SSW Series
1, 2, & 3 Element Speed Switch

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1 INTRODUCTION

The SSW674, SSW675, and SSW676 are respectively one, two, and three element electronic speed switches. They are powered by a DC battery supply and receive engine speed information from a magnetic speed sensor.

Both the SSW675 and SSW676 sense and indicate a low speed setting (CRANK termination), and a high speed setting (OVERSPEED). The SSW676 has a third mid speed setting that can be used for several purposes such as paralleling indication, underspeed, or general auxiliary contacts. The single element SSW674 has a wide range of adjustment and can be used for any one of these three functions.

All speed elements activate discrete, internal relay contacts and LED indicators. The overspeed section of the SSW675 and SSW676 include TEST and RESET switches. An output voltage proportional to engine speed is provided to operate an external tachometer.

SSW674

SSW676

SSW675

2 SPECIFICATIONS

PERFORMANCE		
Input Impedance		> 5K Ω
Response Time		< 50 ms
Tachometer Signal (SSW674) (SSW675/676)		0 to 20 mA 0 to 1 mA
Relay Contact Ratings		5 A
SSW674		
SPEED	Set Point Range Reset	200 to 10000 Hz Manual (remove power)
SSW675		
CRANK Termination	Set Point Range Reset	300 to 2300 Hz Automatic or Manual (remove power)
OVER-SPEED	Set Point Range Reset Test	2300 to 10000 Hz Reset or Manual (remove power) Lowers set speed by 10%
SSW676		
CRANK Termination	Set Point Range Reset	300 to 2300 Hz Automatic or Manual (remove power)
OVER-SPEED	Set Point Range Reset Test	2300 to 10000 Hz Reset or Manual (remove power) Lowers set speed by 10%
PARALLEL	Set Point Range Reset	1600 to 7200 Hz Automatic at 6% below set point

INPUT / OUTPUT	
Supply	10 to 32 V DC (Reverse Voltage Protected)
Polarity	Negative Ground, Case Isolated
Power Consumption	300 mA
Speed Sensor Signal	1.0 to 120 V AC RMS
ENVIRONMENTAL	
Ambient Temperature	-40° to 180°F (-40 to 80°C)
Relative Humidity	up to 95%
All Surface Finishes	Fungus Proof and Corrosion Resistant
RELIABILITY	
Vibration	5 g @ 20 - 500 Hz
Testing	Functionally tested
PHYSICAL	
Dimension	See Section 3 INSTALLATION
Weight (SSW674) (SSW675/676)	 0.6 lbs (0.30 kg) 1.2 lbs (0.54 kg)
Mounting	Any position, Vertical Preferred

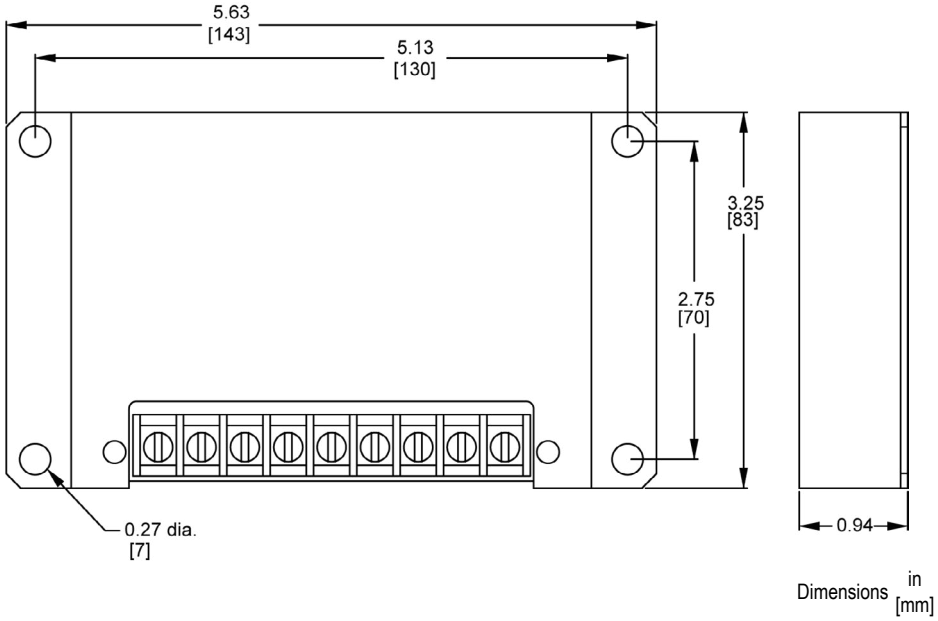
3 INSTALLATION

Vertical orientation allows for the draining of fluids in moist environments.

