



ESSE-1

Electronic Speed Switch

Installation and 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*.

Revisions—Text changes are indicated by a black line alongside the text.

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Electrostatic Discharge Awareness

All electronic equipment is static-sensitive, some components more than others. To protect these components from static damage, you must take special precautions to minimize or eliminate electrostatic discharges.

Follow these precautions when working with or near the control.

1. Before doing maintenance on the electronic control, discharge the static electricity on your body to ground by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.).
2. 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.
3. Keep plastic, vinyl, and Styrofoam materials (such as plastic or Styrofoam cups, cup holders, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, and plastic ash trays) away from the control, the modules, and the work area as much as possible.
4. 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.

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*.

Chapter 1.

General Information

Introduction

The ESSE-1 is a single-channel electronic speed switch with exceptional power transient protection. The unit is potted for protection against harsh environments and has proven to be reliable and rugged as well as flexible and cost effective.

In generator set applications, the single channel can be used for crank (starter motor) disconnect or overspeed protection, or for underspeed and overspeed warnings. In fact, most speed-related switching functions on diesel and gas engines and other rotating machinery can be accommodated by the ESSE-1.

In addition to the standard features, options are available on the input voltage range of operation, setpoint range, reset of tripped setpoint switches, reverse relay logic control, and ignition signal input.

Electrical Operation

The relay contacts (SW1) shown on the front panel of the ESSE-1 are for the no power condition. The contacts shown are also for the condition of power applied and a signal input level below the set point.

With input signal (Mini-Gen, etc.) and power applied, the switch will close at frequencies determined by the set point potentiometer.

When the engine reaches proper speed during crank (starting), SW1 will close. Power will be removed from Terminal 6 and applied to Terminal 7, causing the cranking motor to be disconnected. (Refer to **Figures 2 or 3**).

When SW1 is used for overspeed protection, power will be removed from Terminal 6 (fuel solenoid) and applied to Terminal 7, causing the engine to shut down during an overspeed condition.

On an ESSE-1 with the switch having reverse relay logic, the switch will close when power is applied and open upon reaching the setpoint.

The TEST terminal, when connected to ground, will force SW1 to close at $67 \pm 10\%$ of the setpoint. This allows a test of SW1 without running the engine at overspeed conditions.

Reset Options

There are four reset options available for resetting the speed switch:

1. Electrical latch
2. Manual reset
3. Automatic reset
4. Adjustable (automatic) reset

With the **electrical latch option**, the switch (after the set point has been reached) will close and remain closed even if the input signal frequency has been lowered to 0 Hertz. The only way to reset the unit is to remove power.

With the **manual reset option**, the ESSE-1 is supplied with a reset button. By depressing this button, the unit will be reset.

With the **automatic reset option**, the switch will automatically reset if the frequency of the input signal is lowered to $85 \pm 5\%$. (Refer to the example for more details.)

With the **adjustable (automatic) reset option**, the switch will automatically reset at the frequency determined by the setting of the supplied reset pot. By adjusting the pot, the reset can be selected anywhere between 25% and 95%.

EXAMPLE:

The first setpoint is set to 1000 Hertz. With a 1500 Hertz signal applied, the switch will close. The unit will automatically reset (switch open) if the input frequency is lowered to 800 Hertz. The unit may reset anywhere between 800 and 900 Hertz because automatic reset is specified between 80% and 90% of the setpoint.

Chapter 2. Specifications

Electrical

Input Voltage Range:	8–40 Vdc
Maximum Operating Current @ 40 V: @ 24 V: @ 12 V:	165 mA 140 mA 125 mA
Maximum Standby Current @ 40 V: @ 24 V: @ 12 V:	70 mA 45 mA 30 mA
Relay Contact Ratings 28 Vdc Resistive Load: 28 Vdc Inductive Load:	0.1–10 A 0.1–8 A
Power Supply Transient Protection:	900 Vdc for 100 μ s exponential decay 140 Vdc for 1 ms 110 Vdc for 0.45 s exponential decay
Reverse Polarity Protection:	1000 Vdc
Signal Input Minimum: Maximum:	1.2 V _{rms} 130 V _{rms}
Signal Input Impedance:	33K Ohms (nominal)
Stability @ 9 Vdc to 40 Vdc and 14°F to +185°F (-10°C to +85°C):	Less than 1% or 8 Hz, whichever is greater. Unit performs to -40° F (-40° C)

