



# NCDOT Rail Division

## Preventive Maintenance (PM) Procedures



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**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> WP1-0001		<b>Title</b> Inspect Main Engine Water Pump
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 360 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> If water pump needs to be changed, use: Main Engine Water Pumps (1 EA P/N RAACS00904-Left Bank and EA P/N RAACS00938 Right Bank) and Renew the following gasket/marmons: Water Pump Mounting (2 EA P/N RAACS10372); Inlet Elbow to Water Pump (2 EA RAACS00939); Water Pump Outlet Pipe (4 EA P/N RAACS10371); 3 inch Marmon Seal (4 EA P/N RAACS13064)	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides cooling water to the engine

**FAILURE MODES TO IDENTIFY:**

Water leaks around water pump

**PROCEDURE:**

1. Ensure main engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

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**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

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2. Apply “Do Not Start” tags to:
  - a. Start engine if F59PH.
  - b. “ISOLATION” switch if F59PH/PHI.
3. Ensure locomotive is over an approved containment system.
4. Inspect water pump and area surrounding water pump visually for signs of leaking or other damage, (Refer to Figure 1).
5. Report any discrepancies to Supervisor.
6. Remove “Do Not Start” tags.
7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
8. Make appropriate repairs for any other discrepancies found.



**ENGINE WATER PUMP**

**Figure 1**



**Distribution Statement**  
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<b>Procedure #</b> WH1-0002	<b>Title</b> Inspect/Gauge Wheels
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

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**FUNCTIONS:**

To support the weight of the locomotive; provides a means for power transmission to the rail(s)

**FAILURE MODES TO IDENTIFY:**

Excessive wear, sharp flanges, shelling, cracks, flat spots, out of limits rim thickness

**PROCEDURE:**

NOTE

Wheel inspections require visual observation, knowledge of defects, and the use of gauges for precise measurements. They shall be performed by Qualified Maintenance Personnel (QMP).

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NOTE

Gauges shall be inspected periodically. If anything out of the ordinary happens to the gauge, (i.e. dropped, run over by a piece of equipment, etc.) the gauge must then be checked against a master gauge.

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NOTE

Master gauges shall be calibrated every three years. Gauges failing to compare accurately with the master gauge must not be used.

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1. Start at one end and one side of the locomotive and examine each wheel's front for the following defects in the flange, tread, rim and plate (Refer to Table 1, Table 2, Table 3, Figure 1, Figure 2, Figure 3, and Figure 4):

- a. Cracks.
  - b. Shelling.
  - c. Flat spots.
  - d. Spalling.
  - e. Gouges.
  - f. Chips.
2. Examine the wheel hub back face carefully for cracks.
  3. Complete the following steps where the hub meets the axle:
    - a. Examine for indications that the wheel has not moved in or out along the axle.
    - b. Perform a very close examination of the wheel to determine if it is loose on the axle if either of the following are identified:

**NOTE**

If either wheel condition below is identified, wheel looseness is probable, warranting a very close examination.

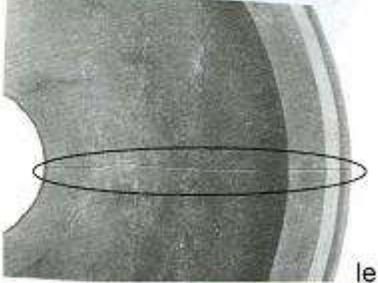
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- (1) A shiny ring or satin-like appearance of metal at the fit.
- (2) An apparent space between the wheel and axle.

**WARNING**

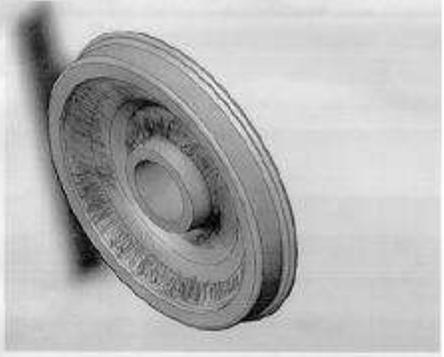
**LOCOMOTIVE FOUND WITH CONDEMNING WHEEL DEFECT CANNOT CONTINUE IN SERVICE.**

4. Measure the following F59 locomotive wheel qualities with respect to their wear limits using a gauge No. W601-4A, (Refer to Table 4 and Figure 5).
  - a. Record measurements on MAP-9:
    - (1) Flange height: FRA 1-1/2 inch.
    - (2) Flange thickness: FRA 15/16 inch.
    - (3) Rim thickness: FRA 1 inch.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.

Defect	Condemning Limit Car	Condemning Limit Locomotive	Photo
Axle	Any axle cracked, broken, or bent must be condemned	Any axle cracked, broken, or bent must be condemned	Not Available
Built up Tread	1/8" or higher than the wheel tread	1/8" or higher than the wheel tread	
Chip or gouge in Flange	Must not be 1-1/2" or more in length and 1/2" or more in width	Must not be 1-1/2" or more in length and 1/2" or more in width	Not Available
Crack or Break in the Flange, Tread, Rim, Plate, or Hub	Any wheel with any crack or break in the Flange, Tread, Rim, Plate, or Hub must be condemned	Any wheel with any crack or break in the Flange, Tread, Rim, Plate, or Hub must be condemned	
Grooved Tread, Scrape, Dent, or Gouge	1/8" or more in depth	1/8" or more in depth	

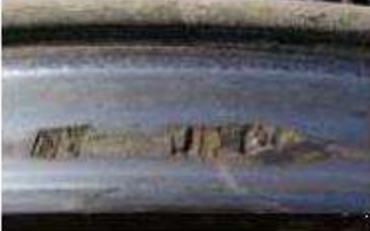
**DEFECT EXAMPLES (1)**

**Table 1**

Defect	Condemning Limit Car	Condemning Limit Locomotive	Photo
*Heat Checks (Refer to page 11)	Wheels shall <b>not</b> be condemned, nor pulled from service for heat checks	Wheels shall <b>not</b> be condemned, nor pulled from service for heat checks	
High Flange	Flange height must not be 1-7/16" or more	Flange height must not be 1-7/16" or more	
Tread Worn Hollow	Must not be greater than 5/32" (4 mm)	Must not be greater than 5/32" (4 mm)	
Loose or Out of Gage	Any loose or out of gage wheels must be condemned	Any loose or out of gage wheels must be condemned	Not Available
Overheated Wheels	Wheels must not have evidence of overheating or discoloration on front and back face of rim and plate that extends 4" into the plate	Wheels must not have evidence of overheating or discoloration on front and back face of rim and plate that extends 4" into the plate	

**DEFECT EXAMPLES (2)**

**Table 2**

Defect	Condemning Limit Car	Condemning Limit Locomotive	Photo
Seam	Seam (grooved tread) running lengthwise within 3-3/4" of the flange and 1/8" or more in depth	Seam running lengthwise that is within 3-3/4" of the flange	
Shelling/Spalling	1-1/2" or more in length (1-1/4" Transport Canada)	1-1/2" or more in length	
Slide Flat	1-1/2" or more in length	1-1/2" or more in length	
**Thermal Cracks, caused by intense brake heating. Appear as small, often jagged breaks or tears in the metal, and usually start in the flange or tread, extending crosswise (Refer to pg. 11)	Thermally-cracked wheels are subject to sudden and complete failure, and any wheel exhibiting any stage or degree of thermal cracking should be removed from service	Thermally-cracked wheels are subject to sudden and complete failure, and any wheel exhibiting any stage or degree of thermal cracking should be removed from service	

**DEFECT EXAMPLES (3)**

**Table 3**

Wheel Defect	FRA Wear Limit	Wheel Gage Reading
1. Single Flat Spot	2-1/2" or more in length	Use gage or ruler
2. Two Adjoining Flat Spots	Each 2 or more inches in length	Use gage or ruler
3. Gouge or Chip in Flange	1-1/2" or more in length and 1/2" or more in width	Use gage or ruler
4. Broken Rim	If the tread, measured from the flange at the point 5/8" above the tread, is less than 3-3/4" in width	Use gage or ruler
5. Single Shelled Spot	2-1/2" or more in length	Use gage or ruler
6. Two Adjoining Shelled Spots	Each 2 or more inches in length	Use gage or ruler
7. Seam Running Lengthwise	Within 3-3/4" of the flange	Use gage or ruler
8. Flange thickness	7/8" or less, gauged at a point 3/8" above the tread	9 on 0
9. Tread Worn Hollow	5/16" or more	8 on hollow tread gage
10. Flange Height	1-1/2" or more measure from the tread to the top of the flange	8 on 22
11. Rim Thickness	Less than 1" thick	16/16
12. Except for Broken Rim Above (Refer to No. 4)	Wheel must not have any cracks or breaks in the flange, tread, rim, plate, or hub	Visually
13. Welds	Condemnable	Visually
14. Loose Wheel	Condemnable	Visually
15. Overheated Wheels	Discoloration on the front and back face of the plate that extends 4" into the plate	Visually

**FRA WEAR LIMIT  
TABLE 4**



**WHEEL ASSEMBLY  
Figure 1**



**WHEEL CHECK**  
**Figure 2**



**WHEEL GAUGE**  
**Figure 3**



**WHEEL ON RAIL**  
**Figure 4**



**GAGE NO. W601-4A**  
**Figure 5**



### Distribution Statement

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<b>Procedure #</b> TX1-0003	<b>Title</b> Inspect Gear Case	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 5
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.75 Hours	<b>Total Man Hours</b> 0.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

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### WARNING

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### FUNCTIONS:

Provides for containment of gear lubrication

### FAILURE MODES TO IDENTIFY:

Cracked gear case; worn gasket/seals; missing or loose bolts

### PROCEDURE:

1. Ensure locomotive is located over an approved containment system.
2. Ensure main engine is shut down.
3. Inspect outside of gear case visually for the following:
  - a. Filler/inspection caps.
  - b. Physical damage
  - c. Missing or damaged seals
  - d. Signs of leakage.
  - e. Loose, missing or damaged mounting bolts and safety straps.
  - f. Broken safety wire.
4. Remove inspection cover, (Refer to Figure 1 and Figure 2).
5. Inspect gears for damage or excessive wear, (Refer to Figure 3 and Figure 4).
6. Verify proper level of lubricant and add as necessary, (Refer to Figure 5, Figure 6, Figure 7, and Figure 8).

7. Reinstall inspection cover.
8. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
9. Make appropriate repairs for any other discrepancies found.



**GEAR BOX COVER (CLOSED POSITION)**

**Figure 1**



**GEAR BOX COVER**

**Figure 2**



**DRY GEAR BOX**  
**Figure 3**



**DRY GEAR BOX (VIEW 2)**  
**Figure 4**



**GEAR BOX OIL CHECK**  
**Figure 5**



**GEAR BOX OIL CHECK (VIEW 2)**  
**Figure 6**



**GEAR BOX OIL CHECK (VIEW 3)**  
**Figure 7**



**GEAR BOX OIL CHECK (VIEW 4)**  
**Figure 8**



**Distribution Statement**  
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<b>Procedure #</b>	<b>Title</b>	Inspect Traction Motors	
TX1-0002			
<b>Revision</b>	<b>Date</b>	<b># of Pages</b>	
0	10/29/2015	11	
<b>Equipment</b>	<b>Type</b>	<b>Frequency</b>	
Locomotive	F59PH/PHI	90 Days	
<b># Personnel</b>	<b>Estimated Task Duration</b>	<b>Total Man Hours</b>	
1 QMP	3.0 Hours	3.0 Hours	
<b>Test Equipment</b>	<b>Supplies</b>	<b>Special Tools</b>	
None	Brushes (P/N RAATX10875-F59PH/PHI)	None	
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>	

**WARNING**

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**FUNCTIONS:**

Provides tractive effort to truck(s)

**FAILURE MODES TO IDENTIFY:**

Grounded phase; worn brush(s); loose cables/wires or hardware; worn bushing(s); worn bearing(s)

**PROCEDURE:**

1. Ensure locomotive is over an approved containment system.
2. Ensure main engine is shut down.
3. Ensure power wash with water only has been completed prior to proceeding.
4. Apply "Do Not Start" tags:
  - a. Start control station for PH.
  - b. ISOLATION switch located in the engine room for PH/PHI.
5. Remove each traction motor inspection cover (Refer to Figure 1 and Figure 2).
  - a. Inspect traction motor covers for damage, loose or missing seals.
6. Inspect each commutator visually for the following, (Refer to Figure 3, Figure 4, Figure 5, and Figure 6):
  - a. Signs of overheating, (Refer to Figure 7, Figure 8, and Figure 9).
  - b. Flash over indications.

- c. Moisture.
  - d. Commutator bar raised or out of position.
  - e. Chips or gouges on bar.
  - f. Melting solder.
7. Inspect armature visually for the following, (Refer to Figure 10):
- a. Loose string band(s).
  - b. Cracks in epoxy band.
  - c. Signs of electrical shorts.
8. Inspect brush's length visually, (Refer to Figure 11):
- a. Remove brush if only one brush score mark is visible.
  - b. Proceed to Step 8 if more than brush score mark is visible.
9. Lift spring clips from top of brushes, (Refer to Figure 12).

**CAUTION**

DO NOT DISCONNECT PIGTAILS FROM BRUSH HOLDER.

- a. Pull brushes out of holder.
10. Inspect each brush and brush holder visually for the following discrepancies;
- a. Chipped or broken brush.
  - b. Uneven wear.
  - c. Loose holders.
  - d. Broken lead(s).
  - e. Warped brush holder path.
11. Use a feeler gauge to check clearance between the brush holder bodies and the commutator with the brushes rose.
- a. Replace brush if clearance is between 1/8 inch and 3/16 inch.
    - (1) Ensure brush is changed in sets (four each per holder) if brushes are changed.
  - b. Adjust brush assembly's clearance to between 1/8 inch and 3/16 inch if clearance is less than 1/8 inch or greater than (>) 3/16 inch.
    - (1) Replace brush.
      - (a) Ensure brush is changed in sets (four each per holder) if brushes are changed.
12. Remove "Do Not Start" tags, (Refer to Figure 13, Figure 14, Figure 15, and Figure 16).
13. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
14. Make appropriate repairs for any other discrepancies found.



**TRACTION MOTOR**  
**Figure 1**



**TRACTION MOTOR (VIEW 2)**  
**Figure 2**



**DOOR HANDLES FOR TRACTION MOTOR**  
**Figure 3**



**DOOR HANDLES FOR TRACTION MOTOR (VIEW 2)**  
**Figure 4**



**TRACTION MOTOR DOOR OPEN**  
**Figure 5**



**ACCESS PANEL ON TRACTION MOTOR REPLACE**  
**Figure 6**



**VIEW OF INSIDE OF TRACTION MOTOR**

**Figure 7**



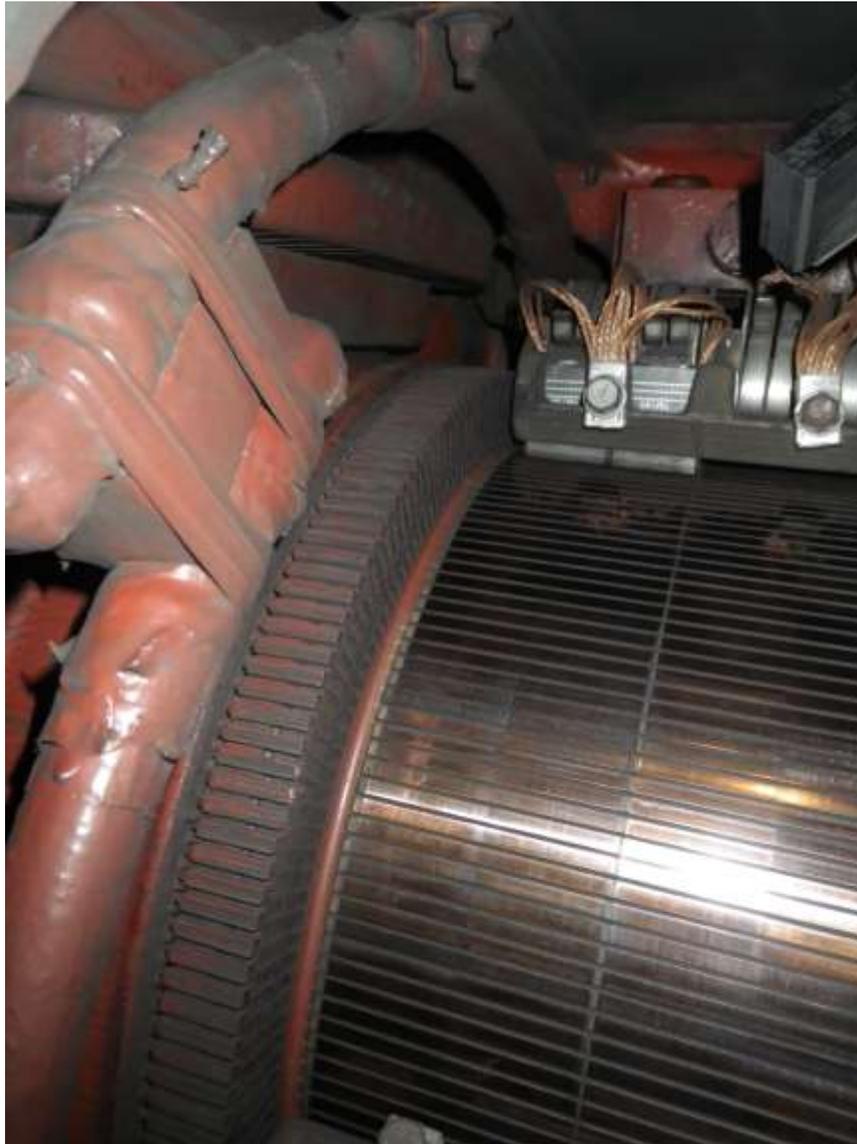
**TRACTION MOTOR LOWER BRUSHES**

**Figure 8**



**TRACTION MOTOR LOWER BRUSHES (VIEW 2)**

**Figure 9**



**TOP BRUSHES ON TRACTION MOTOR**

**Figure 10**



**TRACTION MOTOR BRUSHES**  
**Figure 11**



**TRACTION MOTOR LOWER BRUSHES (VIEW 3)**  
**Figure 12**



**CHANGING ACCESS PANEL ON TRACTION MOTOR**  
**Figure 13**



**TRACTION MOTOR CABLES**  
**Figure 14**



**TRACTION MOTOR CABLES (VIEW 2)**

**Figure 15**



**TRACTION MOTOR CABLING**

**Figure 16**



### Distribution Statement

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<b>Procedure #</b> TR1-0029	<b>Title</b> Service Center Bearing	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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### FUNCTIONS:

Provide support for the weight of the locomotive; transmits power to the rail(s) and responsive braking to limit speed of locomotive

### FAILURE MODES TO IDENTIFY:

Binding and excessive wear

### PROCEDURE:

1. Complete the following for PH only:
  - a. Open conductor's side access hatch.
  - b. Remove cap/plug from the supply pipe.

### WARNING

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH OIL. AVOID INGESTION. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

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- c. Add one pint of oil.
- d. Reinstall cap/plug to the supply pipe.
- e. Close conductor's side access hatch.
- f. Remove cap/plug from the supply pipe near the air compressor.
- g. Add one pint of oil.

- h. Reinstall cap/plug to the supply pipe.
- 2. Complete the following for PHI only:
  - a. Remove floor panel on conductor's side of locomotive cab.
  - b. Remove cap/plug from the supply pipe.

**WARNING**

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH OIL. AVOID INGESTION. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

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- c. Add one pint of oil.
- d. Reinstall cap/plug to the supply pipe.
- 3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
- 4. Make appropriate repairs for any other discrepancies found.



### Distribution Statement

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<b>Procedure #</b> TR1-0028	<b>Title</b> Inspect and Record Side Bearing Clearances	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.1 Hours	<b>Total Man Hours</b> 0.1 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

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### FUNCTIONS:

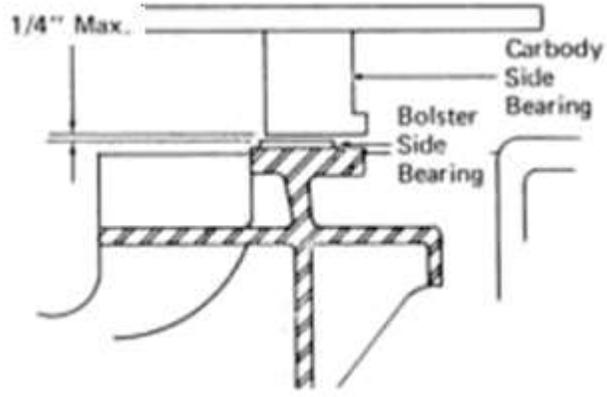
Provide support for the weight of the locomotive, transmits power to the rail(s) and responsive braking to limit speed of locomotive

### FAILURE MODES TO IDENTIFY:

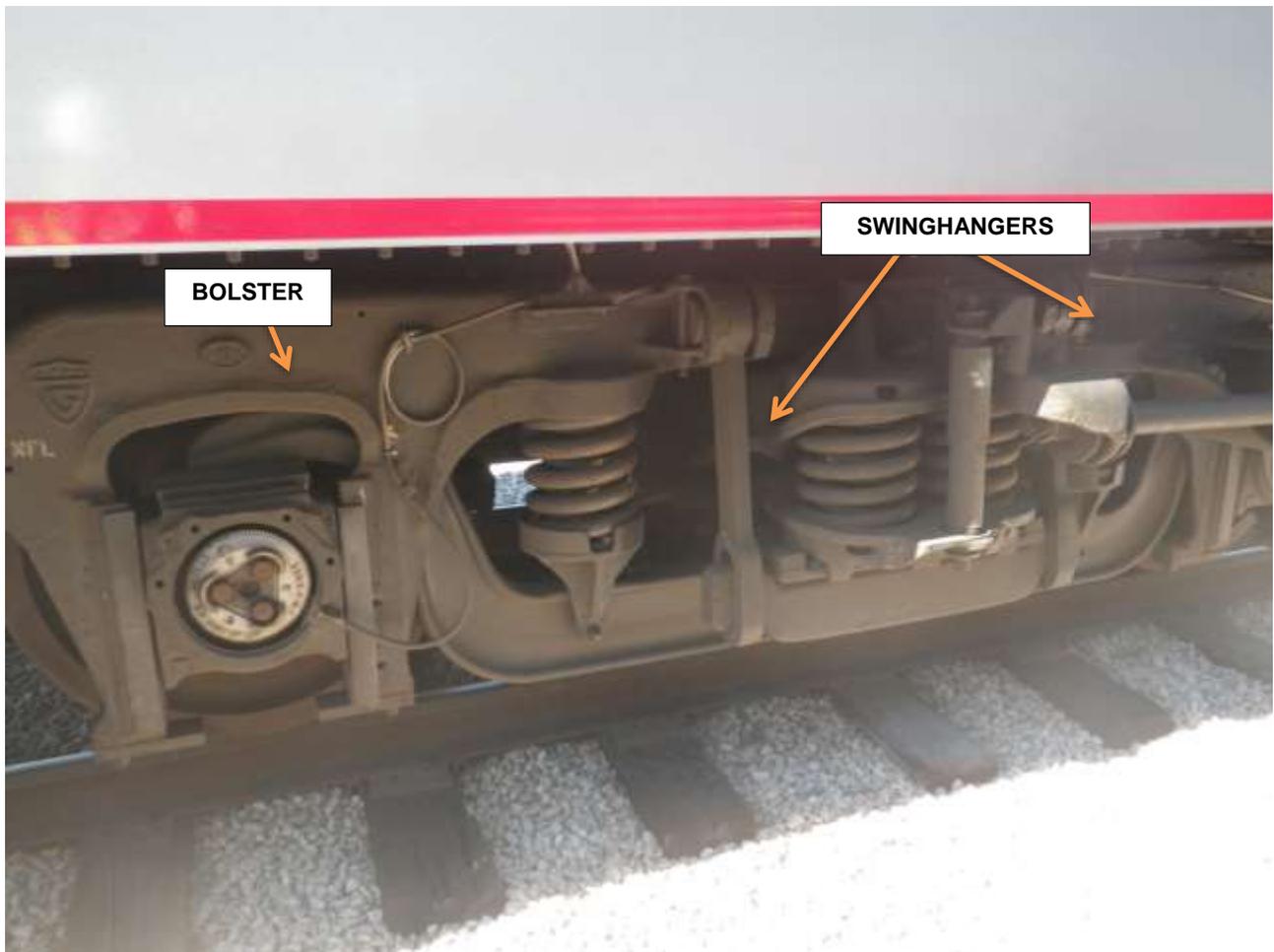
Excessive side bearing clearance or no clearance

### PROCEDURE:

1. Inspect side bearing clearance (Refer to Figure 1 and Figure 2):
  - a. Measure the clearance between the truck bolster side bearing and carbody side bearing on both sides of the locomotive, using side bearing clearance tape gauge.
  - b. Ensure that the maximum clearance does not exceed 1/4 inch on each side or a total of 1/2 inch on both sides.
  - c. Document discrepancy in MAP-9 and notify supervisor if combined clearance measurement is less than (<) 1/32 inch or greater than 1/2 inch.
  - d. Record side bearing clearance measurements on inspection form.
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**CARBODY SIDE BEARING CLEARANCE**  
Figure 1



**RAIL CAR TRUCK**  
Figure 2



**Distribution Statement**  
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<b>Procedure #</b> TR1-0026	<b>Title</b> Inspect Truck Frames
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Locomotive	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

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**FUNCTIONS:**

Provides structural stability for carbody and attaches to running gear

**FAILURE MODES TO IDENTIFY:**

Damaged, missing or improperly adjusted parts

**PROCEDURE:**

1. Inspect truck frames for rubbing or abrasion, (Refer to Figure 1 and Figure 2).
2. Check suspension system for the following:
  - a. Safety hangers.
  - b. Coil spring condition.
  - c. No parts cracked or broken.
  - d. Springs not fully compressed.
  - e. Shock absorbers not leaking or broken.
3. Check truck for the following:
  - a. Tie bars not loose.
4. Check side bearings for the following:
  - a. Springs/support not broken.
  - b. No contact (unless so designed).
  - c. Maximum clearance within OEM recommendations.

5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR TRUCK**

**Figure 1**



**SWINGHANGERS**  
**Figure 2**



**Distribution Statement**  
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<b>Procedure #</b> TR1-0015	<b>Title</b> Visually Inspect Vertical, Lateral and YAW Dampers
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> ALL
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**FUNCTIONS:**

Provide support for the weight of the locomotive, transmits power to the rail(s) and responsive braking to limit speed of locomotive

**FAILURE MODES TO IDENTIFY:**

Excessive wear; sharp flange; shelling, cracks, flat spots, out of limits rim thickness; cracked or broken axle; missing cap(s); worn bushing(s), worn or broken brake shoe(s)

**PROCEDURE:**

1. Complete the YAW damper inspection, (Refer to Figure 1):
  - a. Inspect each YAW damper bracket on the truck and carbody side(s) visually for the following discrepancies:
    - (1) Loose or missing mounting hardware.
    - (2) Bent, cracked or misaligned bracket(s).
  - b. Inspect the YAW damper visually for the following discrepancies:

**NOTE**

A light film of hydraulic fluid on the body is normal and not condemnable.

---

- (1) Leaking fluid indicated by clearly formed droplets on the shock.
- (2) Improperly secured mount(s).
- (3) Worn bushing(s).

- (4) Physical damage.
- 2. Complete the vertical and lateral shock inspection:
  - a. Inspect all mounting hardware and brackets on both ends visually ensuring they are in place and properly secured.
  - b. Inspect each shock for the following:

**NOTE**

A light film of hydraulic fluid on the body is normal and not condemnable.

- (1) Leaking fluid indicated by clearly formed droplets on the shock.
- (2) Improperly secured mount(s).
- (3) Worn bushing(s).
- (4) Physical damage.
- 3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
- 4. Make appropriate repairs for any other discrepancies found.



**YAW DAMPER**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0006	<b>Title</b> Inspect Pedestal Liners	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> ALL	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Allows for controlled movement of wheel sets within pedestal frame

**FAILURE MODES TO IDENTIFY:**

Excessive liner clearance

**PROCEDURE:**

1. Inspect total clearance between pedestal liners to ensure that the total does not exceed 3/8 inch, (Refer to Figure 1).
2. Inspect each pedestal liner to ensure wear has not exceeded a thickness of 3/32 inch.
3. Inspect pedestal tie straps for proper securement.
4. Ensure proper mounting with approved fastener.
5. Replace as required.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR TRUCK**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0005	<b>Title</b> Inspect Center Casting	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> ALL	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

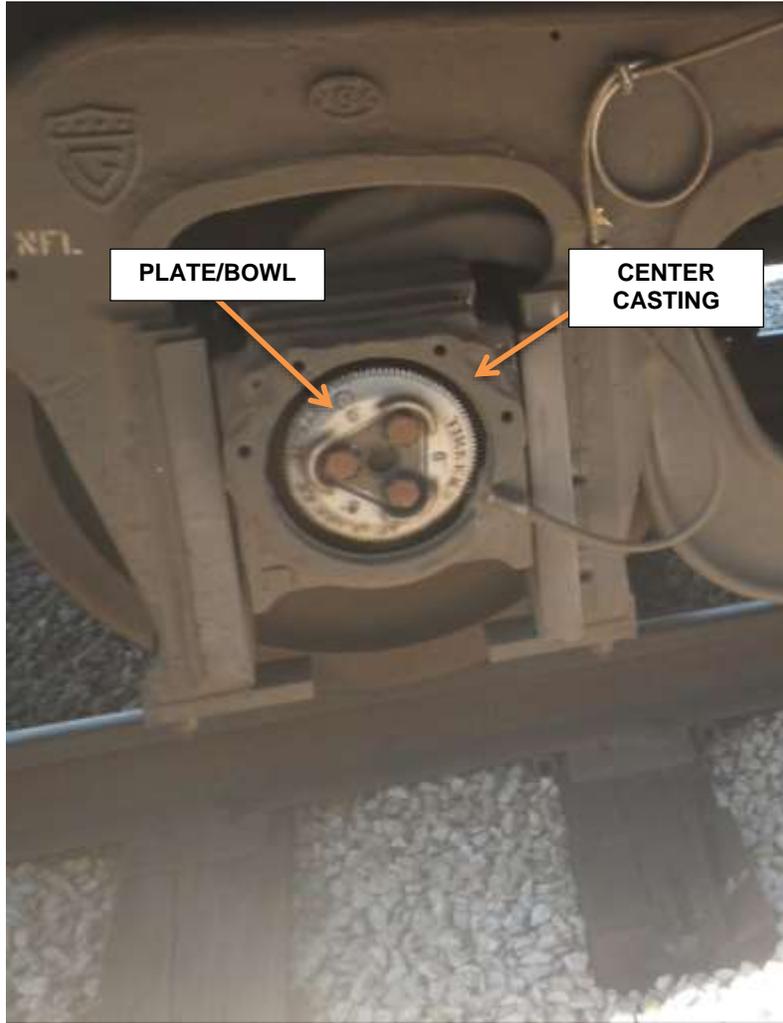
Provides for free movement of truck frame

**FAILURE MODES TO IDENTIFY:**

Cracked, broken or missing parts

**PROCEDURE:**

1. Ensure car is jacked up and wheel set removed to complete this procedure.
2. Ensure that all center castings on trucks are not cracked or broken, (Refer to Figure 1).
3. Ensure that center plate/bowl have no missing or cracked bolts.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**CENTER CASTING**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0004		<b>Title</b> Inspect Truck to Carbody Attachment
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> ALL	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.2 Hours	<b>Total Man Hours</b> 0.2 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Ensure carbody is properly secured to truck frame

**FAILURE MODES TO IDENTIFY:**

Damaged or worn attachments

**PROCEDURE:**

1. Ensure that all trucks are equipped with a device or securing arrangement to prevent the truck and carbody from separating in case of derailment, (Refer to Figure 1 and Figure 2).
2. Inspect center pins and locking mechanisms for proper condition and securement.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**SECUREMENT**  
**Figure 1**



**SECUREMENT NUT**  
**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TC1-0003	<b>Title</b> Inspect and Clean Eductor and Change Gaskets
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Locomotive	<b># of Pages</b> 2
<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 2.5 Hours
<b>Total Man Hours</b> 2.5 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> Inner Eductor Tube Gaskets (3 EA P/N RAAEG14056); Oil Separator Filter Gasket (2 EA P/N RAALS10289)
	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Remove vapor and pressure from engine crankcase

**FAILURE MODES TO IDENTIFY:**

Dirty, clogged or damaged eductor or gaskets

**PROCEDURE:**

1. Ensure engine is shutdown.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Remove bolts from lube oil separator housing, (Refer to Figure 1).
  - a. Retain bolts for reinstallation.
3. Remove lube oil separator from housing.
4. Clean lube oil separator.
5. Inspect lube oil separator.
6. Clean lube oil separator housing.
7. Change lube oil separator cover gasket.

8. Install lube oil separator.
9. Install bolts.
10. Remove inner and outer eductor tubes.
11. Clean inner and outer eductor tubes.
12. Inspect inner and outer eductor tubes.
13. Replace gaskets.
14. Install inner and outer eductor tubes.
15. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
16. Make appropriate repairs for any other discrepancies found.



**LUBE OIL FILTER**  
**Figure 1**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TC1-0002	<b>Title</b> Inspect Turbocharger Screen
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

### FUNCTIONS:

Provides for the removal of exhaust gases from the engine

### FAILURE MODES TO IDENTIFY:

Loose manifold or exhaust piping; loose hardware; cracked silencer

### PROCEDURE:

1. Ensure main engine is shut down and cooled down.

### WARNING

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

### WARNING

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to:
  - a. "START" button in engine compartment, if F59PH.
  - b. "ISOLATION" switch in engine compartment, if F59PH/PHI.
3. Remove inspection cover from exhaust manifold.
4. Inspect screen for cracks, breaks or other damage and foreign matter.

5. Reinstall inspection cover to exhaust manifold.
6. Remove "Do Not Start" tags.
7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
8. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TC1-0001	<b>Title</b> Remove and Clean Exhaust Eductor Tube
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b># of Pages</b> 2
<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 2.0 Hours
<b>Total Man Hours</b> 2.0 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> Approved Solvent; Gaskets/Gasket Material
	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Removes gases from main engine crankcase

**FAILURE MODES TO IDENTIFY:**

Dirty, clogged, broken or missing parts

**PROCEDURE:**

1. Ensure main engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

---

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Apply "Do Not Start" tags to:
  - a. "START" button in engine compartment, if F59PH.
  - b. "ISOLATION" switch in engine compartment, if F59PH/PHI.
3. Ensure locomotive is over an approved containment system.

4. Unbolt educator tube assembly from exhaust stack.
  - a. Remove educator tube assembly from exhaust stack.
5. Unbolt crankcase filter housing.
  - a. Remove filter.
6. Clean educator tube assembly and filter with approved solvent.
7. Reinstall filter with new gasket.
8. Bolt crankcase filter housing.
9. Reinstall educator tube assembly with new gaskets.
10. Remove "Do Not Start" tags.
11. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
12. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> RC1-0001	<b>Title</b> Test Main Generator Ground Relay
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.1 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides measureable indication that electrical cabling, wiring and components are properly insulated and grounded

**FAILURE MODES TO IDENTIFY:**

Grounds, loose cables, wires or hardware, damaged cable/wire insulation

**PROCEDURE:**

1. Ensure main engine is running within normal parameters.
2. Open BATTERY switch and circuit breaker door.
3. Connect ground wire between main generator (+) positive test port and locomotive grounding point, (Refer to Figure 1, Figure 2, and Figure 3).
  - a. Turn ISOLATION switch to "RUN".
  - b. Close GENERATOR FIELD switch.
  - c. Install reverser into throttle.
  - d. Set the independent air brake and hand brake.

## **WARNING**

**PRIOR TO COMMENCING STEP 3.C.(1), ENSURE HANDBRAKE AND LOCOMOTIVE INDEPENDENT AIR BRAKES ARE ENGAGED.**

---

- (1) Place reverser in "FORWARD".
- e. Advance throttle to "Notch 3".
- f. Verify that when main generator output reaches approximately 600 amps then it drops to 0 amps (alarm will sound).
- g. Return throttle to "IDLE".
4. Connect ground wire between main generator (-) negative test point and locomotive grounding point.
  - a. Advance throttle to "Notch 3".
  - b. Verify that when main generator output reaches approximately 600 amps then it drops to 0 amps.
  - c. Return throttle to "IDLE".
  - d. Repeat Steps 4.a. through 4.c. to test ground relay lockout.
    - (1) Depress ground relay lockout to reset.
  - e. Remove reverser.
  - f. Open GENERATOR FIELD switch.
  - g. Turn ISOLATION switch to "Isolate".
  - h. Disconnect ground wire between main generator (-) negative test port and locomotive grounding point.
5. Close BATTERY switch and circuit breaker door.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



**JUMPER GROUND**  
**Figure 1**



**JUMPER TO TEST MAIN GENERATOR GROUND RELAY**  
**Figure 2**



**JUMPER TO TEST MAIN GENERATOR GROUND RELAY (VIEW 2)**

**Figure 3**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> PD1-0002	<b>Title</b> Change Detector (Delta "P") Sensors
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Detector Sensors; Gaskets
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Senses overpressure in crankcase

**FAILURE MODES TO IDENTIFY:**

Damaged or faulty sensor

**PROCEDURE:**

1. Ensure main engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to:
  - a. Start station, if F59PH.
  - b. ISOLATION switch, if F59PH/PHI.
3. Disconnect associated lines and hoses form Delta "P", (Refer to Figure 1).
4. Unbolt Delta "P" mounting bolts.

5. Remove Delta "P" and gasket.
6. Clean mounting surface.
7. Install new Delta "P" with new gasket.
8. Reconnect lines and hoses to Delta "P".
9. Remove "Do Not Start" tags.
10. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
11. Make appropriate repairs for any other discrepancies found.



**DELTA "P"**  
**Figure 1**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> PD1-0001	<b>Title</b> Test Engine Protective Devices
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides protection to main engine from low water level, high crankcase pressure or low oil pressure and overspeed of main engine

**FAILURE MODES TO IDENTIFY:**

Stuck switch, loose connections, dirty or worn contacts

**PROCEDURE:**

1. Ensure main engine is running with approved operational parameters.
2. Test for low water level/pressure:
  - a. Open test cock at water pump supply pipe.
  - b. Verify that "LOW WATER" button on Delta "P" pops out.
  - c. Verify that main engine shuts down.
  - d. Close test cock at water pump supply pipe.
  - e. Reset "LOW WATER" button on Delta "P".
  - f. Reset "GOVERNOR" button, if for F59PH.
3. Complete the following to test for high crankcase pressure:
  - a. Apply vacuum to Delta "P" test port.

