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**Description of revisions:** *This bulletin replaces the version dated December 2013. The part number for the Bracket Assembly in table 6 has been corrected.*

## General Information

This procedure replaces the original standard mount radiator with an isolated radiator on front-engine-power-takeoff (FEPTO)-snowplow equipped M2 vehicles with EPA07 equipped DD-13 engines.

NOTE: While not normally necessary, in a small number of snowplow installations, the power steering cooler must be relocated forward of the crossmember to provide additional clearance for the new radiator installation. If this is the case, include the "Relocating the Power Steering Cooler and Lines" procedure with the "Radiator Installation" procedure. Order the additional parts in [Table 6](#) along with the radiator replacement parts. If the modifications shown in [Fig. 1](#), [Fig. 2](#), and [Fig. 3](#) can not be done on the vehicle being serviced, and there is no other way to route the existing transmission cooler lines, the power steering cooler may need to be relocated.

## Radiator Removal

1. Park the vehicle on a level surface, shut down the engine, and set the parking brakes. Chock the tires.
2. Disconnect the batteries at the negative post.

### WARNING

**Do not attempt to drain the cooling system until the coolant and engine are cool. Draining the cooling system prior to system cooling could cause severe personal injury due to scalding.**

3. Drain the coolant.
4. Remove the lower coolant hose assembly between the radiator and the transmission cooler, and disconnect the hose between the transmission cooler and the engine at the cooler. See [Fig. 4](#).
5. Disconnect the wiring harness from the hood.
6. Remove the hood. See [Group 88](#) of the *Business Class M2 Workshop Manual*.

NOTE: Once the FEPTO driveline is uncoupled, it will remain in the radiator assembly until the radiator is removed.

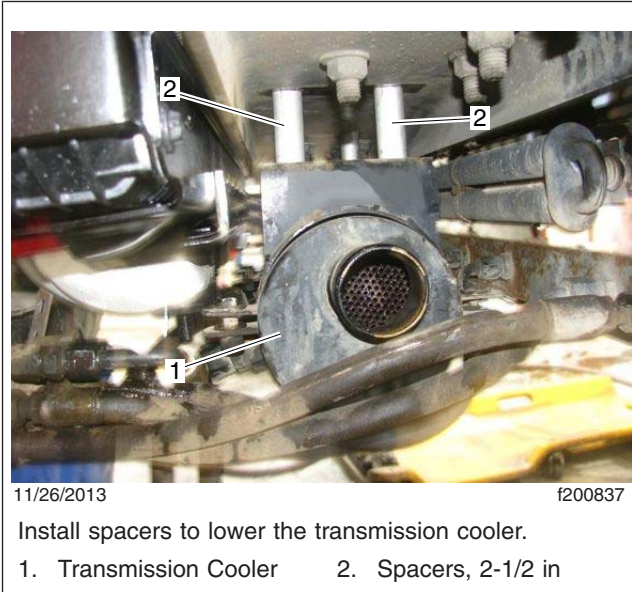
7. Uncouple the FEPTO driveline as follows.
  - 7.1 Unbolt the FEPTO driveline from the engine. See [Fig. 5](#).
  - 7.2 Loosen the setscrew in the slip sleeve, and slide the driveline forward to clear the engine pulley.
  - 7.3 Working through the hole in the front closing cross member, unbolt the FEPTO driveline at the pump.
8. Remove the plow braces.
9. Remove the charge air cooler (CAC) plumbing between the turbocharger outlet and the CAC inlet. See [Fig. 6](#).
10. Remove the CAC plumbing between the CAC outlet and the engine inlet. See [Fig. 7](#).
11. Remove the upper coolant hose. See [Fig. 8](#).

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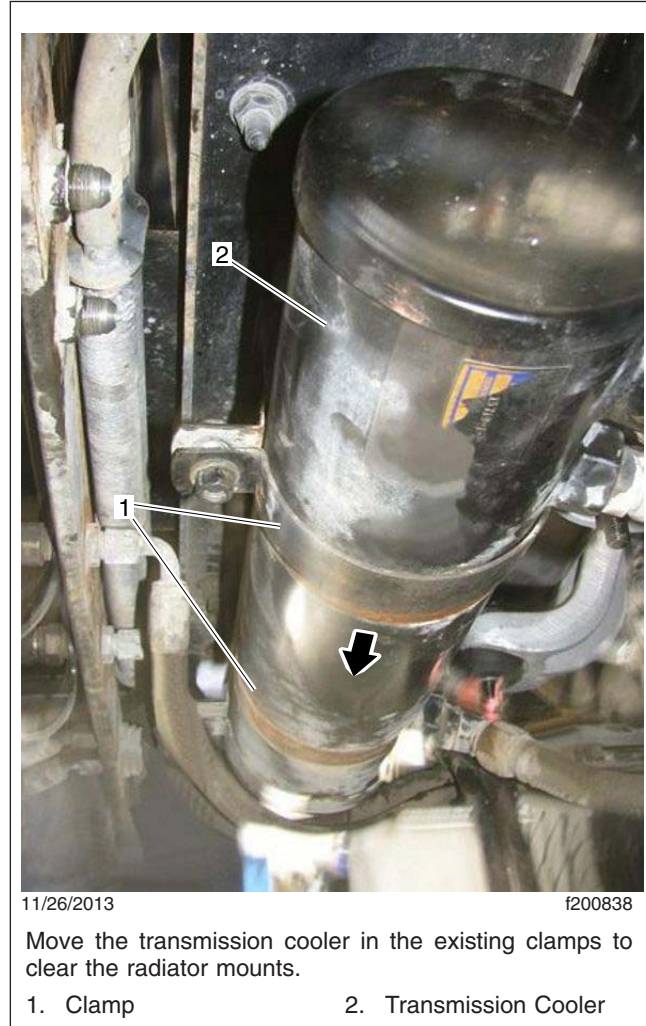
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**Fig. 1, Lowering the Transmission Cooler**



**Fig. 2, Moving the Transmission Cooler**

12. Remove the surge tank vent line from the radiator. See [Fig. 9](#).
13. Remove the three strut rods and discard.
14. Remove the grille from the radiator. See [Fig. 10](#).
15. Loosen the A/C condenser and move it out of the way as follows.
  - 15.1 Remove the receiver-drier and upper condenser line mounting nuts, then free the receiver-drier. See [Fig. 11](#).
  - 15.2 Loosen the radiator baffle at the top right corner of the radiator. See [Fig. 12](#).
  - 15.3 Unbolt the A/C condenser from the CAC. See [Fig. 13](#).

**NOTE:** Wrap the condenser in cardboard to protect it while it is moved. Do not kink the refrigerant hoses.

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**Fig. 3, Moving the Transmission Cooler Clamp**

- 15.4 Carefully move the condenser around and set it on the right front tire or on top of the engine. Secure it as needed. See [Fig. 14](#).
16. Attach an appropriate lifting device to the radiator, then remove the fasteners that connect the radiator to the radiator mounting bracket.
17. Remove the radiator assembly and FEPTO driveline from the vehicle. See [Fig. 15](#).
18. Remove the FEPTO driveline from the radiator.
19. Remove the baffles from the radiator. See [Fig. 16](#).
20. Remove the CAC from the radiator.
21. Remove the fan shroud from the radiator.
22. Remove the radiator mounting brackets. See [Fig. 15](#).
23. Unbolt the power steering cooler from the mounting bracket. Do not disconnect the lines. See [Fig. 17](#).
24. Disconnect and plug the transmission cooler lines.
25. Remove the transmission cooler from the mounting bracket. See [Fig. 18](#).
26. Remove the transmission cooler mounting bracket from the front closing crossmember.
27. Remove the front closing crossmember. See [Fig. 18](#).
28. Remove the power steering cooler mounting bracket from the cooler. See [Fig. 18](#).
29. Remove the transmission cooler from the cooling lines, and clamp the lines.

