RENR8483-06 (en-us)
February 2019

Specifications

14M and 16M Motor Graders Hydraulic and Steering System

B9H 1-UP (Machine)
R9H 1-UP (Machine)
B9J 1-UP (Machine)
R9J 1-UP (Machine)

Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards, including human factors that can affect safety. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you verify that you are authorized to perform this work, and have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the “Safety Alert Symbol” and followed by a “Signal Word” such as “DANGER”, “WARNING” or “CAUTION”. The Safety Alert “WARNING” label is shown below.

⚠ WARNING

The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

A non-exhaustive list of operations that may cause product damage are identified by “NOTICE” labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. You must not use this product in any manner different from that considered by this manual without first satisfying yourself that you have considered all safety rules and precautions applicable to the operation of the product in the location of use, including site-specific rules and precautions applicable to the worksite. If a tool, procedure, work method or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that you are authorized to perform this work, and that the product will not be damaged or become unsafe by the operation, lubrication, maintenance or repair procedures that you intend to use.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Cat dealers have the most current information available.

⚠ WARNING

When replacement parts are required for this product Caterpillar recommends using Cat replacement parts.

Failure to follow this warning may lead to premature failures, product damage, personal injury or death.

In the United States, the maintenance, replacement, or repair of the emission control devices and systems may be performed by any repair establishment or individual of the owner's choosing.

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Specifications Section

i04898494

Hydraulic Tank Mounting

SMCS Code: 4332; 5056

Part No.: 250-3507, 293-4267
S/N: B9H1–Up

Part No.: 250-3507, 293-4267
S/N: R9H1–Up

Part No.: 233-4259, 250-3507
S/N: B9J1–Up

Part No.: 233-4259, 250-3507
S/N: R9J1–Up

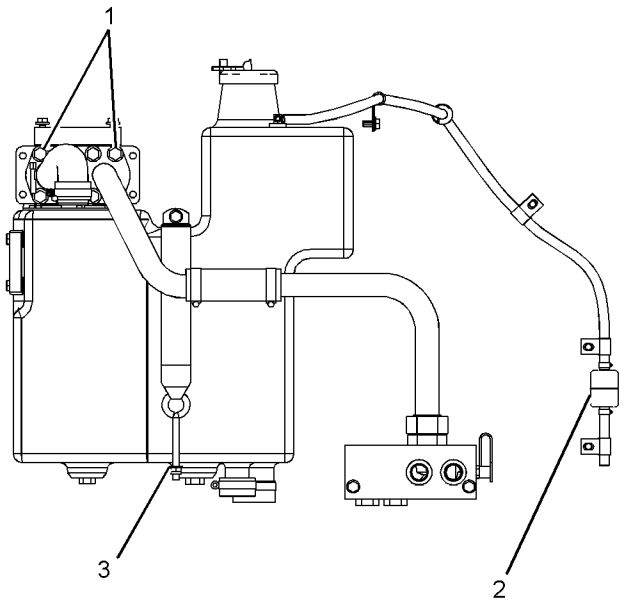

Illustration 1 g01310772

Table 1

Specifications for 233-4259 Hydraulic Tank and Mounting Gp and 250-3507 Hydraulic Oil Filter and Mounting Gp			
Item	**Qty**	**Part**	**Specification Description**
1	8	8T-4183 Bolt	Torque to 50 ± 10 N·m (37 ± 7 lb ft).
2	1	9R-9925 Breather Filter Element	Install so that the air flow into the tank is in the direction of the arrow on the filter.
3	1	8T-0389 Locknut	Tighten enough in order to secure the tank without causing the deformation to the tank.

