



# **INSTRUCTION and OPERATIONS MANUAL**

**for**

**SPEED-O-CALIBRATOR**

**Locomotive Speedometer Calibrator Unit**

**MODEL NUMBER 16470-00**

## **CAUTION**

Be sure to read and become thoroughly familiar with the entire contents of this manual before attempting to operate the **“SPEED-O-CALIBRATOR.”**

**DOCUMENT NO. 16470-99 Rev B**



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## GENERAL DESCRIPTION

The **16470-00 SPEED-O-CALIBRATOR** consist of one case holding all the component parts for the test unit.

In this case are stored:

1. The small yellow **Control Box**.
2. The orange **Umbilical Cable** between the Main Case and the Control Box.
3. The **16484-01 ADAPTER SPACER**.

The **Main Case** is the **Locomotive Axle Alternator Drive** unit.

The small yellow **Control Box** has all the **user controls** for the system.

The **30 foot** orange **Umbilical Cable** between the **Main Case** and the smaller yellow **Control Box** with an 8 foot yellow **Power Cable** with **Battery Clips** on the Control Box end of the cable.

On receipt of the 16470-00 SPEED-O-CALIBRATOR, you should verify that all parts are included:

### List of components included:

- 1 ea Main Case.
- 1 ea small yellow Control Box.
- 1 ea 30 foot orange Umbilical Cable with 8 foot yellow Power Cable.
- 1 ea 16484-01 ADAPTER SPACER.
- 3 ea Bolts 3/8-18 x 4 3/4.
- 1 ea 16470-99 MANUAL.
- 1 ea 16470-91 Quick-Start Instruction.

## **MAIN Case.**

The MAIN Case is self contained with a Cable Connector for the orange Umbilical Cable (the end without yellow cable) to the small yellow Control Box.

The axle alternator from the locomotive under test is attached to the axle alternator receiver port.

There are 12 threaded 3/8-18 holes in the receiver port. It is only necessary to use any two diametrically opposed bolts to attach the alternator to the port.

*Tighten the bolts lightly, DO NOT over tighten!*

The port accepts locomotive axle alternators with 4.5 to 10" long paddle or spline drive. If the locomotive axle alternator drive is longer than 10" but not over 11.5" use the 1.5" long 16484-01 ADAPTER SPACER between alternator and drive port.

**NOTE:** If you have the very short GE type drive spindle, you need to use a special Short Spline Adapter with a rubber sleeve attached.

## **CONTROL Box.**

The small yellow Control Box is used in the cab of the locomotive, to control with what speed that the Main Case motor is driving the axle alternator under test.

The controls on the panel consist of:

- On-Off switch/circuit breaker.

- A Speed Control Knob.

- Four "Software Controlled function" Push Buttons with LED Indicators.

- A Two Line 24 character VFD Display.

There is also a Circular Connector where the 30 foot orange Umbilical Cable (the end with the 8 foot yellow Power Cable with two Battery Clips) is attached to.

There is a Quick-Start Instruction label attached to the inside of the lid for the operator to use.

## CONNECTING THE SYSTEM.

1. Open the **MAIN Case** close to where Locomotive axle alternator to be tested is located, and lift out the small yellow **Control Box** and take out the **Umbilical Cable** stored in the lid.
2. Attach the Locomotive axle alternator to be tested to the **MAIN Case drive port**. Using any two diametrically opposed 3/8-18 bolt holes, they only need to be torqued very lightly, **DO NOT** over tighten them.
3. Take the small yellow **Control Box** and the orange **Umbilical Cable** up into the locomotive cab. Attach the orange **Umbilical Cable**, the end with the yellow **Power Cable** with two **Battery Clips**, to the **Control Box**.
4. Drop the other end of the **Umbilical Cable** ( the one without the yellow stub cable) out the cab window down to be attached to the **MAIN Case**.
5. Go down and attach the orange **Umbilical Cable** to **Main Case Connector** on lower side of electronics cover plate by the side of the motor.
6. **Measure the Wheel Diameter of the Locomotive** to determine what wheel diameter value to use with the calibrator system.
7. Go up in the cab and verify that the power switch on the **Control Box** is **OFF**. Attach the yellow 8 foot **Power Cable with Battery Clips** to **72 VDC** in the locomotive. **Red** to **Positive 72 VDC** and **Black** to **Negative 72 VDC**.

