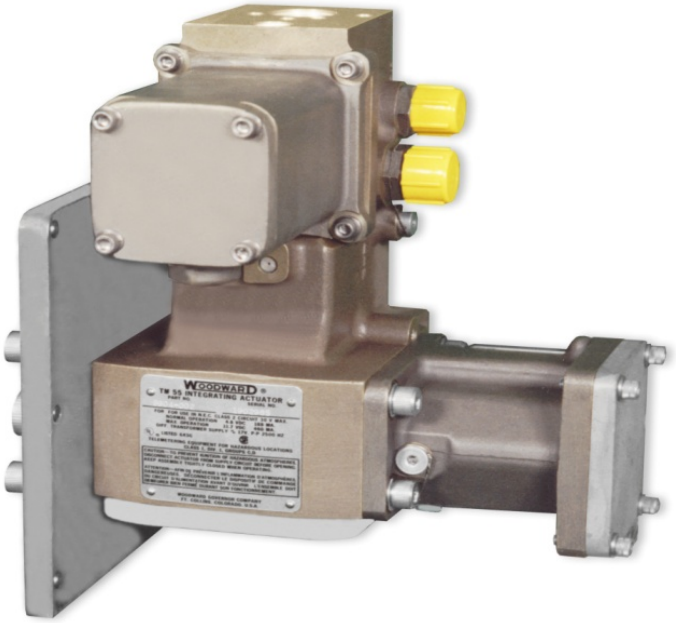
WOODWARD

Product Manual 82768
(Revision C)
Original Instructions



TM-55 Integrating Actuator

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 Out-of-date translations are marked with ⚠.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.

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

Description

The TM-55 integrating actuator is an electro-hydraulic actuator that uses null current settings between 0 and 175 mA. The TM-55 is used for controlling diesel and gas engines or steam and industrial applications of gas turbines and is designed for use with Woodward 43027 electronic controls. It will interface with an adapter directly to Woodward liquid and gas fuel valves. The TM-55 has an aluminum case with through hardened stainless steel internal parts. It weighs about 6.6 kg (14.5 lb).

The TM-55 actuator is UL Listed for use in Class I, Division 1, Groups C and D.

In the actuator, a torque motor servo-valve is energized by the electric control to generate a pressure differential applied to the ends of, and to operate, the second stage spool valve. Supply pressure is controlled by the spool valve to move a double acting servo piston and provide output shaft rotation. An electrical position feedback transducer is used to supply a feedback signal to the electronic control allowing closed loop control of actuator output shaft position.

Hydraulic fluid is sealed from the torque motor by a preformed packing ring between the armature and the servo-valve housing, eliminating the accumulation of magnetic contaminants. the hydraulic inlet fitting incorporates a 70 µm absolute filter screen for additional protection from contaminants in the event of an upstream filter failure.

References

Product specification 82767, *TM-55 Integrating Actuator*

Chapter 2. Installation

Introduction

Use care while handling and installing the actuator. Be particularly careful to avoid striking the output shaft. Abuse can damage seals, installation surfaces, and factory adjustments. Hydraulic connections must be protected by plastic shipping caps whenever the actuator is not connected to the normal piping.

Receiving

The TM-55 actuator is calibrated and drained of calibration fluid at the factory. It is then placed in a cardboard container filled with urethane foam for delivery to the customer. Additional cleaning or calibration is not necessary before installation or operation.

Storage

The TM-55 actuator may be stored as received from the factory for a period of time before installation.

Installation

See the outline drawing, Figure 2-2, for:

- overall dimensions
- installation hole locations
- hydraulic fitting sizes
- output shaft dimensions
- adjustment locations
- electrical connections

Installation attitude does not affect actuator performance.

Make provisions for proper filtration of the hydraulic fluid that is to be supplied to the TM-55 actuator. It is recommended that a 10 µm (nominal) filter be installed in the supply line to the actuator. Take care to keep the immediate area clean and free of dirt and other contaminants.

Hydraulic cleanliness level: ISO 4406 20/18/15 minimum

Make all hydraulic connections that are needed. Supply pressure for the TM-55 actuator can be from either positive displacement or centrifugal type pumps. Woodward recommends the use of a pressure switch to ensure that correct supply pressure is established prior to start-up and continually thereafter.

