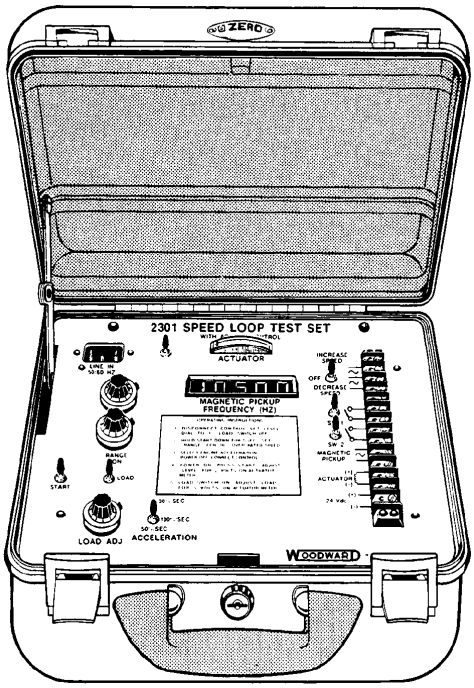
WOODWARD

Product Manual 55012
(Revision NEW)
Original Instructions



2301 Speed Loop Test Box

T95959, T96474, and T96571

Operation Manual

IMPORTANT

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.

DEFINITIONS

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

WARNING

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

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

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

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

NOTICE

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

NOTICE

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

Contents

Illustrations and Tables

Chapter 1.
General Information

Introduction

The manual describes the operation of the 2301 Speed Loop Test Box. Included is the optional AC MOP Control and the Load Sensor Test functions. The test box can test most 2301, 2500, EGM, and Speed Control Systems, and simulates systems that have integrating or proportional actuators and direct or reverse acting actuators.

General Description

The 2301 Test Box simulates most diesel engines with one actuator. The functions of the test box are illustrated in the block diagram (Figure 1-2). The inputs and outputs simulated are as follows:

Standard Functions

- Actuator
- Magnetic Pickup
- Loading of the Prime Mover
- Three Acceleration Rates

Optional Functions

- Integrating Actuator
- Proportional Actuator
- Direct Acting Actuator
- Reverse Acting Actuator
- AC MOP Control
- Load Sensor Test

Specifications

Line input	120/240 Vac, 50/60 Hz
Power supply output	24 Vdc, 350 mA max.
Actuator input	0–200 mA max.
Actuator input resistance	35 Ω
Magnetic pickup output	4.0 Vrms at 4800 rpm
Magnetic pickup range	0–19 kHz
SW 1 and SW 2	125 Vac, 1 A max.
Actuator meter	10 Vdc ±2%
Frequency meter	19 999 ±1 Hz max.

Options

PT Voltages	120/240 Vac L-L
CT Voltages	1.5/3.0 Vac
0.25 Ω	5 A max.
0.50 Ω	5 A max.

