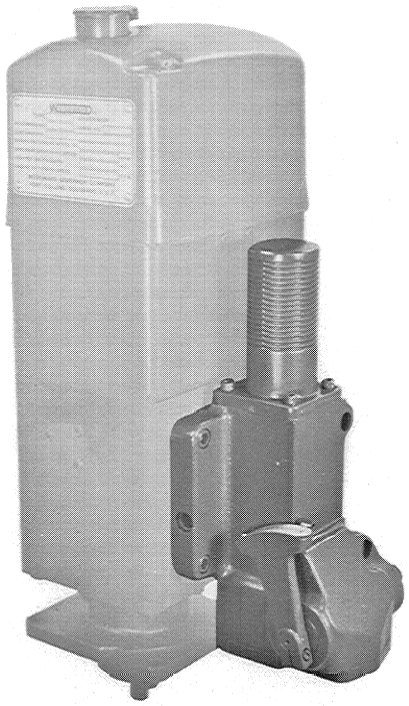
WOODWARD

Product Manual 36692
(Revision H)
Original Instructions



PG Power Cylinder Assemblies

Operation Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

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

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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.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Revisions—Changes in this publication since the last revision are indicated by a black line alongside the text.

Contents

Illustrations and Tables

Warnings and Notices

Important Definitions

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

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

⚠WARNING

Overspeed / Overtemperature / Overpressure

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

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

⚠WARNING

Personal Protective Equipment

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

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

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

⚠WARNING

Start-up

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

⚠WARNING

Automotive Applications

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

NOTICE

Battery Charging Device

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

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

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

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

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

Follow these precautions when working with or near the control.

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

Chapter 1.
General Information

Introduction

This manual provides information for the selection and maintenance of the two types of power cylinder assemblies used with Woodward PG governors. The information in this chapter is general and applies to all power cylinders.

The power cylinders for PG governors are made in two basic types: a single-acting spring-return power cylinder type and a double-acting differential power cylinder type.

Table 1-1 lists the two types of power cylinder assemblies and the rated work outputs available for each. By varying governor oil pressure, each power cylinder can provide different outputs. The output also depends on the stroke of the piston. Generally, power cylinders should be selected to give the required force at the lowest pressure rating.

Power Cylinder Arrangement

Figure 1-1 illustrates plan arrangements and position quadrants for the PG power cylinders. Table 1-2 lists the various position plans and quadrants for a particular governor configuration. Use Table 1-2 as follows:

1. Select the governor configuration required or used at an installation.
2. Select the power cylinder work capacity required for the governor installation.
3. The columns under applicable work capacity indicate what position plans and quadrants may be used for the governor configuration.

Table 1-1. Power Cylinder Work Capacities

		Rated Work Capacity							
		Spring Loaded Power Cylinder 12 ft-lb (16 J)		**Differential Power Cylinder** 17 ft-lb (23 J)			29 ft-lb (39 J)		200 ft-lb (271 J)
	Stroke	Rotary (32°)	Linear (1”/25 mm)	Rotary (32°)	Linear (1”/25 mm)	Linear (2”/51 mm)	Rotary (32°)	Linear (1”/25 mm)	Rotary (40°)
Governor Oil Pressure	100 psi (690 kPa)	12 ft-lb (16 J)	12 ft-lb (16 J)			17 ft-lb (23 J)	29 ft-lb (39 J)	29 ft-lb (39 J)	200 ft-lb (271 J)
	130 psi (896 kPa)						38 ft-lb (52 J)	38 ft-lb (52 J)	
	200 psi (1379 kPa)				16 ft-lb (22 J)	33 ft-lb (45 J)	58 ft-lb (79 J)	58 ft-lb (79 J)	

Usable work is 2/3 of rated work

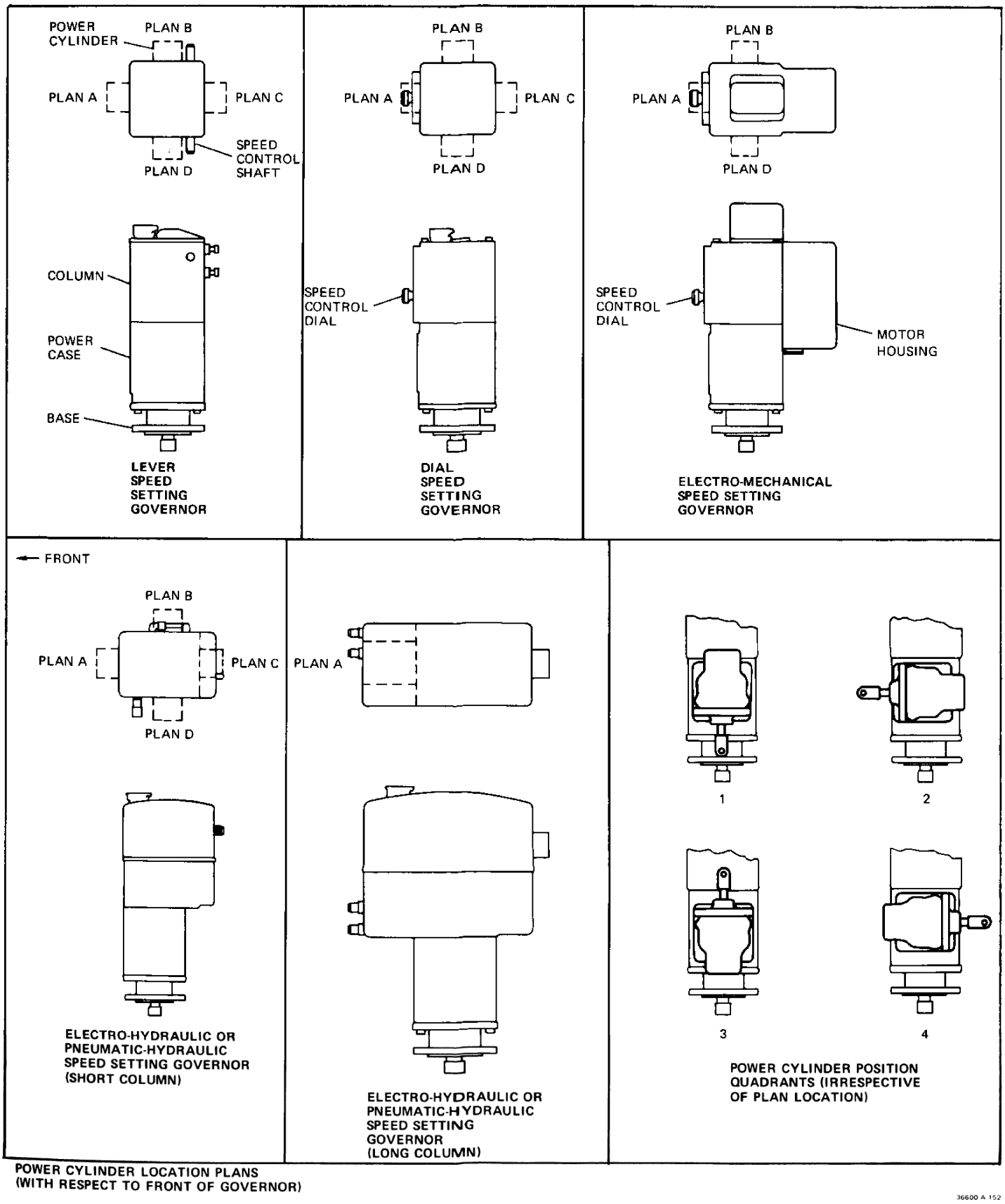
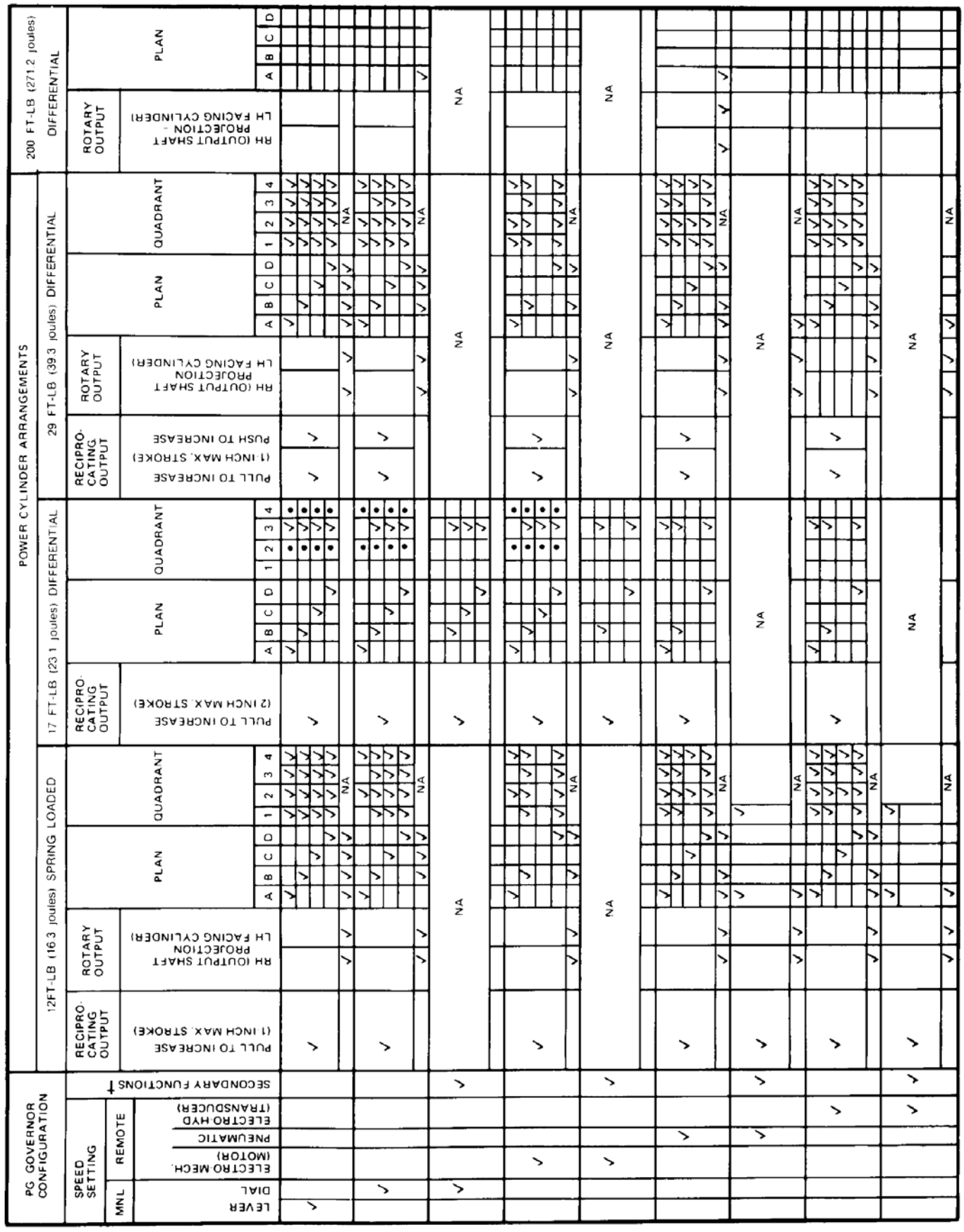


Figure 1-1. Plan and Quadrant Arrangements for Power Cylinders

Table 1-2. Plan and Quadrant Arrangements for Power Cylinders



Description

With either type of power cylinder assembly, spring-loaded or differential, the governor pilot valve plunger controls the movement of the power piston. The piston, acting through the connecting linkage at the rod end, controls the fuel or steam to the engine or turbine.

The spring-loaded power cylinder requires pressure oil to move the power piston in the increase direction. The constant spring force continually urges the piston in the decrease direction. However, the piston cannot move to decrease fuel unless the oil below the power piston can escape to sump. The oil is connected to sump only when the pilot valve plunger is above its centered position. The spring force of the cylinder moves the prime mover controls to the off position when the unit is shut down. With this type of power cylinder, the pressure oil below the power piston and in the accumulator leaks to sump within a few minutes after the prime mover has been shut down. As the oil pressure dissipates, the power spring moves the piston to the minimum fuel position.

In the differential power cylinder, the area on one side of the power piston is smaller than the area on the other side. Therefore, less oil pressure is required against the larger side than against the smaller side to move the piston. Pressured oil is directed to the side of the piston with the smaller area. This pressure urges the piston to the increase-fuel direction. However, the piston can move only when the governor pilot valve plunger is uncentered to permit oil to flow. The pilot valve plunger moves only when a change in prime mover speed is required. With the pilot valve plunger centered, the power piston is, in effect, hydraulically locked.

Surrounding the power piston and its piston rod are grooves connected to the intermediate oil pressure between the governor pilot valve plunger and the buffer piston. The seal grooves ensure that any leakage of pressure oil from the power cylinder to the sump comes from a part of the hydraulic circuit where it will not interfere with governor operation.

The linear output of a power cylinder assembly is normally a push-pull or reciprocating motion (Figure 1-2). On some prime movers it may be more advantageous to use a power cylinder with a rotary output motion. With the use of suitable linkage within the power cylinder assembly, the 12 ft-lb (16 J) spring-loaded power cylinders, and the 29 ft-lb (39 J) differential power cylinder can be transformed into rotary output motion. A power cylinder assembly with a rotary terminal shaft (Figure 1-3) is available to permit a more convenient method of connecting and operating the fuel linkage on certain types of prime movers. A graduated scale and pointer on the side of the power cylinder provide a means of setting and checking the power piston position with relation to the fuel rack settings.

Oil seals at the terminal shaft bearings, a gasket, and a cover close up the entire assembly. This allows oil leakage from around the power piston rod (no oil seals at this point) to accumulate in the lower part of the housing to lubricate the internal linkage and the terminal shaft bearings. To prevent any possibility of building up pressure on this oil from the power cylinder, a bypass hole is provided from the terminal shaft area back into the governor oil sump.

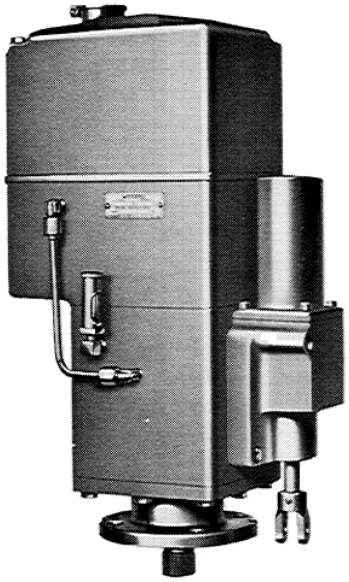


Figure 1-2. Spring-Loaded Power Cylinder with Linear Output (typical) (shown in Position A, Quadrant 1)

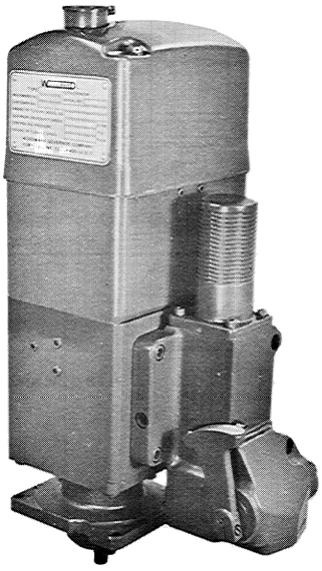


Figure 1-3. Spring-Loaded Power Cylinder with Rotary Terminal Shaft (shown in Position D)

Adapters and Spacers

With the use of adapters and spacers, the power cylinder assembly may be positioned on an angle other than parallel or perpendicular to the governor base. With the use of suitable spacers, additional standoff from the center line of the governor may be provided (see Figure 1-4). In such arrangements, the power cylinder piston movement is a reciprocating movement.

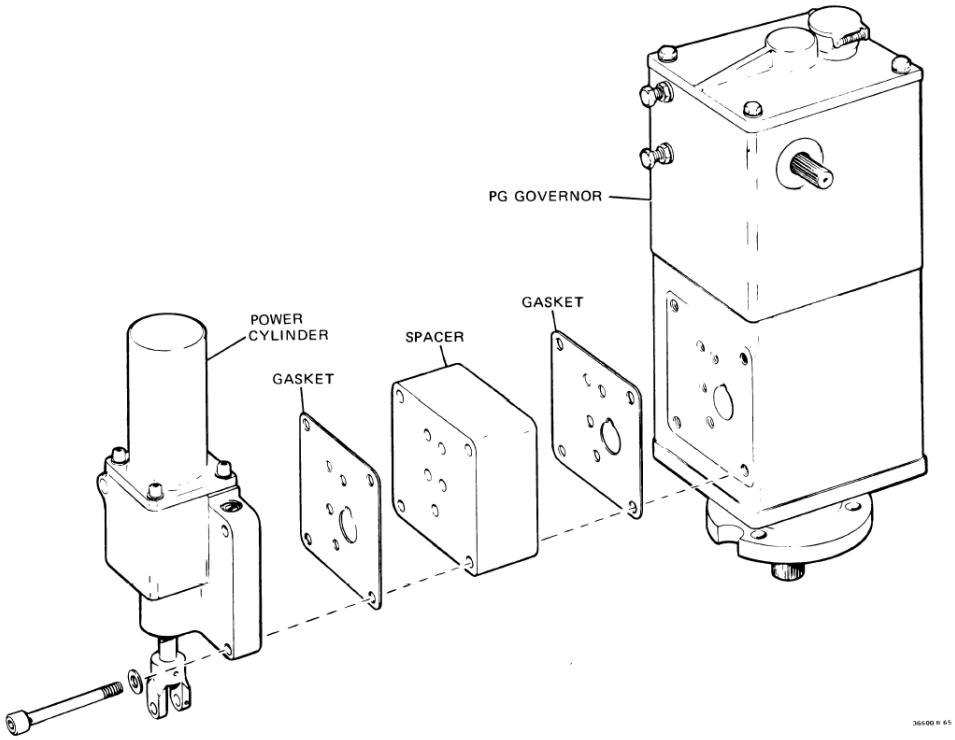


Figure 1-4. Typical Use of Power Cylinder Spacers and Adapters (Position C, Quadrant 1)

Remotely Located Power Cylinder

In some applications, the location of the governor mounting pad on the prime mover may not offer a satisfactory linkage arrangement between the power cylinder assembly and the prime mover control. With the use of PG power case adapters, power cylinder adapters, and suitable plates or brackets, a remote power cylinder may be installed to suit these conditions. With only a few exceptions, all Woodward power cylinder assemblies may be mounted separately from the governor.

Refer to Table 1-3 for connections between the adapter plates of the governor and power cylinder assembly.

Table 1-3. Line Connections Required for Remote Power Cylinders

12 ft-lb (16 J)	17 ft-lb (23 J)	29 ft-lb (39 J)
A–A	A–A	A–A
B–B	B–B	B–B
D–D	C–C	C–C
	D–D	D–D

See Figures 1-6 and 1-7 for a typical remote power cylinder hookup.