i05765681

Hydraulic Tank

SMCS Code: 5056

Part No.: 275-6574
S/N: B9H1–Up

Part No.: 275-6574
S/N: R9H1–Up

Part No.: 241-3867
S/N: B9J1–Up

Part No.: 241-3867
S/N: R9J1–Up

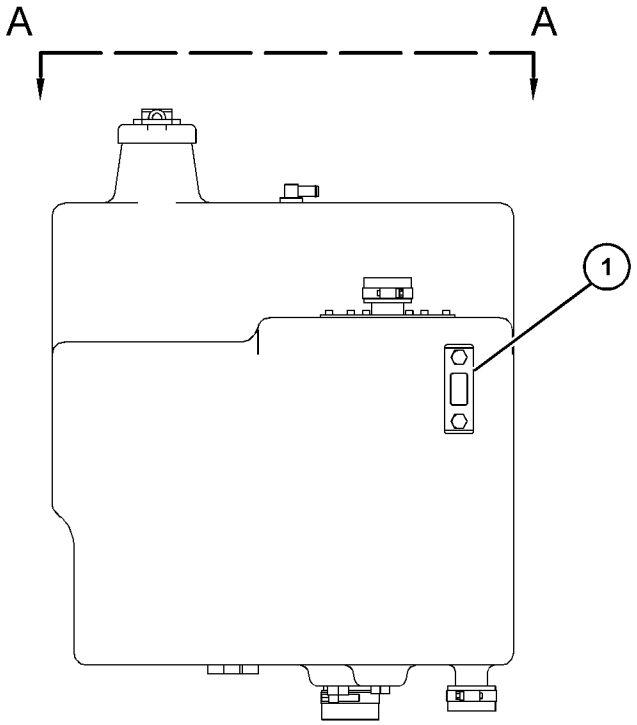

Illustration 2 g03658044
Typical example

Table 2

Specification for 241-3867 Hydraulic Tank Gp and 275-6574 Hydraulic Tank Gp			
item	**Qty**	**Part**	**Specification Description**
1	1	265-5644 Sight Gauge Gp	Torque to 10 ± 2 N·m (90 ± 18 lb in).

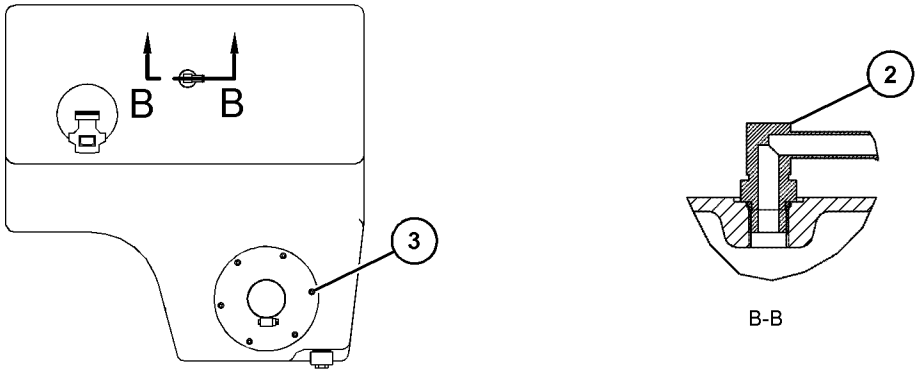

Illustration 3 g03658042

View A-A

Table 3

item	Qty	Part	Specification Description
2	1	150-3024 Elbow As	Torque to 17 to 19 N·m (150 to 168 lb in).
3	6	125-3298 Bolt	Torque to 2.25 ± 0.25 N·m (19.91 ± 2.21 lb in).

i04894867

Oil Filter (Hydraulic Return)