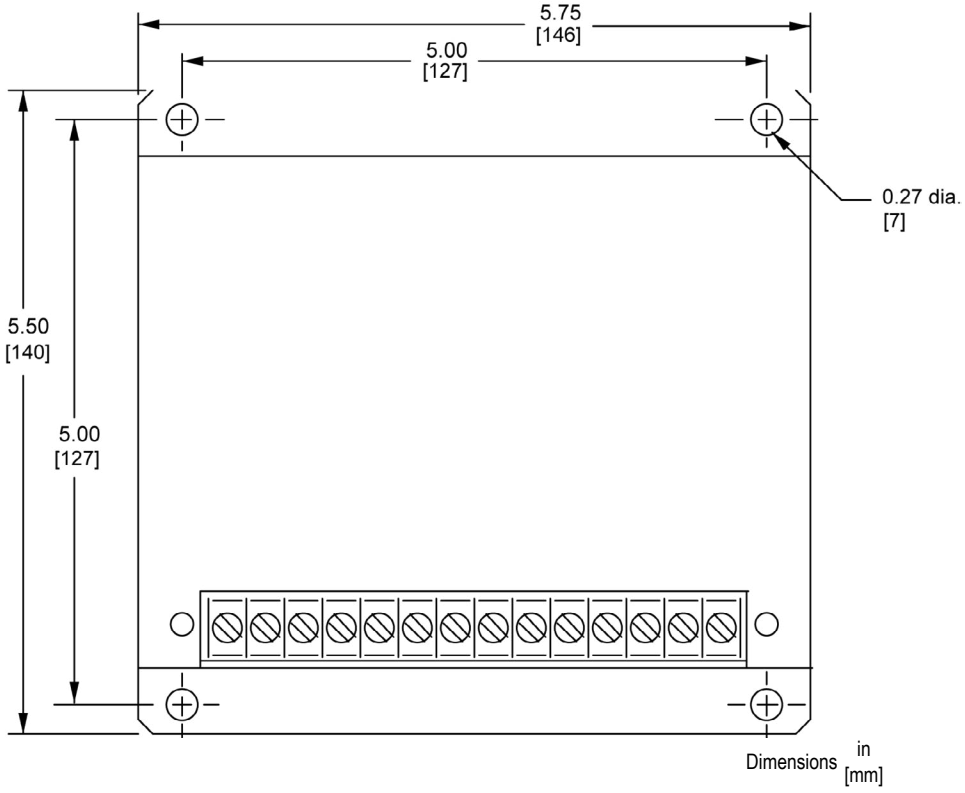
Mount in a cabinet, engine enclosure, or sealed metal box.