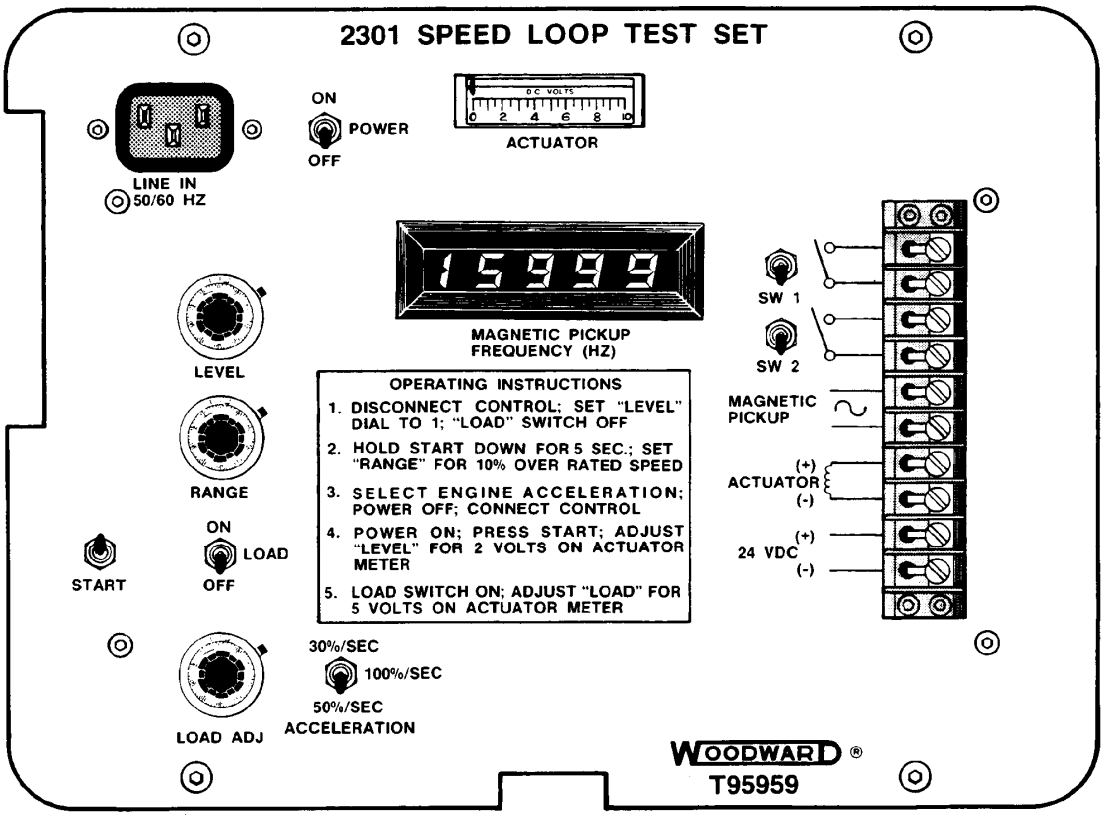

Figure 1-1. 2301 Speed Loop Test Box Front Panel

Circuit Functions

The flow of signals is shown in the block diagram (Figure 1-2). The input signals are on the left, and the outputs are on the right.

Actuator Circuit

The Actuator Circuit simulates an actuator in a control system. The Actuator Meter is connected across the actuator input. The Actuator Circuit is wired at the factory for an integrating or proportional actuator.

Direct Reverse Circuit

The Direct Reverse circuit makes the actuator circuit output simulate a direct or a reverse acting actuator. The Direct Reverse circuit is wired at the factory for a direct or reverse acting actuator.

IMPORTANT

A direct acting actuator gives a minimum output when the input is at minimum. A reverse acting actuator gives a maximum output when the input is at minimum.

Start Circuit

The Start Circuit simulates the starter on a prime mover.

Load Circuit

The Load Circuit simulates the loading of the prime mover. The circuit places an electronic load on the test box independent of the actuator input.

Summing Circuit

The Summing Circuit takes the outputs of the Direct Reverse, Start, and Load Circuits to simulate a prime mover.

Rate Circuit

The Rate Circuit sets the acceleration rate of the simulated prime mover. The acceleration rate is set in % of speed per second increase.

Speed Circuit

The Speed Circuit uses the Rate Circuit output to generate a magnetic pickup signal. The frequency of the magnetic pickup signal is measured by the counter.

Load Sensor Circuit

The Load Sensor Circuit checks a load sensor under static conditions. One set of PT and CT terminals are connected to the potential and current transformers at one time.

MOP Circuit

The MOP Circuit checks an AC MOP in a speed control system. The circuit connects the input voltage to the Increase Speed or Decrease Speed outputs.

