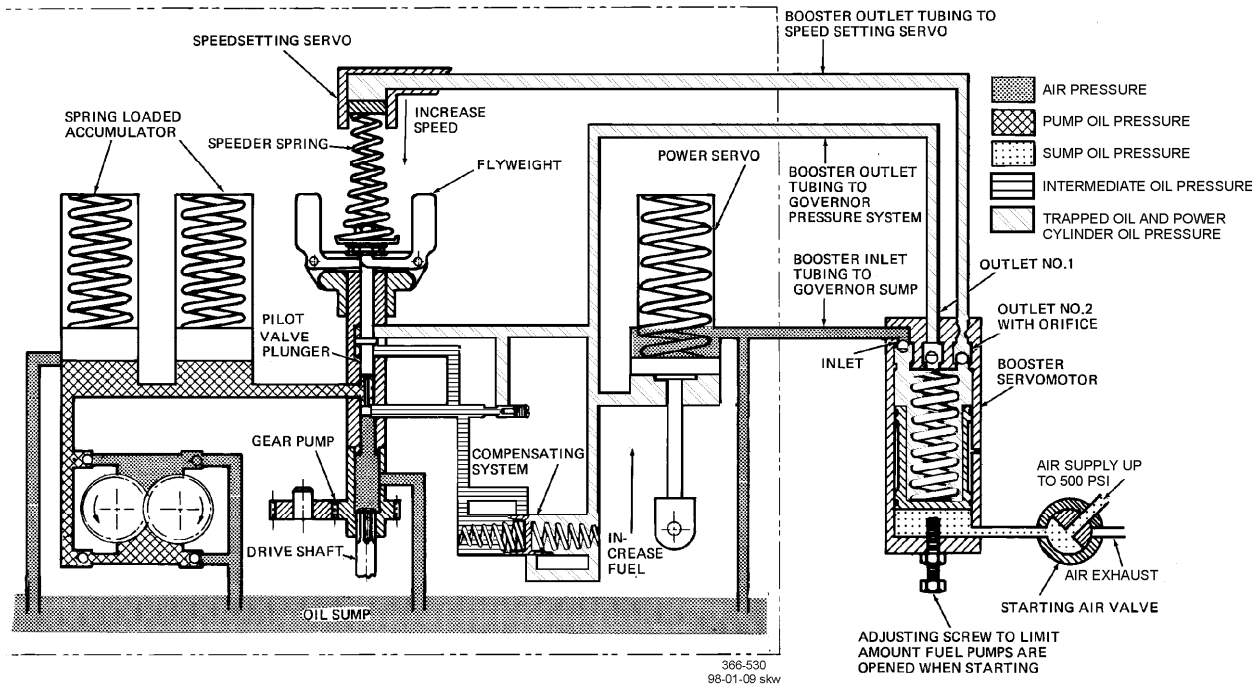

Figure 1-1. Schematic of Single Booster Connections to PG-Type Governor

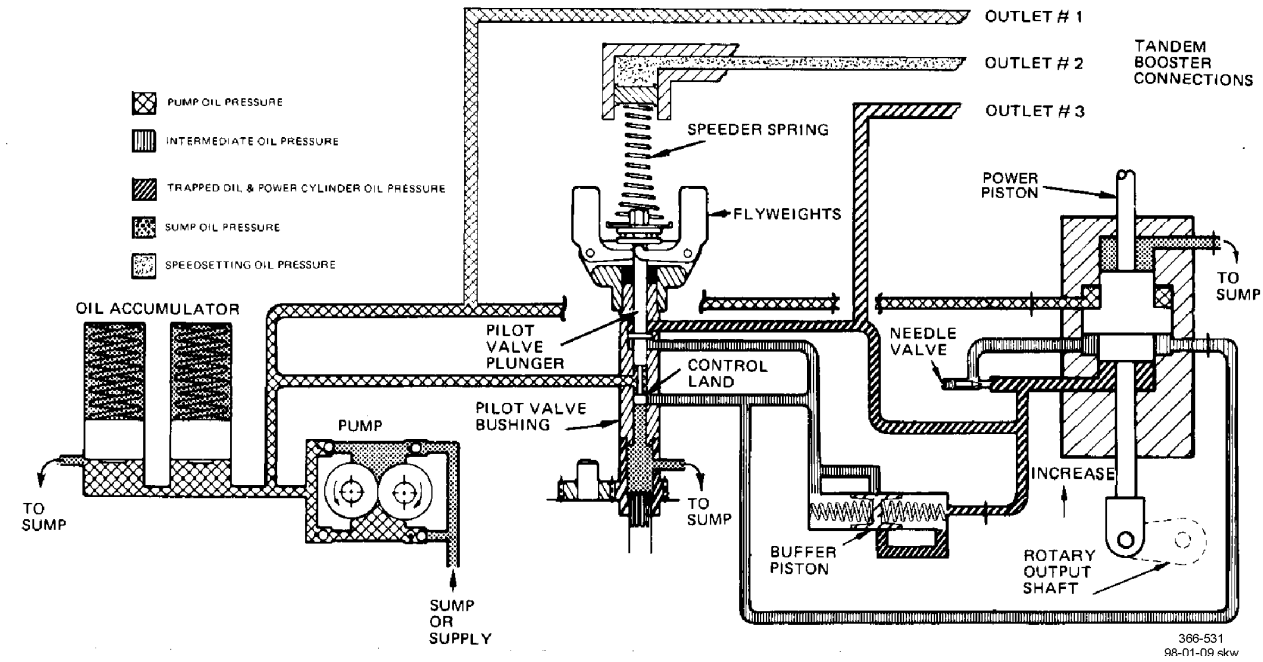

Figure 1-2. Schematic of Tandem Booster Connections to PG-Type Governor

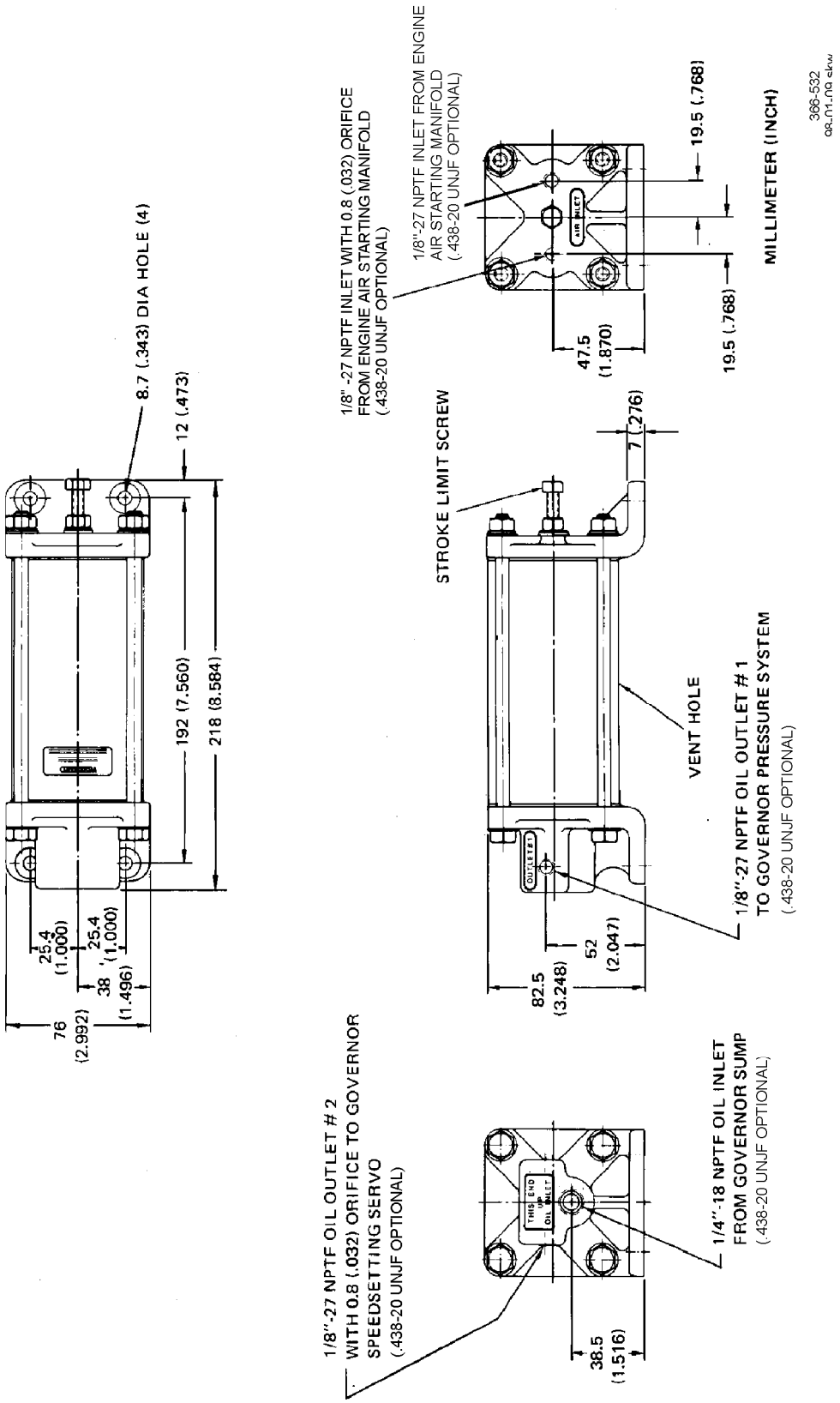

Figure 1-3. Outline Drawing of Single Booster