Table 2-1. Supply Characteristics

Fluid Types:	Mineral or synthetic based oils, diesel fuels, kerosenes, gasolines, or light distillate fuels.
Specific Gravity:	0.6 to 1.0
Recommended Viscosity:	0.6 to 400 centistokes
External Filter:	10 µm nominal
Supply Pressure:	A nominal level between 2758 and 8274 kPa (400 and 1200 psig)

Table 2-2. Flow Requirements

Supply Pressure	Steady State Max. Flow	Transient Flow	Max. Work.
2758 kPa 400 psig	1.1 L/min 0.3 US gal/min	9.5 L/min 2.5 US gal/min	30 J 22 ft-lb
6895 kPa 1000 psig	1.9 L/min 0.5 US gal/min	10.2 L/min 2.7 US gal/min	75 J 55 ft-lb

In applications, where the actuator is supplied without an attached Woodward valve, the customer must assemble the fuel valve or valve linkage to the actuator. These attachments must be secure, free of binding and backlash. It is very important that this linkage between the electric control/actuator output and the fuel system be of correct relationship for proper operation. Use as much of the 45° actuator travel as possible between minimum and maximum flow points. In no case should less than 35° actuator travel be used.

Make all electrical connections that are required using applicable Woodward electric control manuals. A plant wiring diagram will be supplied upon request. In applications where the TM-55 actuator is not used with a Woodward electric control, electrical input requirements will also be supplied upon request.