## Radiator Installation

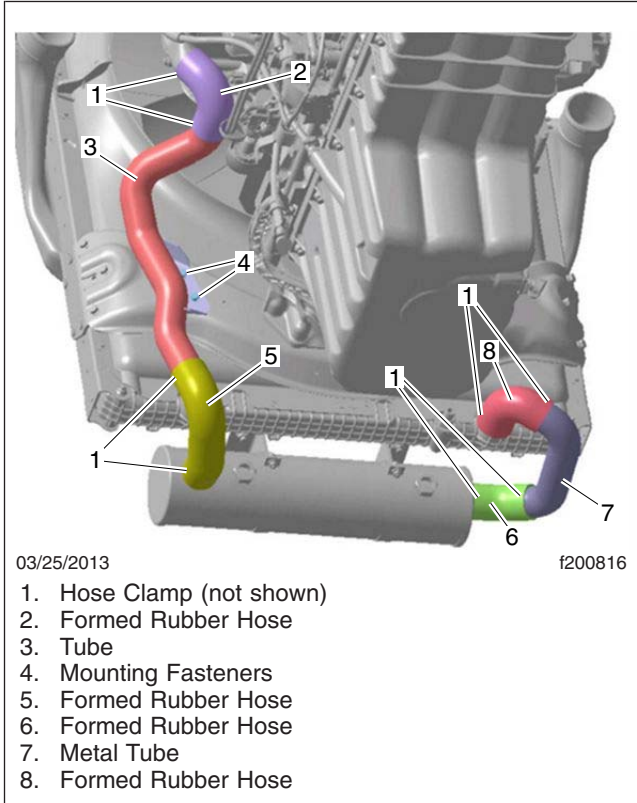
1. Install the new front closing crossmember. Tighten the fasteners 136 lbf-ft (184 N·m).

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**Fig. 4, Lower Coolant Hose Installation**



**Fig. 5, FEPTO Driveline**

2. Install the transmission cooler. Do not tighten the fasteners at this time.
3. Remove the old radiator mounting bracket from the engine bracket.
4. Install the new lower radiator mounting brackets and lower radiator hose standoff. See [Fig. 19](#). Tighten 191 to 234 lbf·ft (260 to 317 N·m).
5. Route the transmission cooler lines as follows.
  - 5.1 Locate the two transmission cooler lines that are cushion-clamped together along the left side of the engine.
  - 5.2 Separate the lines at about the middle of the engine.
  - 5.3 Route one line over the front engine crossmember and one below the crossmember.
  - 5.4 Use zipties to secure the lower line to the body builder's hydraulic lines.
  - 5.5 Connect the upper line to the drivers side port on the transmission cooler. Do not tighten at this time.
  - 5.6 Connect the lower line to the passenger side port on the transmission cooler. Do not tighten at this time.
  - 5.7 Sleeve the line that goes over the engine crossmember with a split section of 1-inch heater hose (DCO 80234GL). Secure the sleeve with zipties.

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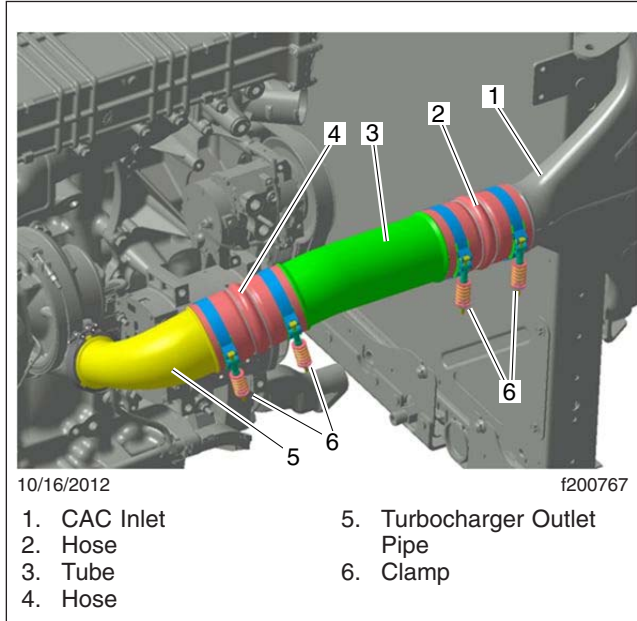


