

**SERVICE BULLETIN**

Original Issue Date: **11/03**  
 Model: **200-2000 kW**  
 Market: **Industrial**  
 Subject: **Engine Speed Senders using Pulse Converter Circuit Board GM24832**

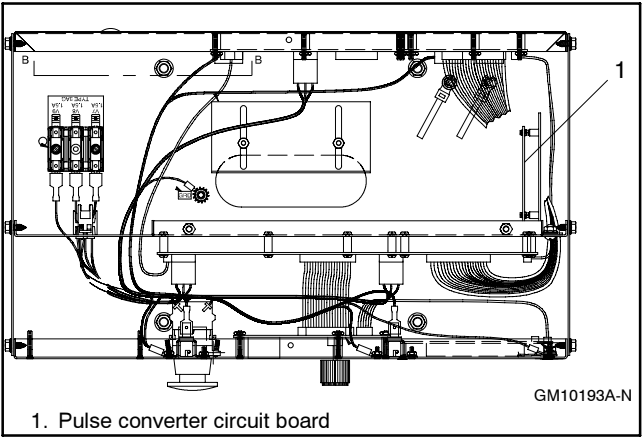
**Introduction**

Use this bulletin for controller troubleshooting and pulse converter circuit board replacement. The pulse converter circuit board converts the engine speed sender signal to a 2-pulse output per engine revolution needed with some controllers.

The controllers using the pulse converter circuit board include:

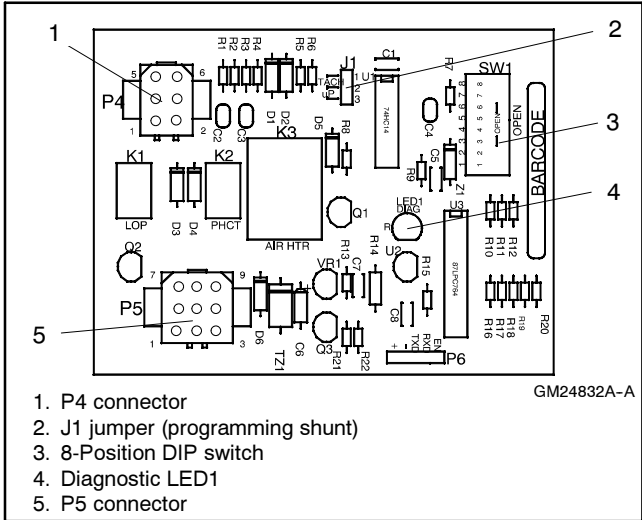
- 16-light microprocessor
- 550

Circuit board GM24832 uses an 8-position DIP switch to provide a 2-pulse output from flywheels with a tooth count between 15 and 255. See Figure 1 for the pulse converter circuit board. See Figure 2 for circuit board mounting location in the controller.

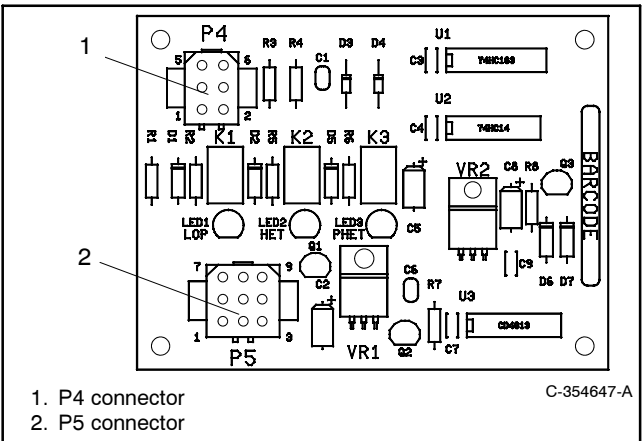


**Figure 2** Pulse Converter Circuit Board Mounting in 550 Controller (top view)

The earlier version pulse converter circuit board C-354647 provided only a 12-2 speed signal conversion and is installed on 450-2000 kW generator sets with DDC/MTU Series 2000 and 4000 engines using DDEC. See Figure 3 for circuit board C-354647.



**Figure 1** Pulse Converter Circuit Board GM24832



**Figure 3** Pulse Converter Circuit Board C-354647

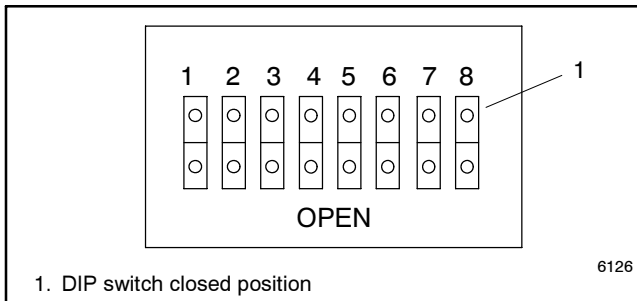
Routing	Service Manager	Sales Manager	Parts Manager	Technician No. 1	Technician No. 2	Technician No. 3	Return This to
Initial Here							

## DIP Switch

Service technicians should be aware that odd number tooth counts have an inherent percent error in engine speed calculations. An even number of flywheel teeth do not cause the percent error in speed. If the flywheel has an odd number of teeth, the circuit board logic uses a correction factor as follows:

$$(1 - [\text{tooth count}] / [\text{tooth count} + 1]) \times 100 = \text{correction value}$$

Use the circuit board DIP switch, see Figure 4 to match the engine flywheel tooth number count.



