WOODWARD

Product Manual 55077
(Revision NEW)
Original Instructions

Duplex Filter Assembly

1326-211

Installation and Operation Manual

General Precautions

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

Practice all plant and safety instructions and precautions.

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

Revisions

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

www.woodward.com/publications

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

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

Translated Publications

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

The original source of this publication may have been updated since this translation was made. Be sure to check manual *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 Out-of-date translations are marked with ⚠.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

General

The 1326-211 Duplex Filter Assembly provides a clean filtered oil from a hydraulic power source (not included) for use by hydraulic actuators to control steam or fuel valves of prime movers. The Duplex Filter shown in Figure 1-1 consists of:

- Single piece manifold housing
- 2 replaceable filler elements
- Selection lever
- Bleed and purge valve for each element
- Electrical ΔP (differential pressure) switch

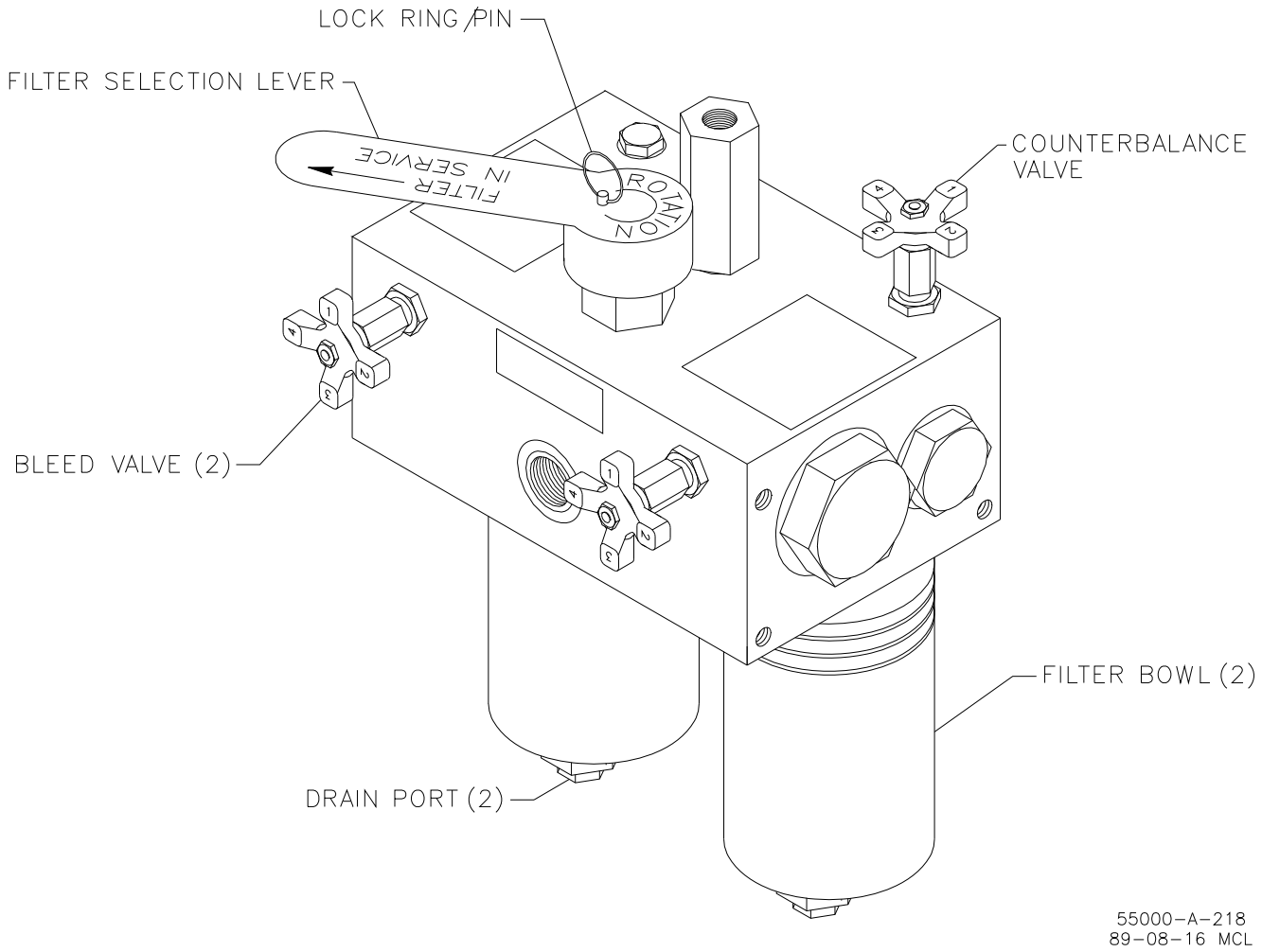

Figure 1-1. Duplex Filter Assembly

Specifications

Hydraulic:

Filtration:	10 µm absolute with Woodward P/N 1326-209 element
Viscosity:	50 to 2000 SUS (7.5 to 430 centistokes)
Output Flow:	20.0 US gal/min (75.7 L/min) maximum
Output Pressure:	2000 psig (13 790 kPa) maximum
Operating Temperature:	–40 to +225 °F (–40 to +107 °C)

Physical:

Height:	14.305 inches (363.35 mm) (allow additional 4.0”/102 mm for element removal)
Width:	10.875 inches (276.22 mm)
Depth:	12.375 inches (314.32 mm)
Weight:	36 lb (16 kg) dry
Mounting:	4 holes for 0.375-16 UNC bolts (see outline drawing for location)

Hydraulic Oil Connections

Input:	1.312-12 UN-2B Thread SAE-16 Straight Thread Port
Outlet:	1.312-12 UN-2B Thread SAE-16 Straight Thread Port
Bleed Port:	2 each 0.125-27 NPTF

Electrical:

ΔP Switch:	Indicator use only
Electrical Connections:	Pigtail leads in 0.500-14 NPT fitting

Repair Parts