SMCS Code: 5068-RJ

Part No.: 249-2307

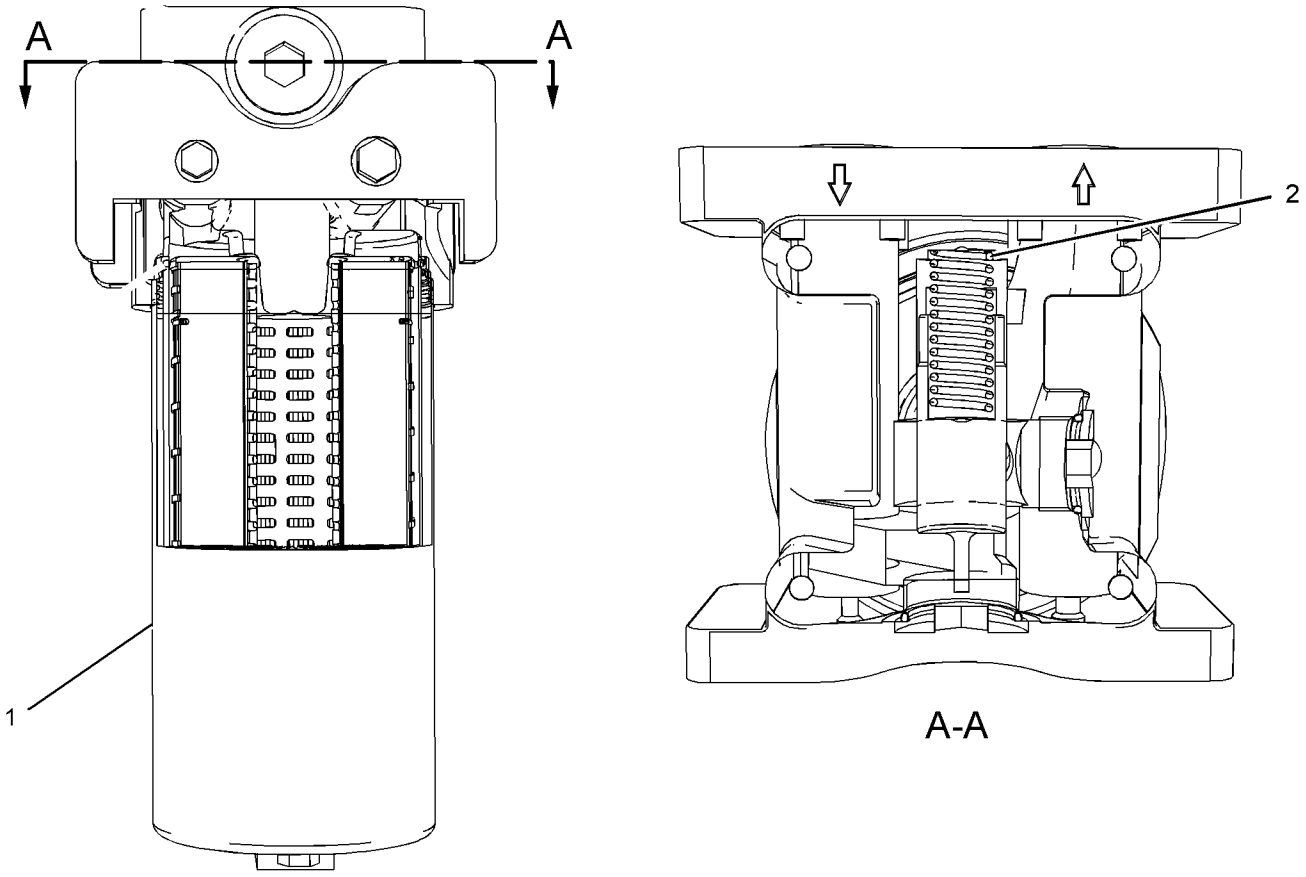

Illustration 4 g03037939

Table 4

Specifications for 249-2307 Oil Filter Gp			
Item	**Qty**	**Part**	**Specification Description**
1	1	321-5967 Filter Housing Gp	Torque to 75 ± 5 N·m (55 ± 4 lb ft).
			Lubricate the seal lightly with the lubricant being filtered prior to installation.
Do not use an air wrench to tighten the housing.			
2	1	7M-1297 Spring	Test length 50.8 mm (2.00 inch)
			Load at test length 175 ± 14 N (40 ± 3.2 lb)
			Free length after test 75.7 mm (2.98 inch)
			Outside diameter 22.35 mm (0.880 inch)

i04898276

Oil Filter (Implement)