To eliminate the possibility of trapping air in the oil, the remote power cylinder must be mounted below the governor oil level, and the connecting tubes must slope upward to the governor. Tubing runs should meet the following criteria: be as short and direct as possible, 0.500 inch (12.7 mm) outside diameter, and must not have any sharp bends for optimum performance. We do not recommend flexible or rubber tubing.

Rod Ends

Several different rod ends are available for use with the power cylinder assembly. Figure 1-5 shows the most common rod ends. Special rod ends are also available.

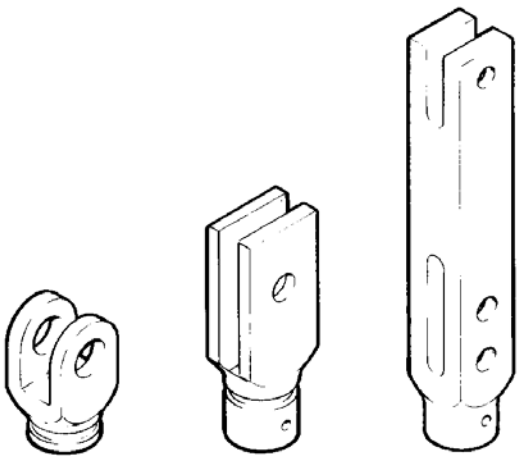


Figure 1-5. Rod End Configurations

Dimensions and Layouts

The outline drawings (Figures 1-8 through 1-17) give dimensions and locations of various power cylinders mounted on various governors.

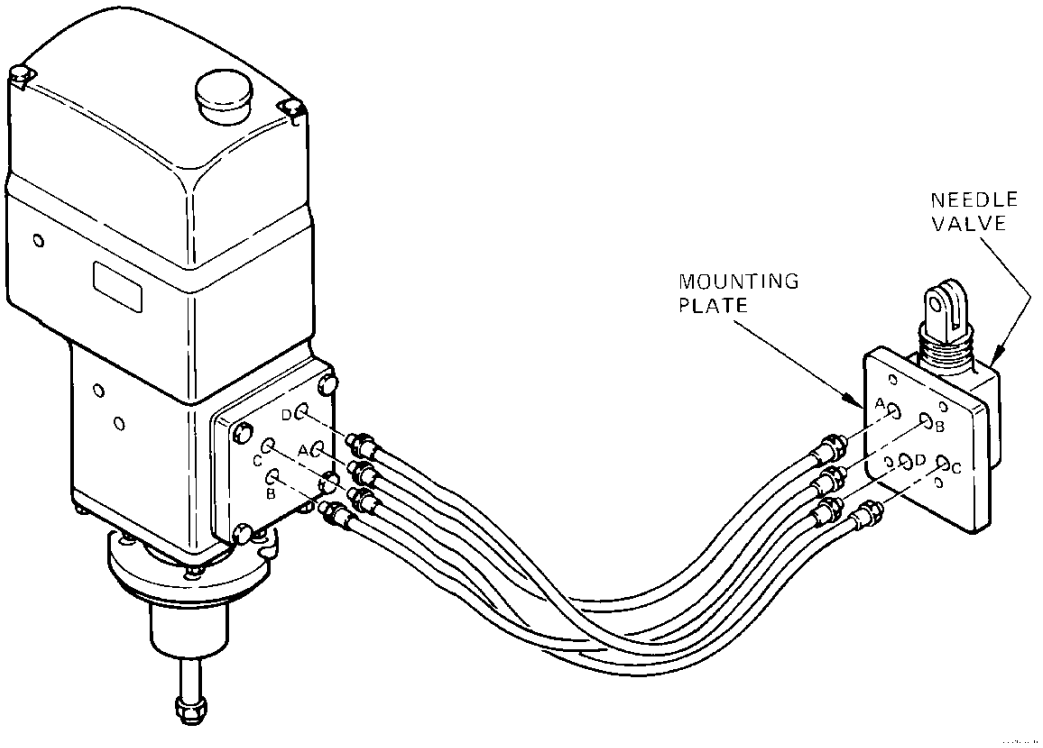


Figure 1-6. Piping Diagram of Remote Servo

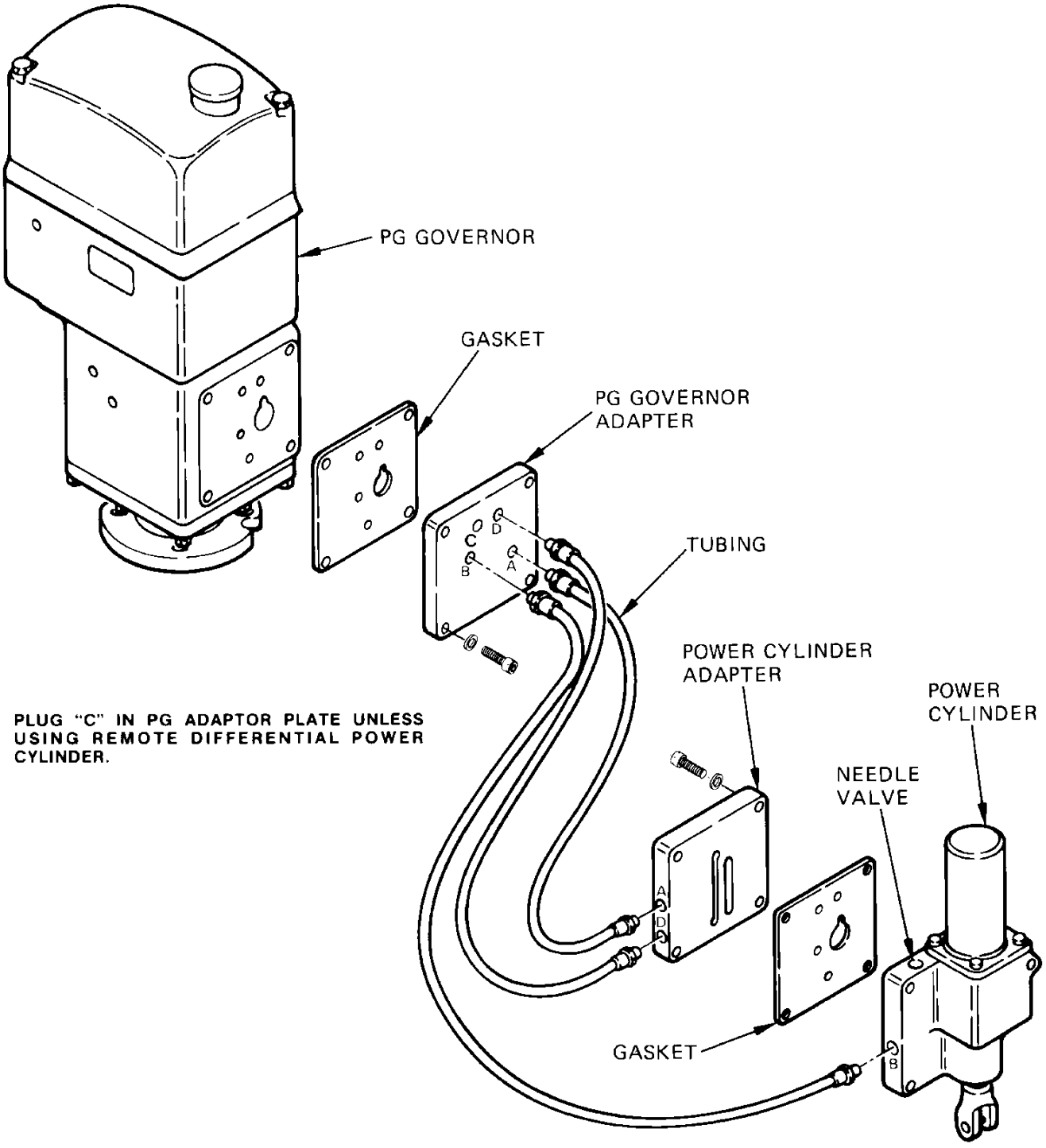
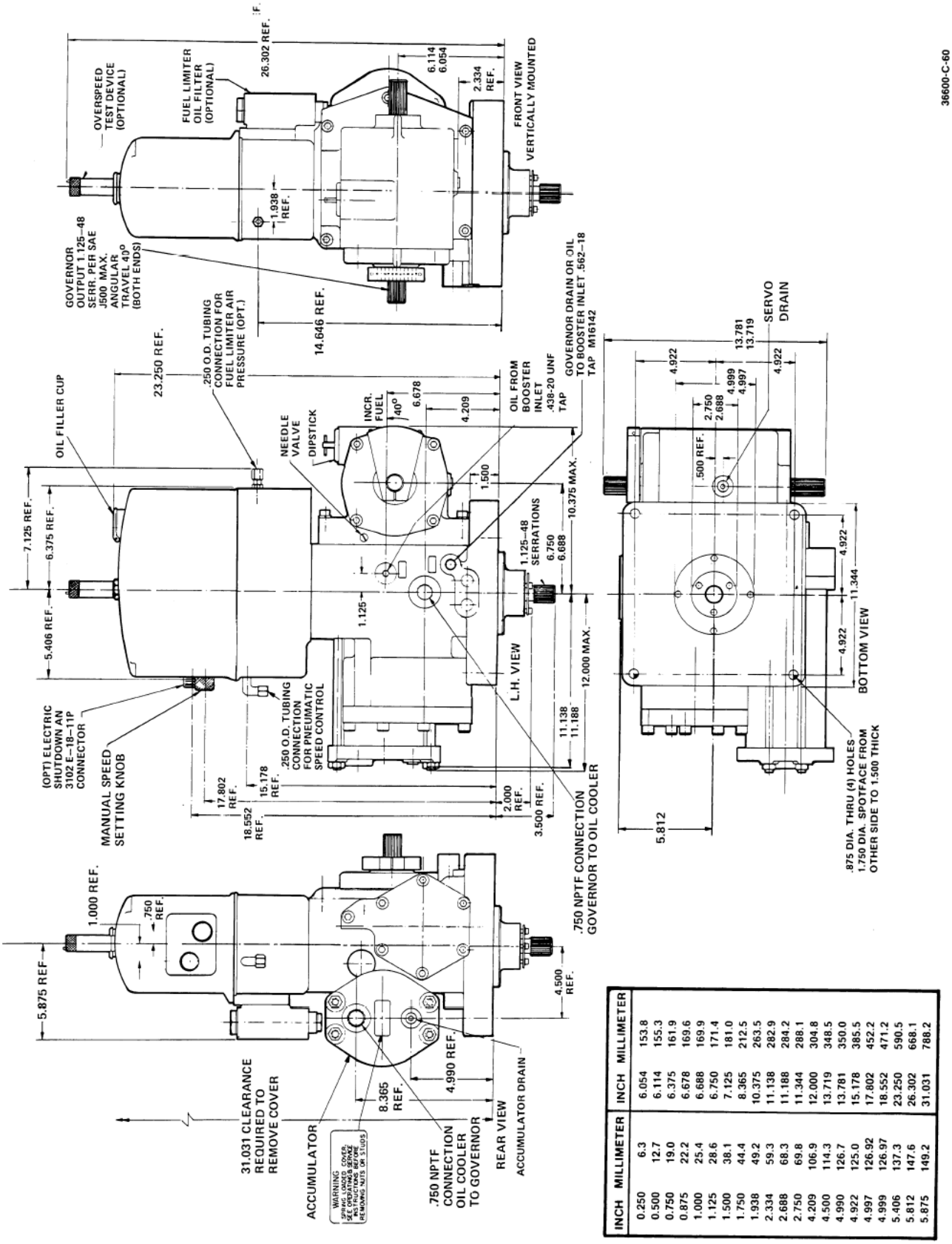


Figure 1-7. Remotely Located (Spring-Loaded) Power Cylinder (Position A, Quadrant 1)



INCH	MILLIMETER	INCH	MILLIMETER
0.250	6.3	6.054	153.8
0.500	12.7	6.114	155.3
0.750	19.0	6.375	161.9
0.875	22.2	6.678	169.6
1.000	25.4	6.688	169.9
1.125	28.6	6.750	171.4
1.500	38.1	7.125	181.0
1.750	44.4	8.365	212.5
1.938	49.2	10.375	263.5
2.334	59.3	11.138	282.9
2.688	68.3	11.188	284.2
2.750	69.8	11.344	288.1
4.209	106.9	12.000	304.8
4.500	114.3	13.719	348.5
4.990	126.7	13.781	350.0
4.922	125.0	15.178	385.5
4.997	126.92	17.802	452.2
4.999	126.97	18.552	471.2
5.406	137.3	23.250	590.5
5.812	147.6	26.302	668.1
5.875	149.2	31.031	788.2

Figure 1-8. Outline of PG 200 ft-lb (271 J) with PGA Column
(Do not use for construction)

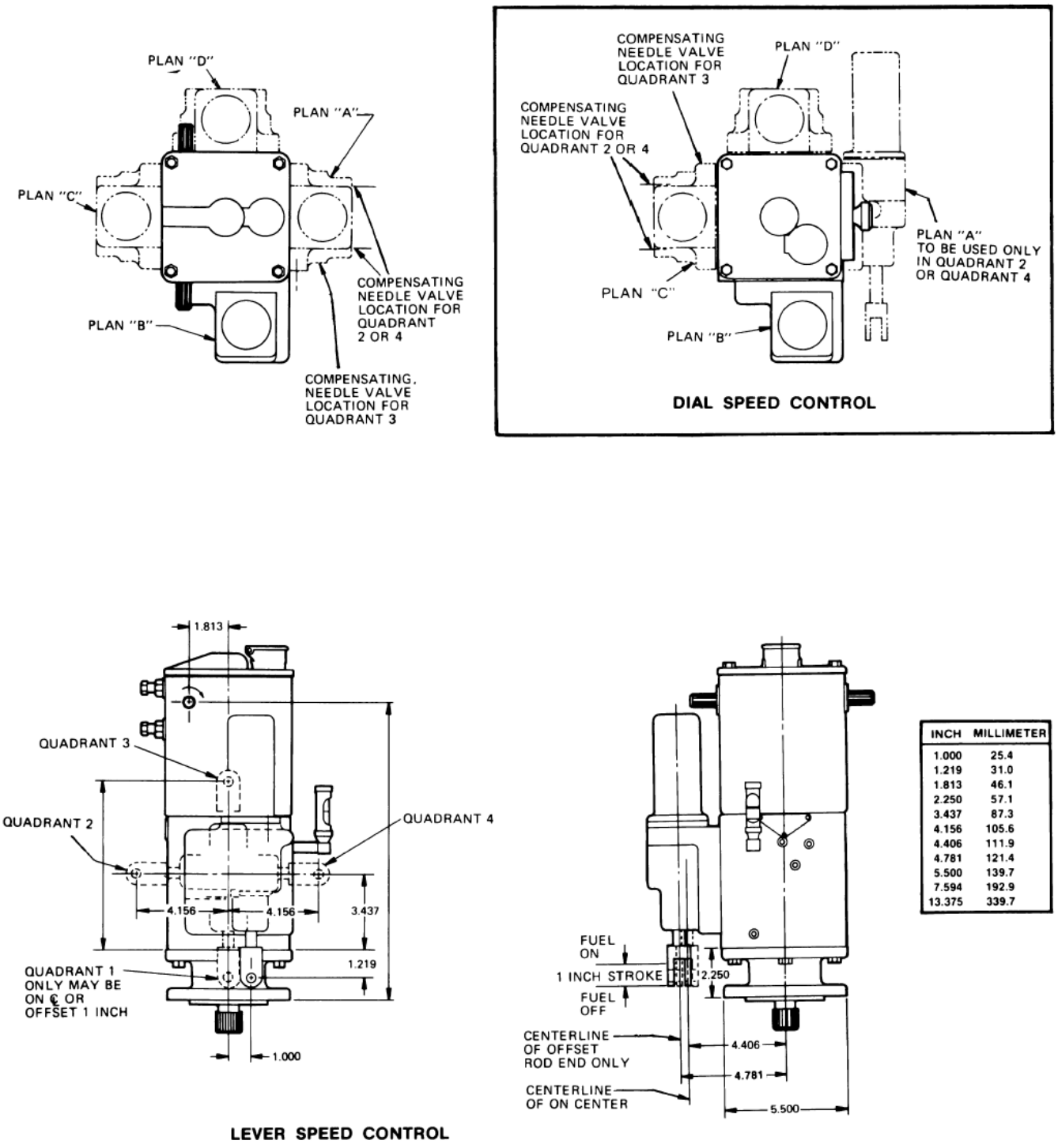
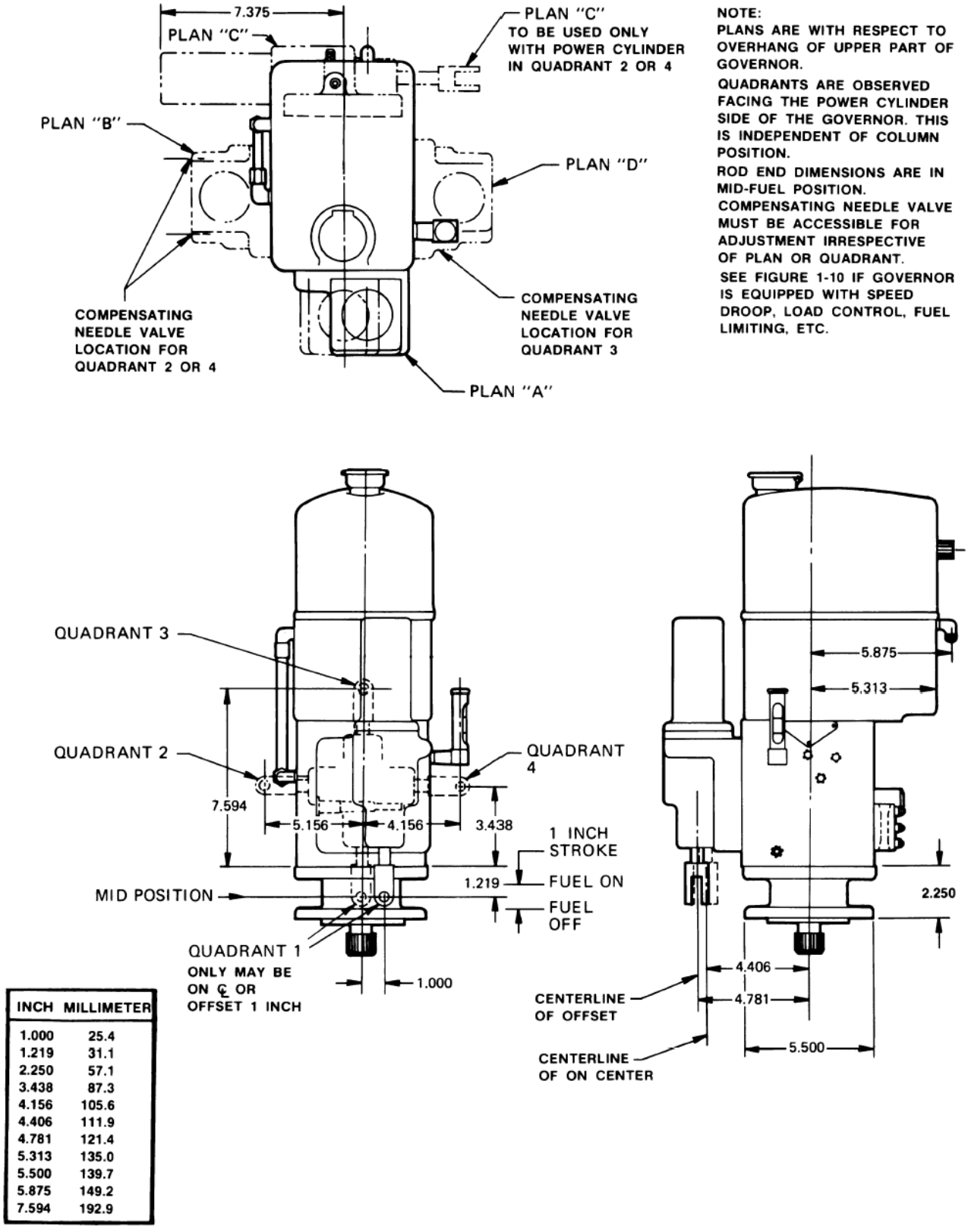
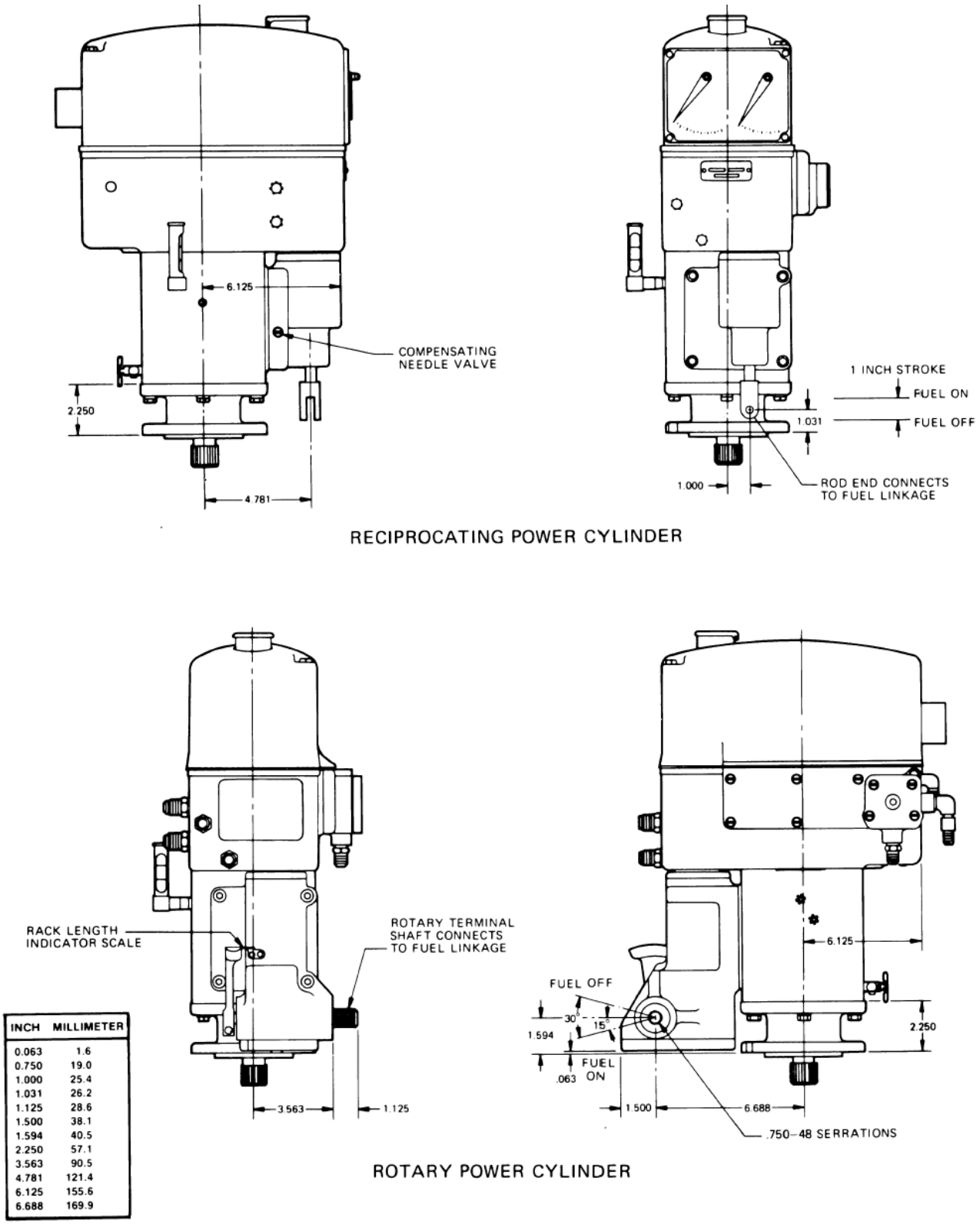