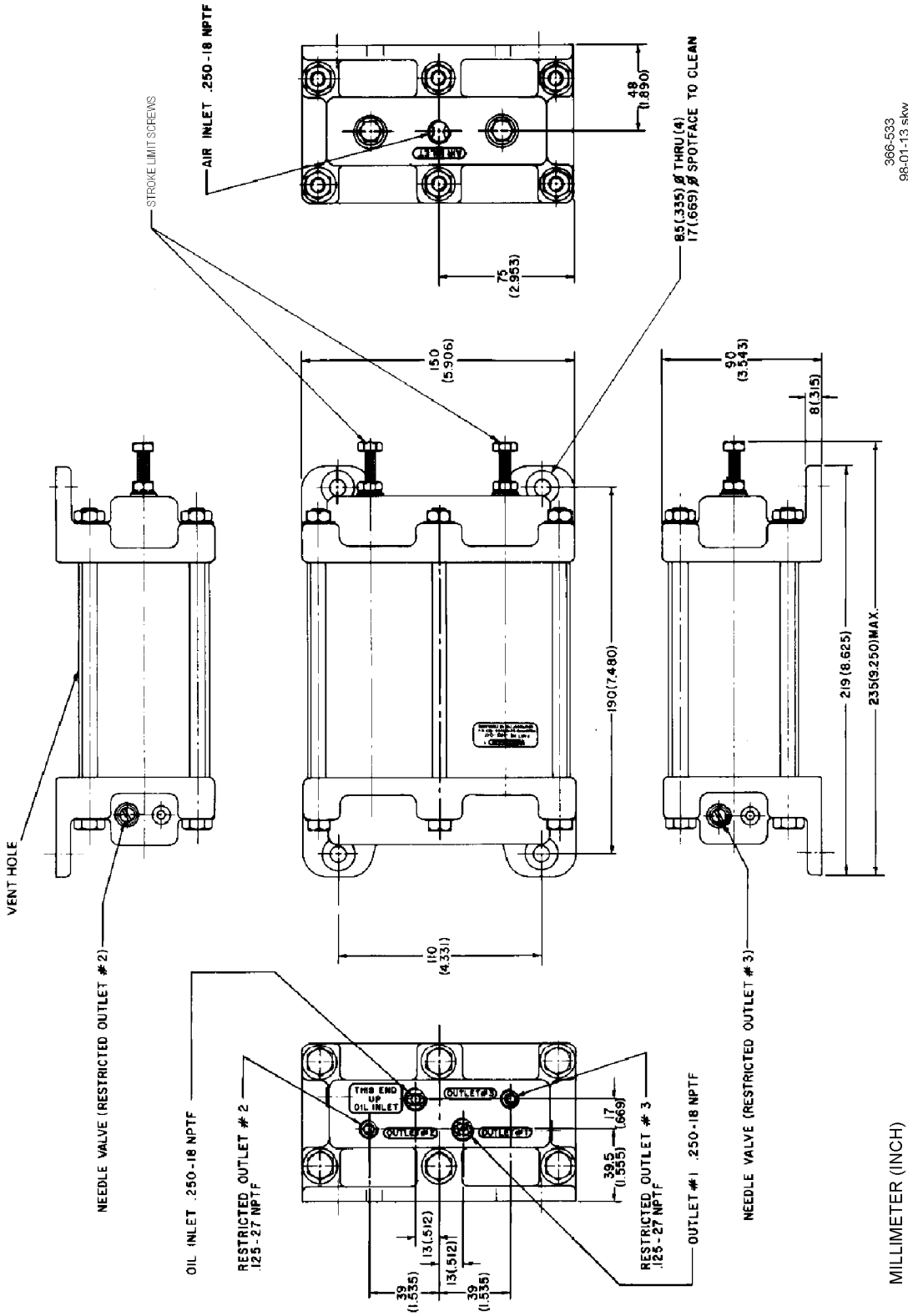

Figure 1-4. Outline Drawing of Tandem Booster

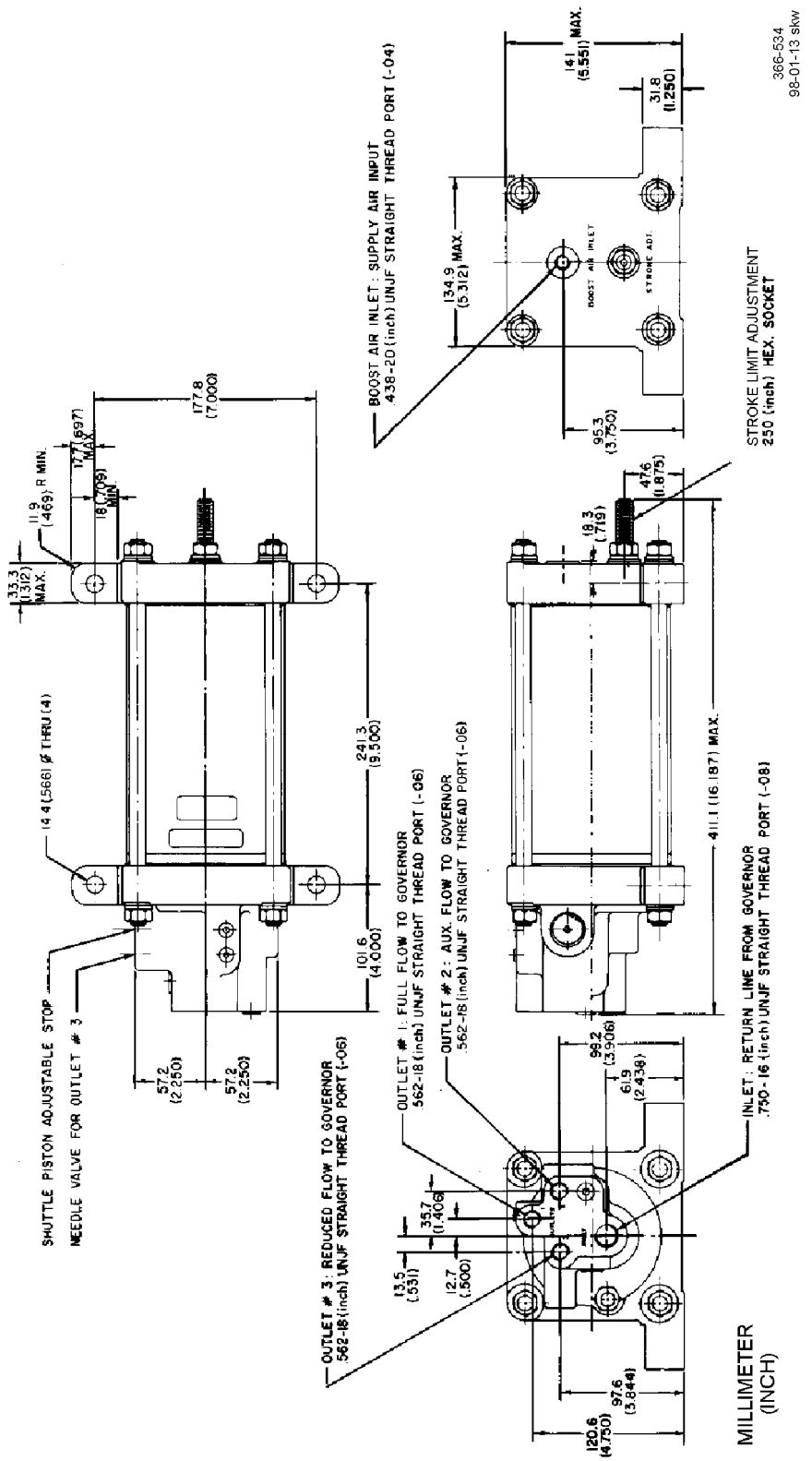

Figure 1-5. Outline Drawing of Two-Stage Booster

Chapter 2.
Installing and Adjusting a Booster Servomotor

General Rules

Observe the following rules when you install a Woodward booster servomotor.