- b. Complete the following for F59PH:
  - (1) Verify “HIGH CRANKCASE PRESSURE” button on Delta “P” pops out.
  - (2) Verify that main engine shuts down.
  - (3) Reset “HIGH CRANKCASE PRESSURE” button on Delta “P”.
  - (4) Reset “GOVERNOR” button.
- c. Complete the following for F59PHI:
  - (1) Verify that main engine shuts down.
  - (2) Open all circuit breakers.
  - (3) Open battery KNIFE switch.
  - (4) Wait a minimum of one minute then close battery KNIFE switch.
  - (5) Close all circuit breakers.
  - (6) Access “Fault Archive” on computer display.
  - (7) Acknowledge shutdown fault.
- 4. Test for low oil pressure for F59PHI only:
  - a. Unplug electrical connector from turbo-lube oil pressure sensor.
  - b. Verify main engine shuts down within 90 seconds.
  - c. Plug electrical connector into turbo-lube oil pressure sensor.
- 5. Complete the following to test for main engine overspeed for F59PH only:
  - a. Push on lay shaft to increase engine speed until main engine shuts down.
  - b. Reset overspeed trip lever on overspeed housing.
- 6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
- 7. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> MD1-0002	<b>Title</b> Inspect and Record Output Voltage of EM2000 Power Supplies	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.2 Hours	<b>Total Man Hours</b> 0.2 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for the supply of power to the EM2000 computer system

**FAILURE MODES TO IDENTIFY:**

Computer fault indications

**PROCEDURE:**

1. Check for fault indications.
2. Measure and record output voltages of, (Refer to Figure 1):
  - a. PSM 300.
  - b. PSM 310.
  - c. PSM 320.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**MEASURING VOLTAGES**  
**Figure 1**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> LS1-0017	<b>Title</b> Change PM Turbocharger Oil Filter
<b>Revision</b> 0	<b>Date</b> 10/27/2015
<b>Equipment</b> Locomotive	<b># of Pages</b> 2
<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.2 Hours
<b>Total Man Hours</b> 0.2 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> Prime Mover Turbocharger Oil Filter (1 EA P/N RAALS10287); Oil
	<b>Special Tools</b> Filter Wrench
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

### FUNCTIONS:

Provides contaminants from entering the turbocharger

### FAILURE MODES TO IDENTIFY:

Clogged, dirty or damaged filter

### PROCEDURE:

1. Ensure main engine is shut down and cooled down.
2. Ensure locomotive is over an approved containment system.

### WARNING

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 3.**

---

### WARNING

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

3. Apply "Do Not Start" tags to:
  - a. Start engine, if F59PH.
  - b. "ISOLATION" switch, if F59PH/PHI.

4. Remove turbocharger oil filter, using filter wrench, (Refer to Figure 1).
  - a. Clean filter mounting surface.

**WARNING**

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH OIL. AVOID INGESTION. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

---

- b. Apply oil to O-ring.
5. Install new turbocharger oil filter.
6. Remove “Do Not Start” tags.
7. Startup main engine.
  - a. Bring the main engine up to the approved operating parameters.
  - b. Inspect visually for leaks.
8. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
9. Make appropriate repairs for any other discrepancies found.



**TURBOCHARGER OIL FILTER**

**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> LS1-0005	<b>Title</b> Re-Torque Shaft Nut
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides compression for oil pump drive gears in the lateral axis

**FAILURE MODES TO IDENTIFY:**

Loose, broken, or missing nut

**PROCEDURE:**

1. Ensure main engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to:
  - a. Start control station, if F59PH.
  - b. "ISOLATION" switch located in the engine room, if F59PH/PHI.
3. Unbolt main engine lube oil pump cover.
  - a. Remove the eight cover bolts and one lock wire bolt.

- b. Remove main engine lube oil pump cover.
  - c. Remove cover gasket.
4. Torque shaft nut to between 325 ft-lbs to 350 ft-lbs.
5. Reinstall main engine lube oil pump cover.
6. Install cover gasket.
7. Bolt main engine lube oil pump cover in place.
  - a. Torque 16 ft-lbs.
8. Lock wire bolt.
9. Remove "Do Not Start" tags.
10. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
11. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> LS1-0003	<b>Title</b> Inspect Soakback Oil System	
<b>Revision</b> 0	<b>Date</b> 10/27/2015	<b># of Pages</b> 3
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 360 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Refill with Shell Rotella T 15W40 (P/N 137020032)	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides pre-lube of turbocharger prior to start and cooling of turbocharger after shutdown

**FAILURE MODES TO IDENTIFY:**

Clogged, dirty or damaged filter, damaged filter housing, loose or missing hardware

**PROCEDURE:**

1. Ensure locomotive is over an approved containment system.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Complete the following if main engine is running:
  - a. Press main engine "SHUTDOWN" button, (Refer to Figure 1).
  - b. Verify that oil soakback pump continues to operate for a minimum of 35 minutes, (Refer to Figure 2).
3. Complete the following if main engine is shut down:
  - a. Close main battery KNIFE switch.
  - b. Close all circuit breakers.

## NOTE

Do not start main engine until procedure is complete.

- c. Verify that oil soakback pump continues to operate for a minimum of 35 minutes.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**MAIN ENGINE SHUT DOWN BUTTON**

**Figure 1**



**SOAK BACK PUMP**  
**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> IN3-0003	<b>Title</b> Test Locomotive Emergency Windows
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PHI
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for emergency egress from locomotive cab

**FAILURE MODES TO IDENTIFY:**

Stuck window, corroded window frame, bent or jammed pull pin

**PROCEDURE:**

1. Select window to be tested.
2. Open window to be tested, (Refer to Figure 1).
3. Remove the pull pin, (Refer to Figure 2).
4. Hold window and prevent it from falling, (Refer to Figure 3).
5. Pull down on emergency window latch and lean window away from locomotive, (Refer to Figure 4).
6. Pull window back in and re-latch emergency latch, (Refer to Figure 5).
7. Reinstall pull pin, (Refer to Figure 6).
8. Close window.
9. Apply calibration sticker with date of test above window.
10. Repeat Steps 1. through 8. for window on other side of locomotive cab.
11. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.

12. Make appropriate repairs for any other discrepancies found.



**OPENING WINDOW TO BE TESTED**

**Figure 1**



**PIN REMOVAL**

**Figure 2**



**PREVENTING WINDOW FROM FALLING**

**Figure 3**



**LEANING WINDOW OUT**

**Figure 4**



**PULLING WINDOW BACK IN**  
**Figure 5**



**PULL PIN (REINSTALLED) AND CALIBRATION STICKER**

**Figure 6**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0037	<b>Title</b> Change HEP Air Intake Filter	
<b>Revision</b> 0	<b>Date</b> 9/21/2015	<b># of Pages</b> 2
<b>Type</b> Locomotive	<b>Frequency</b> F59PH/PHI 180 Days	
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

### FUNCTIONS:

Provides for filtration of atmospheric air for HEP engine combustion

### FAILURE MODES TO IDENTIFY:

Clogged, dirty or damaged filter, damaged filter housing, loose or missing hardware

### PROCEDURE:

1. Ensure HEP engine is shut down and cooled down.

### WARNING

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Apply "Do Not Start" tags to HEP start station.
3. Ensure locomotive is over an approved containment system.
4. Open HEP air intake filter access panels. (Refer to Figure 1).
5. Remove filter housing cover.
  - a. Remove filter element.
  - b. Clean filter housing.
6. Install new filter element.
  - a. Reinstall filter housing cover.

7. Remove "Do Not Start" tags.
8. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
9. Make appropriate repairs for any other discrepancies found.



**AIR INTAKE TO TURBOCHARGER**

**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0035	<b>Title</b> Change HEP Oil Filter
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Approved Solvent; Oil
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for the removal of contaminants from lube oil

**FAILURE MODES TO IDENTIFY:**

Clogged or dirty filter

**PROCEDURE:**

1. Ensure HEP engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to HEP start station.
3. Ensure locomotive is over an approved containment system.
4. Remove HEP oil filters with filter wrench, (Refer to Figure 1).
  - a. Clean filter mount with (insert name of solvent), (Refer to Figure 2).
    - (1) Wipe down with a clean cloth.

## WARNING

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH OIL. AVOID INGESTION. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

---

- b. Apply a thin film of oil around O-ring, (Refer to Figure 3).
5. Install new HEP oil filter, (Refer to Figure 4).
6. Remove “Do Not Start” tags.
7. Startup HEP engine.
  - a. Bring HEP engine to normal operating parameters.
8. Inspect visually for leaks.
9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
10. Make appropriate repairs for any other discrepancies found.

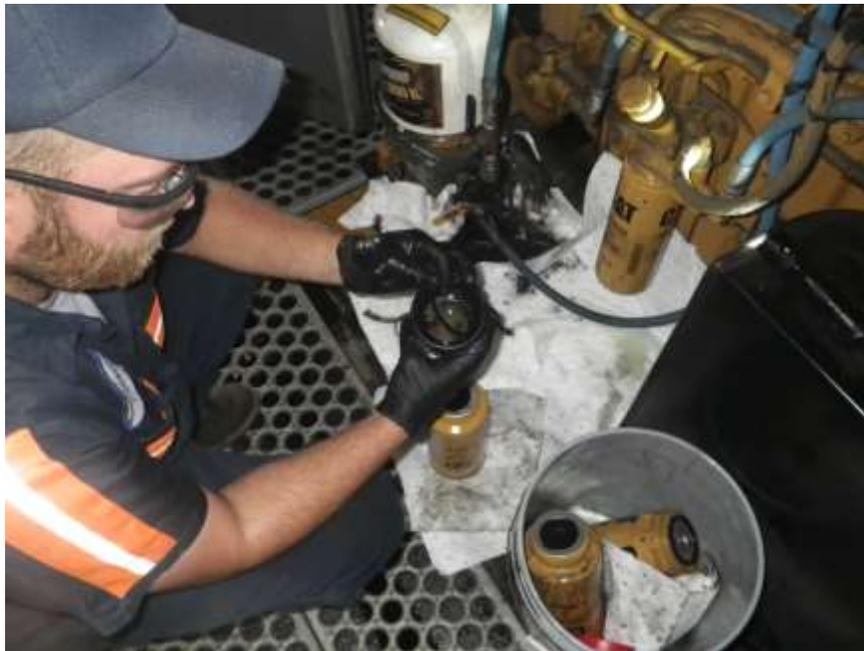


**HEP OIL FILTER**

**Figure 1**



**HEP OIL FILTER REMOVAL FROM CANISTER**  
**Figure 2**



**O-RING INSTALLATION ON HEP OIL FILTER**  
**Figure 3**



**HEP FUEL FILTER INSTALLATION**

**Figure 4**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0029	<b>Title</b> Change HEP Centrifuge Filter and Gasket
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b># of Pages</b> 6
<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Total Man Hours</b> 1.0 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> HEP Centrifuge Fuel & Gaskets (1 EA P/N CBA007018); (1 EA P/N CBA007025); (1 EA P/N CBA007026)
<b>Special Tools</b> None	
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Removes particulate matter from HEP engine fuel and lube oil supply

**FAILURE MODES TO IDENTIFY:**

Clogged, dirty or damaged filter or strainer, damaged filter housing, loose or missing hardware, worn or damaged seals, O-rings, or gaskets

**PROCEDURE:**

1. Ensure HEP engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Apply "Do Not Start" tags to HEP start station.
3. Ensure locomotive is over an approved containment system.
4. Locate lube oil centrifuge assembly by the rear engine room's door on the engineer's side (Refer to Figure 1 and Figure 2).
5. Place pig mats below drain petcock, (Refer to Figure 3, Figure 4, Figure 5, and Figure 6).

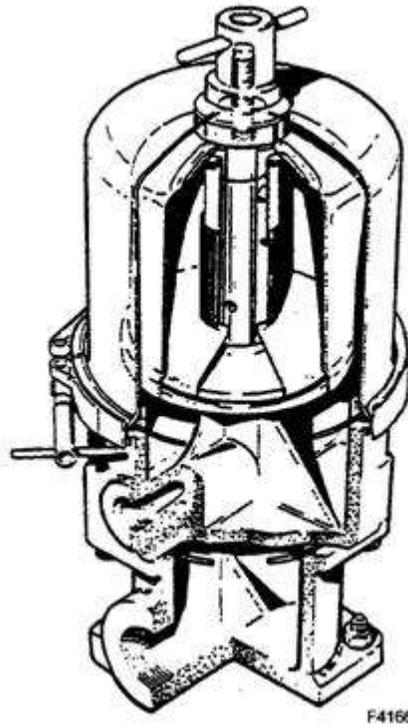
6. Close OIL SUPPLY CUTOFF valves.
7. Open the drain petcock.
  - a. Remove pipe plug, if necessary.

**WARNING**

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH OIL. AVOID INGESTION. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

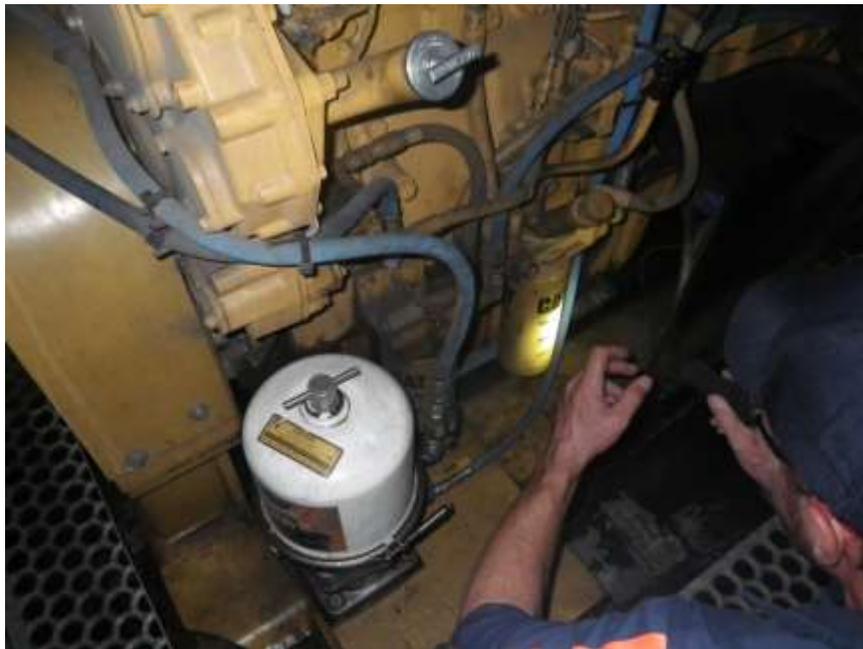
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- b. Drain oil from centrifuge housing.
  - c. Remove band clamp from outer shell when oil stops draining.
  - d. Remove T-handle screw from top of centrifuge.
  - e. Remove centrifuge outer shell, (Refer to Figure 7 and Figure 8).
    - (1) Place centrifuge outer shell on pig mats.
  - f. Remove centrifuge spinner assembly.
    - (1) Place centrifuge spinner assembly on pig mats.
    - (2) Remove paper element from centrifuge spinner assembly.
    - (3) Clean centrifuge spinner assembly at the parts cleaning station with approved solvent.
  - g. Dispose of oil, pig mats, and paper element in accordance with local, state, and federal regulations.
8. Install new paper element into centrifuge spinner assembly:
  - a. Ensure index pin is aligned with slot inside shell.
  - b. Install centrifuge spinner assembly into housing over shaft.
  - c. Install new O-ring.
  - d. Install centrifuge outer shell.
  - e. Install T-handle screw on top of centrifuge by hand.
  - f. Reinstall band clamp on outer shell.
9. Close drain petcock.
  - a. Reinstall pipe plug, if necessary.
10. Open OIL SUPPLY CUTOFF valves.
11. Remove "Do Not Start" tags.
12. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
13. Make appropriate repairs for any other discrepancies found.



**LUBE OIL CENTRIFUGE ASSEMBLY**

**Figure 1**



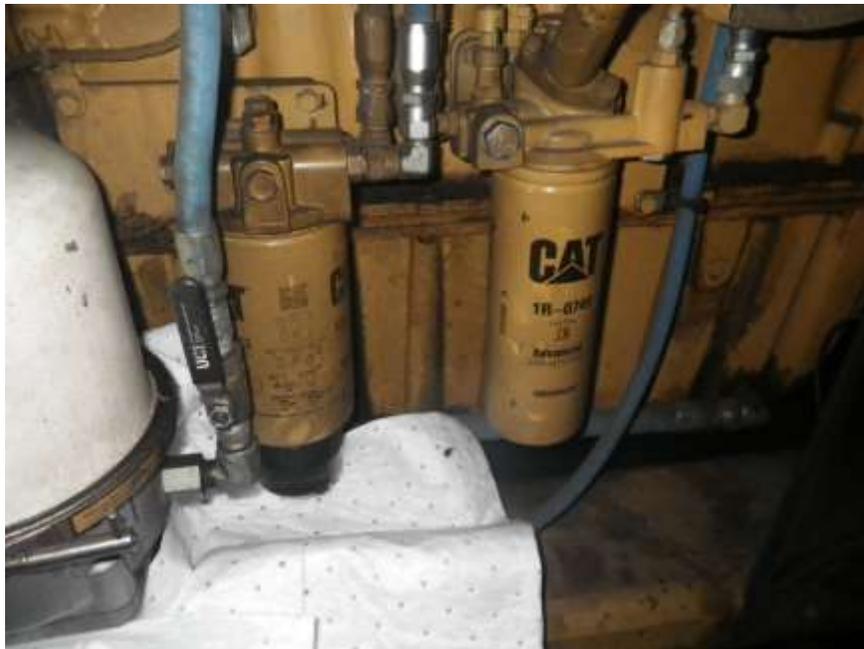
**HEP FUEL FILTER**

**Figure 2**



**TOP REMOVED FROM PURIFIER**

**Figure 3**



**PIG MATS AROUND PURIFIER**

**Figure 4**



**PIG MATS AROUND PURIFIER (VIEW 2)**

**Figure 5**



**PIG MATS**

**Figure 6**



**DISSASSEMBLY OF PURIFIER**  
**Figure 7**



**DISSASSEMBLY OF PURIFIER (VIEW 2)**  
**Figure 8**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0028	<b>Title</b> Change HEP Crankcase Emission Filter
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.2 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Captures crankcase vapors and vents them to the atmosphere

**FAILURE MODES TO IDENTIFY:**

Dirty, clogged or damaged filter

**PROCEDURE:**

1. Ensure HEP engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to HEP start station.
3. Unfasten clips on crankcase filter housing.
  - a. Drop bottom of filter housing.
  - b. Remove old filter and O-ring.
  - c. Clean out filter housing.
4. Install new crankcase emission filter and O-ring.
5. Raise filter housing.
  - a. Refasten clips on crankcase filter housing.

6. Remove "Do Not Start" tags.
7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
8. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0022	<b>Title</b> Inspect and Test HEP Engine Water Pump
<b>Revision</b> 0	<b>Date</b> 10/27/2015
<b>Equipment</b> Locomotive	<b># of Pages</b> 5
<b>Type</b> F59PH/PHI	<b>Frequency</b> 360 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 2.0 Hours
<b>Total Man Hours</b> 2.0 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> For Flush, use Shellzone Anti-freeze 50/50 Mix; If change-out is needed, use: HEP Engine Water Pump (1 EA P/N TBD) and the following gaskets: 1) Water Pump Elbow (1 EA P/N TBD); 2) Water Pump Housing (1 EA P/N TBD); 3) Water Outlet Flange (2 EA P/N TBD); 4) Water Pump O-ring (1 EA P/N TBD); 5) HEP Engine Front Housing O-ring (1 EA P/N TBD)
<b>Special Tools</b> None	
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides circulation of coolant to HEP engine

**FAILURE MODES TO IDENTIFY:**

Leaks, cracks, worn or seized bearings

**PROCEDURE:**

1. Ensure HEP engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Ensure KNIFE switch located in HEP control cabinet is in the “DOWN” position.
3. Apply “Do Not Start” tags to HEP start station.
4. Ensure locomotive is over an approved containment system.
5. Remove radiator cap (expansion tank cap).
6. Connect drain hose to DRAIN valve, (Refer to Figure 1).
  - a. Open DRAIN valve.

**WARNING**

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH COOLANT. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

---

- b. Pump waste coolant from system.
  - (1) Dispose of waste coolant in accordance with local, state, and federal regulations.
- c. Close DRAIN valve.
- d. Remove drain hose.
7. Remove plug from temperature regulator housing, (Refer to Figure 2).
8. Install pressure gauge.
9. Fill system with water.
10. Ensure KNIFE switch located in HEP control cabinet is in the “UP” position, (Refer to Figure 3).
11. Remove “Do Not Start” tags.
12. Check oil level.
13. Startup HEP engine.
  - a. Bring HEP engine to normal operating parameters.
14. Verify water pump pressure is between 15-18 PSI.
15. Shut down HEP engine to allow it to cool down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

16. Apply “Do Not Start” tags to HEP start station.
17. Open DRAIN valve.
18. Drain water from system.
  - a. Dispose of waste water in accordance with local, state, and federal regulations.
19. Close DRAIN valve when drainage is complete.

20. Remove pressure gauge.
21. Reinstall plug into regulator housing.
22. Fill cooling system with new, approved coolant.
  - a. Use a 50/50 mixture.
  - b. Add four bottles of CAT additive.
23. Remove "Do Not Start" tags.
24. Check oil level.
25. Install radiator cap (expansion tank cap).
26. Startup HEP engine.
  - a. Bring HEP engine to normal operating parameters.
27. Check visually for coolant leaks.
28. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
29. Make appropriate repairs for any other discrepancies found.



**COOLANT DRAIN HOSE**

**Figure 1**



**TEMPERATURE REGULATOR HOUSING**  
**Figure 2**



**HEP CONTROL CABINET (DOOR OPEN KNIFE SWITCH DOWN)**  
**Figure 3**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0021	<b>Title</b> Inspect HEP Engine Crankcase Vibration Damper	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 1080 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> 9/16 inch Socket
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Limits vibration in HEP engine

**FAILURE MODES TO IDENTIFY:**

Damaged vibration damper

**PROCEDURE:**

1. Ensure HEP engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to HEP start station.
3. Unbolt inspection cover (located below crankcase breather filter at front of HEP).
  - a. Remove inspection cover.
4. Inspect cover visually for leaks or other damage to damper.
  - a. Clean, as necessary.
5. Reinstall inspection cover.
  - a. Bolt inspection cover.
6. Remove "Do Not Start" tags.

7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
8. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0020	<b>Title</b> Inspect HEP Engine Turbocharger
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for increased air flow to HEP engine

**FAILURE MODES TO IDENTIFY:**

Loose or missing hardware, worn, torn or damaged gasket, worn turbocharger cartridge

**PROCEDURE:**

1. Ensure HEP engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to HEP start station.
3. Remove air piping from the compressor inlet, (Refer to Figure 1, Figure 2, Figure 3, and Figure 4).
4. Inspect the compressor housing for damage.
5. Inspect the compressor wheel for damage, (Refer to Figure 5).
  - a. Complete the following if no damage to the compressor wheel is found:
    - (1) Turn the rotating assembly by hand.
      - (a) Push the cartridge assembly sideways, which should turn freely.

6. Inspect the compressor and compressor wheel for oil leaks, (Refer to Figure 6 and Figure 7):
  - a. Remove the oil drain line for the turbocharger.
  - b. Inspect the drain opening.
    - (1) Clean drain opening as necessary.
  - c. Inspect the oil drain line.
    - (1) Clean oil drain line as necessary.
  - d. Inspect the area between the bearings of the rotating assembly shaft.
    - (1) Clean the area as necessary.
  - e. Remove the oil supply line for the turbocharger.
    - (1) Inspect the opening of the supply line.
      - (a) Clean opening as necessary.
  - f. Inspect the supply line.
    - (1) Clean supply line as necessary.
7. Inspect the turbine wheel and turbine housing:
  - a. Inspect the turbine wheel for carbon buildup.
    - (1) Clean turbine wheel as necessary.
  - b. Turn the rotating assembly by hand.
    - (1) Push the cartridge assembly sideways, which should turn freely.
  - c. Inspect the turbine and turbine housing for oil leaks and oil coking.
    - (1) Complete the following if oil is coming from the turbocharger:
      - (a) Remove the oil drain line for the turbocharger.
      - (b) Inspect the drain opening.
        - 1) Clean drain opening as necessary.
      - (c) Inspect the oil drain line.
        - 1) Clean oil drain as necessary.
      - (d) Inspect the area between the bearings of the rotating assembly shaft.
        - 1) Clean area as necessary.
    - (2) Complete the following if oil coating is found:
      - (a) Clean as necessary.
      - (b) Replace and install a new turbocharger if the coating is heavy.
8. Inspect the crankcase pressure.
  - a. Complete the following if pressure is high or the oil drain is restricted:
    - (1) Check the crankcase pressure.
      - (a) Correct any problems found.

- b. Replace and install a new oil drain line if oil drain line is damaged.
9. Contact supervisor for any discrepancies.
10. Remove “Do Not Start” tags.
11. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
12. Make appropriate repairs for any other discrepancies found.



**HEP**  
**Figure 1**



**HEP EXHAUST CAGE**

**Figure 2**



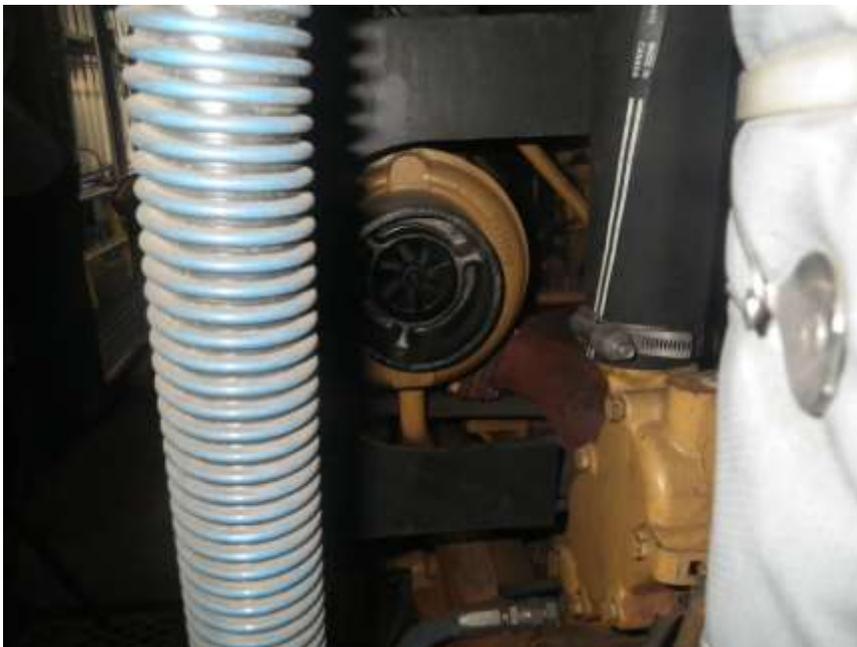
**HEP TEMP REGULATOR INSTALLED**

**Figure 3**



**HEP EXHAUST PIPING**

**Figure 4**



**HEP TURBOCHARGER**

**Figure 5**



**HEP TURBOCHARGER (VIEW 2)**

**Figure 6**



**HEP TURBOCHARGER (VIEW 3)**

**Figure 7**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0019		<b>Title</b> Change HEP Engine Thermostat (Temperature Regulator)
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 11
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 1080 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.5 Hours	<b>Total Man Hours</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> HEP Engine Cooling Regulator (thermostat) (2 EA P/N CBA004108) and Seals: Seal, Water Temperature Regulator (1 EA P/N CBA060915); Seal, O-ring, Manifold Housing (1 EA CBA050932); Seal, O-ring, Regulator Housing (1 EA CBA050938) as per OEM recommendations	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides temperature control for HEP engine

**FAILURE MODES TO IDENTIFY:**

Faulty or damaged regulator (seized, inoperative, etc.)

**PROCEDURE:**

1. Ensure HEP engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to HEP start station.

3. Ensure locomotive is over an approved containment system.
4. Connect drain hose to DRAIN valve, (Refer to Figure 1).
5. Pump waste coolant from system.
  - a. Dispose of waste coolant in accordance with local, state, and federal regulations.
6. Close DRAIN valve.
7. Remove drain hose.
8. Remove heat shielding from HEP engine, (Refer to Figure 2 and Figure 3).
9. Loosen clamps on radiator piping, (Refer to Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8).
10. Unbolt temperature regulator housing, (Refer to Figure 9 and Figure 10).
  - a. Remove temperature regulator housing, (Refer to Figure 11).
  - b. Separate temperature regulator housing.
  - c. Remove old regulators and gaskets, (Refer to Figure 12).
  - d. Clean temperature regulator housing, (Refer to Figure 13).
11. Install new temperature regulators and gaskets, (Refer to Figure 14 and Figure 15):
  - a. Bolt new temperature regulator into regulator housing.
12. Replace O-ring on bottom of temperature regulator housing.
13. Reinstall regulator housing.
  - a. Bolt to HEP engine.
14. Reconnect radiator piping.
  - a. Tighten clamps.
15. Reinstall heat shield on HEP engine.

**WARNING**

**AVOID EYE AND SKIN CONTACT WITH COOLANT. USE IN A WELL VENTILATED AREA. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

---

16. Fill cooling system with new, approved coolant.
17. Remove "Do Not Start" tags.
18. Startup HEP engine.
  - a. Bring HEP engine to normal operating parameters.
  - b. Check visually for coolant leaks.
19. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
20. Make appropriate repairs for any other discrepancies found.



**HEP COOLING WATER DRAIN**  
**Figure 1**



**HEP**  
**Figure 2**



**HEP EXHAUST CAGE**

**Figure 3**



**HEP WATER PIPE**

**Figure 4**



**HEP WATER LINE**  
**Figure 5**



**HEP WATER HOSE**  
**Figure 6**



**HEP TURBOCHARGER**  
**Figure 7**



**HEP TURBOCHARGER (VIEW 2)**

**Figure 8**



**HEP TURBOCHARGER (VIEW 3)**

**Figure 9**



**HEP EXHAUST PIPING**

**Figure 10**



**HEP COOLING WATER PIPE**

**Figure 11**



**HEP TEMP REGULATOR INSTALLED**

**Figure 12**



**HEP TEMP REGULATOR HOUSING REMOVED**

**Figure 13**



**HEP TEMP REGULATOR HOUSING DISASSEMBLED**

**Figure 14**



**HEP TEMP REGULATOR HOUSING**

**Figure 15**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0017	<b>Title</b> Inspect HEP Engine Sensors and Wiring
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.4 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides protection and control for HEP engine

**FAILURE MODES TO IDENTIFY:**

Faulty level/pressure switch, relay, loose or broken wires, loose or missing hardware, etc.

**PROCEDURE:**

1. Ensure HEP engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Apply "Do Not Start" tags to HEP start station.
3. Inspect all visible HEP engine wiring and electrical connections, including starter motor, visually, for the following discrepancies:
  - a. Fraying.
  - b. Torn insulation.
  - c. Signs of overheating.
  - d. Loose electrical connections.
  - e. Loose or missing mounting hardware.

4. Remove "Do Not Start" tags.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0016	<b>Title</b> Change HEP Fuel Filter and Water Separator	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 6
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> HEP Fuel Filter (P/N CBA001094); HEP Water Separator (P/N CBA007000)	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for the removal of particulate matter from engine fuel

**FAILURE MODES TO IDENTIFY:**

Clogged filter, injectors

**PROCEDURE:**

1. Ensure HEP engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Apply "Do Not Start" tags to HEP start station.
3. Complete the following to install new HEP fuel filter:

## WARNING

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH OIL. AVOID INGESTION. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

---

- a. Place oil containment device and pig mats below fuel filter, (Refer to Figure 1 and Figure 2).
  - b. Remove fuel filter by loosening from mounting, (Refer to Figure 3).
  - c. Wipe clean fuel filter mounting surface, (Refer to Figure 4).
  - d. Lubricate seals of new fuel filter, (Refer to Figure 5).
  - e. Install new fuel filter, (Refer to Figure 6 and Figure 7).
    - (1) Dispose of oil, pig mats and old fuel filter in accordance with local, state, and federal regulations.
4. Complete the following to install new HEP fuel-water separator:
- a. Place oil containment device and pig mats below fuel-water separator.
  - b. Remove fuel-water separator by loosening from mounting.
  - c. Remove fuel-water separator bowl from filter element.
  - d. Reinstall fuel-water separator bowl, using new seal provided with filter element.
  - e. Wipe clean fuel-water separator mounting surfaces.
  - f. Lubricate seals of new fuel-water separator.
  - g. Install new fuel-water separator.
  - h. Dispose of oil, pig mats and old fuel-water separator in accordance with local, state, and federal regulations.
5. Remove “Do Not Start” tags.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



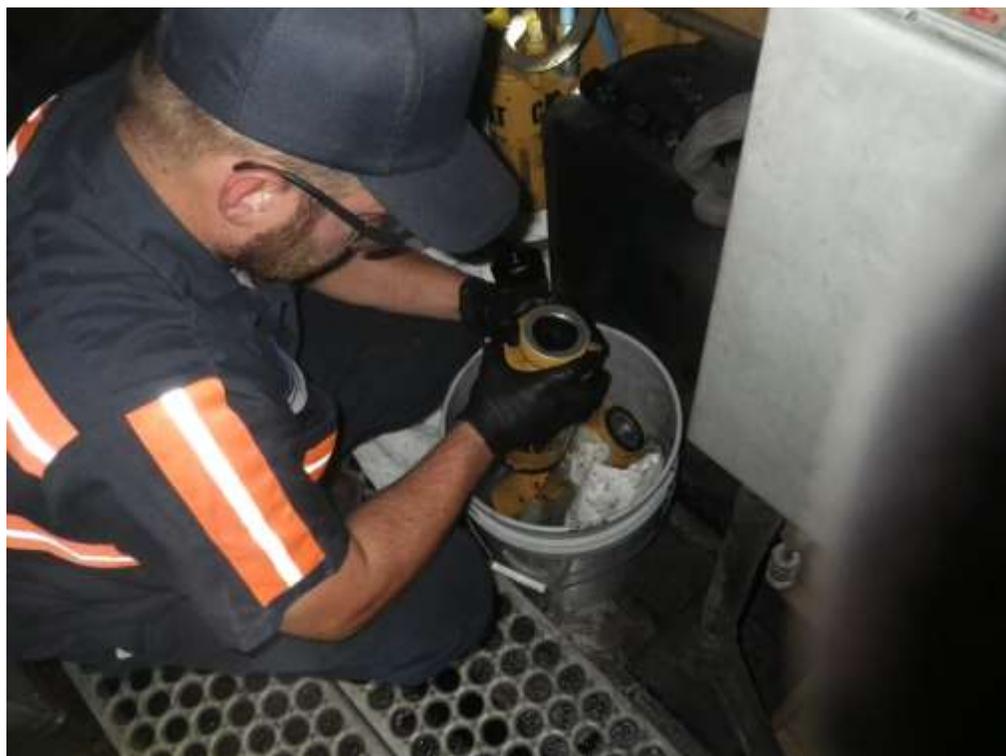
**HEP FUEL FILTER**  
**Figure 1**



**INSPECTION OF PURIFIER CAP**  
**Figure 2**



**HEP OIL FILTER**  
**Figure 3**

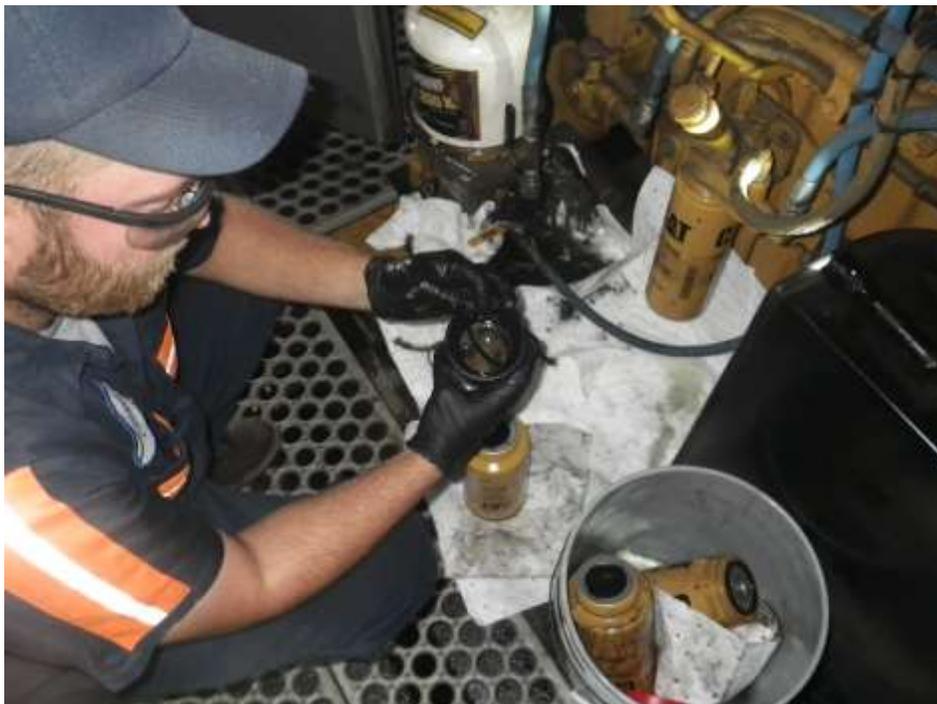


**OIL FILTER REMOVAL FROM CANISTER**  
**Figure 4**



**PURIFIER SHAFT**

**Figure 5**



**O-RING INSTALLATION ON HEP OIL FILTER**

**Figure 6**



**INSTALLATION OF HEP FUEL FILTER**  
**Figure 7**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0013	<b>Title</b> Adjust HEP Engine Valves and Injector Timing	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 3
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 720 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 8.0 Hours	<b>Total Man Hours</b> 8.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Inspector Height Gauge (P/N 9U-7227); Torque Wrench 0-50 ft-lb; Soft Mallet
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Ensures proper engine air intake and exhaust

**FAILURE MODES TO IDENTIFY:**

Valve lash out of adjustment (too tight/loose); injector height out of tolerance

**PROCEDURE:**

1. Ensure engine is shutdown, (Refer to Figure 1).

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Complete valve lash adjustment:
  - a. Rotate engine over.
    - (1) Put the No. 1 piston at the top center position on the compression stroke, (Refer to Table 1).
3. Adjust the valve lash, (Refer to Table 1):
  - a. Tap the rocker arm lightly with a soft mallet to ensure that the lifter roller sets against the camshaft's base circle.
  - b. Loosen the adjustment locknut.

