

Product: ENGINE  
Model: 3512E ENGINE SY4  
Configuration: 3512E Marine Engine SY400001-UP

## Disassembly and Assembly 3512E and 3516E Marine Engines

Media Number -M0075247-08

Publication Date -01/09/2018

Date Updated -11/09/2018

i07233110

## Exhaust Elbow - Remove and Install

SMCS - 1060-010

### Removal Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	477-3138	Eyebolt Assembly	2
	5P-7970	Nut	2
	9M-1974	Hard Washer	2
B	-	Loctite Nickel Anti-Seize	1

#### Start By:

- a. Remove the turbocharger.

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### NOTICE

**Bellows assemblies MUST only be used once. Discard all bellows assemblies after use.**

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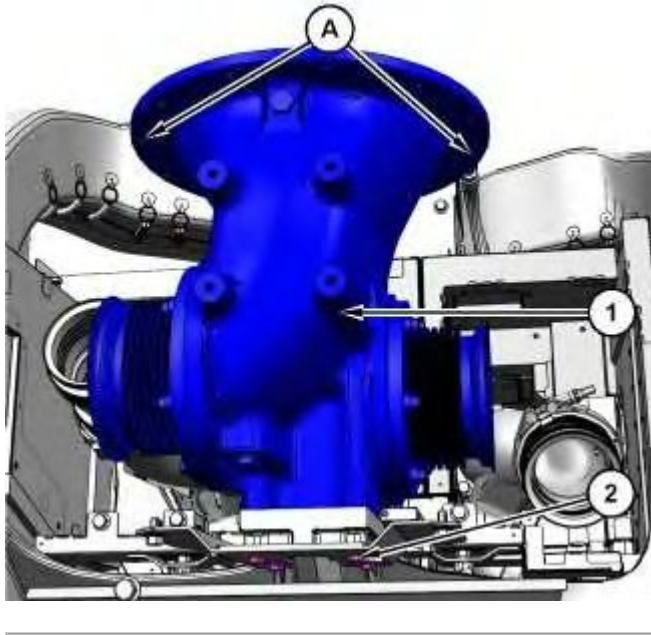


Illustration 1

g06260899

1. Attach Tooling (A) in the location shown in Illustration 1. The weight of exhaust elbow (1) is approximately 50 kg (110 lb).
2. Remove bolts (2) and exhaust elbow (1).

## Installation Procedure

1. Install exhaust elbow (1) in the reverse order of removal.
    - a. Apply Tooling (B) to bolts (2).
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i06693087

# Exhaust Manifold - Remove and Install

SMCS - 1059-010

## Removal Procedure

### Start By:

- a. Remove air inlet manifold.
- b. Remove crossover pipe

**Note:** The clamps and bellows are one-time use components. Discard the components after removal and install new components.

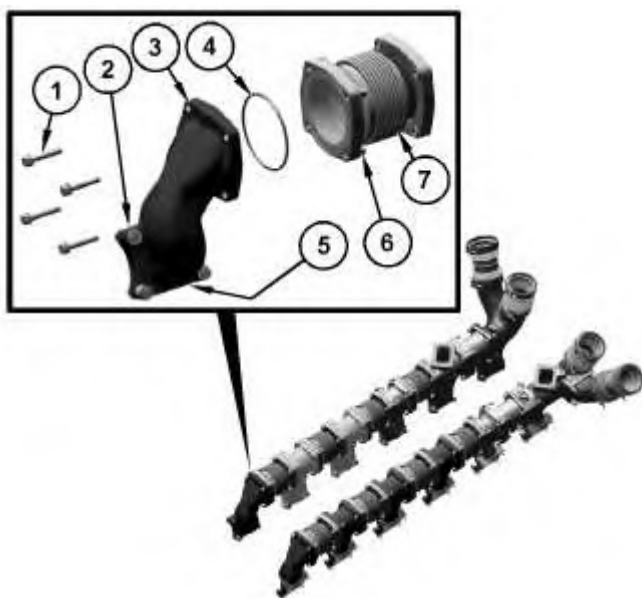


Illustration 1

g06079068

Engine was not illustrated for photographic purposes.

1. Remove bolts (1), bolts (2) and nuts (6).
2. Remove exhaust manifold (3), bellows (7). Remove gasket (5) and gasket (4) from exhaust manifold (3).
3. Repeat Step 1 and Step 2 for the next four exhaust manifolds. Repeat for the other side.

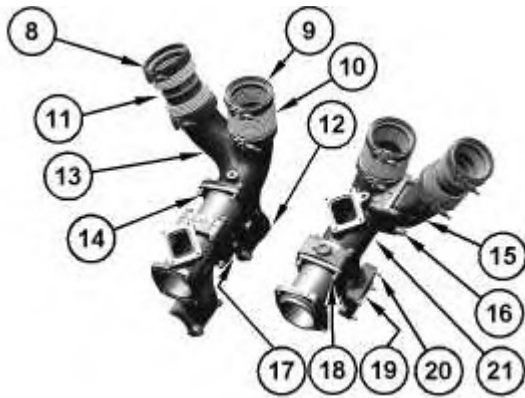


Illustration 2

g06081200

Engine was not illustrated for photographic purposes.

**Note:** Note the orientation of clamps (8) and (9). If installed incorrectly, the clamps will damage the heat shields.

4. Loosen clamps (9) and (8). Remove bellows (10) and (11).
5. Repeat step 2 for the remaining manifold.
6. Remove bolts (12), bolts (14), manifold (13), and gasket (17).
7. Remove bolts (16) and elbow (15).
8. Remove bolts (18), bolts (20), manifold (21), and gasket (19).

## Installation Procedure

**Note:** The following clamps and bellows are one-time use components. Discard the components after removal and install new components. Ensure bellows are installed for proper flow direction as indicated on bellows by arrow.