SMCS Code: 5068-II

Part No.: 191-9784

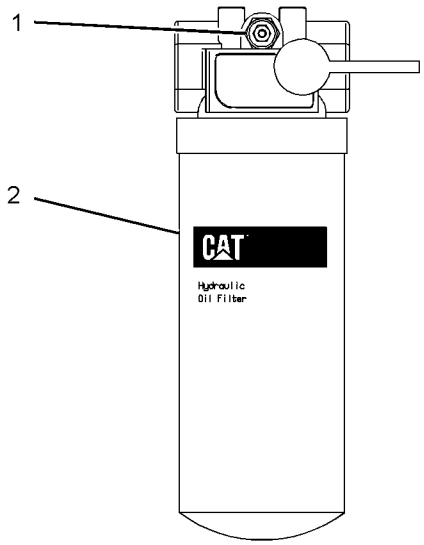

Illustration 5 g01157808

Table 5

Specifications for 191-9784 Oil Filter Gp			
Item	**Qty**	**Part**	**Specification Description**
1	1	7X-8549 Pressure Switch	Torque to 30 ± 3 N·m (265 ± 27 lb in).
			Normally open
2	1	1G-8878 Oil Filter	Torque to 40 to 45 N·m (30 to 33 lb ft).
			Bypass setting 172 kPa (25 psi).

i04897414

Temperature Sensor (Hydraulic Oil)

SMCS Code: 1408-NS; 509T; 5734-NS

Part No.: 264-4297

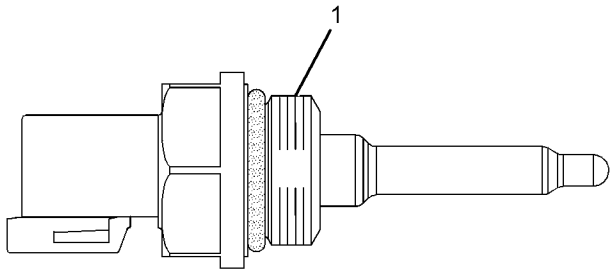

Illustration 6 g02032983
Typical Example

Table 6

Specification for 264-4297 Temperature Sensor			
Item	**Qty**	**Part**	**Specification Description**
1	**-**	**-**	**Torque to 20 ± 3 N·m (177 ± 27 lb in).**
			Output type is passive.

i04019173

Piston Pump (Implement, Steering)

SMCS Code: 5070-ZI

Part No.: 246-4486

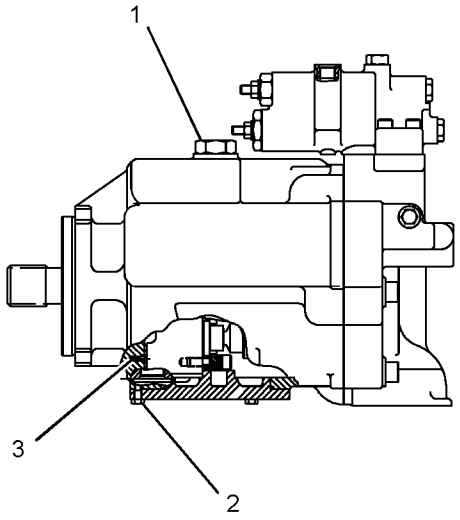

Illustration 7 g01345939

Pump displacement . . . . . 131.1 cc ((8.00 in^3))

Pump rotation . . . . . Clockwise

Pressure compensation . . . . . 25500 ± 400 kPa ((3700 ± 58 psi))

Margin pressure . . . 2100 ± 100 kPa ((305 ± 15 psi))

Reference: The pressures that are listed above are for bench testing purposes only. Refer to the specification, “Pump Control Valve (Implement, Steering)” portion of this book in order to determine the proper pressure settings at installation.

Note: Fill the case with oil prior to running the pump.