- c. Place the appropriate feeler gauge between rocker arm and the valve bridge.
  - (1) Turn the adjustment screw in a clockwise direction.
  - (2) Slide the feeler gauge between the rocker arm and the valve bridge.
  - (3) Continue turning the adjustment screw until a slight drag is felt on the feeler gauge.
  - (4) Remove the feeler gauge.

#### NOTE

Do not allow the adjustment screw to turn while you are tightening the adjustment locknut.

---

- d. Tighten the adjustment locknut to a torque of  $30 \pm 7$  N m ( $22 \pm 5$  ft-lb).
  - e. Recheck the valve lash after tightening the adjustment locknut.
4. Adjust the unit injectors cylinders' height on 1, 2, and 4, using injector height gauge (9U-7227):
    - a. Install injector height gauge to the machine ledge of the fuel injector body.
    - b. Turn unit injector adjusting screw clockwise until the correct height is obtained.
    - c. Hold the adjusting screw in this position:
      - (1) Tighten locknut to a torque of  $100 \pm 10$  N m ( $74 \pm 7$  ft-lb).
  5. Rotate engine  $360^\circ$  to put the No. 6 piston on top center position on the compression stroke.
    - a. Adjust the unit injectors cylinders' height on 3, 5, and 6, using injector height gauge (9U-7227):
      - (1) Install injector height gauge to the machine ledge of the fuel injector body.
      - (2) Turn unit injector adjusting screw clockwise until the correct height is obtained.
      - (3) Hold the adjusting screw in this position:
        - (a) Tighten locknut to a torque of  $100 \pm 10$  N m ( $74 \pm 7$  ft-lb).
  6. Adjust the valve lash, (Refer to Table 2):
    - a. Tap the rocker arm lightly with a soft mallet to ensure that the lifter roller sets against the camshaft's base circle.
    - b. Loose the adjustment locknut.
    - c. Place the appropriate feeler gauge between rocker arm and the valve bridge.
      - (1) Turn the adjustment screw in a clockwise direction.
      - (2) Slide the feeler gauge between the rocker arm and the valve bridge.
      - (3) Continue turning the adjustment screw until a slight drag is felt on the feeler gauge.
      - (4) Remove the feeler gauge.

#### NOTE

Do not allow the adjustment screw to turn while you are tightening the adjustment locknut.

---

- d. Tighten the adjustment locknut to a torque of  $30 \pm 7$  N m ( $22 \pm 5$  ft-lb).

- e. Recheck the valve lash after tightening the adjustment locknut.
- 7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
- 8. Make appropriate repairs for any other discrepancies found.

TC Compression Stroke	Inlet Valves	Exhaust Valves
Valve Lash	0.38 ± 0.08 mm (0.015 ± 0.003 inch)	0.76 ± 0.08 mm (0.030 ± 0.003 inch)
Cylinders	1-2-4	1-3-5

**COMPRESSION STROKE VALVE LASH**

**Table 1**

TC Exhaust Stroke	Inlet Valves	Exhaust Valves
Valve Lash	0.38 ± 0.08 mm (0.015 ± 0.003 inch)	0.76 ± 0.08 mm (0.030 ± 0.003 inch)
Cylinders	3-5-6	2-4-6

**EXHAUST STROKE VALVE LASH**

**Table 2**



**HEP ENGINE**

**Figure 1**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0011	<b>Title</b> Adjust HEP Unit Controls
<b>Revision</b> 0	<b>Date</b> 10/27/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.3 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

### FUNCTIONS:

Provides for 480 VAC to passenger cars

### FAILURE MODES TO IDENTIFY:

Improperly adjusted/set under/over speed, under/over voltage or frequency

### PROCEDURE:

1. Ensure HEP engine is running within normal parameters.
  - a. Verify that HEP engine is operating at 1800 RPM.
    - (1) Adjust, if necessary.

### WARNING

**USE EXTREME CAUTION WHEN USING A MULTIMETER TO MEASURE VOLTAGES. DO NOT TOUCH POWER TERMINALS. FAILURE TO COMPLY COULD RESULT IN PERSONNEL INJURY OR DEATH.**

- (2) Open HEP control cabinet, (Refer to Figure 1).
- (3) Use multimeter to verify voltage indicating 480 VAC (+/- 3 VAC).
  - (a) Maintain 1800 RPM while adjusting voltage to bring within parameters.
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.

3. Make appropriate repairs for any other discrepancies found.



**HEP CONTROL CABINET**

**Figure 1**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0009	<b>Title</b> Megger HEP Alternator	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 3
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 360 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for 480 VAC to passenger cars

**FAILURE MODES TO IDENTIFY:**

Grounded phase(s), damaged cable/wire insulation, loose wires or hardware

**PROCEDURE:**

1. Ensure HEP engine is shut down and cooled down.

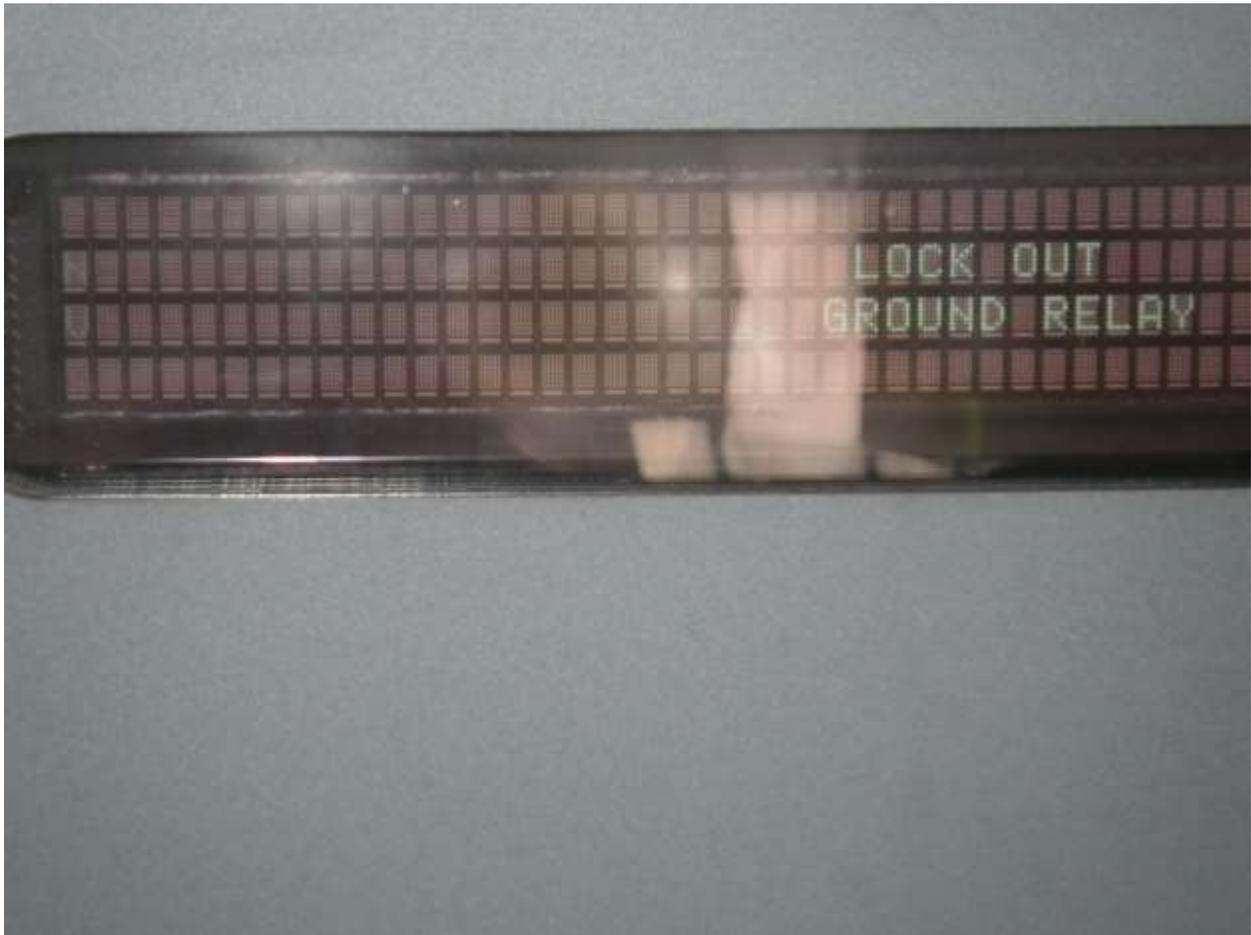
**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Apply "Do Not Start" tags to HEP start station.
3. Disconnect ground wire from ground relay, (Refer to Figure 1).
4. Shut-off all of the following circuit breakers, (Refer to Figure 2):
  - a. HEP layover.
  - b. Lube oil pump.
  - c. Trickle charger.
  - d. Layover cab heater.
  - e. IMM HTR pump.

- f. IMM HTR.
5. Open HEP control cabinet, (Refer to Figure 3).
6. Set Megger meter to 500 volts.
  - a. Connect positive (+) lead to ground and negative (-) lead to phase.
  - b. Verify reading with parameters.
    - (1) Report to the Supervisor if reading is lower than 3 Megaohms.
  - c. Repeat Step 5. for all three phases.
7. Close HEP control cabinet.
8. Reconnect ground wire to ground relay.
9. Remove “Do Not Start” tags.
10. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
11. Make appropriate repairs for any other discrepancies found.



**GROUND RELAY LOCKED OUT**

**Figure 1**



**HEP ENGINE CIRCUIT BREAKERS**

**Figure 2**



**HEP CONTROL CABINET**

**Figure 3**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0004	<b>Title</b> Perform HEP Operational Test
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for 480 VAC power for passenger cars

**FAILURE MODES TO IDENTIFY:**

Damaged electrical cables, loose wires or hardware, faulty electrical control device

**PROCEDURE:**

1. Ensure HEP engine is operating within normal parameters.
  - a. Verify the following switch positions in the vestibule area on engine control panel:
    - (1) HEP SELECTOR switch in "LOCAL" position.
    - (2) TRAIN LINE switch in "SINGLE BUS" position.
    - (3) TRAIN LINE CUT OUT switches are cut in and sealed.
  - b. Verify train line is complete by observing TLC lights are illuminated on the HEP control panel in operating cab.
  - c. Start HEP engine.
    - (1) Allow frequency to reach 60 Hertz (Hz) as read on tachometer and 480 VAC as read on voltmeter.
    - (2) Open control cabinet.
      - (a) Place jumper wire between set terminals.

- (3) Verify that underspeed indicator light is OFF.
- d. Inspect HEP engine visually for oil, fuel, coolant, exhaust leaks, and air induction leaks.
- e. Rotate the VOLTMETER SELECTOR switch to verify 480 VAC on all three phases.
- f. Press HEP "ON" button in control cab.
- g. Perform emergency shut down test by restarting HEP engine after each shut down.
  - (1) Follow emergency shut down instructions inside control cabinet.
  - h. Record hours from engine hour meter on inspection form.
- 2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
- 3. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HP1-0002	<b>Title</b> Inspect HEP Cooling System
<b>Revision</b> 0	<b>Date</b> 10/27/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides cooling for HEP engine

**FAILURE MODES TO IDENTIFY:**

Cracked hoses, contaminated antifreeze

**PROCEDURE:**

1. Ensure engine is at normal operating parameters.
2. Inspect HEP engine and piping visually for leaks and cracks, (Refer to Figure 1).
3. Inspect radiator visually for leaks and cracks, (Refer to Figure 2).
4. Inspect cooling fan visually for damage, proper operation, and rotation.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**HEP ENGINE WATER PIPING**  
**Figure 1**



**INSPECTING HEP ENGINE RADIATOR AND FAN**  
**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> GV1-0003	<b>Title</b> Service Governor	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 3
<b>Equipment</b> Locomotive	<b>Type</b> F59PH	<b>Frequency</b> 360 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Solvent; Governor Oil	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Control engine speed

**FAILURE MODES TO IDENTIFY:**

Dirty oil and/or dirty, clogged or damaged servo oil filter

**PROCEDURE:**

1. Ensure engine is shutdown.

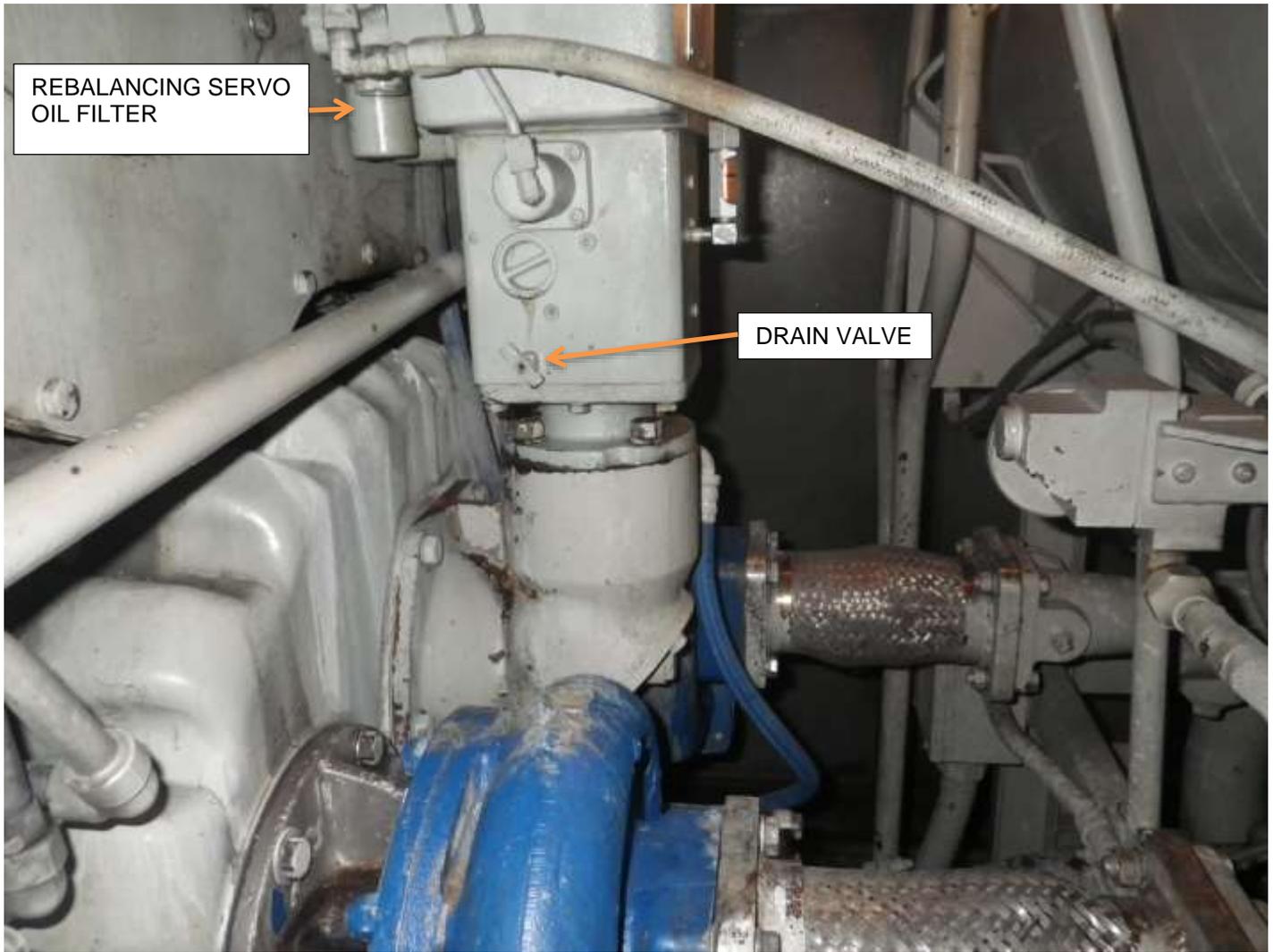
**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Open governor oil DRAIN valve (Refer to Figure 1).
  - a. Drain oil to sump.
  - b. Close governor oil DRAIN valve.
3. Remove rebalancing servo oil filter.
  - a. Clean rebalancing servo oil filter with solvent.
4. Reinstall rebalancing servo oil filter.
5. Fill engine governor oil reservoir with governor oil.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.

7. Make appropriate repairs for any other discrepancies found.



**GOVERNOR**

**Figure 1**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> GV1-0002	<b>Title</b> Perform Diagnostic Self-Test on Load Regulator	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.2 Hours	<b>Total Man Hours</b> 0.2 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

### FUNCTIONS:

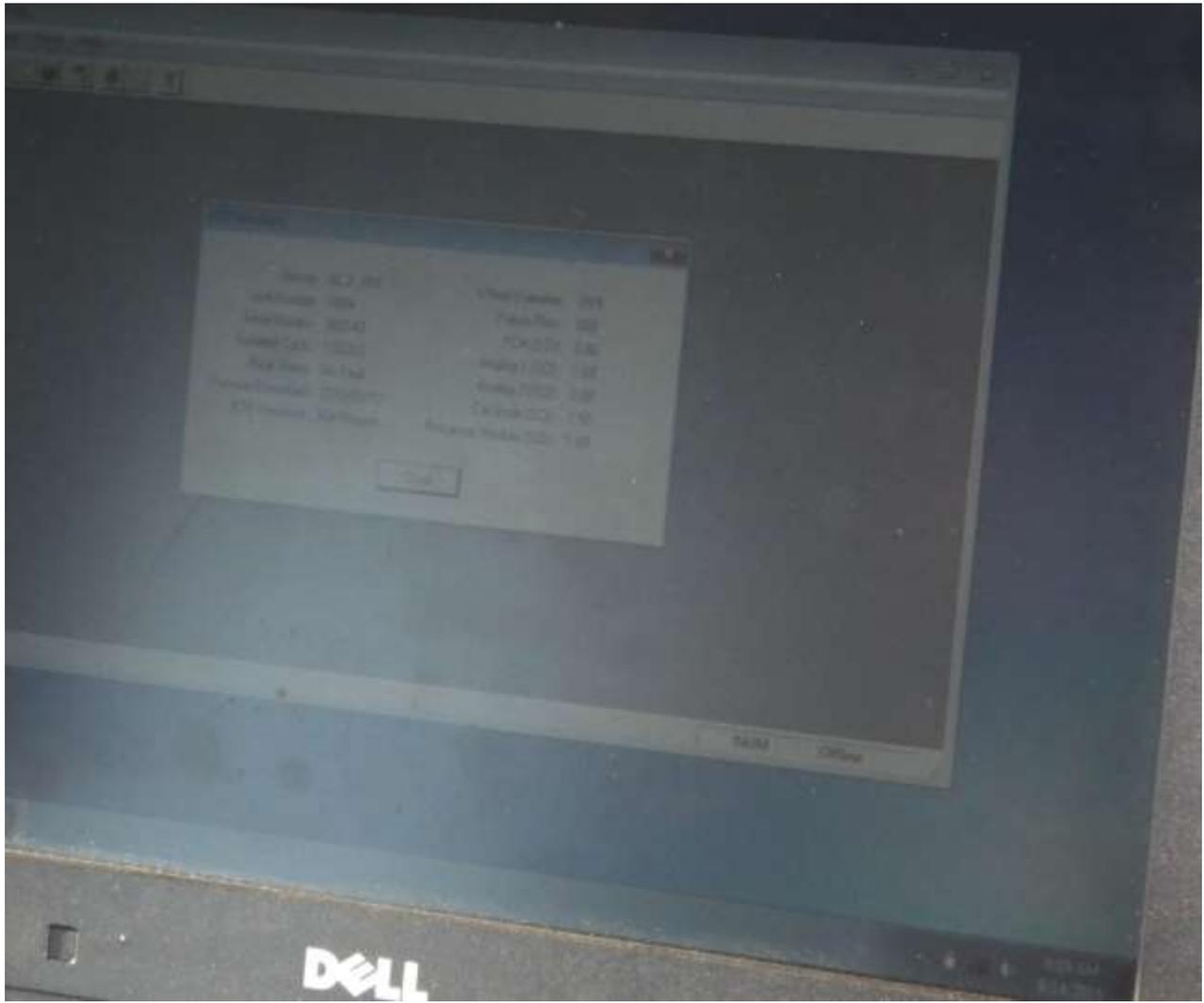
Regulates horsepower and tractive effort of engine

### FAILURE MODES TO IDENTIFY:

Loose wiring or connections

### PROCEDURE:

1. Ensure engine at normal operating parameters.
2. Open computer cabinet.
  - a. Turn on computer display, (Refer to Figure 1).
  - b. Select "Self-Test" from menu.
  - c. Select "Load Regulator Test".
    - (1) Proceed to Step 3 if test passes.
    - (2) Report to Supervisor that governor has failed.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**COMPUTER DISPLAY**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FU3-0001	<b>Title</b> Test Electronic Fuel Gauge System
<b>Revision</b> 0	<b>Date</b> 10/27/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.3 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for monitoring the fuel level

**FAILURE MODES TO IDENTIFY:**

Faulty or damaged wiring or gauge

**PROCEDURE:**

1. Apply power to locomotive.
2. Verify fuel gauge reading to the mechanical gauge installed and to the gauge in the cab, (Refer to Figure 1 and Figure 2).
3. Discontinue power to locomotive.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**FUEL TANK MECHANICAL FUEL GAUGE**  
**Figure 1**



**FUEL GAUGE IN CAB**  
**Figure 2**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FU1-0012	<b>Title</b> Change Spin-On Fuel Filters	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 3
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> F59PH – Spin-On Fuel Filter with O-ring (2 EA P/N RAAFU11340); F59PHI – Spin-On Fuel Filter with O-ring (2 EA P/N RAAFU10874)	<b>Special Tools</b> Filter Wrench
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for the removal of contaminants

**FAILURE MODES TO IDENTIFY:**

Dirty, clogged or damaged filters

**PROCEDURE:**

1. Ensure main engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

---

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Apply “Do Not Start” tags to:
  - a. Start control station, if F59PH.

- b. ISOLATION switch located in the engine room, if F59PH/PHI.
3. Remove spin-on fuel filters, using filter wrench, (Refer to Figure 1).
4. Apply light coat of approved lubricant on filter O-ring.
5. Install new spin-on fuel filter in accordance with original equipment manufacturer's instructions affixed to the filter, (Refer to Figure 2).
6. Replace main engine fuel filter:
  - a. Loosen the 2 ½ nuts on top of filters.
  - b. Remove filter tops.
  - c. Lift filters slowly from housing.
  - d. Allow fuel to drain from filters.
  - e. Remove filters from filter housings.
  - f. Remove O-rings from housings.
  - g. Wipe out filter housings with clean rags.
  - h. Install O-rings into housings.
  - i. Install filters into housings.
  - j. Install filter into housings.
  - k. Place top into position.
  - l. Tighten 2 ½ inch nuts on top of filters.
  - m. Dispose of filters and O-ring IAW procedures.
7. Remove "Do Not Start" tags.
8. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
9. Make appropriate repairs for any other discrepancies found.



**SPIN-ON FUEL FILTERS**

**Figure 1**



**SPIN-ON FILTER**

**Figure 2**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FU1-0011		<b>Title</b> Change PM Fuel Filters and O-rings
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 4
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Clean, Bound-edge Rags (as needed); F59PH - Primary Fuel Filter (P/N AAFU10280; 2 each) F59PH - Primary Fuel Filter Gasket (P/N RAAFU15907; 2 each) F59PHI - Primary Fuel Filter (P/N RAAFU11268) F59PHI - Primary Fuel Filter Gasket (P/N RAAFU11270)	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for the removal of contaminants

**FAILURE MODES TO IDENTIFY:**

Worn or damaged O-rings and/or dirty, clogged or damaged fuel filters

**PROCEDURE:**

1. Ensure main engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

---

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Apply “Do Not Start” tags to:
  - a. Start station, if F59PH.
  - b. ISOLATION switch, if F59PH/PHI.
3. Complete the following for F59PH:
  - a. Unbolt filter housing covers, (Refer to Figure 1).
    - (1) Remove filter housing covers.
  - b. Remove fuel filter elements.
    - (1) Install new filter elements.
  - c. Install new filter housing cover gaskets (O-rings).
  - d. Install filter housing covers.
    - (1) Bolt filter housing covers.
4. Complete the following for F59PHI:
  - a. Open the primary filter housing DRAIN valve.
    - (1) Secure valve in the “OPEN” position with a wire or similar device.

**WARNING**

**IF THE FILTER COVER IS OPENED WITHOUT PROPER DRAINING OF THE HOUSING, PRESSURE RETAINED IN THE SYSTEM MAY CAUSE FUEL TO SPURT OUT OF THE OPENING AND CAUSE INJURY TO PERSONNEL.**

---

- b. Remove filter housing vent plug.
- c. Open FILTER HOUSING VENT valve.
- d. Place a disposal container for the used filter element in a convenient location.
- e. Loosen the filter cover plate retaining hardware, wing nut or hinge bolts, and nuts, (Refer to Figure 1).
- f. Open the cover.
  - (1) Remove the filter element.
    - (a) Discard the element in the container.
- g. Use only clean, bound-edge rags to clean the interior of the filter housing.

**WARNING**

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH OIL. AVOID INGESTION. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

---

- (1) Wipe away any fuel oil that may have spilled in the surrounding areas.

## CAUTION

USE CARE TO AVOID DAMAGING THE LOWER SEAL IN THE FILTER ELEMENT WHEN INSERTING THE NEW FILTER ELEMENT.

- h. Insert a new filter element into the housing.
  - i. Inspect the filter housing cover gasket for the following discrepancies:
    - (1) Cuts.
    - (2) Nicks.
    - (3) Tears.
      - (a) Replace existing gasket, if necessary.
  - j. Close the housing cover.
    - (1) Tighten the retaining wing nut or nuts firmly on the hinge bolts.
  - k. Close FILTER HOUSING VENT valve.
5. Remove "Do Not Start" tags.
  6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  7. Make appropriate repairs for any other discrepancies found.



**FUEL FILTER HOUSINGS**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FU1-0009	<b>Title</b> Change Prime Mover Oil Filters and O-rings
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b># of Pages</b> 3
<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Total Man Hours</b> 1.0 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> Clean, Bound-Edge Rags (As required); Primary Fuel Filter Michiana (P/N RAAFU10872); O-ring (fits Oil Filter Housing Cover)
	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Filters contaminants from engine oil

**FAILURE MODES TO IDENTIFY:**

Clogged, damaged filter, damaged filter housing, loose or missing hardware

**PROCEDURE:**

1. Ensure main engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to:
  - a. Start station, if F59PH.

- b. ISOLATION switch, if F59PH/PHI.
3. Remove strainer cover.
4. Open both DRAIN valves.
5. Complete the following for F59PH:
  - a. Loosen bolts, (Refer to Figure 1 and Figure 2).
  - b. Open filter housing door.
  - c. Replace O-ring.
  - d. Install new filter elements.
  - e. Close door.
  - f. Tighten bolts.
  - g. Proceed to Step 7.
6. Complete the following for F59PHI:
  - a. Loosen wing nuts securing top oil filter housing cover at the main engine lube oil filter housing.
    - (1) Remove cover.
  - b. Remove filter element from housing.
    - (1) Dispose of filter element in accordance with local, state, and federal regulations.

**WARNING**

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH OIL. AVOID INGESTION. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

---

- (2) Wipe out the oil filter housing with clean, bound-edge rags.
  - (3) Inspect oil filter housing cover O-ring visually for the following discrepancies:
    - (a) Cuts.
    - (b) Nicks.
    - (c) Tears.
      - 1) Replace oil filter housing cover O-ring, if discrepancies are noted.
  - (4) Install new filter element in housing.
  - (5) Close filter housing cover.
    - (a) Secure filter housing cover.
  - (6) Repeat Steps 6.a. through 6.b.(a) for remaining three main engine lube oil filters.
7. Close DRAIN valves.
  8. Remove "Do Not Start" tags.
  9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  10. Make appropriate repairs for any other discrepancies found.



**FILTER BANK**  
**Figure 1**



**FILTER HOUSING DOOR**  
**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FU1-0008	<b>Title</b> Change Electrical Cabinet Air Filters
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Frequency</b> 1440 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Michiana/Electrical Cabinet Filter (4 EA P/N RAAFU10280); HEP Electrical Cabinet Air Filter (1 EA RAAFU10280); Gasket Material (As required)
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for clean air for electrical equipment

**FAILURE MODES TO IDENTIFY:**

Dust and debris in electrical components

**PROCEDURE:**

1. Ensure main engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to:
  - a. Start station, if F59PH.

- b. ISOLATION switch, if F59PH/PHI.
3. Remove filter housing cover.
4. Remove filter elements.
5. Replace with new filter elements.
6. Inspect housing cover gasket for damage.
  - a. Replace housing cover gasket, if necessary.
7. Reinstall filter housing cover.
8. Remove "Do Not Start" tags.
9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
10. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FU1-0006	<b>Title</b> Clean PM Fuel Strainer (PHI only)
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Fuel Strainer Filter (P/N RAAFU10276); Turbo Soak Gasket (P/N RAAFU11273)
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for the removal of contaminants from fuel system

**FAILURE MODES TO IDENTIFY:**

Damaged or clogged strainer; contaminated fuel

**PROCEDURE:**

1. Ensure main engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tag to ISOLATION switch.
3. Remove the bolts holding the strainer shell to the strainer cover, (Refer to Figure 1).
  - a. Remove the shell and strainer from the cover.
4. Remove the strainer element.

## WARNING

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH OIL. AVOID INGESTION. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

---

- a. Discard the oil and sediment held in the strainer shell in accordance with local, state, and federal regulations.

## CAUTION

Take care not to lose the spring from the bottom of the shell when cleaning it.

---

5. Clean the shell with fuel oil.
  - a. Wipe with clean bound edge rag.
6. Inspect the housing-to cover O-ring for the following discrepancies:
  - a. Cuts.
  - b. Nicks.
  - c. Tears.
7. Replace O-ring with a new O-ring, if necessary.
8. Clean strainer element in the shell.
  - a. Reapply the shell to the strainer cover.
9. Ensure that the O-ring is properly seated.
  - a. Tighten shell firmly into place.
10. Remove "Do Not Start" tag.
11. Perform leak check, using EM2000 computer:
  - a. Select "Maintenance" from main menu.
  - b. Select "Fuel System Check".
12. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
13. Make appropriate repairs for any other discrepancies found.



**PM FUEL STRAINERS**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FU1-0005	<b>Title</b> Change Spin-on Fuel Filter	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Prime Mover Spin-on Fuel Filters (2 EA RAAFU11340)	<b>Special Tools</b> Strap/Filter Wrench
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Remove dirt and particulates from fuel

**FAILURE MODES TO IDENTIFY:**

Dirty or clogged filter

**PROCEDURE:**

1. Ensure engine is shutdown.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Complete the following for PH, (Refer to Figure 1 and Figure 2):
  - a. Use strap/filter wrench to loosen filters.
  - b. Remove filters from manifold.
  - c. Apply oil to new filter gaskets.

**NOTE**

Do not use wrench to tighten filter.

- d. Install filter on manifold hand-tight.

3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**SPIN-ON FUEL FILTERS**

**Figure 1**



**SPIN-ON FUEL FILTER**

**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FU1-0004	<b>Title</b> Change PM Fuel Filter	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Remove dirt and particulates from fuel

**FAILURE MODES TO IDENTIFY:**

Dirty or clogged filter

**PROCEDURE:**

1. Ensure engine is shutdown.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Complete the following for PH, (Refer to Figure 1):

- a. Loosen retaining nuts on filter housing.
- b. Remove covers.
- c. Allow fuel to drain from filter housing.
- d. Remove filter elements.
- e. Inspect filter housing for debris.
- f. Install new filter elements.
- g. Replace O-ring/gasket.
- h. Reinstall covers and retaining nuts.

3. Complete the following for PHI:
  - a. Open DRAIN valve to release fuel pressure.
  - b. Loosen retaining nuts on filter housing.
  - c. Remove cover.
  - d. Remove filter elements.
  - e. Inspect filter housing for debris.
  - f. Install new filter elements.
  - g. Replace O-ring/gasket.
  - h. Reinstall cover and retaining nuts.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**PM FUEL FILTER**

**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FU1-0002	<b>Title</b> Inspect Fueling System
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.2 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Allows safe refueling of engine and protect overflow from system

**FAILURE MODES TO IDENTIFY:**

Broken or damaged nozzle, hoses or O-rings; vent clogged or obstructed

**PROCEDURE:**

1. Complete the following in the rail yard prior to refueling locomotive:
  - a. Inspect the refueling tank for damage and leaks, (Refer to Figure 1 and Figure 2).
  - b. Inspect the refueling nozzle for damage, (Refer to Figure 3).
  - c. Remove fuel fill caps on the locomotive.
    - (1) Inspect for damaged O-rings in cap, (Refer to Figure 4).
  - d. Inspect for cracks or damage around fuel fill nozzle.
  - e. Inspect hoses for cracks or other damage.
  - f. Ensure tank vent is clear of obstructions.
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**FUEL LINES ON TOP OF TANK**

**Figure 1**



**FUEL TANK**

**Figure 2**



**FUEL FILLER CAP**  
**Figure 3**



**FUEL FILLER INSIDE NECK**  
**Figure 4**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FU1-0001	<b>Title</b> Drain Condensate from Fuel Tank
<b>Revision</b> 0	<b>Date</b> 10/27/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.2 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for the removal of water from fuel

**FAILURE MODES TO IDENTIFY:**

Damage to injectors and/or fuel system

**PROCEDURE:**

1. Place locomotive over approved containment system.
2. Remove protective cover.
3. Remove valve plug/cap, (Refer to Figure 1).
4. Open valve.
  - a. Drain until only fuel is discharging.
  - b. Close valve when complete.
5. Reinstall valve plug.
6. Reinstall protective cover.
7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
8. Make appropriate repairs for any other discrepancies found.



**FUEL DRAIN**

**Figure 1**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FC1-0004	<b>Title</b> Inspect Top Deck	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

### FUNCTIONS:

Provides control power for Electronically Controlled Unit Injector (EUI) and proper operation of main engine

### FAILURE MODES TO IDENTIFY:

Damaged, loose or broken wires, loose or missing hardware, damaged injector seals, seized bearings, broken springs, broken valves, broken camshaft, and damaged cylinder head

### PROCEDURE:

1. Ensure main engine is shut down.

### WARNING

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Inspect the injector wire harness visually for (PHI only):
  - a. Loose or broken wires.
  - b. Damaged wire insulation.
3. Inspect the cylinder heads visually for (PH/PHI):
  - a. Broken or damaged springs.
  - b. Broken valve stems.
  - c. Broken, loose or missing fasteners.

- d. Worn cam followers and camshaft lobes.
  - e. Discoloration of camshaft bearings.
  - f. Signs of fuel and water leaks.
  - g. Broken, damaged, missing or leaking top deck cover seals.
  - h. Broken, damaged or missing latches or hinges.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  5. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FC1-0003	<b>Title</b> Test Emergency Fuel Cut-off (EFCO) Devices
<b>Revision</b> 0	<b>Date</b> 10/27/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**THIS IS A SAFETY CRITICAL ITEM.**

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**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides emergency fuel cut off to the diesel engine

**FAILURE MODES TO IDENTIFY:**

Stuck switch, loose connection or dirty/worn contacts

**PROCEDURE:**

1. Ensure engine is operating in idle and before each time engine is started, give audible notification to nearby technicians.
2. Depress "EMERGENCY STOP" button in the locomotive cab (back wall), (Refer to Figure 1).
  - a. Verify the engine shuts down.
3. Restart engine.
4. Depress emergency fuel trip, identified by red decal, at right side exterior above the front truck, (Refer to Figure 2).
  - a. Verify the engine shuts down.
5. Restart engine.
6. Depress emergency fuel trip, identified by red decal, at left side exterior above the front truck.

- a. Verify the engine shuts down.
7. Restart engine.
8. Attach a 74 volt (V) test lamp to pins 3(+) and 4(-) on any of the four, black, MU receptacles to verify MU train line shutdown.
9. Depress red segment of the red/green portion of "MU SHUTDOWN" push button on the control console engineer's side, (Refer to Figure 3).
  - a. Verify engine stops.
  - b. Verify 74 V test lamp is illuminated.
10. Depress green segment of the red/green "MU SHUTDOWN" push button on the control console engineer's side to allow engine to restart.
11. Restart engine.
12. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
13. Make appropriate repairs for any other discrepancies found.