Fig. 6, CAC Plumbing, Turbocharger-to-CAC

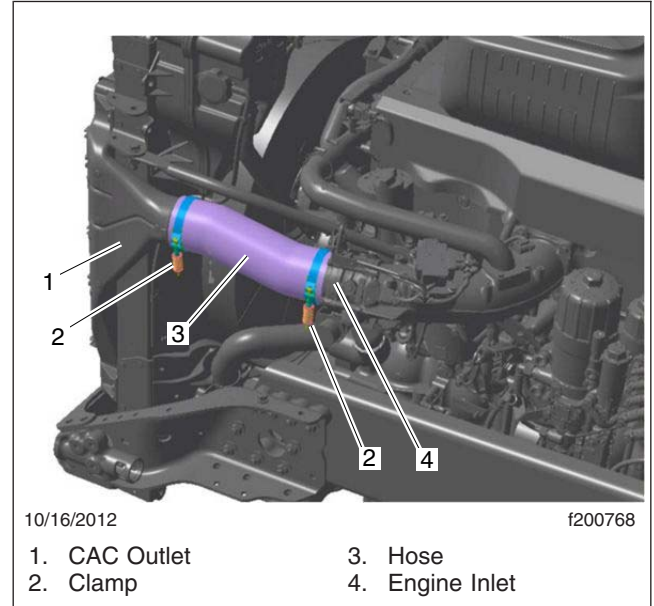


Fig. 7, CAC Plumbing, CAC-to-Engine Inlet

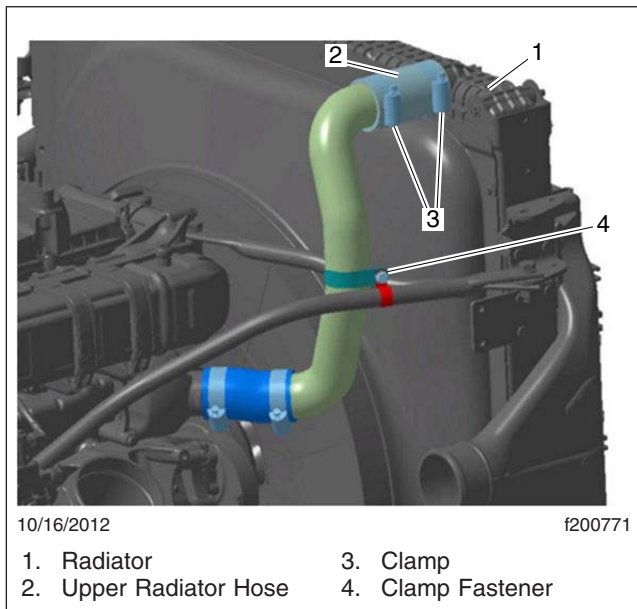


Fig. 8, Upper Coolant Hose

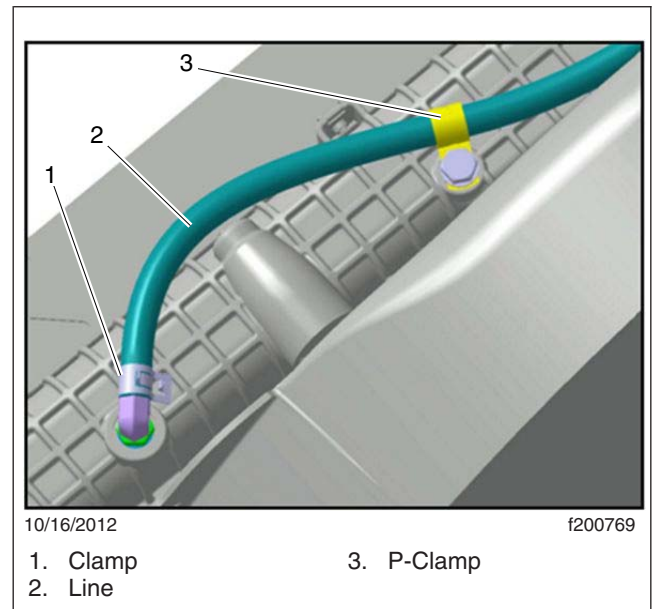


Fig. 9, Surge Tank Vent Line

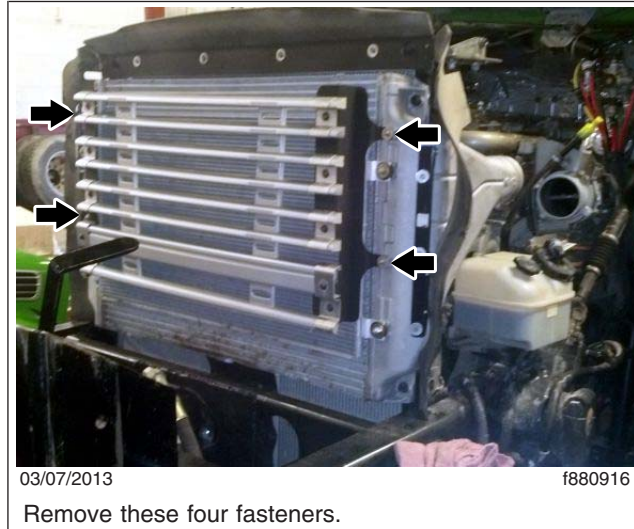
- 5.8 Install a ziptie swivel (23-12886-001) to separate the lines where they cross each other to prevent rubbing. See Fig. 20.
- 5.9 Tighten the transmission cooler line fittings.

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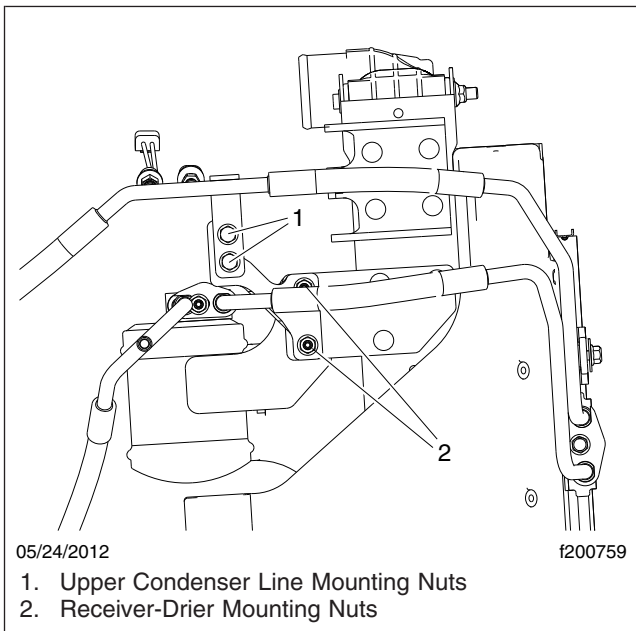
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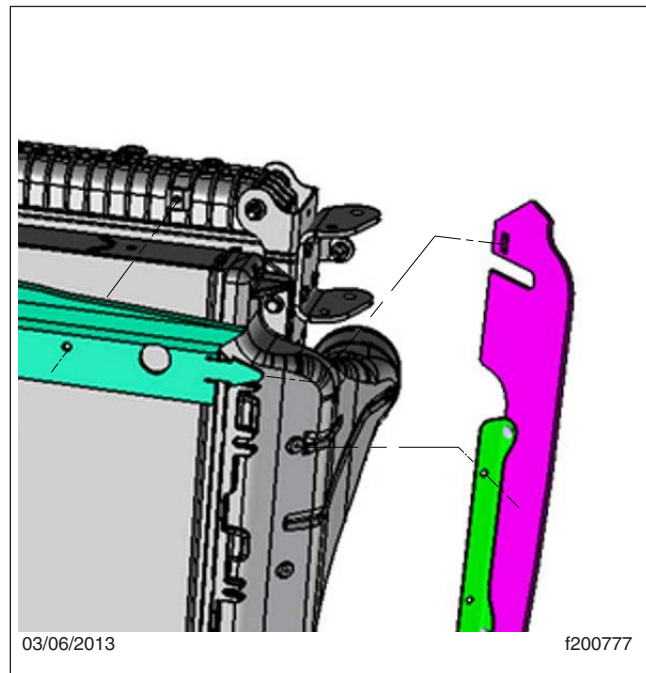
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**Fig. 10, Removing the Grille**



**Fig. 11, Receiver-Drier Installation (typical)**



**Fig. 12, Radiator Baffle, Top Right Side Corner**

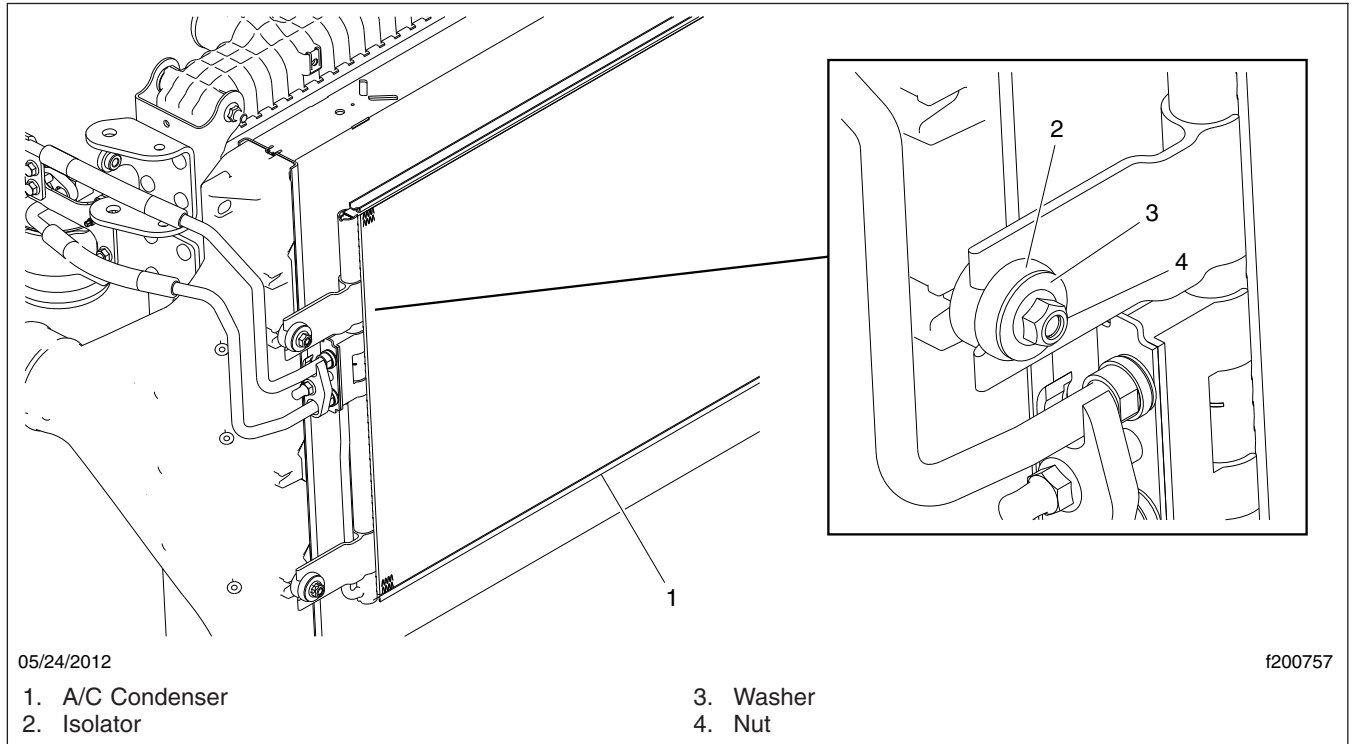
6. Install the CAC on the new radiator.
7. Install the fan shroud on the new radiator.
8. Install the baffles on the new radiator. See [Fig. 16](#).