Location
Install the booster servomotor at a lower level than the governor to prevent air from being trapped in the booster and oil lines.

Oil Lines
Oil lines must slope up from the booster to the governor with a minimum of loops and bends.

Oil Leakage
It is not unusual for small oil particles (from assembly oil) to come out of the vent hole at initial use of the booster and after several starts in a row, due to oil particles in the bleed air.

Starting-Air Valve
A starting-air valve (supplied by the customer) must be installed in the air line to the booster. This valve must admit compressed air to the booster at the same time that starting air is supplied to the engine, and it must vent the air cylinder of the booster to atmosphere when starting air is removed from the engine. Air pressure at the booster air inlet must not exceed 3500 kPa (500 psi).

NOTICE

Purge air from the booster's oil chamber, the tubing, and the governor before starting the engine, by cycling the booster piston with start-air or air from a separate source. Failure to purge air completely may result in sluggish governor response.

Installing and Adjusting a Single Cylinder Booster

Models 8901-037, -043, and -051 (Figures 1-3, 2-1, and 2-2)

Refer to the general rules at the beginning of this section.

Figures 2-1 and 2-2 show locations of inlet and outlet ports on Woodward governors with which a single-cylinder booster can be used. Figure 1-3 shows locations of ports and the stroke limit screw on a single-cylinder booster.

Install 10 mm (3/8 inch) steel tubing from the sump of the governor to the oil inlet on the booster.

Install 6 mm (1/4 inch) steel tubing from oil outlet #1 on the booster to the power piston (the inlet marked “OUTLET #1”) of the governor.

If the governor is a PGA, PGPL, or PGG equipped with any shutdown feature, install 6 mm (1/4 inch) steel tubing from oil outlet #2 on the booster to the speed setting servo (the inlet marked “OUTLET #2”) of the governor. Otherwise, plug outlet #2 (this plug is delivered with the booster).

Connect a line containing an air-starting valve from the starting-air supply to the appropriate air inlet on the booster. Use the inlet with the built-in orifice if you want to move the fuel racks at a slower rate. The other air inlet needs to be plugged.

Fill the governor with oil to the proper level (refer to the installation manual for the governor).

When all air and oil connections are secure, purge air from the booster and oil lines by cycling air to the booster from a remote source without cranking the engine. Add oil to the governor as needed.

When there is no more air in the booster and oil lines, set the initial opening of the fuel racks by adjusting the stroke of the booster piston. Turn the stroke limit screw counterclockwise to increase starting fuel, and clockwise to decrease it. This screw limits the intake stroke of the booster and the volume of oil supplied to the governor in one stroke of the booster servomotor.

Installing and Adjusting a Tandem Booster

Models 8901-065 and 8901-067 (Figures 1-4 and 2-3)

On PGA governors, decals indicating where to connect lines from the booster do NOT apply to tandem boosters. Refer to Figure 2-3 when connecting a tandem booster to a PGA governor.

Refer to the general rules at the beginning of this section.

Figure 2-3 shows locations of outlet and inlet ports on governors with which a tandem booster can be used. Figure 1-4 shows locations of stroke limit screws and ports on a tandem booster.

Connect 10 mm (3/8 inch) steel tubing from the sump of the governor to the oil inlet on the booster; and from oil outlet #1 of the booster to the accumulator of the governor.

On PGA, PGPL, and PGG governors equipped with any shutdown feature, connect 6 mm (1/4 inch) steel tubing from oil outlet #2 on the booster to the speed setting servo of the governor.

On PGA, PGPL, and PGG governors, connect 6 mm (1/4 inch) steel tubing from oil outlet #3 on the booster to the power piston of the governor.

Connect a line with an air-starting valve from the starting-air supply to the air inlet on the booster.

Plug the unused oil outlet(s) and air inlet (these plugs are delivered with the booster).

Fill the governor with oil to the correct level (refer to the installation manual for the governor).

When all oil and air connections are secure, purge air from the booster and oil lines by cycling air to the booster from a remote source without cranking the engine. Add more oil to the governor as needed.

When there is no more air in the booster and oil lines, limit the volume of oil going to the governor by adjusting the two stroke limit screws. The positions of these screws determine the maximum volume of oil supplied by the booster. This, in turn, determines the maximum travel of the fuel racks. Turn the screws clockwise to reduce the travel of the racks, and counterclockwise to increase the travel.

Adjust the needle valves in oil outlets #2 and #3. If outlet #2 is used, its needle valve controls the rate of oil flow to the speeder spring servo, which determines how fast the speeder spring servo moves. The needle valve in outlet #3 controls the rate at which the power piston moves. Turn the needle valve clockwise to restrict oil flow, and counterclockwise to increase flow.

IMPORTANT

Outlets #2 and #3 are connected to separate cylinders. Outlet #1 is connected to both cylinders, with check valves preventing flow between the cylinders. Unequal amounts of oil will flow through the two outlets if the stroke limit screws are adjusted unequally. It is usually best to adjust both of these screws the same distance, and regulate the rate of oil flow through outlets #2 and #3 with their respective needle valves.

Installing and Adjusting a Two-Stage Booster

Models 8901-091 and 8901-103 (Figures 1-5 and 2-4)

On PGA, PGPL, and PGG governors, decals indicating where to connect lines from the booster do NOT apply to two-stage boosters. Refer to Figure 2-4 when connecting a two-stage booster to a PGA, PGPL, or PGG governor.

Refer to the general rules at the beginning of this section.

Connect 12 mm (1/2 inch) steel tubing from the sump of the governor to the oil inlet port on the booster, and from oil outlet #1 on the booster to the power piston of the governor.

On PGA, PGPL, and PGG governors equipped with any shutdown feature, connect 8 mm (5/16 inch) steel tubing from oil outlet #2 on the booster to the speed setting servo of the governor.

Connect 8 mm (5/16 inch) steel tubing from oil outlet #3 on the booster to the relay piston of the governor.

If you have an EGB-200, -300, or -500 actuator, leave oil outlet #3 of the booster plugged and loosen the plug in outlet #2. Turn the shuttle piston adjusting screw fully clockwise, thereby opening up the passage to outlet #1 (otherwise, the booster servomotor remains inactive). Tighten the plug in outlet #2.

Connect a line with an air-starting valve from the starting-air supply to the air inlet on the booster.

Fill the governor with oil to the correct level (refer to the installation manual of the governor).

When all air and oil connections are secure, purge air from the booster and oil lines by cycling air from a remote source to the booster without cranking the engine. Add oil to the governor as needed.

When there is no more air in the booster and oil lines, regulate the volume of oil going to the governor by adjusting the stroke limit screw. If you are not using an EGB-200, -300, or -500 actuator, adjust the shuttle piston adjusting screw and the needle valve in oil outlet #3.

Remember that:

- The stroke limit screw limits the volume of oil going to the governor through oil outlets #1 and #3. This controls the maximum amount of fuel output during a booster-assisted start.
- If you use outlet #2, the shuttle piston adjusting screw limits the volume of oil going to the speed setting servo through oil outlet #2.
- The needle valve limits the rate of flow of oil through oil outlet #3; this controls the rate at which the output shaft of the governor moves. The needle valve setting also limits the stroke of the power piston in the governor.

Turn the stroke limit screw clockwise to reduce the volume of oil to the governor and fuel to the engine, and counterclockwise to increase volume.

Turn the needle valve clockwise to reduce the rate and volume of oil flow, and counterclockwise to increase the rate and volume.