**EMERGENCY STOP BUTTON**

**Figure 1**



**EMERGENCY FUEL TRIP**  
**Figure 2**



**MU SHUTDOWN PUSH BUTTON**  
**Figure 3**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EX1-0003	<b>Title</b> Re-Torque Exhaust Manifold	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 2.5 Hours	<b>Total Man Hours</b> 2.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Torque Wrench
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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### FUNCTIONS:

Provides for the removal of exhaust gases from the engine

### FAILURE MODES TO IDENTIFY:

Loose manifold or exhaust piping, loose hardware, and cracked expansion joint

### PROCEDURE:

1. Ensure main engine is shut down and cooled down.

### WARNING

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

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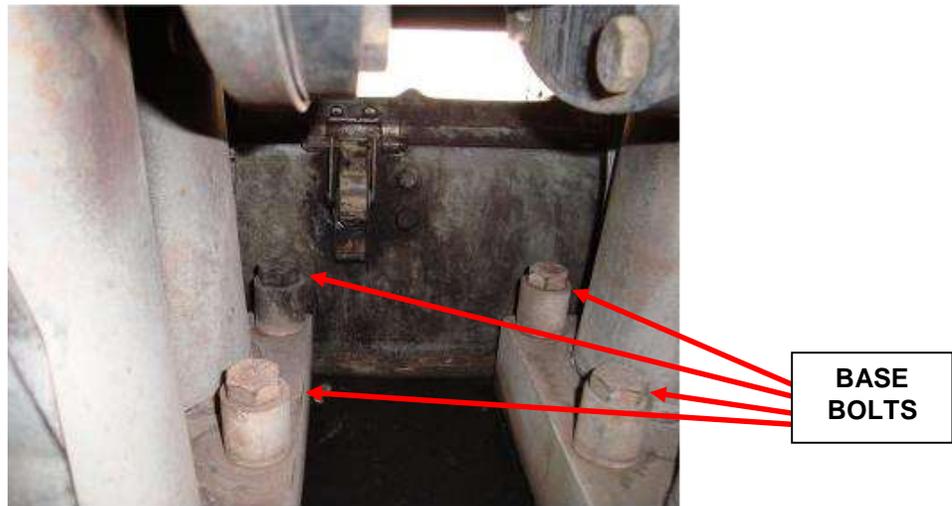
### WARNING

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

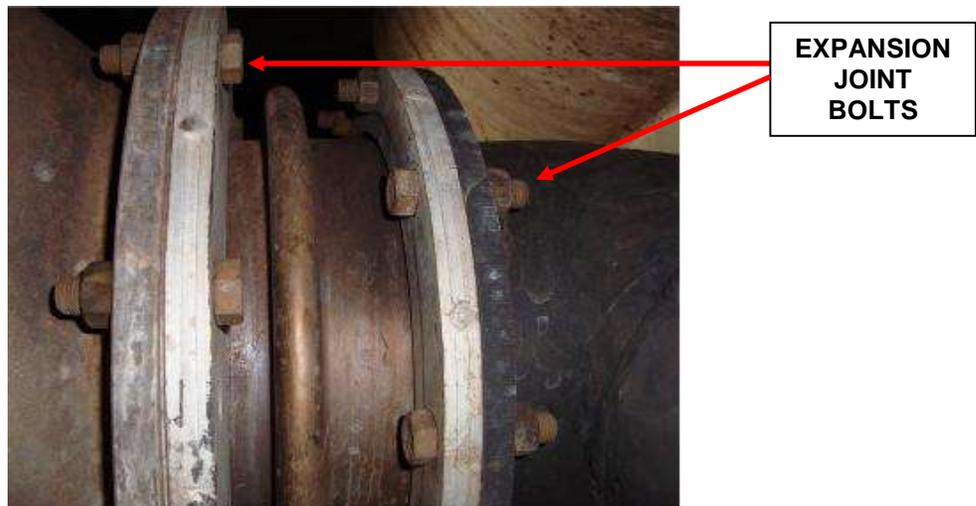
2. Apply "Do Not Start" tags to:
  - (1) Start control station, if F59PH.
  - (2) ISOLATION switch located in the engine room, if F59PHI.
3. Torque bolts and spacer assemblies, using torque wrench. (Refer to Figure 1 and Figure 2).

4. Re-torque to 176 N-m (130 ft-lbs) after a 10 minute waiting period.
5. Remove "Do Not Start" tags.
6. Start engine.
  - a. Bring it to normal operating temperatures.
  - b. Run engine for the first time after installing gaskets.
  - c. Re-torque the bolt spacer assemblies a final time to 176 N-m (130 ft-lbs).
7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
8. Make appropriate repairs for any other discrepancies found.



**EXHAUST MANIFOLD BASE BOLTS**

**Figure 1**



**EXHAUST MANIFOLD EXPANSION JOINT BOLTS**

**Figure 2**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL8-0002	<b>Title</b> Download Engine Computer
<b>Revision</b> 0	<b>Date</b> 11/19/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

### FUNCTIONS:

Provides for determination if a specific fault condition has caused an engine protection shutdown

### FAILURE MODES TO IDENTIFY:

Display fault(s)

### PROCEDURE:

1. Navigate the computer display screen:
  - a. Push the locomotive “Data” key to access the main menu on the computer.
  - b. Push “UP” or “Down” key to highlight fault archive and push the “Select” key.
  - c. Use “UP” or “Down” keys to ensure that “Display Archive Faults” is highlighted and then press “Select” key.
  - d. Use “UP” or “Down” keys to ensure that “Display Fault Records Only” is highlighted and then push “Select” key.
  - e. Use “UP” or “Down” keys to ensure that “Entire Archive” is highlighted and then push “Select” key.
  - f. The most current “Fault” will now be displayed.
  - g. To find a “Fault” from the most current to the oldest “Fault”, push the “Older” key.
    - (1) Note that every time “Older” is pushed, it will display the previous “Fault” that was logged.

2. Note active "Faults" observed:
  - a. Record the date, time, and type of active "Fault" on MAP 9.
  - b. Report an active "Fault" to a supervisor.
3. Note inactive "Faults" observed:
  - a. Review an inactive and acknowledged "Fault" recorded in the last calendar day.
  - b. Identify any significant "Fault" that has occurred and report it to the supervisor.
  - c. Exit the "Fault Log" by pushing the "Exit Session" key.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL4-0002	<b>Title</b> Download Event Recorder, Analyze Results and Make Necessary Corrections
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QMP; 1QP	<b>Estimated Task Duration</b> 0.63 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides a means to capture locomotive operating events

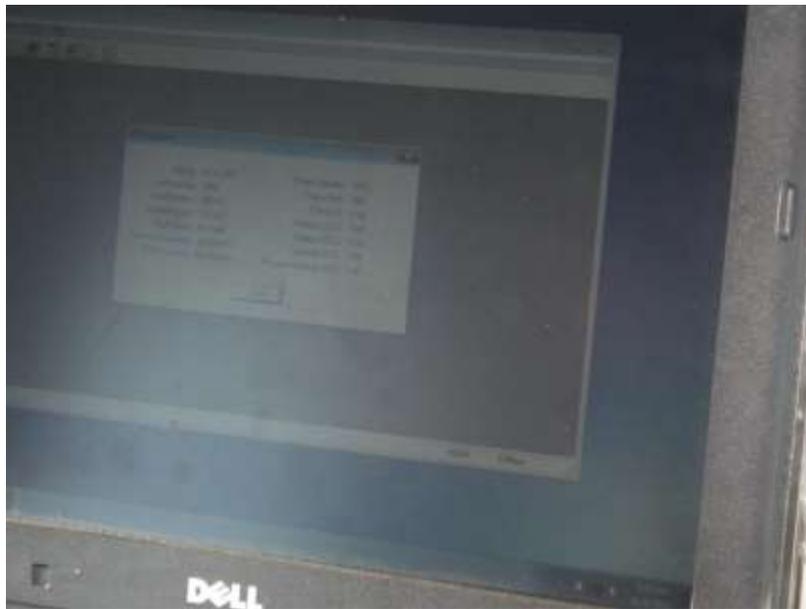
**FAILURE MODES TO IDENTIFY:**

Missing data, corrupt software or CPU memory failure

**PROCEDURE:**

1. Ensure main engine is running within normal operating parameters.
2. Connect laptop to download port (in cab or directly to recorder), (Refer to Figure 1, Figure 2, and Figure 3).
3. Open download software, using real time display to verify and record all signals.
4. Download and save event recorder data to laptop.
5. Open data file after completing the download.
6. Analyze data to verify inputs are being recorded, including:
  - a. Speed.
  - b. Direction.
  - c. Time.
  - d. Distance.
  - e. Throttle position.
  - f. Applications and operations of the train automatic air brake.

- g. Applications and operations of the independent brake.
  - h. Applications and operations of the dynamic brake, if applicable.
  - i. Cab signal, if applicable.
  - j. Loading.
  - k. Horn/bell.
  - l. Lights (head lights, marker lights, and crossing lights).
  - m. Any other inputs as listed on Model ERS Event Recorder Periodic Test Data Verification Results 49 CFR 229.25 (e)(4) form.
- 7. Troubleshoot and repair, if any of the data inputs listed in Step 6 are missing.
  - 8. Print out one page from most recent in-service trip.
    - a. Attach with Model ERS Event Recorder form to NCDOT inspection form.
  - 9. Save files on electronic media per local instructions.
  - 10. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  - 11. Make appropriate repairs for any other discrepancies found.



**COMPUTER SCREEN**

**Figure 1**



**COMPUTER DOWNLOAD**  
Figure 2



**DOWNLOADING TO COMPUTER**  
Figure 3



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL3-0011	<b>Title</b> Inspect and Test High Voltage AC/DC System for Grounds	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 3
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Megohmmeter (Megger)
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for distribution of high voltage (AC/DC) power as dictated by the control circuits that respond to the operating controls in the cab, as well as to operating conditions

**FAILURE MODES TO IDENTIFY:**

Grounded high voltage system; faulty contactor; faulty switch; loose, missing or damaged wiring hardware

**PROCEDURE:**

1. Ensure main engine is shut down.
2. Ensure HEP is "OFF".
3. Ensure BATTERY KNIFE switch is "OPEN".
4. Ensure the following CIRCUIT breakers are "OPEN":
  - a. ER/TMS.
  - b. Module (PH).
  - c. Computer control (PHI).
5. Complete the P1-P4 and B contactor tip inspection:
  - a. Open floor panel(s) (two each) in the control panel area:
    - (1) Remove floor panel(s).
  - b. Remove each lower access panel to the GEAR switch.

- c. Remove P1-P4 arc chutes and B arc chute:
  - (1) Unlatch the arc chute by compressing “RELEASE LATCH” button.
  - (2) Lift the arc chute up simultaneously while pulling straight out with tab compressed up.
- d. Inspect P1-P4 and B contactor tips for the following discrepancies:
  - (1) Burn marks.
  - (2) Excessive arcing evidence by metal buildup or melted tips.
  - (3) Pitting.
  - (4) Proper alignment.
- e. Inspect each cable lug visually for the following discrepancies:
  - (1) Loose or missing hardware.
  - (2) Signs of overheating:
    - (a) Burned insulation.
    - (b) Discoloration of terminals.
    - (c) Melted terminals, wiring, or cables.

**NOTE**

Arc chutes should be properly installed or locomotive will not load.

- f. Ensure arc chutes are properly installed.
  - g. Install P1-P4 and B arc chutes by completing the following:
    - (1) Place arc chute into its respective track.
    - (2) Push forward and then down to ensure holding clips engage arc chute.
6. Complete the following for LOAD TEST TRANSFER (LTT) switch inspection:

**CAUTION**

TAKE CARE NOT TO DROP ACCESS COVER SCREW INTO CONTACTOR.

- a. Remove screw holding access cover in place.
    - (1) Retain the screw.
  - b. Remove access cover.
  - c. Inspect LTT switch contacts for the following discrepancies:
    - (1) Burn marks.
    - (2) Excessive arcing evidence by metal buildup or melted tips.
    - (3) Pitting.
  - d. Reinstall access cover.
  - e. Secure access cover with retained screw.
7. Complete the following for GEAR switch inspection:
- a. Remove each plastic inspection covers.

- b. Rotate TRANSFER switch to center using an appropriate wrench.
  - c. Inspect the MOTOR BRAKE TRANSFER switches (MB/L1, MB/L2, MB/R1) and directional transfer switching devices (RV1/L2, RV2/R1, RV3/R2, RV4/L1) visually for the following discrepancies:
    - (1) Burn marks.
    - (2) Excessive arcing evidence by metal buildup or melted tips.
    - (3) Pitting.
  - d. Clean the inspection cover, using a dry rag.
  - e. Reinstall each plastic inspection cover by sliding into place.
8. Test high voltage system for grounds:
- a. Set megohmmeter to 500 volts.
  - b. Connect megohmmeter:
    - (1) Positive (+) lead to carbody ground.
    - (2) Negative (-) lead to MB/L1 terminal #5.
  - c. Operate megohmmeter.
    - (1) Ensure reading is greater than (>) 3 Megohms.
    - (2) Troubleshoot and correct/repair ground, if reading is less than (<) 3 Megohms.
  - d. Repeat Steps 8.b. through 8.c.(2) for each "TRANSFER" switches listed in Step 7.c.
  - e. Disconnect megohmmeter.
9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
10. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL3-0009	<b>Title</b> Test Low Voltage DC System for Grounds	
<b>Revision</b> 0	<b>Date</b> 10/27/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Test Light with a 6 watt, 72 volt Bulb
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides control power

**FAILURE MODES TO IDENTIFY:**

Burned or discolored terminals; loose or missing mounting hardware; frayed or chafed wire insulation

**PROCEDURE:**

1. Ensure main engine is shut down.
2. Ensure locomotive’s BATTERY KNIFE switch is engaged.
3. Ensure all CIRCUIT breakers are “CLOSED”.

**NOTE**

Prior to continuing with procedure the test light must be operational.

4. Ensure test light is operational.
5. Connect test light between BATTERY KNIFE switches positive (+) terminal and carbody, (Refer to Figure 1).
  - a. Verify light does not illuminate.
  - b. Troubleshoot for low voltage grounds, if light illuminates.
6. Connect test light between BATTERY KNIFE switches negative (-) terminal and carbody.

- a. Verify light does not illuminate.
- b. Troubleshoot for low voltage grounds, if light illuminates.
7. Repeat Steps 5 and 6 at HEP start station cabinet.
8. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
9. Make appropriate repairs for any other discrepancies found.



**LOW VOLTAGE TEST**  
**Figure 1**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL3-0003	<b>Title</b> Inspect Circuit Breaker Panels for Proper Covers and Labels	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 1
<b>Equipment</b> Locomotive	<b>Type</b> ALL	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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### FUNCTIONS:

Prevents inadvertent contact with live electrical circuits and proper selection of circuit breakers when necessary

### FAILURE MODES TO IDENTIFY:

Damaged, missing covers or labels

### PROCEDURE:

1. Ensure that the following apply to all switches:
  - a. Switches are hand operated, carrying currents with potential of more than 150 volts that may be operated while under load are covered and are operative from the outside of the cover.
  - b. A means is provided to display whether the switches are open or closed; and covered.
  - c. Switches not designed to be operated safely while under load are legibly marked with the voltage carried and the words "Must not be operated under load."
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL2-0003	<b>Title</b> Measure and Record Specific Gravity	
<b>Revision</b> 0	<b>Date</b> 10/27/2015	<b># of Pages</b> 6
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 2.0 Hours	<b>Total Man Hours</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> No Ox Grease or Vaseline	<b>Special Tools</b> Battery Filler Cart; Nylon Brush; Hydrometer
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**WARNING**

**DANGEROUS VOLTAGES ARE PRESENT IN THIS EQUIPMENT.**

---

**WARNING**

**BATTERY HANDLING REQUIRES SPECIAL SAFETY PRECAUTIONS. ENSURE THAT THE FOLLOWING SPECIAL SAFETY PRECAUTIONS ARE READ AND UNDERSTOOD BEFORE WORKING WITH NI-CAD BATTERIES.**

---

**WARNING**

**WORK CAUTIOUSLY. USE ONLY TOOLS WITH INSULATED HANDLES. REMOVE RINGS, WRIST WATCHES, AND ITEMS OF CLOTHING WITH METAL PARTS WHEN WORKING ON BATTERY.**

---

**WARNING**

**LEAKS SHOULD BE STOPPED. SPILLS, AFTER CONTAINMENT, SHOULD BE SHOVELED UP AND REMOVED TO CHEMICAL WASTE AREAS OR REMOVED BY VACUUM TRUCK, IF LIQUID NEUTRALIZE RESIDUE WITH DILUTE ACID. FLUSH SPILL AREA WITH WATER FOLLOWED BY LIBERAL COVERING OF SODIUM BICARBONATE. DISPOSE OF WASH WATER ACCORDING TO FEDERAL, STATE, AND LOCAL REGULATIONS.**

---

## **WARNING**

**MULTICELL SYSTEMS ATTAIN HIGH VOLTAGES. EXTREME CAUTION MUST THEREFORE BE EXERCISED DURING REPLACEMENT AND MAINTENANCE OF A BATTERY SYSTEM TO PREVENT SERIOUS ELECTRICAL BURNS OR SHOCK. INTERRUPT DIRECT CURRENT (DC) CIRCUITS BEFORE WORKING ON BATTERIES OR CHARGING EQUIPMENT. FAILURE TO DO SO MAY RESULT IN INJURY OR DEATH.**

---

### **FUNCTIONS:**

Provides locomotive battery power for the starting system

### **FAILURE MODES TO IDENTIFY:**

Battery fluid low; missing cap(s); cracked case(s); loose wires/terminal connection(s)

### **PROCEDURE:**

#### **NOTE**

Ensure this procedure is completed within 12 hours of main engine shut down.

---

1. Open the front skirt doors on both locomotive sides to gain access to battery boxes (PHI only).
2. Unlatch and open each battery box door, (Refer to Figure 1).
3. Clean each battery and battery box with soap, water and nylon brush.
4. Verify battery connections are clean and securely fastened.

#### **CAUTION**

**DO NOT ADD WATER TO THE CELLS UNTIL THE SPECIFIC GRAVITY CHECKS HAVE BEEN PERFORMED. IF THERE IS NOT ENOUGH ELECTROLYTES IN THE CELLS TO ALLOW THE HYDROMETER TO OPERATE, THE BATTERY SHOULD BE REPLACED.**

---

5. Open BATTERY KNIFE switch located in fuse and switch compartment, (Refer to Figure 2).
6. Follow railroad "Lock Out-Tag Out" procedures to lock the MAIN ENGINE and HEP BATTERY switches in the "OPEN" position.
  - a. Apply "Do Not Start" tags:
    - (1) Start station for PH.
    - (2) ISOLATION switch for PH/PHI.

#### **WARNING**

**USE EXTREME CAUTION WHEN USING A MULTIMETER TO MEASURE VOLTAGES. DO NOT TOUCH POWER TERMINALS. FAILURE TO COMPLY COULD RESULT IN PERSONNEL INJURY OR DEATH.**

---

7. Measure the open circuit battery voltage using a multimeter.

- a. Charge the battery prior to measuring cells' specific gravity if the open circuit battery voltage is below 56 volts (V0) direct current (DC).

**NOTE**

The battery may consist of multiple cell mono-blocs; all cells in series constitute the battery, regardless of the packaging configuration.

8. Remove battery cell caps, (Refer to Figure 3).
9. Use a hydrometer or Refractometer to measure and record the specific gravity of each cell for each battery, (Refer to Figure 4).
10. Replace battery if the specific gravity of one cell or more is less than 1,200 and the difference between the highest and lowest specific gravity readings is greater than (>) 0.050.
11. Use automatic battery filler cart with distilled water to fill batteries as necessary.
12. Reinstall all battery cell caps.
13. Grease the battery connections with No Ox grease or Vaseline.
14. Remove "Lock Out – Tag Out.
15. Close the MAIN ENGINE and HEP BATTERY switches.
16. Close the BATTERY KNIFE switch located in the fuse and switch compartment.
17. Close and latch battery box door(s).
18. Close front skirt doors (PHI only).
19. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
20. Make appropriate repairs for any other discrepancies found.



**BATTERY BOX DOOR**  
Figure 1



**F59 HEP BATTERY KNIFE SWITCH**  
Figure 2



**BATTERY CAPS (IN RED)**  
Figure 3



**BATTERY SPECIFIC GRAVITY TOOL**  
Figure 4



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EG1-0008	<b>Title</b> Check Main Engine Timing (Injector and Valve)	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 4
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 3,600 Operating Hours
<b># Personnel</b> 2 QP	<b>Estimated Task Duration</b> 2.0 Hours	<b>Total Man Hours</b> 4.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Clearance Gauges Go/No-Go Gauges Governor Jack MUI Injector/Rack Gauge#8339610 Injector Timing Gauge#8034638
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for proper engine operation

**FAILURE MODES TO IDENTIFY:**

Broken internal parts, improper rack settings or malfunctioning injectors

**PROCEDURE:**

1. Ensure main engine at normal operating temperature.
  - a. Shut down main engine.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

---

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

- b. Apply "Do Not Start" tags to:
  - (1) Start control station, if F59PH.
  - (2) ISOLATION switch located in the engine room, if F59PHI.
2. Open engine top deck covers.
3. Open test cocks.
4. Complete the following to set injector rack for F59PH only:
  - a. Install the injector linkage setting jack.
  - b. Adjust the setting jack until the pointer on the governor aligns with governor terminal shaft scale at the 1.00-inch mark.

#### NOTE

The rack setting gauge is an 8 to 1 multiplying gauge which indicates the 0.40 mm (1/64 inch) tolerance by marks 3.18 mm (1/8 inch) each side of the center mark on the gauge scale.

---

- c. Use the injector rack gauge to set the racks within the setting range marks on the gauge.
- d. Place the gauge over the injector rack.
  - (1) Hold the gauge firmly against the face of the calibrating slide on the injector.
- e. Check the gauge pointer:
  - (1) Complete the following if pointer is at the short ("S") end of the gauge scale, outside of the setting range, and/or the rack is not extending out far enough from the injector:
    - (a) Loosen the locknut on the adjusting link and turn adjusting nut on link until pointer is at the long ("L") end of the scale.
    - (b) Reverse the pointer travel until it is with the scale setting range.

#### NOTE

To ensure the backlash is taken up in the same direction when making adjustment in setting all the racks you should exceed the setting range when making adjustment.

---

- (c) Hold the adjusting nut.
  - 1) Tighten the locknut.
- (2) Complete the following if the pointer is at the long ("L") end of the gauge scale.
  - (a) Set the pointer within the setting range.
    - 1) Check for accuracy of the injector rack gauge by inserting the master block in the gauge body.
      - a) Ensure that the pointer is aligned with the center mark on the scale.
- f. Remove governor jack.
5. Complete the following to set injector timing for F59PH/PHI:

- a. Bar the engine over in the normal direction of rotation until the flywheel pointer indicates the correct crankshaft position in degrees relative to top dead center of the cylinder being timed.
- b. Use the following steps for F59PH:
  - (1) Insert injector timing gauge into the hole provided for it in the injector body.

**NOTE**

Injectors cannot be timed if the over speed has been tripped. It must first be reset and the engine crankshaft barred over at least one revolution.

---

- (2) Loosen locknut.
  - (a) Turn the rocker arm adjusting screw until the shoulder of the gauge just passes over the injector follower guide.
- (3) Tighten adjusting screw locknut while holding adjusting screw in position with a screwdriver.
- (4) Recheck setting with gauge.
- c. Use the following steps for F59PHI:
  - (1) Loosen locknut.
    - (a) Slowly run each injector follower by adjusting screw down clockwise until it bottoms.
  - (2) Back off adjustment by turning screw counter clockwise 1 ½ turns.
  - (3) Tighten adjusting screw locknut securely while holding adjusting screw in position with a screwdriver.
6. Set valves, using Go/No-Go gauge for F59PH/PHI:
  - a. Open cylinder test valves.
  - b. Rotate crankshaft so that piston is at or near top dead center of the cylinder being set.
  - c. Loosen rocker arm adjusting screw locknuts.
  - d. Turn rocker arm adjusting screw down until the last valve just touches the hydraulic lash adjuster plunger or until a 0.001-inch shim is just snug between valve stem top and adjuster plunger.
  - e. Remove shim, if used.
    - (1) Turn adjusting screw down 1 ½ turns.
  - f. Check valve bridge spherical seat to be sure that it is spring-loaded against the cylinder head spherical seat.
    - (1) Complete the following if the bridge spring spherical seat is not spring-loaded against the cylinder head spherical seat.
      - (a) Turn down the rocker arm adjusting screw until no movement is felt.
      - (b) Turn it another ¼ turn.
      - (c) Check to be certain valves are not held open.
  - g. Tighten rocker arm adjusting screw locknut to a torque of 108 ± 7 N-m (80 ± 5 ft-lbs).

7. Remove "Do Not Start" tags.
8. Start engine.
  - a. Ensure lube oil reaches normal operating temperature.
9. Check the clearance between lash adjuster bodies and the end of the valve stems with the piston near top center.
  - a. Remove the cylinder head for reconditioning, if the clearance is less than (<) the minimum.

#### NOTE

The minimum clearance gauge is 1/16-inch-thick and should fit between lash adjuster body and valve stem top to ensure minimum clearance.

---

10. Use minimum clearance gauge to check clearances between lash adjuster and exhaust valve.
  - a. Verify that there is no clearance between valve tip and adjuster plunger.
11. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
12. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EG1-0007	<b>Title</b> Inspect Base Bolts, Re-Torque as necessary	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 3
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 3,600 Operating Hours
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 9.0 Hours	<b>Total Man Hours</b> 9.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Paint Pen (1)	<b>Special Tools</b> Torque Wrench Impact Wrench Torque Multiplier
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for securing machinery to deck engine deck

**FAILURE MODES TO IDENTIFY:**

Loose, broken, or missing bolts

**PROCEDURE:**

1. Ensure equipment associated with this maintenance task, including main engine, are shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

---

**WARNING**

**ENGINE/EQUIPMENT MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Apply "Do Not Start" tags to:
  - a. Start control station, if F59PH.
  - b. ISOLATION switch located in the engine room, if F59PH/PHI.

3. Inspect the following equipment mounting bolts, using a hammer to sound each:
  - a. Main engine.
  - b. Main generator.
  - c. Air compressor.
  - d. Equipment rack.
  - e. HEP engine.
  - f. HEP generator.
  - g. All other deck mounted equipment.
4. Mark any equipment mounting bolts that are loose, missing, or broken. (Refer to Figures 1 and 2.)
  - a. Re-torque any bolts marked as required, using a torque wrench.
5. Remove "Do Not Start" tags.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



**AIR COMPRESSOR BASE BOLTS**

**Figure 1**



ACCESS  
PANEL

**GENERATOR BASE BOLT ACCESS PANEL**

**Figure 2**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EG1-0006	<b>Title</b> Clean Engine Room
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for safety of personnel while working in engine room

**FAILURE MODES TO IDENTIFY:**

Oil, grease, and particulate on engine room surfaces

**PROCEDURE:**

1. Open engine room sump drains.

**CAUTION**

**TAKE CARE NOT TO APPLY DETERGENT OR WATER TO ELECTRICAL EQUIPMENT.**

---

**NOTE**

If main engine is not cooled down, ensure that detergent is removed immediately after application.

---

2. Use foamer to apply detergent to engine room surfaces.
3. Rinse engine room surfaces with water.
4. Wipe/dry engine room surfaces.
5. Close engine room sump drains.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.

7. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EG1-0005	<b>Title</b> Clean Main Generator Pit and Drain Aspirator
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for the routing of all electrical conduit cables and wires. The aspirator provides for the removal of effluent from generator pit

**FAILURE MODES TO IDENTIFY:**

Clogged aspirator; drain holes, damaged or plugged screen

**PROCEDURE:**

1. Ensure that locomotive is located over an approved containment system.
2. Ensure main engine is shut down.
3. Open all electrical breakers and switches.
4. Remove the floor from the generator pit.
5. Clean generator pit using a shop vacuum.
6. Ensure aspirator drain hole is clear.
7. Reinstall floor to generator pit.
8. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
9. Make appropriate repairs for any other discrepancies found.



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EG1-0003	<b>Title</b> Drain Main Engine Package Sump & CAT HEP Package Sump	
<b>Revision</b> 0	<b>Date</b> 9/20/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.3 Hours	<b>Total Man Hours</b> 0.3 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

### FUNCTIONS:

Collects fluids

### FAILURE MODES TO IDENTIFY:

Clogs or leaks

### PROCEDURE:

1. Ensure locomotive is parked over an approved containment system.
2. Ensure engine is in "OFF" position.
3. Apply "Do Not Start" tags to:
  - a. EMD.
  - b. HEP engine control cabinets.
4. Open DRAIN valve for main engine.
  - a. Drain water from sump.
  - b. Close DRAIN valve.
  - c. Attach drain hose to drain on right side of locomotive.
  - d. Open DRAIN valve.
  - e. Start drain pump.
  - f. Stop drain pump when sump is empty.

- g. Close drain valve when discharge is complete.
5. Open DRAIN valve for HEP engine.
  - a. Drain water from sump.
  - b. Close DRAIN valve.
  - c. Attach drain hose to drain on right side of locomotive.
  - d. Open DRAIN valve.
  - e. Start drain pump.
  - f. Stop drain pump when sump is empty.
  - g. Close drain valve when discharge is complete.
6. Drain water.
7. Hook up hose to pump then to the dirty oil tanks.
8. Pump down dump until empty.
9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
10. Make appropriate repairs for any other discrepancies found.



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EB2-0003	<b>Title</b> Change Air Intake Filters	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> As required (based on Manometer Readings)
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Filter, Air, Intake Element GP, (4 EA P/N RAAEB20871)	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

### FUNCTIONS:

Provides for filtration of atmospheric air for engine combustion

### FAILURE MODES TO IDENTIFY:

Clogged, dirty or damaged filter; damaged filter housing; loose or missing hardware

### PROCEDURE:

1. Ensure main engine is shut down and cooled down.

### WARNING

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

---

### WARNING

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

- a. Apply "Do Not Start" tags to:
  - (1) Start station, if F59PH.
  - (2) ISOLATION switch, if F59PHI.
2. Open main generator room.

3. Remove wire filter support frame bolts and frame.
4. Remove filter.
5. Install new filter element.
6. Reinstall wire filter support frame and bolt.
7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
8. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EB2-0002	<b>Title</b> Inspect Main Engine for Leaks	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for proper engine cooling during normal operations

**FAILURE MODES TO IDENTIFY:**

Cracked piping/hoses; cracked storage tank; cracked cylinder liner/piston; cracked radiator; damaged or torn O-ring(s) or gasket(s); worn pump seal(s); missing or loose hardware or fittings

**PROCEDURE:**

1. Ensure main engine is running within normal operating parameters.
2. Inspect main engine for oil, fuel, coolant or air leaks.
3. Shut main engine down.
  - a. Ensure main engine is cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

- b. Apply "Do Not Start" tags to:

(1) Start station, if F59PH.

(2) ISOLATION switch, if F59PHI.

4. Inspect main engine visually for the following:
  - a. Cracked piping/hoses.
  - b. Cracked storage tank.
  - c. Cracked cylinder liner/piston.
  - d. cracked radiator.
  - e. Damaged or torn O-ring(s) or gasket(s).
  - f. Worn pump seal(s).
  - g. Missing or loose hardware or fittings.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EB2-0001	<b>Title</b> Load Test Main Engine	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 4
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 2.5 Hours	<b>Total Man Hours</b> 2.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

### FUNCTIONS:

Provides for main AC/DC power generation

### FAILURE MODES TO IDENTIFY:

Damaged electrical cables, loose wires or hardware, faulty electrical control device

### PROCEDURE:

1. Complete the following set up for both PH and PHI:
  - a. Ensure diesel engine is running and at normal operating temperature of 160°F.
  - b. Verify the oil level is full in main engine and air compressor.
  - c. Verify that the coolant level is at the full mark on the water tank sight glass.

### NOTE

The inertial air filter compartment door should remain closed during performance of tests.

- d. Ensure that the inertial air filter compartment door remains closed during the testing.
- e. Set the independent air brake and hand brake.

### WARNING

**PRIOR TO COMMENCING STEP 1.F, ENSURE HAND BRAKE AND LOCOMOTIVE INDEPENDENT AIR BRAKES ARE ENGAGED.**

- f. Verify the following conditions are met:
  - (1) No fuel, oil, or water leaks.
  - (2) Throttle handle set to idle.
  - (3) Reverser handle inserted and set in the "CENTER" position, (Refer to Figure 1).
  - (4) ISOLATION switch set to "RUN".
  - (5) Close GENERATOR FIELD switch.
  - (6) Active D.B. grid lockout faults: "NONE".
  - (7) Circuit breakers in black panel areas are all closed (electrical control cabinet).
2. Complete the following self load test for F59PHI:
  - a. Navigate to "Main Menu" on EM2000 display screen.
  - b. Follow the below steps when "Main Menu" screen appears.
    - (1) Select "Self-Test".
    - (2) Move cursor to "Self-Test" with arrow keys.
    - (3) Press "Select Function Key (F3)".
    - (4) Select "Self Load" from the "Self-test Menu" screen, then select "Next".
  - c. Select "Next" again when the "Entry Conditions" screen appears.
    - (1) Press the "Continue Function Key (F1)".
    - (2) If all entry conditions are met, the "Self Load Test Default" screen appears.
      - (a) Record parameters at idle and at "Notch 8" on table. (Refer to Table 1.)
      - (b) Incrementally (minimum of 10 seconds at each setting) advance throttle controller from "Notch 1" to "Notch 8".
        - 1) At each "Notch View Parameter" screen ensure parameters are within designated criteria, if not notify supervisor.
      - (c) While in "Notch 8" ensure the following parameters are achieved and held for 15 minutes:
        - 1) Horsepower is greater than (>) 3000.
        - 2) Main generator voltage is approximately 1390 Volts (V).
        - 3) Main generator current is approximately 1500 Amps (A).
        - 4) Lube oil pressure is approximately 70 Pounds per Square Inch (PSI).
        - 5) Check for leaks and/or abnormal noises.
      - (d) Incrementally (minimum of 10 seconds at each setting) move throttle controller to idle one "Notch" at a time.
  - d. Press "End Test" on EM2000 screen to exit load test mode.
  - e. Set ISOLATION switch to isolate.
  - f. Open GENERATOR FIELD switch.
3. Complete the following self load test load for F59PH:

- a. Open computer cabinet and turn on computer.
- b. Select "Load Test" when screen comes up.
  - (1) If all entry conditions are met, the "Self Load Test Default" screen appears.
    - (a) Record parameters at idle and at "Notch 8" on table, (Refer to Table 1).
    - (b) Incrementally (minimum of 10 seconds at each setting) advance throttle controller from "Notch 1" to "Notch 8".
      - 1) At each "Notch View Parameter" screen ensure parameters are within designated criteria, if not notify supervisor.
    - (c) While in "Notch 8" ensure the following parameters are achieved and held for 15 minutes:
      - 1) Horsepower is greater than (>) 3000.
      - 2) Main generator voltage is approximately 1390 Volts (V).
      - 3) Main generator current is approximately 1500 Amps (A).
      - 4) Lube oil pressure is approximately 70 Pounds per Square Inch (PSI).
      - 5) Check for leaks and/or abnormal noises.
    - (d) Incrementally (minimum of 10 seconds at each setting) move throttle controller to idle one "Notch" at a time.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



6.

**SPECIAL TOOLS FOR TAKING PISTON TO HEAD CLEARANCE**

**Figure 1**

Instructions: Record parameters at idle and at "Notch 8" below.		
<b>Main Generator Voltage (VDC)</b>	<b>Idle:</b>	<b>Notch 8:</b>
<b>Main Generator Amps (A)</b>	<b>Idle:</b>	<b>Notch 8:</b>
<b>Lube Oil Pressure (psi)</b>	<b>Idle:</b>	<b>Notch 8:</b>
<b>Engine Temperature (F)</b>	<b>Idle:</b>	<b>Notch 8:</b>
<b>Cooling Fan Pickup (F)</b>	<b>#1 (TA):</b>	<b>#2 (TB):</b>
<b>Horsepower (HP)</b>	<b>Idle:</b>	<b>Notch 8:</b>

**PARAMETERS AT IDLE AND AT "NOTCH 8"**

**Table 1**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EB1-0006	<b>Title</b> Inspect Crab Bolts and Re-Torque as Necessary	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 1080 Days
<b># Personnel</b> 2 QP	<b>Estimated Task Duration</b> 2.0 Hours	<b>Total Man Hours</b> 4.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Hi-Torque Wrench
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

### FUNCTIONS:

Secure power assembly to engine block

### FAILURE MODES TO IDENTIFY:

Broken, missing, or loose bolts

### PROCEDURE:

1. Ensure main engine is shut down and cooled down.

### WARNING

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

---

### WARNING

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Apply "Do Not Start" tags to:
  - a. Start control engine, if F59PH.
  - b. "ISOLATION" switch located in the engine room, if F59PH/PHI.
3. Open top deck covers.
4. Remove the three 3/16 allen head bolts.

5. Remove frame support bar.
6. Inspect crab bolt heads for the following:
  - a. Rounding off.
  - b. Cracks.
  - c. Correct grade.
    - (1) Proceed to Step 11, if unacceptable conditions are found.
    - (2) Proceed to Step 7, if no unacceptable conditions are found.
7. Re-torque crab bolts to 2400 ft-lbs.
8. Reinstall frame support bar.
9. Close top deck covers.
10. Remove "Do Not Start" tags.
11. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
12. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EB1-0005	<b>Title</b> Inspect and Re-Torque Head Frame to Crankcase Bolts as Necessary
<b>Revision</b> 0	<b>Date</b> 9/20/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Secure power assembly to engine block

**FAILURE MODES TO IDENTIFY:**

Broken, missing or loose bolts

**PROCEDURE:**

1. Ensure main engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Apply "Do Not Start" tags to:
  - a. Start control station, if F59PH.
  - b. ISOLATION switch located in the engine room, if F59PH/PHI.
3. Open top deck covers.
4. Inspect head frame to crankcase bolt heads for the following:

- a. Rounding off.
- b. Cracks.
- c. Correct grade.
  - (1) Proceed to Step 8, if any unacceptable conditions found.
  - (2) Proceed to Step 5, if no unacceptable conditions are found.
- 5. Re-torque head frame to crankcase bolts to 30 ft-lbs, using a universal extension or universal socket 3/8 inch bolt and torque wrench.
- 6. Close top deck covers.
- 7. Remove "Do Not Start" tags.
- 8. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
- 9. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EB1-0004	<b>Title</b> Inspect Air Boxes
<b>Revision</b> 0	<b>Date</b> 11/2/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 5.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Clean Rags (As needed); Gasket Material (As needed); Lubricant, WD40 or equivalent (As needed) NIOSH approved respirator
<b>Completed By (Print Name)</b>	<b>Signature</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides air to cylinders for combustion

**FAILURE MODES TO IDENTIFY:**

Loose, missing hardware; worn, torn, or damaged gaskets; water leaks

**PROCEDURE:**

1. Ensure engine is shut down and cooled down.
2. Apply "Do Not Start" tags:
  - a. Start station, (F59PH).
  - b. ISOLATION switch, (F59PH/PHI).

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 3.**

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

3. Remove all 12 air box hand-hold inspection covers, (Refer to Figure 1).
4. Inspect and clean interior of both air boxes.
  - a. Wipe down with clean rags and lubricant.
  - b. Remove excess liquid.
5. Inspect hand-hold cover gaskets.
  - a. Replace with new gaskets as needed.
6. Reinstall all 12 air box hand-hold inspection covers.
7. Remove "Do Not Start" tags.
8. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
9. Make appropriate repairs for any other discrepancies found.



