WOODWARD

**Product Manual 01504**
**(Revision B)**
**Original Instructions**

# RVDT Setup and Polarity Checking Tool for EG Governors

**T87444**

**Operation and Calibration 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 Out-of-date translations are marked with ⚠.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.**

# 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.

# RVDT Setup and Polarity Checking Tool. Operation and Calibration

## Introduction

T87444 checks the polarity and position of the Rotary Variable-Differential Transformer (RVDT) used with a Woodward EG10P actuator. The tool provides the excitation signal for an RVDT, and then accurately displays the position signal returned on a digital volt meter.

### Purpose

The purpose of the T87444 is to provide an excitation signal to the RVDT in the EG governor and display a dc voltage relevant to position. Two lamps display the polarity of the return signal. The green lamp indicates that the polarity of the return signal is correct (+) and the red lamp indicates that the return signal is incorrect (–).

### Physical Description

The T87444 is housed in an 8.5 x 9.25 x 5.5 inch hard plastic case. The front panel has:

- An ON/OFF switch for power
- A 3½ digit dc voltmeter
- A connector for the cable to governor interface
- A red lamp and a green lamp to display polarity
- A six-foot long cord to connect the test box to 115 Vdc power

### Circuit Description

The T87444 applies a 2.50 kHz square wave to the RVDT. The return signal from the RVDT is input to a solid-state, full-wave bridge that is turned on in phase with the excitation signal. The resulting signal is filtered, amplified, and sent to the DVM.

Two lamps on the front panel are used to show the polarity of the dc signal. The red lamp will light if the RVDT is improperly installed. A properly installed RVDT will light the green lamp.

## Operation

The T87444 is connected to the EG governor with the cable supplied. Connect the round connector to the test box. Connect the colored clips to the appropriate connection on the governor. Use the proper wiring diagram and TSP for the governor being tested. The Green and Gray clips on the cable carry the exciter signal to the RVDT unit in the actuator. In most cases the Green clip should be attached to the G pin on the actuator and the Grey clip should be attached to the H pin on the actuator. With this connection the green light on the test box should light.

**IMPORTANT** **There is a small hysteresis band at zero volts that will cause the two lamps to be on at the same time. This band should not be any larger than ±0.05 volts.**

The proper wiring diagram and TSP for the governor being tested should be carefully followed when connecting the test box to the actuator and when setting the RVDT.

Apply power and allow about 15 minutes for the test box to stabilize. Bring the governor test stand up to desired speed. Loosen the RVDT mounting screws and rotate the RVDT until the green lamp lights. Set the governor at the proper degrees of rotation and rotate the RVDT for the required feedback voltage. Tighten the mounting screws and setup the governor according to normal procedure.

# T87444 Calibration

## Equipment Required:

- Variable 0–10 Vdc power supply
- Calibrated dc voltmeter with at least two decimal places on the twenty volt range
- Frequency counter
- 115 Vac outlet

## Procedure

1. Connect unit to 115 Vac and allow unit to stabilize for 15 minutes.
2. Connect a frequency counter and a 10K resistor to pins G and H on the front panel connecter. The counter should display 2500 ±300 Hz.
3. Remove the counter and the 10K resistor.
4. Connect a dc voltmeter to pins C (+) and F (–) on the front panel connector.
5. Connect a jumper between pins E and F on the front panel connector. The external meter should read 0 ± 0.02 Vdc. Adjust R14, located on the circuit board inside, if necessary.
6. Compare the external dc voltmeter to the front panel meter. The readings should agree ±0.02 Vdc. There is no adjustment.
7. Remove the jumper from between pins F and E.
8. Connect a variable dc voltage source between pins E (+) and F (–).
9. Vary the dc supply until the external dc meter reads +10 ±0.05 Vdc.
10. Compare the front panel meter reading to the external meter. They should agree ±0.10 V. There is not any adjustment for the meter.
11. Check that the green lamp is on and the red lamp is off.
12. Change the dc supply so that the input to pins E and F is negative. The red lamp should be on and the green lamp off.

**IMPORTANT** **There is a small hysteresis band at zero volts that will cause the two lamps to be on at the same time. This band should not be any larger than ±0.05 Vdc.**

This completes the calibration procedure. Remove all external connections.