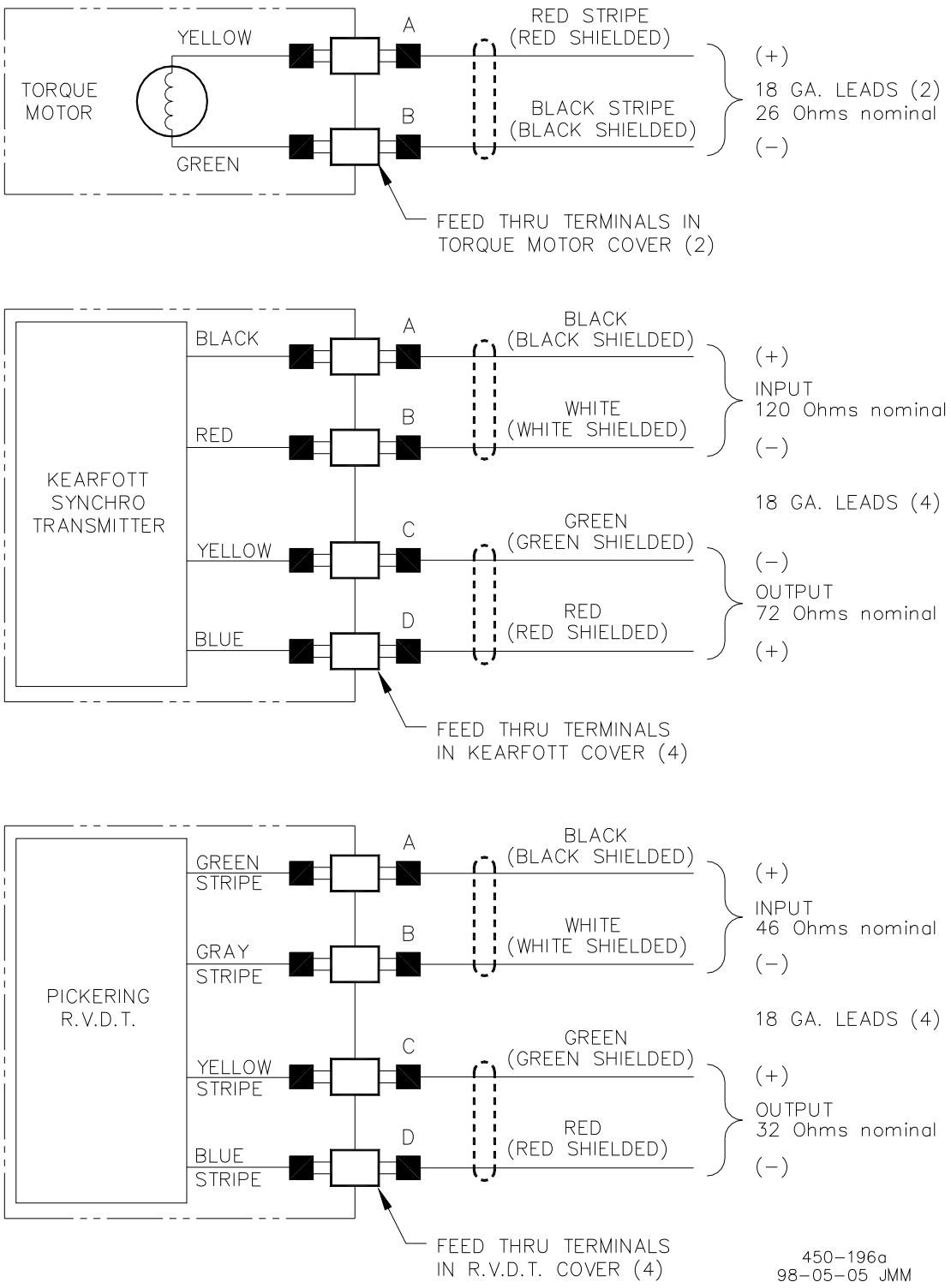


Figure 2-1. Wiring Diagram for TM-55 Actuator

IMPORTANT **On feedback transducers, polarity shown indicates feedback output signal in phase with excitation signal.**