Figure 1-9. Outline of Lever and Dial Speed-Setting Governor with Spring-Loaded Power Cylinder
(Do not use for construction)



INCH	MILLIMETER
1.000	25.4
1.219	31.1
2.250	57.1
3.438	87.3
4.156	105.6
4.406	111.9
4.781	121.4
5.313	135.0
5.500	139.7
5.875	149.2
7.594	192.9

Figure 1-10. Outline of Pneumatic and Electrohydraulic Speed-Setting Governor with Spring-Loaded Power Cylinder
(Do not use for construction)



INCH	MILLIMETER
0.063	1.6
0.750	19.0
1.000	25.4
1.031	26.2
1.125	28.6
1.500	38.1
1.594	40.5
2.250	57.1
3.563	90.5
4.781	121.4
6.125	155.6
6.688	169.9

Figure 1-11. Outline of Pneumatic and Electrohydraulic Speed-Setting Governor with Secondary Functions and Spring-Loaded Power Cylinder (Do not use for construction)

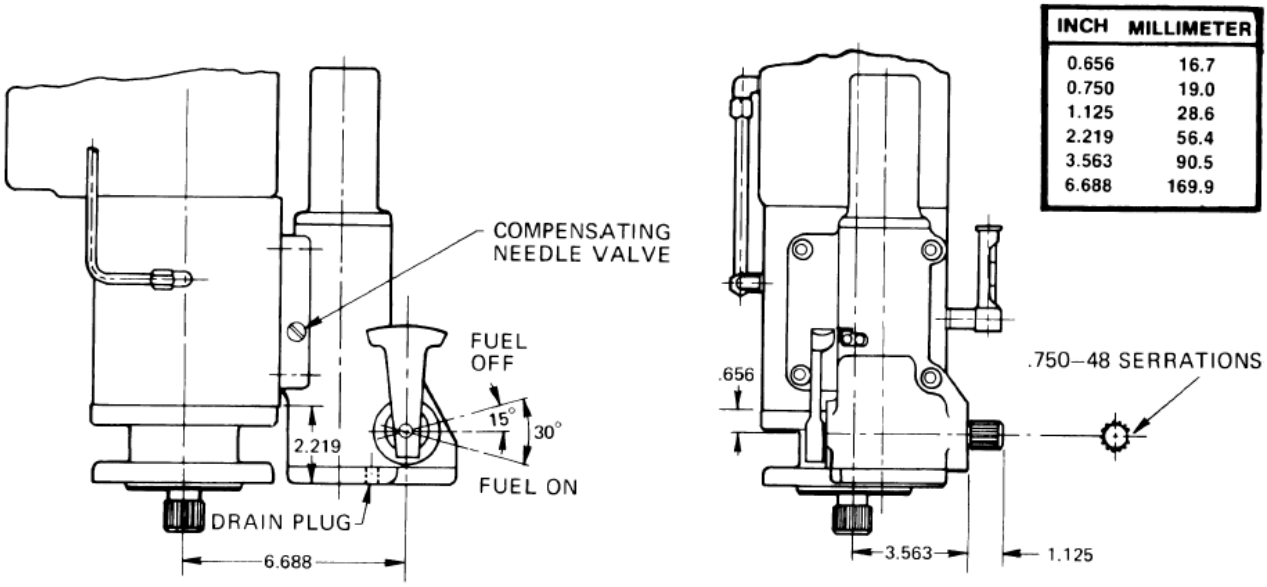


Figure 1-12. Outline of Governor with Spring-Loaded Rotary Power Cylinder
(Do not use for construction)

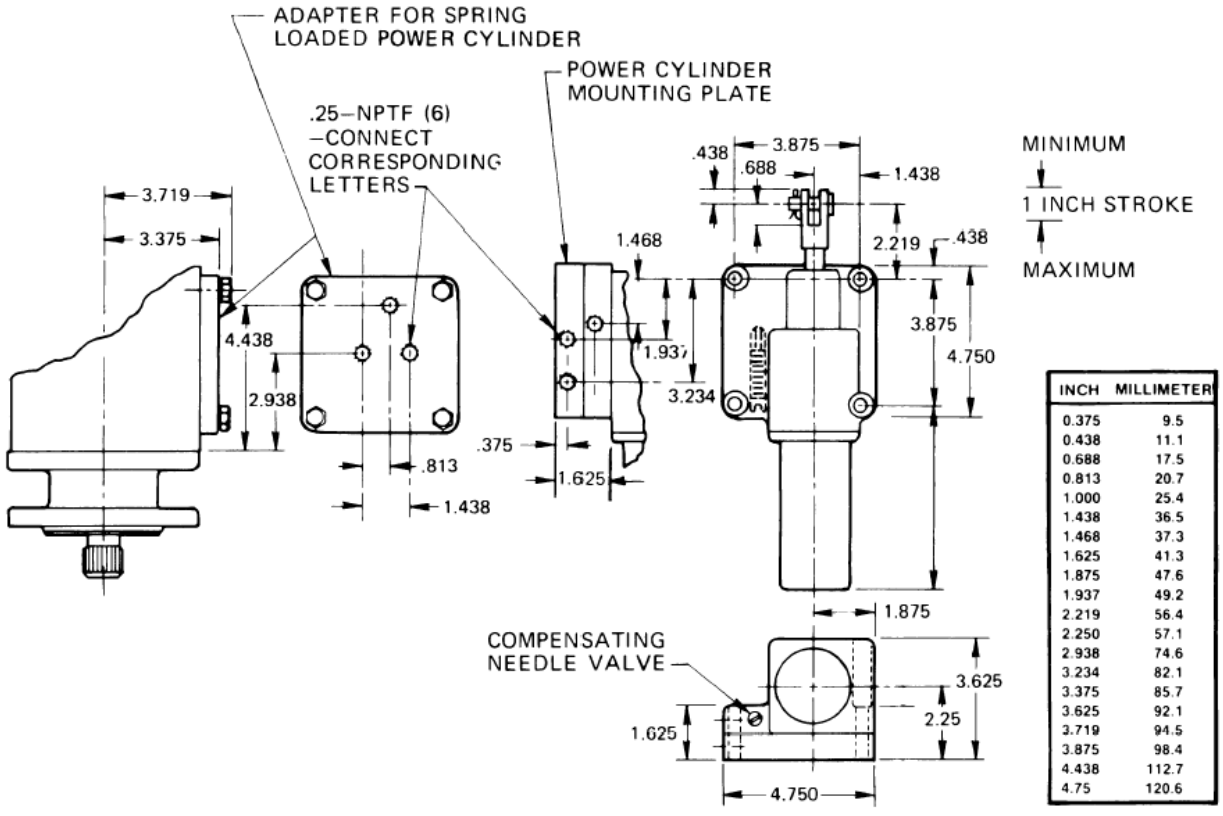
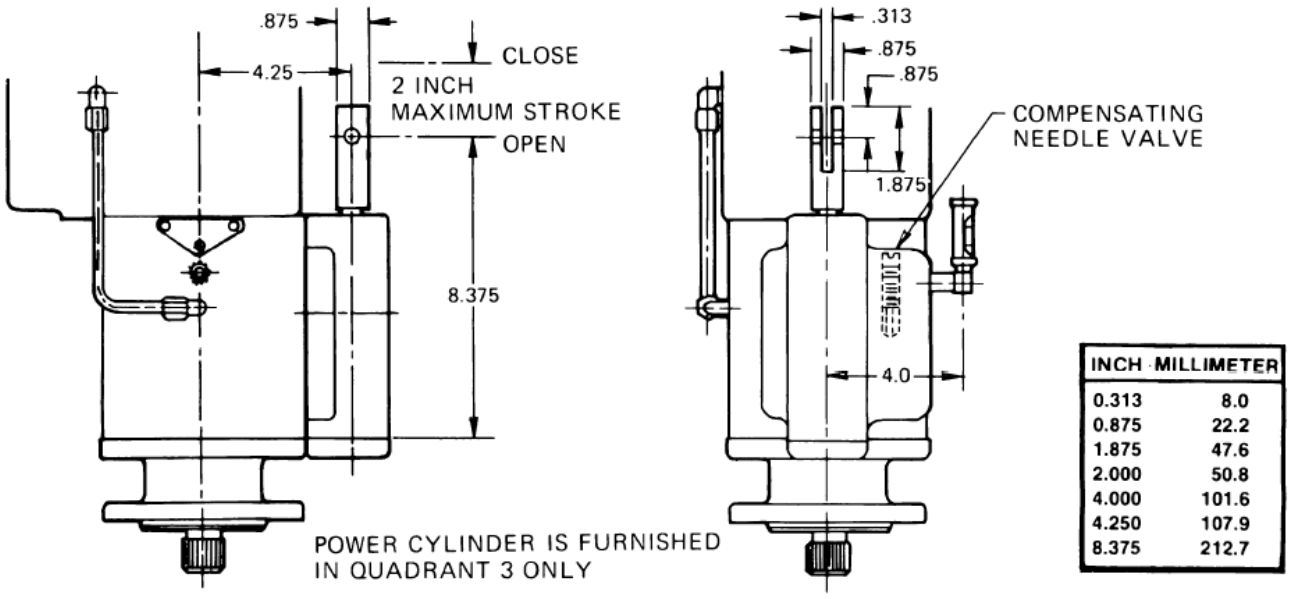
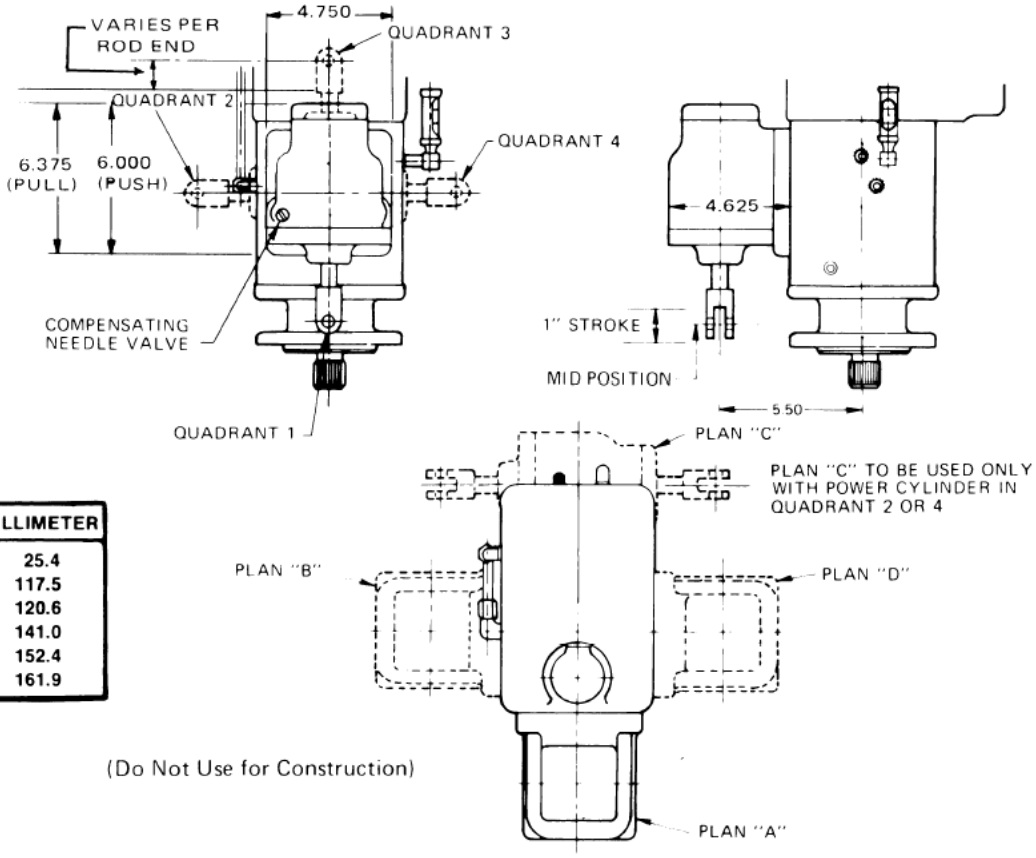


Figure 1-13. Outline of Remote Spring-Loaded Power Cylinder
(Do not use for construction)



INCH	MILLIMETER
0.313	8.0
0.875	22.2
1.875	47.6
2.000	50.8
4.000	101.6
4.250	107.9
8.375	212.7

Figure 1-14. Outline of Governor with 17 ft-lb Differential Power Cylinder
(Do not use for construction)



INCH	MILLIMETER
1.000	25.4
4.625	117.5
4.750	120.6
5.550	141.0
6.000	152.4
6.375	161.9

Figure 1-15. Outline of Short Column Governor with 29 ft-lb Differential Power Cylinder
(Do not use for construction)