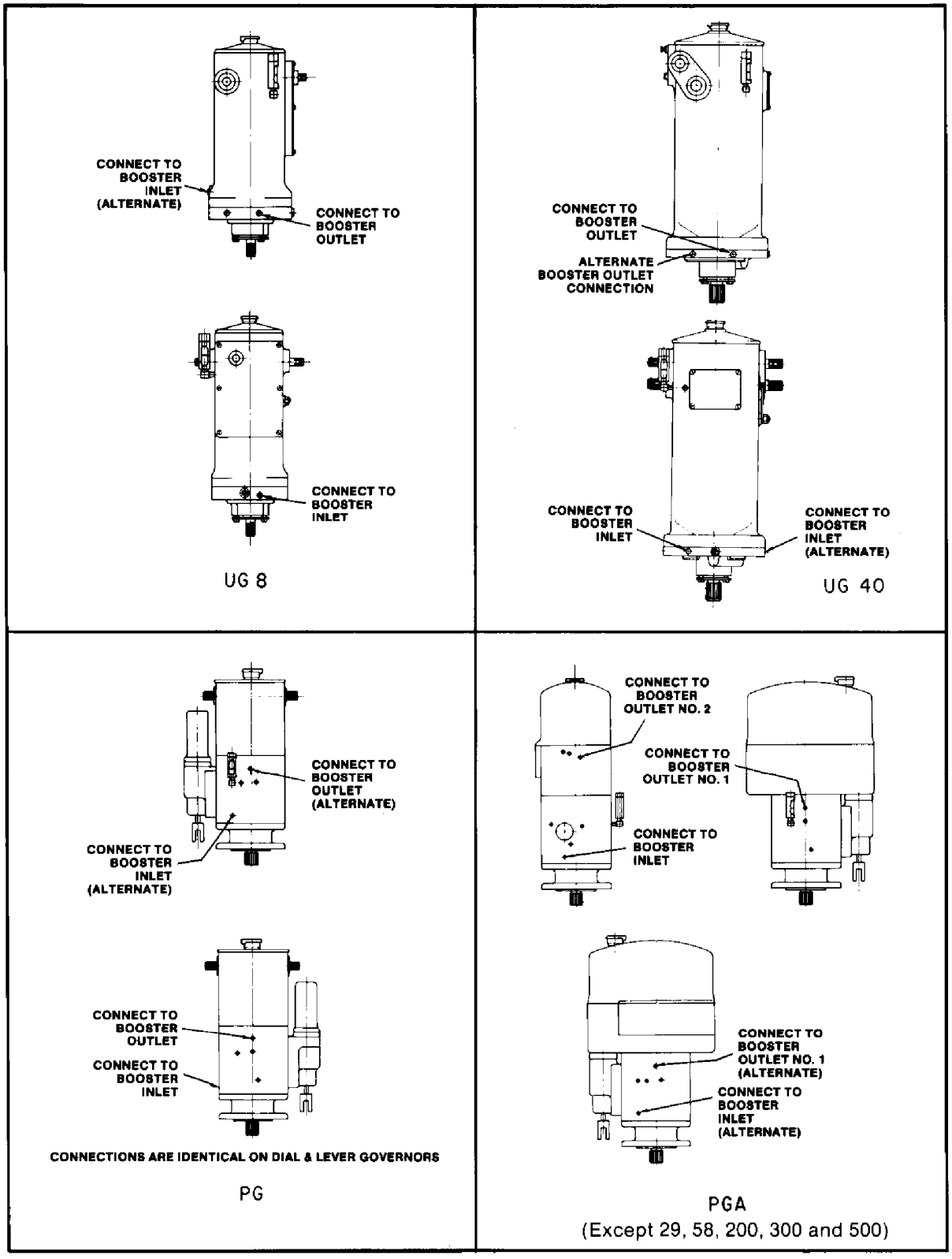

Figure 2-1. Governors Used with Single-Cylinder Boosters

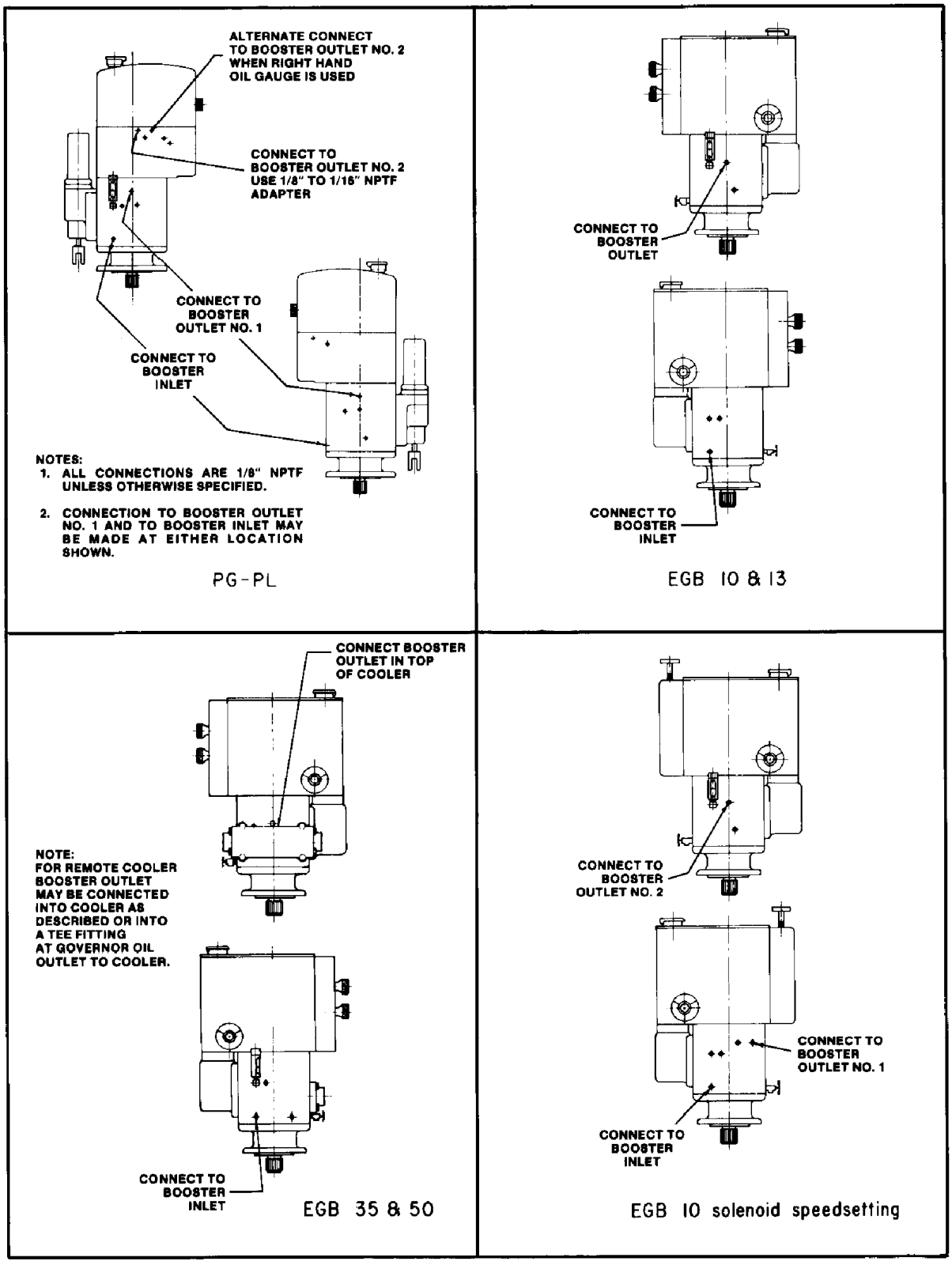

Figure 2-2. Governors Used with Single-Cylinder Boosters

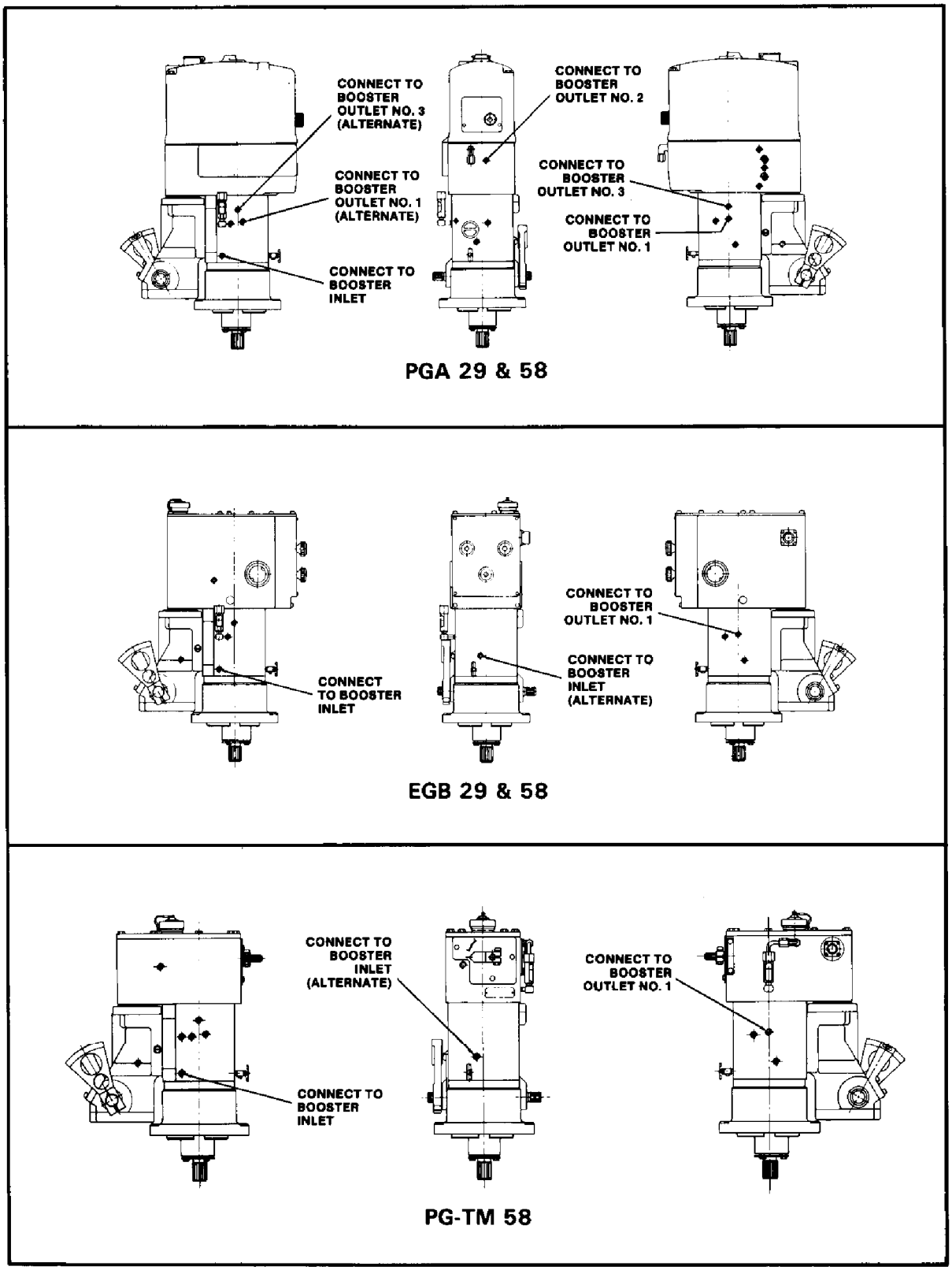

Figure 2-3. Governors Used with Tandem Boosters

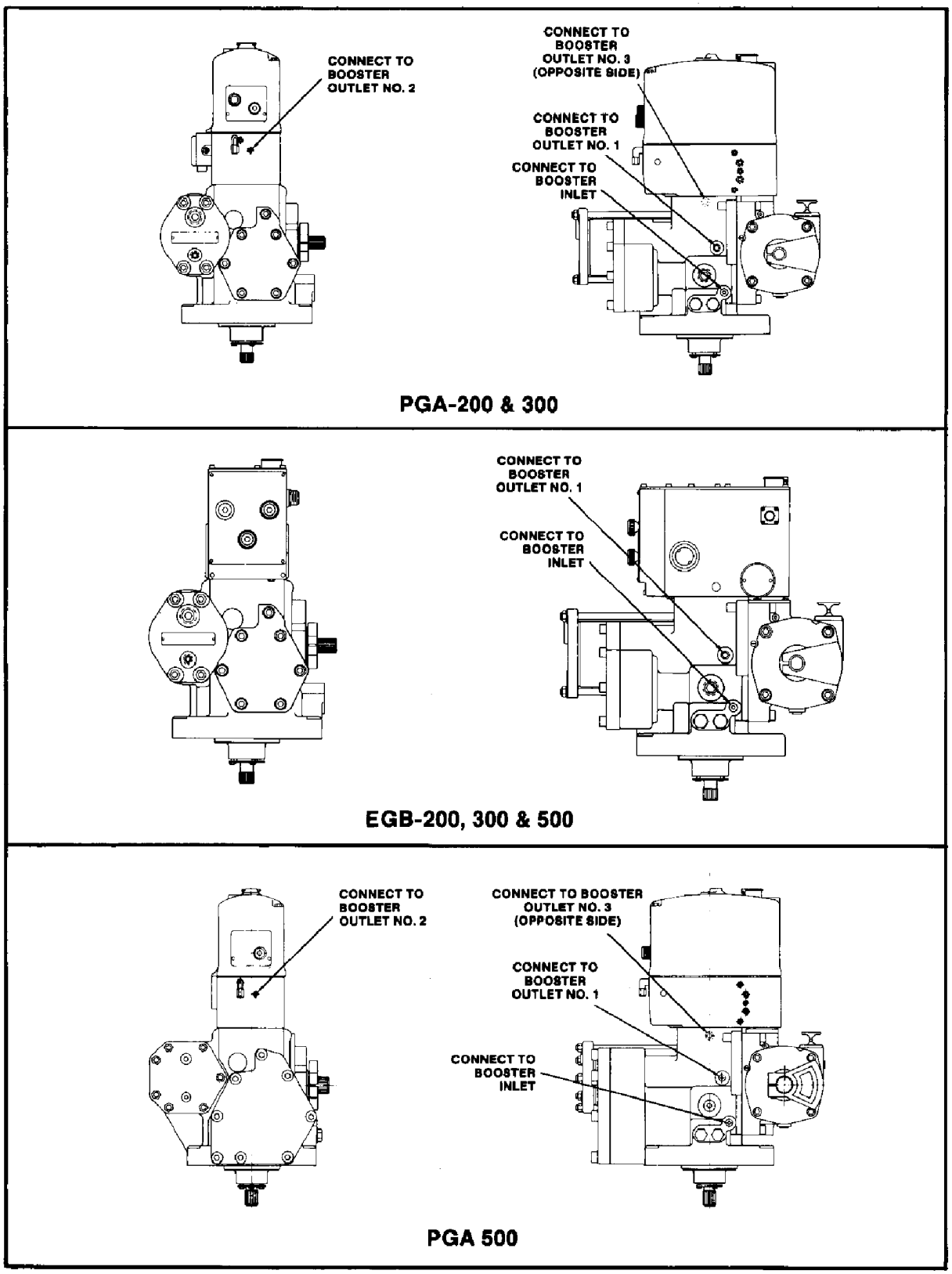

Figure 2-4. Governors Used with Two-Stage Boosters

Chapter 3.
Principles of Operation

How Single-Cylinder and Tandem Boosters Operate

First Phase of Operation

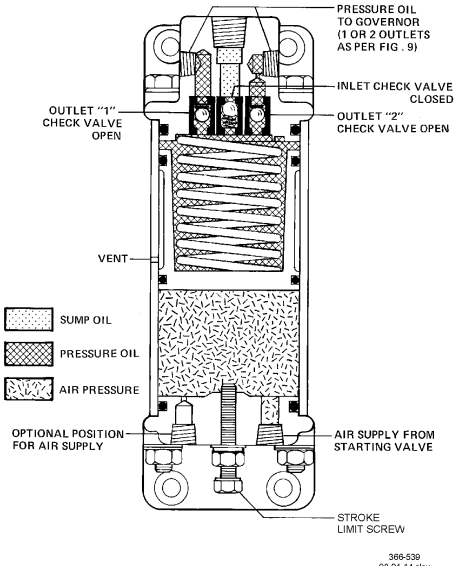

Figure 3-1. Single Booster, Phase 1

Refer to Figure 311 (which represents a single-cylinder booster; a tandem booster has two pistons and three oil outlets, but its principle of operation is the same).

When compressed air enters the booster, the piston(s) moves up, forcing oil through the outlets to the governor's pressurized oil system. The governor's power piston moves to increase fuel.

A check valve in the oil inlet prevents oil from flowing from the booster back to the sump in the governor.