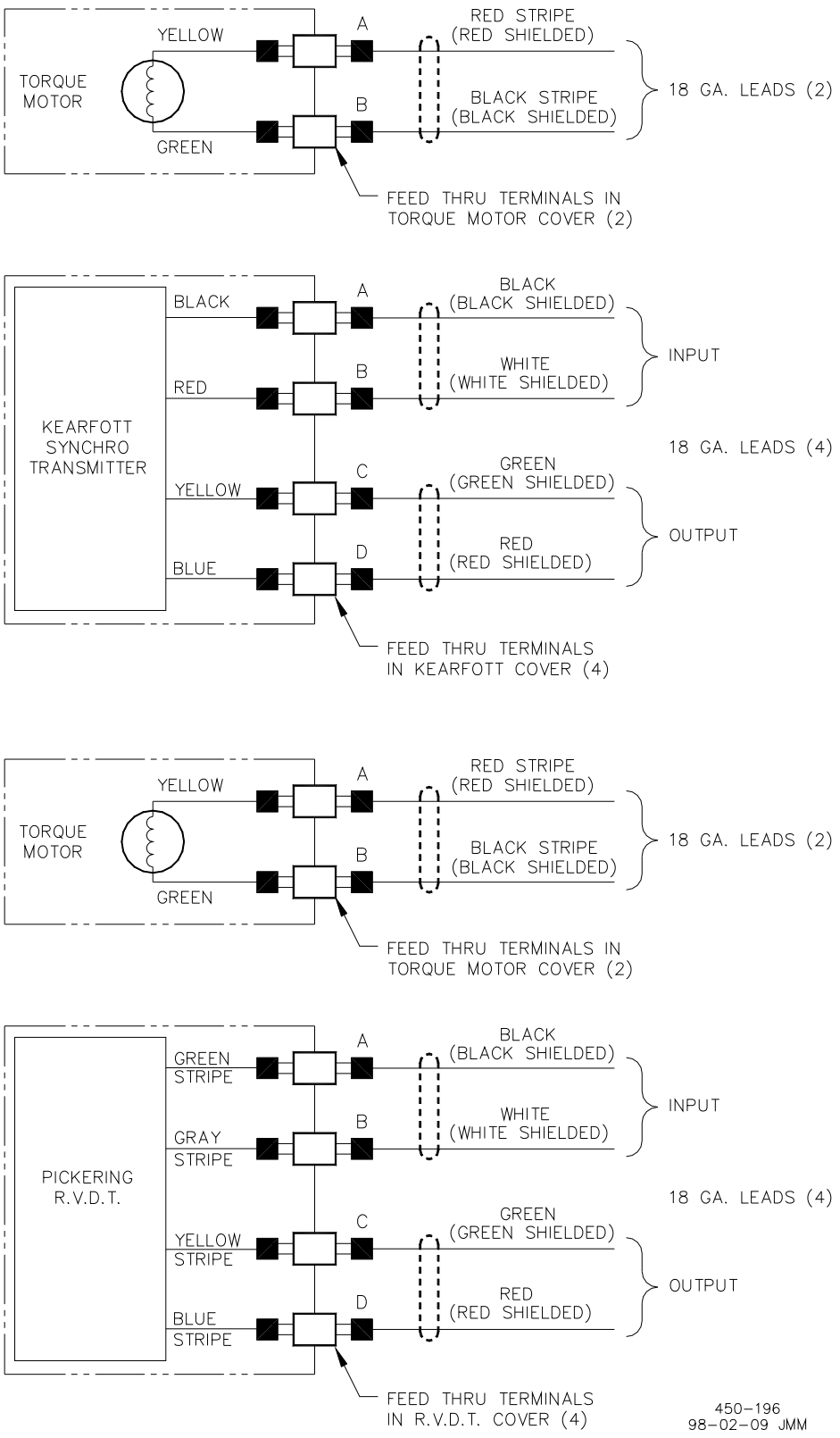


Figure 2-2. Wiring Diagram for TM-55 Actuator

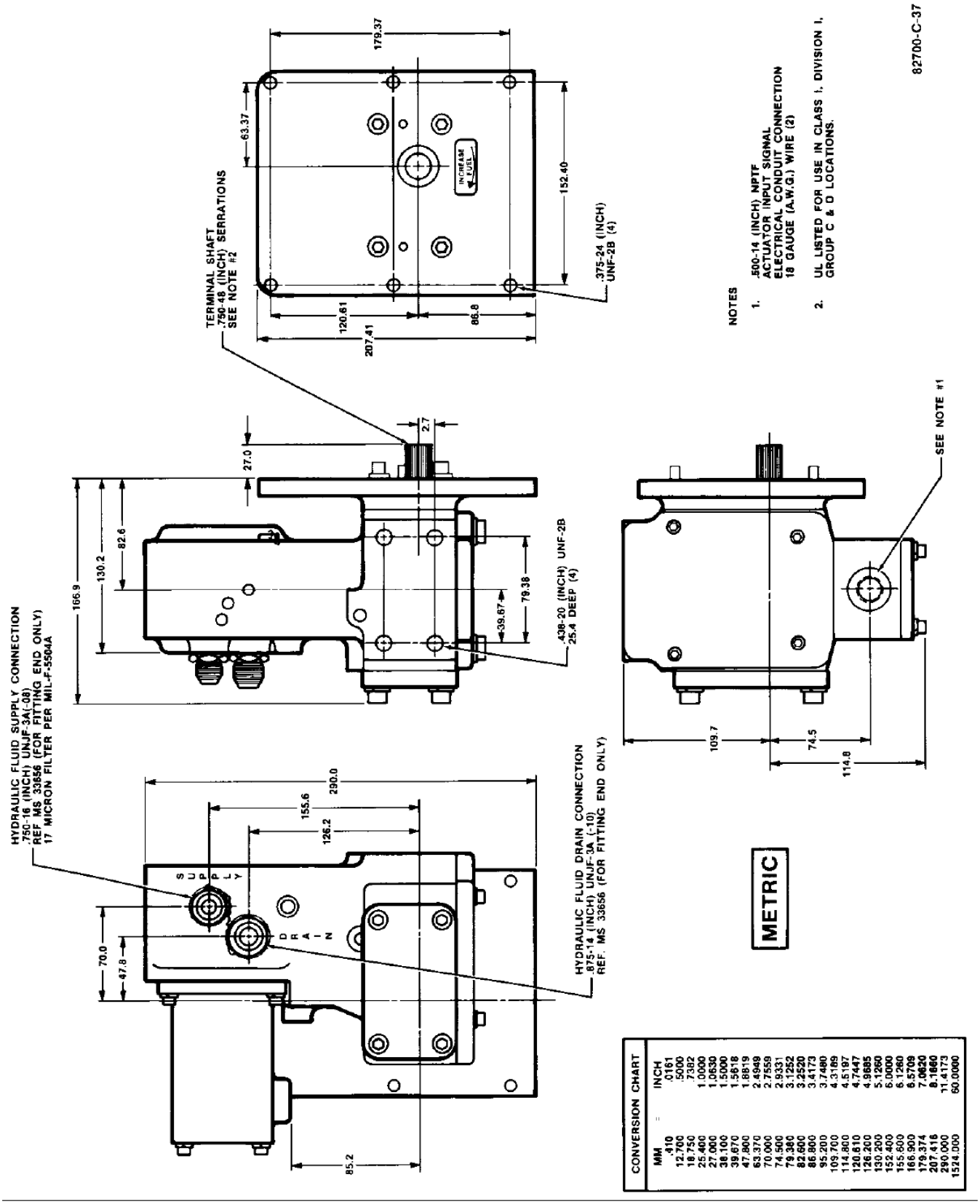


Figure 2-3. Outline Drawing, TM-55 Integrating Actuator

Chapter 3.
Initial Operation

Initial Operation

Before initial operation of the actuator, check that all previous installation and hookup steps are successfully accomplished and all linkages (if any), electrical connections, and hydraulic fittings are secure and properly attached.

Make certain that correct hydraulic supply pressure to the actuator is established before start-up. Trapped air within the hydraulic system may cause erratic behavior of the actuator during the first few minutes of initial operation. Use applicable Woodward manuals for the particular Woodward electric control to begin prime mover operation.

Woodward recommends adequate dither be used on all hydraulic actuators to minimize mA threshold and hysteresis which can result from second stage static friction or hydraulic contamination.

Dither is a low amplitude, relatively high frequency periodic signal that is superimposed on the servovalve input current signal. A typical dither signal generated by a Woodward control is:

- 25 Hz, 0–10 mA (tunable) amplitude
- 25% duty cycle, bipolar, square wave

Adequate dither is defined as that amount which produces no more than .0005 inch total oscillation in output shaft position.

⚠WARNING

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

Null current shifts of up to ±4% of maximum rated current (200 mA) can occur due to variations in the following parameters:

- hydraulic supply and return pressures
- hydraulic fluid temperature
- servovalve and actuator wear

Due to the inherent null shifts and position drift of all hydraulic servovalves and proportional actuators, engine control applications must be designed with these errors in mind.

Adjustments

Normally, all operating adjustments are made to the TM-55 actuator during factory calibration according to specifications provided by the customer and should not require further adjustment. Do not attempt adjustments to the actuator unless thoroughly familiar with the proper procedures. If an adjustment/ calibration must be made to the null current (level adjustment) follow these steps:

1. Remove the plug (15) that covers the level adjusting screw.

IMPORTANT

To remove plug (15): puncture the center of the plug with a sharp tool, being careful not to penetrate the plug to the depth of the level adjusting screw (14). Gently, but firmly, pry the plug from the case.

