

# Load Pulse Sensor w/ Turbo Boost

## for Electric Generation Applications

### Applications

The Load Pulse Sensor with Turbo Boost is used in an engine-driven generator system to help the engine meet transient load swings with minimal frequency excursions.

The load-pulse unit monitors the output current level of the generator, noticing changes before the engine speed drops or increases due to a change in load. When a change in generator load is sensed, the unit sends a pulse to the engine-speed controller (701/721/723 series, 2301A, 2301, EPG, EGM, or 2500 control) which causes an immediate increase or decrease in the signal to the actuator controlling the engine fuel setting. At the same time the unit can change a relay position, causing air impingement (turbocharger boost).

These changes help to overcome the normal lag in response due to the effect of inertia in the engine, turbocharger, and generator.

The relay contacts are changed only on load increase. Decreases in load do not affect the relay contacts, even though the load-pulse unit sends a lower speed pulse to the speed-control unit.

### Description

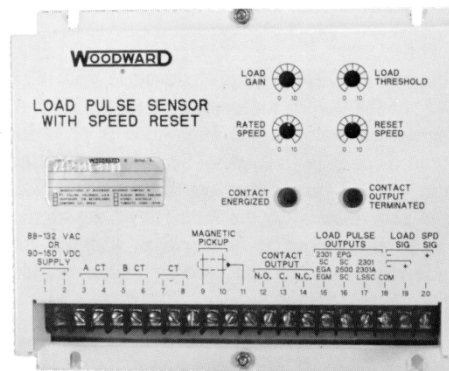
The Load Pulse Sensor with Turbo Boost (speed reset) changes the position of an internal relay at the same time a load pulse is sent to the speed control on the engine (or engines) when a load change in an increase direction is sensed. The unit has an adjustable threshold for the minimum load change which will be sensed.

The load pulse to the electronic speed or load control on the engine provides a temporary increase in the reference speed setting, causing an increase in fuel setting before the engine has slowed down due to the increased load.

The change in the relay output is usually used to cause air impingement into the turbocharger (turbocharger boost). This injection of compressed air into the turbo causes it to start accelerating before the engine "feels" the additional load. The relay remains energized until engine speed recovers, or for a maximum of eight seconds.

When speed returns to the desired range, the relay will de-energize and the load-pulse signal will drop out, returning the engine to normal operation.

The automatic return to normal operation occurs only when engine speed, as monitored by the MPU, drops below the deadband range and returns to the deadband range. If the load increases but the speed does not drop below the deadband range, the relay will remain in the de-energized state. A timer in the load pulse control will cause the relay to energize if speed drops out of the deadband range but does not recover in an eight-second time limit.



- Anticipates engine speed changes
- Adjustable base speed setting
- Automatic relay on Load Pulse Sensor for turbocharger boost (air impingement)
- Monitors speed and load
- Pulse magnitude matches load change

## Supply Voltage

The load pulse sensor can accept a 24 Vdc low voltage power source (models 8272-827/-828) or an 88 to 132 Vac/90 to 150 Vdc high voltage power source (models 8272-805/-812, 9900-465). The load pulse unit is designed for installation in the control panel.

## Indicators

A yellow light indicates when the turbo-boost relay is energized.

A red light on the unit will light for about one second after a reset due to the eight-second period. The red light turns on momentarily when the relay resets due to speed recovery.

## Pulse Signal

Speed change signals from the load-pulse unit (8272-805, 8872-812, or 9900-465) are connected to the SPM-A inputs on the speed control. Signal magnitude is proportional to the amount of change in load. The pulse is in effect for a maximum of 500 ms. The length of time the signal is present is proportional to the strength of the signal. The pulse can be either positive or negative, with the maximum magnitude dependent on the type of signal needed for a particular control system.

The maximum pulse is about 6 V when measured at the 2301A connections. A 6 V pulse to a 2301A control will momentarily change the speed setting of the control about 4 percent, enough to cause the control to order maximum fuel to the engine being controlled. Other Woodward controls will be changed about the same amount. The level of the maximum output is adjusted with the Load Gain potentiometer on the Load Pulse unit.

Part number 8272-687 provides pulse signals to turbo boost only. The speed reference pulse is not present.

## Load Sharing

Multiple engine/generator systems using isochronous load sharing through parallel (load sharing) lines, use a single load-pulse unit which provides load pulses to the parallel (load sharing) lines. Multiple load-pulse units cannot be used with isochronous load-sharing systems. In droop paralleling systems, a load-pulse unit may be used on every engine in the system.

## Speed Ranges

The 8272-805, 9900-465, and 8272-687 units are designed to receive an MPU input of 1000 to 3000 Hz. The 8272-812 unit with load pulse and turbo boost has a speed range of 3000 to 6000 Hz.

## Current Transformers

CT signals may be obtained by wiring in series with the CTs used for load control. The burden in the load-pulse unit is extremely low (30 mW) and will not disturb most CT circuits.