Second Phase of Operation

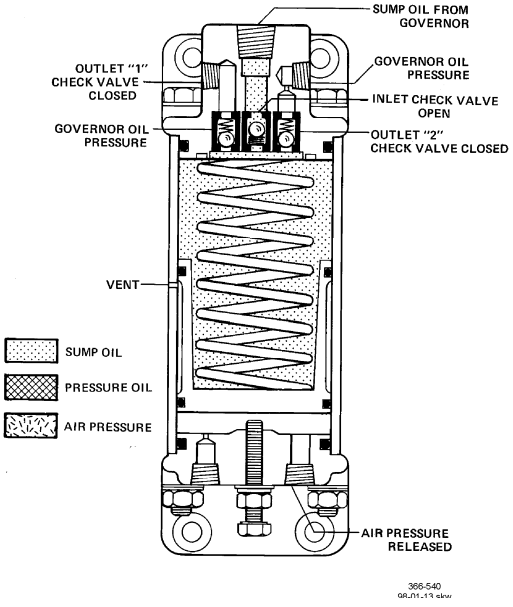

Figure 3-2. Single Booster, Phase 2

Refer to Figure 3-2 (which represents a single cylinder booster; a tandem booster has two pistons and three oil outlets, but its principle of operation is the same).

When starting air is removed, the booster is vented to atmosphere through the starting-air valve (customer supplied) in the booster's air line. Spring force returns the booster's piston(s) to the original position. Oil stops flowing out of the booster. Reduced pressure in the booster causes sump oil to flow back into the booster. The booster is ready to start again.

Check valves in the oil outlets prevent oil from flowing back through the oil outlets into the booster.

How a Two-Stage Booster Operates

First Phase of Operation

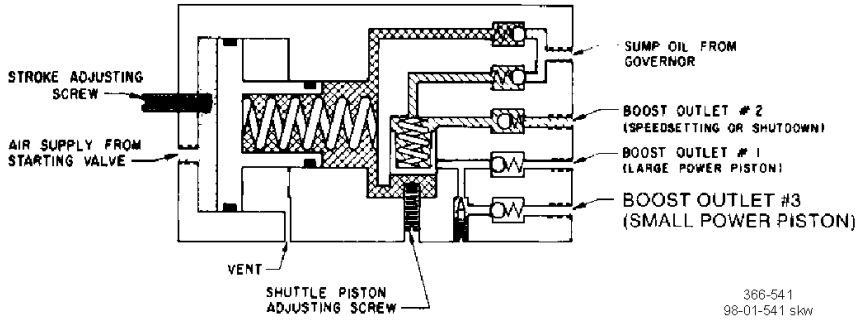

Figure 3-3. Two-Stage Booster, Phase 1

When compressed air enters the booster, the main piston moves to the right, forcing oil to the shuttle piston cavity and moving the shuttle piston up. The shuttle piston forces oil through oil outlet #2 and blocks oil outlets #1 and #3.

The shuttle piston adjusting screw limits the stroke of the shuttle piston, which limits the amount of oil supplied through oil outlet #2.

Second Phase of Operation

When the shuttle piston reaches the end of its stroke, it uncovers the passages to outlets #1 and #3, and oil flow through outlet #2 ceases. Oil remaining in the booster flows through outlets #1 and #3 to the relay and power pistons in the governor, moving them to increase fuel.

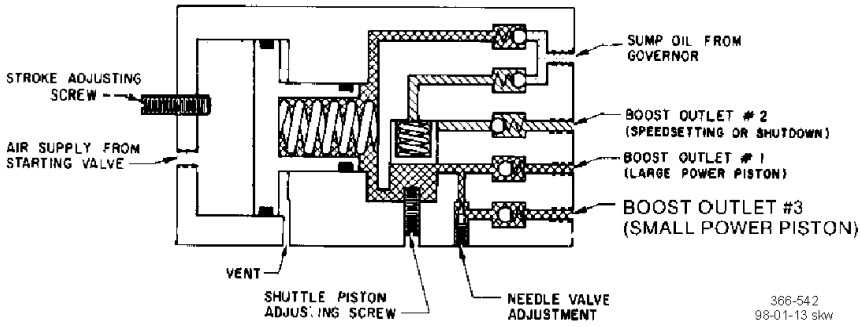

Figure 3-4. Two-Stage Booster, Phase 2

The needle valve in outlet #3 limits the amount of oil that goes through this outlet and its rate of flow. This, in turn, limits the stroke of the power piston in the governor and the rate at which fuel is supplied to the engine.

The stroke limit screw limits the stroke of the main booster piston, which limits the total amount of oil supplied to the governor by the booster.

Check valves prevent oil from flowing from the booster into the governor's sump.

Third Phase of Operation

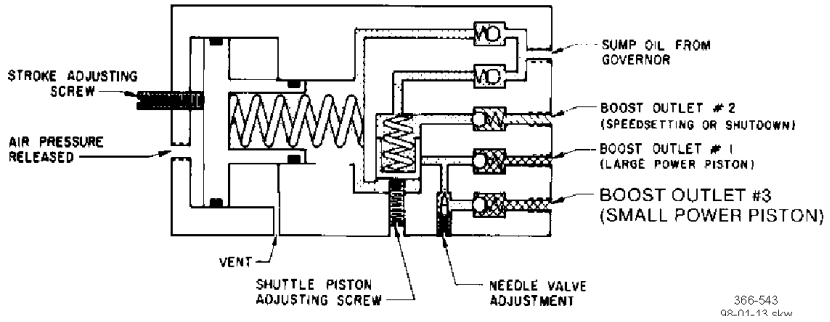

Figure 3-5. Two-Stage Booster, Phase 3

The air side of the main piston is vented to atmosphere through the starting-air valve. Spring forces return the main booster piston and shuttle piston to their original positions. Reduced pressure in the booster causes sump oil to flow back into the booster.

Check valves prevent oil from flowing into the booster from the oil outlet lines.

Chapter 4.
Replacement Parts

Ordering Replacement Parts

When ordering replacement parts, include the following information:

- The booster servomotor part number shown on the nameplate.
- The manual number printed on the cover of the manual (this is manual 36684).
- The part reference number in the parts list, and the description of the part or part name.

Figures 4-1, 4-2, and 4-3 and their associated parts lists illustrate and name all the replaceable parts of the various booster servomotors. 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 booster.

Parts List for Figure 4-1

Part No.	Name	No. Req'd
36684-6	0-ring	1
36684-7	Glide Ring	1
36684-15	5/16"-24 Nut	4
36684-16	0-ring	1 or2
36684-18	1/8"-27 Steel Plug	2
36684-23	Glide Ring	1 or 2
36684-24	0-ring	1 or 2
36684-25	Check Valve Assembly	3
36684-31	Cylinder Head	1
36684-32	Booster Spring	1
36684-33	Accumulator Cylinder	1
36684-34	Piston	1
36684-35	End Cap	1
36684-36	5/16"-24 Screw	4
36684-37	Flat Washer	8
36684-38	5/16" Shakeproof Washer	4
36684-39	1/4" Thread Seal	1
36684-40	Flat Washer	1
36684-41	1/4"-28 Nut	1
36684-42	1/4"-28 Stroke Limit Screw	1
36684-44	Cylinder Head	1
36684-45	0-ring	1
36684-46	Reducing Bushing	1
36684-47	Booster Spring	1
36684-48	Accumulator Cylinder	1
36684-49	Piston	1