2. With the actuator output in mid range, use a 3/16” Allen wrench to adjust the null level adjustment (14) for the specified null current (not to exceed 175 mA).

Chapter 4.
Principles of Operation

The TM-55 actuator consists of three basic sections:

- A torque motor servo-valve
- A spring-centered, four-land spool valve
- A double-sided, equal-area servo piston linked to the rotary output shaft

The essential element of the TM-55 is the torque motor servovalve which uses a double nozzle and flapper to generate a differential pressure to operate the second stage spool valve. The torque motor receives dc current signals from the electric control and applies torque to the single piece armature and flapper which is supported on a torsion flexure. The servovalve uses the flapper as a variable flow restrictor and throttles the flow of hydraulic fluid from a nozzle on each side of the flapper. The two nozzles are supplied hydraulic fluid from the actuator supply pressure inlet via separate, fixed orifices. During steady state operation, the flapper is centered between the nozzles and the two pressures, Pc1 and Pc2, are equal.

The integrating actuator is used with an electronic position control circuit which compares position demand (Vc) and feedback (Vk) signals. When the actuator output shaft is stationary, coil current is at the null value. Any change in position demand voltage will result in a change in coil current until the actuator moves to the new required position. When position demand signal is increased, there will be a positive position error causing a rise in coil current.

The increased current raises the flapper and restricts hydraulic flow from the upper nozzle while flow from the lower nozzle increases. The resulting differential pressure is applied to the ends of the spool valve, lowering it from the spring centered null position.

When lowered, the spool valve directs supply pressure to the top side of the servo piston, and simultaneously, vents the underside of the servo piston to drain at the lower control port. The servo piston then moves down, and through a linkage to the output shaft, increases actuator shaft position. As the output shaft moves to an increase fuel position, the voltage output of the position feedback transducer also increases. This increase is sensed by the control circuit and reduces the coil current back to the null value.