Avoid Extreme Heat

SSW674 INSTALLATION DIMENSIONS



SSW675 & SSW676 INSTALLATION DIMENSIONS

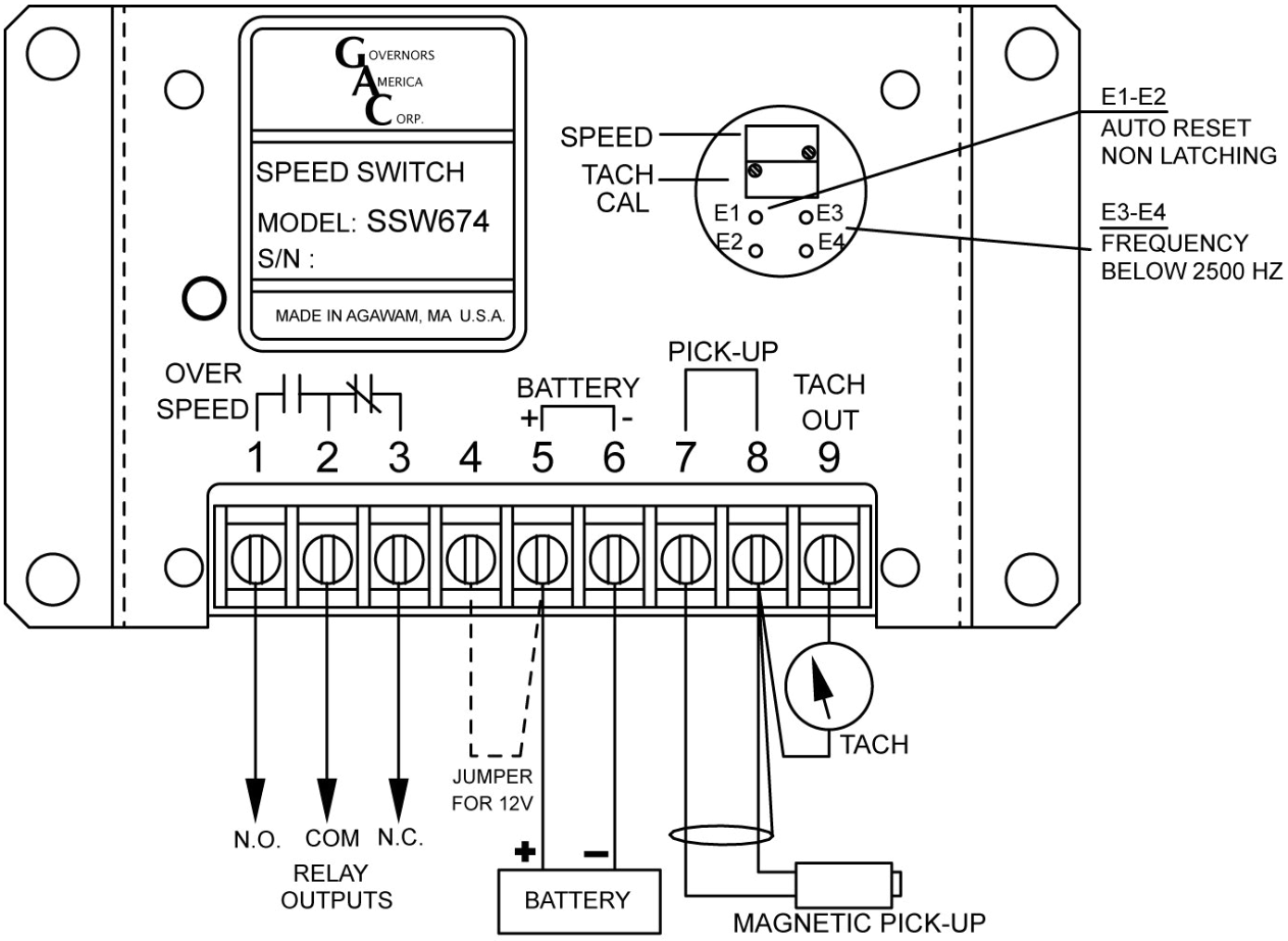


4 WIRING

For SSW674 see SSW674 WIRING diagram below. For SSW675 or SSW676, see the SSW675 & SSW676 WIRING diagram on the next page. Read this entire section before wiring the speed switch.

- An overspeed shutdown device, independent of the governor system, should be used to prevent loss of engine control which may cause personal injury or equipment damage.
- Do not rely exclusively on the governor system electric actuator to prevent overspeed. A secondary shutoff device, such as a fuel solenoid must be used.