Here are the replacement parts for the 1326-211 duplex filter assembly:

Quantity/Description	Manufacturer P/N	Woodward P/N
2 Filter Element O-ring, Viton	Parker V92151	1355-308
2 Filter Element	Parker 924423	1326-209

Chapter 2.
Description

General Description

The duplex filter assembly is designed to provide a clean filtered supply of hydraulic oil under pressure (pressure source not included) to an actuator for control of input fuel or steam to a prime mover. The 1326-211 duplex filter assembly provides a reliable source of filtered hydraulic oil to the actuator because of its redundant design. Two filter elements in the assembly are used to provide redundancy. The duplex filter assembly enables changing of filters while operating. A ΔP (differential pressure) switch is included that will close electrical contacts to indicate a plugged filter.

The duplex filter assembly consist of a manifold housing that contains two 3 µm filters, a differential pressure switch, check valves, and a selection lever. The selection lever is used to choose which filter is in use. When one filter is in service, the other is in standby. The selection lever swings through a 90 degree angle, and is positioned at either end of its movement. When in the right position, the right filter is in use while the left filter is in standby.

As the filter in use becomes contaminated or clogged, a pressure differential increases between input and output flow through the filter system. As the pressure differential increases to a preset limit (ΔP psig/kPa), the pressure switch is activated. This ΔP pressure switch closes contacts that can be wired to turn on an indicator light at a control panel to indicate to the system operator that the filter in operation has become dirty and should be changed. The operator may switch the selection lever to the other extreme of movement to put the other filter into operation and remove the dirty filler from use. (The lever should be moved quickly to prevent a drop in supply pressure to the actuator.) The dirty filter canister can then be removed, the filter changed, and air purged from the canister while the unit is on line. The new filter then becomes the standby. This allows continuous operation of the system during maintenance of the duplex filter assembly.