Null current is determined by a spring applied biasing force on the flapper valve. The bias force is determined by the Level Adjustment.

Loss of the null current will put the actuator at minimum output.

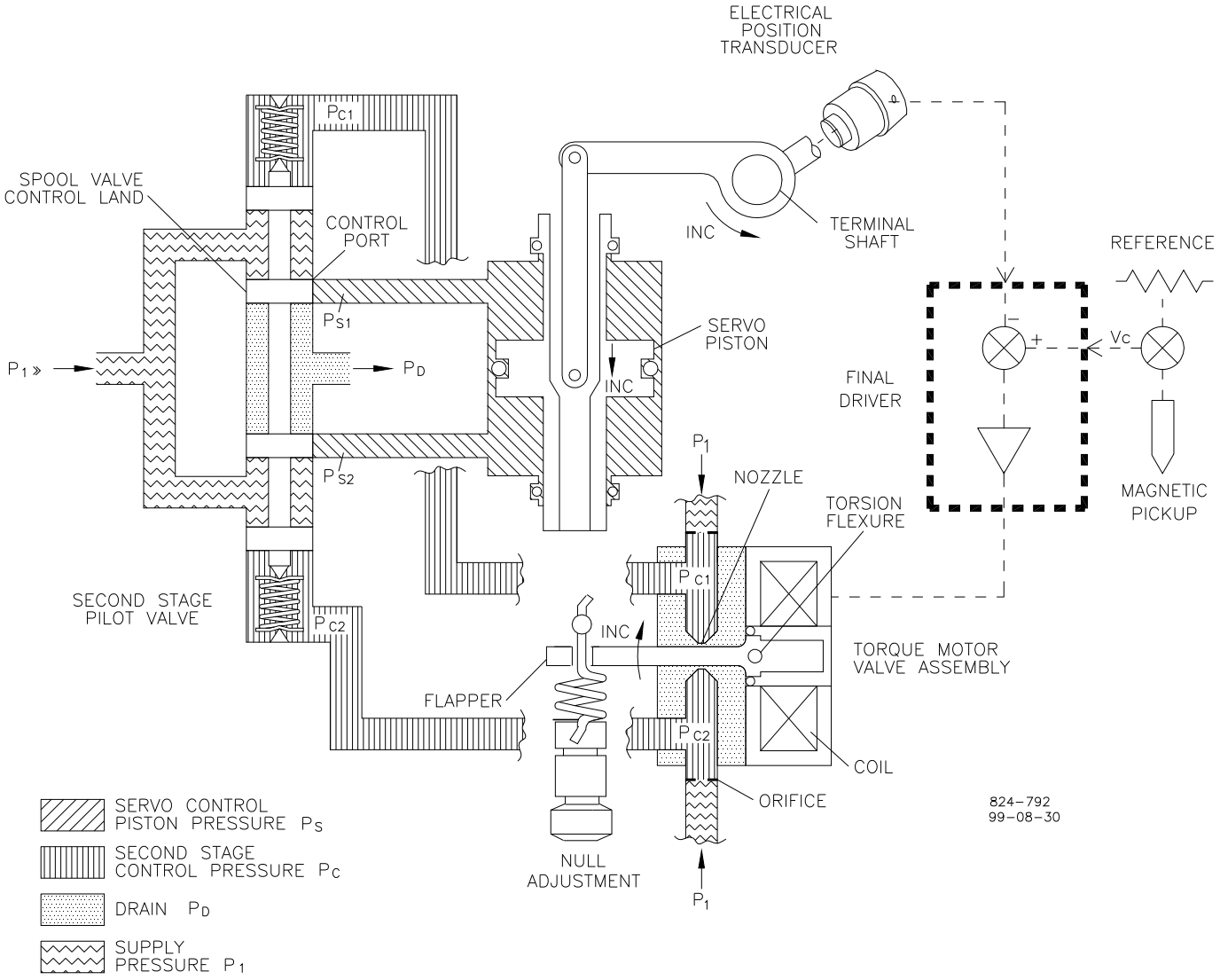


Figure 4-1. Schematic of the TM-55 Integrating Actuator

Chapter 5. Maintenance

Introduction

Contaminant resistance of the TM-55 actuator is excellent due to design features and high working forces. However, the service life of the actuator is increased with the use of clean supply flow.