Environmental

Operating Temperature:	-40°F to +185°F (-40°C to +85°C)
Vibration:	4.2 G's from 20 to 500 Hz
Shock:	4' drop test
Case:	Nickel plated terminals. Humidity and salt spray resistant. Potted for environmental protection
Weight:	1.5 lbs (0.68 kg)

Performance

Overspeed Response Time:	75 ms typical
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Chapter 3. Installation

Mounting Instructions

Four mounting holes are provided as shown in **Figure 1**. Although the unit can withstand normal vibration levels and temperature excursions, it is a good practice to mount the unit in a location where these effects are minimized. The unit should be attached to the mounting plate with four 10-32 screws.

Dimensions in brackets are millimeters.

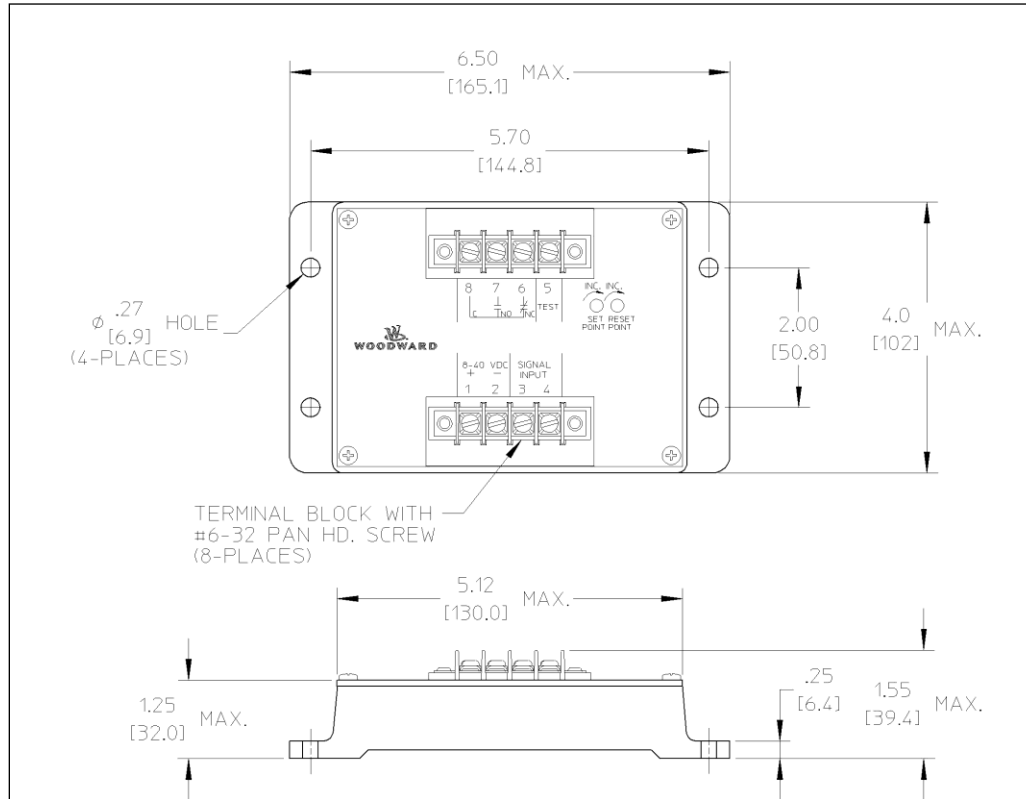


Figure 1. ESSE-1 Dimensions

Wiring Instructions

Good wiring practices should be applied whenever electronics are introduced into an engine control system. If poor wiring practices are used, the ESSE-1 may malfunction or operate erratically. See the wire gauge chart below for proper selection of ESSE-1 terminal wires.