## OPERATING INSTRUCTIONS.

1. Turn the **Black Control Knob** to **MIN.** position.
2. Turn the power switch to **ON** position.
3. Display will now light up, and the unit start up sequence is displayed for a moment.
4. Push the "**WhDia**" lighted push button, to go to the Wheel Diameter Select Menu.
5. Now Select the wheel diameter, measured earlier, with the lighted "**DECR**" or "**INCR**" Push Buttons to the desired Diameter ( range is 36 to 44 inch in ½ inch increments ). Then push the lighted "**ENTER**" Push Button when the correct diameter is displayed.

6. Unit will display the selected wheel diameter and 20 MPH (default startup speed) on the top line. If the selected wheel diameter is the desired size push the lighted **"MANUAL"** or **"AUTO"** Push Button to go to the run Menu. If the wheel diameter is not the desired size and need to be changed, push the lighted **"WhDia"** Push Button to go back to the Wheel Diameter Select Menu to change it.
7. If **"MANUAL"** was **entered**, the actual axle alternator drive speed is displayed in MPH on the top line and the selected speed is displayed on the bottom line. The startup default speed is 20 MPH. Use the **Black Knob** to adjust the Top Line Speed to match the Bottom Line Speed. NOTE: If the drive shaft is not moving, the actual top MPH indication will be blank until the drive shaft have made one complete turn.
8. If **"AUTO"** was **entered**, the axle alternator drive will automatically adjust the speed to match the selected speed setting. NOTE: In low speed setting, it may take a few seconds for the actual MPH to indicate. The MPH will be blank until the drive shaft have made one complete turn.
9. **NOTE:** In **"AUTO"** mode, the Black **Speed** select **Knob** must be in the **fully counter-clockwise** position ( Minimum Speed position, **OFF**).
10. Select the desired speed "ON THE FLY" with **"DECR"** and **"INCR"** Push Buttons. If the Top Line actual Speed is more then 1 MPH "OFF" from the Bottom Line target Speed selected, the top line actual speed will Flash to indicate that speed is NOT within 1 MPH from target speed.
11. Step thru the required speeds to be tested, 6, 20, 22, 40, 60, 72, 75 and 80 MPH. And verify that the readings comply with FRA tolerance limits:
  - +/- 3 MPH for 20 and 22 MPH and
  - +/- 5 MPH for 40, 60, 72 and 75 MPH.
12. Use **"BACK"** push button to go back to the previous Menu to change selected wheel diameter, or once more to get to the "HELP" for instructions.
13. When testing is complete. Turn the **Black Knob to MIN.** position and the power switch to **OFF**.
14. Disconnect the yellow **Power Cable** and the **Umbilical Cable**. Drop the Cable out the cab window to the MAIN Case, do not drop the circular connector in dirt or grease. Take the yellow Control Box and go down to the MAIN Case.
15. Put the **Control Box** back in the **Main Case**.  
Remove the axle alternator from the drive port, and re-install it on the locomotive.
16. Coil up the **Umbilical Cable** on the storage fingers in the lid of the **MAIN Case**.

## **SAFETY SUMMARY.**

The 16470-00 SPEED-O-CALIBRATOR unit is meant to be used by qualified Railroad technicians, familiar with FRA and Company safety procedures and regulations.

All safety regulations, local codes and instructions that appear in the manual or on the equipment must be observed to ensure personal safety and to prevent damage to either the instrument or equipment connected to it. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired, and warranty status may be revoked.

When working with electrical wiring and connections, it is essential to observe polarity and proper wiring techniques to avoid damage to components or inflicting serious injury to yourself and others.