**AIR BOX**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EB1-0002	<b>Title</b> Inspect Main Engine for Leaks
<b>Revision</b> 0	<b>Date</b> 10/27/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QMP, 2 QP	<b>Estimated Task Duration</b> 8.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Lead wire (P/N 8243661) Wire holder (P/N 8243220)
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provide proper operation of the power pack

**FAILURE MODES TO IDENTIFY:**

Worn connecting rod bushings, wrist pins bushings, connecting rods; cracked or worn piston rings, damaged cylinder liners

**PROCEDURE:**

1. Ensure engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

---

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Open test cocks.
3. Remove air box covers, (Refer to Figure 1 and Figure 2).

## NOTE

When positioned on the top of the piston, each end of the wire should be at least 3.18 mm (1/8 inch) from the outside diameter.

4. Place a length of 1/8-inch diameter lead wire in each end of the wire holder by using a piston of the same size as the one being checked, (Refer to Figure 3).
5. Bar the engine over until the piston being checked is at the bottom dead center by using a jacking bar.
6. Apply the lead wire through a liner port and position it on top of the piston so that it is parallel with the crankshaft.
7. Bar the engine over one complete revolution to compress the lead wire by using a jacking bar.
8. Remove the wire from the engine.

## NOTE

It is important that the "thinner" of the two compressed areas be measured to provide the minimum piston to head clearance.

## NOTE

Within the maximum clearance and minimum clearance, the difference in micrometer readings between the two compressed ends should not exceed 0.13 mm (0.005 inch) for new, remanufactured or otherwise requalified clean parts; if the difference exceeds that value, repeat the procedure as the wire may have changed position.

- a. Measure the inboard portion of both compressed ends of the wire. (Refer to Figure 4 and Figure 5).
9. Reinstall air box covers.
10. Close test cocks.

## NOTE

Due to carbon buildup on both the fire face of the cylinder head and the crown of the piston during service life, lead wire readings should not be used as a basis for power assembly change-out. Lead wire readings may continue to be used to indicate wear trends. Any significant clearance increases should be investigated as possible component failures.

11. Measure piston to cylinder head clearances.
  - a. Record lead wire measurements. (Refer to Table 1).
12. Measure top piston snap ring to land clearances on top compression rings.
  - a. Renew power assembly if reading is higher than 0.025 inch.
  - b. Record measurements. (Refer to Table 2.)
13. Document on MAP-9, all failure modes, unacceptable conditions identified and additional parts required.
14. Make appropriate repairs for any other discrepancies found.

Minimum	0.51 mm (0.020 inch)
New Power Assembly Max	1.73 mm (0.068 inch)
Remanufactured Power Assembly Max	2.03 mm (0.080 inch)
Differential reading between ends of lead wire on installation	0.13 mm (0.005 inch)
Record readings below.	
Position/Measurement	Position/Measurement
Cylinder 1:	Cylinder 7:
Cylinder 2:	Cylinder 8:
Cylinder 3:	Cylinder 9:
Cylinder 4:	Cylinder 10:
Cylinder 5:	Cylinder 11:
Cylinder 6:	Cylinder 12:

## PISTON TO CYLINDER HEAD CLEARANCE

**Table 1**

Minimum	0.05 mm (0.002 inch)
Maximum	1.07 mm (0.042 inch)
Record readings below.	
Position/Measurement	Position/Measurement
Cylinder 1:	Cylinder 7:
Cylinder 2:	Cylinder 8:
Cylinder 3:	Cylinder 9:
Cylinder 4:	Cylinder 10:
Cylinder 5:	Cylinder 11:
Cylinder 6:	Cylinder 12:

## TOP TO PISTON SNAP RING CLEARANCE

**Table 2**

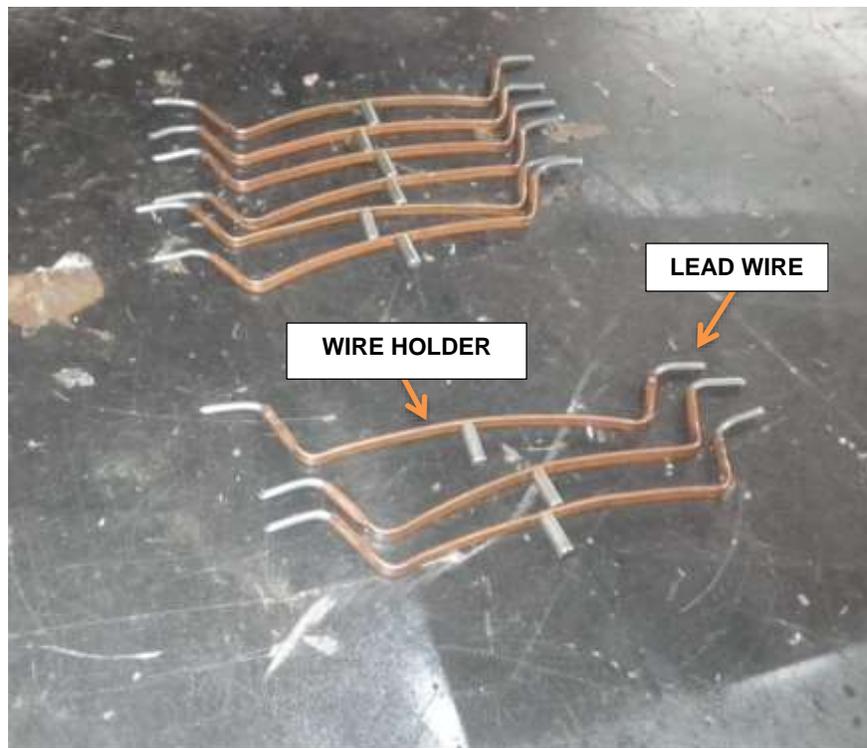


**AIR BOX COVERS**  
**Figure 1**



**AIR BOX COVERS (REMOVED)**

**Figure 2**



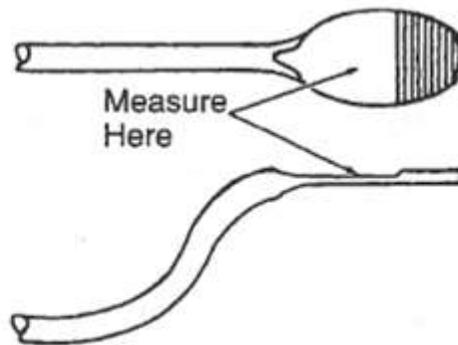
**LEAD WIRE IN WIRE HOLDER**

**Figure 3**



**LEAD WIRE TO MEASURE**

**Figure 4**



**LEAD WIRE MEASUREMENT**

**Figure 5**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EB1-0001	<b>Title</b> Inspect Prime Mover Interior
<b>Revision</b> 0	<b>Date</b> 11/2/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 2 QP	<b>Estimated Task Duration</b> 3.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> 12 Crankcase access O-rings P/N RAAEB 20906
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Ensure engine internals are free of unusual wear or damage

**FAILURE MODES TO IDENTIFY:**

Broken bolts, discolored metals, loose, or broken parts

**PROCEDURE:**

1. Apply "Do Not Start" tags to:
  - a. Engine control station for PH.
  - b. "Isolation" switch located in the engine compartment for PHI.
2. Ensure engine is shut down and cooled down.

**WARNING**

**FOR F59PHI, ENSURE AUTOSTART SYSTEM IS DISABLED PRIOR TO STEP 2.**

---

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

3. Remove engine crankcase covers, (Refer to Figure 1).

4. Inspect the following for signs of damage or excessive wear (heat, discoloration, etc.) by barring over the engine for each cylinder:
  - a. Liner.
  - b. Piston.
  - c. Connecting rods.
  - d. Baskets.
  - e. Gaskets.
  - f. Crankshaft.
  - g. Bearings.
  - h. Piston cooling pipe.
5. Replace all crankcase access O-rings.
6. Reinstall crankcase covers.
7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
8. Make appropriate repairs for any other discrepancies found.



**AIR BOX AND CRANKCASE COVERS REMOVED**

**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> DO1-0006	<b>Title</b> Inspect and Lubricate Door Hardware
<b>Revision</b> 0	<b>Date</b> 9/20/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Lubricant Graphite
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for proper operation of all doors and associated hardware

**FAILURE MODES TO IDENTIFY:**

Corroded hinges; seized locks; Bound handles; broken or damaged seals

**PROCEDURE:**

1. Inspect all doors and associated hardware visually for the following, (Refer to Figure 1):
  - a. Binding, bound or broken hinges.
  - b. Seized or corroded locks and latches.
  - c. Missing, deformed or broken fasteners.
  - d. Broken or damaged seals.
  - e. Misalignment.
  - f. Broken or missing handles.
2. Lubricate the following as necessary:
  - a. Hinges.
  - b. Locks and latches.
  - c. Pivot points.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.

4. Make appropriate repairs for any other discrepancies found.



**Door at rear of PHI Locomotive  
Figure 1**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CS2-0001	<b>Title</b> Clean and Inspect Radiators and Shutters
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Lubricant
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for dissipation of heat from engine cooling water prior to its entrance into the oil cooler

**FAILURE MODES TO IDENTIFY:**

Corroded fins; excessive dirt; clogged radiator; faulty temperature regulator

**PROCEDURE:**

**WARNING**

**ONLY TRAINED, QUALIFIED PERSONNEL ARE TO CLEAN THE RADIATOR. DO NOT USE THE RADIATOR CLEANING OPERATIONS FOR ANY OTHER PURPOSE. NORMAL PPE MUST BE USED IN ADDITION TO A FACE SHIELD AS THE MINIMUM PERSONAL PROTECTIVE WEAR REQUIRED FOR THIS TASK.**

---

**WARNING**

**ENSURE LOCOMOTIVE IS POSITIONED IN APPROPRIATE AREA WITH ALL NECESSARY FALL PROTECTION IN PLACE.**

---

1. Remove each main engine hatch, four each.
2. Remove each main engine radiator access hatch, two each, (Refer to Figure 1).
3. Clean radiator with compressed air and/or detergent foamer and water.
4. Use a flashlight to visually inspect radiator fins for the following discrepancies:

- a. Corrosion.
- b. Excessive dirt accumulation indicated by light that cannot be seen through radiator.
5. Inspect shutter and linkages for, (Refer to Figure 2):
  - a. Binding.
  - b. Alignment.
  - c. Loose or missing hardware.
  - d. Damaged shutters.
  - e. Foreign objects.
  - f. Damaged air lines.
6. Lubricate shutter pivot points and linkages with approved lubricant.
7. Reinstall all removed hatches.
8. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
9. Make appropriate repairs for any other discrepancies found.



**MAIN ENGINE RADIATOR HATCH**

**Figure 1**



**SHUTTERS AND LINKAGES**

**Figure 2**

		<b>Distribution Statement</b>	
		Distribution limited to NCDOT employees and officially authorized contractors.	
<b>Procedure #</b>	<b>Title</b>	Take Coolant and Oil Samples (Main Engine and HEP Engine)	
CS1-0002			
<b>Revision</b>	<b>Date</b>	<b># of Pages</b>	
0	10/29/2015	6	
<b>Equipment</b>	<b>Type</b>	<b>Frequency</b>	
Locomotive	F59PH/PHI	90 Days	
<b># Personnel</b>	<b>Estimated Task Duration</b>	<b>Total Man Hours</b>	
1 QP	1.0 Hours	1.0 Hours	
<b>Test Equipment</b>	<b>Supplies</b>	<b>Special Tools</b>	
None	Ziploc bags, As needed; Fluid Analysis Kit-Coolant B (2 EA P/N CBA007020); Fluid Analysis Kit-Oil Sample (3 EA P/N CBA000015)	Suction Gun	
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>	

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides for monitoring of lube oil and coolant for continued use

**FAILURE MODES TO IDENTIFY:**

Lube oil dilution; Fuel or water contamination; Lube oil sample out of specifications; Particulate contamination; Insufficient lube oil or coolant level; Expended inhibitor element

**PROCEDURE:**

1. Complete the main engine, HEP engine, and air compressor oil samples:
  - a. Ensure engine is shut down.

**NOTE**

Oil samples should be taken within 15 minutes of engine shut down.

- b. Identify the following on each sample bottle prior to taking the samples, (Refer to Figure 1):
  - (1) Locomotive number.
  - (2) Location.

- (3) Date sample taken.
  - (4) Type of inspection.
  - (5) Component to be sampled.
  - c. Conduct pre- and post-sample oil purge as follows:
    - (1) Use a suction gun through the oil level dipstick opening to draw in small sample.
    - (2) Discharge the gun several times before taking final sample.
    - (3) Clean suction gun after each sample to avoid contamination of future samples.
  - d. Fill sample bottle from suction gun, (Refer to Figure 2, Figure 3, and Figure 4).
  - e. Place individual sample bottles in separate Ziploc bags.
  - f. Take samples to oil sample collection point immediately.
2. Complete the main and HEP engine coolant sample:
- a. Identify the following on the sample bottle prior to taking the sample:
    - (1) Locomotive number.
    - (2) Location.
    - (3) Date sample taken.
    - (4) Type of inspection.
    - (5) Component to be sampled.

**WARNING**

**COOLING SAMPLE MAY BE HOT. HANDLE WITH CARE TO AVOID  
PERSONAL INJURY.**

---

3. Proceed as follows to complete the main engine coolant sample:
  - a. Drain a small coolant amount from lower sight glass Petcock at coolant level sight glass into sump, (Refer to Figure 5).
  - b. Fill sample bottle from lower sight glass Petcock.
  - c. Place sample bottle in Ziploc bag.
  - d. Take coolant sample to collection point immediately.
4. Proceed as follows to complete the HEP engine coolant sample, (Refer to Figure 6):
  - a. Gain access to the roof of the locomotive.
  - b. Open access cover to HEP engine fill cap.

**NOTE**

Pressure is released when audible air escaping stops.

- c. Depress PRESSURE RELIEF button in center of cap until pressure is released.
- d. Remove fill cap.
- e. Use suction gun to draw coolant sample.
- f. Fill sample bottle.

- g. Place sample bottle in Ziploc bag.
  - h. Install fill cap.
  - i. Close access cover.
  - j. Take coolant sample to collection point immediately.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  6. Make appropriate repairs for any other discrepancies found.



**PAPER WORK FOR COOLANT AND OIL SAMPLES**

**Figure 1**



**TAKING HEP ENGINE OIL SAMPLE**

**Figure 2**



**TAKING EMD OIL SAMPLE**

**Figure 3**



**TAKING AIR COMPRESSOR OIL SAMPLE**  
**Figure 4**



**COOLANT SAMPLE FROM EMD**  
**Figure 5**



**TAKING HEP COOLANT SAMPLE**

**Figure 6**

**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CP1-0007	<b>Title</b> Inspect Coupler to Yoke Pivot Pin and Bushings	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 4
<b>Equipment</b> Locomotive	<b>Type</b> ALL	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.75 Hours	<b>Total Man Hours</b> 0.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Sledge hammer; Long Bar
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for vertical, lateral and horizontal movement of the coupler

**FAILURE MODES TO IDENTIFY:**

Worn or damaged coupler shank pin, yoke pin, wear plate, bushing, coupler carrier, or coupler carrier springs, damaged or missing uncoupling rod

**PROCEDURE:**

1. Ensure that coupler does not have the following conditions, (Refer to Figure 1, Figure 2, Figure 3, and Figure 4):
  - a. Distance between the guard arm and the knuckle nose of more than 5-5/16 inches on D&E couplers.
  - b. Crack or break in the pulling face of the knuckle or in the side wall or pin bearing bosses outside of the shaded areas, (Refer to Figure 5).
  - c. Coupler assembly without anti-creep protection.
  - d. Free slack in the coupler or drawbar not absorbed by friction devices or draft gears that exceeds one-half inches.
  - e. Broken or cracked coupler carrier.
  - f. Broken or cracked yoke.
  - g. Broken draft gear.
  - h. Device shall be provided under the lower end of all drawbar pins and articulated connection pins to prevent the pin from falling out of place in case of breakage.

2. Use sledge hammer to drive coupler out until pin is against bushing.

**NOTE**

The difference between these two measurements is the amount of free slack in the draft arrangement. The maximum free slack permitted by 49CFR229.61 is  $\frac{1}{2}$  inch.

---

3. Measure and record the clearance between the coupler horn and striker face.
4. Use long bar to push coupler in the opposite direction out until pin is against the other side of bushing.
5. Measure and record the clearance between the coupler horn and striker face.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



**COUPLING INSPECT**

**Figure 1**



**COUPLING WEAR PLATE**

**Figure 2**

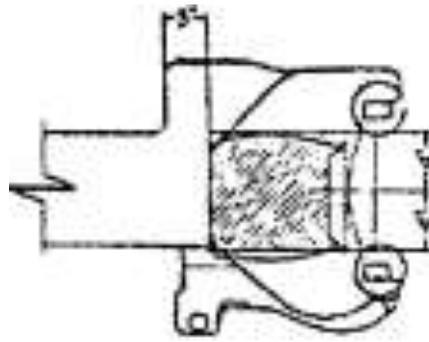


**DRAFT GEAR**

**Figure 3**



**DRAFT GEAR (VIEW 2)**  
**Figure 4**



**COUPLER**  
**Figure 5**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CP1-0006	<b>Title</b> Measure Coupler Height
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Locomotive	<b>Type</b> ALL
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.2 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Ability to safely couple the locomotive to another locomotive or car; Allows for mechanical coupling and uncoupling of coupler with moderate mechanical force

**FAILURE MODES TO IDENTIFY:**

Improper adjustment or misaligned coupler

**PROCEDURE:**

**NOTE**

Prior to performing this procedure, all wheel maintenance truck shimming must be completed.

1. Measure 5-½ inch from top of knuckle making a mark to identify the center of the knuckle.
2. Measure from the top of the rail to the center of the knuckle, (Refer to Figure 1).
3. Verify height from top of rail to center of knuckle is 31-½ inches to 34-½ inches, (Refer to Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8, and Figure 9).
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**DISTANCE FROM RAIL TOP TO KNUCKLE CENTER**  
**Figure 1**



**COUPLING INSPECT**  
**Figure 2**



**COUPLING INSPECT (VIEW 2)**  
**Figure 3**



**COUPLING MEASUREMENT**  
**Figure 4**



**COUPLING MEASUREMENT (VIEW 2)**

**Figure 5**



**COUPLING MEASUREMENT (VIEW 3)**

**Figure 6**



**COUPLING WEAR PLATE**  
Figure 7



**DRAFT GEAR**  
Figure 8



**DRAFT GEAR (VIEW 2)**  
**Figure 9**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CP1-0003	<b>Title</b> Inspect Coupler	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 8
<b>Equipment</b> Locomotive	<b>Type</b> ALL	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.75 Hours	<b>Total Man Hours</b> 0.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Special Gauge for Locomotives/Cars
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Connect cars and locomotives

**FAILURE MODES TO IDENTIFY:**

Worn, damaged components

**PROCEDURE:**

1. Ensure that each coupler is in the following condition, (Refer to Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8 and Figure 9):
  - a. The distance between the guard arm and the knuckle nose is not more than 5 ½ inches on standard type couplers (MCB contour 1904), or not more than 5 5/16 inches on D & E couplers by using appropriate gauge, (Refer to Figure 10).
  - b. The free slack in the coupler or drawbar is not absorbed by friction devices or draft gears are not more than ½ inch, (Refer to Figure 11).
  - c. The draft gear is not broken, (Refer to Figure 12).
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR COUPLER**

**Figure 1**



**USED TO INSPECT COUPLERS**

**Figure 2**



**COUPLER CONDITION INSPECT (VIEW 1)**

**Figure 3**



**COUPLER CONDITION INSPECT (VIEW 2)**

**Figure 4**



**COUPLER CONDITION INSPECT (VIEW 3)**

**Figure 5**



**COUPLER CONDITION INSPECT (VIEW 4)**

**Figure 6**



**COUPLER CONDITION INSPECT (VIEW 5)**

**Figure 7**



**MANUAL RELEASE FOR COUPLER**

**Figure 8**



**MANUAL RELEASE TO COUPLER**  
**Figure 9**



**CAR COUPLER INSPECT**  
**Figure 10**



**CAR COUPLER INSPECT (2)**

**Figure 11**



**DRAFT GEAR**  
**Figure 12**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CO1-0004	<b>Title</b> Inspect and Clean Control Stand and Throttle/Reverser	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 8
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Electrical cleaner Silicon Lubricant	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Controls engine speed and direction

**FAILURE MODES TO IDENTIFY:**

Broken wires or attachment point, worn gears

**PROCEDURE:**

1. Apply "Do Not Start" tag to:
  - a. Engine control station for PH, (Refer to Figure 1).
  - b. "Isolation" switch in engine compartment for PHI.
2. Ensure engine is shut down and breakers are open.
3. Clean and inspect control stand and contacts, (Refer to Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8):
  - a. Remove control stand cover.
  - b. Ensure all electrical connections are secure (visually and manually).
  - c. Inspect for signs of damage:
    - (1) Burned insulation.
    - (2) Loose equipment, etc.

4. Clean assembly with approved electrical cleaner.
5. Inspect DB rheostat brush.
  - a. Change brush, if necessary (PHI only).
6. Inspect throttle switches for sticking, loose rollers, and electrical connectors.
7. Reinstall control stand cover.
8. Engage hand brake and locomotive independent air brakes.

**WARNING**

**PRIOR TO COMMENCING STEP 8, ENSURE HAND BRAKE AND LOCOMOTIVE INDEPENDENT AIR BRAKES ARE ENGAGED.**

9. Test load meter (per OEM recommendations and 49CFR229.2b), (Refer to Figure 9, Figure 10, and Figure 11).
  - a. Close breakers.
  - b. Start engine.
  - c. Place ISOLATION switches in “RUN” position.
  - d. Close GENERATOR FIELD switch.
  - e. Place reverser in throttle assembly in “FORWARD” position.
  - f. Advance throttle to “NOTCH 1” position.
    - (1) Observe load meter.
  - g. Retard throttle to idle.
  - h. Place reverser in throttle assembly in “REVERSE” position.
  - i. Advance throttle to “NOTCH 1” position.
    - (1) Observe load meter.
  - j. Retard throttle to idle.
    - (1) Remove reverser.
  - k. Open GENERATOR FIELD switch.
  - l. Return ISOLATION switch to “Isolate”.
  - m. Shut down engine.
10. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
11. Make appropriate repairs for any other discrepancies found.



**THROTTLE REVERSER AND THROTTLE**  
**Figure 1**

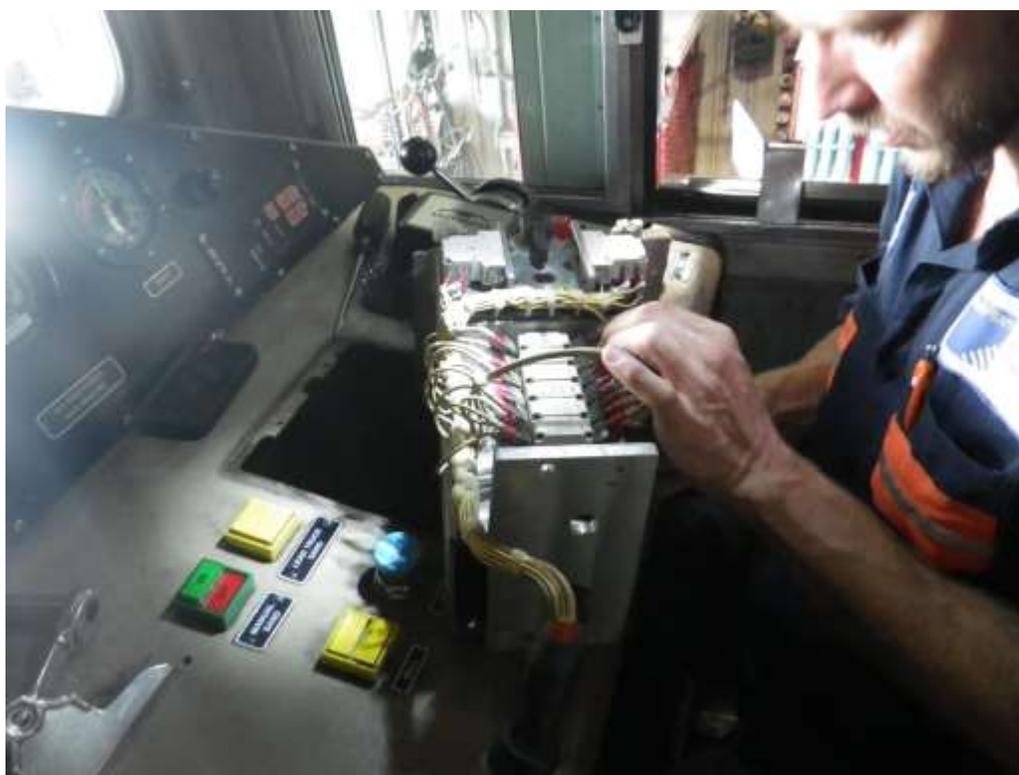


**REVERSER HANDLE REMOVAL**  
**Figure 2**



**REVERSER HANDLE REMOVED**

**Figure 3**



**REVERSER INSPECT**

**Figure 4**



**REVERSER HANDLE INSPECT**

**Figure 5**



**REVERSER HANDLE INSPECT (VIEW 2)**

**Figure 6**



**REVERSER HANDLE INSPECT (VIEW 3)**

**Figure 7**



**REVERSER REMOVED**

**Figure 8**



**TESTER**  
**Figure 9**



**SPEED O**  
**Figure 10**



**SPEED SIMULATOR**  
**Figure 11**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CO1-0002	<b>Title</b> Perform Self Test of Computer System
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for the control and operations of locomotive

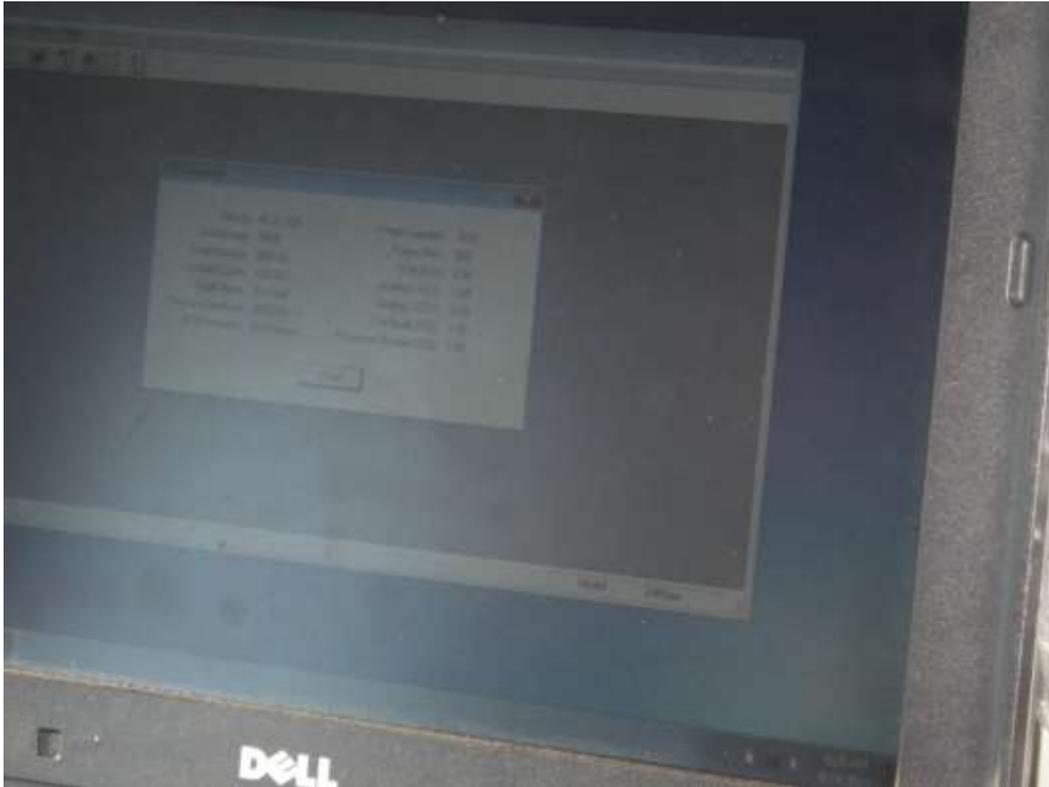
**FAILURE MODES TO IDENTIFY:**

Failed power supply, failed CPU

**PROCEDURE:**

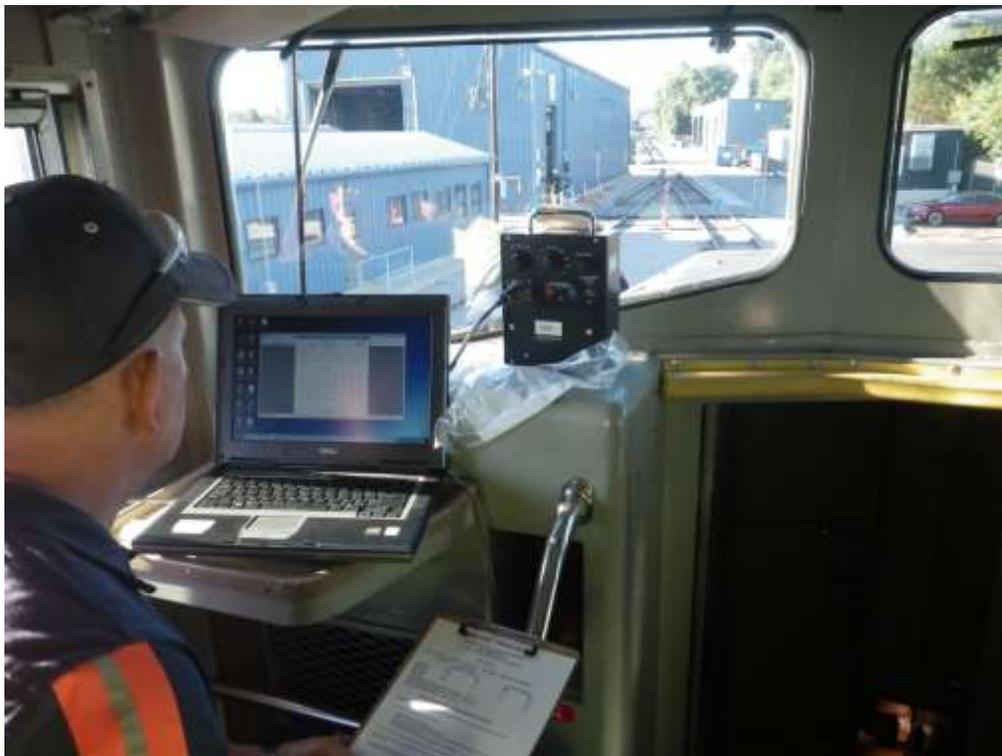
1. Ensure main engine is running within normal operating parameters.
2. Proceed to Step 4. if completing self-test for PHI.
3. Proceed to Step 5. if completing self-test for PH.
4. Complete the following steps for PHI, (Refer to Figure 1 and Figure 2):
  - a. Select "Self Test" from main menu.
    - (1) Select "Excitation" from "Self Test" menu.
      - (a) Follow on screen instructions.
      - (b) Select "Exit" upon completion of steps.
    - (2) Select "Wheel Slip" from "Self Test" menu.
      - (a) Follow on screen instructions.
      - (b) Select "Exit" upon completion of steps.
    - (3) Select "Radar" from "Self Test" menu.
      - (a) Follow on screen instructions.

- (b) Select "Exit" upon completion of steps.
  - (4) Select "Cooling Fans" from "Self Test" menu.
    - (a) Select "Test All Fans" from menu.
    - (b) Follow on screen instructions.
    - (c) Select "Exit" upon completion of steps.
  - (5) Shut down main engine using injector START/STOP toggle switch located on high voltage cabinet at accessory rack.
  - (6) Select "Contactors/Relay" from "Self Test" menu.
    - (a) Select "Test All Devices".
    - (b) Follow on screen instructions.
    - (c) Select "Exit" upon completion of steps.
  - (7) Select "Exit" to return to main menu.
  - b. Proceed to Step 6.
5. Complete the following steps for PH:
- a. Open computer cabinet and press push button to turn on computer screen.
  - b. Press push button "3" to select "Self Test".
    - (1) Press push button "1" to select "Cooling Fan Test".
      - (a) Follow on screen instructions.
      - (b) Select "Run Clear" upon completion of steps.
    - (2) Press push button "3" to select "Radar Test".
      - (a) Follow on screen instructions.
      - (b) Select "Run Clear" upon completion of steps.
    - (3) Press push button "4" to select "Load Regulator Test".
      - (a) Follow on screen instructions.
      - (b) Select "Run Clear" upon completion of steps.
    - (4) Press push button "6" to select "WS (Wheel Slip) Indicator Test".
      - (a) Follow on screen instructions.
      - (b) Select "Run Clear" upon completion of steps.
    - (5) Shut main engine down.
    - (6) Press push button "2" to select "Contactors Test".
      - (a) Follow on screen instructions.
      - (b) Select "Run Clear" upon completion of steps.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



**COMPUTER SCREEN**

**Figure 1**



**COMPUTER DOWNLOAD**

**Figure 2**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CF2-0002	<b>Title</b> Wash Undercar Exterior
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> ALL
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for motive power for trains

**FAILURE MODES TO IDENTIFY:**

Excessive dirt, dust debris on equipment

**PROCEDURE:**

**NOTE**

Prior to initiating procedure ensure ambient temperature is above 37°F.

1. Notify supervisor if procedure cannot be completed.
2. Ensure main engine is running within normal operating parameters.
3. Ensure locomotive is parked and secured over an approved containment system.
4. Prepare soap mixture with the correct ratio of water to soap.
5. Advance throttle controller to "NOTCH 3".

**CAUTION**

**DO NOT DIRECT THE SPRAY INTO TRACTION MOTORS OR ELECTRICAL EQUIPMENT.**

---

6. Use high volume low pressure applicator to apply approved cleaning solution, (Refer to Figure 1).
7. Use power washer to remove oil, dirt, and debris from undercarriage of locomotive.

8. Retard throttle controller to "IDLE".
9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
10. Make appropriate repairs for any other discrepancies found.



**EXTERIOR WASH UNDERCAR**

**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CF2-0001	<b>Title</b> Wash Locomotive/Car Exterior
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive/Cars	<b>Type</b> ALL
<b># Personnel</b> 2 QP	<b>Estimated Task Duration</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for motive power for trains

**FAILURE MODES TO IDENTIFY:**

Excessive dirt, dust debris on equipment; dirty windows

**PROCEDURE:**

**NOTE**

Prior to initiating procedure ensure ambient temperature is above 37°F.

1. Ensure locomotive/car is parked over an approved containment system.
2. Rinse locomotive/car body with water.
3. Wash locomotive/car body with approved solution.
4. Rinse locomotive/car body with water.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CF1-0003	<b>Title</b> Conduct Visual Inspection of Undercar
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b># of Pages</b> 2
<b>Type</b> ALL	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Total Man Hours</b> 1.0 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Special Tools</b> None	
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for the connecting of wheel sets and other associated equipment

**FAILURE MODES TO IDENTIFY:**

Cracks, broken, or damaged equipment or components

**PROCEDURE:**

1. Ensure locomotive is over an approved containment area.
  - a. Clean the undercar of the locomotive thoroughly by power washing with water only.
2. Inspect the following equipment visually, (Refer to Figure 1):
  - a. Fuel tank and piping for:
    - (1) Leaks.
    - (2) Cracks or damage.
    - (3) Missing, cracked or loose mounting bolts and safety blocks.
  - b. Running gear for:
    - (1) Excessive or uneven wear.
    - (2) Cracked or broken components.
    - (3) Grounding straps.
  - c. Suspension for:
    - (1) Cracked or broken springs.

- d. Air piping and reservoir tank for:
    - (1) Missing, cracked or loose mounting bolts.
    - (2) Cracks.
    - (3) Leaks.
    - (4) Rubbing or abrasions.
  - e. Electrical lines and connections for:
    - (1) Rubbing or chaffing.
    - (2) Loose connections.
    - (3) Burned or damaged insulation.
    - (4) Exposed wires and cables.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  4. Make appropriate repairs for any other discrepancies found.



**UNDERCAR INSPECTION**

**Figure 1**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CF1-0002	<b>Title</b> Inspect Mechanical Systems	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 3
<b>Equipment</b> Locomotive	<b>Type</b> ALL	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

### FUNCTIONS:

Provide for safety of crew, passengers, and equipment

### FAILURE MODES TO IDENTIFY:

Excessive oil or grease; any cracks, excessive wear, structural defect, leaks, or broken equipment or parts

### PROCEDURE:

1. Ensure that all mechanical systems and components of the equipment are free of all the following general conditions that endanger the safety of the crew, passengers, or equipment, (Refer to Figure 1 and Figure 2):
  - a. A continuous accumulation of oil or grease.
  - b. Improper functioning of a component.
  - c. A crack, break, excessive wear, structural defect, or weakness of a component.
  - d. A leak.
  - e. Use of a component or system under a condition that exceeds that for which the component or system is designed to operate.
  - f. Insecure attachment of a component.
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR REAR DOOR AND COUPLER**  
**Figure 1**



**YAW DAMPER**  
**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CD1-0001	<b>Title</b> Visually Inspect Inertial Blower and Cooling Fans	
<b>Revision</b> 0	<b>Date</b> 10/28/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Socket Wrench
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**WARNING**

**COMPLY WITH THE UNIT'S WORKING ALOFT REGULATIONS. FAILURE TO DO SO MAY RESULT IN INJURY OR DEATH TO PERSONNEL.**

---

**FUNCTIONS:**

Provides the cooling air for the main/HEP radiators

**FAILURE MODES TO IDENTIFY:**

Locked rotor; seized bearing; single phase motor windings; faulty electrical plugs or cables; broken, cracked or missing fan blades and loose or missing guards

**PROCEDURE:**

1. Ensure engine is shut down.

**NOTE**

The mechanic should be properly qualified and utilized the overhead harness and monorail system prior to ascending to the top of the locomotive.

---

2. Inspect all fan guards on the locomotive roof, (Refer to Figure 1).
  - a. Use a hammer to conduct a sound check of all bolts on all fan guards.
3. Inspect fans visually for the following:
  - a. Cracked, broken, or missing fan blades.