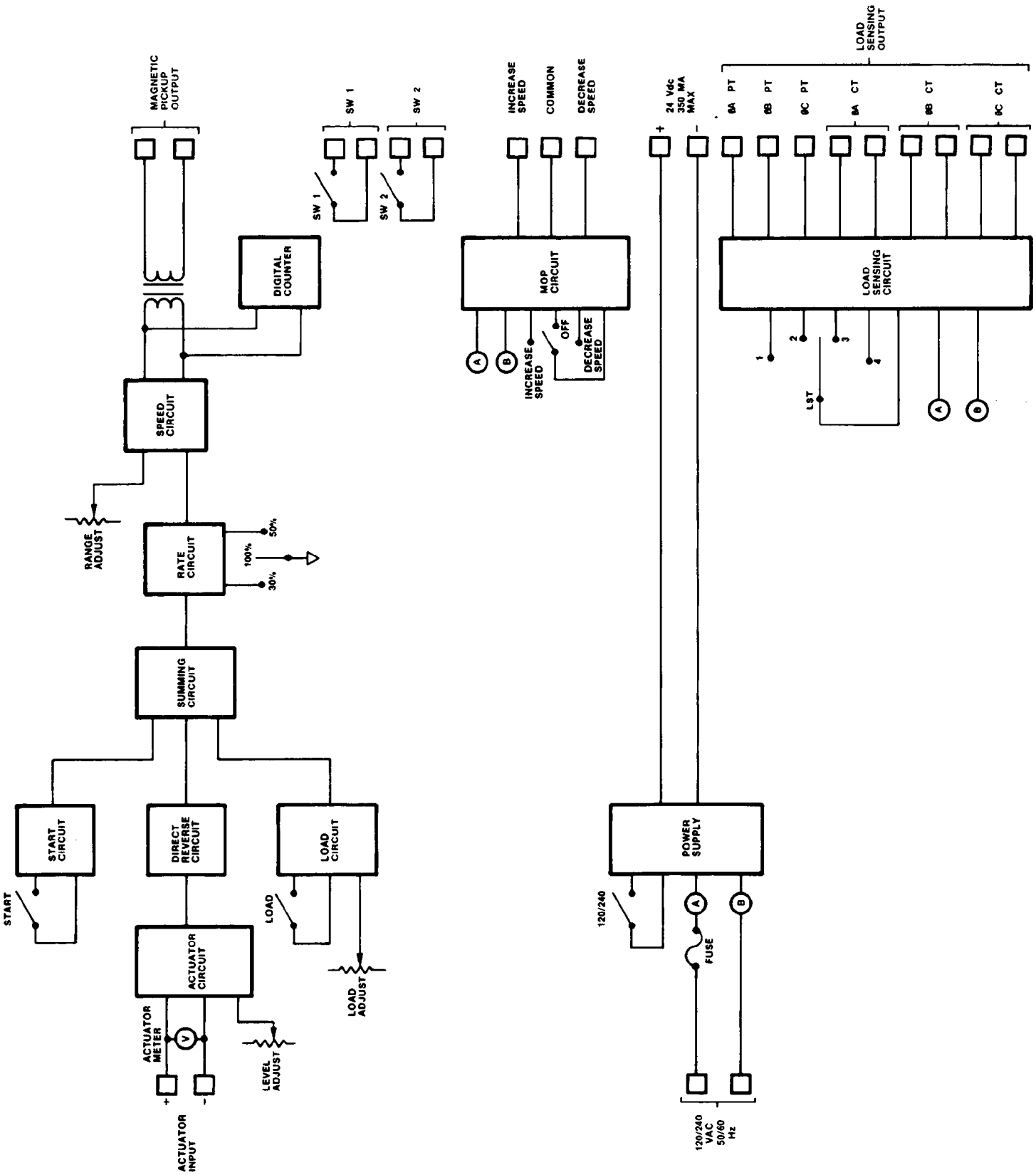

Figure 1-2. Block Diagram

Chapter 2.
Test Box Setup

Introduction

The following procedure sets the Speed Loop part of the test box for operation in a closed loop speed test. The Speed Loop setup for the 2301 Speed Loop Test Box with AC MOP Control and 2301 Speed Loop Test Box with Load Sensor Test is the same as for the 2301 Speed Loop Test Box. The AC MOP Control and the Load Sensor Test parts of the test box are static checks that do not need to be set up.