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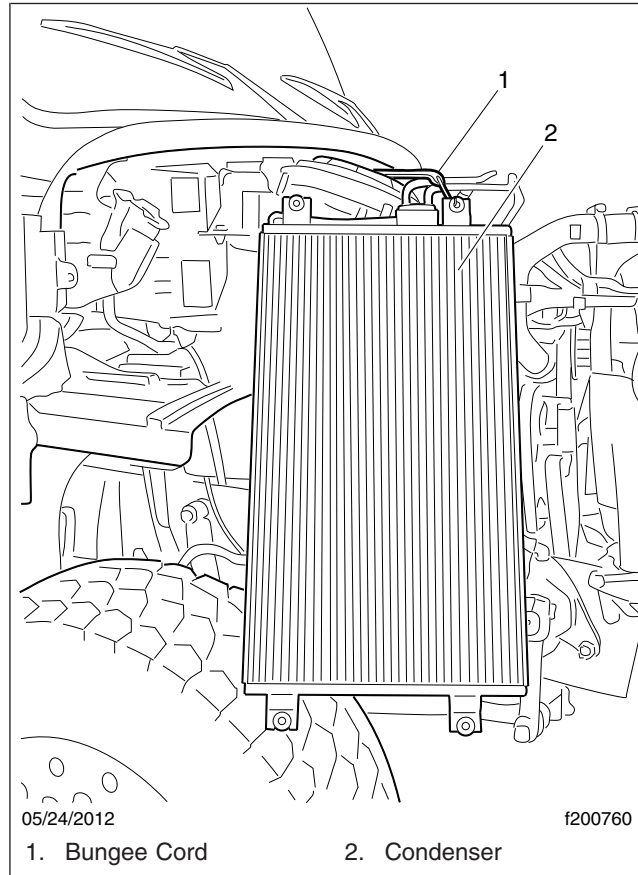
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**Fig. 13, A/C Condenser Installation (typical)**

9. Remove the fan and install a new fan. For instructions, refer to **Group 20** of the *Business Class M2 Workshop Manual*.
10. Insert the FEPTO driveshaft in the radiator.
11. Install the lower radiator isolators on the mounting brackets. See **Fig. 21**.
12. Using a proper lifting device, position the radiator, and install the mounting fasteners in the isolators. Do not tighten at this time.
13. Install the A/C condenser as follows.
  - 13.1 Move the condenser into position in front of the radiator and secure it temporarily. See **Fig. 13**.
  - 13.2 Position the receiver-drier and upper A/C line on their respective brackets and install the mounting nuts. See **Fig. 11**. Tighten the nuts 14 to 16 lbf-ft (19 to 22 N·m).
  - 13.3 Install the condenser mounting bolts. Tighten 112 to 144 lbf-in (1265 to 1625 N·cm).
14. Adjust the fan shroud as needed.
15. Connect the FEPTO drive shaft.
  - 15.1 Expand the driveshaft and align it with the engine and pump.
  - 15.2 Install the coupling fasteners in the engine pulley.
  - 15.3 Install the coupling fasteners in the pump through the hole in the front closing crossmember.
  - 15.4 Tighten the set screw in the slip sleeve.



**Fig. 14, Securing the A/C Condenser**

15.5 Safety wire the set screw.

16. Install the upper coolant hose. See [Fig. 8](#).

17. Install the new isolated strut rods. See [Fig. 22](#).

18. Install the charge air cooler (CAC) plumbing between the turbocharger outlet and the CAC inlet. See [Fig. 6](#).

19. Install the CAC plumbing between the CAC outlet and the engine inlet. See [Fig. 7](#).

20. Install the lower coolant hoses. See [Fig. 4](#).

21. Align the transmission cooler and the connected transmission fluid lines.

**IMPORTANT:** If the hydraulic plumbing for the plow is installed similarly to [Fig. 23](#), it may block access to the power steering cooler, and it will be necessary to modify the power steering cooler installation and line routing. Go to "Relocating the Power Steering Cooler and Lines" below for the procedure for the alternate power steering cooler installation and line routing.

22. Route the power steering lines, and connect them to the power steering cooler.

23. Fill the cooling system with approved coolant.

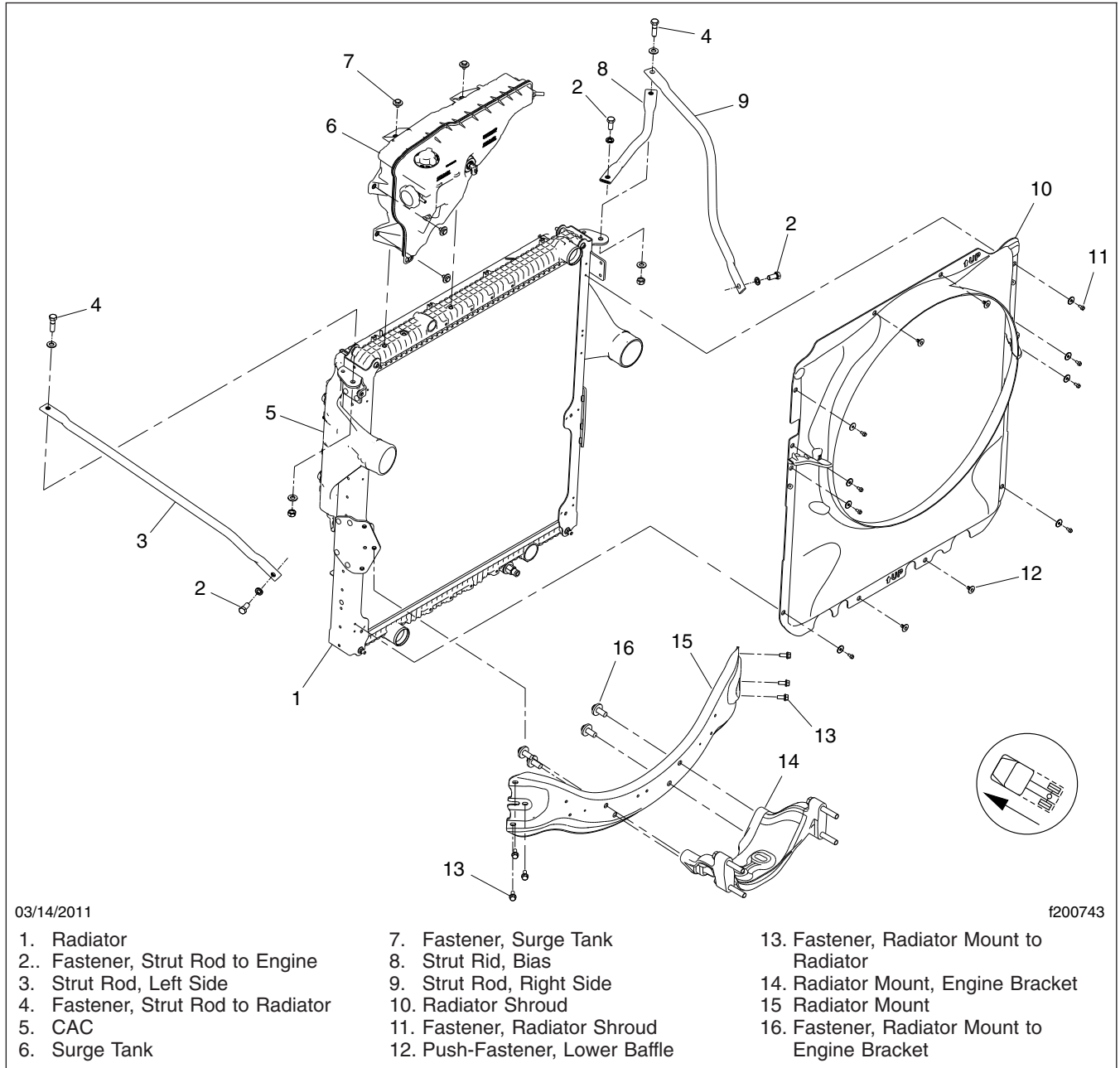
24. Connect the batteries.