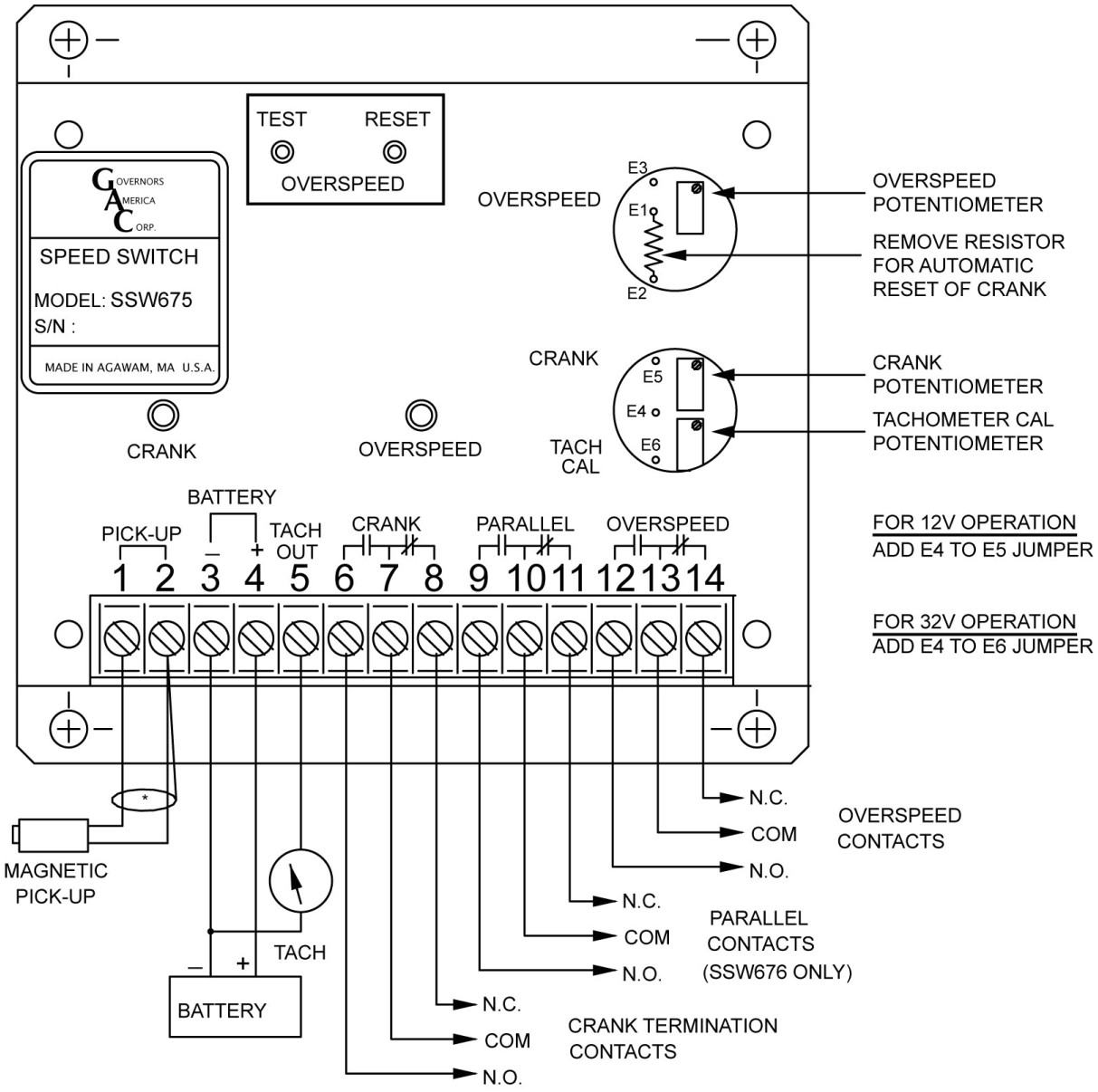
SSW674 WIRING



TERMINAL	DEFINITION	NOTES
1	Relay Output N.O.	
2	Relay Output COM	Jumper
3	Relay Output N.C.	Jumper
4	Jumper for 12 V	
5	BATTERY (+)	Battery, 12 V or 24 V
6	BATTERY (-)	Jumper
7	PICK-UP	Magnetic speed pickup
8	PICK-UP	Magnetic speed pickup. For wire connections longer than 10 ft (3 m) use shielded cable. Ground shield at one end only.
9	TACH OUT	Tachometer (0 to 20 mA)

4 WIRING - CONTINUED

SSW675 & SSW676 WIRING



TERMINAL	DEFINITION	NOTES
1	PICK-UP	Magnetic speed pickup
2	PICK-UP	For wire connections longer than 10 ft (3 m) use shielded cable. Ground shield at one end only.
3	BATTERY (+)	Battery, 12 V or 24 V
4	BATTERY (-)	
5	TACH OUT	Tachometer (0 to 20 mA)
6	CRANK	N.O.
7	CRANK	COM
8	CRANK	N.C.
9	PARALLEL (SSW676 ONLY)	N.O.
10	PARALLEL (SSW676 ONLY)	COM
11	PARALLEL (SSW676 ONLY)	N.C.
12	OVERSPEED	N.O.
13	OVERSPEED	COM
14	OVERSPEED	N.C.

4 WIRING - CONTINUED

Each unit is factory set for 24V operation. For 12V and 32V power systems use the following section for jumper requirements.

When wiring the speed switch into the engine protection control system, use the proper wire sizes. The speed switch relay contacts are rated for a maximum current of 5 amps. All other connections have less than 1 amp current flow each.

ALTERNATE WIRING FOR 12 VOLT AND 32 VOLT POWER SYSTEMS

SSW674	
12V System	Jumper connection between Terminals 4 and 5 as shown in SSW674 WIRING diagram.
SSW675 & SSW676	
12V System	Solder jumper wire between posts E4 and E5.
32V System	A soldered wire jumper between posts E4 and E6 is required.
NOTE	Posts E4, E5, and E6 are accessible through the top cover adjustment hole as shown in SSW675 & SSW676 WIRING diagram

CONNECTING THE MAGNETIC SPEED SENSOR

The magnetic speed sensor connections MUST BE TWISTED AND/OR SHIELDED for their entire length. The speed sensor cable shield must only be connected to Terminal 2 on the SSW675 and SSW676, or Terminal 8 on the SSW674. The shield should be insulated to ensure that no other part of it comes into contact with engine ground, otherwise stray signals may be introduced into the speed switch.