## Adjustments

The magnitude of the load pulse for a given load change is adjustable, permitting the unit to be individually tailored to match the inertia in a specific engine/generator set (not present on 8272-687).

The amount of load change required to operate the load pulse contacts for turbo boost (the load threshold) is adjustable from a 10% change to a 75% change.

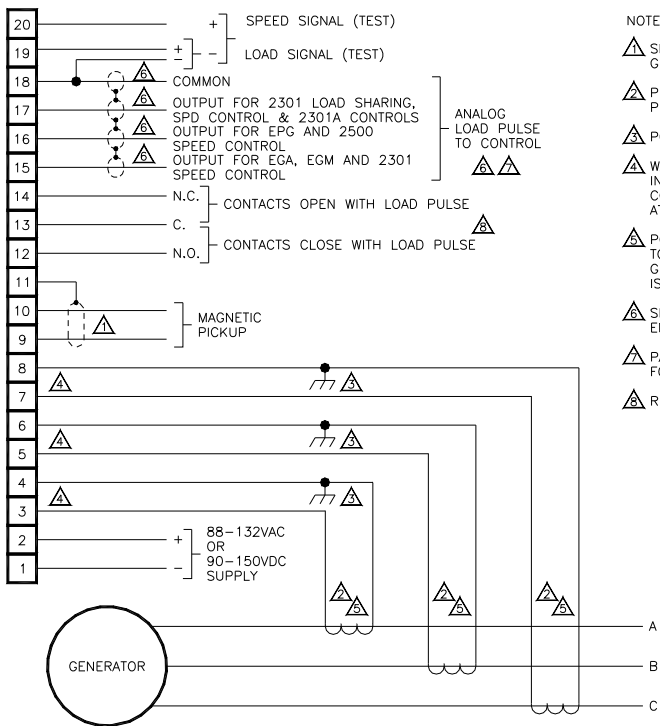
## Reset Adjustment

Adjustment is provided for the point at which the contacts are reset when the engine returns to rated speed after a load change. The reset-speed set point is adjustable from 98.3% to 93.3% of rated. The rated speed of the load pulse unit is adjusted to make it the same as the rated speed of the speed control. This is only used to set the operating range for the relay contact reset position.

## MPU Requirement

The load-pulse unit requires a magnetic-pickup (MPU) for the engine being controlled. This signal may be provided by the same MPU that is installed for the electronic speed control. A minimum signal of 1 Vac (peak to peak) is required at both the load pulse and the speed control. It may be necessary to adjust the MPU sensor to obtain enough voltage to service both controls. Separate MPUs may be used, if desired.

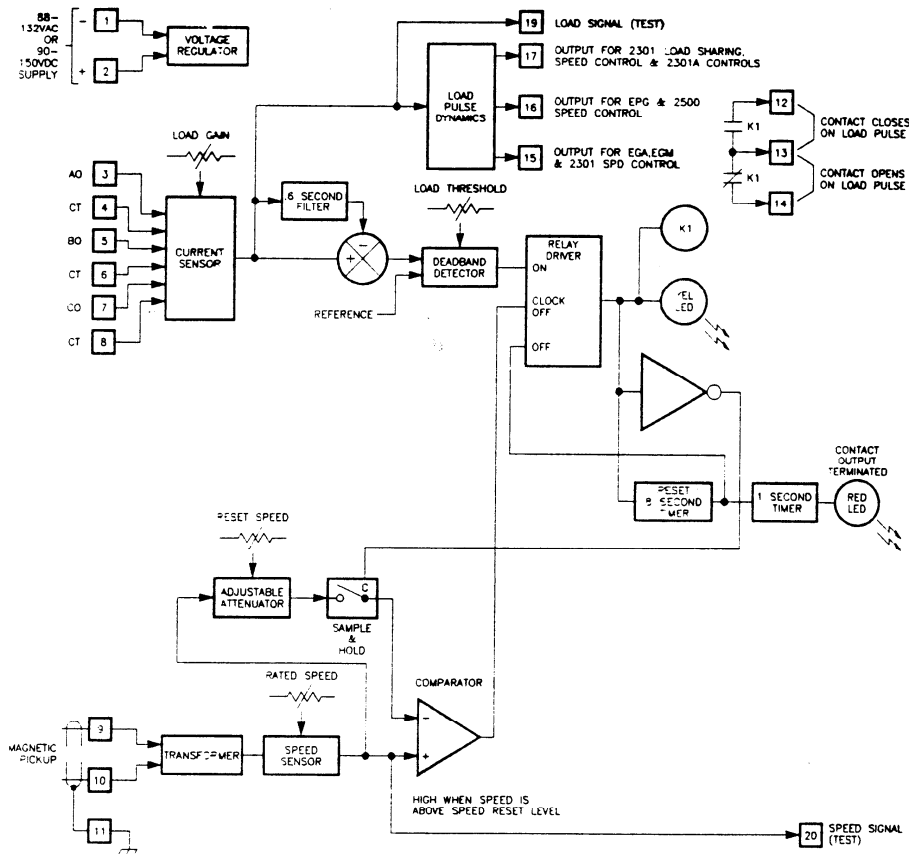
Part Number	Input Voltage	Speed Range (Hz)	Vibration Tested to US Mil. Spec. 167-1
8272-805	high	1000–3000	
8272-812	high	3000–6000	
8272-827	low	1000–3000	
8272-828	low	3000–6000	
9900-465	low	1000–3000	yes