Wire Gauge Chart

CURRENT	TERMINALS	WIRE SIZE	
		AWG	mm ²
Under 5 A	1-2, 6-8	16	1.3
5-10 A	1-2, 6-8	14	2
—	3-5	18-20	0.8-0.5

Two-conductor shielded cable should be used when connecting the signal source (Mini-Gen, magnetic pickup) to the ESSE-1. Single-conductor shielded cable is recommended for alternator or ignition signal sources. The shield should be connected to ground *only at one end*. The shield must be connected to Terminal 2 of the ESSE-1 for the Mini-Gen or magnetic pickup connection and to Terminal 3 for the alternator connection.

NOTICE

Do not connect a voltage between Terminals 2 and 3 of the ESSE-1. This can damage the printed circuitry and void the manufacturer's warranty.

Output Circuit Protection

NOTICE

Pulling continuous currents greater than 10 amps through the ESSE-1's switch contact can damage the printed circuitry and void the manufacturer's warranty.

Fuses or circuit breakers should be connected in series with the load to protect the ESSE-1 and your warranty. The fuse should be a 10 amp slow blow. The circuit breaker should be rated at 10 amps.

If load currents in excess of 10 amps are expected, interface relays should be used (refer to **Figures 2 and 3**).

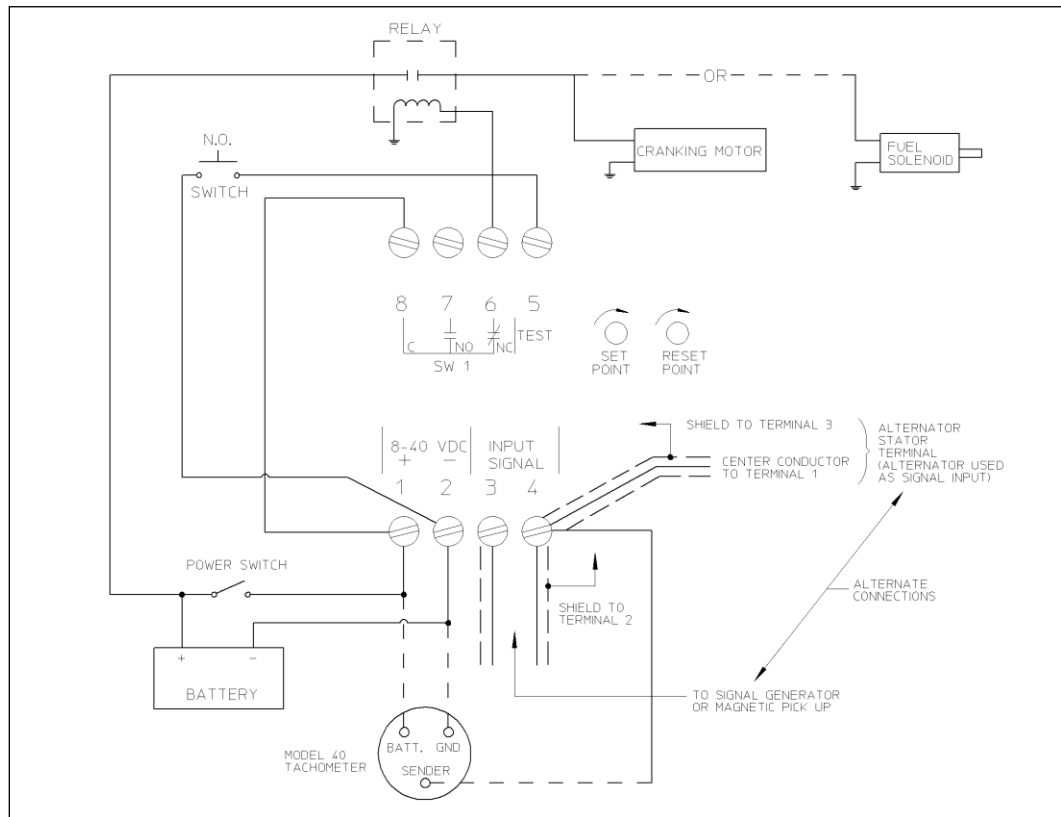


Figure 2. Connection Diagram

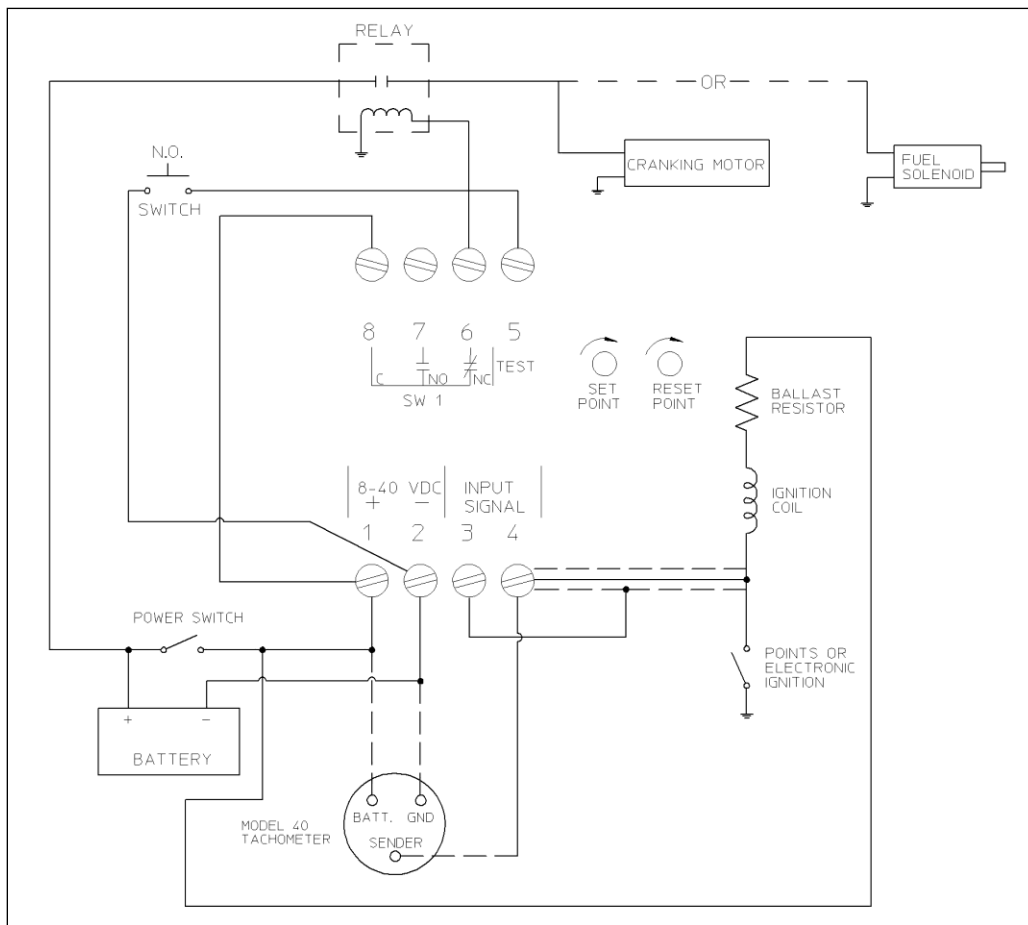


Figure 3. Connection Diagram Showing Ignition Input Option

To prevent damage to the controller, make sure that it is wired in accordance with the wiring instructions and diagrams in this manual.

NOTICE

- Do not tin the leads before placing them into the terminals.
- Ensure the terminals are tightened properly to secure wires.
- Perform a continuity check to ensure all the wires are connected to the proper system devices.
- Measure from each terminal to the ESSE chassis (any cover mounting screw) and verify high impedance ($>10M\Omega$) to eliminate any unexpected ground loops or unintended connections to the housing. The battery(-) pin may be an exception to this, depending on the housing mounting strategy.