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**Fig. 15, Radiator Removal**

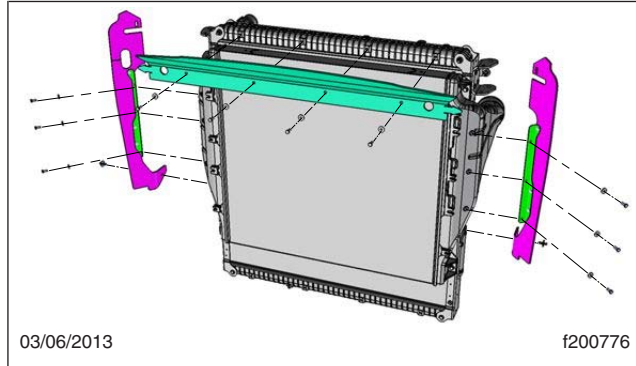
- 25. Install the plow support arms.
- 26. Install the hood.
- 27. Connect the wiring harness to the hood.

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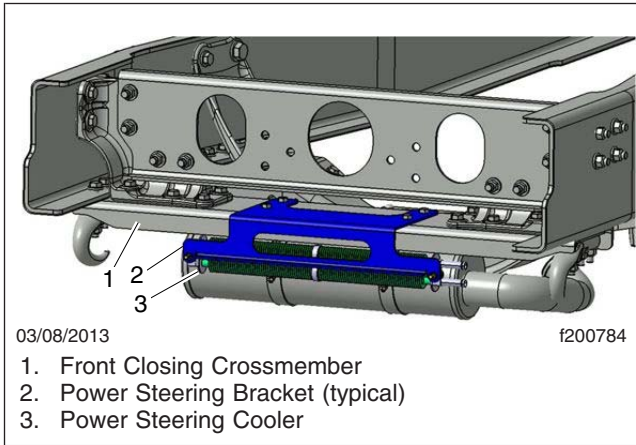
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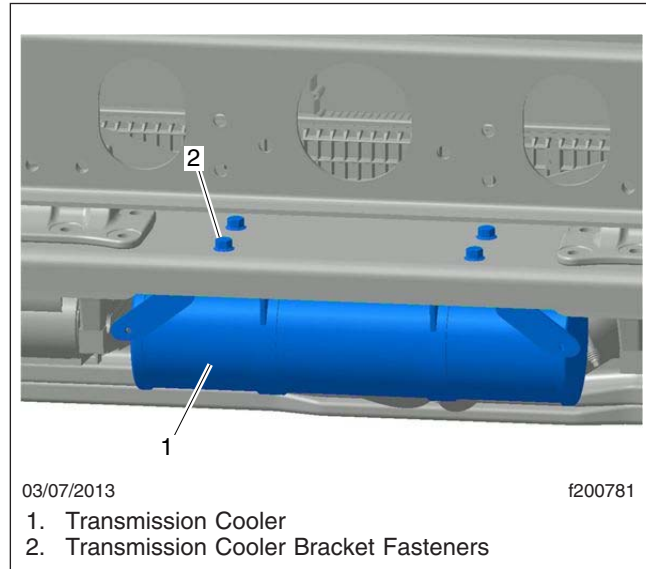
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**Fig. 16, Radiator Baffles**



**Fig. 17, Power Steering Cooler**



**Fig. 18, Transmission Cooler Installation**

28. Start the engine and check for leaks on all lines and hoses that were disconnected for this procedure. Tighten any leaking connections as needed.

## Relocating the Power Steering Cooler and Lines

**IMPORTANT:** This procedure requires the parts listed in [Table 6](#).

In some cases, the power steering cooler must be relocated forward of the crossmember to provide additional clearance for the new radiator installation.

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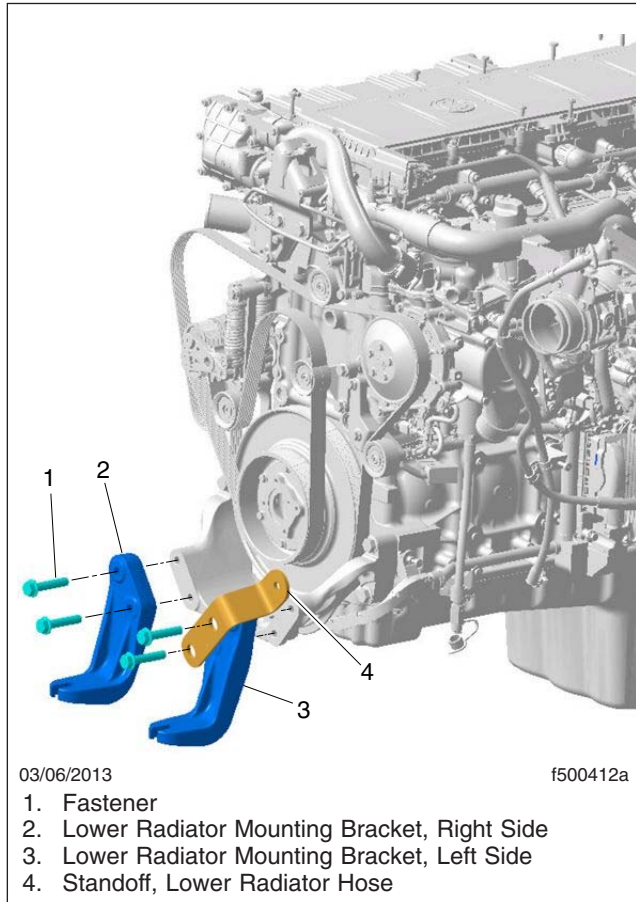


Fig. 19, New Radiator Mount Installation



Fig. 20, Ziptie Swivel Installation

## NOTICE

Before performing any electric welding on a vehicle, disconnect the battery power and ground cable, and any electronic control units (ECUs) or similar devices installed on the vehicle. Electric currents produced during electric welding can damage various electrical components on the vehicle, such as alternator diodes and ECUs. Refer to [Subject 31.00, 110](#) of the *Business Class M2 Workshop Manual* before performing any welding on the vehicle.