Filter Cleaning

The TM-55 actuator is equipped with a 40 µm (nominal) filter fitting at the supply connection. See the outline drawing (Figure 2-2) for its location. If the filter becomes clogged, as evidenced by sluggish response, it may be cleaned ultrasonically, and back flushed with a light solvent.

Troubleshooting

Faults in the governing system are usually revealed as speed variations of the prime mover, but it does not necessarily follow that such speed variations indicate governing system faults.

Therefore, when improper speed variations appear, check all components including the engine or turbine for proper operation. Refer to applicable Woodward electric control manuals for assistance in isolating the trouble. The following steps describe troubleshooting for the actuator.

1. Customer installed linkage between the actuator and liquid or gas valve should be checked. A common source of trouble is binding or lost motion in the linkage.

2. If, during the starting sequence, the actuator does not respond to electric control input, check the actuator pressure supply and filters in the supply line.

Disassembly of the TM-55 actuator in the field is not recommended. Under unusual circumstances where disassembly becomes necessary, all work and adjustments should be made only by personnel thoroughly trained in the proper procedures.

When requesting information of service help from Woodward, it is important to include the part number and serial number of the actuator in your communication.

Chapter 6.
Replacement Parts

Introduction

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

- Serial number and part number shown on the actuator nameplate
- Manual number (this is manual 82768)
- Part reference number in parts list

Parts List for the TM-55 Integrating Actuator

Ref. No.	Part Name	Quantity
82768-1	Screw - .375-24 x 1.500	4
82768-2	Washer - .375	4
82768-3	Mounting plate assembly	1
82768-4	Preformed packing - 1.174 ID x .103	2
82768-5	Step seal - .812	1
82768-6	Preformed packing - .924 ID x .103	1
82768-7	Shaft seal plug	1
82768-8	Bearing assembly	1
82768-9	Output shaft	1
82768-10	Preformed packing– included with torque motor assembly	1
82768-11	Preformed packing– included with torque motor assembly	1
82768-12	Plug - .438	1
82768-13	Preformed packing - .351 ID x .072	2
82768-14	Extension spring level adjustment	1
82768-15	Plug	1
82768-16	Plunder bushing	1
82768-17	Preformed packing - .551 ID x .070	6
82768-18	Expansion plug	1
82768-19	Spring support assembly	2
82768-20	Preformed packing - .737 ID x .103	2
82768-21	Plunger spring assembly	2
82768-22	Retainer assembly	1
82768-23	Pilot valve plunger	1
82768-24	Preformed packing	1
82768-25	Filter fitting	1
82768-26	Preformed packing	1
82768-27	Connector assembly	1
82768-28	Washer	13
82768-29	Screw - .250-18 x 1.000	11
82768-30	Plug	1
82768-31	Preformed packing	3
82768-32	Step seal	3
82768-33	Shim	2
82768-34	Shim	2
82768-35	Bearing assembly	1
82768-36	Cover	1
82768-37	Preformed packing - 4.489 ID x .070	1
82768-38	Retainer ring	1
82768-39	Washer	1
82768-40	Inner race	2
82768-41	Headed pin	1
82768-42	Cover	1
82768-43	Preformed packing	1
82768-44	Bowed retaining ring	1
82768-45	Piston rod guide tube	1
82768-46	Link assembly	1
82768-47	Preformed packing	1
82768-48	Pin - .375 OD x 1.062	1
82768-49	Servo pin	1
82768-50	Preformed packing	1
82768-51	Seal - 1.250	1
82768-52	Servo sleeve	1
82768-53	Preformed packing	1
82768-54	Ring seal	1
82768-55	Nameplate	1
82768-56	Drive screw	4
82768-57	Body assembly	1
82768-58	Torque motor	1
82768-59	Housing assembly	1
82768-60	Cover	1
82768-61	Screw - 6.32 x .250	1
82768-62	Washer	1
82768-63	Clamp	1
82768-64	Cover	1
82768-65	Preformed packing - 2.114 ID x .070	1
82768-66	Transmitter	1
82768-67	Screw - 4-40 cleat	3
82768-68	Bellows coupling	1
82768-69	Preformed packing	1
82768-70	Seal .312	1
82768-71	Washer	1
82768-72	Kearfott housing assembly	1
82768-73	Clamp	1
82768-74	Washer	1
82768-75	Screw - 6-32 x .250	1
82768-76	Plug	1
82768-77	Cover	1
82768-78	Lever assembly	1