## **FRA REGULATIONS REGARDING SPEEDOMETER CALIBRATION.**

49 CFR Section 229.117 reads.

- (a) After December 31, 1980, each locomotive used as a controlling locomotive at speeds in excess of 20 miles per hour shall be equipped with a speed indicator which is –
  - (1) Accurate within +/- 3 miles per hour of actual speed at speeds of 10 to 30 miles per hour and accurate within +/- 5 miles per hour at speeds above 30 miles per hour, and
  - (2) is clearly readable from the engineers normal position under all light conditions.
- (b) Each speed indicator required shall be tested as soon as possible after departure by means of speed test sections or equivalent procedures.

## **TROUBLE SHOOTING GUIDE.**

1. Unit does not power up. No visible display or red push button lights visible.

Check that the Battery Clips on the yellow Power Cable have power to them

Check that the polarity is connected correctly, Red positive and Black negative.

Check that the ON-OFF switch is in ON position.

Check that the orange Umbilical Cable is connected to the MAIN Case.



## **SPECIFICATIONS.**

### **PHYSICAL DIMENSIONS.**

**MAIN Case:**

12" W x 13" L x 4.75" H  
Total system weight 50 lbs.

**Control Box:**

7.5" W x 9.25" L x 4.4" H

**Umbilical Cable:**

orange 30 foot long with a circular connector in one end and a the other end a circular connector with also have a 8 foot yellow stub power cable with Red and Black battery clips.

**Accepted axle alternators:**

4.5" to 10" long paddle or spline type.  
10" to 11.5" long paddle or spline with the ADAPTER SPACER.

### **ELECTRICAL.**

**DC Power:**

50 to 90 Volt DC, reverse polarity protected.

**Current draw, typical:**

1 Ampere.

**Overload circuit breaker:**

**Speed range:**

6 to 80 MPH, ( 40 to 750 RPM ).

**Speed accuracy:**

+/- 0.1 MPH.

**Drive motor:**

¼ Hp.

### **ENVIRONMENTAL.**

**Storage temperature:**

-22 to 185 Degrees F, -30 to 85 Degrees C.

**Operating temperature:**

32 to 104 Degrees F, 0 to 40 Degrees C.

**Humidity:**

5 to 95 %.

## WARRANTY

Ultra-Tech Enterprises, Inc. (the "Company"), will repair or replace, at the Company's option, its products free of charge if such products are found to be defective in material or workmanship, for the period of one year from the date of purchase, except as follows:

Transportation charges to the Company's designated repair station for defective and replacement parts or service are the responsibility of the purchaser. This warranty does not apply, if: (i) the product has been damaged by improper connection or disconnection with any electrical device; (ii) the product has been damaged in shipping; (iv) the product has been damaged due to an act of God, accident, misuse, abuse, negligence or any other use than the product's intended use as set forth in the specifications; or (v) the device has suffered damage from an external blow or trauma. This warranty does not cover cosmetic damage and may not be transferred to any person or entity. The Company will provide warranty service as provided herein as soon, as is commercially reasonable.

THE SOLE REMEDY UNDER THIS WARRANTY IS THE REPAIR OR REPLACEMENT OF THE PRODUCT AS PROVIDED HEREIN. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR ANY INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ON THIS PRODUCT. IN ANY EVENT, IF DAMAGES ARE AWARDED, THEY WILL BE LIMITED TO THE COST OF THIS PRODUCT.

EXCEPT TO THE EXTENT PROHIBITED BY ANY APPLICABLE STATE OF FEDERAL LAW, ALL IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED.

Some states do not allow the exclusion or limitation of incidental, indirect, or consequential damages, or allow limitations to the length of an implied warranty, in which case the foregoing warranty shall be extended to conform to the minimum requirement of such applicable law.

To obtain service under this warranty, it is necessary to obtain a Return Merchandise Authorization (RMA) from the Company prior to returning equipment for service. RMA numbers must be clearly marked on the outside of the shipping package in which the merchandise is returned. Failure to follow the Company's RMA procedure may result in delays in obtaining requested service and or refusal of the Company to accept packages not marked clearly with the appropriate RMA number.