(1) Torque for one plug . . . . . 101.5 ± 4.5 N·m ((75 ± 3 lb ft))

(2) Torque for three bolts . . . . . .8.5 ± 1 N·m ((75 ± 9 lb in))

(3) Torque for two screws . . . . . 4.0 ± 0.4 N·m ((35 ± 4 lb in))

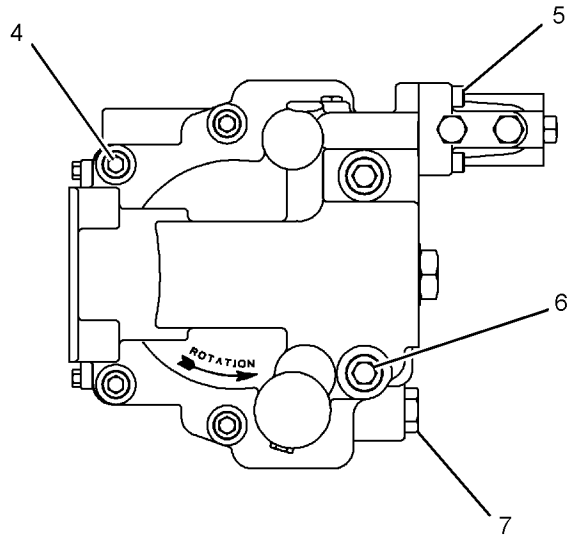

Illustration 8 g01345928

(4) Torque for four bolts . . . . . 115 ± 12 N·m ((85 ± 9 lb ft))

(5) Torque for four bolts . . . .34 ± 3 N·m ((25 ± 2 lb ft))

(6) Torque for two bolts . . . . . 286 ± 29 N·m ((210 ± 21 lb ft))

(7) Torque for one plug . . . .79 ± 4 N·m ((60 ± 3 lb ft))

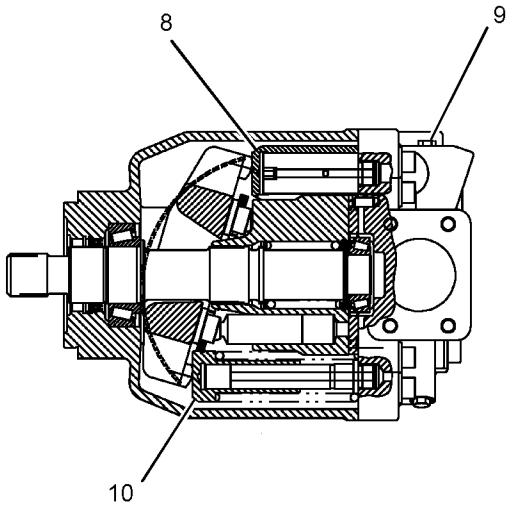

Illustration 9 g01189257

(8) Apply Loctite 242 to the threads of pin. Tighten the rod to 80 ± 4 N·m (60 ± 3 lb ft).

(9) Torque for two plugs . . . . . 12.9 ± 0.1 N·m ((114 ± 1 lb in))

(10) Apply Loctite 242 to the threads of pin. Torque for rod to 80 ± 4 N·m (60 ± 3 lb ft)

i04897657

Pump Control Valve (Implement, Steering)