1. Install exhaust manifold in reverse order of removal.
  - a. Tighten bolts (1) to a torque of  $55 \pm 5 \text{ N}\cdot\text{m}$  ( $40 \pm 4 \text{ lb ft}$ ).
  - b. Tighten bolts (2) to a torque of  $55 \pm 5 \text{ N}\cdot\text{m}$  ( $40 \pm 4 \text{ lb ft}$ ).
  - c. Tighten bolts (8) to a torque of  $12 \pm 1 \text{ N}\cdot\text{m}$  ( $106 \pm 9 \text{ lb in}$ ).
  - d. Tighten bolts (9) to a torque of  $12 \pm 1 \text{ N}\cdot\text{m}$  ( $106 \pm 9 \text{ lb in}$ ).
  - e. Tighten bolts (14) to a torque of  $55 \pm 5 \text{ N}\cdot\text{m}$  ( $40 \pm 4 \text{ lb ft}$ ).

f. Tighten bolts (18) to a torque of  $55 \pm 5 \text{ N}\cdot\text{m}$  ( $40 \pm 4 \text{ lb ft}$ ).

g. Tighten bolts (20) to a torque of  $55 \pm 5 \text{ N}\cdot\text{m}$  ( $40 \pm 4 \text{ lb ft}$ ).

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## **Disassembly and Assembly 3512E and 3516E Marine Engines**

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i06881305

# **Exhaust Manifold - Remove and Install**

SMCS - 1059-010

## **Removal Procedure**

### **Start By:**

- a. Remove air inlet manifold.

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### **NOTICE**

**Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.**

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**Note:** The clamps and bellows are one-time use components. Discard the components after removal and install new components.

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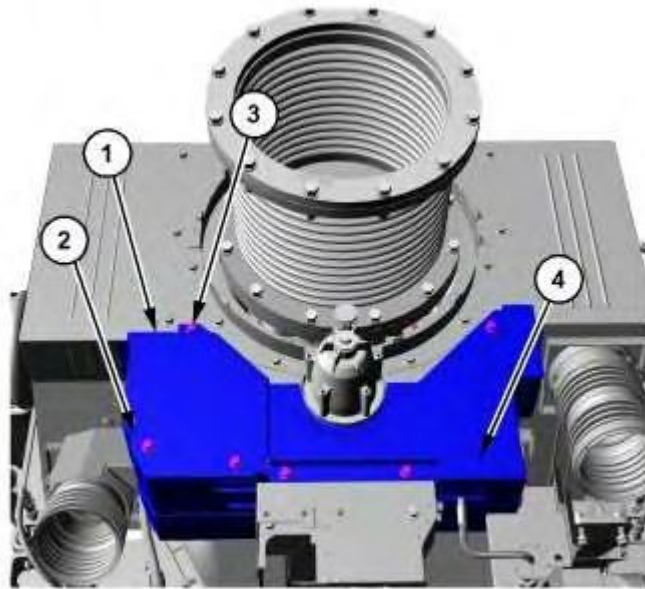


Illustration 1

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1. Remove nine bolts (3) and remove shields (1), (2), and (4).