Chapter 4. Adjustments

SW1 Setpoint Adjustments

Setpoint Frequency in Hertz

Mini-Gen Signal Generator Signal Source

Setpoint Frequency in Hertz = $\frac{1}{2}$ Mini-Gen RPM Setpoint

Magnetic Pickup Signal Source

Setpoint Frequency in Hertz = $\frac{\text{No. of Gear Teeth} \times \text{Engine RPM Setpoint}}{60}$

Alternator Signal Source

Setpoint Frequency in Hertz = $\frac{\text{Pulley Ratio} \times \text{No. of Poles} \times \text{Engine RPM Setpoint}}{120}$

Ignition Signal Source (Special Option)

Setpoint Frequency in Hertz = $\frac{\text{No. of Cylinders} \times \text{Engine RPM Setpoint}}{120}$

ESSE-1 Frequency Ranges

ESSE-1 speed switches have two possible operating ranges for standard inputs and for ignition inputs, as shown in the chart below. *Units are factory set to operate within Range 2 frequencies.*

Part number suffixes in the chart describe reset options:

A = Automatic reset

L = Latch up

M = Manual reset

P = Automatic adjustable reset

Frequency Range Chart

PART NUMBER	RANGE 1 FREQUENCIES	RANGE 2 FREQUENCIES *
Standard Inputs		
SA-3753-A	80-2,500 Hz	325-10,000 Hz
SA-3753-L		
SA-3753-M		
SA-3753-P		
SA-3906-P	2-25 Hz	5-50 Hz
Ignition Inputs		
SA-3754-L	10-250 Hz	20-500 Hz
SA-3754-P		

(*) Factory settings

Range and Automatic Reset

While range and automatic reset are normally set at the factory, adjustments or changes may be performed by following the steps below.

1. Remove cover plate to expose jumpers. Refer to **Figure 4**.
2. Refer to SW1 setpoints determined above. Refer to the table below to determine if the J1 Jumper is to be removed.

SETPOINT HERTZ	JUMPER REMOVAL	APPROX. POT HERTZ ADJ. PER TURN
RANGE 1 80-2,500 Hz	J1	120
RANGE 2 325-10,000 Hz	None	400

3. With J2 in place, SW1 is latching and the relay will remain energized once engine speed increases above the setpoint. If speed decreases, the relay will stay energized unless the control is powered down and then back up again.

If automatic reset is required on SW1, cut J2. Once the relay is energized, when the engine speed increases above the setpoint, the relay will de-energize if speed decreases to a point that is 80-90% of the setpoint. For example, if the setpoint is 1000 Hz, the automatic reset point would be around 800-900 Hz.

4. Replace cover and screws.

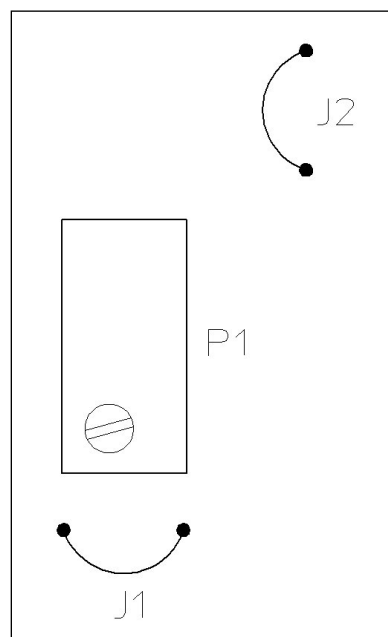


Figure 4. Jumpers 1 and 2

Potentiometer (Setpoint Bench) Adjustment

The setpoint bench adjustment may be performed as follows:

1. Connect signal generator, frequency counter and power to ESSE-1 as shown in **Figure 5**.
2. Connect ohmmeter to SW1 Terminals 6 and 8.
3. Turn SW1 setpoint potentiometer adjustment 20 turns clockwise or until a clicking noise is heard.
4. Turn power supply, signal generator and frequency counter ON. Adjust the input frequency for SW1 to the setpoint determined previously and set generator output level to 1 Vac or greater.
5. The ohmmeter should read "Zero".
6. Turn SW1 setpoint potentiometer counter clockwise slowly until the ohmmeter indicates an open circuit.
7. If desired, recheck setpoint adjustment for SW1 by lowering frequency setting on signal generator. Remove and reapply power and slowly increase frequency until switch trips. Repeat Steps 4, 5, and 6 if necessary.