Setup Procedure

1. Before connecting the control to be tested to the test box, adjust the Level Adjustment to ONE on the dial and the Load Switch off.
2. Place the Power Switch in the ON position and hold the Start switch down for five seconds.
3. Set the Range Adjustment for 10% over the Rated Speed of the control to be tested.
4. Select the Acceleration Rate needed. Place the Power Switch in the OFF position.
5. Connect the control to be tested.
6. Place the Power Switch in the ON position and momentarily hold the Start switch down.
7. After the control being tested is controlling the speed output of the test box, adjust the Level Adjustment for 2 V on the actuator meter.
8. Place the Load Switch in the ON position and set the Load Adjustment for 5 V on the actuator meter.

MOP Switch

The MOP Switch on the AC MOP Control Test Box connects the test box input power to the MOP Control output terminals. The switch must be held in the Increase Speed or Decrease Speed position for the input power to be connected to the output terminals. In the OFF position, the input power is not connected to the output terminals.

LST Switch

The LST Switch on the Load Sensor Test Box connects the test box potential and current transformers to the cutout terminals as follows:

Position	Active PT	Active CT
1	OFF	OFF
2	AØ – BØ	AØ
3	BØ – CØ	BØ
4	CØ – AØ	CØ

IMPORTANT **The Potential Transformer and Current Transformer outputs are set for 100% Load and are not adjustable.**