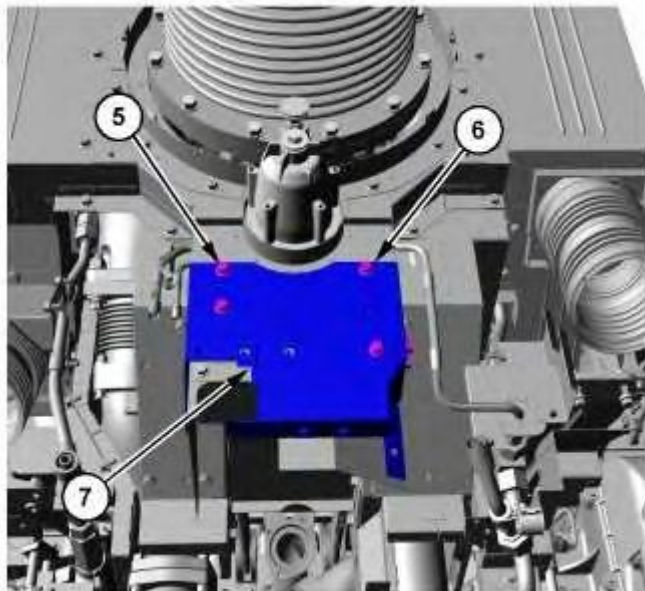


Illustration 2

g06150963

2. Remove six bolts (5) and remove shields (6) and (7).

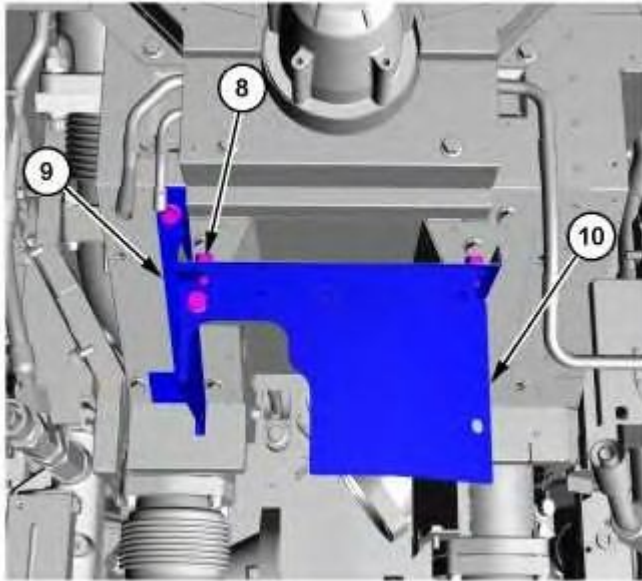


Illustration 3

g06150989

3. Remove four bolts (8) and remove shields (9) and (10).

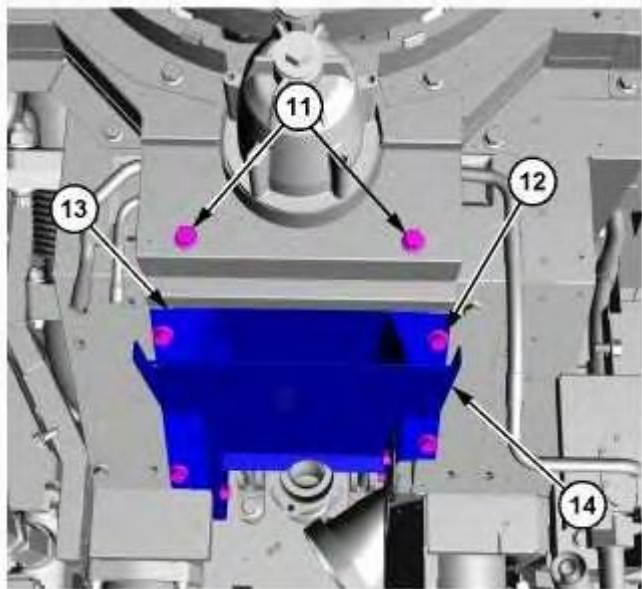
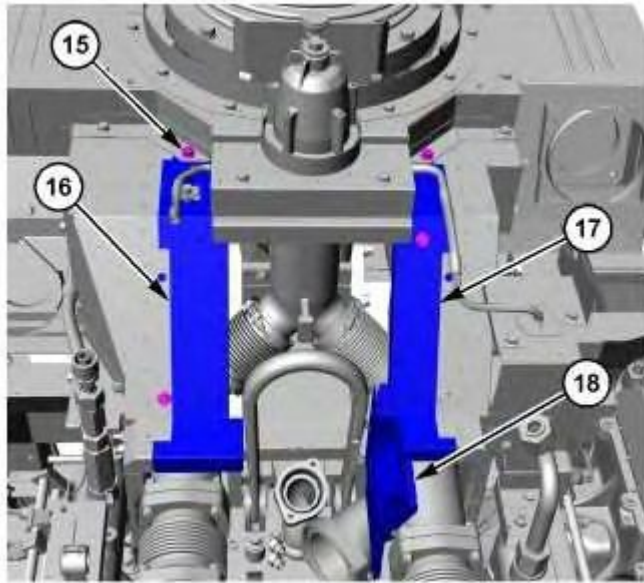


Illustration 4

g06150995

4. Loosen two bolts (11).
5. Remove seven bolts (12) and remove shields (13) and (14) as one piece.



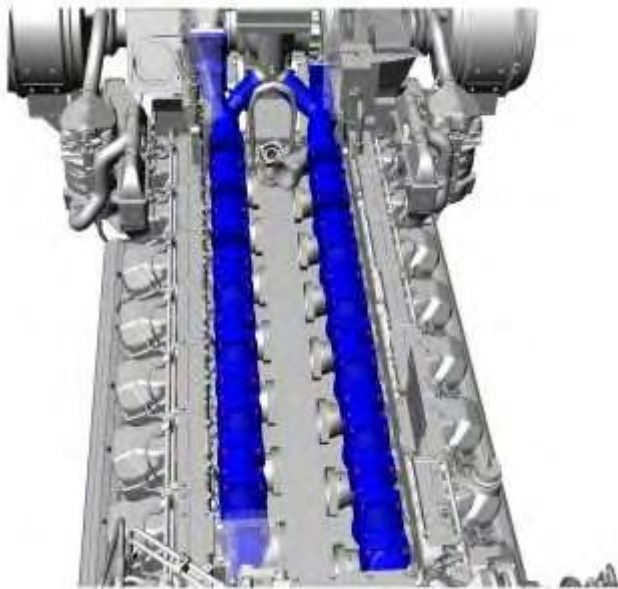


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Illustration 5

g06151514

6. Remove four bolts (15) and remove shields (16), (17), and (18).



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Illustration 6

g06151517

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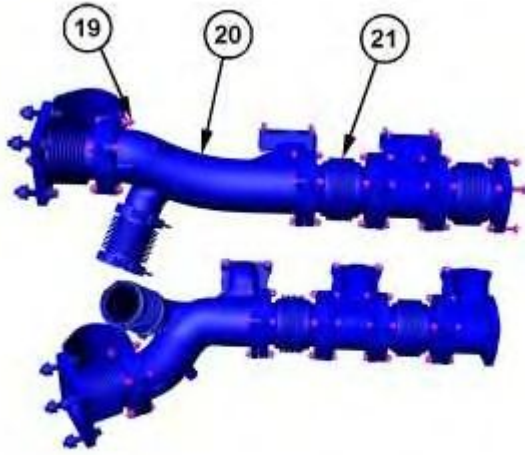


Illustration 7

g06151518

7. Remove bolts (19), exhaust manifold (20), and bellows (21).
8. Repeat for all necessary manifolds and bellows.



Illustration 8

g06151519

9. Remove necessary V-band clamps (21).

## Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty.