SMCS Code: 5455

Part No.: 271-6847

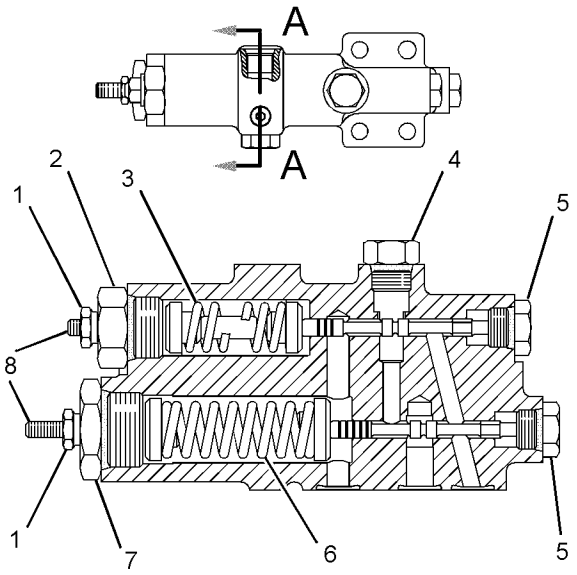

Illustration 10 g01566416

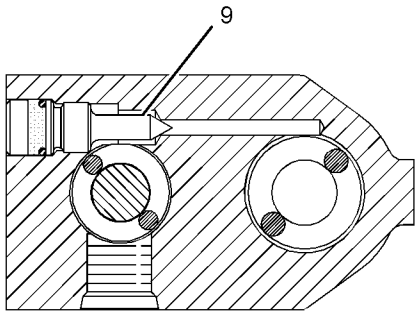

Illustration 11 g01325982

Section A-A

Table 7

Specifications for 271-6847 Pump Control Valve Gp			
Item	**Qty**	**Part**	**Specification Description**
1	2	6E-6141 Sealing Locknut	Torque nut to 17 ± 3 N·m (150 ± 27 lb in).
2	1	6E-6142 Margin Plug	Torque to79 ± 4 N·m (60 ± 3 lb ft).

(continued)

(Table 7, contd)

			Margin pressure is 2100 ± 100 kPa (305 ± 15 psi).
3	1	6E-4246 Margin Spring	Free length is 38.1 mm (1.50 inch).
			Outside diameter is 14.5 mm (0.57 inch).
4	1	9S-4191 O-Ring Plug	Torque to 30.5 ± 1.5 N·m (270 ± 13 lb in).
5	2	9T-2186 Plug	Torque to 30.5 ± 1.5 N·m (270 ± 13 lb in).
6	1	6E-4228 Spring	Test length is 44.7 mm (1.76 inch).
			Test Force is 871 ± 1 N·m (640 ± 1 lb ft).
			Free length after test is 57.15 mm (2.250 inch).
			Outside diameter is 24.25 ± .25 mm (0.955 ± 0.010 inch).
7	1	6E-6140 Compensator Plug	Torque to 101.5 ± 4.5 N·m (75 ± 3 lb ft).
			Pressure compensation is 25500 ± 400 kPa (3700 ± 58 psi).
8	2	9X-8914 Socket Setscrew	Hold while torquing sealing nut (1).
9	1	Valve	Torque to 13.0 ± 0.5 N·m (115 ± 4 lb in).

i04019324

Control Manifold (Implement, Steering)

SMCS Code: 5051-ZI

Part No.: 263-1790

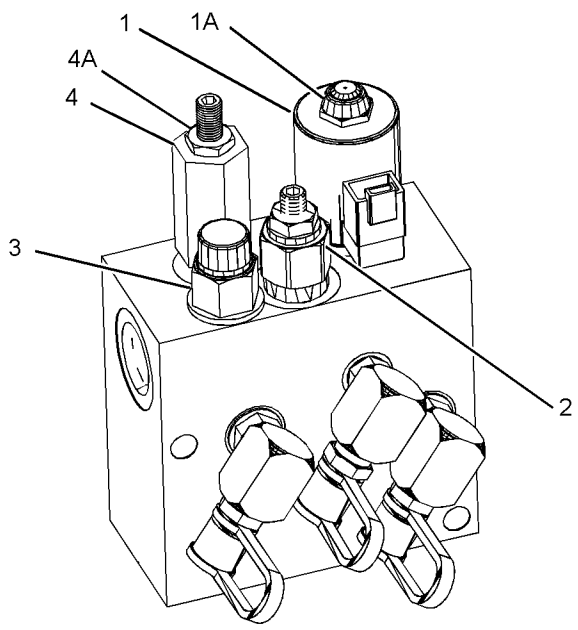

Illustration 12 g01333699

(1) 252-0741 Solenoid Valve Gp

Final installation torque . . . . . 50.2 ± 5 N·m ((37 ± 4 lb ft))

(1A)Torque for nut . . . . . 9.5 ± 1.0 N·m ((85 ± 9 lb in))

Coil

Nominal voltage . . . . . 24 VDC
Resistance at 20° C (68° F) . . . . . 26.96 ± 1.35 ohms

(2)252 - 8038 Pressure Reducing Valve

Reference: For more information on the 252 - 8038 Pressure Reducing Valve, refer to the Specifications, “Pressure Reducing Valve (Implement Pilot)” story in this manual.