Operation

The duplex filter assembly (Figure 2-1) receives pressurized hydraulic oil from a hydraulic source. The duplex filler has two identical flow paths that are selected by the selector valve. Hydraulic oil goes from the selector valve through a 3 µm filter element and check valve to the output line. A ΔP (backpressure) switch compares the output pressure with the input pressure, and closes a contact to indicate when the filter element in use is plugged. The check valve prevents reverse oil flow through the filter element not in use so that it can be serviced while the other filter element continues to operate. The air bleed valve is used to purge air from the serviced filter element before returning it to a standby condition.

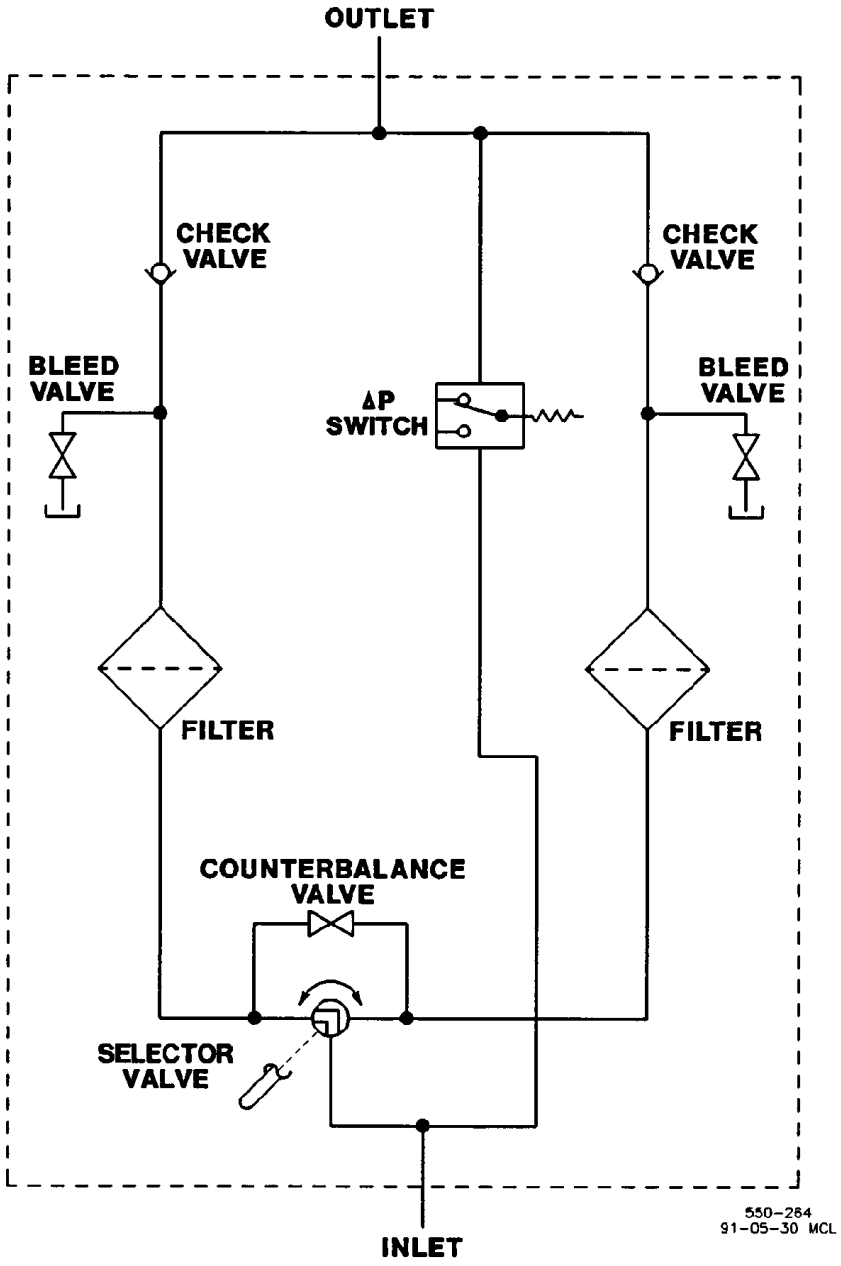

Figure 2-1. Duplex Filter Assembly Hydraulic Schematic

Chapter 3.
Installation

Receiving Instructions

The duplex filter assembly was carefully packed at the factory to protect it from damage during shipment. However, careless handling during shipment could have caused damage. Before unpacking the unit, carefully inspect the container for signs of shipping damage. Notify the shipper if damage is found.