A	5P-3931	Anti-Seize Compound	-
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**NOTICE**

**Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.**

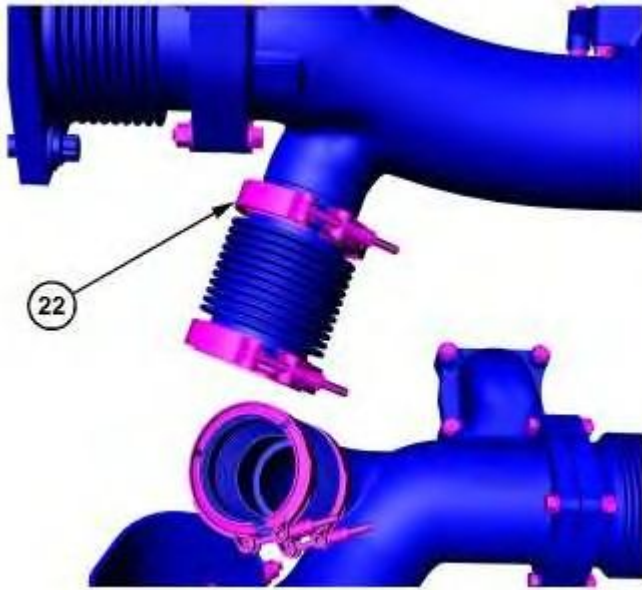
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**NOTICE**

**Lubricate threads and bearing surfaces before assembly.**

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Illustration 9

g06151519

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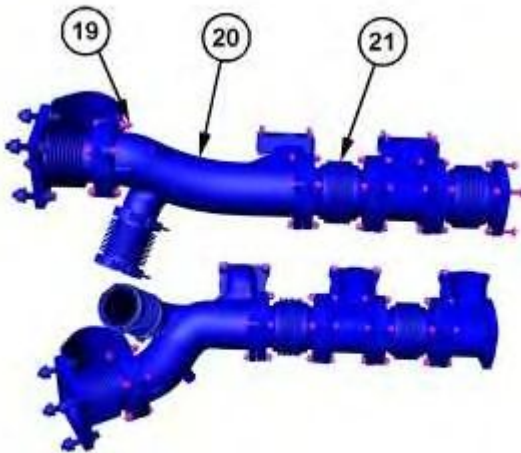


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Illustration 10

g06149724

1. Position and install V-band clamps (22).
2. Gap (x) is to be  $12.7 \pm 3$  mm ( $0.5 \pm 0.1$  inch).
  - a. Tighten V-band clamps (22) to a torque of 12 N·m (9 lb ft).

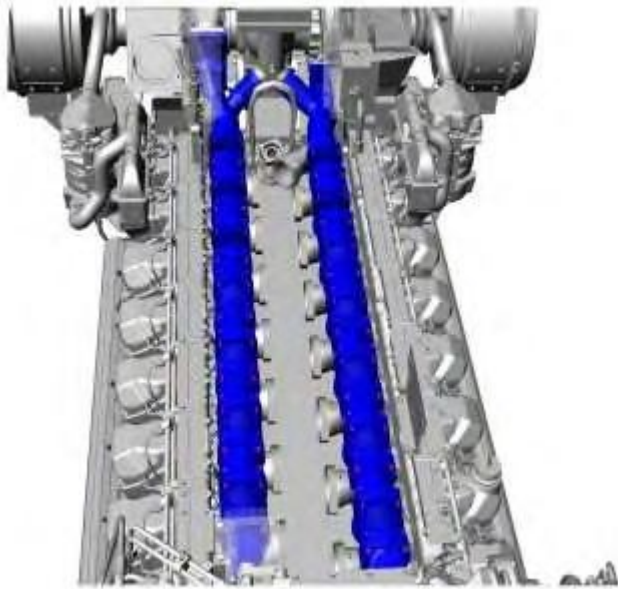


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Illustration 11

g06151518

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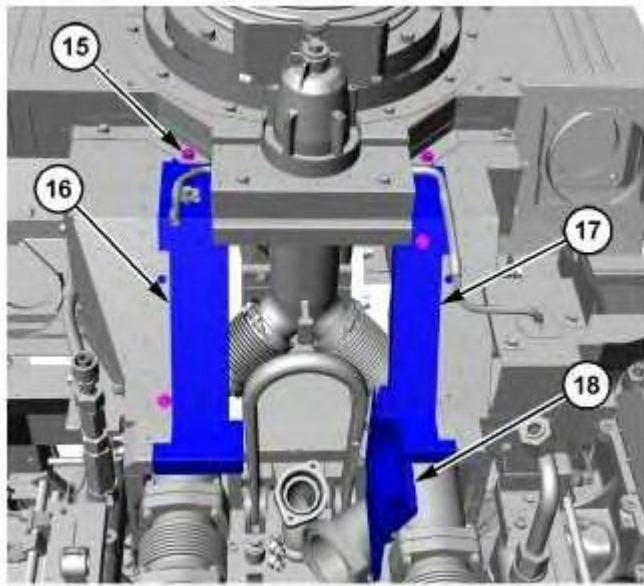


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Illustration 12

g06151517

3. Position exhaust manifold (20) and bellows (21).
4. Install bolts (19).
  - a. Tighten bolts (19) to a torque of  $55 \pm 5 \text{ N}\cdot\text{m}$  ( $40.5 \pm 4 \text{ lb ft}$ ).

