



No. EL/3.1.35/26

Dated: 01.05.2008

**Chief Electrical Engineers,**

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**SPECIAL MAINTENANCE INSTRUCTION NO. RDSO/2008/EL/SMI/0252(Rev.'0')**  
**Dated 01.05.08**

**1.0 Title:**

Testing of “Weigand” speed sensor fitted with Traction Motor in WAG9, WAG9H, WAP7 and WAP5 locomotives.

**2.0 Brief History:**

Railways have been reporting the problem of poor adhesion on WAG9 locomotives. Failures of TM speed sensors with the message “ASC-1 / ASC-2: Error Tacho generator TM 1,2,3” have also been reported. The poor adhesion performance, failure of TM speed sensors and the TM failures are all related problems. There are jerks from traction motors while movement of locomotive during testing in sheds.

For satisfactory performance of the locomotive, speed sensor output must be good at all speeds and therefore methodology / procedure should be available to detect any poor sensor output. As per “Weigand” pulse generator-working instruction (Doc. No. HTAT 620491), the speed sensors are to be tested at  $\geq 30$  rpm and the pulse amplitude should be  $> 350$  mV; 1 or 2 pulses may be in the range of 300 – 350 mV for new sensor. For in service sensor, the requirement for 30 revolutions, pulse no.  $n$  is  $\geq n-1 \geq 290$  mV,  $n \geq 250$  mV.

ELS/Ajni, Central Railway has developed a “Fixture for testing the speed sensor fitted with TM type 6FRA6068 in WAG9 locomotive”. The same was also discussed in 32<sup>nd</sup> MSG meeting. As per recommendation of 32<sup>nd</sup> MSG, concerned sheds should develop facility similar to Central Railway for checking of speed sensor.

### 3.0 Object:

To improve reliability of locos on line and avoid undesirable messages in locos.

### 4.0 Instructions:

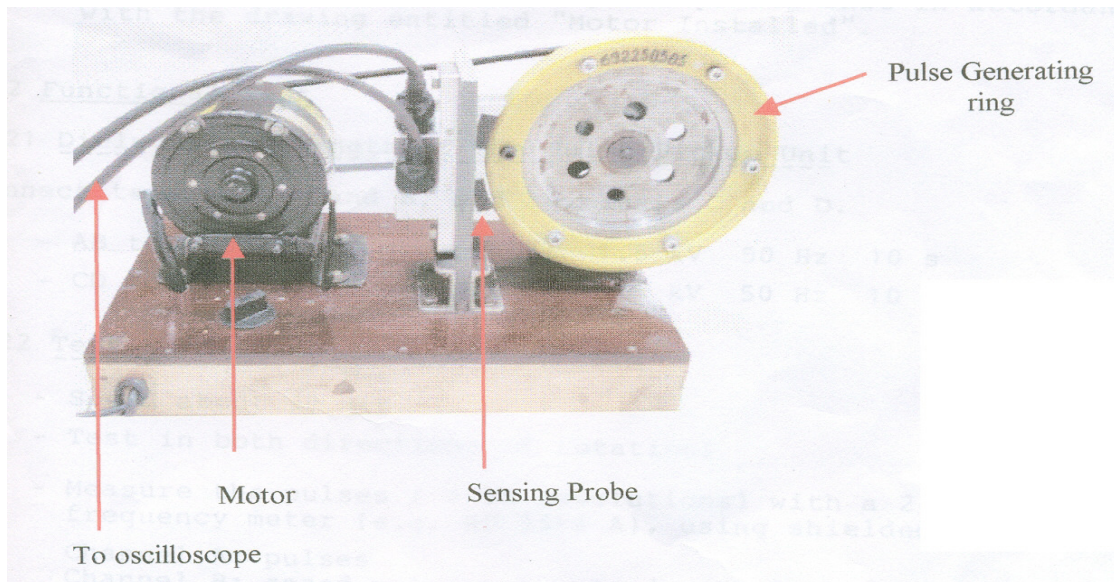
The speed sensor should be tested for speed  $\geq 30$  rpm. The fixture arrangement shall be prepared as given in diagram to test the speed sensor from 30 rpm to 900 rpm or above. In this arrangement a motor is used to rotate the pulse-generating ring, which, rotates at a speed at and above 30 rpm. The sensor probe is fitted at a gap of 0.5 mm to 1.0 mm from pulse generating ring, which is connected to oscilloscope. The sensor generates voltage by the movement of the pulse generating ring. The magnitude and frequency of the pulses generated is measured and monitored with the help of oscilloscope. The motor is run at variable speeds in steps by varying the speed by means of a regulator. Thus a set of readings may be obtained with generated voltage and frequency at variable speeds. By measuring the voltage and frequency generated, the condition of the pulse generating ring or sensor with respect to standard can be ascertained. In the defective pulse generating ring the frequency generated is of random order whereas in healthy pulse generating ring frequency generated has very little variation. At lower speed, wide range of fluctuations in frequency are observed because of few pulses are missing in defective pulse generating ring. In the defective sensor the generated output voltage shall be less than 250mV.

Speed sensor shall be tested in both direction of rotation in following manner:

| Sl.No. | Speed in rpm | Standard frequency of pulse in Hz | Actual Frequency of pulse in Hz |                  | Pulse magnitude or output voltage in |                  |
|--------|--------------|-----------------------------------|---------------------------------|------------------|--------------------------------------|------------------|
|        |              |                                   | Forward rotation                | Reverse rotation | Forward rotation                     | Reverse rotation |
| 1.     | 30           | 60                                |                                 |                  |                                      |                  |
| 2.     | 50           | 100                               |                                 |                  |                                      |                  |
| 3.     | 100          | 200                               |                                 |                  |                                      |                  |
| 4.     | 200          | 400                               |                                 |                  |                                      |                  |
| 5.     | 400          | 800                               |                                 |                  |                                      |                  |
| 6.     | 600          | 1200                              |                                 |                  |                                      |                  |
| 7.     | 800          | 1600                              |                                 |                  |                                      |                  |
| 8.     | 900          | 1800                              |                                 |                  |                                      |                  |

### Observations:

1. If wide variations in frequency are measured, "Pulse Generating Ring" is defective.
2. If output voltage is measured  $\leq 350$ mV (new sensor) &  $\leq 250$ mV (in-service sensor), "Sensor" is defective.



Air gap between pulse generator ring and sensing unit = 0.5 mm to 1.0 mm.

**Diagram of the fixture arrangement**

**5.0 Application to:**

WAG9, WAG 9H, WAP7 and WAP5 electric locomotives.

**6.0 Agency of implementation:**

All sheds holding WAG9, WAG9H, WAP7 and WAP5 locomotives and Electric Loco Workshop /Bhusawal.

**7.0 Periodicity of implementation:**

During IOH/POH or whenever message of "ASC1/ASC2: Error Techo generator TM1, 2, 3" is observed repeatedly.

**Encl:** Nil.

**Copy to:-**

(Sandeep Srivastava )  
for Director General / Elect.

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**Encl:** Nil.

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