Unpacking Instructions

Carefully open and remove the duplex filter assembly from the shipping container. Do not remove the shipping plugs from the hydraulic oil connections until ready to connect piping.

Mounting Instructions

The duplex filter assembly is designed for upright mounting.

Location Consideration

When selecting a location for the duplex filter assembly consider the following:

- Provide adequate ventilation and avoid placing it near heat producing devices.
- Place the unit as close as possible to the actuator device to reduce the length of the pressure output line from the duplex filter assembly to the actuator and the return oil line.
- Provide shielded electrical conduit to the ΔP switch of the duplex filter assembly to connect the electrical wiring.
- Allow clearance around the duplex filter assembly for servicing. Be sure to leave clearance for removing the filter elements.

Mounting Pad Preparation

The duplex filter assembly has four mounting holes in the side (2 on each side) of the manifold housing for 0.375-16 inch bolts (see Figure 3.1 for location). Prepare a mounting pad for the unit that will provide adequate support and protection from excessive vibration.

Installation

Install the duplex filter assembly on the mounting pad and secure with 0.375-16 inch bolts and locking devices (lock washers, lock wire, etc.).

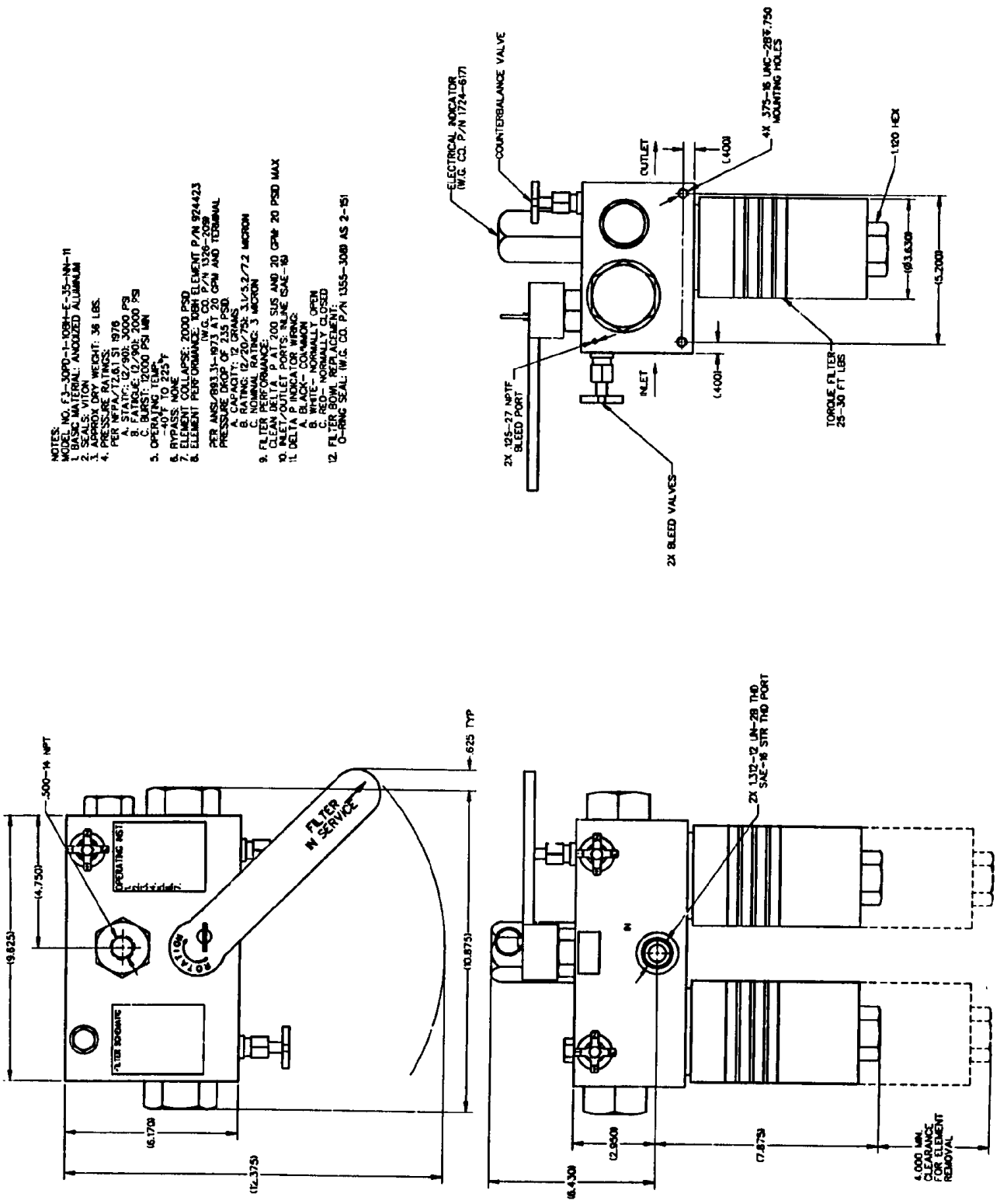

Figure 3-1. Duplex Filter Assembly Outline Drawing

Hydraulic Connections

Two hydraulic lines must be connected to the duplex filter assembly for operation, they are the input and output. The two bleed ports do not need lines connected, but it is recommended. Woodward recommends the use of steel or stainless steel tubing of as large a size as possible to reduce back pressure in the lines.

Input Connection