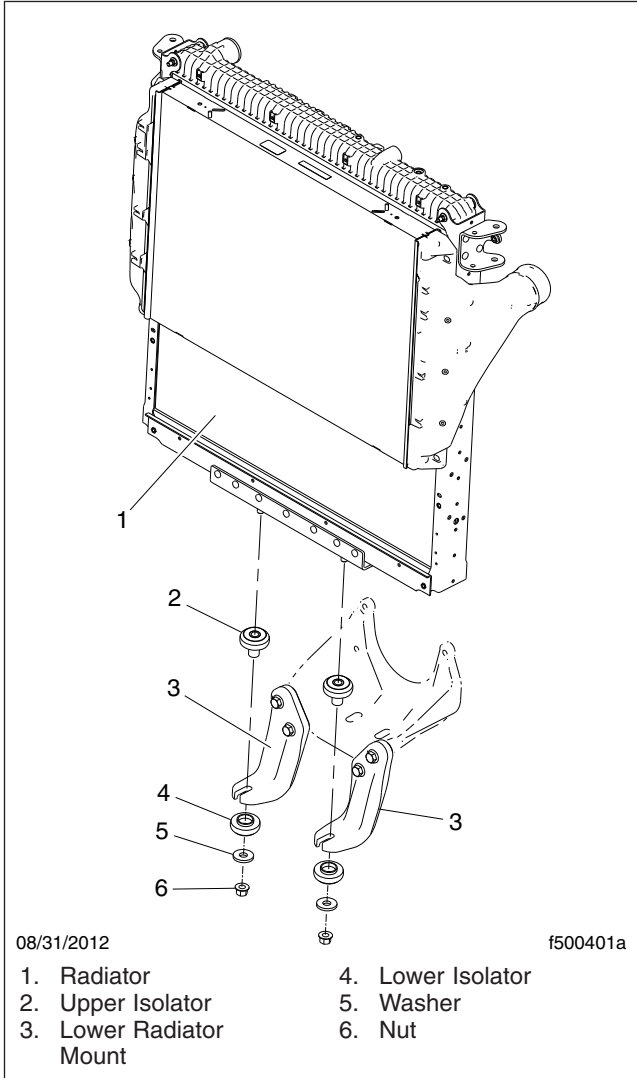
1. Center the original power steering cooler mounting bracket under the bottom flange on the crossmember with the mounting surface 3 inches from the inside of the crossmember. See [Fig. 24](#).
2. Weld the bracket to the crossmember. Make three evenly spaced welds approximately one-inch long on the top, and two welds on the bottom spaced between the upper welds.
3. Disconnect the original power steering cooler lines from the cooler.
4. Install the power steering cooler on the mounting bracket. See [Fig. 25](#).

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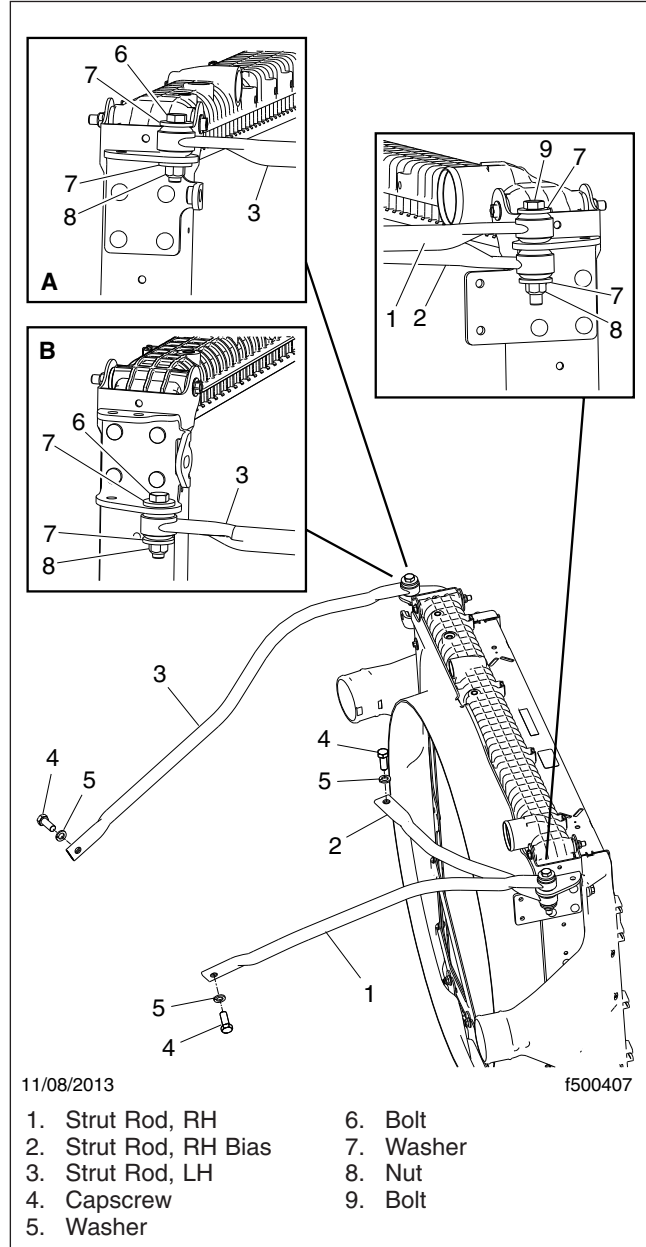
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**Fig. 21, Radiator Installation**



**Fig. 22, Strut Rod Installation**

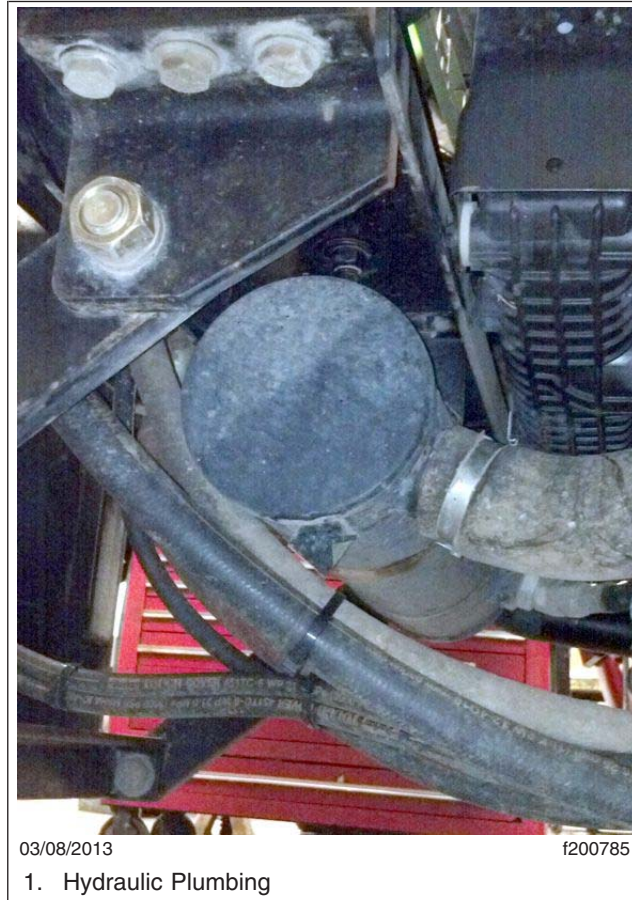
5. Remove the original power steering cooler lines and install the new ones. Route the lines as follows.
  - 5.1 Sleeve the new hoses with the two-inch Flextab hose (FLF FRE5515 200A) where they will pass through the crossmember. See [Fig. 25](#).
  - 5.2 Connect the hoses to the cooler, and secure them with hose clamps.
  - 5.3 Route the 80-inch (203-cm) line to the power steering reservoir. See [Fig. 26](#).