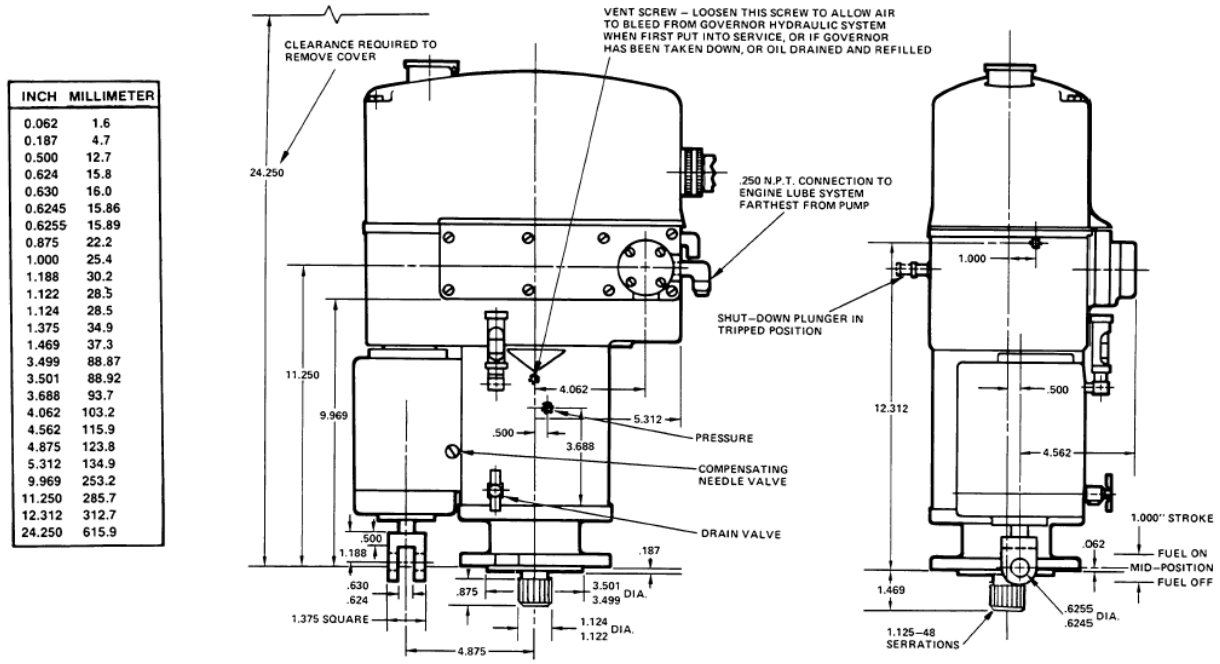


Figure 1-16. Outline of Long Column Governor with Reciprocating Differential Power Cylinder
(Do not use for construction)

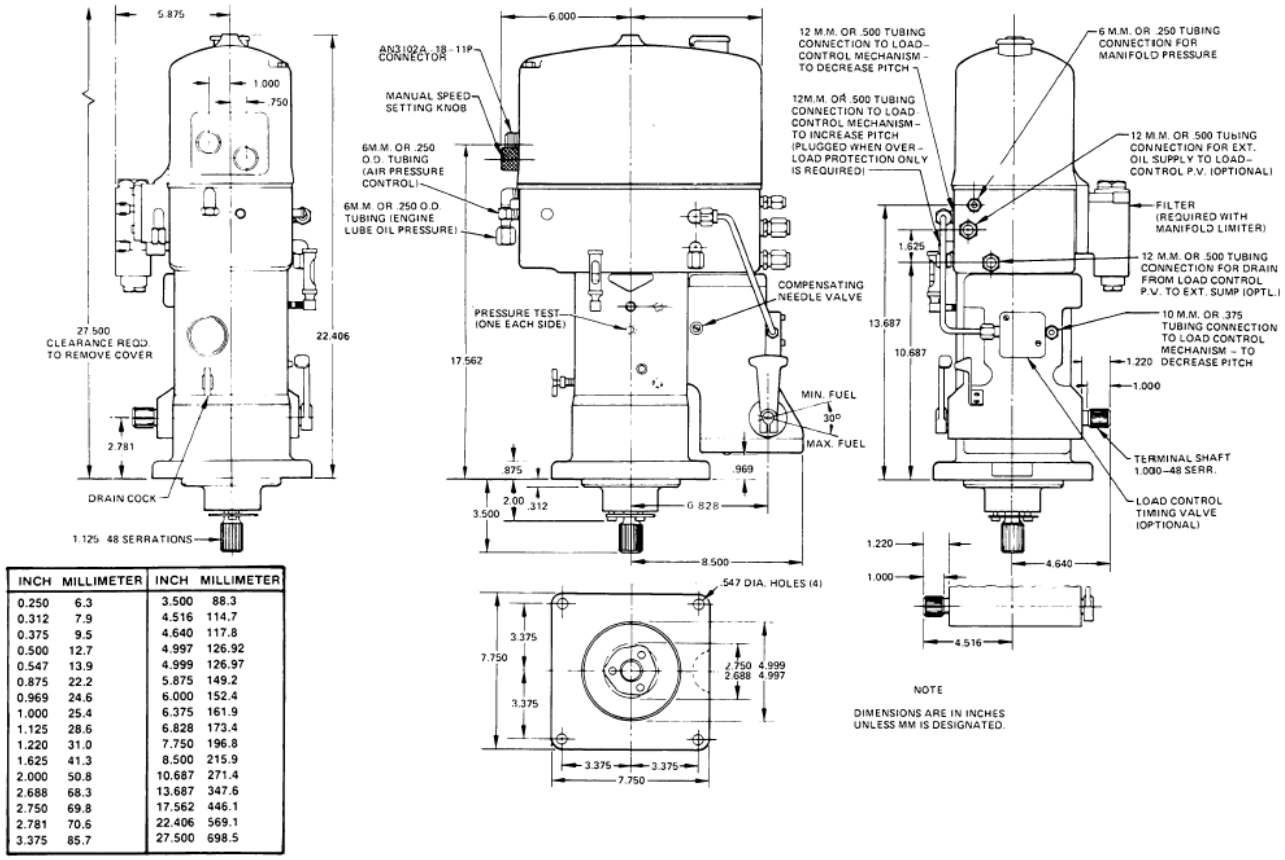


Figure 1-17. Outline of 29 ft-lb Differential Rotary Output with UG40 Base
(Do not use for construction)

Chapter 2.
Principles of Operation

Introduction

This chapter provides information for operation of the 12, 17, and 29 ft-lb (16, 23, and 39 J) servos. Schematic diagrams facilitate understanding the operation of the various systems.

Figures 1-2 and 1-3 show typical applications of the spring-loaded power cylinder. One shows a linear output, and the other shows a rotary output. Figure 2-1 illustrates a typical 17 ft-lb (23 J) power cylinder with linear output installed on a PG governor. Figure 2-2 illustrates a typical 29 ft-lb (39 J) power cylinder with linear output installed on a PG governor.

Oil pressure is directed to the side of the power piston with the larger piston area to move the piston in the increase-fuel direction. For a detailed description of operation, refer to the correct manual for your particular governor.

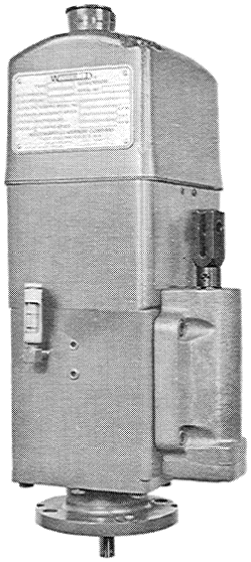


Figure 2-1. 17 ft-lb (23 J) Differential Power Cylinder (Linear Output)

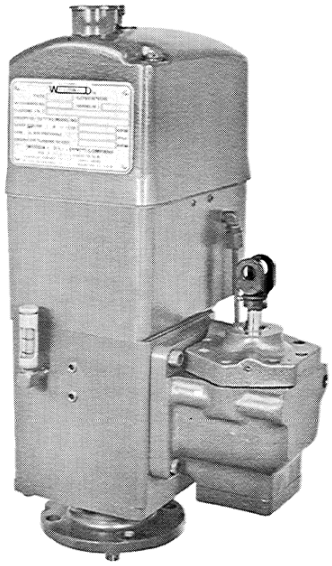


Figure 2-2. 29 ft-lb (39 J) Differential Power Cylinder (Linear Output)

Operation

12 ft-lb (16 J) Spring-Loaded Power Cylinder

All power cylinder assemblies operate under the same basic principle, with a reciprocating (push-pull) motion. On some models of governors, such as the PG-PH, through connecting linkage, the push-pull motion may be converted to a rotary motion. Power cylinder assemblies with a rotary terminal shaft are available as an alternate, depending on installation requirements.

Figure 2-3 is a schematic layout of the oil passages of a PG governor. When the pilot valve plunger moves downward, the control land opens the control port. Oil is released to the buffer piston, moving the buffer piston to transfer oil to the power cylinder. This forces the power piston in the increase-fuel direction.

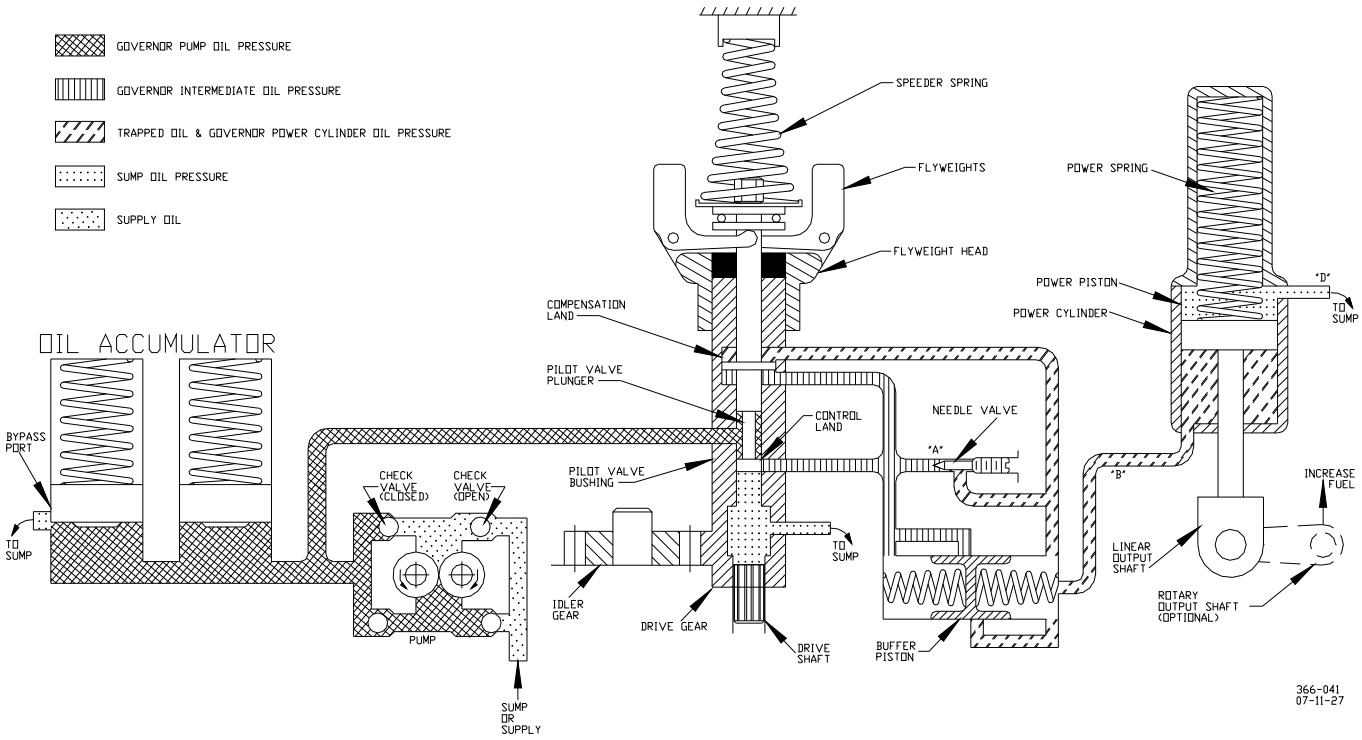


Figure 2-3. Schematic of 12 ft-lb (16 J) Spring-Loaded Power Cylinder (Rotary or Linear Output)

When the pilot valve plunger is raised above its centered position, the control land opens the control port. Oil is released from the power cylinder through the buffer system and back to sump. This allows the spring to force the power piston in the decrease-fuel direction.

Figures 4-3 and 4-4 show a spring loaded servo with tailrod. The tailrod is used on PGA governors to provide feedback information for speed droop, load control, etc.

17 ft-lb (23 J) Differential Power Cylinder

Figure 2-4 illustrates a typical 17 ft-lb (23 J) power cylinder, with reciprocating (push-pull) motion, installed on a PG governor.

All power cylinder assemblies operate under the same basic principle, with a reciprocating motion. In the arrangement shown in Figure 2-4, the power piston is “pull” to increase fuel to the prime mover. The oil needed to move the power piston is obtained when the governor pilot valve plunger is lowered below its centered or balanced position. The open port admits pressure oil to the buffer piston area, moving the buffer piston, transferring oil to the power cylinder and forcing the power piston to move in the direction to increase fuel to the prime mover.

To move the power piston in the decrease-fuel direction, the pilot valve plunger is raised above its centered position. When the trapped oil above the power piston is released to the sump, the pump pressure forces the piston in the decrease direction.

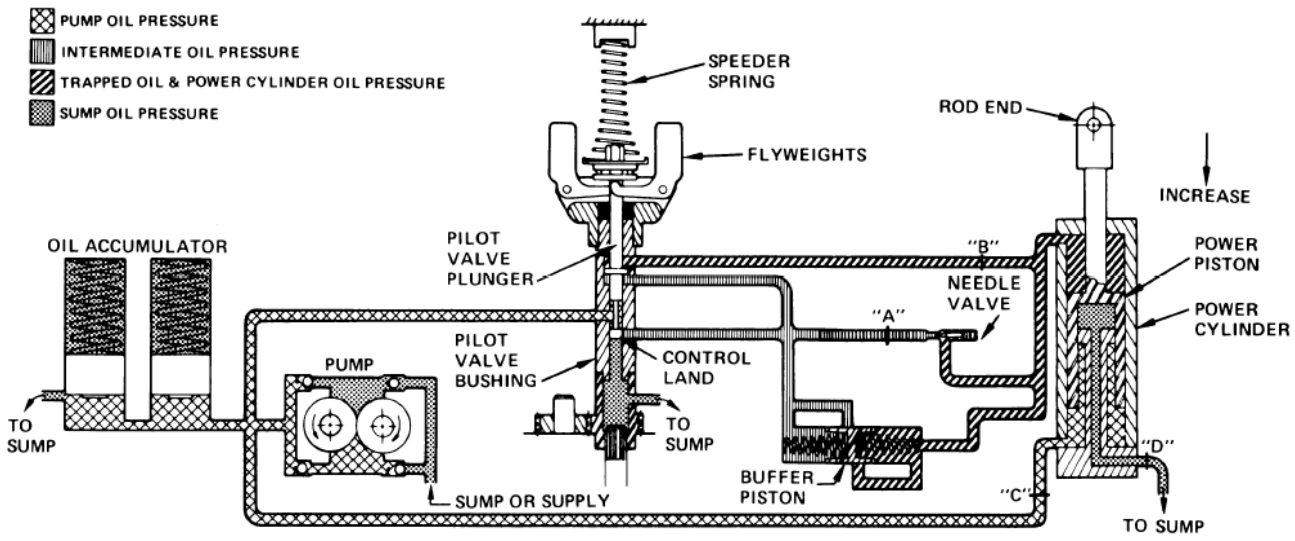


Figure 2-4. Schematic of 17 ft-lb (23 J) Differential Power Cylinder (Linear Output)

29 ft-lb (39 J) Differential Power Cylinder

Reciprocating Motion

Figure 2-5 illustrates a typical 29 ft-lb (39.3 joules) power cylinder, with reciprocating (push-pull) motion, installed on a PG governor. Two separate power cylinders are available with push-pull motion. One arrangement provides for a “push” to increase fuel or steam to the prime mover, and the second arrangement provides for a ‘pull” to increase. In either arrangement. the oil pressure is directed to the side of the power piston with the larger piston area to move the piston in the increase-fuel direction. The power cylinder is also available with rotary motion.

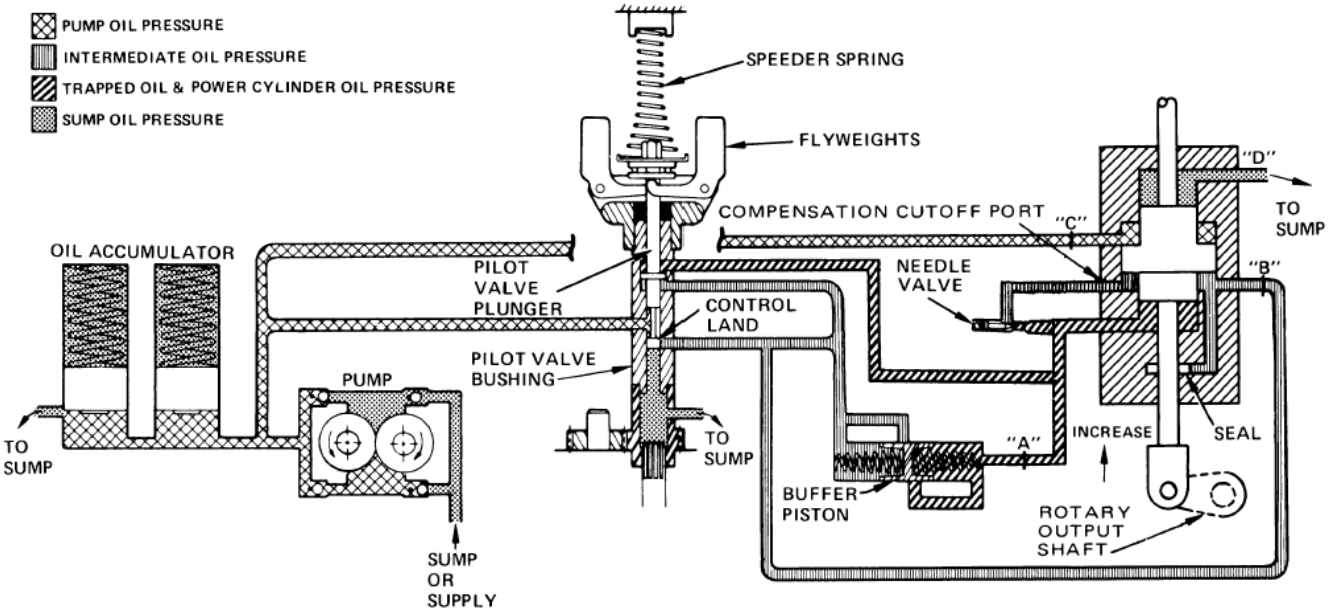


Figure 2-5. Schematic of 29 ft-lb (39 J) Differential Power Cylinder (Linear Output)

Figure 2-5 shows a “pull” to increase fuel type of power piston. In this type of power cylinder, the power piston area is larger and requires a larger volume of oil to move the piston (in response to load changes on the prime mover) than the normal buffer piston displacement is capable of producing. A direct passage is provided between the governor pilot valve plunger control land and power piston to provide the large volume of oil needed to move the piston for fast responses. Pressured oil is released to the power piston when the pilot valve plunger is lowered below its centered or balanced position. The open port admits pressure oil to the power piston and buffer piston area, forcing the power piston towards the increase-fuel direction.

Raising the pilot valve plunger above its centered position releases the trapped oil from below the power piston to sump. The pump-pressured oil forces the piston and terminal shaft in the decrease-fuel direction. Refer to the appropriate manual for the principles of operation of your particular governor. All power cylinders used with reciprocating output operate on the same principal.