- b. Loose or missing blade mounting bolts.
4. Open access panel on fan guard.
5. Inspect fan motor plugs for tight connections.
6. Inspect cables for chaffing and burned insulation.
7. Rotate fan manually and listen for bearing noise.
  - a. Ensure fan does not contact side of fan guard.
  - b. Ensure that fan rotates freely.
8. Close and secure access panel.
9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
10. Make appropriate repairs for any other discrepancies found.



**AC COMPRESSOR FAN ON TOP OF CAB**

**Figure 1**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CA1-0009	<b>Title</b> Check and Record Aftercooler Pressure	
<b>Revision</b> 0	<b>Date</b> 10/28/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 360 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Test fittings
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Provides for cooling air to the turbocharger prior to entering the main engine

**FAILURE MODES TO IDENTIFY:**

Aftercooler gasket failure, inlet/outlet piping O-ring failure; clogged aftercooler

**PROCEDURE:**

1. Ensure main engine is running within normal operating parameters.
2. Complete the following for PH:
  - a. Remove 5<sup>th</sup> bolt down from the top on each side of aftercooler.
  - b. Install test fittings in place of removed bolts.
  - c. Connect manometer or pressure gauge to test fittings.
  - d. Ensure engine ISOLATION switch is set to "RUN".
  - e. Gradually advance throttle controller to "NOTCH 8".
  - f. Record the pressure differential reading on inspection.
  - g. Retard throttle controller to "IDLE".
  - h. Return ISOLATION switch to "ISOLATE".
  - i. Disconnect manometer or pressure gauge.
  - j. Remove test fittings.
  - k. Reinstall bolts on either side of aftercooler.

3. Complete the following for PHI:
  - a. Remove pipe plugs from air intake duct on each side of aftercooler.
  - b. Install test fittings in place of removed plugs.
  - c. Connect manometer or pressure gauge to test fittings.
  - d. Ensure engine ISOLATION switch is set to "RUN".
  - e. Gradually advance throttle controller to "NOTCH 8".
  - f. Record the pressure differential reading on inspection.
  - g. Retard throttle controller to "IDLE".
  - h. Return ISOLATION switch to "ISOLATE".
  - i. Disconnect manometer or pressure gauge.
  - j. Remove test fittings.
  - k. Reinstall pipe plugs on either side of aftercooler.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CA1-0008	<b>Title</b> Conduct Operational Test of Inertial Filter Blower and Coolant Fans
<b>Revision</b> 0	<b>Date</b> 10/27/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 2 QP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for removal of particulates from inertial filter

**FAILURE MODES TO IDENTIFY:**

Burned termination terminals

**PROCEDURE:**

1. Ensure main engine is running within normal operating parameters.
2. Open the FILTER BLOWER MOTOR circuit breaker.
  - a. Allow time for the blower to coast to a stop.
3. Climb on top of the locomotive, and observe the squirrel cage blower through the exhaust filter compartment, (Refer to Figure 1, and Figure 2).
4. Close the FILTER BLOWER MOTOR circuit breaker.
  - a. Confirm proper direction of rotation.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**ON TOP OF LOCOMOTIVE**  
**Figure 1**



**FILTER BLOWER**  
**Figure 2**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CA1-0007	<b>Title</b> Manometer Readings
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Determines the performance of the inertial filters

**FAILURE MODES TO IDENTIFY:**

Leaky air seals

**PROCEDURE:**

1. Connect a flexible tube to the inertial filters hose stem.
2. Connect the other end of the hose to a U-tube manometer.
3. Vent the end of the manometer to the atmosphere.
4. Ensure diesel engine is running and at normal operating temperature of 160°F.
5. Complete the following with the reverser handle in the “NEUTRAL” position and the GENERATOR FIELD CIRCUIT breaker in the “OFF” position:

**NOTE**

Loading is not required.

- a. Place the throttle in the “NOTCH 8” position.
- b. Ensure the following if central air compartment depression readings are less than (<) the minimum stipulated in the service data:

- (1) All central air compartment panels, partitions, and cover plates are properly applied.
- (2) Air is not bypassing the carbody filters.
- c. Ensure the following if central air compartment depression reading are greater than (>) the maximum stipulated in the service data:

**NOTE**

If readings are taken on an annual basis, a reading of more than 3.5 inches of H<sub>2</sub>O indicates that the inertial filters can be expected to plug within the next 12 months.

---

- (1) Clean the carbody inertial filters immediately.

**NOTE**

Possible causes for less than (<) minimum readings could be; tears in the media, improper element seating, a loose connecting bolt to the engine, and loose or broken pressure lines leading to the manometer hose stem, or to the pressure switch.

---

6. Connect the manometer to the engine and inertials hose stem, (Refer to Table 1).
  - a. If reading is less than (<) the minimum stipulated in the service data and the previous inertia filter reading was "Satisfactory", inspect the engine air filters for bypassing.
  - b. If the pressure drop remains low after a lengthy period of service (similar to new/clean filters), or if the pressure drop is decreasing rather than increasing, inspect the engine air filters for bypassing.
  - c. If the reading is greater than (>) the maximum stipulated in the service data, install new engine air filters.
7. Ensure that all cabinet doors are securely latched.
8. Connect the manometer to the electrical cabinet hose stem.

**NOTE**

Air filter elements in the high voltage electrical control cabinet, the HEP contactor cabinet, HEP start station cabinet, and AC cabinet should be replaced at the intervals specified in the scheduled maintenance program.

---

**NOTE**

It is recommended that the filter elements be replaced with new elements on an annual basis for the HEP contactor cabinet, the HEP start station cabinet, and the AC cabinet.

---

- a. If static pressure is less than (<) the minimum stipulated in the service data, install all new electrical cabinet filter elements.
9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
10. Make appropriate repairs for any other discrepancies found.

<b>Inertial air filters (central air compartment):</b>	<b>Combination engine plus inertial filters:</b>
Minimum depression - 76 mm (3 in.) of H <sub>2</sub> O	Minimum depression - 127 mm (5 in.) of H <sub>2</sub> O
Maximum depression - 178 mm (7 in.) of H <sub>2</sub> O	Maximum depression - 356 mm (14 in.) of H <sub>2</sub> O
<b>Electrical control cabinet filter:</b>	
<b>Aftercooler Core:</b>	
Minimum static pressure - 13 mm (0.5 in.) of H <sub>2</sub> O	Maximum pressure differential - 254 mm (10 in.) of H <sub>2</sub> O

**SPECIFICATIONS**

**Table 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CA1-0006	<b>Title</b> Visually Inspect and Lubricate Inlet Guide Vane Linkage	
<b>Revision</b> 0	<b>Date</b> 10/28/2015	<b># of Pages</b> 1
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for cooling air to the traction motors

**FAILURE MODES TO IDENTIFY:**

Faulty air cylinder, incorrectly adjusted linkage/improperly set operating arm; faulty magnet valve; malfunctioning computer DIO module

**PROCEDURE:**

1. Ensure engine is shut down.
2. Inspect linkage attached to guide vanes visually.
3. Inspect for loose bolts around safety cage.
4. Inspect vanes for cracks, rust and other damage.
  - a. Ensure proper alignment.

**NOTE**

There is no grease fitting on the PH. Inspect only do not lubricate.

5. Lubricate the linkage.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> BK4-0001	<b>Title</b> Inspect/Test Hand Brake
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> ALL
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for an independent manual means to apply friction brake(s) to locomotive’s axle(s)

**FAILURE MODES TO IDENTIFY:**

Broken cable; missing/damaged cable run bracket; missing, broken or worn brake shoe(s); missing or damaged hand brake chain stop; corroded hand brake chain; debris lodged in chain

**PROCEDURE:**

**WARNING**

**BEFORE BEGINNING THIS PROCEDURE THE LOCOMOTIVE MUST BE CHOCKED TO PREVENT MOVEMENT.**

1. Ensure locomotive is chocked to prevent movement.
2. Inspect hand brake mechanism inside the engine room visually for the following:
  - a. Loose or missing hardware.
  - b. Missing or damaged hand brake chain stop.
3. Inspect hand brake chain visually for the following discrepancies:
  - a. Corrosion.
  - b. Debris lodged in chain.
4. Inspect hand brake cleat for physical damage.

- a. Ensure that the cleat is securely mounted.
5. Verify brakes are released.
6. Apply hand brake.
7. Verify each brake shoe is applied to its rear truck wheel.
8. Release hand brake.
9. Inspect hand brake chain on engineers' side, adjacent to R3 and R4 wheel visually to verify it has slack.
10. Remove the hand brake cover.
  - a. Lubricate mechanism with spray lubrication.
  - b. Stencil the cover with the date of test and lubrication date.
  - c. Replace cover.
11. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
12. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> BK3-0003	<b>Title</b> Inspect Dynamic Brake Blower
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for removal of heat energy from dynamic brake grids

**FAILURE MODES TO IDENTIFY:**

Worn brushes, grounded phase, worn bearings; flash overs; melted solder

**PROCEDURE:**

1. Ensure is engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Unlatch/unbolt the dynamic brake blower access panels, (Refer to Figure 1).
3. Inspect visually for the following, (Refer to Figure 2):
  - a. Flash over on commutator and brush holders.
  - b. Excessive wear on commutator.
  - c. Worn brushes.
  - d. Frayed wires.
  - e. Burned insulation.
  - f. Loose electrical connections.
  - g. Melted solder.

4. Manually verify tension on brush holder.
5. Inspect seal on access panel.
  - a. Replace seal if necessary.
6. Latch/bolt the dynamic brake blower access panels.
7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
8. Make appropriate repairs for any other discrepancies found.



**DYNAMIC BRAKE BLOWER ACCESS PANEL (OPEN)**

**Figure 1**



**DYNAMIC BRAKE BLOWER WIRING**  
**Figure 2**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> BK3-0002	<b>Title</b> Visually Inspect Dynamic Brake Grids
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 2 QP	<b>Estimated Task Duration</b> 0.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides for absorption and dissipation of electrical energy generated by traction motors during dynamic braking operations

**FAILURE MODES TO IDENTIFY:**

Grid shorting or broken cables

**PROCEDURE:**

1. Ensure engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

**NOTE**

The mechanic should be properly qualified and utilized the overhead harness and monorail system prior to ascending to the top of the locomotive.

---

2. Gain access to grid by using ladder or forklift with man basket, (Refer to Figure 1 and Figure 2).
3. Use flashlight to look through each baffle to inspect visually for:
  - a. Cracks.
  - b. Burned or scorch marks.

- c. Loose connections and mounting bolts.
  - d. Discoloration or warping due to overheating.
  - e. Chaffed insulation on wires.
  - f. Any other visual abnormalities.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  5. Make appropriate repairs for any other discrepancies found.



**LADDER TO ACCESS GRIDS**

**Figure 1**



**GRIDS ON SIDE OF LOCOMOTIVE**

**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> BK1-0055	<b>Title</b> Change Automatic Drain Valves	
<b>Revision</b> 0	<b>Date</b> 10/28/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 360 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> O-ring (2); Drain Valves (2 EA P/N RAABK11007)	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for the removal of accumulated moisture from the main reservoir tank system

**FAILURE MODES TO IDENTIFY:**

Damaged valve body, faulty operating spool, loose wires or hardware

**PROCEDURE:**

1. Ensure engine is shut down.
2. Manually open AUTOMATIC DRAIN valves.
3. Disconnect plug from heater assembly.
4. Disconnect the two wires from the solenoid coil if equipped.
5. Remove two mounting bolts and valves from tank, (Refer to Figure 1).
6. Inspect tank outlet for clogs or signs of cracks.

**NOTE**

During replacement of O-ring and installation of valve ensure to remove red oil plugs from new DRAIN valve, (Refer to Figure 1).

7. Replace O-ring and reinstall valve.
8. Reinstall two mounting bolts.
9. Reconnect two wires to the solenoid coil if equipped.

10. Reconnect plug to heater assembly.
11. Ensure all connections are secure and sealed.
12. Close AUTOMATIC DRAIN valves and set to "AUTOMATIC".
13. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
14. Make appropriate repairs for any other discrepancies found.



**VALVES**  
**Figure 1**

**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> BK1-0036	<b>Title</b> Replace Air Filter and Gasket on Dirt Collector
<b>Revision</b> 0	<b>Date</b> 10/27/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Filter (1 EA P/N RAABK10659); Gasket (2 EA P/N RAABK11211); Gasket (1 EA P/N RAABK11212); Gasket (1 EA P/N RAABK11368) O-rings (11211 and 11212)
<b>Completed By (Print Name)</b>	<b>Signature</b>

**WARNING****WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.****WARNING****PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.****FUNCTIONS:**

Remove dirt and particulates from supply air going to brake pipe system

**FAILURE MODES TO IDENTIFY:**

Dirty clogged filter

**PROCEDURE:**

1. Ensure engine is shut down.
2. Ensure brake pipe pressure is at 0 PSI.
3. Ensure valve lever is in the "HORIZONTAL" position, (Refer to Figure 1).
4. Unlatch and open brake rack panel access door.
5. Mark cover with paint pin to ensure correct reassembly prior to removal of dirt collector.
  - a. Remove and disassemble dirt collector.
6. Remove filter and O-rings.
7. Replace filter, (RAABK10659) and O-rings (11211 and 11212).
8. Remove and clean dirt collector cup.

9. Reinstall dirt collector cup.
10. Reassemble and reinstall dirt collector.
11. Ensure valve lever is in the "VERTICAL" position.
12. Close and relatch brake rack panel access door.
13. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
14. Make appropriate repairs for any other discrepancies found.



**VALVE**  
**Figure 1**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> BK1-0030	<b>Title</b> Change Main Reservoir (MR) Filter and Gasket	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Main Reservoir Filter Element (1 EA P/N RAABK10021); Filter Gasket, (RAABK10020)	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Prevents moisture from entering system

**FAILURE MODES TO IDENTIFY:**

Corrosion and failure of brake valves

**PROCEDURE:**

1. Ensure engine is shut down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Bleed all the air from the system.
3. Replace reservoir filter and gaskets, (Refer to Figure 1):
  - a. Remove the air supply line.
  - b. Remove the 8 ½ inch bolts.
  - c. Lower filter housing.
  - d. Remove wing nut holding filter.
  - e. Remove filter from housing and filter support.

- f. Remove filter gasket.
  - g. Install filter, (RAABK10021) into support housing.
  - h. Install wing nut.
  - i. Install filter gasket, (RAABK10020) into housing.
  - j. Install the 8 ½ inch bolts.
    - (1) Tighten bolts.
  - k. Connect air supply line.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  5. Make appropriate repairs for any other discrepancies found.



**MAIN RESEVOIR FILTER**

**Figure 1**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> BK1-0025	<b>Title</b> Change Coalescer Filter Element and Gaskets
<b>Revision</b> 0	<b>Date</b> 11/19/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Coalescer Filter Element (1 EA P/N RAABK10015); Coalescer Filter Deflector Gasket (1 EA P/N RAABK10017); Coalescer Filter Bottom Gasket (1 EA P/N RAABK10016)
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

Prevents moisture from entering system

**FAILURE MODES TO IDENTIFY:**

Corrosion and failure of brake valves

**PROCEDURE:**

1. Ensure engine is shut down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Bleed all the air from the system.
3. Replace coalescer filter and gaskets, (Refer to Figure 1):
  - a. Remove supply line to DRAIN valve.
  - b. Remove the 6 5/16 inch bolts from filter housing.
  - c. Lower filter housing.

- d. Remove filter.
- e. Remove filter gasket from housing.
- f. Install filter, (RAABK10015) in housing.
- g. Install filter gaskets, (RAABK10016) and (RAABK10017) to housing.
- h. Reinstall filter housing 6 5/16 inch bolts.
  - (1) Tighten bolts.
  - (2) Connect supply lines.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**COALESCER FILTER**

**Figure 1**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> BK1-0003	<b>Title</b> Test Air Gauges
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides the engineer with brake cylinder pressure, brake pipe pressure, main reservoir pressure and equalizing reservoir pressure

**FAILURE MODES TO IDENTIFY:**

Faulty gauge component(s); damaged air line or fitting(s)

**PROCEDURE:**

1. Complete the following steps for the main reservoir/equalizing reservoir gauge, (Refer to Figure 1):
  - a. Remove face plate for the control stand air gauges at the engineer's control stand pane.
  - b. Unscrew one test plug from the test port on the main reservoir/equalizing reservoir gauge.
  - c. Attach test connection from testing kit to the gauge test port.
  - d. Open the TEST KIT valve to pressurize the main reservoir gauge to 110 pounds per square inch (PSI) as read on the test gauge kit.
  - e. Verify that one main reservoir/equalizing reservoir gauge needle matches the reading on the test gauge.
  - f. Close the TEST KIT valve.
  - g. Remove the test connection from the test port on the main reservoir/equalizing reservoir gauge, (Refer to Figure 2).

- h. Screw the test plug into the test port on the main reservoir/equalizing reservoir gauge.
  - i. Unscrew the other test plug from the main reservoir/equalizing reservoir gauge to between 135 and 140 PSI as read on the test gauge kit.
  - j. Close the TEST GAUGE KIT valve.
  - k. Verify the other main reservoir/equalizing reservoir gauge needle matches the reading on the test gauge.
  - l. Release pressure from the test kit by pressing the “RELEASE” button on the back of the test gauge kit.
  - m. Remove the test connection from the test port on the main reservoir/equalizing reservoir gauge.
  - n. Screw the test plug into the test port on the main reservoir/equalizing reservoir gauge.
2. Complete the following steps for the brake cylinder/brake pipe gauge, (Refer to Figure 1):
- a. Unscrew one of the test plugs from the test port on the brake cylinder/brake pipe gauge.
  - b. Attach test connection from testing kit to the gauge test port, (Refer to Figure 3, Figure 4, and Figure 5).
  - c. Open the TEST KIT valve to pressurize the brake/cylinder/brake pipe gauge to 110 PSI as read on the test gauge kit.
  - d. Close the TEST GAUGE KIT valve.
  - e. Verify one brake cylinder/brake pipe gauge needle matches the reading on the test gauge.
  - f. Release pressure from the test kit by pressing the “RELEASE” button on the back of the test gauge kit.
  - g. Remove the test connection from the brake cylinder/brake pipe gauge.
  - h. Screw the test plug into the test port on the brake/cylinder/brake pipe gauge.
  - i. Unscrew the other test plug from the brake cylinder/brake pipe gauge.
  - j. Attach test connection from testing kit to the gauge test port.
  - k. Open the TEST KIT valve to pressurize the brake cylinder/brake pipe gauge to 72 PSI as read on the test gauge kit.
  - l. Close the TEST GAUGE KIT valve.
  - m. Verify other brake cylinder/brake pipe gauge needle matches the reading on the test gauge.
  - n. Release pressure from the test kit by pressing the “RELEASE” button on the back of the test gauge kit.
  - o. Remove the test plug from the test port on the brake cylinder/brake pipe gauge.
  - p. Screw the test plug into the test port on the brake cylinder/brake pipe gauge.
  - q. Reinstall face plate for the control stand air gauge(s).
3. Complete the following steps for the main reservoir master gauge located at the front of the main engine at accessory rack (engineer’s side), (Refer to Figure 1):
- a. Unscrew the test plug from the test port on the main reservoir master gauge.

- b. Attach test connection from testing kit to the gauge test port.
  - c. Open the TEST KIT valve to pressurize the main reservoir master gauge to 140 PSI as read on the test gauge kit.
  - d. Close the TEST GAUGE KIT valve.
  - e. Verify one main reservoir master gauge needle matches the reading on the test gauge.
  - f. Release pressure from the test kit by pressing the “RELEASE” button on the back of the test gauge kit.
  - g. Remove the test connection from the main reservoir master gauge.
  - h. Screw the test plug into the test port on the main reservoir master gauge.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  5. Make appropriate repairs for any other discrepancies found.



**CONTROL STAND GAUGES AND TEST PORTS**

**Figure 1**



**GAUGE REMOVAL**  
**Figure 2**



**AIR GAUGE TESTER**  
**Figure 3**



**CONSOLE**  
**Figure 4**



**AIR GAUGE TEST**  
**Figure 5**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AR1-0001		<b>Title</b> Inspect AR-15
<b>Revision</b> 0	<b>Date</b> 10/28/2015	<b># of Pages</b> 3
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.2 Hours	<b>Total Man Hours</b> 0.2 Hours
<b>Test Equipment</b> Multimeter	<b>Supplies</b> Approved silicone heat sink compound; Generator Brush (P/N RAAAR11008) and/or Alternator Brush (P/N RAAXG11104), as needed; Diodes (Various), as needed	<b>Special Tools</b> Diode Wrench, EMD 8361524, AMMPS 4551612005
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides main generator production of AC/DC power for locomotive's main propulsion and auxiliary motor operation

**FAILURE MODES TO IDENTIFY:**

Blown fuse(s) or diode(s), worn brushes, slip ring defects, damaged wire and cable connections

**PROCEDURE:**

1. Visually inspect internal components of the AR-15 generator in the generator room through the viewing windows for the following discrepancies (Refer to Figure 1):
  - a. Blown fuse(s) as indicated by pin protruding from the visible end of the fuse.
  - b. Signs of overheating.
  - c. Worn brushes.
  - d. Defective slip rings.
  - e. Burned diode(s).

- f. Carbon tracking.
  - g. Cracked or broken insulation.
  - h. Broken or chafed wires.
2. Unfasten and remove access panel:
- a. Complete the following steps for any discrepancies found:
    - (1) Blown fuse(s).
      - (a) Proceed to Step 3.
    - (2) Signs of overheating.
      - (a) Proceed to Step 3.
    - (3) Worn brushes.
      - (a) Replace brushes.
    - (4) Defective slip rings.
      - (a) Notify supervisor.
    - (5) Burned diode(s).
      - (a) Proceed to Step 4.
    - (6) Carbon tracking.
      - (a) Clean the area with approved electrical cleaner.
    - (7) Broken or chafed wires.
      - (a) Notify supervisor.

**WARNING**

**USE EXTREME CAUTION WHEN USING A MULTIMETER TO MEASURE VOLTAGES. DO NOT TOUCH POWER TERMINALS. FAILURE TO COMPLY COULD RESULT IN PERSONNEL INJURY OR DEATH.**

---

3. Use a multimeter on the Ohms scale to verify continuity of each fuse.
- a. Place each probe across the fuse and note the multimeter's reading.

NOTE

Fuse is good if the reading is 0 Ohms.

- b. Replace defective fuse(s).
4. Use a multimeter on the Diode Check scale to verify functionality of each diode:
- a. Place probes across the diode and note multimeter reading.
  - b. Reverse the probe locations and note the multimeter reading.

NOTE

The diode is acceptable if the reading in one direction is 10-20 Ohms and the reading in the opposite direction is greater than 30k Ohms.

- c. Replace defective diodes with ones of the same polarity and voltage class (or higher).

**CAUTION**

**DO NOT APPLY APPROVED SILICONE HEAT SINK COMPOUND  
ON DIODE THREADS.**

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- (1) Apply a thin coating of approved silicone heat sink compound to the base of the diode hex to cover the surface.
- d. Torque the diode into heat sink compound to 33-35 ft-lbs and the diode terminal lugs to 11-15 ft-lbs.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**MAIN GENERATOR  
Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AP2-0004	<b>Title</b> Inspect Air Dryer and Replace Filter
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Coalescent Filter Element and Gasket (1 Kit P/N RAAAP20879)
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for removal of moisture from compressed air system

**FAILURE MODES TO IDENTIFY:**

Dryer beads expended, humidity indicator indicates saturation, failed solenoid valve, failed timer or relay, faulty purge valve, faulty drain valve, failed heater, loose wires or hardware

**PROCEDURE:**

1. Ensure engine is shut down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

2. Inspect the drain heaters and wiring visually for the following discrepancies:
  - a. Frayed.
  - b. Torn or cracked insulation.
  - c. Loose or missing mounted hardware.
  - d. Melted or signs of overheating.
3. Verify air dryer system angle cock's locking handle springs are intact.
4. Inspect air dryer moisture indicator color visually for the following:

- a. Both indicators are blue, (Refer to Figure 1).
  - (1) Proceed to Step 9.
- b. Either indicator is lavender, (Refer to Figure 2).
  - (1) Proceed to Step 5. to verify if dryer working properly.
- c. Either indicator is white, yellow, brown or blue green, (Refer to Figure 3 and Figure 4).
  - (1) Replace the air dryer:
    - (a) Document a compressor problem in MAP-9, if the dryer has been damaged.

#### NOTE

This portion of the procedure should only be performed if the moisture indicator is lavender as described in Step 4.a.b. above.

5. Verify the air dryer is cycling properly by observing the following:
  - a. Verify there is a slight, continuous exhaust of air at the exhaust port of the purge valve on one dryer.
  - b. After approximately one minute, verify there is a short, loud discharge of air at the exhaust port of the opposite PURGE valve, followed by a slight, continuous exhaust of air.
  - c. After approximately one minute, verify there is a short, loud discharge of air at the exhaust port of the opposite dryer.
  - d. Verify the AUTOMATIC DRAIN valve on the sump of the precoalescer exhaust each time the air dryer cycles.
6. Continue to Step 7, if the air dryer is cycling properly as observed in Step 5 above.
  - a. Troubleshoot and repair, if the air dryer is not cycling properly.
7. Ensure #1 MAIN RESERVOIR DRAIN valve is operating correctly.
8. Remove moisture indicator by performing the following:
  - a. Close the air dryer's CUTOUT valve(s) upstream and downstream of the air dryer.

#### WARNING

**AIR DRYER UNDR HIGH PRESSURE: RISK OF INRY FROM FLYNG DEBRIS. PRIOR TO REMOVING, SLOWLYTURN THE MOISTURE INDICATOR COUNTER –CLOCKWISE TO BLEED THE AIR FROM THE AIR DRYER.**

- b. Remove moisture indicator by turning counterclockwise using 1-1/16 inch wrench.
- c. Inspect the inside manifolds and moisture indicator visually for contamination in the form of water, oil, rust, desiccant dust, a mushy residue, or solids.
  - (1) If any contamination is seen, remove the dryer and replace.
  - (2) If the inside of the manifold is clean, dry and oil-free, perform the following:
    - (a) Install new blue indicators with 1-1/16 inch wrench by turning clockwise.
    - (b) Close air dryer's MANUAL DRAIN valve, (Refer to Figure 5).
    - (c) Open the air dryer's CUTOUT valve upstream and downstream of the air dryer.

9. Complete the following steps for filter change out during running check:
  - a. Disconnect heater wire.
  - b. Disconnect supply line.
  - c. Remove the 4 3/8 inch mounting bolts.
  - d. Remove filter housing, (Refer to Figure 6).
  - e. Remove filter.
  - f. Install filter (RAAAP20879) and O-ring.
  - g. Reinstall filter housing.
  - h. Connect heater wire.
  - i. Connect supply line.
10. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
11. Make appropriate repairs for any other discrepancies found.



**BLUE INDICATOR-DRYER IS WORKING PROPERLY**

**Figure 1**



**LAVENDER INDICATOR-DRYER IS SUSPECT**

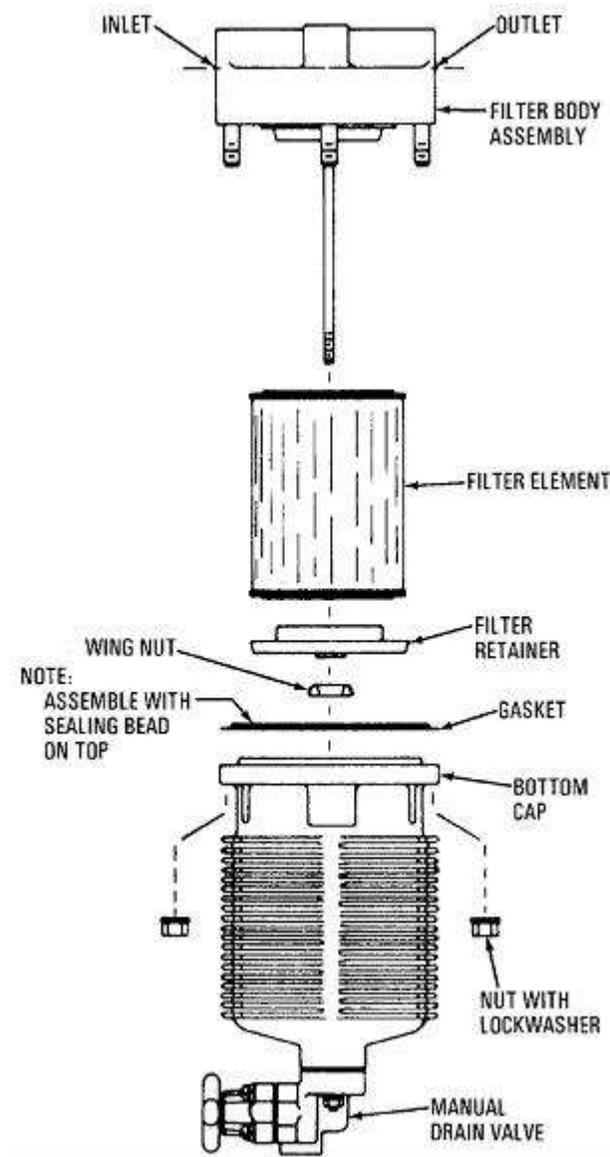
**Figure 2**



**WHITE INDICATOR-DRYER DAMAGED**  
**Figure 3**



**YELLOW/BROWN/BLEU GREEN INDICATOR-DAMAGED DRYER**  
**Figure 4**



**DIRT COLLECTOR**  
**Figure 5**



**FILTER**  
**Figure 6**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AP1-0006	<b>Title</b> Change Air Compressor Air Filter	
<b>Revision</b> 0	<b>Date</b> 10/28/2015	<b># of Pages</b> 3
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Air Compressor Air Filter (1 EA P/N RAAAP10882)	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### **WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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### **WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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### **FUNCTIONS:**

Removes airborne contaminants prior to entering air compressor and main air supply

### **FAILURE MODES TO IDENTIFY:**

Clogged, dirty or damaged filter element; damaged filter housing; loose or missing hardware

### **PROCEDURE:**

1. Verify engine is shut down.

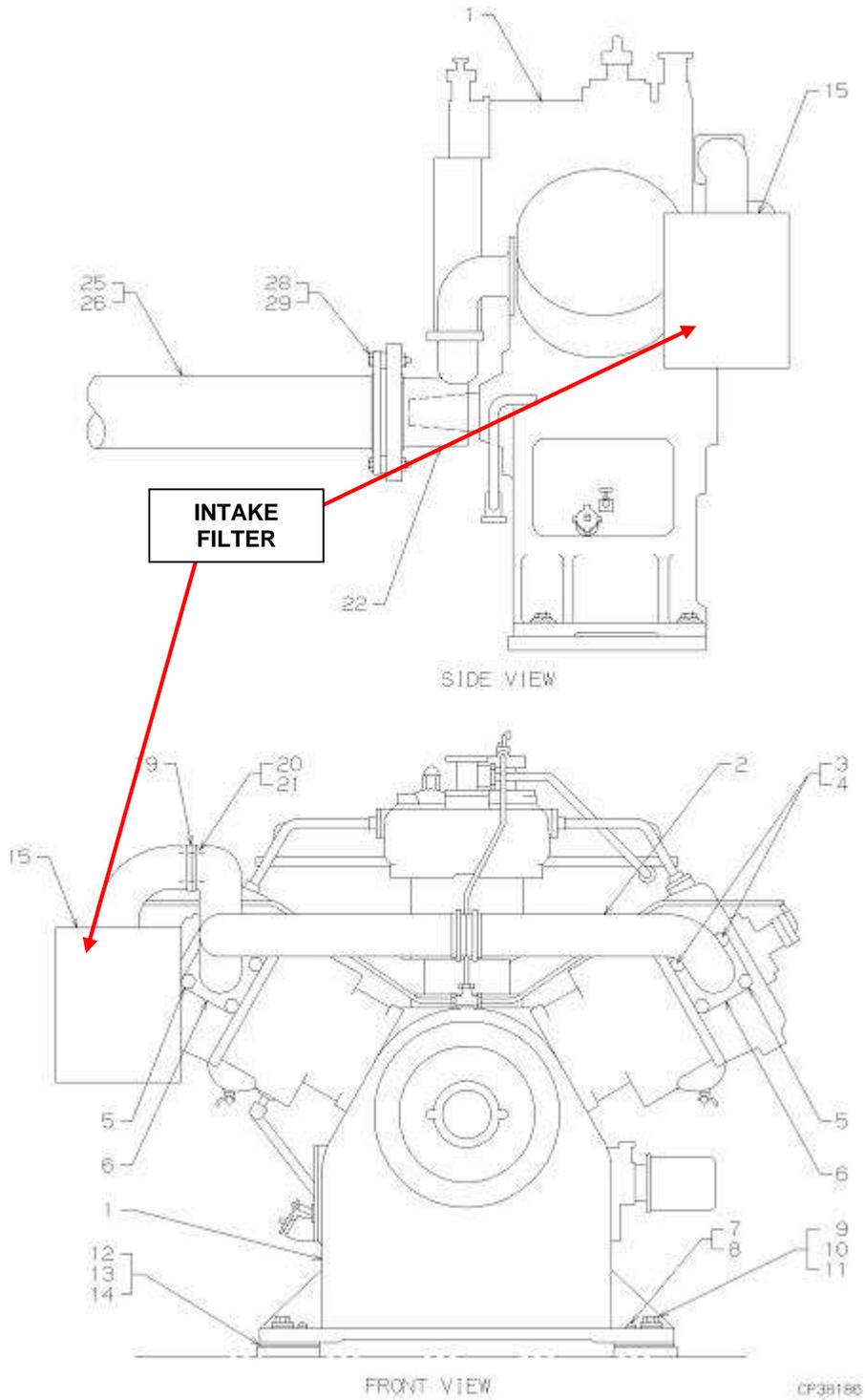
### **WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

---

2. Remove nut securing filter cover end plate, (Refer to Figure 1).
3. Remove end plate.
4. Remove air compressor air filter, (Refer to Figure 2).
5. Clean filter housing by wiping cavity with clean rag.
6. Install new air filter.
7. Install filter cover end plate by securing in place with nut, (Refer to Figure 3).
8. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.

9. Make appropriate repairs for any other discrepancies found.



**AIR COMPRESSOR INTAKE FILTER**  
**Figure 1**



**AIR FILTER REMOVE**  
**Figure 2**



**INSTALL AIR FILTER CAP**  
**Figure 3**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AP1-0005	<b>Title</b> Change Air Compressor Oil Filter
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Rags; 55 Gallon Collection Container; Ziploc Bag; Sullube 32 (AAMMS#37 225 01740); Air Compressor Oil Filter (AAMMS#26-518-01070)
<b>Completed By (Print Name)</b>	<b>Signature</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides lubrication for air compressor

**FAILURE MODES TO IDENTIFY:**

Cracked; lube oil dilution; water contamination; lube oil filter failure; lube oil sample out of specifications, particulate contamination

**PROCEDURE:**

1. Verify engine is shut down and cooled down.

**WARNING**

**ENGINE MAY BE HOT IF RECENTLY SHUT DOWN. TAKE PROPER PRECAUTIONS.**

**WARNING**

**AVOID EYE CONTACT, INHALATION, AND PROLONGED SKIN CONTACT WITH OIL. AVOID INGESTION. WASH EXPOSED SKIN THOROUGHLY AFTER HANDLING. FAILURE TO COMPLY MAY RESULT IN PERSONAL INJURY.**

2. Remove air compressor oil filter using a filter wrench, (Refer to Figure 1).

- a. Dispose of filter IAW local, state, and federal regulations.
3. Install new oil filter.
4. Put the ENGINE CONTROL switch to the "START" position.
  - a. Start the engine.
5. Check for oil leaks after compressor starts.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any discrepancies found.



**OIL FILL**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AP1-0003	<b>Title</b> Change Oil and Conduct Operational Test of Air Compressor	
<b>Revision</b> 0	<b>Date</b> 10/28/2015	<b># of Pages</b> 2
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 360 Days
<b># Personnel</b> 1 QP; 1QMP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Air Compressor oil (Shell Turbo T 32 P/N 137020027)	<b>Special Tools</b> 9/32 inch Orifice Tester
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provide sufficient air for operating the locomotive

**FAILURE MODES TO IDENTIFY:**

Broken unloader valve; worn compression ring(s)

**PROCEDURE:**

**WARNING**

**BEFORE BEGINNING THIS PROCEDURE THE LOCOMOTIVE MUST BE CHOCKED TO PREVENT MOVEMENT.**

1. Ensure locomotive is secured with hand/parking brake and chocks.
2. Install 9/32 inch orifice gladhand onto main reservoir hose.
3. Ensure locomotive is running to increase air pressure in brake system.
4. Open the MAIN RESERVOIR CUTOFF valve attached to the 9/32 inch orifice tester when air pressure is between 130-140 PSI.
5. Place ENGINE CONTROL switch in the "RUN" position.
6. Place the throttle handle in the "4" position.
  - a. Verify the air compressor speed (RPM) is at 700.
7. Monitor main reservoir air pressure on main reservoir gauge on control stand.

- a. Verify that the compressor maintains between 90-100 PSI for three minutes.
8. Return throttle handle to "IDLE" position.
9. Close MAIN RESERVOIR CUTOFF valve.
10. Remove orifice tester from the main reservoir connection.
11. Put ENGINE CONTROL switch in the "ISOLATE" position.
12. Check dirty oil tank for room.
  - a. Ensure there is enough oil in clean oil tank.
13. Remove fill cap.
14. Hook up oil drain to locomotive (left side of locomotive).
15. Check dirty oil to drain filters.
16. Open oil DISCHARGE valve.
17. Start Air Operated Pump (AOP).
18. Ensure all old oil has been removed from compressor by viewing fill port.
19. Secure AOP.
20. Close oil DISCHARGE valve.
21. Add oil to correct level.
22. Install fill cap
23. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required (Add signature block to confirm oil change).
24. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AP1-0002	<b>Title</b> Service Air Compressor
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Clean Rags; 2 Gaskets (1 EA, P/N RAAAP14788, 1 EA, P/N RAAAP14789) Safety Wire; Breather Valve (1 EA)
<b>Completed By (Print Name)</b>	<b>Signature</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provide for the removal of harmful vapors from the crankcase

**FAILURE MODES TO IDENTIFY:**

Cracked, burned, missing, or clogged air compressor

**PROCEDURE:**

1. Verify engine is shut down.
2. Remove crankcase breather from compressor.
  - a. Remove crankcase breather housing cap, (Refer to Figure 1).
  - b. Lift crankcase breather out of housing.
  - c. Remove surface dirt from BREATHER valve with clean rag, (Refer to Figure 2).
  - d. Shine a flashlight through BREATHER valve.
    - (1) Replace BREATHER valve if light can be seen through BREATHER valve.
  - e. Place BREATHER valve into housing.
    - (1) Ensure "This Side Up" marking is up.