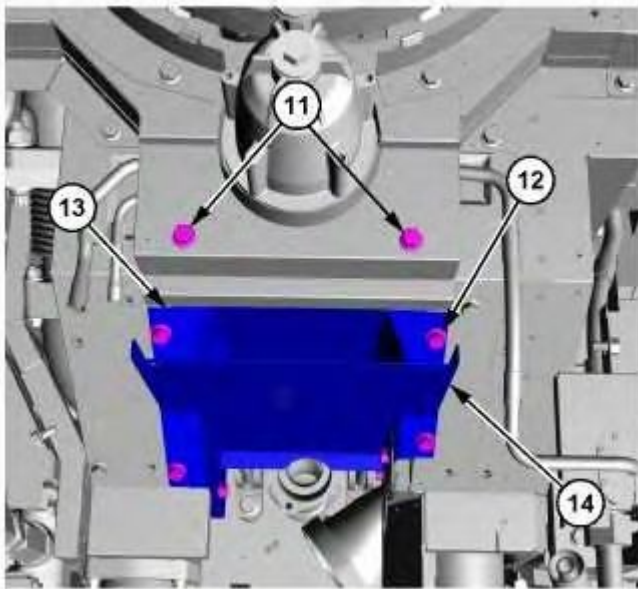


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Illustration 13

g06151514

5. Position shields (16), (17), and (18).
  6. Install four bolts (15).
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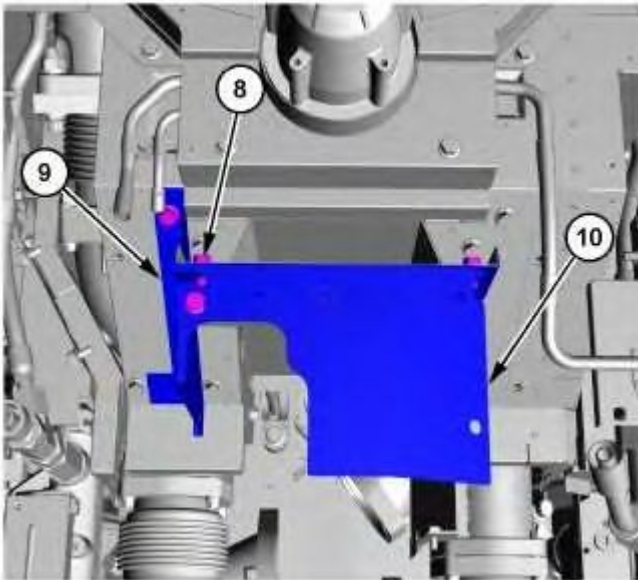


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Illustration 14

g06150995

7. Position shields (13) and (14) and install seven bolts (12).
8. Tighten two bolts (11).



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Illustration 15

g06150989

9. Position shields (9) and (10) and install four bolts (8).
-

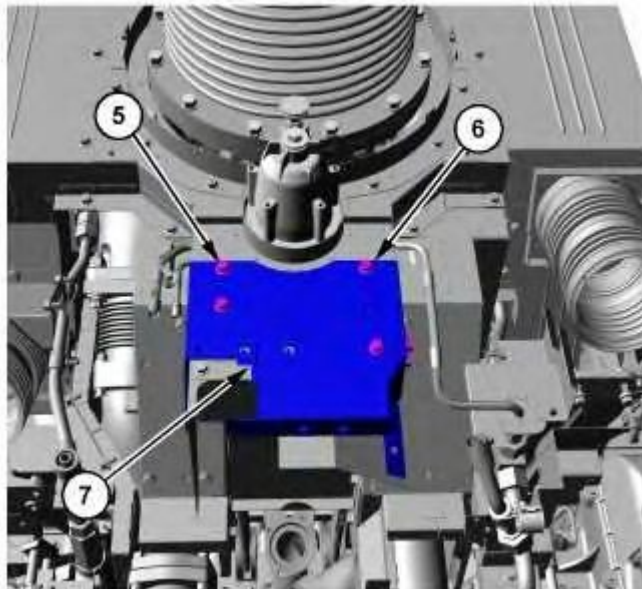


Illustration 16

g06150963

10. Position shields (7) and (6) and install six bolts (5).

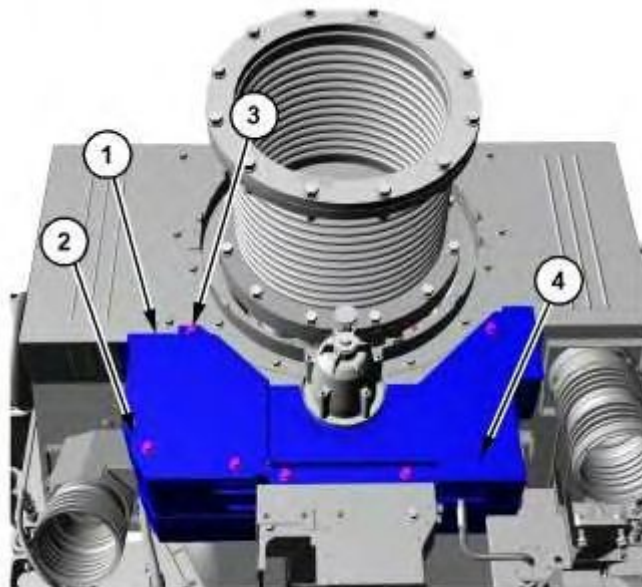


Illustration 17

g06150950

11. Position shields (1), (2), and (4) and install nine bolts (3).

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## **Disassembly and Assembly 3512E and 3516E Marine Engines**

Media Number -M0075247-08

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i06649952

# **Exhaust Bypass Valve - Remove and Install**

SMCS - 1057-010

## **Removal Procedure**

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### **NOTICE**

**Keep all parts clean from contaminants.**

**Contaminants may cause rapid wear and shortened component life.**

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### **NOTICE**

**Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting, and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.**

**Refer to Special Publication, NENG2500, "Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Cat<sup>®</sup> products.**

**Dispose of all fluids according to local regulations and mandates.**

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1. Drain the coolant from the cooling system to a level below the exhaust bypass valve into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, "Cooling System Coolant - Change".