Rotary Motion

With rotary motion power cylinders, the reciprocating motion is converted to a rotary motion.

When the pilot valve plunger is lowered below its centered or balanced position, the control port releases pressured oil to the needle valve and the buffer piston area, moving the buffer piston. Oil is released to the power cylinder and forces the power piston in the direction to increase fuel to the prime mover.

When the pilot valve plunger is raised above its centered position, the trapped oil above the power piston is released to the sump, and the pump pressure forces the piston in the decrease-fuel direction. Refer to the appropriate manual for principles of operation of your particular governor.

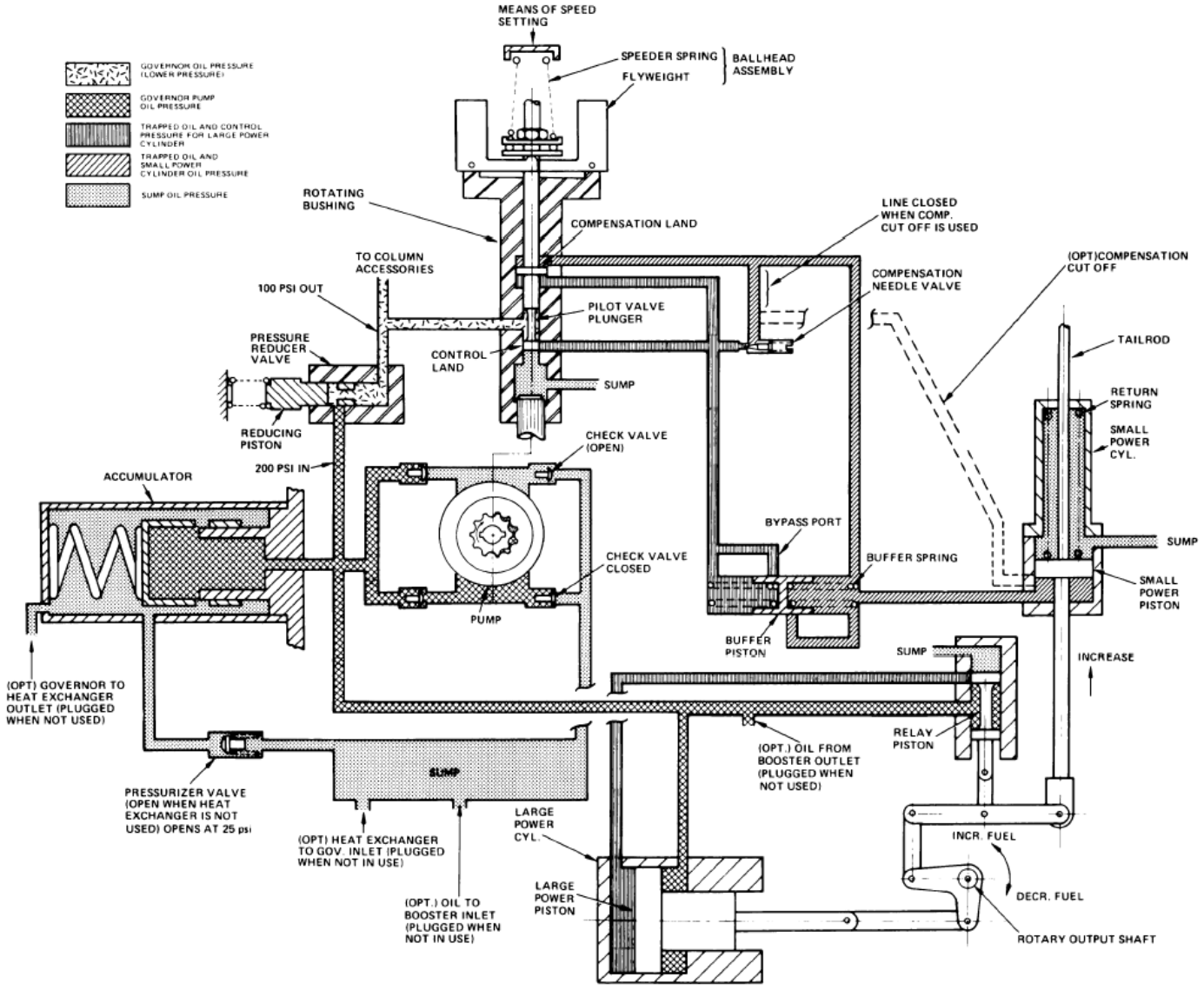


Figure 2-6. Schematic of PG-200

In brief, an accumulator provides 200 psi (1379 kPa) oil pressure to the relay valve. An increase in fuel allows the small power piston to raise the relay piston and release high pressured oil (200 psi or 1379 kPa) to the large power piston.

Chapter 3. Maintenance

Introduction

This chapter includes information for disassembly, cleaning, and assembly in general for the various power cylinders.

Regular Maintenance and Overhaul Recommendations

Monitoring governor health and performing regular servicing and overhaul are important in maintaining proper operation of an engine or turbine.

Oil should be changed regularly (see Woodward Oil Manual 25071) or monitored to insure proper lubrication and function of unit. Excessive contamination or varnishing of oil can affect good speed control as well as other functions of the governor or actuator such as fuel limiting.

The life of the Woodward product can vary depending on operating conditions and frequency of maintenance. Generally, the overhaul period should correspond with the engine's manufacturer's recommendation for overhaul of the engine or 20,000 hours, whichever comes first.

Disassembly

Refer to the appropriate exploded view, depending on the type of power cylinder being disassembled. Index numbers are assigned in the order of disassembly on the parts breakdown figures.

IMPORTANT **Discard all gaskets, O-rings, seals, retaining rings, etc, removed in the process of disassembly (replace with new parts during reassembly).**

1. Clean the exterior of the unit with cleaning solvent (Federal Specification P-D-680).

2. On spring-loaded power cylinders, position the power cylinder in an arbor press and hold the spring guard down against the force of the spring while removing screw and washers (Figure 3-1).

⚠CAUTION **Release the arbor press slowly to prevent the spring and cover from flying off and injuring someone.**

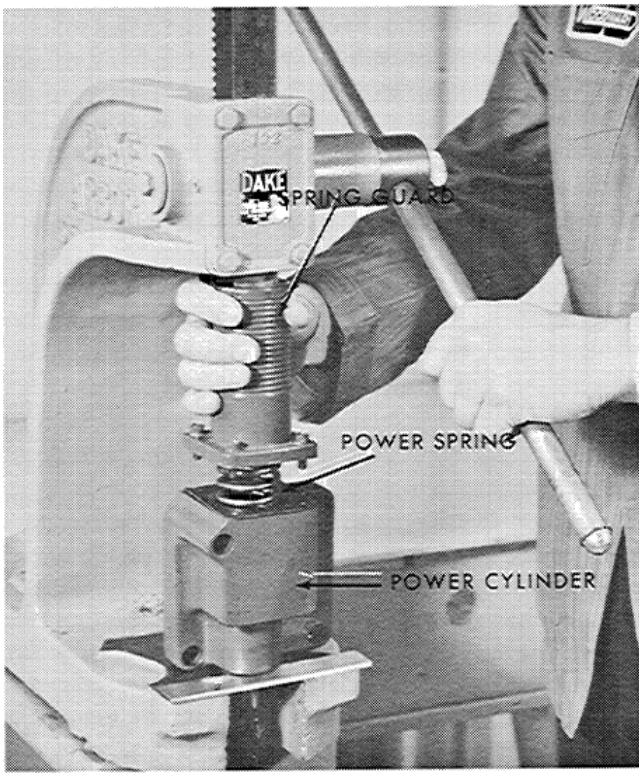


Figure 3-1. Removing Spring Guard

3. Use a rod end puller (Woodward part number 012281) to remove the rod end (Figure 3-2).

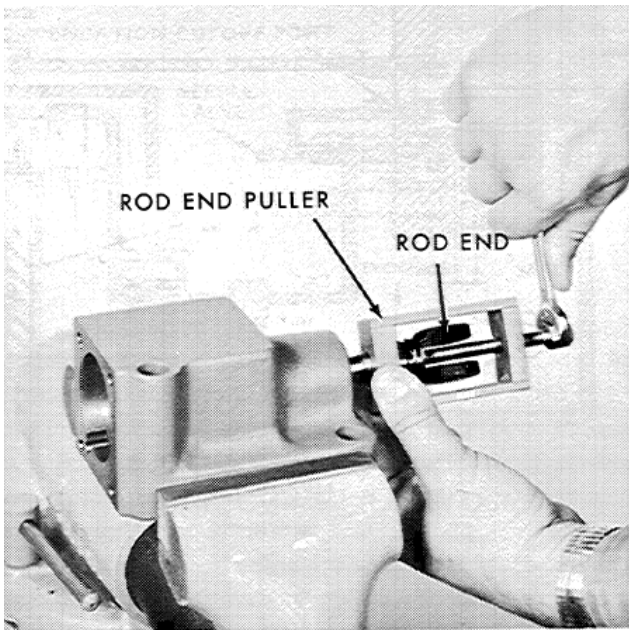


Figure 3-2. Removing Rod End

4. Position the power cylinder in a vise and remove the oil seals (Figure 3-3).

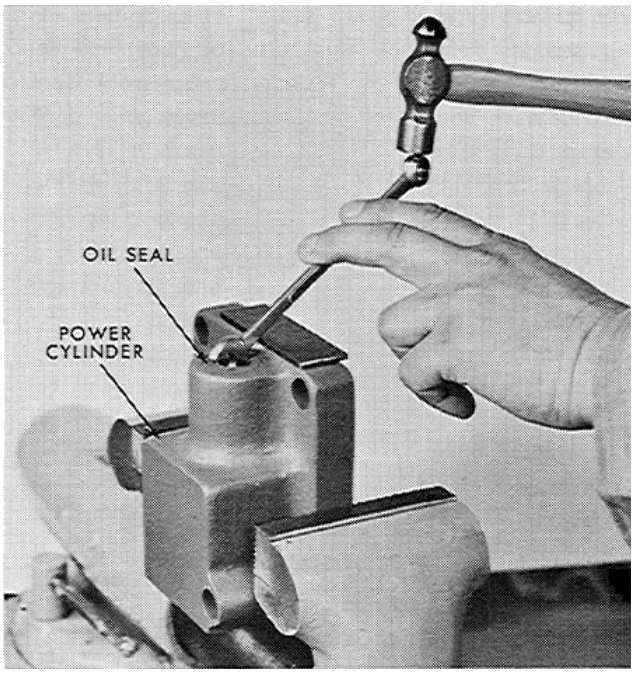


Figure 3-3. Oil Seal Removal

Cleaning

Immerse all parts in cleaning solvent and wash ultrasonically or by agitation. Do not permit the sealing surfaces of the piston to contact other parts or objects. Use a non-metallic brush or a jet of compressed air to clean slots, holes, or apertures. Dry all parts after cleaning with a jet of clean, dry compressed air.

Assembly

Assemble the power cylinder assembly in the reverse order of index numbers assigned to the parts breakdown figures.

IMPORTANT **A dust-free work area is recommended to obtain acceptable results.**

Obtain new gaskets, O-rings, seals, retaining rings, etc., to replace those discarded during disassembly.

Place the oil seal inserter tool (Woodward part number 360066) on the piston rod to avoid damage to the oil seals when inserting the piston in the power cylinder.

Position the power cylinder in an arbor press. Place a small steel block in the rod end slot, and press the rod end onto the power piston. Be sure that the taper pin holes are aligned (Figure 3-4).

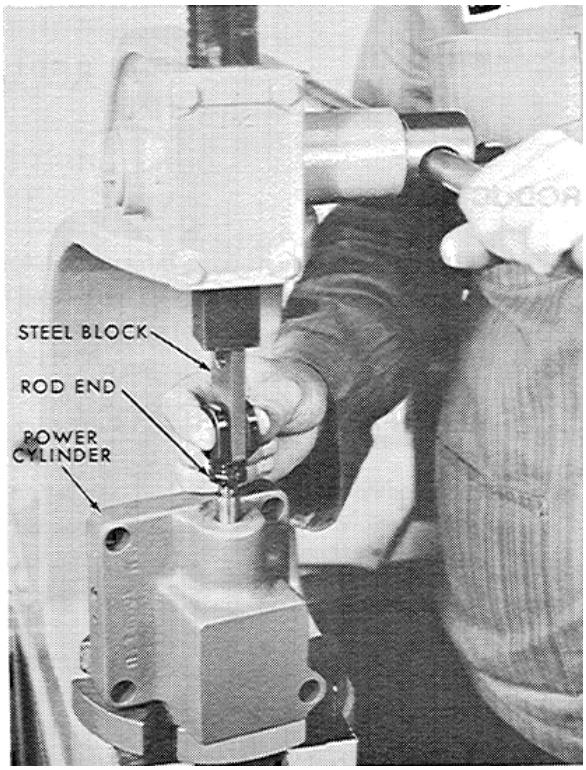


Figure 3-4. Rod End Installation

The piston rod end of the push-pull cylinder requires two oil seals. Press in the inner oil seal with the part number facing out. Press in the outer seal with the part number facing in and 0.005 inch (0.13 mm) below flush.

IMPORTANT **When replacing servos on governors or mounting pads, it is imperative that the securing bolts be torqued to 40 lb-ft (54 N·m).**

Chapter 4.
Replaceable Parts

Introduction

This chapter provides replacement parts information for the 12, 17, and 29 ft-lb (16, 23, and 39 J) power servos. An illustrated parts breakdown shows all replaceable parts of the governor.

Replacement Parts Information

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

1. Governor serial number and part number shown on nameplate.
2. Manual number (this is manual 36692).
3. Part reference number in parts list and description of part or part name.

Illustrated Parts Breakdown

The illustrated parts breakdown (Figures 4-1 through 4-11) illustrate and list all the replaceable parts for the various power servos. 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.

Parts List for Figure 4-1

Ref. No.	Part Name	Quantity
36692-1	Screw, cap, soc hd, 1/4-28 x 3/4	4
36692-2	Washer	4
36692-3	Spring guard	1
36692-4	Spring, power cylinder	1
36692-5	Gasket	1
36692-6	Stop ring, piston	A.R.
36692-7	Pin, cotter	1
36692-8	Washer	1
36692-9	Pin, rod end	1
36692-10	Pin, taper	1
36692-11	Rod end	1
36692-12	Piston and rod assembly	1
36692-13	Seal, oil, type G	1
36692-14	Seal, oil, type P	1
36692-15	Valve, needle	1
36692-16	O-ring	1
36692-17	Plug, pipe, 1/16	1
36692-18	Plug, pipe, 1/8	1
36692-19	Power cylinder assembly	1

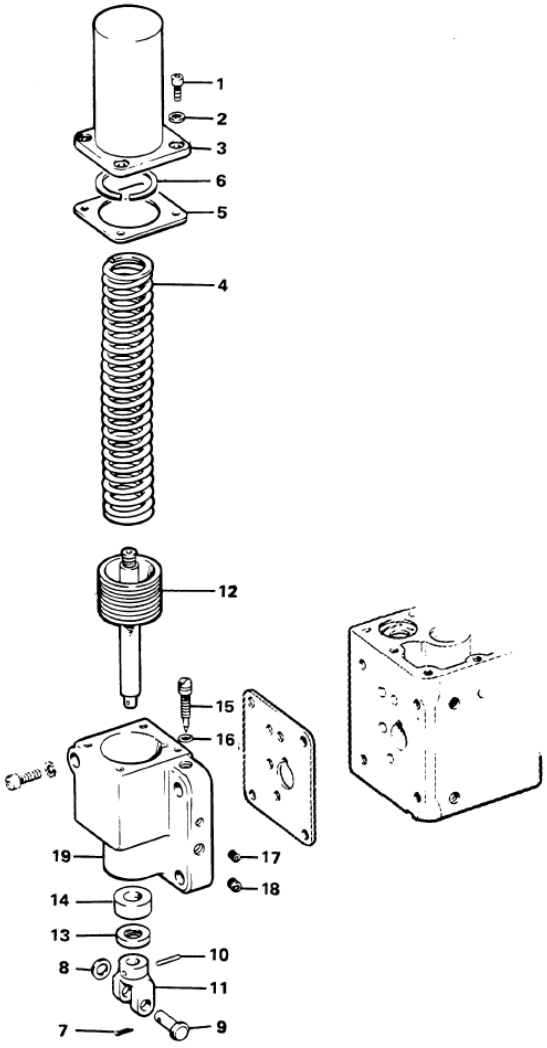


Figure 4-1. Exploded View of Spring-Loaded Power Cylinder (Linear Output)

Parts List for Figure 4-2

Ref. No.	Part Name	Quantity
36692-101	Screw, cap, soc hd, 1/4-28 x 3/4	4
36692-102	Washer, shakeproof, 1/4 (6.3 mm)	4
36692-103	Spring guard	1
36692-104	Gasket	1
36692-105	Spring, power	1
36692-106	Plug, pipe, 1/8 NPT	1
36692-107	Screw, cap, soc hd, 1/4-28 x 3/4	8
36692-108	Washer, splitlock, 1/4 (6.3 mm)	8
36692-109	Cover, power cylinder	1
36692-110	Gasket	1
36692-111	Pin, taper, #2/0	1
36692-112	Screw, cap, soc hd, 10-32 x 5/8	1
36692-113	Washer, splitlock	1
36692-114	Rack dial segment	1
36692-115	Screw, drive	2
36692-116	Scale, terminal shaft	1
36692-117	Screw, soc hd cap, 5/16-18 x 7/8	2
36692-118	Washer, splitlock, 5/16 (7.9 mm)	2
36692-119	Ring, retaining	2
36692-120	Pin, power lever	1
36692-121	Terminal shaft	1
36692-122	Power lever	1
36692-123	Nut, 7/16-20	1
36692-124	Ring, retaining	2
36692-125	Link, power piston	2
36692-126	Pin, power rod	1
36692-127	Power piston and rod assembly	1
36692-128	Seal, oil (large)	1
36692-129	Bearing, needle (large)	1
36692-130	Seal, oil (small)	1
36692-131	Bearing, needle (small)	1
36692-132	Screw, cap, soc hd, 8-32 x 3/8	2
36692-133	Washer, splitlock, #8	2
36692-134	Pointer, rack scale	1
36692-135	Valve, needle	1
36692-136	O-ring	1
36692-137	Power cylinder assembly	1