When the engine is stopped, adjust the gap between the magnetic speed sensor and the ring gear teeth. The gap should not be smaller than 0.020 in. (0.45 mm). Usually, backing out the speed sensor 3/4 turn after touching the ring gear tooth will result in a satisfactory gap. The magnetic speed sensor voltage should be at least 1 V RMS while cranking. During operation, 5 to10 V RMS is recommended.

5 ADJUSTMENTS

All elements are factory set at the maximum setting. Turning the adjustment counterclockwise will lower the set point.

The tachometer output is factory set at its minimum setting. Turning the adjustment clockwise increases the current output.

OVERSPEED ADJUSTMENT - SSW674

The range of adjustment of the overspeed set point is from 200 to 10,000 Hz.

For settings below 2,500 Hz., solder a jumper wire between posts E3 & E4 located below the adjustments and to the right.

1. Raise the engine speed to the desired overspeed alarm point.
2. Turn the speed adjustment counterclockwise until the relay energizes and the red overspeed LED lights.
3. Lower the engine speed to the normal operating speed.
4. The SSW674 is shipped from the factory configured so that the internal relay latches when the set speed is reached. Power must be removed from the unit to reset the relay.
5. To add an automatic reset (non latching relay) , cut the jumper wire between the two posts located below the adjustments and to the left. With the jumper between E1 & E2 removed, the SSW674 relay will reset when the engine speed falls below set speed.

GAC recommends that each speed switch setting be checked periodically when maintenance is being performed on the engine. The overspeed set point can be tested by pressing the TEST button.

OVERSPEED ADJUSTMENT SSW675 & SSW676

To set overspeed for the SSW675 or SSW676:

1. Raise the engine speed to 10% below the desired overspeed set point.
2. Press and hold the OVERSPEED TEST button on the top of the unit. This lowers the overspeed setting by 10%.
3. Turn the OVERSPEED adjustment counterclockwise until the overspeed relay energizes and the red OVERSPEED LED illuminates.
4. Reset the overspeed relay by pressing the RESET button. Allow the engine to stop, then remove battery power from the unit.
5. Readjust the engine speed to the normal operating speed with the governor speed control.

GAC recommends that each speed switch setting be checked periodically when maintenance is being performed on the engine. The overspeed set point can be tested by pressing the TEST button on the unit.

CRANK TERMINATION - SSW675 & SSW676

CRANK	STEPS
Manual Reset	The unit is factory set for manual reset. To re-initiate engine cranking, battery power must be removed and then reapplied as follows: 1. Crank the engine and simultaneously turn the CRANK adjustment slowly counterclockwise until the proper crank termination speed is reached. 2. When the cranking termination set point is reached, the green CRANK LED will illuminate.
Automatic Reset	To select Automatic reset: Removing the 82K ohm resistor located between posts E1 and E2 on the circuit board. See Section 4, SSW675 & SSW676 WIRING diagram.

PARALLEL / AUXILIARY - SSW676

To use parallel:

1. Raise the engine speed to the desired mid speed set point.
2. Turn the PARALLEL adjustment counterclockwise until the parallel relay energizes and the green PARALLEL LED illuminates.
3. The parallel relay will automatically reset when the engine speed falls to 6% below the set point.

TACHOMETER OUTPUT

To set the Tachometer:

1. Rotate the TACH CAL adjustment clockwise to increase the current, and counterclockwise to decrease the current.
2. Adjust until the speed reading corresponds to a standard tachometer.
3. Stop the engine and adjust the tachometer zero point if necessary. Recheck the maximum setting.
4. If a meter movement less that 1 mA is used, a fixed series resistor is required.

OUTPUT SIGNAL RANGE	MODEL
0 - 1 mA	SSW675, SSW676
0 - 20 mA	SSWS674

TROUBLESHOOTING THE TACHOMETER	CHECK
1. Remove the tachometer connections. 2. Apply DC power and an input speed signal to the speed switch. 3. Measure the voltage on the TACH OUT Terminal as the speed input frequency is varied. An increase in frequency should cause a voltage increase.	If the voltage is proportional to frequency, check the wiring to the relays.
	If the voltage is not proportional to frequency, check the output of the magnetic speed sensor.
	If the speed sensor is operating, and the relays are wired correctly, the unit is defective.