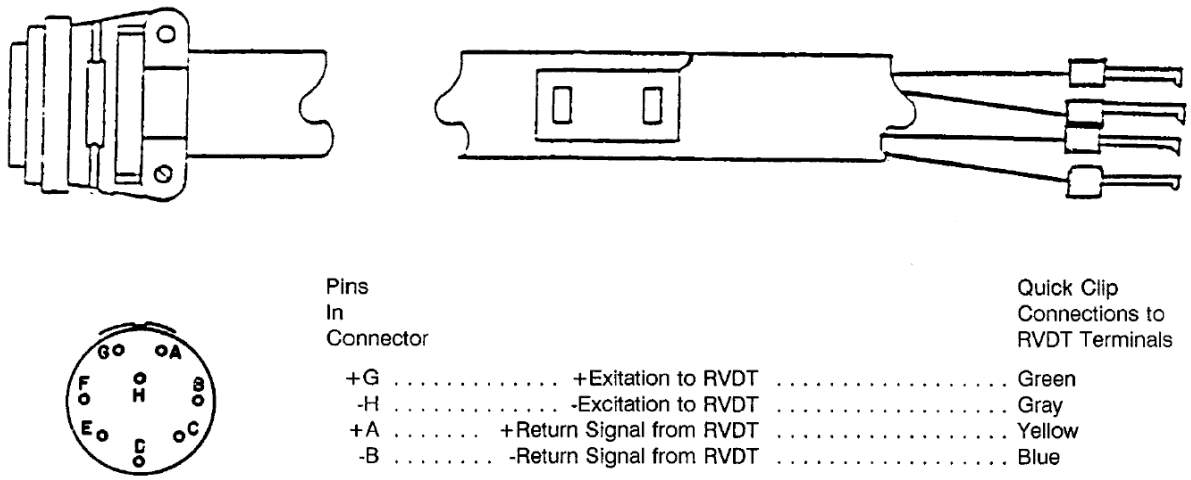


Figure 1. Cable Supplied to Connect Test Box to RVDT in Actuator

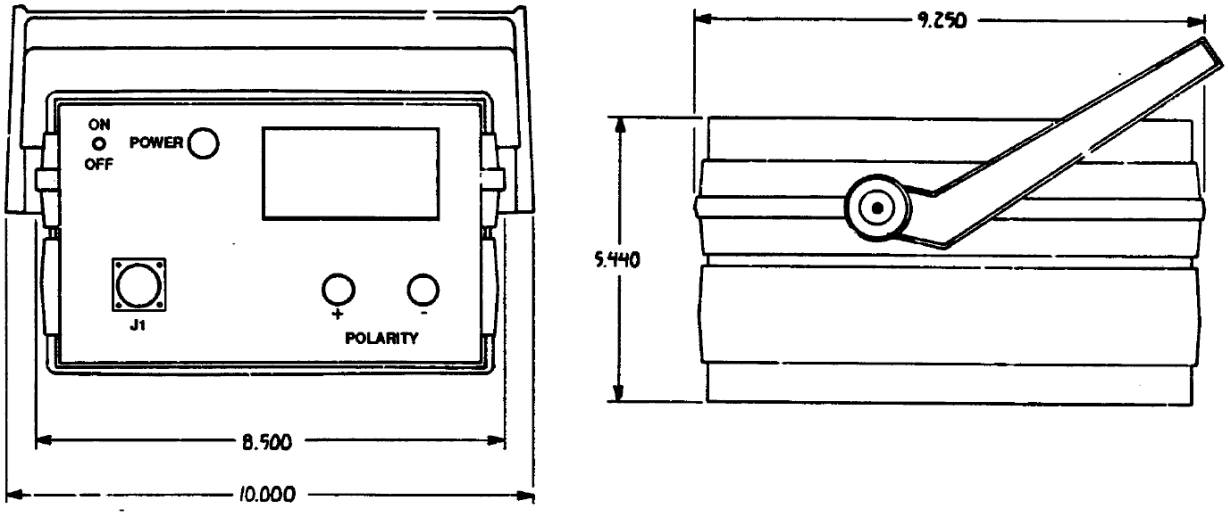


Figure 2. Outline Drawing of T87444 RVDT Check Box

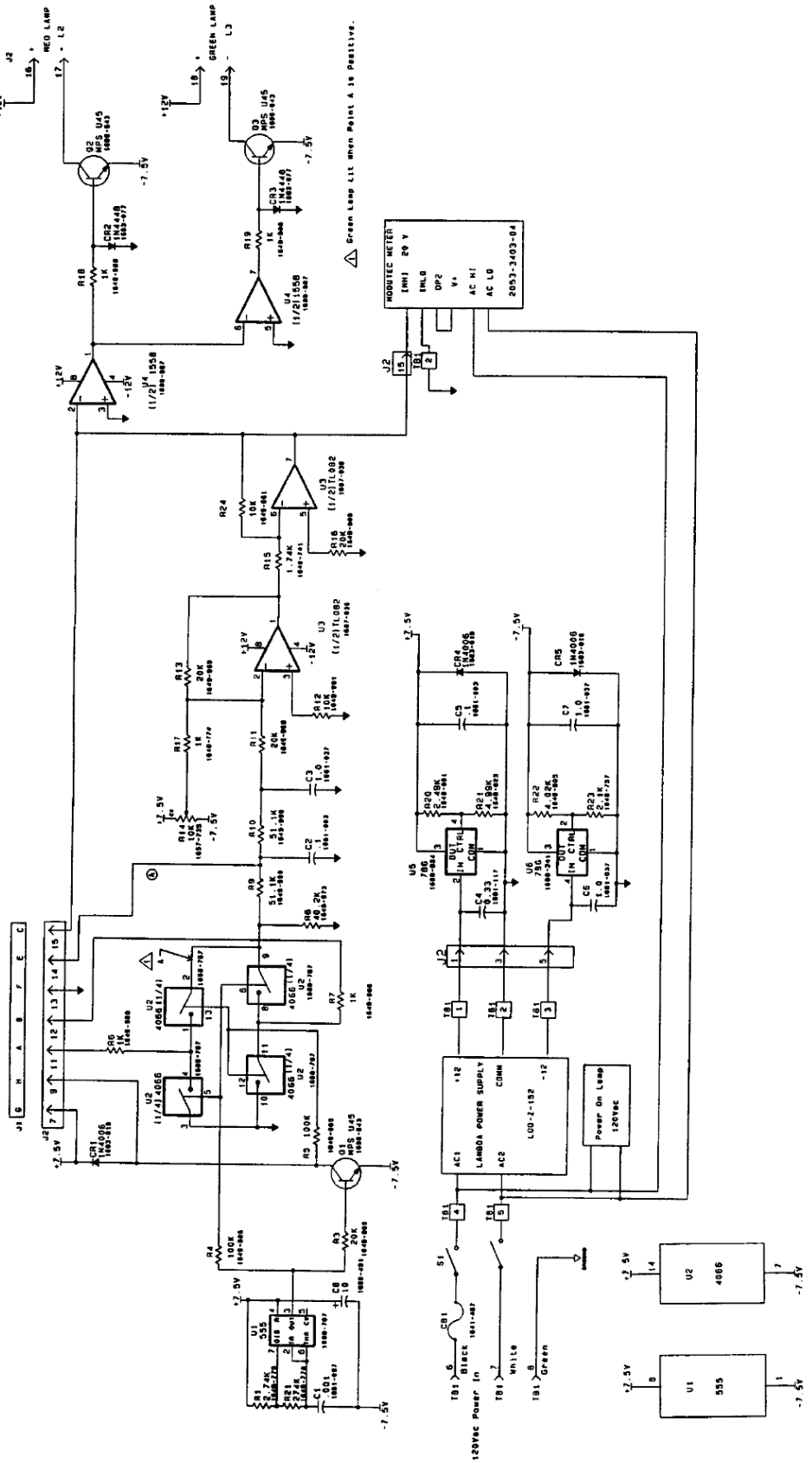

Figure 3. Schematic of T87444 RVDT Test Box

**We appreciate your comments about the content of our publications.**

**Send comments to: icinfo@woodward.com**

**Please reference publication 01504B.**

PO Box 1519, Fort Collins CO 80522-1519, USA
1000 East Drake Road, Fort Collins CO 80525, USA
Phone +1 (970) 482-5811 • Fax +1 (970) 498-3058

**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.**

2013/1/Colorado