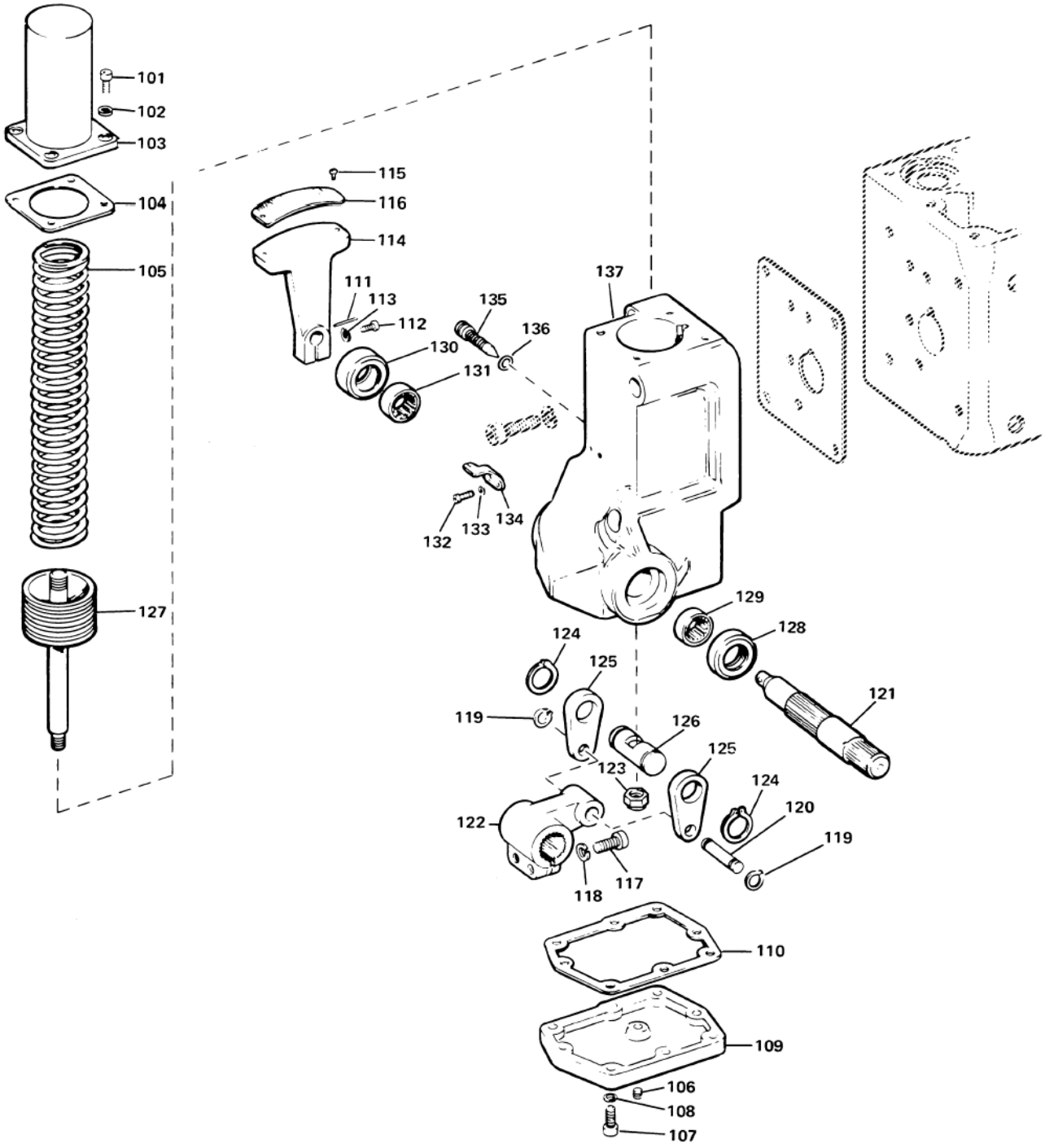


Figure 4-2. Exploded View of Spring-Loaded Power Cylinder
(Rotary Output)

Parts List for Figure 4-3

Ref. No.	Part Name	Quantity
36692-201	Pin, fuel indicator	1
36692-202	O-ring, spring guard seal	1
36692-203	Ring, spring guard seal	1
36692-204	Spring, spring guard seal	1
36692-205	Screw, fil hd, 10-32 x 3/8	2
36692-206	Washer, #10	2
36692-207	Scale, piston gap	1
36692-208	Screw, cap, soc hd, 1/4-28 x 1/2	4
36692-209	Washer, shakeproof, 1/4 (6.3 mm)	4
36692-210	Spring guard	1
36692-211	Spring, power	1
36692.212	Gasket, spring guard	1
36692-213	Nut, tailrod flex-bc, 3/8-24	1
36692-214	Tailrod, power piston	1
36692-215	Nut, tailrod lift	1
36692-216	Washer, shakeproof, 3/8 (9.5 mm)	1
36692-217	Pin, cotter, 3/32 x 1-1/4	1
36692-218	Pin, rod end, 3/8 x 7/8	1
36692-219	Pin, cotter, 1/16 x 3/8	1
36692-220	Pin, taper	1
36692-221	Rod end	1
36692-222	Power piston and rod assembly	1
36692-223	Seal, oil, type G	1
36692-224	Seal, oil, type P	1
36692-225	Valve, needle	1
36692-226	O-ring	1
36692-227	Power cylinder assembly	1

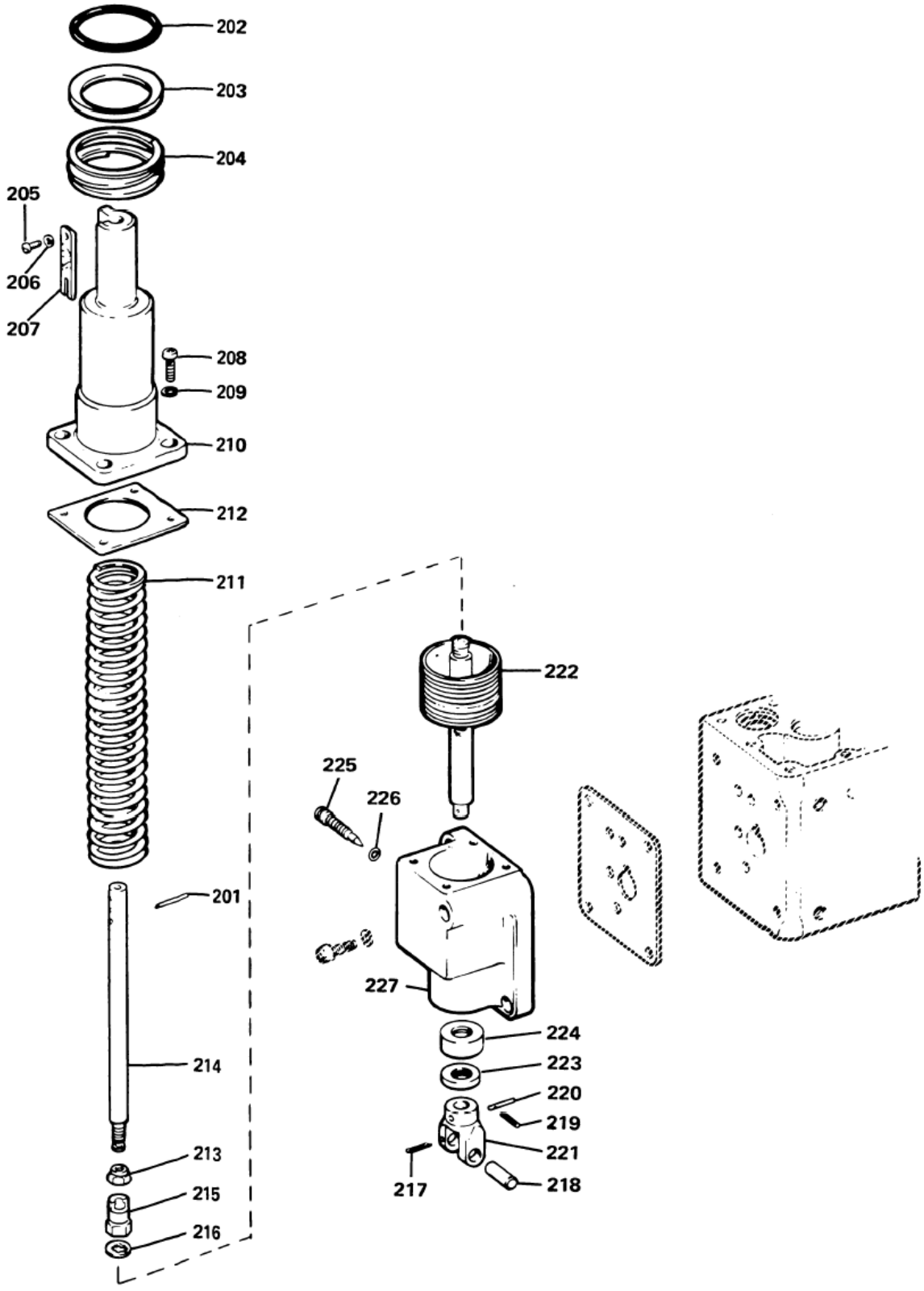


Figure 4-3. Exploded View of Spring-Loaded Power Cylinder
(Linear Output with Tailrod)

Parts List for Figure 4-4

Ref. No.	Part Name	Quantity
36692-301	Pin, fuel indicator	1
36692-302	O-ring, spring guard seal	1
36692-303	Ring, spring guard seal	1
36692-304	Spring, spring guard seal	1
36692-305	Screw, fil hd, 10-32 x 3/8	2
36692-306	Washer, #10	2
36692-307	Scale, piston gap	1
36692-308	Screw, cap, soc hd, 1/4-28 x 1/2	4
36692-309	Washer, shakeproof, 1/4 (6.3 mm)	4
36692-310	Spring guard	1
36692-311	Spring, power	1
36692-312	Gasket, spring guard	1
36692-313	Nut, tailrod flex-bc, 3/8-24	1
36692-314	Tailrod, power piston	1
36692-315	Nut, tailrod lift	1
36692-316	Washer, shakeproof, 3/8 (9.5 mm)	1
36692-317	Plug, pipe, 1/8 NPT	1
36692-318	Screw, soc hd cap, 1/4-28 x 3/4	8
36692-319	Washer, splitlock, 1/4 (6.3 mm)	8
36692-320	Cover, power cylinder	1
36692-32 1	Gasket	1
36692-322	Pin, taper, #2/0	1
36692-323	Screw, cap, soc hd, 10-32 x 5/8	1
36692-324	Washer, splitlock, #10	1
36692-325	Rack dial segment	1
36692-326	Screw, drive	2
36692-327	Scale, terminal shaft	1
36692-328	Screw, power lever clamp, 5/16-18x7/8	2
36692-329	Washer, splitlock, 5/16 (7.9 mm)	2
36692-330	Ring, retaining	2
36692-331	Pin, power lever	1
36692-332	Terminal shaft	1
36692-333	Power lever	1
36692-334	Nut, 7/16-20	1
36692-335	Ring, retaining	2
36692-336	Link, power piston	2
36692-337	Pin, piston rod	1
36692-338	Power piston and rod assembly	1
36692-339	Seal, oil (large)	1
36692-340	Bearing, needle (large)	1
36692-341	Seal, oil (small) .	1
36692-342	Bearing, needle (small)	1
36692-343	Screw, cap, soc hd, 8-32 x 3/8	2
36692-344	Washer, splitlock, #8	2
36692-345	Pointer, rack scale	1
36692-346	Valve, needle	1
36692-347	O-ring	1
36692-348	Power cylinder assembly	1

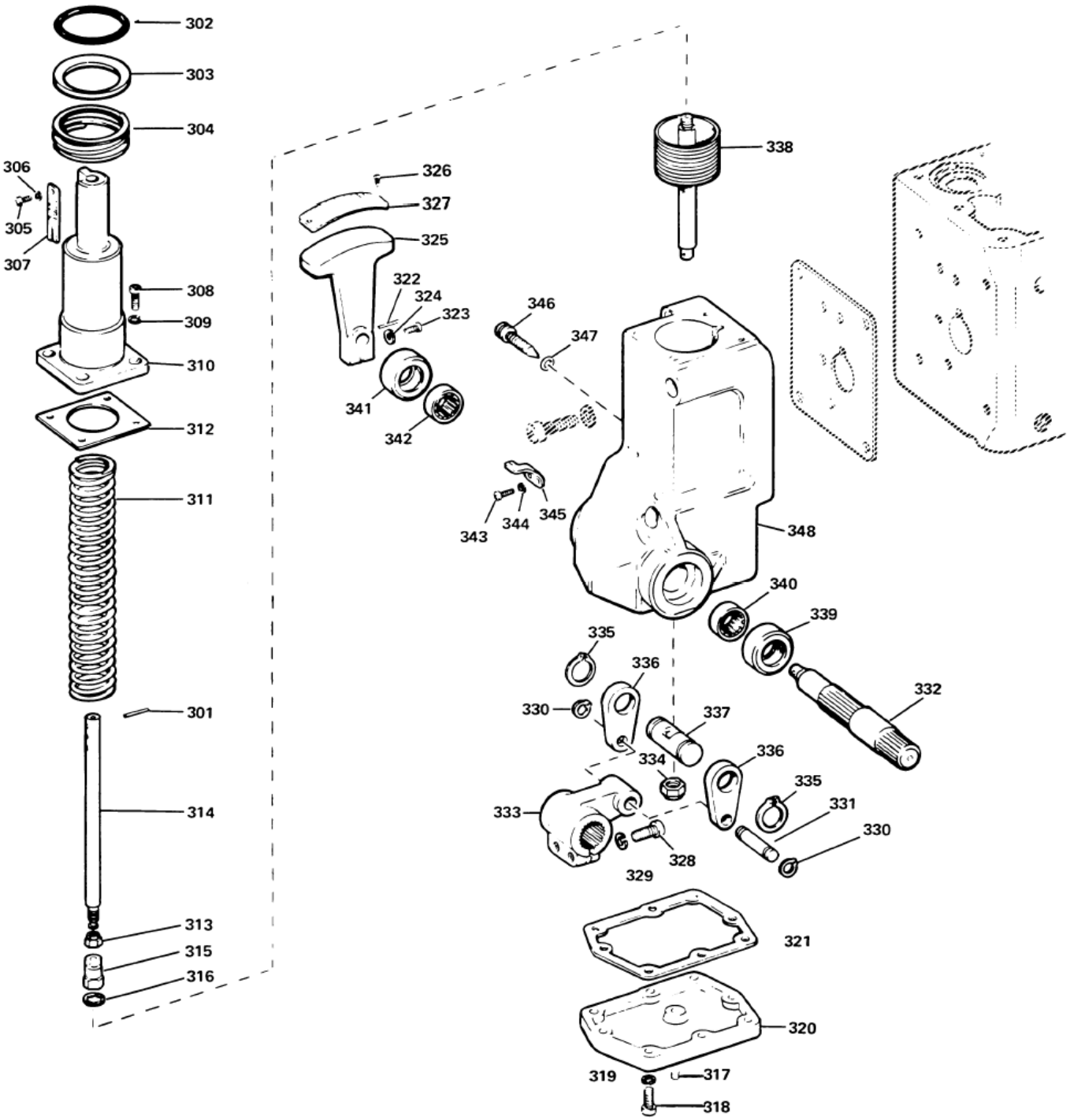


Figure 4-4. Exploded View of Spring-Loaded Power Cylinder
(Rotary Output with Tailrod)

Parts List for Figure 4-5

Ref. No.	Part Name ..... Quantity
36692-401	Screw, cap, soc hd, 1/4-28 x 3/4 4
36692-402	Washer, splitlock, 1/4 (6.3 mm) 4
36692-403	Cylinder head (large) 1
36692-404	Plug, pipe, 1/8 NPT 4
36692-405	Gasket, cylinder head 1
36692-406	Screw, cap, soc hd, 10-32 x 3/8 2
36692-407	Retainer 1
36692-408	Ring, retaining 1
36692-409	O-ring 1
36692-410	Piston 1
36692-411	Pin, cotter, 1/16 x 5/16 (1.6 x 7.9 mm) 1
36692-412	Pin, taper 1
36692-413	Rod end 1
36692-414	Ring, retaining 1
36692-415	Seal, oil 1
36692-416	Seal, oil 1
36692-417	Cylinder head (small) 1
36692-418	Collar, stop 1
36692-419	Power piston and rod assembly 1
36692-420	Valve, needle 1
36692-421	O-ring 1
36692-422	Plug 2
36692-423	O-ring 2
36692-424	Power cylinder assembly 1

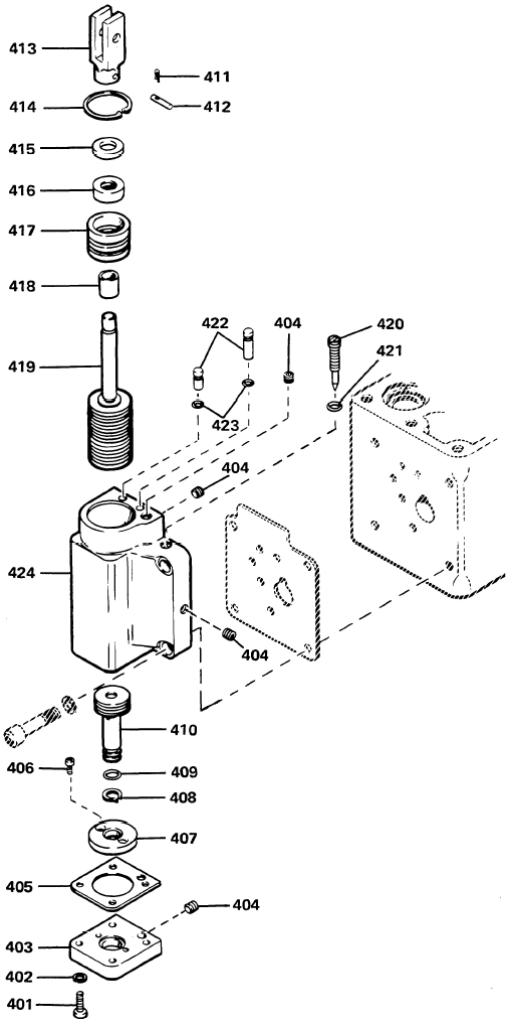


Figure 4-5. Exploded View of 17 ft-lb (23 J) Differential Power Cylinder

Parts List for Figure 4-6

Ref. No.	Part Name	Quantity
36692-501	Screw, cap, soc hd, 1/4-20 x 5/8	8
36692-502	Washer, splitlock, 1/4 (6.3 mm)	8
36692-503	Cover, differential servomotor	1
36692-504	Plug, pipe, 1/16 NPT	1
36692-505	Gasket	1
36692-506	Pin, cotter, 1/16x 1/4	1
36692-507	Pin, taper	1
36692-508	Rod end	1
36692-509	Nut, 3/8-24	1
36692-510	Washer	1
36692-511	Spring	1
36692-512	Piston	1
36692-513	O-ring	1
36692-514	Nut, power piston	1
36692-515	Washer, shakeproof, 1/2 (12.7 mm)	1
36692-516	Power piston	1
36692-517	Rod, differential piston	1
36692-518	Screw, cap, soc hd, 5/16-18 x 1	4
36692-519	Washer	4
36692-520	Seal, oil	1
36692-521	Seal, oil	1
36692-522	Cylinder head	1
36692-523	Gasket	1
36692-524	Valve, needle	1
36692-525	O-ring	1
36692-526	Power cylinder assembly	1