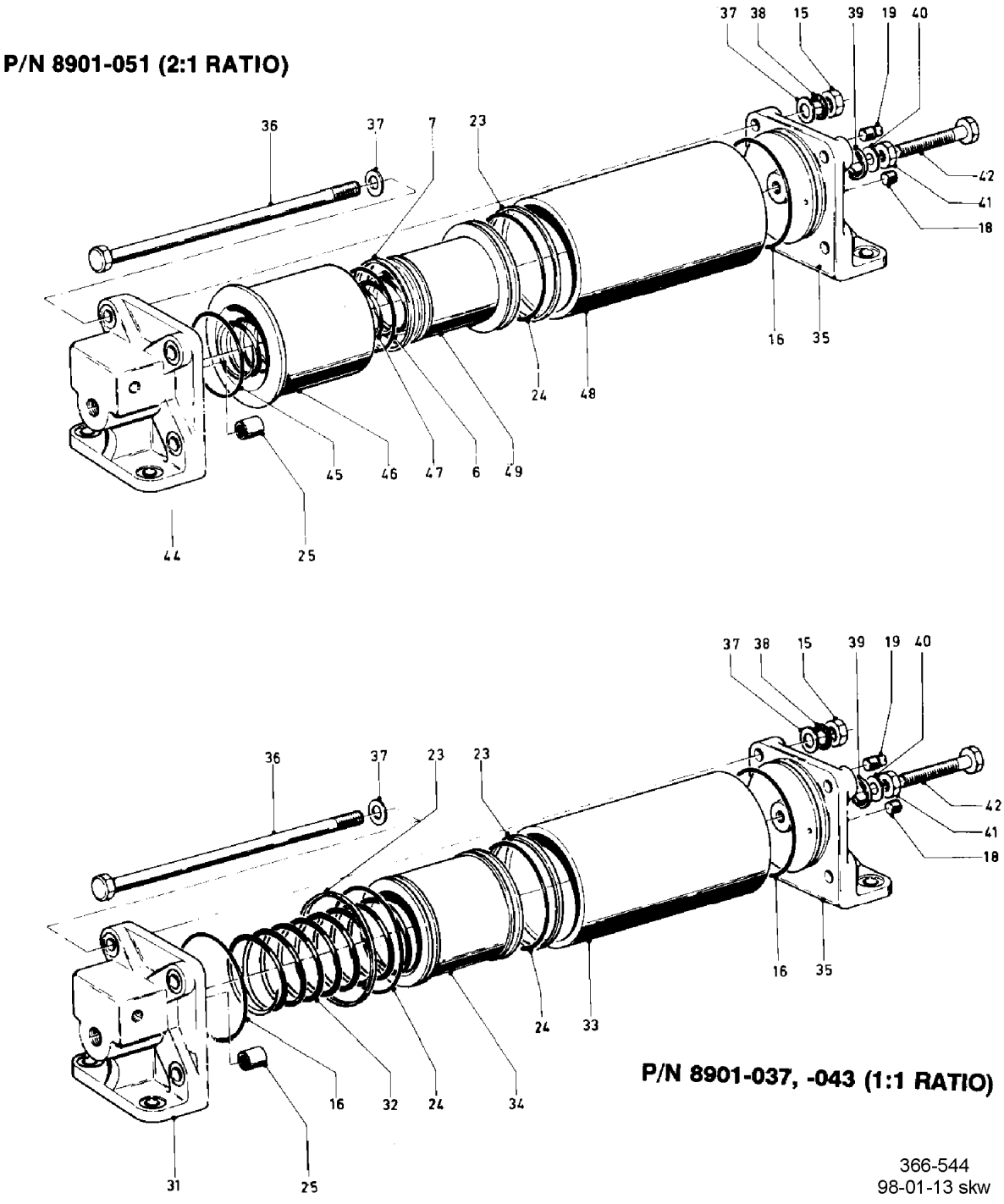

Figure 4-1. Exploded View of Single Boosters

Parts List for Figure 4-2

Part No.	Name	No. Req'd
36684- 6	0-ring	2
36684- 7	Glide Ring	2
36684-15	5/16"-24 Nut	6
36684-18	1/8"-27 Steel Plug	4
36684-23	Glide Ring	2 or 4
36684-24	0-ring	2 or 4
36684-25	Check Valve Assembly	6
36684-32	Booster Spring	2
36684-34	Piston	2
36684-36	5/16"-24 Screw	6
36684-37	Flat Washer	6
36684-38	5/16" Shakeproof Washer	6
36684-39	1 /4" Threadseal	2

Part No.	Name	No. Req'd
36684-40	Flat Washer	2
36684-41	1/4"-28 Nut	2
36684-47	Booster Spring	2
36684-49	Piston	2
36684-52	Needle Valve	2
36684-53	0-ring	2
36684-55	1 /4"-28 Stroke Limit Screw	2
36684-56	End Cap	1
36684-57	Accumulator Cylinder	2
36684-58	Gasket	4
36684-59	Servo Head	1
36684-61	Accumulator Cylinder	2
36684-62	Reducing Bushing	2

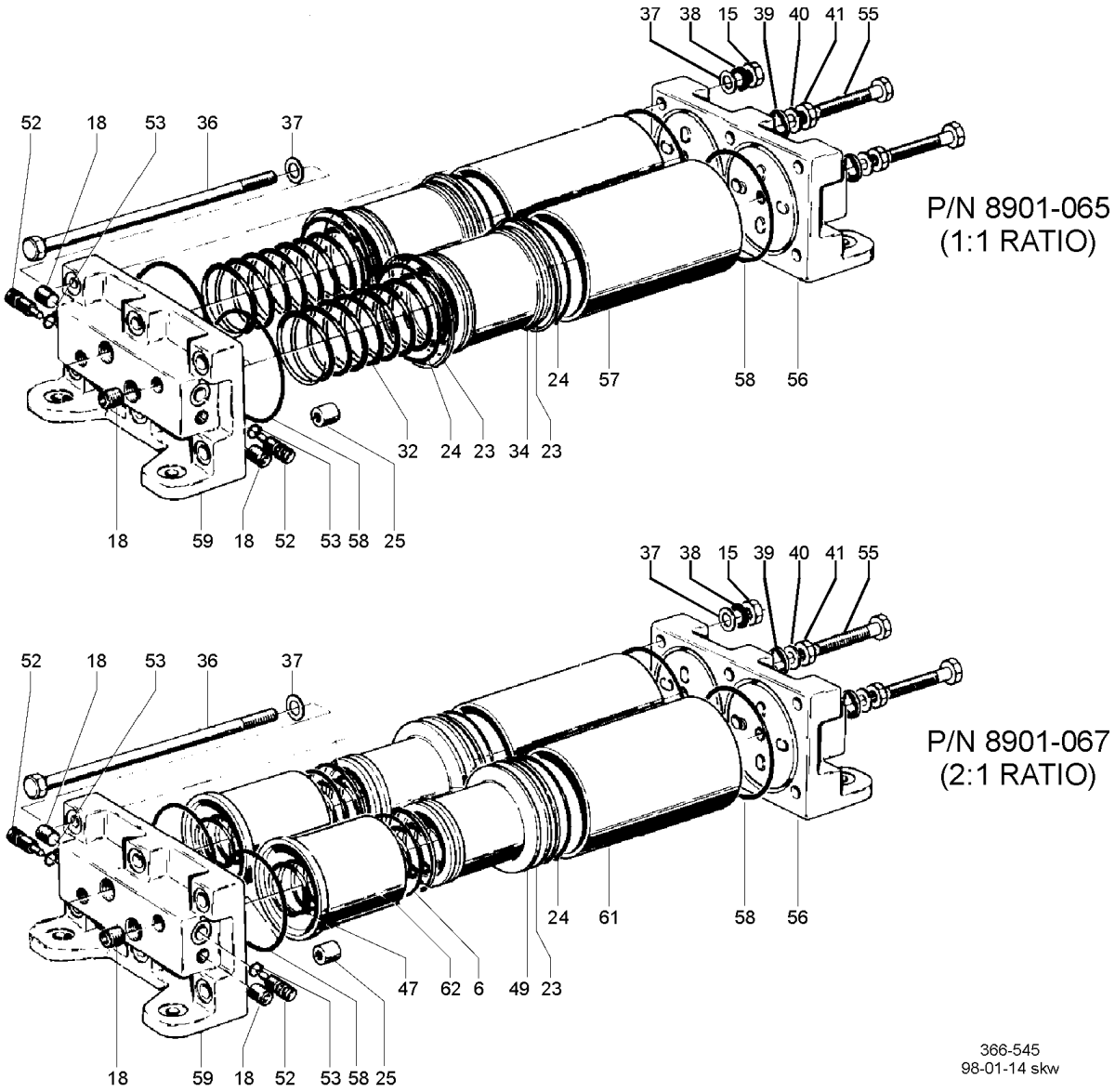

Figure 4-2. Exploded View of Tandem Boosters

Parts List for Figure 4-3

Part No.	Name	No. Req'd
36684-25	Check Valve Assembly	4
36684-63	Booster Servo Piston	1
36684-64	Seal	1
36684-65	Block Vee Seal	2
36684-66	Backup Ring	1
36684-67	Seal Retainer	1
36684-68	.500 Springlock Washer	9
36684-69	.500-13 Cap Screw	1
36684-70	2:1 Ratio Spring	1
36684-71	Reducing Bushing	1
36684-72	Booster Servo Sleeve	1
36684-73	Booster Servo End Cap	1
36684-74	4.234 ID O-ring	1
36684-75	.500 Thread Seal	1
36684-76	.500 Flat Washer	1
36684-77	.500-13 Hex Nut	1
36684-78	.500-13 Stroke Limit Screw	1
36684-79	3.484 ID O-ring	1
36684-80	Servo Head Assembly	1
36684-81	Steel Ball	1
36684-82	Ball Check Spring	1
36684-83	Int. Retaining Ring	1
36684-84	Oil Failure Piston	1
36684-85	Spring	1
36684-86	.864 ID O-ring	1
36684-87	Booster Servo Plug	1
36684-88	Int. Retaining Ring	1
26684-89	Needle Valve	1
36684-90	.301 IDO-ring	1
36684-91	Stop Screw	1
36684-92	.312 UNF Steel Plug	1
36684-93	.562 UNF Steel Plug	1
36684-94	.486 ID O-ring	3
36684-95	Breather Filter Cap	1
36684-96	.239 ID O-ring	2
36684-97	Threaded Rod	4
36684-98	.500-20 Hex Nut	8
36684-104	.351 ID O-ring	1
36684-105	.438 UNF Steel Plug	1