The input hydraulic line is connected to the port on the duplex filter assembly marked IN with a 1.312-12 UN-28 thread SAE-16 straight thread fitting. When connecting the input line to the filter, keep the line as short and straight as possible. Avoid bends and turns, as they lend to reduce line pressure.

Output Connection

The output hydraulic line is connected to the port on the duplex filter assembly marked OUT with a 1.312-12 UN-28 thread SAE-16 straight thread fitting. The output line should be connected to the duplex filter assembly so that it offers the least amount of back pressure at the actuator.

IMPORTANT

Woodward recommends the installation of an accumulator assembly between the duplex hydraulic power unit and the actuator. The accumulator will reduce or eliminate pressure fluctuations to the actuator.

Bleed Line Connections

The bleed lines are connected to the two bleed ports on the duplex filter assembly with 0.125-27 NPTF fittings. Route the output ends of the bleed lines to a sump or catch pan to collect any hydraulic oil that may be vented while bleeding air from a filter element.

Electrical Connections

The electrical connections to the ΔP switch on the duplex filter assembly are made at the pigtail leads inside the 0.500-14 NPT filling. See Figure 3-2 for the ΔP switch wiring diagram, and keep the following in mind:

- Use 14–18 AWG (0.8–2.0 mm²) wire for connecting the switch and indicators (in the control room).
- Follow standard wiring procedures and any special local procedures.

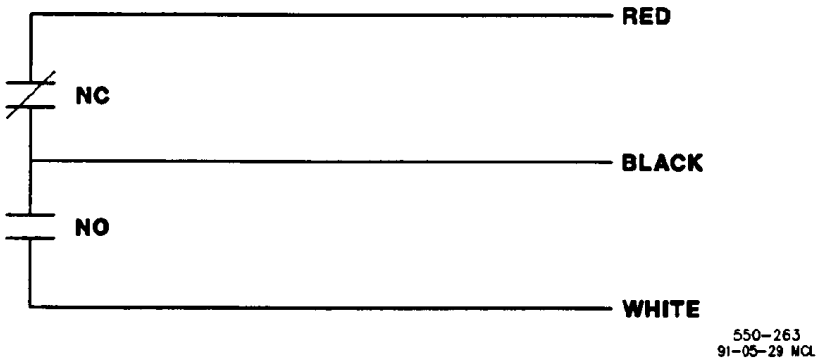

Figure 3-2. ΔP Switch Wiring Diagram

Initial Servicing

Alter installation of the duplex filter assembly and connection of hydraulic lines and electrical connections, the unit must be serviced before operating. Perform the following:

1. Verify that all hydraulic lines are properly connected and the fittings tight.

2. Fill the reservoir of the hydraulic source with clean hydraulic fluid or lubricating oil. Follow the instructions for the hydraulic source and fill to the proper level. Secure the filler cap.

IMPORTANT **Prime mover lubricating oil may be used if it meets the recommended oil properties and characteristics outlined in Woodward Manual 25071, Oils for Hydraulic Controls.**

3. Verify that the duplex filter assembly elements are installed and the covers are tightened.

4. Verify that the air purge valves on the duplex filter are closed.

System Flush Instructions

Before normal operation of hydraulic system, including the hydraulic source, duplex filter assembly, and actuator, it is necessary to flush contaminants from the system (including the lines). This is done after installation; the actuator is removed from the system by means of a flexible bypass jumper. Bypassing the actuator prevents contaminants from entering it and becoming trapped in the actuator or its filters or screens.

NOTICE **Equipment damage may result if contaminants from hydraulic lines are not flushed before operation of system.**

1. Remove the actuator from the system by bypassing it using a short hose attached to the supply and drain lines of the hydraulic system.

2. Apply power to the hydraulic source, following the manufacturers instructions and put it into operation.

3. Verify that the duplex filter selection lever is in either the full right or full left position.

4. Verify that oil is flowing through the hydraulic system and lines.

5. Operate the system for as least 2 hours to allow all contaminants to be removed from the system lines.

6. While the system is operating, verify that the oil level is correct. Inspect the system for leaks, and repair if found.

7. After the 2 hour flush, switch the duplex filter selection lever to the standby filler. Change the dirty filter (see duplex filter change procedure).

IMPORTANT **It may be necessary to change the dirty filter more than once during the 2-hour flush period.**

8. After the filter change is complete, shut off the hydraulic source.

9. Remove the jumper hose around the actuator and connect the actuator in the system.

Start-up and Air Purging

NOTICE **Equipment damage can result if the air is not purged from the hydraulic lines of the hydraulic system and actuator before operating the prime mover. Air not purged from the hydraulic system, actuator, and connecting lines can cause damage to equipment and erratic operation of the prime mover.**

Before normal operation, it is necessary to purge air from the hydraulic system. This must be done after initial installation or after changing the hydraulic oil in she hydraulic source reservoir. To purge air from the system, perform the following procedure:

⚠WARNING **To prevent personal injury and damage to equipment, secure the prime mover to prevent its operation during the following procedure.**

1. Apply power to the hydraulic source.

2. Place the duplex filter selection lever in the full right position. (Pull up on the ring and move lever to the right, the pin will snap in place when the lever is in the full right position.)

3. Start the hydraulic source, following the manufacturers instructions.

4, Verify that hydraulic oil is circulating through the hydraulic system and the output pressure is increasing.

5. Using the actuator control device, cause the actuator to stroke from full closed to full open several times to purge air from the actuator.

6. Open the counterbalance and air purge valve for the left fitter on the duplex filter assembly to purge air from the left filter element. Close the valves when the air Is purged.

7. As the hydraulic system, actuator, and connecting lines fill with hydraulic oil and the air is purged, check the oil level in the reservoir of the hydraulic source—it must not drop below the proper level. Add more oil if the level is low.

8. Inspect the entire system for leaks, tighten or repair as needed.

9, Continue to run the hydraulic system, and keep stroking the actuator until all air is purged.