- f. Reinstall BREATHER valve housing cap.
  - (1) Apply safety wire to the housing cap.
3. Reinstall crankcase breather onto compressor.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**BREATHER HOUSING CAP**

**Figure 1**



**BREATHER VALVE**

**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AC1-0013	<b>Title</b> Inspect HVAC Filters, Clean/Change as necessary
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**WARNING**

**USE CARE WHEN CLIMBING ONTO AND OFF OF LOCOMOTIVE ROOF.**

**FUNCTIONS:**

Provides air filtration and proper air flow across evaporator coils for efficient A/C unit operation

**FAILURE MODES TO IDENTIFY:**

Clogged, dirty or damaged filter; damaged filter housing; loose or missing hardware

**PROCEDURE:**

1. Ensure air conditioner is "OFF".
2. Remove and clean the condenser inlet filters (replace filters if necessary):
  - a. Unbolt the HVAC panels on the condenser unit located on the locomotive roof.
  - b. Remove condenser inlet filters.
    - (1) Inspect filters, replace as necessary.
    - (2) If retained, clean filters with water.
      - (a) Inspect cleaned filters, replace as necessary.
  - c. Install clean or new filters.
  - d. Reinstall HVAC panels on the condenser unit.

3. Remove and clean the evaporator inlet filter (replace filter if necessary):
  - a. Unbolt the HVAC panel on the evaporator unit in locomotive cab.
  - b. Remove evaporator inlet filter.
    - (1) Inspect filter, replace as necessary.
    - (2) If retained, clean filter with water.
      - (a) Inspect cleaned filter, replace as necessary.
  - c. Install clean or new filter.
  - d. Reinstall HVAC panel on the evaporator unit.
4. Return air conditioner to original configuration ("ON" / "OFF").
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AC1-0012	<b>Title</b> Inspect HVAC Filters, Clean/Change as necessary
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Filters
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides air filtration and proper air flow across evaporator coils for efficient A/C unit operation

**FAILURE MODES TO IDENTIFY:**

Clogged, dirty or damaged filter; damaged filter housing; loose or missing hardware

**PROCEDURE:**

1. Ensure air conditioner is "OFF".

**NOTE**

Ensure filters are installed according to indicated (arrow) direction of proper air flow.

2. Remove and clean the condenser inlet filter (replace filter if necessary):

**WARNING**

**USE CARE TO AVOID INJURY WHEN OPENING HVAC ACCESS DOOR**

- a. Unlatch the HVAC access door outside the fireman's side, (PHI engine).
  - (1) Open the HVAC access door.
- b. Remove condenser inlet filter.
  - (1) Inspect filter, replace as necessary.

- (2) If retained, clean filter with water.
    - (a) Inspect cleaned filter, replace as necessary.
  - c. Install clean or new filter.
  - d. Close HVAC access door.
    - (1) Secure latches to access door.
- 3. Replace the fresh air inlet filter:
  - a. Ensure FRESHER AIR MU breaker is open.
  - b. Unlatch the small access door at left of ladder outside on the engineer's side.
    - (1) Open the access door.
  - c. Rotate filter retaining tabs.
    - (1) Open retainer.
  - d. Remove fresh air inlet filter.
    - (1) Discard filter.
  - e. Insert new filter.
  - f. Close retainer.
    - (1) Rotate tabs to secure it.
  - g. Close access door.
    - (1) Secure latches to access door.
  - h. Close FRESH AIR MU breaker.
- 4. Replace the step well filters:
  - a. Remove bolts from the second step and third step to access each filter in the stairwell.
    - (1) Raise each step.
    - (2) Remove each step well filter.
      - (a) Discard step well filter.
  - b. Insert new step well filter for each step.
  - c. Lower each step into place.
    - (1) Install bolts.
- 5. Return air conditioner to original configuration ("ON" / "OFF").
- 6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
- 7. Make appropriate repairs for any discrepancies found.



**Distribution Statement:**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AC1-0011	<b>Title</b> Conduct Operational Test of Heater/Air Conditioner	
<b>Revision</b> 0	<b>Date</b> 10/28/2015	<b># of Pages</b> 9
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides heating and cooling to the locomotive cab

**FAILURE MODES TO IDENTIFY:**

Damaged electrical wiring or hardware; faulty compressor; refrigerant leak; faulty expansion valve(s); damaged evaporator; faulty thermostat

**PROCEDURE:**

1. Verify main engine is running.
2. Verify HVAC breaker is closed.
3. Activate the air conditioning (A/C) system using the HEATER-A/C SELECTOR switch in the operating cab on the control stand (PHI) or on A/C unit (PH), (Refer to Figure 1).
  - a. Place switch on "Low Cool".
    - (1) Verify discharge air flows from the A/C unit.
    - (2) Verify discharge is approximately 20 degrees cooler than ambient air temperature.
  - b. Place switch to "High Cool" position.
    - (1) Verify increased discharge air flows from the unit.
    - (2) Place switch to "OFF" position.
  - c. Inspect the overhead vent louvers for proper operation, (Refer to Figure 2, Figure 3, Figure 4, Figure 5, and Figure 6).

- d. Inspect the fittings, drain pipes, and drip pan for leaks and other discrepancies, (Refer to Figure 7).
- e. Inspect the sight glass.

#### NOTE

Anticipate a foul smell when first checking the heater if it has not been operated for a significant period of time (e.g. over the summer, since the last 90-day inspection, etc.).

---

- 4. Activate the cab heater using the HEATER-A/C SELECTOR switch in the operating cab on the control stand, (Refer to Figure 8).
  - a. (PH only) Verify circuit breaker(s) are in correct position:
    - (1) On units with single breaker, open the breaker.
    - (2) On units with two breakers, open the A/C breaker and close the heater breaker.
  - b. Place switch on "Low Heat".
    - (1) Verify warm air flow from vents, (Refer to Figure 9).
    - (2) Verify air flow from floor vents, (Refer to Figure 10).
    - (3) Inspect switch labels.
      - (a) Replace switch labels as necessary.
    - (4) Inspect switch for proper operation.
  - c. Place switch on "Medium Heat".
    - (1) Verify increased warm air flow from vents compared to the medium heat airflow.
    - (2) Verify air flow from floor vents.
    - (3) Inspect switch labels.
      - (a) Replace switch labels as necessary.
    - (4) Inspect switch for proper operation.
  - d. Place switch on "High Heat".
    - (1) Verify increased warm air flow from vents compared to the medium heat airflow.
    - (2) Verify air flow from floor vents.
    - (3) Inspect switch labels.
      - (a) Replace switch labels as necessary.
    - (4) Inspect switch for proper operation.
- 5. Place switch vent to "OFF".
- 6. Locate air conditioning filters (3) on top of locomotive.
  - a. Remove air conditioning filter cover (held in place by single pin).
- 7. Inspect air conditioning filter compartment on top of locomotive for the following, (Refer to Figure 11 and Figure 12):
  - a. Damage (binding, bugs, other debris).
  - b. Fan guard for damage.

- c. Fan for proper operation (spins freely without binding).
  - d. Fan blades for damage (nicks, cuts, broken or loose, or missing/broken bolts).
  - e. Wiring for chaffing, cuts, broken or other damage.
  - f. Bolts on fan case and guard for damage.
8. Inspect filters (3).
- a. Clean or replace as necessary.
9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
10. Make appropriate repairs for any other discrepancies found.



**SWITCH IN CAB**

**Figure 1**



**LOUVER INSPECT (VIEW 1)**  
**Figure 2**



**LOUVER INSPECT (VIEW 2)**  
**Figure 3**



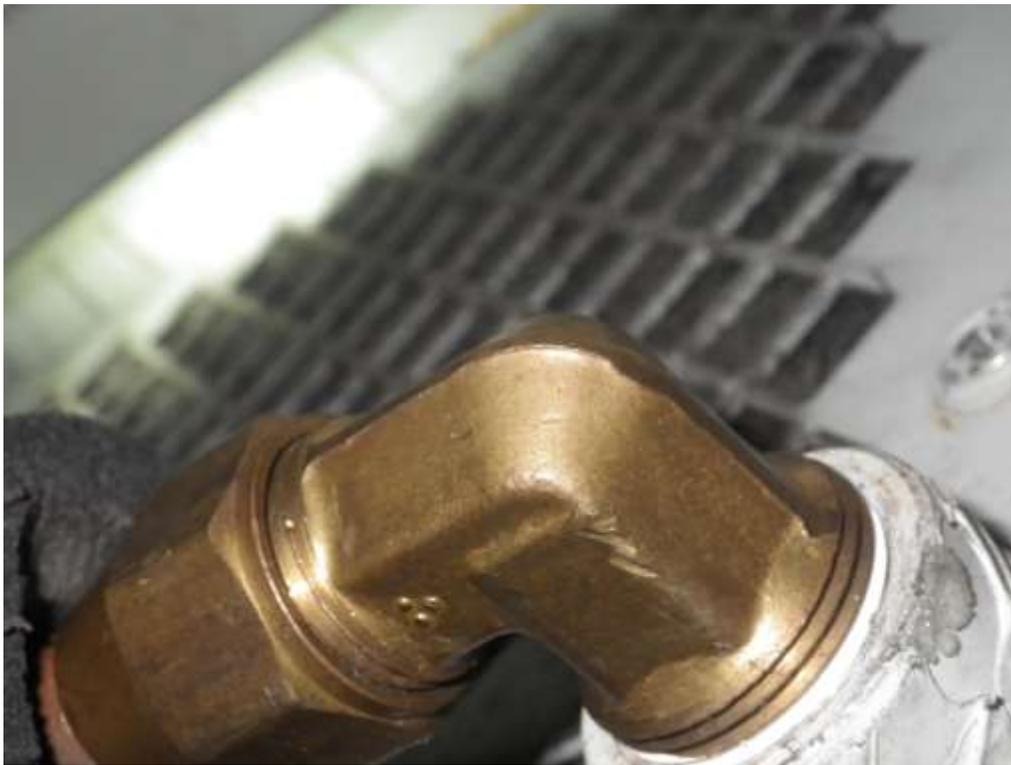
**LOUVER INSPECT (VIEW 3)**  
**Figure 4**



**LOUVER INSPECT (VIEW 4)**  
**Figure 5**



**AIR LINES FOR LOUVERS**  
**Figure 6**



**AC FILTER WITH LINE FOR CONDENSATE**  
**Figure 7**



**HEATER AC SELECTOR SWITCH**  
**Figure 8**



**OVERHEAD AC VENTS IN CAB**  
**Figure 9**



**HEATER CONTROL SWITCH AND HEAT VENTS**  
**Figure 10**



**AC FILTER ON TOP OF CAB**  
**Figure 11**



**AC COMPRESSOR FAN ON TOP OF CAB**  
**Figure 12**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AC1-0010	<b>Title</b> Inspect HVAC Filters	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 5
<b>Equipment</b> Locomotive	<b>Type</b> F59PH/PHI	<b>Frequency</b> 90 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.5 Hours	<b>Total Man Hours</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**WARNING**

**COMPLY WITH THE UNIT'S WORKING ALOFT REGULATIONS. FAILURE TO DO SO MAY RESULT IN INJURY OR DEATH TO PERSONNEL.**

---

**FUNCTIONS:**

Prevents dirt and debris from entering the system

**FAILURE MODES TO IDENTIFY:**

Dirty, clogged or damaged filter

**PROCEDURE:**

1. Complete the following for PH:
  - a. Unbolt covers from condensing unit located on top of locomotive, (Refer to Figure 1).
    - (1) Retain bolts for reinstallation.
    - (2) Remove filter element.
    - (3) Inspect filter element for damage.
      - (a) Replace filter element, if necessary.
  - b. Unbolt cover from the evaporator unit located inside the cab.
    - (1) Retain bolts for reinstallation.
    - (2) Remove filter element.

- (3) Inspect filter element for damage.
    - (a) Replace filter element, if necessary.
  - c. Wash the filter elements using soap and water.
  - d. Inspect filter element for damage.
  - e. Dry filter elements using compressed air.
  - f. Reinstall filter elements.
  - g. Reinstall covers and bolts.
2. Complete the following for PHI:
- a. Open HVAC access door on left side of locomotive, (Refer to Figure 2 and Figure 3).
  - b. Remove filter element, .
  - c. Inspect filter element for damage.
    - (1) Replace filter element, if necessary.
  - d. Wash filter element using soap and water.
  - e. Inspect for damage.
    - (1) Replace filter element, if necessary.
  - f. Dry filter elements using compressed air.
  - g. Reinstall filter element.
  - h. Close HVAC access door.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**HVAC FILTER**

**Figure 1**



**PHI LOCOMOTIVE – LEFT SIDE WITH HVAC FILTER ACCESS PANEL**  
**Figure 2**



**LOCOMOTIVE HVAC FILTER ACCESS PANEL (OPEN)**  
**Figure 3**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> WH1-0007	<b>Title</b> Inspect Coach/Lounge Wheels	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 3
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.4 Hours	<b>Total Man Hours</b> 0.4 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Transmits motion between car and rail

**FAILURE MODES TO IDENTIFY:**

Broken or missing parts

**PROCEDURE:**

1. Clean road dirt from wheel plates.
2. Inspect all wheels, (Refer to Figure 1):
  - a. Gauge all wheels, (Refer to Figure 2 and Figure 3):
    - (1) Ensure all wheels are in compliance with 49 CFR 229.73, 229.75, and/or 238.30e8.
  - b. Ensure that disc or tread brake wheels are within OEM recommendations for wheel size mismatch.
    - (1) Record tread findings, (Refer to Table 1).
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.

HEIGHT		THK	RIM TREAD	
R1				
L2				
R3				
L4				
R5				
L6				
R7				
L8				

**TREAD FINDINGS**

**Table 1**



**PASSENGER CAR WHEEL SET**

**Figure 1**



**CHECKING WHEEL WITH WHEEL GAUGE**

**Figure 2**



**GAUGE WHEELSETS**

**Figure 3**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> WH1-0003	<b>Title</b> Inspect Wheelsets
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Passenger Car	<b># of Pages</b> 4
<b>Type</b> Coach/Lounge	<b>Frequency</b> 360 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Total Man Hours</b> 1.0 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Special Tools</b> None	
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Transmits motion between car and rail

**FAILURE MODES TO IDENTIFY:**

Broken or missing parts

**PROCEDURE:**

1. Inspect the axles visually for no signs of abnormal wear, movement of wheels, bearings, etc., (Refer to Figure 1).
2. Check brake discs visually (where equipped) for wear, attachment, safety wires, etc., (Refer to Figure 2).
3. Inspect wheels visually for signs of overheating, mechanical damage, and other unsafe conditions, etc., (Refer to Figure 3 and Figure 4).
4. Inspect brake pads visually for proper alignment, thickness (1/4 inch on pads).
5. Check variation in circumference between wheels on the same axle (229.73a).
6. Check variation in diameter between wheelsets in truck (229.73b).
7. Check distance between the inside gauge of flanges (229.73c).
8. Check distance back to back of flanges (229.73d).
9. Check for defects in accordance with 49 CFR 238.303 (8).
10. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.

11. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR AXLE AND WHEELS**

**Figure 1**



**PASSENGER CAR AXLE**  
**Figure 2**



**WHEEL CHECK**  
**Figure 3**



**WHEEL SETS INSPECTION**  
**Figure 4**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0026	<b>Title</b> Inspect Truck Frames	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 3
<b>Equipment</b> Passenger Car	<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.5 Hours	<b>Total Man Hours</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides structural stability for carbody and attaches to running gear

**FAILURE MODES TO IDENTIFY:**

Damaged, missing or improperly adjusted parts

**PROCEDURE:**

1. Inspect truck frames for rubbing or abrasion, (Refer to Figure 1 and Figure 2).
2. Check suspension system for the following:
  - a. Safety hangers.
  - b. Coil spring condition.
  - c. No parts cracked or broken.
  - d. Springs not fully compressed.
  - e. Shock absorbers not leaking or broken.
3. Check truck for the following:
  - a. Tie bars not loose.
4. Check side bearings for the following:
  - a. Springs/support not broken.
  - b. No contact (unless so designed).
  - c. Maximum clearance within OEM recommendations.

5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR TRUCK**

**Figure 1**



**SWINGHANGERS**  
**Figure 2**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0015	<b>Title</b> Visually Inspect Vertical, Lateral and YAW Dampers	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 2
<b>Equipment</b> Passenger Car	<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.75 Hours	<b>Total Man Hours</b> 0.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provide support for the weight of the locomotive, transmits power to the rail(s) and responsive braking to limit speed of locomotive

**FAILURE MODES TO IDENTIFY:**

Excessive wear; sharp flange; shelling, cracks, flat spots, out of limits rim thickness; cracked or broken axle; missing cap(s); worn bushing(s), worn or broken brake shoe(s)

**PROCEDURE:**

1. Complete the YAW damper inspection, (Refer to Figure 1):
  - a. Inspect each YAW damper bracket on the truck and carbody side(s) visually for the following discrepancies:
    - (1) Loose or missing mounting hardware.
    - (2) Bent, cracked or misaligned bracket(s).
  - b. Inspect the YAW damper visually for the following discrepancies:

**NOTE**

A light film of hydraulic fluid on the body is normal and not condemnable.

---

- (1) Leaking fluid indicated by clearly formed droplets on the shock.
- (2) Improperly secured mount(s).
- (3) Worn bushing(s).

- (4) Physical damage.
- 2. Complete the vertical and lateral shock inspection:
  - a. Inspect all mounting hardware and brackets on both ends visually ensuring they are in place and properly secured.
  - b. Inspect each shock for the following:

**NOTE**

A light film of hydraulic fluid on the body is normal and not condemnable.

- (1) Leaking fluid indicated by clearly formed droplets on the shock.
  - (2) Improperly secured mount(s).
  - (3) Worn bushing(s).
  - (4) Physical damage.
- 3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  - 4. Make appropriate repairs for any other discrepancies found.



**YAW DAMPER**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0014	<b>Title</b> Inspect Truck Piping
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.4 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides compressed air for air brakes

**FAILURE MODES TO IDENTIFY:**

Cracked or broken piping

**PROCEDURE:**

1. Inspect truck piping and connections, (Refer to Figure 1):
  - a. Check for proper securement/attachment.
    - (1) Ensure nothing is loose or rattling.
  - b. Check for overall condition for the following:
    - (1) No leaks.
    - (2) Rubbing.
    - (3) Worn through.
    - (4) No damage.
  - c. Tighten or replace components as necessary.
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**TRUCK PIPING AND CONNECTIONS**

**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0009	<b>Title</b> Inspect Equalizers	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

To distribute the weight of the carbody between wheelsets in a truck frame

**FAILURE MODES TO IDENTIFY:**

Broken or missing parts; improper alignment and/or travel of adapter

**PROCEDURE:**

1. Inspect the following for wear and that proper height equalizer seat has been applied, (Refer to Figure 1 and Figure 2):
  - a. Equalizers.
  - b. Equalizer seats.
  - c. Associated parts.
2. Inspect equalizers for cracks and evidence of rubbing against the truck frame.
3. Inspect journal bearing end cap securement and adapter wear plates.
4. Inspect for proper alignment and travel of journal box adapter within pedestal jaws.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR TRUCK**  
**Figure 1**



**EQUALIZER**  
**Figure 2**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0007	<b>Title</b> Inspect Swinghangers	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 3
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Suspends carbody in truck frame

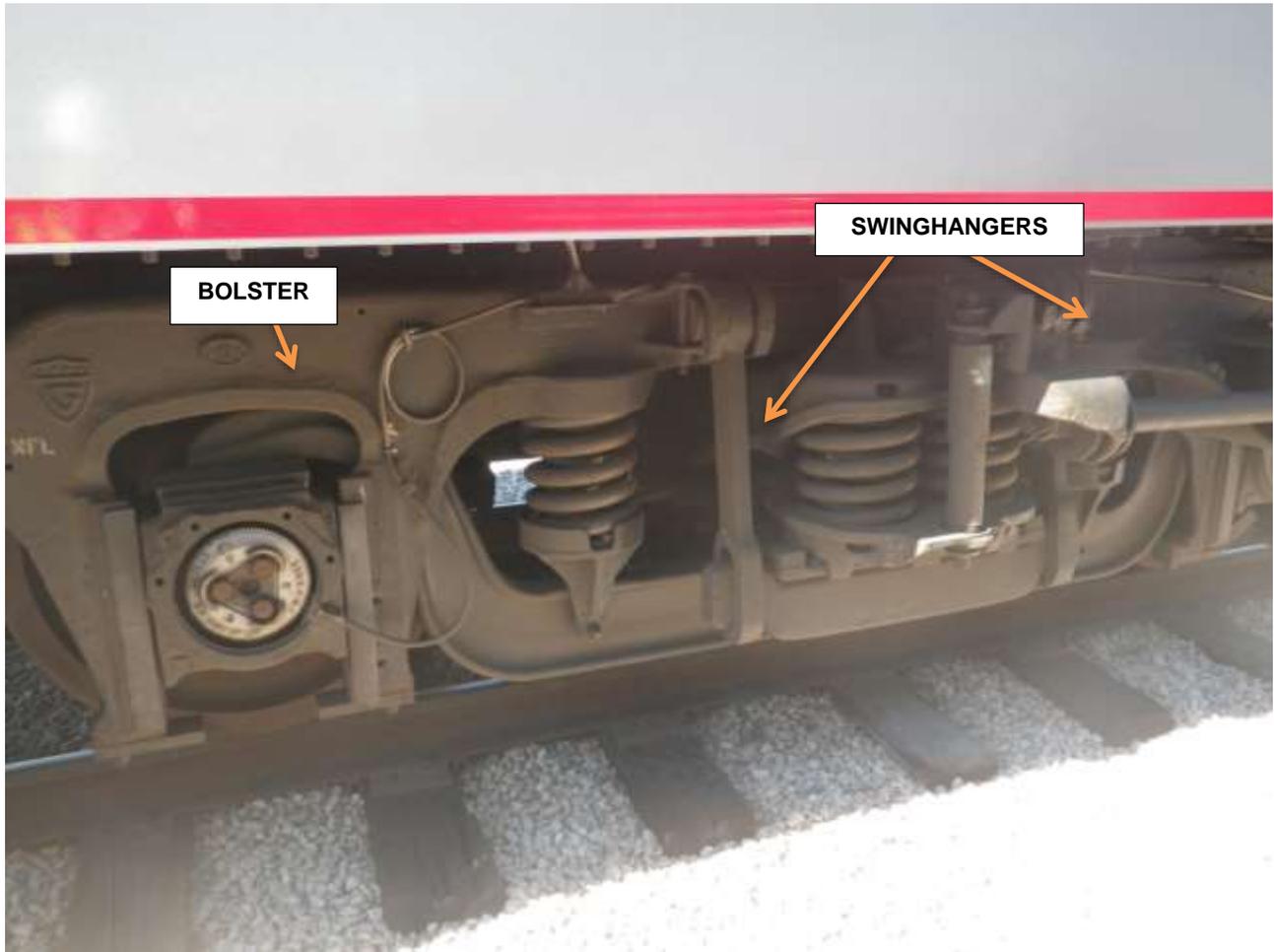
**FAILURE MODES TO IDENTIFY:**

Broken or missing parts

**PROCEDURE:**

1. Inspect the following for wear and misalignment, (Refer to Figure 1 and Figure 2):
  - a. Swinghangers.
  - b. Pins.
  - c. Bushings.
  - d. Crossbars.
2. Inspect bolster anchor rods:
  - a. Ensure assembly is tight.
    - (1) Shim or adjust as necessary.
      - (a) Ensure an equal distance on both sides.
      - (b) Ensure any adjustments are made on a straight track.
  - b. Ensure rubber in good condition.
  - c. Ensure there is a cotter pin or other locking mechanism on restraining nut.
3. Repair or replace as necessary.

4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**RAIL CAR TRUCK**  
**Figure 1**



**SWINGEHANGER**  
**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0006	<b>Title</b> Inspect Pedestal Liners	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Passenger Car	<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Allows for controlled movement of wheel sets within pedestal frame

**FAILURE MODES TO IDENTIFY:**

Excessive liner clearance

**PROCEDURE:**

1. Inspect total clearance between pedestal liners to ensure that the total does not exceed 3/8 inch, (Refer to Figure 1).
2. Inspect each pedestal liner to ensure wear has not exceeded a thickness of 3/32 inch.
3. Inspect pedestal tie straps for proper securement.
4. Ensure proper mounting with approved fastener.
5. Replace as required.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR TRUCK**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0005	<b>Title</b> Inspect Center Casting	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Passenger Car	<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

---

**FUNCTIONS:**

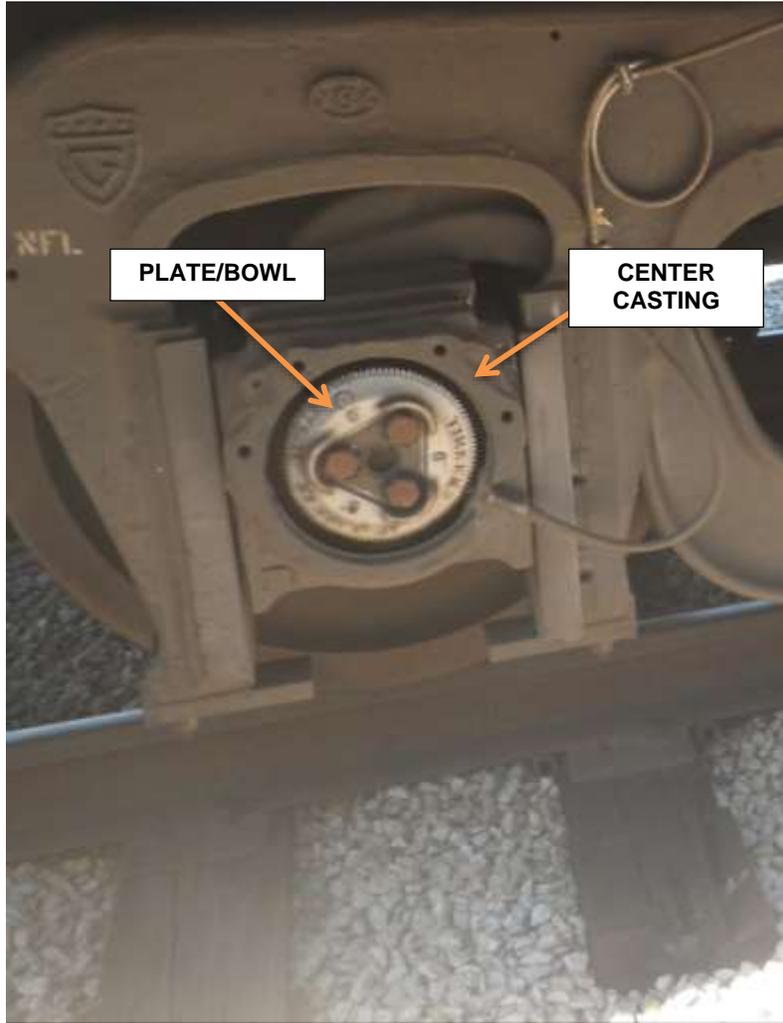
Provides for free movement of truck frame

**FAILURE MODES TO IDENTIFY:**

Cracked, broken or missing parts

**PROCEDURE:**

1. Ensure car is jacked up and wheel set removed to complete this procedure.
2. Ensure that all center castings on trucks are not cracked or broken, (Refer to Figure 1).
3. Ensure that center plate/bowl have no missing or cracked bolts.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**CENTER CASTING**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TR1-0004	<b>Title</b> Inspect Truck to Carbody Attachment
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Passenger Car	<b># of Pages</b> 2
<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.2 Hours
<b>Total Man Hours</b> 0.2 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Special Tools</b> None	
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Ensure carbody is properly secured to truck frame

**FAILURE MODES TO IDENTIFY:**

Damaged or worn attachments

**PROCEDURE:**

1. Ensure that all trucks are equipped with a device or securing arrangement to prevent the truck and carbody from separating in case of derailment, (Refer to Figure 1 and Figure 2).
2. Inspect center pins and locking mechanisms for proper condition and securement.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**SECUREMENT**  
**Figure 1**



**SECUREMENT NUT**  
**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> TL1-0001	<b>Title</b> Test 27 Point Control and Communication/MU	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 4
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP; 1 QP	<b>Estimated Task Duration</b> 2.0 Hours	<b>Total Man Hours</b> 4.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Multimeter (set for Ohms); Long Jumper Wire (90 feet, must have COMM receptacle pin on one end)
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides communication between cars

**FAILURE MODES TO IDENTIFY:**

Broken or missing pins

**PROCEDURE:**

**NOTE**

All testing done with Public Address (P.A.) unit removed from housing.

1. Complete the continuity test by starting with the COMM receptacle, (Refer to Figure 1):
  - a. Connect the receptacle pin of the jumper wire to pin 1 of the 27 pin COMM receptacle on the car.

**WARNING**

**USE EXTREME CAUTION WHEN USING A MULTIMETER TO MEASURE VOLTAGES. DO NOT TOUCH POWER TERMINALS. FAILURE TO COMPLY COULD RESULT IN PERSONNEL INJURY OR DEATH.**

- b. Use the multimeter (set to Ohms) at the other end of the car to measure the resistance between the jumper wire and pin 1 of the COMM receptacle.

- c. Ensure that there is about 1 ohm or less resistance.

**NOTE**

Some pins cross going through the car COMM system (14 and 15, 16 and 17, and 18 and 23. Pins 18 through 23 and pin 26 are unused on coaches and some require loop relay to be energized for continuity. If this is the case, disregard.

---

- d. Continue with continuity test for the rest of the pins until all are complete.
2. Complete the continuity test for the MU receptacles:
    - a. Connect the receptacle pin of the jumper wire to pin 1 of the 27 pin MU receptacle on the car.

**WARNING**

**USE EXTREME CAUTION WHEN USING A MULTIMETER TO MEASURE VOLTAGES. DO NOT TOUCH POWER TERMINALS. FAILURE TO COMPLY COULD RESULT IN PERSONNEL INJURY OR DEATH.**

---

- b. Use the multimeter (set to Ohms) at the other end of the car to measure the resistance between the jumper wire and pin 1 of the MU receptacle.
- c. Ensure that there is about 1 ohm or less resistance.

**NOTE**

Pins 8 and 9 cross in the MU system.

---

- d. Check from side to side at both ends once end to end is checked.
  - e. Ensure that the wires do not cross from side to side.
3. Complete the ground test for the COMM and MU receptacles:
    - a. Use the multimeter (set if Ohms) to check each pin to ground on the carbody.

**NOTE**

Pins 1 and 2 in COMM will show continuity to ground. Pin 1 is the shield, Pin 2 is battery negative (-).

---

- b. Ensure there is no continuity to ground.

**NOTE**

The short test is only necessary at one of each receptacle (COMM and MU).

---

4. Complete the short test:
  - a. Use the multimeter (set to Ohms) to check each pin to every other pin in the receptacle.
  - b. Ensure there is not continuity between pins.
5. Test 27 point control trainline circuits, (Refer to Figure 2):
  - a. Apply 27 pt. jumper to each end (blue to white receptacles).
  - b. Check that corresponding loop relay picks up and drops out.

- (1) Remove jumper when finished.
- c. Test diodes on loop relay panel for proper operation.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



**MU, COMM, AND DUMMY RECEPTACLES**

**Figure 1**



**27 PIN RECEPTACLE**

**Figure 2**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> PL3-0003	<b>Title</b> Change Potable Water Filter
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Passenger Car	<b># of Pages</b> 4
<b>Type</b> Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.2 Hours
<b>Total Man Hours</b> 0.2 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> Filter, Potable Water, Coffee Maker (RAAPL35469)
<b>Special Tools</b> None	
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Ensures clean water for coffee

**FAILURE MODES TO IDENTIFY:**

Dirty, clogged or damaged filter

**PROCEDURE:**

1. Close CUT-OUT valve located inside the cabinet, (Refer to Figure 1).
2. Open faucet to relieve pressure, (Refer to Figure 2).
3. Replace the potable water filter (coffee pot filter), (Refer to Figure 3).
4. Open CUT-OUT valve.
5. Allow water to flush filter.
6. Close faucet.
7. Run water through coffee maker to flush.
8. Check for leaks.
9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
10. Make appropriate repairs for any other discrepancies found.



**CUT OUT VALVE**  
Figure 1



**FAUCET**  
**Figure 2**



**POTABLE WATER FILTER**  
**Figure 3**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> PL3-0002	<b>Title</b> Service Potable Water Tank	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 3
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Chlorine/Bleach	<b>Special Tools</b> Potable Water Hose
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

### FUNCTIONS:

Provides potable water to passengers and crew

### FAILURE MODES TO IDENTIFY:

Unsanitary condition; contaminated water tank

### PROCEDURE:

1. Open POTABLE WATER TANK DRAIN valve, (Refer to Figure 1 and Figure 2).
  - a. Drain water.
2. Add one gallon of bleach and potable water to the potable water tank, (Refer to Figure 3).
  - a. Close POTABLE WATER TANK DRAIN valve.
  - b. Attach a caution tag with date bleach is added to system on valve, (Refer to Figure 4).
3. Allow system to sit for at least one hour.
4. Open POTABLE WATER TANK DRAIN valve.
  - a. Drain chlorinated water.
5. Close POTABLE WATER TANK DRAIN valve.
6. Fill the potable water tank with potable water, using appropriate hose.
7. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
8. Make appropriate repairs for any other discrepancies found.



**POTABLE WATER DRAIN VALVE**  
Figure 1

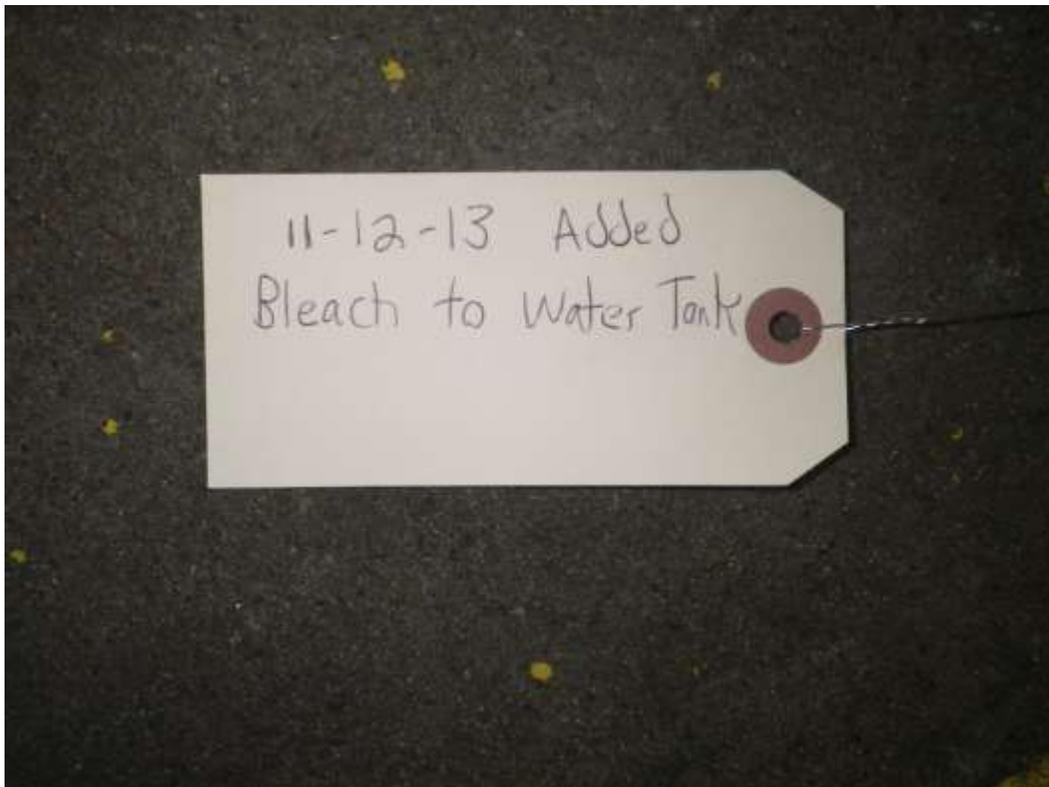


**WATER FLUSH**  
Figure 2



**ADDING BLEACH TO SYSTEM**

**Figure 3**



**CAUTION TAG WITH DATE**

**Figure 4**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> PL2-0002	<b>Title</b> Inspect Operation of Toilets	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Passenger Car	<b>Type</b> Coach	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 2.0 Hours	<b>Total Man Hours</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides restrooms for passengers

**FAILURE MODES TO IDENTIFY:**

Broken or missing parts

**PROCEDURE:**

1. Remove shroud, (Refer to Figure 1).
  - a. Inspect for leaks or other defects.
  - b. Repair or replace toilet as necessary.
2. Reinstall shroud.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**TOILET**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> PC1-0002	<b>Title</b> Schedule Rodent Control Service
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge
<b># Personnel</b> Vendor	<b>Estimated Task Duration</b> TBD Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides safe environment for passengers

**FAILURE MODES TO IDENTIFY:**

Unsanitary conditions

**PROCEDURE:**

1. Use an approved vendor to perform intensive mouse trapping.
  - a. Record vendor and date intensive mouse trapping performed, (Refer to Table 1).
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.

Name of Vendor	Date of Trapping

**RECORD OF TRAPPING DATE**

**Table 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> PC1-0001	<b>Title</b> Schedule Car Fumigation
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge
<b># Personnel</b> Vendor	<b>Estimated Task Duration</b> TBD Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides clean carbody interior

**FAILURE MODES TO IDENTIFY:**

Unsanitary condition

**PROCEDURE:**

1. Use an approved vendor to apply Vikane fumigation treatment and glue traps.
  - a. Record vendor and date of treatment, (Refer to Table 1).
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.