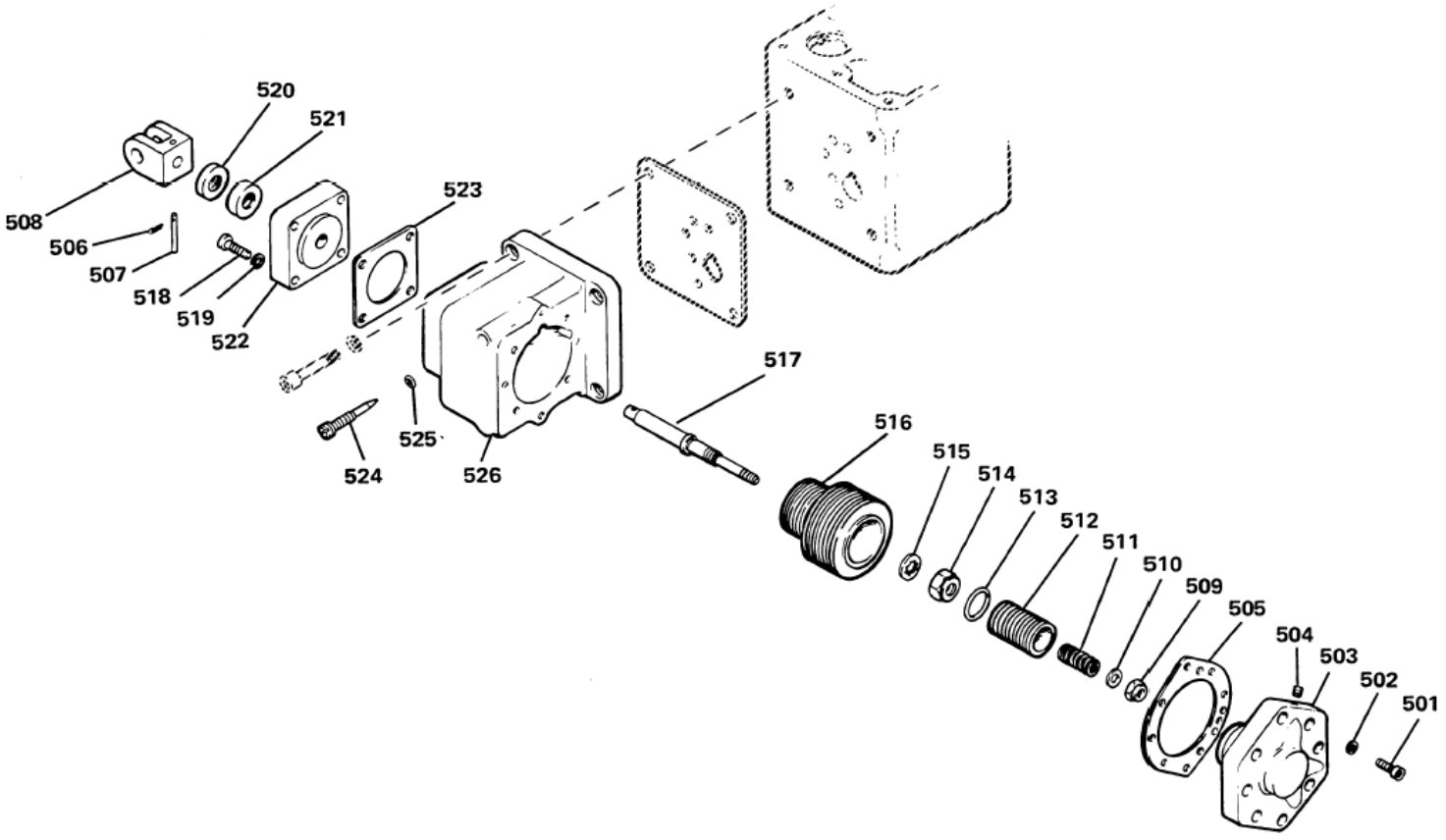


Figure 4-6. Exploded View of 29 ft-lb (39 J) Differential Power Cylinder (Linear Push Output)

Parts List for Figure 4-7

Ref. No.	Part Name ..... Quantity
36692-601	Screw, cap soc hd, 5/16-18 x 1 4
36692-602	Washer, splitlock, 5/16 (7.9 mm) 4
36692-603	Cylinder head 1
36692-604	Gasket 1
36692-605	Pin, cotter, 1/16x 1/4 1
36692-606	Pin, taper 1
36692-607	Rod end 1
36692-608	Screw, cap, soc hd, 1/4-20 x 3/4 8
36692-609	Washer, splitlock, 1/4 (6.3 mm) 8
36692-610	Cylinder head 1
36692-611	Plug, pipe, 1/16 NPT 1
36692-612	Gasket 1
36692-613	Ring, retaining 1
36692-614	Washer 1
36692-615	Spring 1
36692-616	Piston 1
36692-617	O-ring 1
36692-618	Nut 1
36692-619	Rod, differential piston 1
36692-620	Power piston 1
36692-621	Valve, needle 1
36692-622	O-ring 1
36692-623	Seal, oil 1
36692-624	Seal, oil 1
36692-625	Power cylinder assembly 1

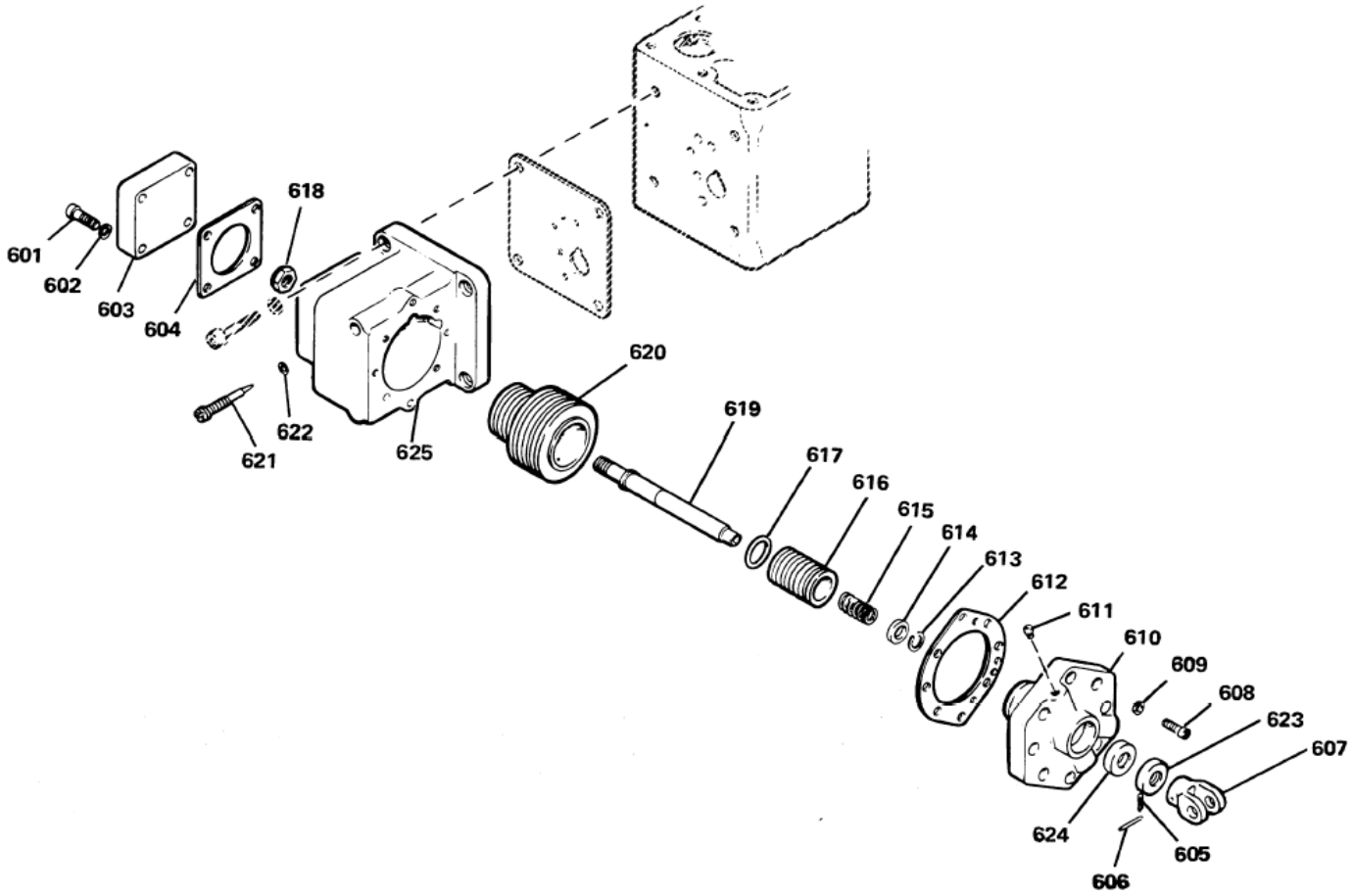


Figure 4-7. Exploded View of 29 ft-lb (39 J) Differential Power Cylinder (Linear Pull Output)

Parts List for Figure 4-8

Ref. No.	Part Name	Quantity
36692-751	Soc. hd. cap screw, 0.250—20 x 0.750	8
36692-752	Lock washer, 0.250 I.D. (6.3 mm)	8
36692-753	29 ft. (39.3 joules) cylinder head (push)	1
36692-754	O-ring, 0.208 I.D. x 0.070	3
36692-755	O-ring, 2.864 I.D. x 0.070	1
36692-756	Power cylinder piston assembly	1
36692-757	29 ft-lb. (39.3 joules) differential power cylinder	1
36692-758	Hex soc. plug 0.062-27	3
36692-759	Needle valve	1
36692-760	O-ring, 0.301 I.D. x 0.070 (7.6 ID. x 1.8 mm)	1
36692-761	Lock washer, 0.375 I.D. (9.5 ID. mm)	4
36692-762	Soc. hd. screw, 0.375—16 x 1.000	4
36692-763	O-ring, 2.364 I.D. x 0.070 (66.9 ID. x 1.8 mm)	1
36692-764	29 ft-lb. cylinder cover (push)	1
36692-765	Lock washer, 0.3 12 (7.9 mm)	4
36692-766	Soc. hd. cap screw, 5/16—18 x 1.000	4
36692-767	Oil seal	1
36692-768	Scraper seal	1
36692-769	Servomotor case gasket	1
36692-770	Rod end	1
36692-771	Set screw	1
36692-772 to 775		Not used

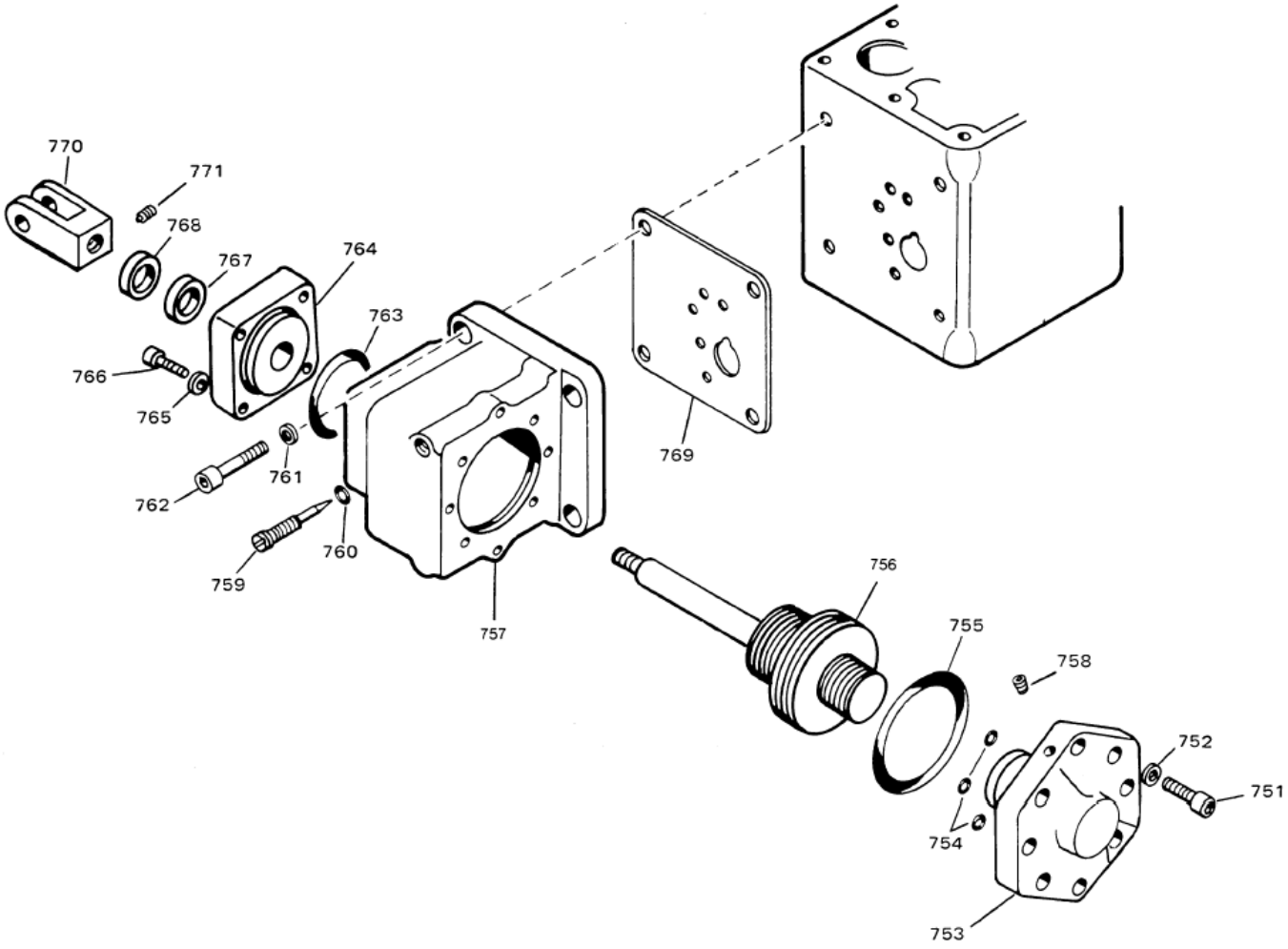


Figure 4-8. Exploded View of 29 ft-lb (39 J) Power Cylinder (Push)

Parts List for Figure 4-9

Ref. No.	Part Name	Quantity
36692-701	Screw, cap soc hd, 5/16 - 24 x 3/4	6
36692-702	Washer, splitlock, 5/16 (7.9mm)	8
36692-703	Power cylinder head	1
36692-704	Screw, soc hd, self-locking 1/4 - 28 x 1/2	1
36692-705	Washer, flat, 17/64 ID X 9/16 OD x 1/16 Thk (6.7 x 14.3 x 1.6 mm)	1
36692-706	Tailrod end	1
36692-707	Tailrod, power piston	1
36692-708	Screw, cap, soc hd, 1/4 - 28 x 7/8	8
36692-709	Washer, splitlock, 1/4 (6.3 mm)	8
36692-710	Cover, power cylinder	1
36692-711	Plug, pipe, 1/8 - 27 NPT	1
36692-712	Gasket	1
36692-713	Screw, cap, soc hd, 5/16 – 18 x 1	2
36692-714 through 36692-718		Not used
36692-719	Ring, retaining	2
36692-720	Pin, power lever	1
36692-721		Not used
36692-722	Power lever	1
36692-723	Nut, 7/16 – 20	1
36692-724	Link, power piston	2
36692-725	Pin, piston rod	1
36692-726	Packing, performed	1
36692-727	Power piston	1
36692-728	Seal, oil	2
36692-729	Bearing, needle	2
36692-730 through 36692-734		Not used
36692-735	Valve, needle	1
36692-736	O-ring, .438 OD (11.1 mm)	1
36692-737	Power cylinder	1
36692-738	Terminal shaft	2
36692-739	Screw, .250 - 28 x 1.000	2
36692-740	Lock washer, .250	2
36692-741	Pointer Bracket	1
36692-742	Screw, 8 - 32 x .625	1
36692-743	Lock washer, No. 8	1
36692-744	Flat washer, No. 8	1
36692-745	Pointer	1
36692-746	Drive screw	2
36692-747	Scale	1
36692-748	Rack dial lever	1
36692-749	Screw, .250 - 28 x 1	1
36692-750	Lock washer, .250	1

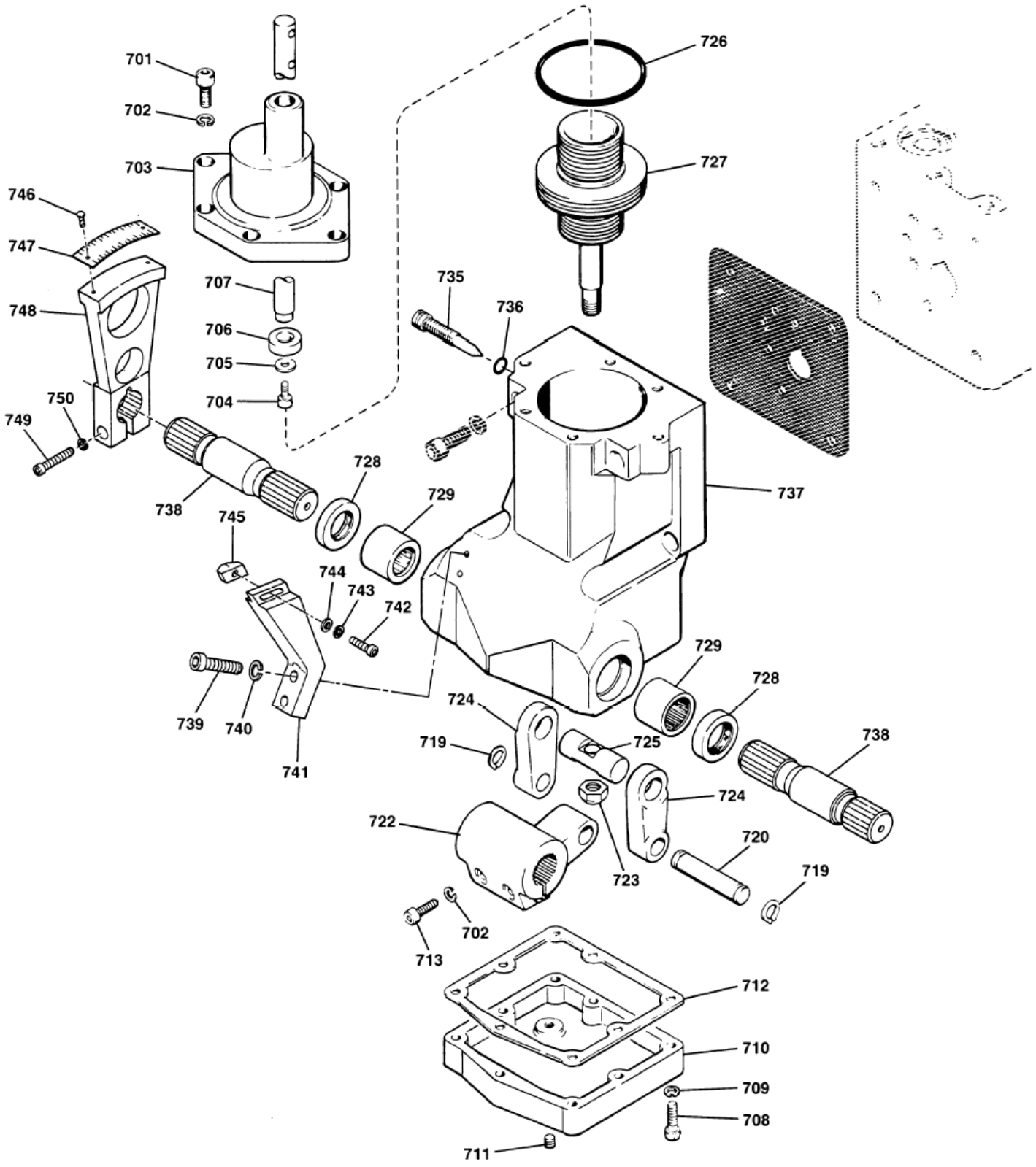


Figure 4-9. Exploded View of 29 ft-lb (39 J) Differential Power Cylinder (Rotary Output with Tailrod)