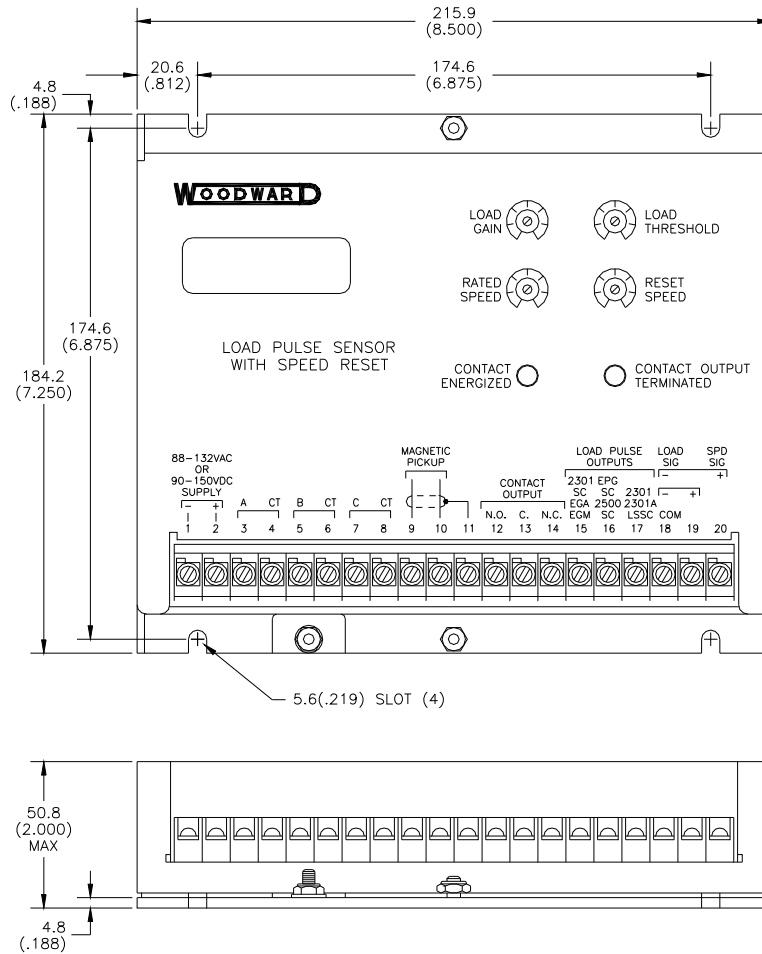
- NOTES:
- ⚠ SHIELDED WIRES TO BE TWISTED PAIRS WITH SHIELD GROUNDED ONLY AT TERMINAL 11.
  - ⚠ PHASING NOT IMPORTANT TO OPERATION OF LOAD PULSE SENSOR.
  - ⚠ POINT OF GROUNDING IF REQUIRED BY LAW.
  - ⚠ WARNING: INTERNAL CURRENT TRANSFORMER BURDEN MUST BE CONNECTED ACROSS POWER SOURCE CURRENT TRANSFORMERS AT ALL TIMES TO PREVENT LETHAL HIGH VOLTAGES.
  - ⚠ POWER SOURCE CURRENT TRANSFORMERS SHOULD BE SIZED TO PRODUCE 5A SECONDARY CURRENT WITH MAXIMUM GENERATOR CURRENT, CURRENT TRANSFORMER BURDEN IS LESS THAN 0.1 VA PER PHASE.
  - ⚠ SHIELDED WIRES TO BE GROUNDED AT SPEED CONTROL END ONLY.
  - ⚠ PAIR COMMON (TERMINAL 18) WITH OUTPUT SELECTED FOR THE APPLICATION (TERMINAL 15, 16 OR 17).
  - ⚠ RELAY IS RATED FOR 5 AMPS MAXIMUM.

820-555  
92-7-23 GA

**Plant Wiring Diagram—Load Pulse Sensor with Speed Reset**



**Block Diagram—Load Pulse Sensor with Speed Reset**



METRIC

NOTE: INCHES SHOWN IN PARENTHESES

82000-A-39  
10-30-89RM

**Outline Drawing—Load Pulse Sensor with Speed Reset**  
(Do not use for construction)



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