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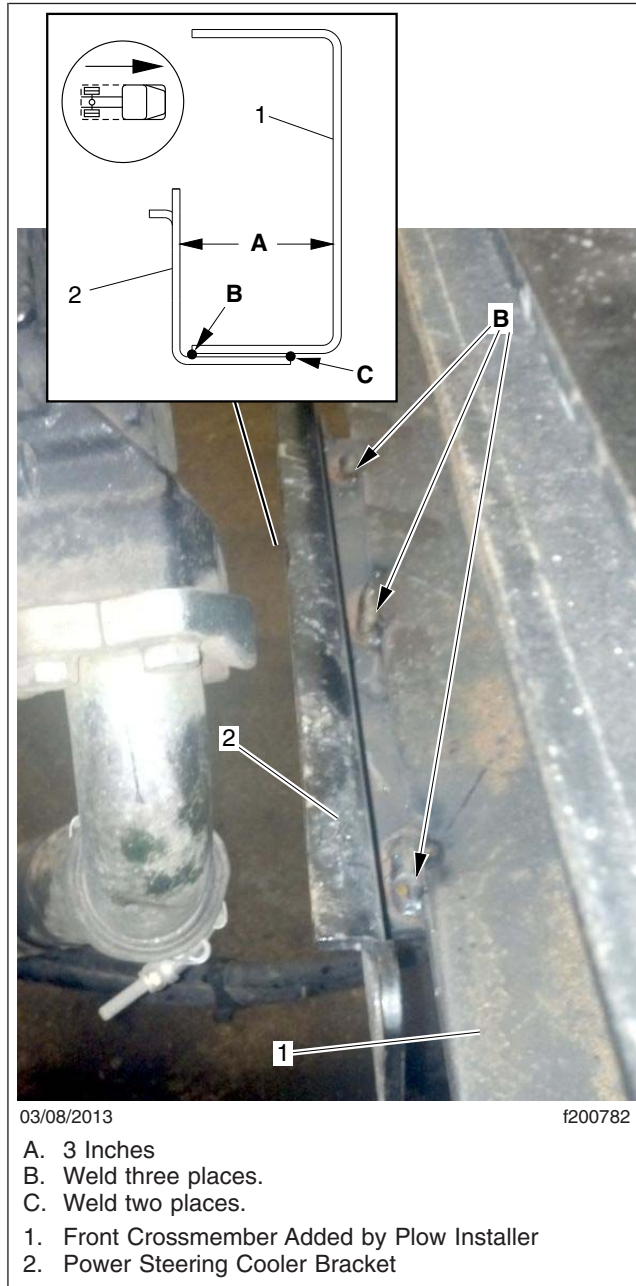
**Fig. 23, Hydraulic Plumbing**

- 5.4 Route the 64-inch (163-cm) line to the return port on the power steering gearbox. See [Fig. 26](#).
6. Secure the lines with P-clamps and/or zipties.

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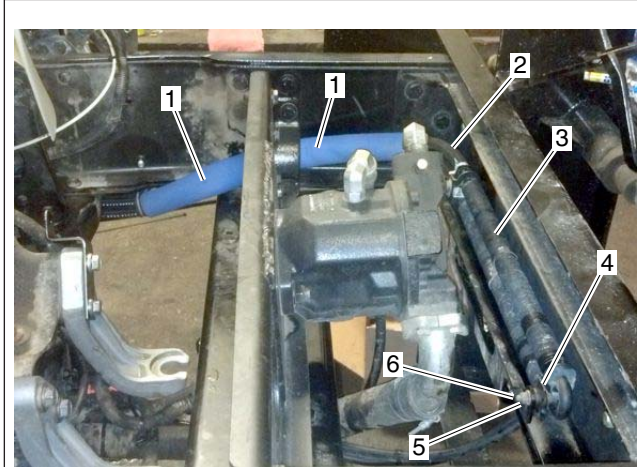
**Fig. 24, Power Steering Cooler Mounting Bracket Installation**

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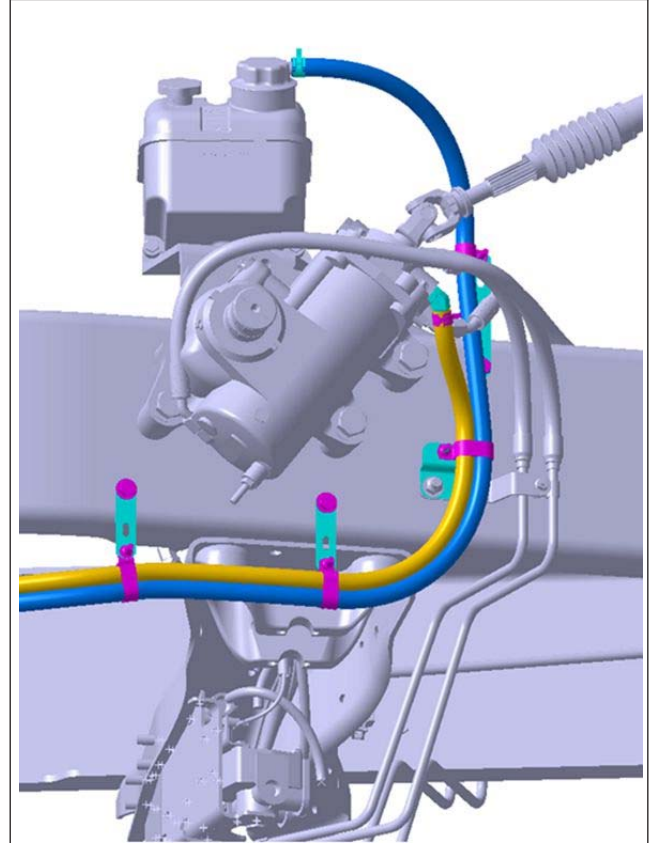


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- 1. Sleeving
- 2. Power Steering Hoses
- 3. Power Steering Cooler
- 4. Capscrew
- 5. Washer
- 6. Nut

Fig. 25, Power Steering Cooler Installation



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Fig. 26, Power Steering Cooler Lines Installation

## Parts

Parts are available through the PDC. See [Table 1](#) for required parts.