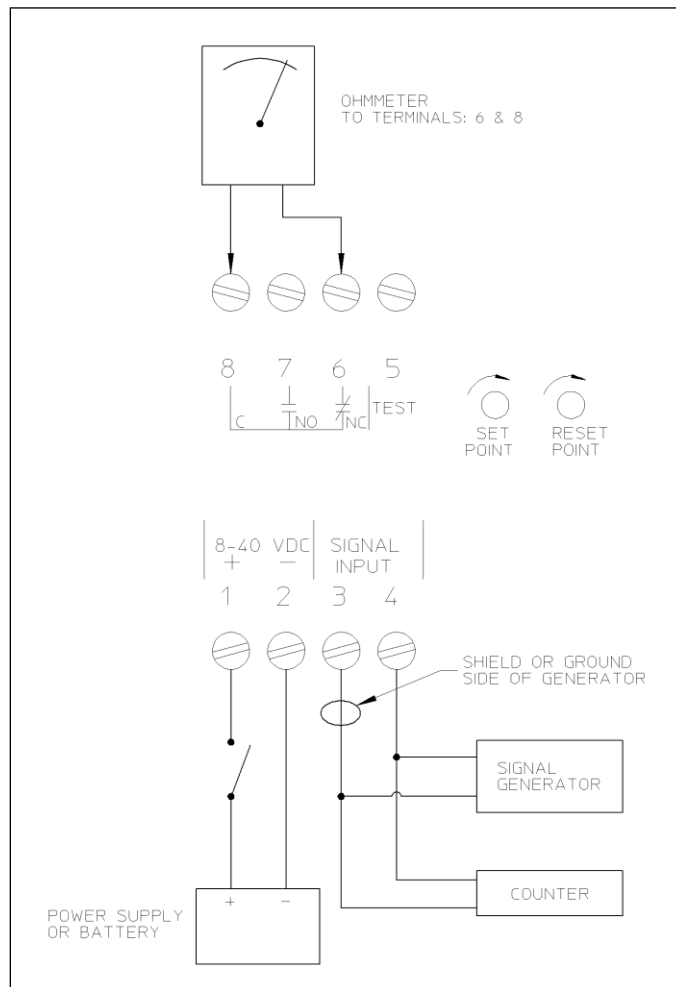


Figure 5. Setpoint Bench Adjustment

Engine Verification

This procedure may be used to verify the performance of the SW1 setpoint after bench adjustment with the ESSE-1 integrated on an engine. Woodward recommends performing this test prior to commissioning an engine and as part of your regularly scheduled maintenance program. At a minimum, it should be completed on an annual basis.

NOTICE

This procedure is for a standard relay logic model in which the Normally Open (NO) contacts will close and the Normally Closed (NC) contacts will open when the relay is energized. If a switch is ordered with reverse relay logic, battery voltage and zero voltage must be interchanged for the given switch.

SW1 Setpoint Verification for Crank Disconnect

To verify the function of SW1 (which is energized during cranking RPM), the following procedure can be utilized.

1. Connect a DC voltmeter between Terminal 2 (or negative terminal of battery) and Terminal 6 as shown in **Figures 2 or 3**.
2. Apply power to the ESSE-1 unit and start the engine.
3. The DC voltmeter should indicate zero volts at engine idle speed. If this does not occur and the battery voltage is indicated on the DC voltmeter, shut off engine power.
4. Review the previous adjustment section to determine if SW1 setpoint is correct and if SW1 functions properly. Check the wiring. If everything appears OK, remove ESSE unit and readjust SW1 according to procedure outlined.

SW1 Setpoint Verification for Overspeed Protection

To verify the operation of SW1 for overspeed protection, the following procedure can be utilized.