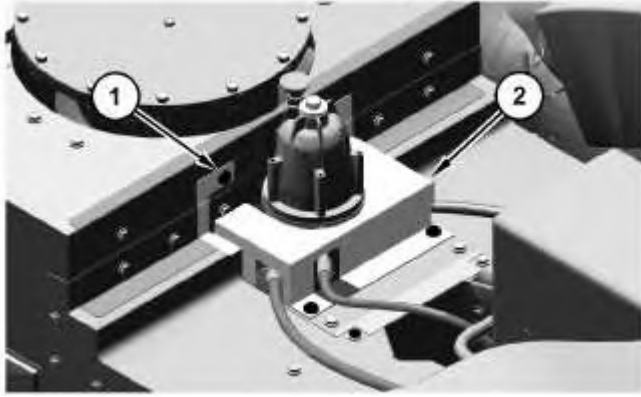


Illustration 1

g06059614

2. Remove bolts (1) and cover (2).

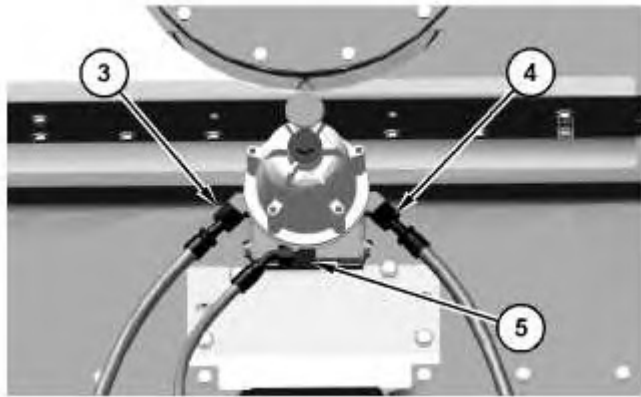


Illustration 2

g06059654

3. Disconnect line (3), line (4), and line (5)

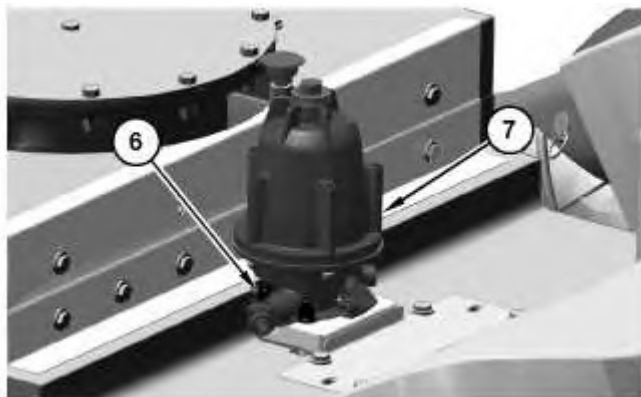


Illustration 3

g06059706

4. Remove locknuts (6) and exhaust bypass valve (7).

## Installation Procedure

Table 1

Required Tools			
Tool	Part Number	Part Description	Qty
A	2P-2333	High Temperature Sealer	-

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### NOTICE

**Keep all parts clean from contaminants.**

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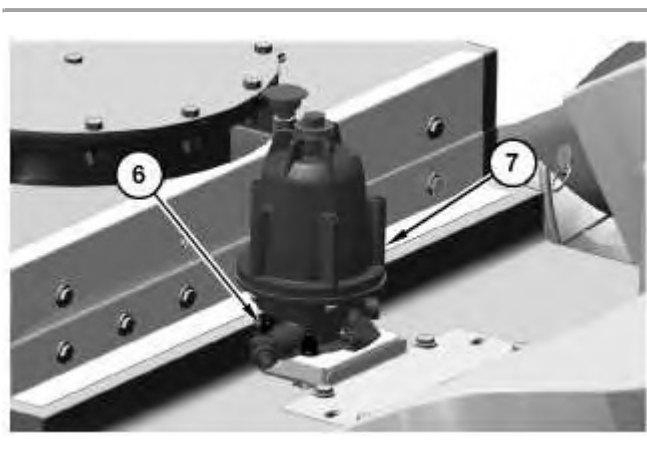


Illustration 4

g06059706

1. If the studs for exhaust bypass valve (7) are installed, tighten the studs to a torque of  $35 \pm 5 \text{ N}\cdot\text{m}$  ( $26 \pm 4 \text{ lb ft}$ ).
  2. Apply Tooling (A) to the threads of the studs and to the mating face of the locknuts. Position the new gasket and exhaust bypass valve (7) on the exhaust elbow. Install new locknuts (6). Tighten locknuts (6) according to the following procedure.
  3. Tighten two diagonal locknuts to a torque of  $25 \pm 6 \text{ N}\cdot\text{m}$  ( $18 \pm 4 \text{ lb ft}$ ).
  4. Tighten the remaining locknuts to a torque of  $25 \pm 6 \text{ N}\cdot\text{m}$  ( $18 \pm 4 \text{ lb ft}$ ).
  5. Tighten all four locknuts to a torque of  $47 \pm 9 \text{ N}\cdot\text{m}$  ( $35 \pm 7 \text{ lb ft}$ ).
-

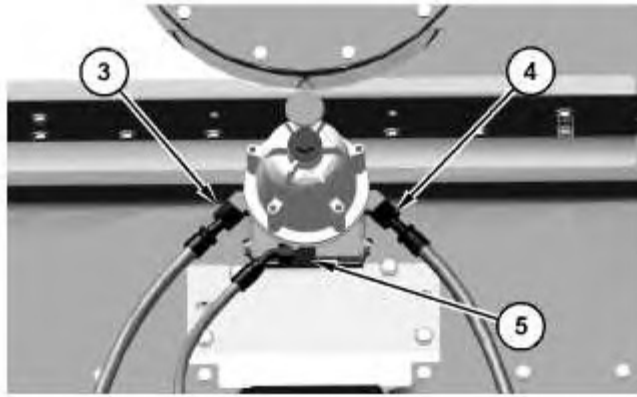


Illustration 5

g06059654

6. Connect line (3), line (4), and line (5)

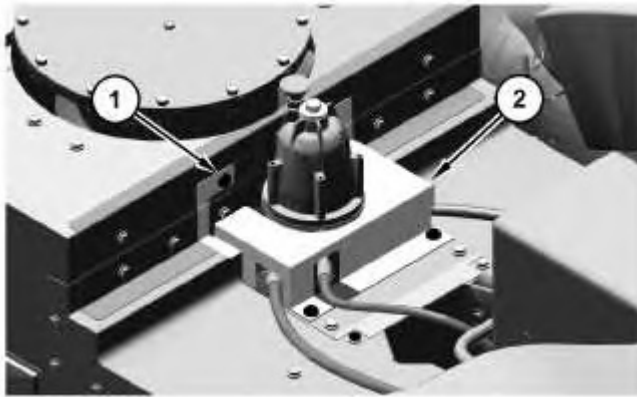


Illustration 6

g06059614

7. Install cover (2) and bolts (1).
  8. Fill the cooling system with coolant. Refer to Operation and Maintenance Manual, "Cooling System Coolant - Change".
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## **Disassembly and Assembly 3512E and 3516E Marine Engines**