10. Close the actuator.

11. The hydraulic system is now ready for normal operation.

Chapter 4.
Maintenance

Hydraulic Oil

For continued operation of the hydraulic system and actuator, it is important that the oil in the hydraulic oil source reservoir be kept up to the proper level, and that it not become contaminated. Dirt contamination is filtered out with the duplex filter assembly. Other types of contamination such as dilution or mixing with other fluids require that the oil in the system be changed and replaced with clean new oil. A regular maintenance schedule must include inspection of the oil level and quality checks of the oil. Woodward manual 25071, Oils for Hydraulic Controls, contains information on recommended oil properties and characteristics. Prime mover lubricating oil may be used if it meets these recommendations and is clean.

Maintenance Checks

Regular maintenance checks of the hydraulic system should include:

- Visually check and maintain proper oil level. Check oil quality and replace if contaminated or diluted.
- Check the oil operating temperature. Adjust if necessary.
- Inspect for and stop oil leaks In lines and fittings.
- Remove and clean reservoir breather cap (if provided) on a regular basis.
- Approximately every 6 months, have an oil analysis performed by a qualified chemical laboratory. If oil needs to be changed as this time (because of contamination, shift in viscosity, high water content, etc.), change oil, and perform an oil analysis at 3-month intervals. If oil appears contaminated or breakdown of oil is excessive, investigate the source or problem and correct if possible. Oil should last at least 6 months and it is not uncommon for it to remain usable for several years with proper maintenance when it is free from harsh environments.

Duplex Filter Replacement

When replacement of a filter element in the duplex filter (see Figure 4-1) is indicated, perform the following:

1. Check that air has been purged from the standby filter by opening the bleed valve and counterbalance valve. When oil is discharged from the bleed valve, close it. Close the counterbalance valve.

2. Switch the filter in use by placing the filter selection lever in the other position. (Pull up on the lock ring/pin, move the lever to the full travel position and the lock ring/pin will snap into place.

3. Open the bleed valve for the filter to be replaced, to vent pressure from the chamber. (The other bleed valve and the counterbalance valve must be closed.)

4. Remove the bowl and filter element.

5. Wipe the bowl clean and install a new fitter element (Woodward P/N 1326-209 or Parker No. 924423).

6. Inspect the O-ring seal for damage. If damaged, replace with a new O-ring (Woodward P/N 1355-308).

7. Replace the bowl and tighten to 25–30 lb-ft (34–41 N·m). If leaks are present during operation, repeat the procedure and re-inspect the O-ring.

8. Open the counterbalance valve to fill the chamber of the standby filter, and purge the air. Close the bleed valve when the air is purged.

9. Close the counterbalance valve. The clean standby filter is ready for use.

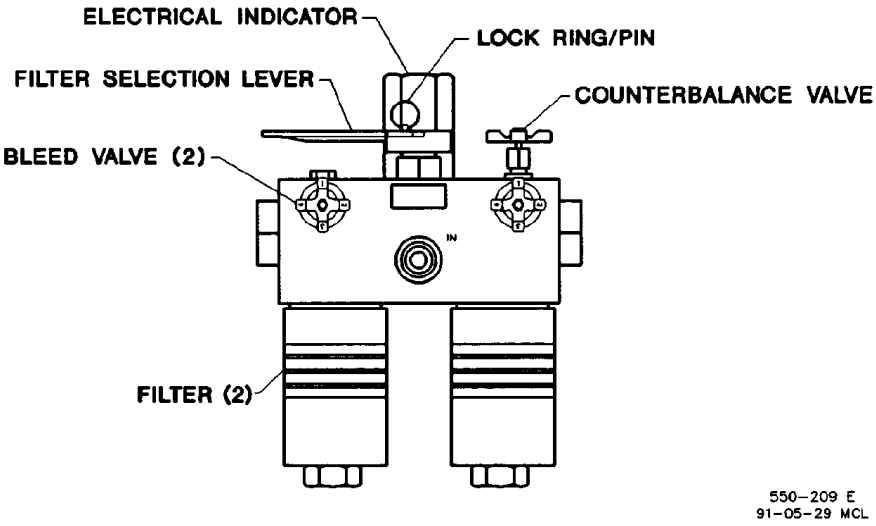

Figure 4-1. Duplex Filter Assembly

Chapter 5.
Troubleshooting the Hydraulic System

The following contains general information on troubleshooting the hydraulic system.