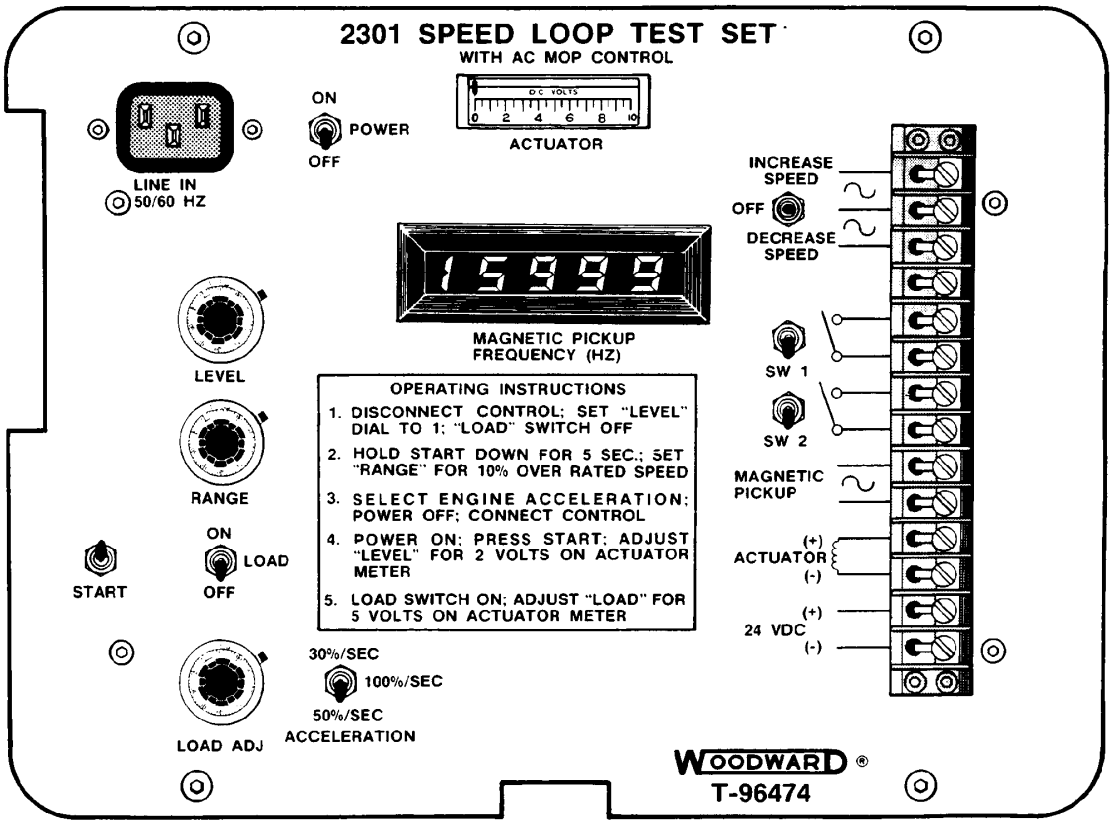

Figure 2-1. 2301 Speed Loop Test Box with AC MOP Control Front Panel

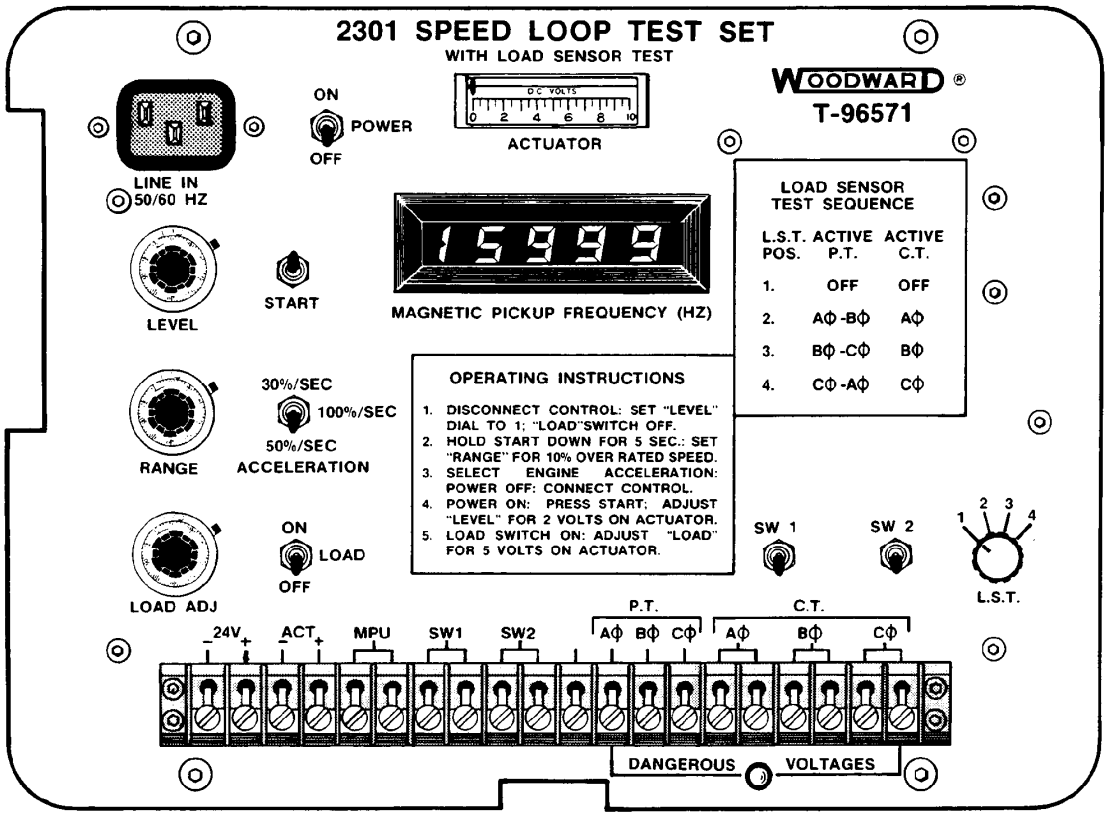

Figure 2-2. 2301 Speed Loop Test Box with Load Sensor Test Front Panel

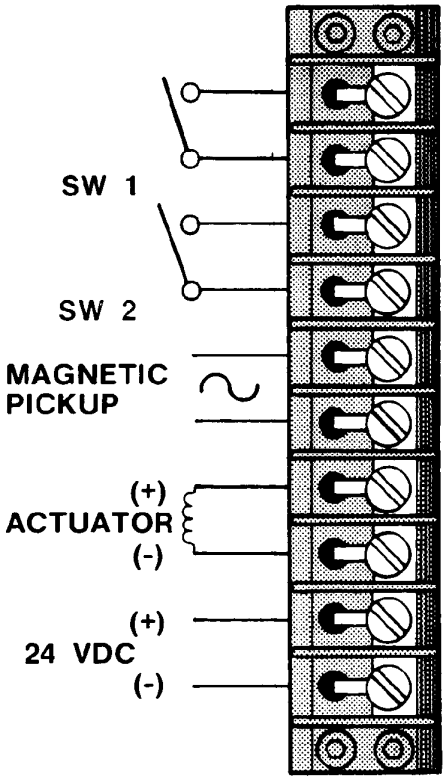

Figure 2-3. 2301 Speed Loop Test Box Plant Wiring Diagram

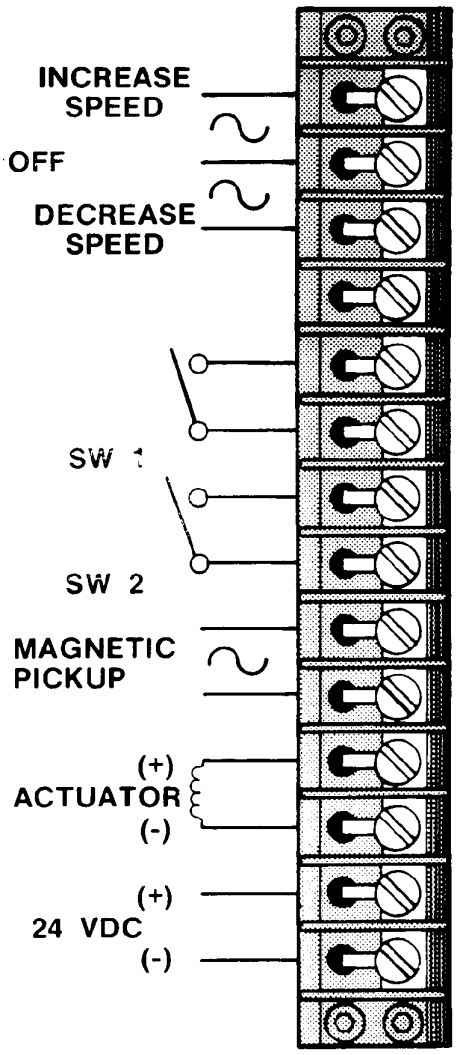