Required Parts by Vehicle Configuration	
Vehicle Configuration	Table
M2-112V w/DD13 M1500 RAD	<a href="#">Table 2</a>
M2-112V w/DD13 Allison Auto M1500 RAD	<a href="#">Table 3</a>
M2-112V w/DD13 M1500 RAD,FEPTO	<a href="#">Table 4</a>
M2-112V w/DD13 Allison Auto M1500 RAD,FEPTO	<a href="#">Table 5</a>
Power Steering Cooler Relocation	<a href="#">Table 6</a>

**Table 1, Required Parts by Vehicle Configuration**

M2-112V w/DD13 M1500 RAD		
PART	DESCRIPTION	QTY
KYS 010024426	FAN-XMD9,31.5",2.56",EMB	1
MOD 3S0580790003 & PH 1695HB64	RAD-ALUM,1500,MED,LSO,ITOC,ISO	1
A05-29515-001	ASSY-SHROUD,1500SQIN,HI FAN	1
A05-30377-000	STRUT-RAD,DD13,MED,FWD,RH,ISO	1
A05-30378-000	STRUT-RAD,DD13,MED,FWD,BS,ISO	1
A05-30703-000	STRUT-RAD,DD13,MED,FWD,LH,ISO	1
05-30369-000	BRKT-RAD SUPT,BTM CHNL,LH	1
05-30369-001	BRKT-RAD SUPT,BTM CHNL,RH	1
BCD 27463 14	ISOLATOR-RAD,LWR,60 DURO(KIT)	2
05-16836-204	HOSE-ECR,2.50"ID	1
05-23480-002	HOSE-ELBOW,ECR	1
05-25925-003	HOSE-COOLANT,LWR,ELBOW,ECR	1
01-20963-000	WASHER-HRDND,STL,.66X2.75"	2
N210100 016000	NUT-FLG HD,M16,CLASS 10, P&O	2
23-13509-080	SCRW HX FLNG,M16-1.5X80,10.9	4

**Table 2, M2-112V w/DD13 M1500 RAD**

M2-112V w/DD13 Allison Auto M1500 RAD		
PART	DESCRIPTION	QTY
KYS 010024426	FAN-XMD9,31.5",2.56",EMB	1
MOD 3S0580790002 & PH 1695HB64	RAD-ALUM,1500,MED,RSO,ITOC,ISO	1
A05-29515-001	ASSY-SHROUD,1500SQIN,HI FAN	1
A05-30377-000	STRUT-RAD,DD13,MED,FWD,RH,ISO	1
A05-30378-000	STRUT-RAD,DD13,MED,FWD,BS,ISO	1
A05-30703-000	STRUT-RAD,DD13,MED,FWD,LH,ISO	1
05-30369-000	BRKT-RAD SUPT,BTM CHNL,LH	1

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M2-112V w/DD13 Allison Auto M1500 RAD		
05-30369-001	BRKT-RAD SUPT,BTM CHNL,RH	1
BCD 27463 14	ISOLATOR-RAD,LWR,60 DURO(KIT)	2
01-20963-000	WASHER-HRDND,STL,.66X2.75"	2
N210100 016000	NUT-FLG HD,M16,CLASS 10, P&O	2
23-13509-080	SCRW HX FLNG,M16-1.5X80,10.9	4

Table 3, M2-112V w/DD13 Allison Auto M1500 RAD

M2-112V w/DD13 M1500 RAD,FEPTO		
PART	DESCRIPTION	QTY
KYS 010024426	FAN-XMD9,31.5",2.56",EMB	1
MOD 3S0580790007 & PH 1695HB64	RAD-ALUM,1500,MED,LSO,ITOC,FEPTO,ISO	1
A05-29515-000	ASSY-SHROUD,1500SQIN,FEPTO	1
A05-30377-000	STRUT-RAD,DD13,MED,FWD,RH,ISO	1
A05-30378-000	STRUT-RAD,DD13,MED,FWD,BS,ISO	1
A05-30703-000	STRUT-RAD,DD13,MED,FWD,LH,ISO	1
05-30369-000	BRKT-RAD SUPT,BTM CHNL,LH	1
05-30369-001	BRKT-RAD SUPT,BTM CHNL,RH	1
BCD 27463 14	ISOLATOR-RAD,LWR,60 DURO(KIT)	2
05-16836-204	HOSE-ECR,2.50"ID	1
05-23480-002	HOSE-ELBOW,ECR	1
05-25925-003	HOSE-COOLANT,LWR,ELBOW,ECR	1
01-20963-000	WASHER-HRDND,STL,.66X2.75"	2
N210100 016000	NUT-FLG HD,M16,CLASS 10, P&O	2
23-13509-080	SCRW HX FLNG,M16-1.5X80,10.9	4

Table 4, M2-112V w/DD13 M1500 RAD,FEPTO

M2-112V w/DD13 Allison Auto M1500 RAD,FEPTO		
PART	DESCRIPTION	QTY
KYS 010024426	FAN-XMD9,31.5",2.56",EMB	1
05-30353-006 & PH 1695HB64	RAD-ALUM,1500,MED,RSO,ITOC,FEPTO,ISO	1
A05-29515-000	ASSY-SHROUD,1500SQIN,FEPTO	1
A05-30377-000	STRUT-RAD,DD13,MED,FWD,RH,ISO	1
A05-30378-000	STRUT-RAD,DD13,MED,FWD,BS,ISO	1
A05-30703-000	STRUT-RAD,DD13,MED,FWD,LH,ISO	1
05-30369-000	BRKT-RAD SUPT,BTM CHNL,LH	1
05-30369-001	BRKT-RAD SUPT,BTM CHNL,RH	1
BCD 27463 14	ISOLATOR-RAD,LWR,60 DURO(KIT)	2
01-20963-000	WASHER-HRDND,STL,.66X2.75"	2
N210100 016000	NUT-FLG HD,M16,CLASS 10, P&O	2

## Freightliner Service Bulletin

FLA COE  
FLB COE  
FLD Conventional  
Business Class  
FLC 112 Conventional

Century Class Conventional  
Argosy COE  
Cargo  
Columbia

Coronado  
> Business Class M2  
Cascadia  
108SD/114SD

M2-112V w/DD13 Allison Auto M1500 RAD,FEPTO		
23-13509-080	SCRW HX FLNG,M16-1.5X80,10.9	4

**Table 5, M2-112V w/DD13 Allison Auto M1500 RAD,FEPTO**

Power Steering Cooler Relocation		
Part Number	Description	Quantity
48-25049-010	5/8" hose	80"
48-25049-010	5/8" hose	64"
23-12691-000	Spring clamp	4
TYC DCT110HIR	Dual tie strap	6
FLF FRE5515 200A	Flexfab hose	2'
23-13322-008	Push on duel strap	1
23-09130-003	Flat standoff bracket, small and big hole with Slot	2
23-09432-075	SCREW-CAP,HEX1/4-20X.7	2
23-13110-025	NUT-HEX,SHLDR,1/4-20 U	2
23-00600-025	1/4 FLAT WASHER	4
23-11358-008	Dual cushion clamp	2
14-17741-002	Power steering cooler mounting bracket	1
UMP S464G16	Single hose cushion clamp	1
Zipties	8"x5/16" or 3/8"	10
23-12886-001	Ziptie swivel	1
A14-17744-000	BRAKT ASSY-PLMB,STRG,CLR,RTN	1

**Table 6, Power Steering Cooler Relocation**

## Warranty

This procedure is warrantable only if the described condition exists and the repair is performed within the applicable base or extended coverage warranty period. If a failure is not found, this procedure is considered preventive and warranty does not apply.

Normal warranty applies. See [Table 7](#) for OWL VMRS codes and labor allowance information. Enter this service bulletin number in the *Service Bulletin #* field.

OWL VMRS Codes and Labor Allowance					
Primary Failed Part	Component Code	Cause Code	SRT Code	Description	Time: Hours
Radiator	042-002-001	12	266-5040A	M2 FEPTO radiator, convert to isolated mounting.	11.1
Radiator	042-002-013	12	266-5040A	M2 FEPTO radiator, convert to isolated mounting.	11.1

**Table 7, OWL VMRS Codes and Labor Allowance**