Media Number -M0075247-08

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i06882132

# **Exhaust Bypass Valve - Remove and Install**

SMCS - 1057-010

## **Removal Procedure**

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### **NOTICE**

**Keep all parts clean from contaminants. Contaminants may cause rapid wear and shortened component life.**

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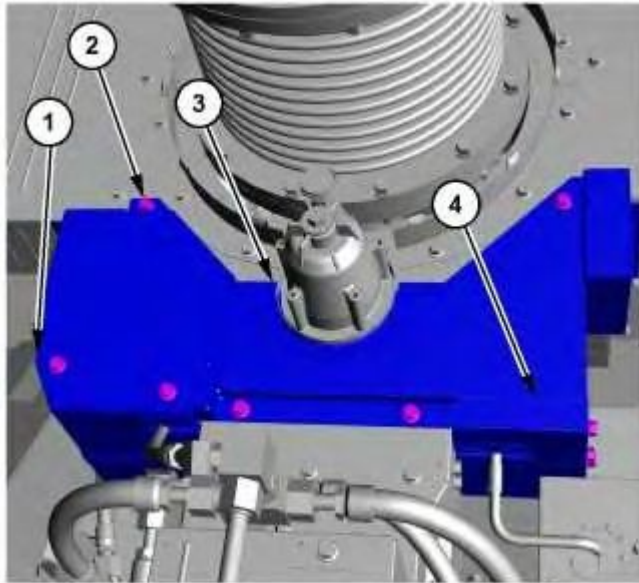
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### **NOTICE**

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1. Drain the coolant from the cooling system to a level below the exhaust bypass valve into a suitable container for storage or disposal. Refer to Operation and Maintenance Manual, “Cooling System Coolant - Change”.
-

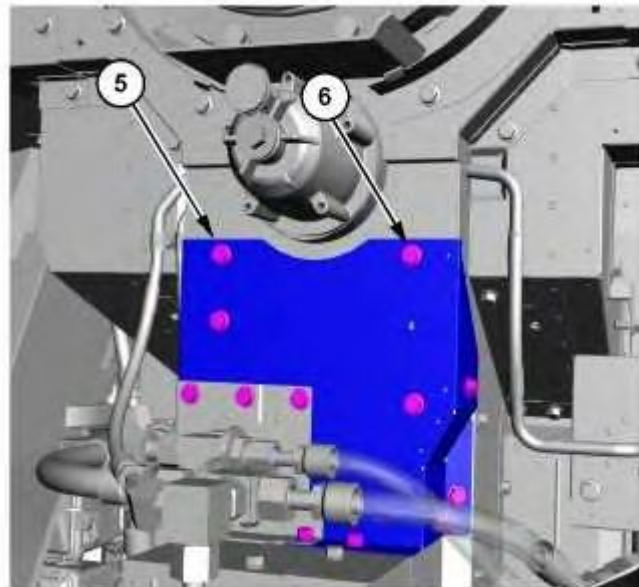


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Illustration 1

g06151917

2. Remove 11 bolts (2) and remove shields (1), (3), and (4).
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Illustration 2