Figure 2-4. 2301 Speed Loop Test Box with AC MOP Control Plant Wiring Diagram

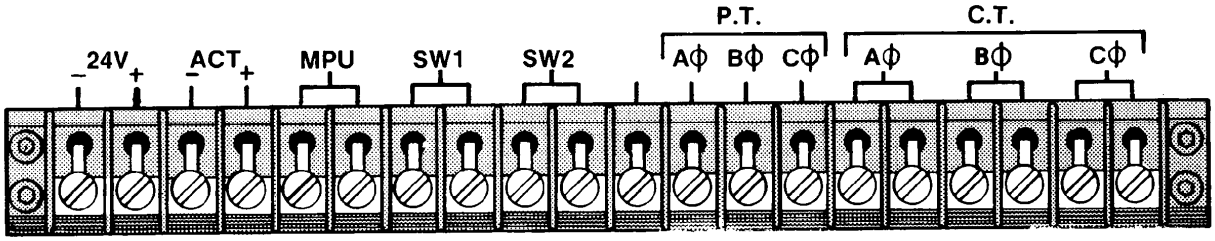

Figure 2-5. 2301 Speed Loop Test Box with Load Sensor Test Plant Wiring Diagram

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Send comments to: icinfo@woodward.com

Please reference publication 55012.

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

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