**Figure 4** DIP Switch Positions

## Programming Shunt

Use programming shunt J1 across pins 1 and 2 on the circuit board to get a 1:1 output. The shunt provides a 1:1 output regardless of the DIP switch selection. The shunt is typically used with the 550 controller and is also intended as a diagnostic test during troubleshooting.

Place J1 across pins 2 and 3 for a 2-pulse output signal.

## Tach Output

The circuit board has a secondary output (P5-4) that matches the input signal 1:1. Some generator set models use this connection to eliminate an engine speed sensor. See Figure 1 for P5-4 location.

## Air Heater Control

The circuit board provides a 6-minute ( $\pm 30$  seconds) signal to activate the air heater after the start switch is toggled. If the start switch signal is interrupted during the 6 minutes, the air heater control signal is deenergized.

## Anticipatory High Coolant Temperature (AHCT) and Low Oil Pressure (LOP) Relays

The circuit board provides dry contacts for AHCT and LOP inputs for some generator set models.

## LED Indicator

The red LED will flash at 1 Hz rate if the DIP switch setting matches the engine flywheel tooth count and the generator set is running at 60 Hz. The LED indicator provides some diagnostic help. See Troubleshooting following.

## Circuit Board Connections

Figure 5 shows the connections made to the pulse converter circuit board. Some generator set models may not have all connections.

Plug-Pin	Connection
P4-1	Low oil pressure input signal
P4-2	Battery positive (+) lead 70
P4-3	Anticipatory high coolant temperature input signal
P4-4	Cable shield (ground)
P4-5	Magnetic pickup sensor low (ground)
P4-6	Magnetic pickup sensor high
P5-1	Magnetic pickup output signal shield (ground)
P5-2	Speed signal output signal
P5-3	Speed sensor ground
P5-4	Tach output signal
P5-5	Magnetic pickup output signal (ground)
P5-6	V+ Speed sensor
P5-7	Low oil pressure output signal
P5-8	Anticipatory high coolant temperature output signal
P5-9	Air heater output signal

**Figure 5** Pulse Converter Circuit Board Connections

## Circuit Board Troubleshooting

The pulse converter circuit board contains an LED indicator for diagnostic troubleshooting. See Figure 6.

Figure 7 shows generator set models implementing the pulse converter circuit board and Figure 8 indicates the pulse converter circuit board settings based on number of flywheel teeth.

LED Indicator	Probable Causes	Recommended Actions
Flashes very fast (greater than 1 Hz)	DIP switch set at less than 15 flywheel teeth DIP switch setting does not match flywheel number of teeth	Reset the DIP switch to match the engine flywheel number of teeth
Flashes at a 1 Hz rate	DIP switch set correctly. <b>NOTE:</b> The distinction between 1 Hz and 1.1 Hz, for example, is visually unrecognizable.	Circuit board functionally okay
Flashes very slowly (less than 1 Hz)	DIP switch setting does not match flywheel number of teeth	Reset the DIP switch to match the engine flywheel number of teeth
Off (red on, black off)	DIP switch setting does not match flywheel number of teeth No power to the circuit board Defective circuit board	Reset DIP switch Check power source Replace defective circuit board
On continuous (steady)	DIP switch setting does not match flywheel number of teeth Defective circuit board	Reset DIP switch Replace defective circuit board

**Figure 6** Pulse Converter Circuit Board Troubleshooting Chart

Generator Set Model	Controller	No. of Flywheel Teeth	Comments	J1 Shunt Connection
200REOZV	550	NA	Tach feature	Pins 1-2
230/250REOZV	550	NA	Tach feature and P5-9 air heater output feature	Pins 1-2
275/300REOZV	16-light microprocessor	NA	P5-7 LOP and P5-8 AHCT alarms only	NA
350/400REOZV	16-light microprocessor	38 (timing gear)	P5-7 LOP and P5-8 AHCT alarms only	Pins 2-3
500REOZV	550	NA	Tach feature	Pins 1-2
500REOZV	16-light microprocessor	153		Pins 2-3

NA not applicable

**Figure 7** Generator Set and Number of Engine Flywheel Teeth

No. of Flywheel Teeth	DIP Switch Position (1=Open , 0=Closed)							
	DIP 8 Switch Value=128	DIP 7 Switch Value=64	DIP 6 Switch Value=32	DIP 5 Switch Value=16	DIP 4 Switch Value=8	DIP 3 Switch Value=4	DIP 2 Switch Value=2	DIP 1 Switch Value=1
1	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	1	0
4	0	0	0	0	0	1	0	0
8	0	0	0	0	1	0	0	0
16	0	0	0	1	0	0	0	0
32	0	0	1	0	0	0	0	0
64	0	1	0	0	0	0	0	0
128	1	0	0	0	0	0	0	0
38 (timing gear)	0	0	1	0	0	1	1	0
153	1	0	0	1	1	0	0	1

**Figure 8** Pulse Converter Circuit Board Settings Based on Number of Flywheel Teeth