Parts List for Figure 4-10

Ref. No.	Part Name ..... Quantity
36692-776	Soc. hd. cap screw, 5/16—18 x 1.000 4
36692-777	Lock washer, .312 (7.9 mm).....4
36692-778	29 ft-lb. (39.3 joules) pull cover 1
36692-779	O-ring, 2.364 I.D. x 0.070 (60.4 x 1.8 mm).....1
36692-780	29 ft-lb. (39.3 joules) power cylinder 1
36692-781	Lock washer, 0.37 5 (9.5 mm).....4
36692-782	Socket hd. screw, 0.375—16 x 1.000 4
36692-783	O-ring, 0.301 I.D. x 0.070 (7.6 x 1.8 mm).....1
36692-784	Needle valve 1
36692-785	Power cylinder piston assembly (pull).....1
36692-786	O-ring, 2.864 I.D. x 0.070 (72.7 x 1.8 mm).....1
36692-787	O-ring, 0.208 I.D. x 0.070.....2
36692-788	29 ft-lb. (39.3 joules) cylinder head (pull) 1
36692-789	Lock washer, 0.250 (6.3. mm).....8
36692-790	Soc. hd. cap screw 0.250—20 x 0.750 8
36692-791	Oil seal.....1
36692-792	Scraper rod 1
36692-793	Set screw 1
36692-794	Rod end 1
36692-795	Servomotor case gasket 1
36692-796	Hex soc. plug, 0.062-27 3

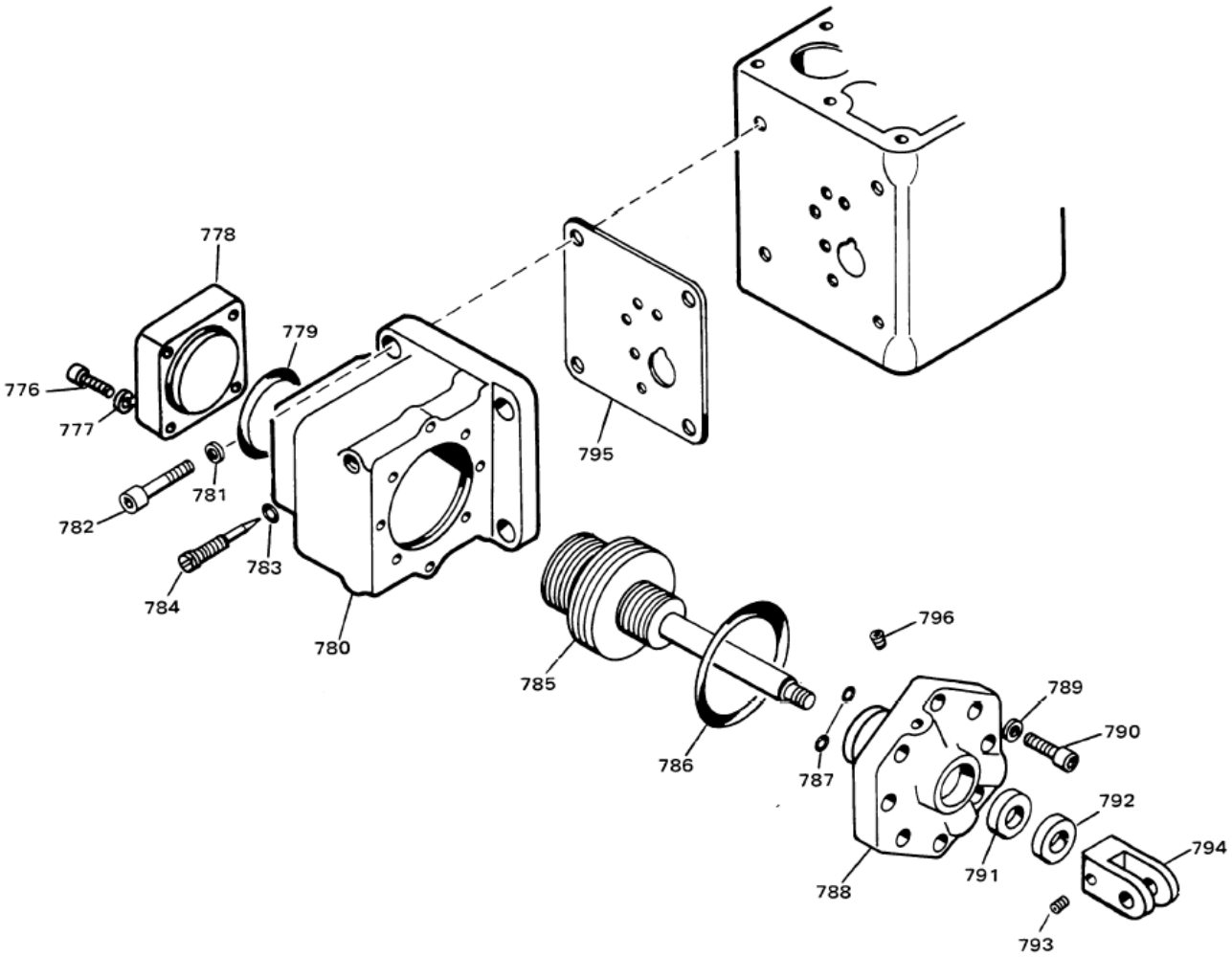


Figure 4-10. Exploded View of 29 ft-lb (39 J) Power Cylinder (Pull)

Parts List for Figure 4-11

Ref. No.	Part Name	Quantity
36692-800	O-ring	1
36692-801	Seal ring	1
36692-802	Spring	1
36692-803	Phillips head screw, 10-32	1
36692-804	No. 10 Lockwasher	1
36692-805	Piston gap scale	1
36692-806	Spring guard	1
36692-807	Socket head screw .250-28	4
36692-808	Lockwasher	4
36692-809	Gasket	1
36692-810	Pin	1
36692-811	Power piston tailrod	1
36692-812	Flex-bc nut, .375-24	1
36692-813	Snap ring	1
36692-814	Sleeve	1
36692-815	Power piston assembly	1
36692-816	Power cylinder assembly	1
36692-817	Socket head screw .375 x 1	4
36692-818	Split lockwasher	4
36692-819	O-ring	1
36692-820	Needle valve	1
36692-821	Oil seal, inner	1
36692-822	Oil seal, outer	1
36692-823	Rod end	1
36692-824	Cotter pin	1
36692-825	Cotter pin	1
36692-826	Taper pin	1
36692-827	Socket head screw, .250-28	4
36692-828	Power cylinder cover	1
36692-828a	Socket head screw, .250-28	4
36692-829	Sleeve	1
36692-830	Power piston assembly	1
36692-831	Terminal shaft	1
36692-832	Oil seal	1
36692-833	Needle bearing	1
36692-834	Power piston link	2
36692-835	Snap ring	2
36692-836	Snap ring	2
36692-837	Stop nut, .437-20	1
36692-838	Split lockwasher	2
36692-839	Socket head screw, .312-18	2
36692-840	Gasket	1
36692-841	Cover	1
36692-842	Piston rod pin	1
36692-843	Needle bearing	1
36692-844	Terminal lever	1
36692-845	Power lever pin	1
36692-846	Split lockwasher	8
36692-847	Socket head screw, .250-28	8
36692-848	Pipe plug	1
36692-849	Sleeve	1
36692-850	Power piston assembly	1
36692-851	Bushing	1
36692-852	O-ring	1
36692-853	Washer	2
36692-854	Shakeproof washer	2
36692-855	Hex head screw, .250-20	2
36692-856	Power cylinder assembly	1
36692-857 through 36692-860		Not used
36692-861	Power piston assembly	1
36692-862	Plug	1
36692-863	O-ring	1
36692-864	Snap ring	1

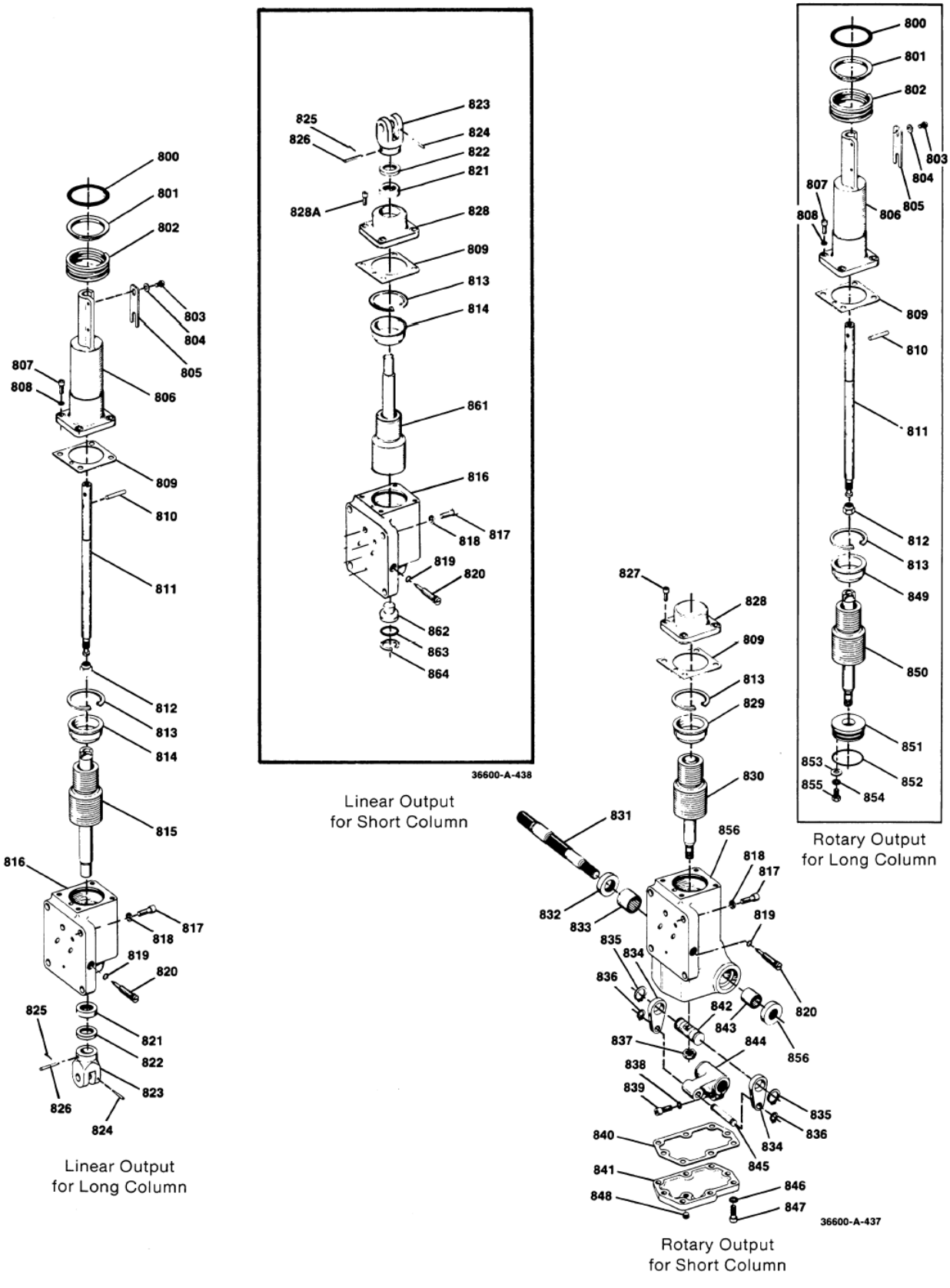


Figure 4-11. Exploded View of 12 ft-lb (16 J) Differential Power Cylinders

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**) with detailed information on the product, application, and symptoms. Your email will be forwarded to an appropriate expert on the product and application to respond by telephone or return email.
5. If the issue cannot be resolved, you can select a further course of action to pursue based on the available services listed in this chapter.

OEM or Packager Support: Many Woodward controls and control devices are installed into the equipment system and programmed by an Original Equipment Manufacturer (OEM) or Equipment Packager at their factory. In some cases, the programming is password-protected by the OEM or packager, and they are the best source for product service and support. Warranty service for Woodward products shipped with an equipment system should also be handled through the OEM or Packager. Please review your equipment system documentation for details.

Woodward Business Partner Support: Woodward works with and supports a global network of independent business partners whose mission is to serve the users of Woodward controls, as described here:

- A **Full-Service Distributor** has the primary responsibility for sales, service, system integration solutions, technical desk support, and aftermarket marketing of standard Woodward products within a specific geographic area and market segment.
- An **Authorized Independent Service Facility (AISF)** provides authorized service that includes repairs, repair parts, and warranty service on Woodward's behalf. Service (not new unit sales) is an AISF's primary mission.
- A **Recognized Engine Retrofitter (RER)** is an independent company that does retrofits and upgrades on reciprocating gas engines and dual-fuel conversions, and can provide the full line of Woodward systems and components for the retrofits and overhauls, emission compliance upgrades, long term service contracts, emergency repairs, etc.

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

Product Service Options

Depending on the type of product, the following options for servicing Woodward products may be available through your local Full-Service Distributor or the OEM or Packager of the equipment system.

- Replacement/Exchange (24-hour service)
- Flat Rate Repair
- Flat Rate Remanufacture

Replacement/Exchange: Replacement/Exchange is a premium program designed for the user who is in need of immediate service. It allows you to request and receive a like-new replacement unit in minimum time (usually within 24 hours of the request), providing a suitable unit is available at the time of the request, thereby minimizing costly downtime.

This option allows you to call your Full-Service Distributor in the event of an unexpected outage, or in advance of a scheduled outage, to request a replacement control unit. If the unit is available at the time of the call, it can usually be shipped out within 24 hours. You replace your field control unit with the like-new replacement and return the field unit to the Full-Service Distributor.

Flat Rate Repair: Flat Rate Repair is available for many of the standard mechanical products and some of the electronic products in the field. This program offers you repair service for your products with the advantage of knowing in advance what the cost will be.

Flat Rate Remanufacture: Flat Rate Remanufacture is very similar to the Flat Rate Repair option, with the exception that the unit will be returned to you in "like-new" condition. This option is applicable to mechanical products only.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned for repair, please contact your Full-Service Distributor in advance to obtain Return Authorization and shipping instructions.

When shipping the item(s), attach a tag with the following information:
- return number;
- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part number(s) and serial number(s);
- description of the problem;
- instructions describing the desired type of repair.

Packing a Control

Use the following materials when returning a complete control:
- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

NOTICE

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

Replacement Parts

When ordering replacement parts for controls, include the following information:
- the part number(s) (XXXX-XXXX) that is on the enclosure nameplate;
- the unit serial number, which is also on the nameplate.

Engineering Services

Woodward's Full-Service Distributors offer various Engineering Services for our products. For these services, you can contact the Distributor by telephone or by email.

- Technical Support
- Product Training
- Field Service

Technical Support is available from your equipment system supplier, your local Full-Service Distributor, or from many of Woodward's worldwide locations, depending upon the product and application. This service can assist you with technical questions or problem solving during the normal business hours of the Woodward location you contact.

Product Training is available as standard classes at many Distributor locations. Customized classes are also available, which can be tailored to your needs and held at one of our Distributor locations or at your site. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability.

Field Service engineering on-site support is available, depending on the product and location, from one of our Full-Service Distributors. The field engineers are experienced both on Woodward products as well as on much of the non-Woodward equipment with which our products interface.

For information on these services, please contact one of the Full-Service Distributors listed at **www.woodward.com/directory**.

Contacting Woodward's Support Organization

For the name of your nearest Woodward Full-Service Distributor or service facility, please consult our worldwide directory published at **www.woodward.com/directory**.

You can also contact the Woodward Customer Service Department at one of the following Woodward facilities to obtain the address and phone number of the nearest facility at which you can obtain information and service.

Products Used In Electrical Power Systems

Facility	Phone Number
Brazil	+55 (19) 3708 4800
China	+86 (512) 6762 6727
Germany:	
Kempen	+49 (0) 21 52 14 51
Stuttgart	+49 (711) 78954-510
India	+91 (124) 4399500
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 (124) 4399500
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 (124) 4399500
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
Poland	+48 12 295 13 00
United States	+1 (970) 482-5811

For the most current product support and contact information, please visit our website directory at **www.woodward.com/directory**.

Technical Assistance

If you need to contact technical assistance, you will need to provide the following information. Please write it down here before contacting the Engine OEM, the Packager, a Woodward Business Partner, or the Woodward factory:

General

Your Name _____

Site Location _____

Phone Number _____

Fax Number

Prime Mover Information

Manufacturer _____

Engine Model Number _____

Number of Cylinders _____

Type of Fuel (gas, gaseous, diesel, dual-fuel, etc.) _____

Power Output Rating _____

Application (power generation, marine, etc.)

Control/Governor Information

Control/Governor #1

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #2

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Control/Governor #3

Woodward Part Number & Rev. Letter _____

Control Description or Governor Type _____

Serial Number

Symptoms

Description _____

_____

If you have an electronic or programmable control, please have the adjustment setting positions or the menu settings written down and with you at the time of the call.

Revision History

Changes to Revision H—

- Added Regular Maintenance and Overhaul Recommendations to Chapter 3.

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We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 36692H.

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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.