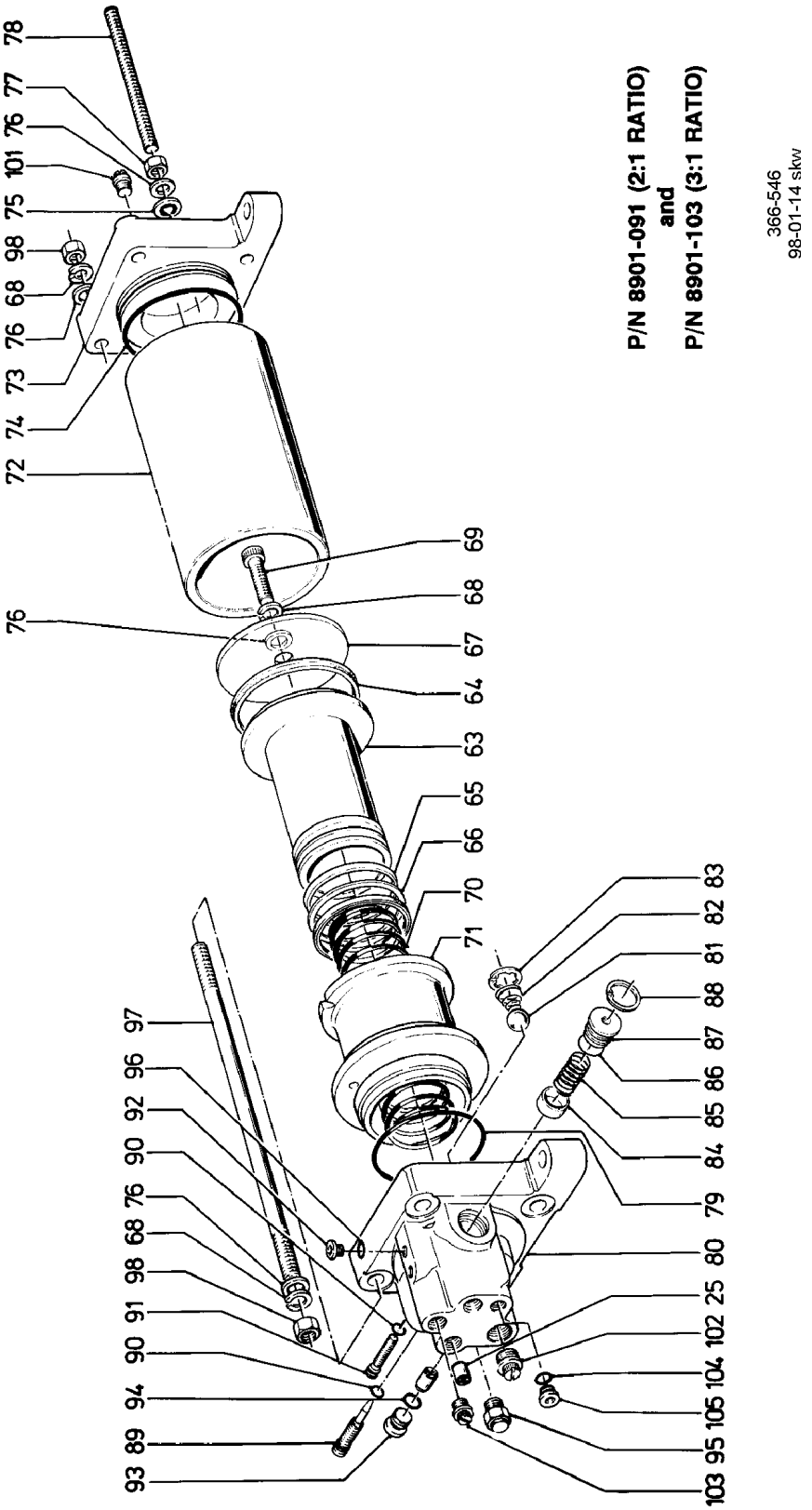

Figure 4-3. Exploded View of Two-Stage Boosters

Chapter 5.
Service Options

Product Service Options

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

- Consult the troubleshooting guide in the manual.
- Contact the manufacturer or packager of your system.
- Contact the Woodward Full Service Distributor serving your area.
- Contact Woodward technical assistance (see "How to Contact Woodward" later in this chapter) and discuss your problem. In many cases, your problem can be resolved over the phone. If not, you can select which course of action to pursue based on the available services listed in this chapter.

OEM and 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 **Recognized Turbine Retrofitter (RTR)** is an independent company that does both steam and gas turbine control retrofits and upgrades globally, and can provide the full line of Woodward systems and components for the retrofits and overhauls, long term service contracts, emergency repairs, etc.

A current list of Woodward Business Partners is available at **www.woodward.com/support/directory.cfm**.

Woodward Factory Servicing Options

The following factory options for servicing Woodward products are available through your local Full-Service Distributor or the OEM or Packager of the equipment system, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is originally shipped from Woodward or a service is performed:

- 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 is a flat-rate program and includes the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205).

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.

Charges for the Replacement/Exchange service are based on a flat rate plus shipping expenses. You are invoiced the flat rate replacement/exchange charge plus a core charge at the time the replacement unit is shipped. If the core (field unit) is returned within 60 days, a credit for the core charge will be issued.

Flat Rate Repair: Flat Rate Repair is available for the majority of standard 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. All repair work carries the standard Woodward service warranty (Woodward Product and Service Warranty 5-01-1205) on replaced parts and labor.

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 and carry with it the full standard Woodward product warranty (Woodward Product and Service Warranty 5-01-1205). 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 authorization 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 offers various Engineering Services for our products. For these services, you can contact us by telephone, by email, or through the Woodward website.

- 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. Emergency assistance is also available during non-business hours by phoning Woodward and stating the urgency of your problem.

Product Training is available as standard classes at many of our worldwide locations. We also offer customized classes, which can be tailored to your needs and can be held at one of our 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 many of our worldwide locations or 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 us via telephone, email us, or use our website: **www.woodward.com/support**.

How to Contact Woodward

For assistance, call one of the following Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

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) 78954-0
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

Engine Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany:	
Stuttgart	+49 (711) 78954-0
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

Turbine 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

You can also contact the Woodward Customer Service Department or consult our worldwide directory (**www.woodward.com/support/directory.cfm**) for the name of your nearest Woodward distributor or service facility.

Technical Assistance

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

Your Name	
Site Location	
Phone Number	
Fax Number	
Engine/Turbine Model Number	
Manufacturer	
Number of Cylinders (if applicable)	
Type of Fuel (gas, gaseous, steam, etc)	
Rating	
Application	
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	

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.

Declaration of Incorporation

Woodward Governor Company
1000 E. Drake Road
Fort Collins, Colorado 80525
United States of America

Product: Booster Servomotors
Part Number: 8901-XXX, 9900-XXX, 9903-XXX and similar

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 the following EU Directives as they apply to a component:

98/37/EEC (Machinery)

This product is intended to be put into service only upon incorporation into an apparatus/system that itself will meet the requirements of the above Directives and bears the CE mark.

Manufacturer

Jennifer R. Williams
Signature

Jennifer R. Williams
Full Name

Engineering Project/Process Manager
Position

WGC, Fort Collins, CO, USA
Location

5-06-02
Date

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 36684M.

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Email and Website—www.woodward.com

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

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

2011/1/Colorado