

INSTRUCTIONS FOR MAINTENANCE AND INSPECTION OF  
"8 9 0 9" H O T B O X D E T E C T O R S Y S T E M S  
W I T H I T U A N D T I M C

I. Weekly Inspections and Tests performed by Signal Maintainer:

- A. Clean sensors optical lens and reflector. Use anti-fog cleaning solution. Do not apply ammonia or alkaline solutions to reflector. Dry reflector with soft cloth applying only light pressure.
- B. Inspect transducers, scanners, deflecting guards and track fittings to see if properly secured and no external damage visible.
- C. Check track conditions: If track is "pumping" or "running" more than two inches, contact Section gang for repair.
- D. Run self-test on Integrity Test Unit (I T U) Logic No. 3 Card: Push Switch "S 1", and observe proper operation.
- E. Change recorder tape (as required) and send tapes to Signal Inspector' Office for their review.
- F. Watch train and observe normal levels.

II. Monthly Inspections and Tests performed by Signal Maintainer:

- A. Using Simpson Model 2 6 0 or Fluke 8 0 2 4 B meter, check supply voltages and enter on log sheet:
  - 1. -12 Volts D C Unregulated: T B 1 - 4 and T B 1 - 1.
  - 2. -12 Volts D C Regulated: T B 1 - 3 and T B 1 - 1.
  - 3. +24 Volts D C Regulated: Main Power Supply Test Jack and Common.

A - 2 0 5 - 1

+26  
1.2

4. +200 Volts D C: Main Power Supply Test Jack and Common.
5. 120 Volts A C Unregulated: T B 1 - 5 and T B 1 - 7.
6. 115 Volts A C Regulated: T B 1 - 9 and T B 1 - 10.
7. -300 Volts D C: Bolometer Bias Supply Test Jack and Common.
8. +300 Volts D C: Bolometer Bias Supply Test Jack and Common.

Note: Bolometer bias voltage will vary with ambient temperature. The important check is that the readings are balanced. They should not vary more than +/- 5 Volts.

9. Pulse Processor Input: Input Jack on front of Pulse Processor and Common.
10. Pulse Processor Output: Output Jack on front of Pulse Processor and Common.

Note: Output should be "0" Volts. If not, change "Q1", "Q2", "Q6" or "Q7" and, if this does not correct, change Pulse Processor.

C. Recorder Calibration:

1. Start Test Panel by pushing Direction One or Direction Two.
2. Push Rail One on Test Panel.
3. Adjust level pot on Test Panel until 10 m m is seen on Test Panel Meter.
4. Recorder top channel should show 10 m m deflection. If not, adjust gain until 10 m m is seen.
5. Push Rail Two on Test Panel.
6. Do Steps C.-3. and C.-4. for bottom channel on recorder.
7. Push Reset on Test Panel.

A - 2 0 5 - 2

D. Check Differential Alarm:

1. Start Test Panel.
2. Push Rail One on Test Panel.
3. Adjust level pot until 10 m m is seen on Test Panel Meter (with 1 m m pedestal on Rail 2).
4. Rail One should fire. If not, adjust differential alarm until it fires.
5. Push Rail Two on Test Panel.
6. Do Steps D.-3. and D.-4. for Rail Two.

Note: There is only one pot of differential adjustment of Rail One and Rail Two so leave set where both rails fire at 9 m m differential.

7. Push Reset on Test Panel.

E. Check Absolute Alarm:

1. Jumper Rail One and Rail Two Pulse Processor outputs together.
2. Start Test Panel.
3. Push Rail One on Test Panel.
4. Adjust level pot until 15 m m is seen on Test Panel Meter
5. System should alarm. If not, adjust Absolute Alarm until it fires.
6. Push Reset on Test Panel.

F. Dragging Equipment Test:

1. Drop Short Track Relay (C T R).
2. Start Test Panel.
3. Kick Dragger.

A - 2 0 5 - 3

- 4. Push Reset on Test Panel.
- 5. Pick C T R.
- 6. Verify that Mars light came on; D S got indication; and, that radio transmitted.

G. Make Standard Cross and Grounds Test.

Note: Local battery B B and N will show ground because of connection to Harmon Recorder.

III. Quarterly Inspections and Tests performed by Signal Inspector and Signal Maintainer:

A. All weekly and monthly tests should be performed before continuing with Quarterly Tests.

B. Check alignment:

Note: (Use Optical Alignment Fixture P N - 2 0 0 0 9 9 - 8 1 - 5)

- 1. Install mirror cap on front of bolometer lens.

Note: Insure that cap fits securely and is flush to top of bolometer.

- 2. Install alignment fixture on rail and adjust to a point 20 inches from center of scanner to center of alignment target and seven inches from gage.

Note: If 20 inches from center of scanner to alignment fixture does not put the target in the center of the gating transducers, check your measurements again and find out where you are off.

- 3. Site through alignment target hole and see if red dot appears inside circle of target.