1. Dirty oil can be caused by:
- Improperly cleaned components
- Inadequately screened fill pipe
- An improperly assembled air filler/breather
- Improperly seated or broken gaskets which permit dirt to leak past missing gasket material
- Inadequately protected pipe lines during service
- Dirty or ruptured filters

2. Foaming oil can be caused by:
- A low oil level
- Broken pipe
- Incompatible foreign material in the oil (water for example)
- A suction leak in the pump
- Missing anti-foaming additives

3. Moisture in the oil can be caused by:
- Condensation caused by cold water lines placed against hot tank
- Poorly gasketed tanks or open fill lines
- Moisture in replacement oil tanks
- Extreme temperature variations
- Long-term, undrained water accumulation

4. System overheating can be caused by:
- Continuous operation at a relief setting:
  - Stalling under load
  - Oil viscosity is too high or too low
- Excessive slip or internal leaking:
  - Stall leakage past pumps
  - Oil viscosity too low
- Pipe, hose, and tube inside diameter which is too small
- Wrong size valving
- Inadequate tank air circulation
- A relief valve set too high
- The unit operating in a high-temperature location

5. Foreign material in system can be caused by:
- Improper removal of pipe scale
- Sealing compound inside fittings
- Burrs on the pipe
- Shipping or packing material in the unit
- Improper sealing of the unit
- Unprotected open lines, components, etc., during repair
- Rams without wipers or boots
- Contaminated repair/replacement parts

6. Excessively heated oil can be caused by:
- System temperature too high
- Unloading valve set too high
- Dirty oil or low supply of oil
- Incorrect oil viscosity
- Faulty oil temperature system
- Worn pump, valve, motor, cylinder, or other component

7. Low oil pressure can be caused by:
- The existence of a pressure relief path
- Pressure reducing valve set too low
- Damaged pressure reducing valve
- Damaged pump, motor, or cylinder

8. Erratic pressure can be caused by:
- Aerated reservoir oil
- Worn relief valve
- Contaminated oil
- Accumulator defective or has lost charge
- Worn pump, motor, or cylinder

9. Excessive pressure can be caused by:
- Improperly adjusted pressure reducing or unloading valve
- Worn or damaged pressure reducing or unloading valve

10. No actuator movement can be caused by:
- No oil flow or pressure
- Inoperative or misadjusted limit or sequence device
- Mechanical bind
- No control signal to the servo amplifier
- Inoperative servo valve
- Worn or damaged cylinder

11. Slow actuator movement can be caused by:
- Low flow
- Oil viscosity too high
- Insufficient control pressure for the valves
- No lubrication of linkage
- Misadjusted or malfunctioning servo amplifier
- Sticking servo valve
- Worn or damaged cylinder

12. Erratic movement can be caused by:
- Erratic pressure
- Aerated reservoir oil
- No lubrication of the linkage
- Erratic command signal
- Misadjusted or malfunctioning actuator
- Malfunctioning actuator feedback transducer
- Sticking servo valve
- Worn or damaged cylinder

13. Excessive actuator speed or movement can be caused by:
- Excessive oil flow
- Malfunctioning actuator feedback transducer
- Misadjusted or malfunctioning actuator
- Overriding the work load

Chapter 6.
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.

You can locate your nearest Woodward distributor, AISF, RER, or RTR on our website at:

www.woodward.com/directory

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**.

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	+49 (0) 21 52 14 51
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	+49 (711) 78954-510
India	+91 (129) 4097100
Japan	+81 (43) 213-2191
Korea	+82 (51) 636-7080
The Netherlands	+31 (23) 5661111
United States	+1 (970) 482-5811

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 locate your nearest Woodward distributor or service facility on our website at:

www.woodward.com/directory

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.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 55077.

WOODWARD

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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.

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