g06151954

3. Remove 13 bolts (6) and remove shield (5).
-

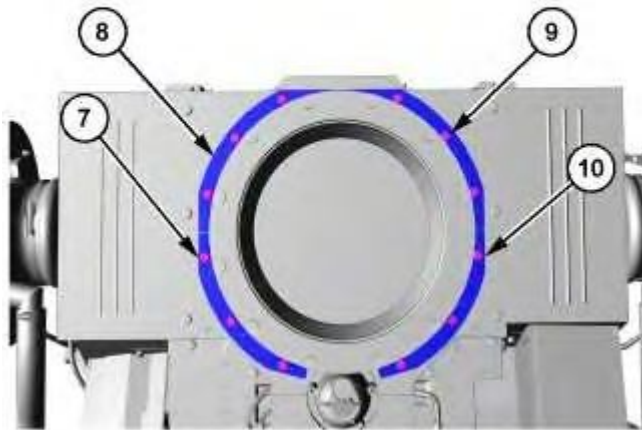


Illustration 3

g06152213

4. Remove 12 bolts (9) and remove shields (7), (8), and (10).

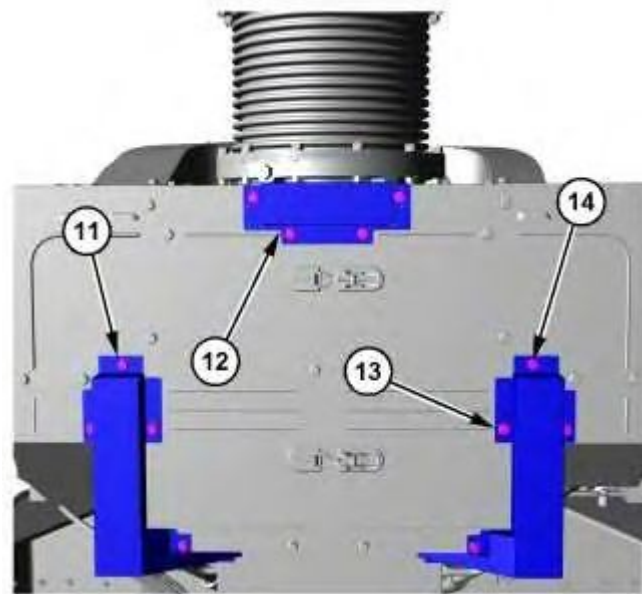
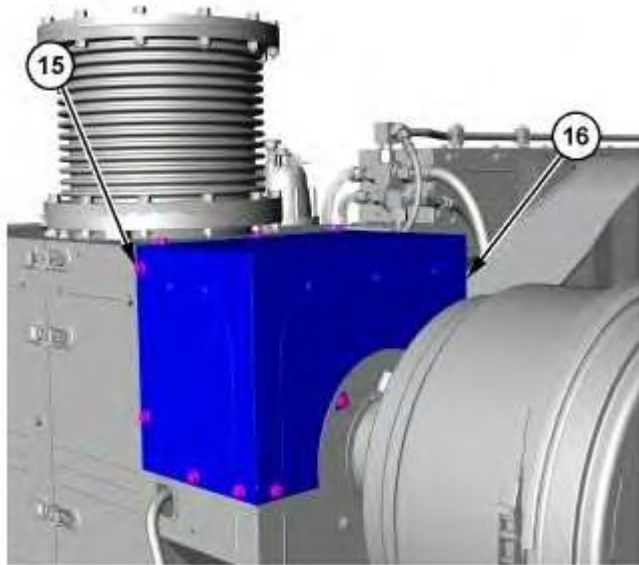


Illustration 4

g06152245

5. Remove 14 bolts (14) and remove shields (11), (12), and (13). Two bolts are not shown.

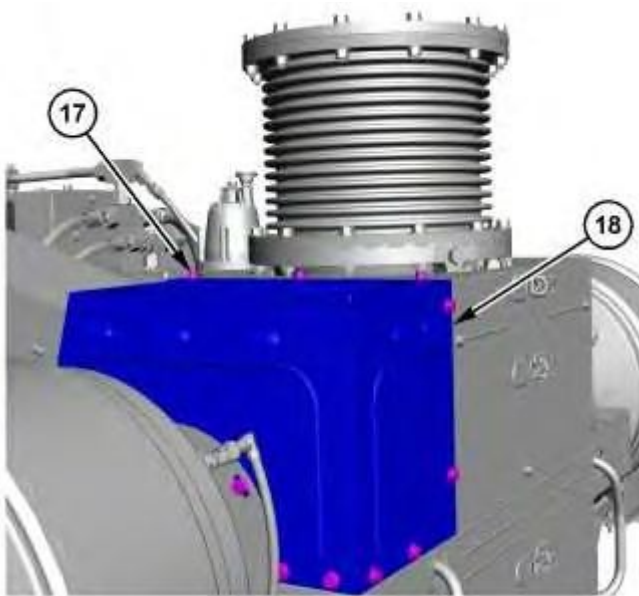


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Illustration 5

g06152261

6. Remove 14 bolts (15) and remove shield (16). Five bolts are not shown.

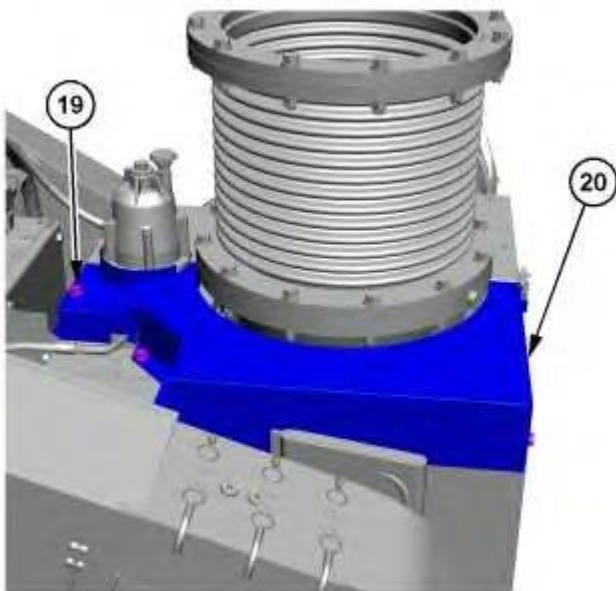


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Illustration 6

g06152285

7. Remove 16 bolts (17) and remove shield (18). Ten bolts are not shown.
-

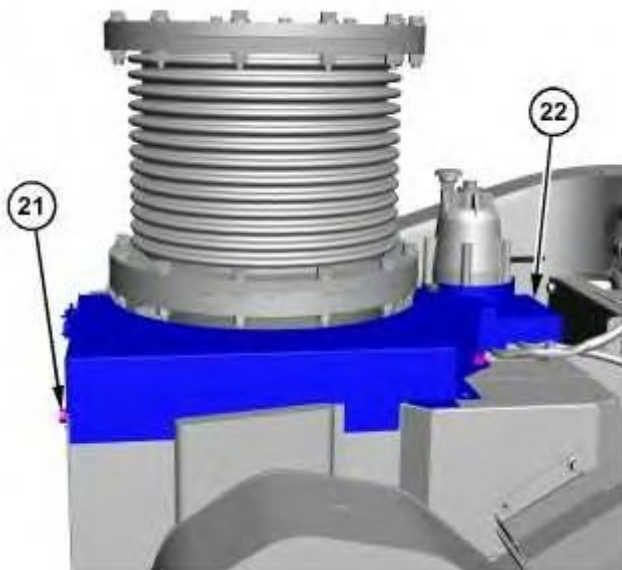


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Illustration 7

g06152304

8. Remove three bolts (19) and remove shield (20).
- 



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Illustration 8

g06152444

9. Remove two bolts (21) and remove shield (22).
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