A - 2 0 5 - 4

4. If alignment is not correct, adjust cant nuts to achieve proper alignment.
  5. Check that the opposite scanner is directly across from the scanner you started with. If not, move and then do Steps B.-2. through B.-4. for second scanner.
  6. Remove mirror cap and replace scanner lids.
- C. Set tension of Recorder Pens to two grams.
- D. Check calibration of test panel meter:
1. Turn on Test Panel.
  2. Using either a Scope or Fluke 8024B: "Peak hold" meter. Read the output of Pulse Processor.
  3. Adjust Test Panel level pot until 55 volts D C is seen and adjust Test Panel Meter with Centering Adjustment until 10 mm is seen (5.5 Volts per mm).
  4. Reset Test Panel.
- E. Check Pulse Processor Gains
1. Set function simulator for 130° F over ambient, turn on power and let cycle 2 or 3 times.
  2. Set on saddle on Rail 1 scanner and turn on gate.
  3. Adjust gain on Rail 1 Pulse processor for 10 mm when function simulator is at top of heating cycle.
  4. Set function simulator off scanner and adjust pedestal for 1 mm.
  5. Do steps E.2 through E.4 for Rail 2.
  6. Turn off function simulator.

F. Alarm Check-out:

1. Drop Short Track Relay (C T R).
2. Turn on Test Panel.
3. Put heat in front of Rail One Scanner (cigarette or soldering iron).
4. Leave heat source in front of scanner until more than four (4) alarms are seen.
5. Reset Test Panel.
6. Pick C T R.
7. Listen to readout and verify that alarms are correct for left or right designation—and count is correct—and only four (4) alarms are given.
8. Do Steps E.-3. through E.-7 for Rail Two.
9. On one of the above tests, kick the dragger and verify alarm is given—and count is correct.
10. On one of the above tests, listen to readout on truck radio to verify radio is "keying" and audio quality is good.

G. Additional tests performed when hot wheel detector option is used

1. Alignment

- a. The center of the scanner is 6' from gage.
- b. The perpendicular distance from center line of scanner to alignment point on far rail is 77".
- c. Remove scanner cover and install site tube on "V" grove.
- d. Look through site tube and verify that alignment is at the 77" point on the far rail and is midway between "A" & "B" transducers on near rail and 2 1/2" above crown of rail.
- e. Make any adjustments necessary and re-install scanner cover when done.

## 2. Calibration

- a. Install function simulator mounting bracket on front of HWD scanner.
- b. Turn ratio adj pot full counter clockwise.
- c. Using a Simpson model 260 or Fluke model 8024B meter read "alarm level". Put black lead in common jack and red lead in alarm level adj jack. Adjust "alarm level adj" pot until 1.5 VDC is seen.
- d. Set function simulator for 100 degrees over ambient and when stabilized set on mounting bracket with gate off.
- e. Disconnect the wire from the hot wheel chassis TB2-5.
- f. Press and hold cal push-button switch and adjust "cal adj" until alarm is firing intermittently.
- g. Release cal push-button and readjust function simulator to 110 degrees F over ambient.
- h. Reconnect the wire removed from the hot wheel chassis TB2-5.
- i. When temperature is again stabilized turn on gate and push cal push-button and adjust "ratio adj" pot until alarm is again firing intermittently.
- j. Release cal push-button, turn off function simulator and remove mounting bracket.

3. Alarm level adjust

a. Using a Simpson model 260 or Fluke model 8024B meter again read alarm level.

b. Adjust "alarm level adj" until you see 4.5 VDC.

Note: This level is determined by the following procedure. We want to alarm at 650 degrees F or above. With near/far rail sensitivity compensation you set alarm for 90% of alarm level, ie; 585 degrees. Then you go to table 2-1 in manual page 2-12 to find the alarm level voltage to correspond with 585 degrees. You will see it is between 550 degrees and 620 degrees which corresponds with 4.0 V to 5.0 V. To interpolate for 585 degrees you find the change in both and apply the ratio of temperature change, ie;

$$\begin{array}{r} 620 \\ -550 \\ \hline = 70 \end{array} \qquad \begin{array}{r} 5.0 \\ -4.0 \\ \hline = 1.0 \end{array}$$

You have a ratio of  $1.0/70 = .014$  volts per degree

For 585 degrees

$$\begin{array}{r} -550 \\ \hline = 35 \text{ degrees} \end{array} \quad 35 \times .014 = .5$$

4.0V for 550 degrees

+ .5V for 35 degrees above 550 degrees

4.5V for 585 degrees alarm level

## 4. Talker Check

- a. Install function simulator on front of scanner and adjust for 130 degrees over ambient.
- b. Drop CTR.
- c. Turn on gate on function simulator.
- d. Push cal push-button.
- e. System Should alarm.
- f. Turn off gate and pick CTR.
- g. Listen to talker and verify only four alarms are given and that count is correct.
- h. Remove function simulator.