1. Connect a temporary jumper between Terminals 2 and 5. (Terminal 5 is the TEST terminal for the 0.67x Setpoint test).
2. Convert the frequency setpoint of SW1 to RPM by using conversion formula and multiply by 0.67. ($\text{RPM} \times 0.67 = \text{Test Setpoint}$).
3. Apply power to the ESSE-1 unit.
4. Connect a DC voltmeter between Terminal 2 (or battery negative terminal) and Terminal 6. Negative lead of voltmeter goes to Terminal 2 (or battery negative).
5. Start the engine. Monitor the tach and slowly increase engine RPM to the TEST SETPOINT reading. Observe the DC voltmeter. It should indicate the battery voltage before the setpoint is activated and the relay trips. When the relay trips, at the TEST SETPOINT $\pm 6\%$ RPM, the DC voltmeter will indicate zero volts. (Remove jumper from Terminals 2 and 5 and reset SW1).

Chapter 5.

Troubleshooting

The following check points can be used to determine if the ESSE-1 is operating properly. Refer to **Figure 2**. All AC voltage readings are in RMS.

1. Check for battery voltage and proper polarity on Terminals 1 and 2.
2. Check input signal on Terminals 3 and 4 with an AC voltmeter. When the engine is running, the input voltage signal must be greater than 0.7 Vac.
3. Connect negative lead of DC voltmeter to negative side of battery or to Terminal 2.
4. With power switch "ON", the DC voltmeter must indicate battery voltage on Terminal 8.
5. The DC voltmeter must indicate battery voltage on Terminal 6 if an overspeed condition did not occur. If the voltmeter does not indicate battery voltage, review the "Adjustments" chapter to determine if the SW1 setpoint is correct and that SW1 is functioning.
6. The DC voltmeter must indicate battery voltage on Terminal 6 during cranking and zero voltage when the engine is running. If the voltmeter indicates battery voltage on Terminal 6 when the engine is running, turn the power switch to the "OFF" position and review the "Adjustments" chapter to determine if the SW1 setpoint is correct and that SW1 is functioning.

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.

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

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 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 and reference **www.woodward.com/support**, and then **Customer Support**.

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		Engine Systems		Turbine Systems	
FACILITY	PHONE NUMBER	FACILITY	PHONE NUMBER	FACILITY	PHONE NUMBER
Brazil -----	+55 (19) 3708 4800	Brazil -----	+55 (19) 3708 4800	Brazil -----	+55 (19) 3708 4800
China -----	+86 (512) 6762 6727	China -----	+86 (512) 6762 6727	China -----	+86 (512) 6762 6727
Germany:		Germany:			
Kempen ---	+49 (0) 21 52 14 51				
Stuttgart ----	+49 (711) 78954-0	Stuttgart ----	+49 (711) 78954-0		
India -----	+91 (129) 4097100	India -----	+91 (129) 4097100	India -----	+91 (129) 4097100
Japan -----	+81 (43) 213-2191	Japan -----	+81 (43) 213-2191	Japan -----	+81 (43) 213-2191
Korea -----	+82 (51) 636-7080	Korea -----	+82 (51) 636-7080	Korea -----	+82 (51) 636-7080
		The Netherlands -	+31 (23) 5661111	The Netherlands -	+31 (23) 5661111
Poland -----	+48 12 618 92 00				
United States-----	+1 (970) 482-5811	United States-----	+1 (970) 482-5811	United States-----	+1 (970) 482-5811

You can also contact the Woodward Customer Service Department or consult our worldwide directory on Woodward's website (**www.woodward.com/support**) for the name of your nearest Woodward distributor or service facility.

For the most current product support and contact information, please refer to the latest version of publication **51337** at **www.woodward.com/publications**.

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:

General

Your Name _____
Site Location _____
Phone Number _____
Fax Number _____

Prime Mover Information

Engine/Turbine Model Number _____
Manufacturer _____
Number of Cylinders (if applicable) _____
Type of Fuel (gas, gaseous, steam, etc) _____
Rating _____
Application _____

Control/Governor Information

Please list all Woodward governors, actuators, and electronic controls in your system:

Woodward Part Number and Revision Letter

Control Description or Governor Type

Serial Number

Woodward Part Number and Revision Letter

Control Description or Governor Type

Serial Number

Woodward Part Number and Revision 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 36555A.



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Email and Website—www.woodward.com

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as well as authorized distributors and other authorized service and sales facilities throughout the world.**

Complete address / phone / fax / email information for all locations is available on our website.