Name of Vendor	Date of Treatment

**RECORD OF TREATMENT**

**Table 1**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> IN6-0003	<b>Title</b> Remove and Clean Upholstered Seats
<b>Revision</b> 0	<b>Date</b> 10/26/2015
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge
<b># Personnel</b> 1 Cleaner	<b>Estimated Task Duration</b> 8.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides comfortable seating for passengers

**FAILURE MODES TO IDENTIFY:**

Unsanitary, dirty or damaged seat cushions

**PROCEDURE:**

1. Remove upholstered seat cushions, where installed, (Refer to Figure 1 and Figure 2).
  - a. Clean upholstered seat cushion.
  - b. Reinstall upholstered seat cushions when clean.
2. Remove vinyl seat or booth cushions, where installed, (Refer to Figure 3).
  - a. Clean vinyl seat or booth cushions with an approved cleaner.
  - b. Reinstall vinyl seat or booth cushions when clean.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR UPHOLSTERED SEATS**

**Figure 1**



**PASSENGER CAR UPHOLSTERED SEAT CUSHIONS (REMOVED)**

**Figure 2**



**PASSENGER CAR VINYL SEATING**  
**Figure 3**

**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> IN6-0001	<b>Title</b> Inspect Seats and Luggage Racks	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 4
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides safe passage for customers and luggage

**FAILURE MODES TO IDENTIFY:**

Broken or missing parts

**PROCEDURE:**

1. Ensure that seats and seat attachments (i.e. tray tables, foot rests) are not broken or loose, (Refer to Figure 1, Figure 2 and Figure 3).
2. Ensure that luggage racks/baggage racks are not broken or loose, (Refer to Figure 4).
3. Repair seats and racks as necessary.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR SEATING**  
**Figure 1**



**PASSENGER CAR TRAY TABLE**

**Figure 2**



**PASSENGER CAR FOOT REST**

**Figure 3**



**LUGGAGE/BAGGAGE RACK**  
**Figure 4**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> IN4-0011	<b>Title</b> Clean Lockers	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 4
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 Cleaner	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Storage

**FAILURE MODES TO IDENTIFY:**

Unsanitary conditions

**PROCEDURE:**

1. Clean interior of lockers, (Refer to Figure 1):
  - a. PA system, (Refer to Figure 2).
    - (1) Wipe handset with disinfectant.
  - b. Crew and trash lockers, (Refer to Figure 3).
  - c. Other storage areas.
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**INTERIOR LOCKER**  
**Figure 1**



**PA SYSTEM**  
**Figure 2**



**TRASH COMPARTMENT**  
**Figure 3**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> IN4-0004	<b>Title</b> Remove Dust and Debris	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 4
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 Cleaner	<b>Estimated Task Duration</b> 2.0 Hours	<b>Total Man Hours</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides a safe environment for passengers

**FAILURE MODES TO IDENTIFY:**

Unsanitary conditions, dirty or damaged seat cushions

**PROCEDURE:**

1. Complete the following to remove dust and debris which accumulates in out of the way places:
  - a. Open the access panels, ceiling panels, and all storage areas, (Refer to Figure 1, Figure 2 and Figure 3).
  - b. Turn off the car’s main blower.
  - c. Remove seat cushions, (Refer to Figure 4).
  - d. Use compressed air to complete the following:
    - (1) Blow out the seat frame and between the seat frame and wall.
    - (2) Blow underfloor heat guards.
      - (a) Check that trash and debris does not become lodged on or in the heating elements.
  - e. Reinstall seat cushions.
  - f. Close all areas previously opened when completed.

2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**ACCESS PANEL (OPEN)**

**Figure 1**



**CEILING PANELS**

**Figure 2**



**STORAGE CABINET (OPEN)**  
**Figure 3**



**SEAT CUSHIONS (REMOVED)**

**Figure 4**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> IN3-0001	<b>Title</b> Test Emergency Window	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 4
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 2.0 Hours	<b>Total Man Hours</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides emergency egress for passengers and crew

**FAILURE MODES TO IDENTIFY:**

Broken hardware, missing label

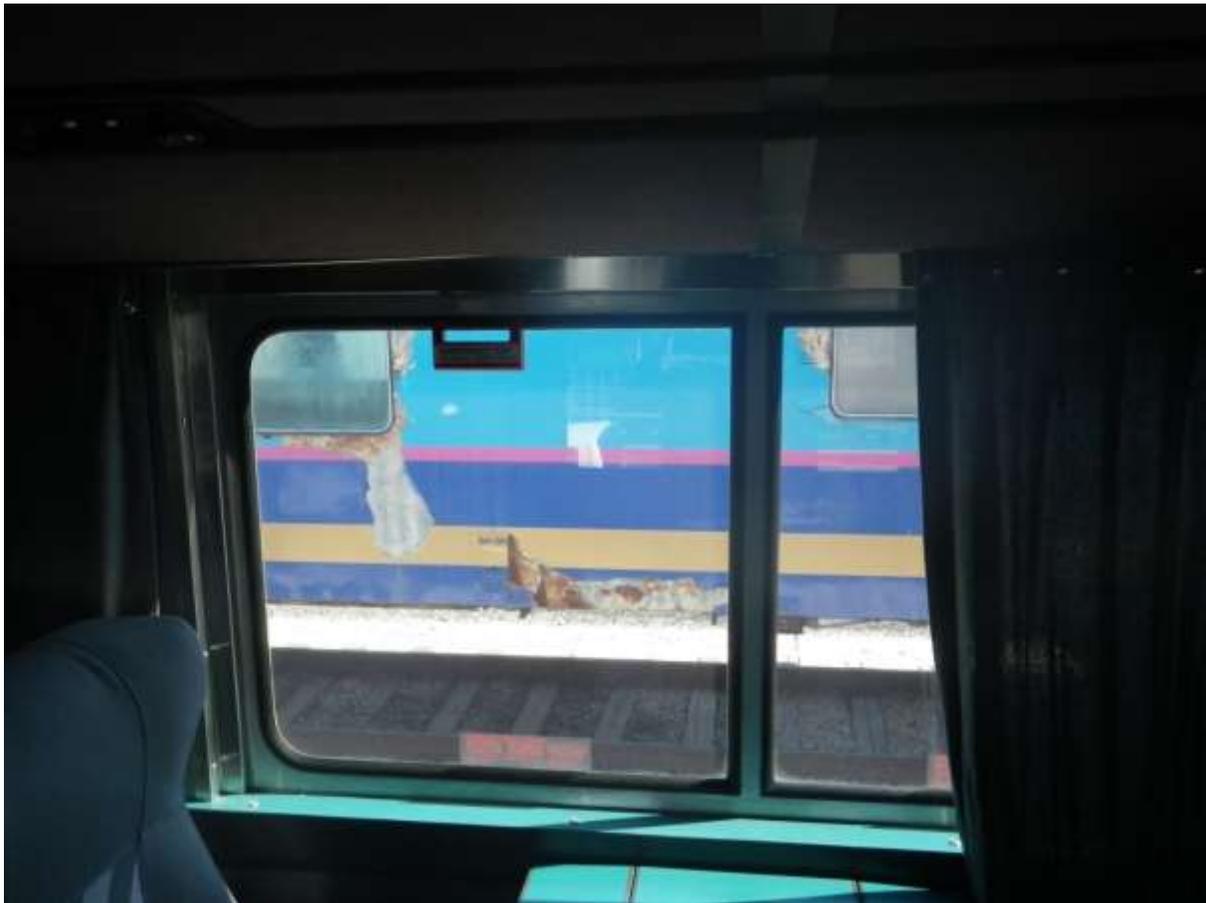
**PROCEDURE:**

1. Test a representative sample of the emergency exit windows to verify that they are operating properly, (Refer to Figure 1, Figure 2, and Figure 3):
  - a. Cycle between left and right side of car according to oldest test date.
    - (1) Remove each emergency portion of the window.
    - (2) Reinstall each emergency portion of the window.
2. Check that all emergency windows are labeled with a calibration sticker above windows so tested with date of test, (Refer to Figure 4).
3. Repair any defects before returning the car to service.
4. Record last date tested, (Refer to Table 1).
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.

Emergency Windows:	Last Date Tested:
BR 1 & 2:	
BR 3 & 4:	
BR 5 & 6:	
BL 1 & 2:	
BL 3 & 4:	
BL 5 & 6:	

**LAST DATE TESTED FOR EMERGENCY WINDOWS**

**Table 1**



**PASSENGER CAR EMERGENCY WINDOW**

**Figure 1**



**EMERGENCY WINDOW REMOVAL**

**Figure 2**



**GASKET REINSTALLATION**

**Figure 3**



**EMERGENCY WINDOW CALIBRATION STICKER**  
**Figure 4**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> IN2-0003	<b>Title</b> Shampoo Carpet	
<b>Revision</b> 0	<b>Date</b> 10/27/2015	<b># of Pages</b> 2
<b>Equipment</b> Passenger Car	<b>Type</b> Coach	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 Cleaner	<b>Estimated Task Duration</b> 4.0 Hours	<b>Total Man Hours</b> 4.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Steam Cleaner/Shampooer
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provide slip free environment for passengers

**FAILURE MODES TO IDENTIFY:**

Unsanitary, dirty, torn or excessively worn carpet

**PROCEDURE:**

1. Shampoo all carpeted areas, (Refer to Figure 1).
2. Put down aisle runner paper to protect carpet.
3. Remove runner paper before returning car to service.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**CARPET DOWN CENTER AISLE OF LOUNGE CAR**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HV1-0002	<b>Title</b> Inspect and Replace Air Hoses As Necessary	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides compressed air for proper operation of air brakes

**FAILURE MODES TO IDENTIFY:**

Broken or cracked hoses

**PROCEDURE:**

1. Inspect all hoses, associated valves, glad hands, and dummy couplings for damage, age, and overall condition at the following locations, (Refer to Figure 1 and Figure 2):
  - a. End of car connection.
  - b. Intermediate hoses.
  - c. Truck hoses.
2. Replace hoses, associated valves, glad hands, and dummy couplings if excessively worn or otherwise damaged.
3. Check dates stamped on hoses.
  - a. Replace hoses if the manufacturer’s date exceeds 8 years.
4. Inspect truck piping and connections:
  - a. Check for proper securement (nothing loose or rattling).
  - b. Check overall condition (nothing leaking, rubbing, worn through, otherwise damaged).
  - c. Tighten components.

- (1) Replace components, as necessary.
- (2) Inspect CONTROL valves and associated components for proper securement.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**AIR HOSES AND GLAD HANDS**

**Figure 1**



**HOSES**

**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HT2-0002	<b>Title</b> Inspect Heater Guard	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.5 Hours	<b>Total Man Hours</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

---

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Protects passengers from contact with electrical element

**FAILURE MODES TO IDENTIFY:**

Guard broken or missing

**PROCEDURE:**

1. Inspect heater guards for proper securement, (Refer to Figure 1).
  - a. Repair heater guards as necessary.
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**HEATER GUARD**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> HT1-0003	<b>Title</b> Inspect Freeze Protection System	
<b>Revision</b> 0	<b>Date</b> 10/26/2015	<b># of Pages</b> 2
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP; 1 QP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Protects piping for potable water

**FAILURE MODES TO IDENTIFY:**

Frozen, cracked pipes and tanks

**PROCEDURE:**

1. Ensure power is "OFF".

**WARNING**

**USE EXTREME CAUTION WHEN USING A MULTIMETER TO MEASURE VOLTAGES. DO NOT TOUCH POWER TERMINALS. FAILURE TO COMPLY COULD RESULT IN PERSONNEL INJURY OR DEATH.**

2. Use a multimeter to check the continuity of, (Refer to Figure 1 and Figure 2):
  - a. Floor and overhead heat elements.
  - b. OGONTZ valve heat elements and Ogontz drain line heat tapes.
  - c. Heat tapes on all drains (water coolers, sinks, etc.).
  - d. Heat tapes on water tank and associated piping equipment.
  - e. Heat tapes on waste tank and associated piping and equipment.
  - f. Activate system.

- (1) Check each circuit and device physically to ensure proper heating.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**OPEN COMPARTMENT DOOR**

**Figure 1**



**FREEZE PROTECTION VALVES AND WIRING**

**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> FS1-0002	<b>Title</b> Clean Food Service Equipment	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 3
<b>Equipment</b> Passenger Car	<b>Type</b> Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 Cleaner	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides food service area for passengers

**FAILURE MODES TO IDENTIFY:**

Unsanitary food service area

**PROCEDURE:**

1. Clean food service equipment as follows, (Refer to Figure 1 and Figure 2):
  - a. Clean and disinfect all counters.
  - b. Clean all storage cabinets.
  - c. Dust the tops of all vending machines.
  - d. Wipe clean the front of all vending machines.
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**FOOD SERVICE AREA**  
**Figure 1**



**VENDING MACHINES**  
**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL5-0002	<b>Title</b> Test Emergency Lighting	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 2
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.75 Hours	<b>Total Man Hours</b> 1.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides lighting during an emergency

**FAILURE MODES TO IDENTIFY:**

Burned out bulbs, broken wiring

**PROCEDURE:**

1. Remove power to car.
2. Ensure that emergency lighting systems are operational for a minimum of 90 minutes following the removal of power, (Refer to Figure 1).
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**EMERGENCY LIGHTING**

**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL3-0007	<b>Title</b> Inspect Electrical Equipment	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 5
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.25 Hours	<b>Total Man Hours</b> 1.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides power to carbody systems

**FAILURE MODES TO IDENTIFY:**

Broken or worn equipment or wires; dirty connectors; loose connections

**PROCEDURE:**

1. Use required lockout/tag-out procedures.
2. Inspect electrical locker equipment for the following, (Refer to Figure 1):
  - a. Loose hardware.
  - b. Loose terminations.
  - c. Insulation or mechanical damage.
  - d. Evidence of smoke, arcing, or overheating.
3. Clean and/or vacuum electric locker and all panels.
4. Inspect undercar junction boxes for the following, (Refer to Figure 2):
  - a. Loose hardware.
  - b. Loose terminations.
  - c. Insulation or mechanical damage.
  - d. Evidence of smoke, arcing, or overheating.
5. Inspect trainline receptacles/lids for the following, (Refer to Figure 3):

- a. Loose hardware.
  - b. Loose terminations.
  - c. Insulation or mechanical damage.
  - d. Evidence of smoke, arcing, or overheating.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  7. Make appropriate repairs for any other discrepancies found.



**ELECTRICAL LOCKER**  
**Figure 1**



**UNDERCAR JUNCTION BOXES**

**Figure 2**



**TRAINLINE RECEPTACLES AND LIDS**

**Figure 3**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL3-0004	<b>Title</b> Test 480 VAC Circuits
<b>Revision</b> 0	<b>Date</b> 11/19/2015
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.2 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides AC power

**FAILURE MODES TO IDENTIFY:**

Improper ground, broken or worn grounding connections

**PROCEDURE:**

1. Use required lockout/tag-out procedures.
  - a. Open main power circuit breaker.
  - b. Tag main power circuit breaker in the "OPEN" position.
2. Set megohmmeter to 500 volts.
  - a. Use megohmmeter to test all 480 VAC circuits for grounds, (Refer to Figure 1).
3. Repair all grounds less than (<) 3 megohms.
4. Remove tag from main power circuit breaker.
5. Close main power circuit breaker.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



**COOLER FOR 480 HIGH VOLTAGE AC**  
**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL3-0003	<b>Title</b> Inspect Circuit Breaker Panels for Proper Covers and Labels	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 1
<b>Equipment</b> Passenger Car	<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Prevents inadvertent contact with live electrical circuits and proper selection of circuit breakers when necessary

**FAILURE MODES TO IDENTIFY:**

Damaged, missing covers or labels

**PROCEDURE:**

1. Ensure that the following apply to all switches:
  - a. Switches are hand operated, carrying currents with potential of more than 150 volts that may be operated while under load are covered and are operative from the outside of the cover.
  - b. A means is provided to display whether the switches are open or closed; and covered.
  - c. Switches not designed to be operated safely while under load are legibly marked with the voltage carried and the words "Must not be operated under load."
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> EL2-0002	<b>Title</b> Inspect and Service Car Batteries	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 4
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours	<b>Total Man Hours</b> 1.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provide DC voltage power to cars

**FAILURE MODES TO IDENTIFY:**

Dirty battery terminals, broken or frayed leads, improperly connected connections, low water

**PROCEDURE:**

1. Service batteries/charger per OEM instructions, (Refer to Figure 1, Figure 2, Figure 3, Figure 4, and Figure 5):
  - a. Clean battery charger.
  - b. Test battery charger.
  - c. Clean batteries.
  - d. Fill batteries, using only distilled water, if necessary.
  - e. Check all battery connections for tightness and approved terminal protection.
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**PASSENGER BAR BATTERY BOXES**  
**Figure 1**



**OPEN BATTERY COMPARTMENT**  
**Figure 2**



**BATTERIES**  
**Figure 3**



**CROSS BAR REMOVAL**  
**Figure 4**



**LEVEL BETWEEN RED LINES INSPECTION**

**Figure 5**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> DO3-0001	<b>Title</b> Inspect Interior Doors	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 3
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.4 Hours	<b>Total Man Hours</b> 0.4 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Secures and provides access to carbody interior

**FAILURE MODES TO IDENTIFY:**

Broken, worn or damaged equipment or hardware

**PROCEDURE:**

1. Inspect all door hinges, locks, latches, etc., (Refer to Figure 1 and Figure 2):
  - a. Adjust all door hinges, locks, latches, etc., if necessary.
  - b. Lubricate all door hinges, locks, latches, etc., if necessary.
2. Check that all mounting hardware is in place and secure.
3. Ensure that doors operate as intended.
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**RESTROOM DOOR**  
**Figure 1**



REAR DOOR  
Figure 2

**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CP1-0007	<b>Title</b> Inspect Coupler to Yoke Pivot Pin and Bushings	
<b>Revision</b> 0	<b>Date</b> 10/29/2015	<b># of Pages</b> 4
<b>Equipment</b> Passenger Car	<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.75 Hours	<b>Total Man Hours</b> 0.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Sledge hammer; Long Bar
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides for vertical, lateral and horizontal movement of the coupler

**FAILURE MODES TO IDENTIFY:**

Worn or damaged coupler shank pin, yoke pin, wear plate, bushing, coupler carrier, or coupler carrier springs, damaged or missing uncoupling rod

**PROCEDURE:**

1. Ensure that coupler does not have the following conditions, (Refer to Figure 1, Figure 2, Figure 3, and Figure 4):
  - a. Distance between the guard arm and the knuckle nose of more than 5-5/16 inches on D&E couplers.
  - b. Crack or break in the pulling face of the knuckle or in the side wall or pin bearing bosses outside of the shaded areas, (Refer to Figure 5).
  - c. Coupler assembly without anti-creep protection.
  - d. Free slack in the coupler or drawbar not absorbed by friction devices or draft gears that exceeds one-half inches.
  - e. Broken or cracked coupler carrier.
  - f. Broken or cracked yoke.
  - g. Broken draft gear.
  - h. Device shall be provided under the lower end of all drawbar pins and articulated connection pins to prevent the pin from falling out of place in case of breakage.

2. Use sledge hammer to drive coupler out until pin is against bushing.

**NOTE**

The difference between these two measurements is the amount of free slack in the draft arrangement. The maximum free slack permitted by 49CFR229.61 is ½ inch.

---

3. Measure and record the clearance between the coupler horn and striker face.
4. Use long bar to push coupler in the opposite direction out until pin is against the other side of bushing.
5. Measure and record the clearance between the coupler horn and striker face.
6. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
7. Make appropriate repairs for any other discrepancies found.



**COUPLING INSPECT**

**Figure 1**



**COUPLING WEAR PLATE**

**Figure 2**

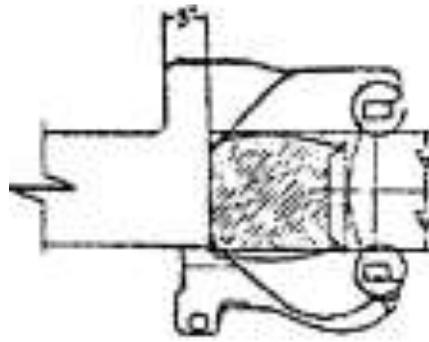


**DRAFT GEAR**

**Figure 3**



**DRAFT GEAR (VIEW 2)**  
**Figure 4**



**COUPLER**  
**Figure 5**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CP1-0006	<b>Title</b> Measure Coupler Height
<b>Revision</b> 0	<b>Date</b> 10/29/2015
<b>Equipment</b> Passenger Car	<b># of Pages</b> 6
<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.2 Hours
<b>Total Man Hours</b> 0.2 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Special Tools</b> None	
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Ability to safely couple the locomotive to another locomotive or car; Allows for mechanical coupling and uncoupling of coupler with moderate mechanical force

**FAILURE MODES TO IDENTIFY:**

Improper adjustment or misaligned coupler

**PROCEDURE:**

NOTE

Prior to performing this procedure, all wheel maintenance truck shimming must be completed.

---

1. Measure 5-½ inch from top of knuckle making a mark to identify the center of the knuckle.
2. Measure from the top of the rail to the center of the knuckle, (Refer to Figure 1).
3. Verify height from top of rail to center of knuckle is 31-½ inches to 34-½ inches, (Refer to Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8, and Figure 9).
4. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
5. Make appropriate repairs for any other discrepancies found.



**DISTANCE FROM RAIL TOP TO KNUCKLE CENTER**  
**Figure 1**



**COUPLING INSPECT**  
**Figure 2**



**COUPLING INSPECT (VIEW 2)**  
**Figure 3**



**COUPLING MEASUREMENT**  
**Figure 4**



**COUPLING MEASUREMENT (VIEW 2)**

**Figure 5**



**COUPLING MEASUREMENT (VIEW 3)**

**Figure 6**



**COUPLING WEAR PLATE**  
Figure 7



**DRAFT GEAR**  
Figure 8



**DRAFT GEAR (VIEW 2)**  
**Figure 9**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CP1-0003	<b>Title</b> Inspect Coupler	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 8
<b>Equipment</b> Passenger Car	<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.75 Hours	<b>Total Man Hours</b> 0.75 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Special Gauge for Locomotives/Cars
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

### FUNCTIONS:

Connect cars and locomotives

### FAILURE MODES TO IDENTIFY:

Worn, damaged components

### PROCEDURE:

1. Ensure that each coupler is in the following condition, (Refer to Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, Figure 8 and Figure 9):
  - a. The distance between the guard arm and the knuckle nose is not more than 5 ½ inches on standard type couplers (MCB contour 1904), or not more than 5 5/16 inches on D & E couplers by using appropriate gauge, (Refer to Figure 10).
  - b. The free slack in the coupler or drawbar is not absorbed by friction devices or draft gears are not more than ½ inch, (Refer to Figure 11).
  - c. The draft gear is not broken, (Refer to Figure 12).
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR COUPLER**

**Figure 1**



**USED TO INSPECT COUPLERS**

**Figure 2**



**COUPLER CONDITION INSPECT (VIEW 1)**

**Figure 3**



**COUPLER CONDITION INSPECT (VIEW 2)**

**Figure 4**



**COUPLER CONDITION INSPECT (VIEW 3)**

**Figure 5**



**COUPLER CONDITION INSPECT (VIEW 4)**

**Figure 6**



**COUPLER CONDITION INSPECT (VIEW 5)**

**Figure 7**

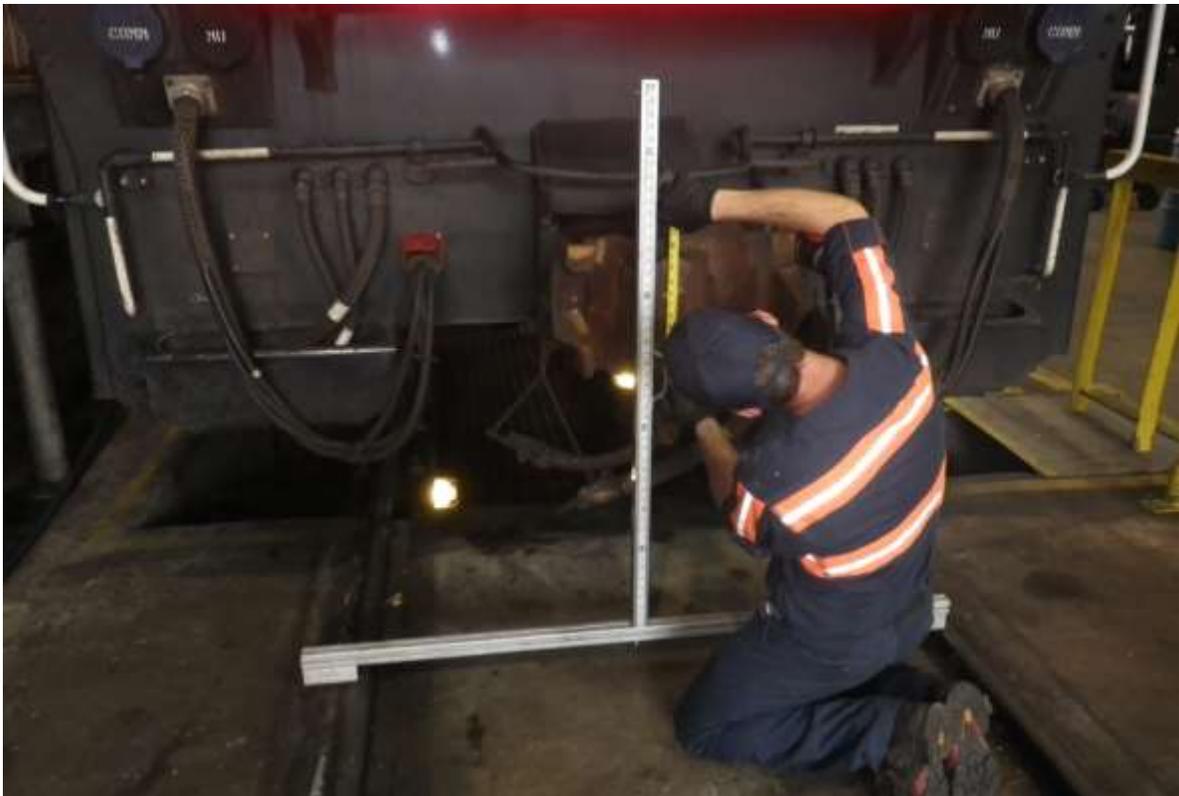


**MANUAL RELEASE FOR COUPLER**

**Figure 8**



**MANUAL RELEASE TO COUPLER**  
**Figure 9**



**CAR COUPLER INSPECT**  
**Figure 10**



**CAR COUPLER INSPECT (2)**

**Figure 11**



**DRAFT GEAR**  
**Figure 12**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CF2-0002	<b>Title</b> Wash Undercar Exterior
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Passenger Car	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provides for motive power for trains

**FAILURE MODES TO IDENTIFY:**

Excessive dirt, dust debris on equipment

**PROCEDURE:**

**NOTE**

Prior to initiating procedure ensure ambient temperature is above 37°F.

1. Notify supervisor if procedure cannot be completed.
2. Ensure main engine is running within normal operating parameters.
3. Ensure locomotive is parked and secured over an approved containment system.
4. Prepare soap mixture with the correct ratio of water to soap.
5. Advance throttle controller to "NOTCH 3".

**CAUTION**

**DO NOT DIRECT THE SPRAY INTO TRACTION MOTORS OR ELECTRICAL EQUIPMENT.**

---

6. Use high volume low pressure applicator to apply approved cleaning solution, (Refer to Figure 1).
7. Use power washer to remove oil, dirt, and debris from undercarriage of locomotive.

8. Retard throttle controller to "IDLE".
9. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
10. Make appropriate repairs for any other discrepancies found.



**EXTERIOR WASH UNDERCAR**

**Figure 1**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CF2-0001	<b>Title</b> Wash Locomotive/Car Exterior
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Locomotive/Cars	<b>Type</b> ALL
<b># Personnel</b> 2 QP	<b>Estimated Task Duration</b> 1.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for motive power for trains

**FAILURE MODES TO IDENTIFY:**

Excessive dirt, dust debris on equipment; dirty windows

**PROCEDURE:**

**NOTE**

Prior to initiating procedure ensure ambient temperature is above 37°F.

1. Ensure locomotive/car is parked over an approved containment system.
2. Rinse locomotive/car body with water.
3. Wash locomotive/car body with approved solution.
4. Rinse locomotive/car body with water.
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CF1-0003	<b>Title</b> Conduct Visual Inspection of Undercar
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Passenger Car	<b># of Pages</b> 2
<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 1.0 Hours
<b>Total Man Hours</b> 1.0 Hours	
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Special Tools</b> None	
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for the connecting of wheel sets and other associated equipment

**FAILURE MODES TO IDENTIFY:**

Cracks, broken, or damaged equipment or components

**PROCEDURE:**

1. Ensure locomotive is over an approved containment area.
  - a. Clean the undercar of the locomotive thoroughly by power washing with water only.
2. Inspect the following equipment visually, (Refer to Figure 1):
  - a. Fuel tank and piping for:
    - (1) Leaks.
    - (2) Cracks or damage.
    - (3) Missing, cracked or loose mounting bolts and safety blocks.
  - b. Running gear for:
    - (1) Excessive or uneven wear.
    - (2) Cracked or broken components.
    - (3) Grounding straps.
  - c. Suspension for:
    - (1) Cracked or broken springs.

- d. Air piping and reservoir tank for:
    - (1) Missing, cracked or loose mounting bolts.
    - (2) Cracks.
    - (3) Leaks.
    - (4) Rubbing or abrasions.
  - e. Electrical lines and connections for:
    - (1) Rubbing or chaffing.
    - (2) Loose connections.
    - (3) Burned or damaged insulation.
    - (4) Exposed wires and cables.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
  4. Make appropriate repairs for any other discrepancies found.



**UNDERCAR INSPECTION**

**Figure 1**



### Distribution Statement

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CF1-0002	<b>Title</b> Inspect Mechanical Systems	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 3
<b>Equipment</b> Passenger Car	<b>Type</b> ALL	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

### WARNING

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

### WARNING

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

### FUNCTIONS:

Provide for safety of crew, passengers, and equipment

### FAILURE MODES TO IDENTIFY:

Excessive oil or grease; any cracks, excessive wear, structural defect, leaks, or broken equipment or parts

### PROCEDURE:

1. Ensure that all mechanical systems and components of the equipment are free of all the following general conditions that endanger the safety of the crew, passengers, or equipment, (Refer to Figure 1 and Figure 2):
  - a. A continuous accumulation of oil or grease.
  - b. Improper functioning of a component.
  - c. A crack, break, excessive wear, structural defect, or weakness of a component.
  - d. A leak.
  - e. Use of a component or system under a condition that exceeds that for which the component or system is designed to operate.
  - f. Insecure attachment of a component.
2. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
3. Make appropriate repairs for any other discrepancies found.



**PASSENGER CAR REAR DOOR AND COUPLER**  
**Figure 1**



**YAW DAMPER**  
**Figure 2**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> CA1-0001		<b>Title</b> Replace Air Filters
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 5
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QP	<b>Estimated Task Duration</b> 0.25 Hours	<b>Total Man Hours</b> 0.25 Hours
<b>Test Equipment</b> None	<b>Supplies</b> Filter, AC 20X16X2, 66 S (RAACA10037); Filter, AC 20X12X1, 56 SE (RAACA15575); Filter, Air, HVAC, Fresh Air (RAAC10877)	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Remove dirt and particulates from air circulation system

**FAILURE MODES TO IDENTIFY:**

Dirty, clogged or damaged filters

**PROCEDURE:**

1. Change out the following after fumigation or IMT.
  - a. Fresh air filters.
  - b. Recirculating air filters.
2. Remove or open applicable access panels and doors, (Refer to Figure 1 and Figure 2).
3. Replace appropriate filters, (Refer to Figure 3, Figure 4 and Figure 5).
4. Close applicable access panels and doors, (Refer to Figure 6).
5. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
6. Make appropriate repairs for any other discrepancies found.



**HVAC AIR FILTERS**  
**Figure 1**



**FILTER ACCESS PANEL**  
**Figure 2**



**FILTER ACCESS PANEL IN OVERHEAD**

**Figure 3**



**FILTER IN OVERHEAD**

**Figure 4**



**FILTER IN OVERHEAD (#2)**  
**Figure 5**



**SECURING PANEL**

**Figure 6**



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> BK4-0001	<b>Title</b> Inspect/Test Hand Brake
<b>Revision</b> 0	<b>Date</b> 10/28/2015
<b>Equipment</b> Passenger Car	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 0.5 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>
	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provides for an independent manual means to apply friction brake(s) to locomotive’s axle(s)

**FAILURE MODES TO IDENTIFY:**

Broken cable; missing/damaged cable run bracket; missing, broken or worn brake shoe(s); missing or damaged hand brake chain stop; corroded hand brake chain; debris lodged in chain

**PROCEDURE:**

**WARNING**

**BEFORE BEGINNING THIS PROCEDURE THE LOCOMOTIVE MUST BE CHOCKED TO PREVENT MOVEMENT.**

1. Ensure locomotive is chocked to prevent movement.
2. Inspect hand brake mechanism inside the engine room visually for the following:
  - a. Loose or missing hardware.
  - b. Missing or damaged hand brake chain stop.
3. Inspect hand brake chain visually for the following discrepancies:
  - a. Corrosion.
  - b. Debris lodged in chain.
4. Inspect hand brake cleat for physical damage.

- a. Ensure that the cleat is securely mounted.
5. Verify brakes are released.
6. Apply hand brake.
7. Verify each brake shoe is applied to its rear truck wheel.
8. Release hand brake.
9. Inspect hand brake chain on engineers' side, adjacent to R3 and R4 wheel visually to verify it has slack.
10. Remove the hand brake cover.
  - a. Lubricate mechanism with spray lubrication.
  - b. Stencil the cover with the date of test and lubrication date.
  - c. Replace cover.
11. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
12. Make appropriate repairs for any other discrepancies found.



**Distribution Statement**

Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> BK1-0001	<b>Title</b> Test Single Car Air Brakes	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 6
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 4 Hours	<b>Total Man Hours</b> 4 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> Single Car Test Device; Appropriate Air Gauges
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

**FUNCTIONS:**

Provide train braking to each car

**FAILURE MODES TO IDENTIFY:**

Broken, damaged, or excessively worn equipment or components

**PROCEDURE:**

1. Perform a single car test as per APTA Standard SS-M-005-98, Rev. 2, (Refer to Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8).
2. Repair all defects before returning the equipment to revenue service.
3. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
4. Make appropriate repairs for any other discrepancies found.



**BLOWDOWN OF BRAKE AND MAIN RESERVOIR LINES 1**  
**Figure 1**



**BLOWDOWN OF BRAKE AND MAIN RESERVOIR LINES 14**  
**Figure 2**



**BLOWDOWN OF BRAKE AND MAIN RESERVOIR LINES 3**  
**Figure 3**



**BLOWDOWN OF BRAKE AND MAIN RESERVOIR LINES 6**  
**Figure 4**



**BLOWDOWN OF BRAKE AND MAIN RESERVOIR LINES 7**

**Figure 5**



**BLOWDOWN OF BRAKE AND MAIN RESERVOIR LINES 11**

**Figure 6**



**BLOWDOWN OF BRAKE AND MAIN RESERVOIR LINES 15**  
**Figure 7**



**BLOWDOWN OF BRAKE AND MAIN RESERVOIR LINES 2**  
**Figure 8**



**Distribution Statement**  
Distribution limited to NCDOT employees and officially authorized contractors.

<b>Procedure #</b> AC1-0002	<b>Title</b> Inspect HVAC Package	
<b>Revision</b> 0	<b>Date</b> 11/19/2015	<b># of Pages</b> 5
<b>Equipment</b> Passenger Car	<b>Type</b> Coach/Lounge	<b>Frequency</b> 180 Days
<b># Personnel</b> 1 QMP	<b>Estimated Task Duration</b> 2.0 Hours	<b>Total Man Hours</b> 2.0 Hours
<b>Test Equipment</b> None	<b>Supplies</b> None	<b>Special Tools</b> None
<b>Completed By (Print Name)</b>	<b>Signature</b>	<b>Completion Date</b>

**WARNING**

**WEAR PERSONAL PROTECTIVE EQUIPMENT AT ALL TIMES WHILE CONDUCTING THIS PROCEDURE.**

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**WARNING**

**PRIOR TO COMMENCING THIS PROCEDURE, COMPLY WITH ALL CODE OF FEDERAL REGULATIONS, TITLE 49, CHAPTER II, PART 218, REQUIREMENTS AND APPLY BLUE SIGNAL PROTECTION.**

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**FUNCTIONS:**

Provide cooling air to passengers and crew

**FAILURE MODES TO IDENTIFY:**

Cracks or damage to HVAC equipment; low oil or Freon levels; dirty, clogged or damaged filters

**PROCEDURE:**

1. Clean condenser and evaporator coils with back flow of low velocity air as required.
2. Inspect the following HVAC Compressor/Condenser and evaporator packages visually, (Refer to Figure 1 and Figure 2):
  - a. Piping.
  - b. Filter/dryer.
    - (1) Replace, if necessary.
  - c. Compressor oil level.
  - d. Freon sight glass for leaks and condition, (Refer to Figure 3).
3. Check condensate drains from evaporator package for proper operation.
4. Perform HVAC pump down test on each package, where applicable.
5. Test each HVAC PRESSURE switch for proper operation (high, low, modulating, etc., (Refer to Figure 4, Figure 5, Figure 6, and Figure 7).
6. Check status of refrigerant charge.

- a. Add refrigerant, if necessary.
7. Check proper operation of cooling and modulating thermostats, SOLENOID and EXPANSION valves.
8. Inspect HVAC equipment resilient mounting bolts, ground straps, etc.
9. Ensure proper operation of thermostats, AIR FLOW switches, OVERTEMPERATURE switches, SHUNT TRIP breakers, elements, etc.
10. Document on MAP-9 all failure modes, unacceptable conditions identified and additional parts required.
11. Make appropriate repairs for any other discrepancies found.



**HVAC COMPRESSOR/CONDENSER UNIT**

**Figure 1**



**HVAC (VIEW 1)**  
**Figure 2**



**HVAC (VIEW 2)**  
**Figure 3**



**HVAC (VIEW 3)**  
**Figure 4**



**HVAC (VIEW 4)**  
**Figure 5**



**HVAC (VIEW 5)**  
**Figure 6**



**HVAC (VIEW 6)**  
**Figure 7**