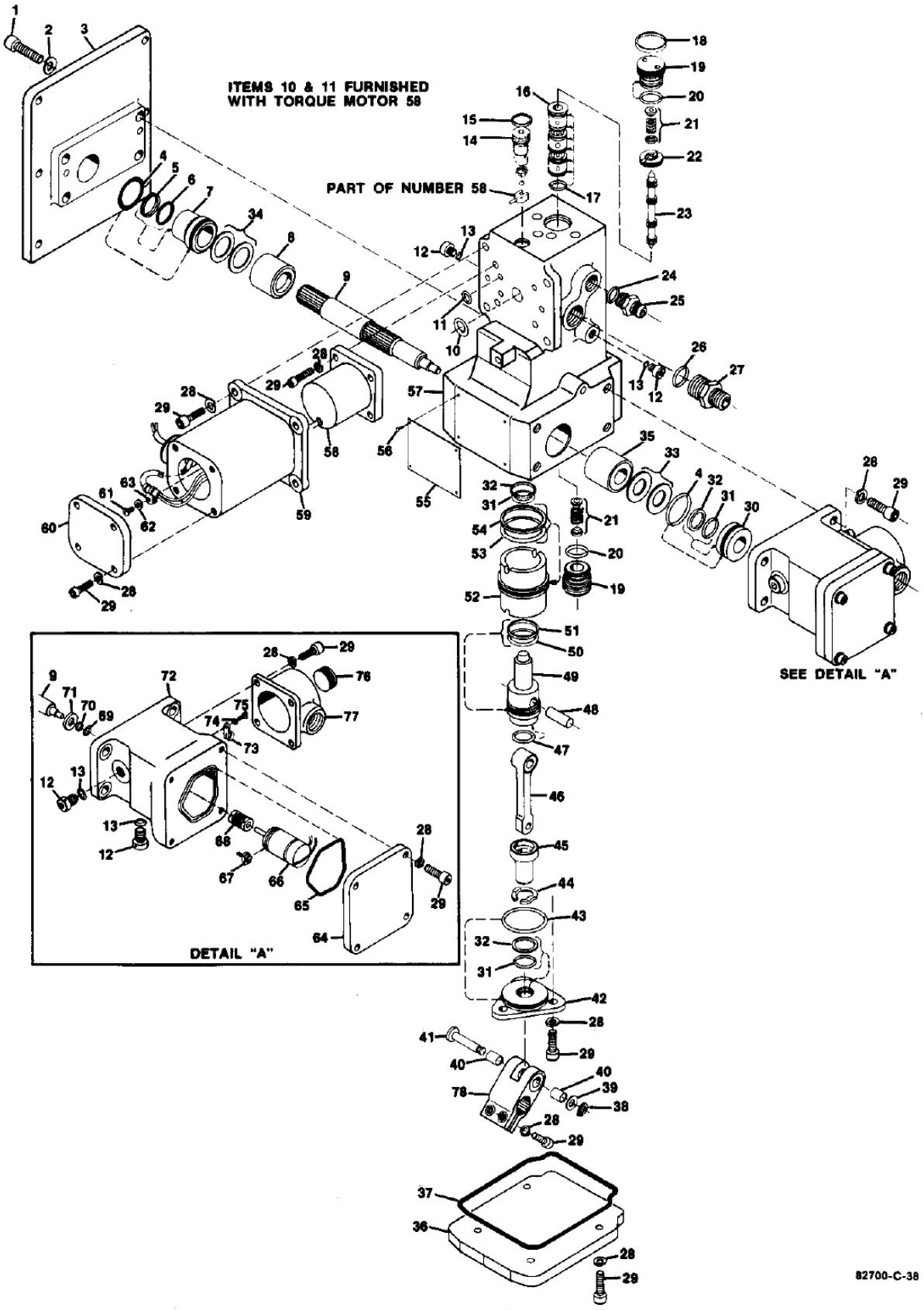


Figure 6-1. Exploded Drawing, TM-55 Integrating Actuator

Chapter 7.
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 82768C.

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