(3) 237 - 0957 Pressure Sensor Gp

Final installation torque . . . 20.3 N·m ((180 lb in))

Reference: For more information on the 237 - 0957 Pressure Sensor Gp, refer to Specifications, “Secondary Steering System” and Specifications, “Pressure Sensor (Secondary Steering)” stories in the Secondary Steering manual for your machine.

(4) 133 - 5330 Relief Valve Gp

Final installation torque . . . . . 50.2 ± 5 N·m ((37 ± 4 lb ft))
(4A)Torque for nut . . . . . 12.2 ± 1.2 N·m ((110 ± 11 lb in))

Reference: For more information on the 133 - 5330 Relief Valve Gp, refer to the Specifications, “Relief Valve (Main)” story in this manual.

i05673550

Relief Valve (Main)

SMCS Code: 5069; 5117

Part No.: 133-5330

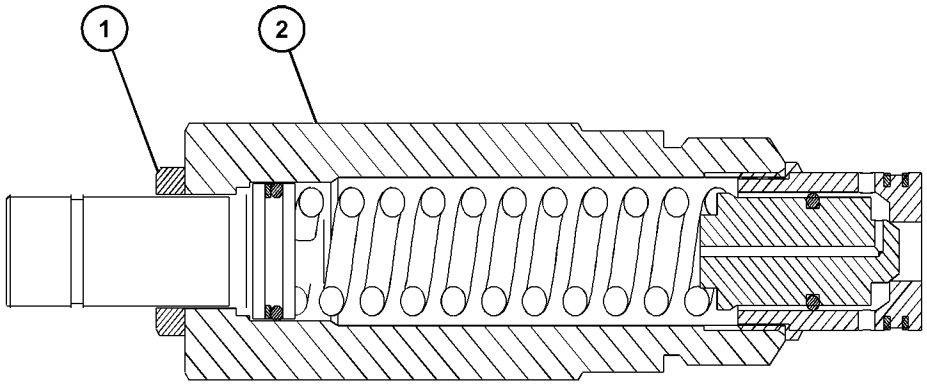

Illustration 13 g03598016

Table 8

Specification for 133-5330 Relief Valve Gp			
Item	**Qty**	**Part**	**Specification Description**
1	1	Nut	Torque to 12 N·m (106 lb in).
2	1	-	Torque to 50.2 ± 5.0 N·m (37.0 ± 3.7 lb ft).

i04897424

Relief Valve (Signal)

SMCS Code: 5072

Part No.: 243-5210

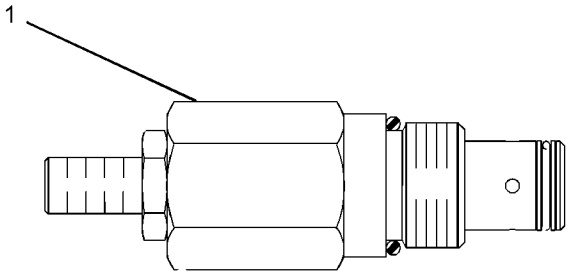

Illustration 14 g03046980

Table 9

Specifications for 243-5210 Relief Valve Gp			
Item	**Qty**	**Part**	**Specification Description**
1	1	243-5210 Relief Valve Gp	Torque nut to 12 N·m (106 lb in).
			Torque to 50.2 ± 5 N·m (37 ± 3.7 lb ft).

i07385151

Pressure Reducing Valve (Implement Pilot)

SMCS Code: 5467-PS

Part No.: 252-8038

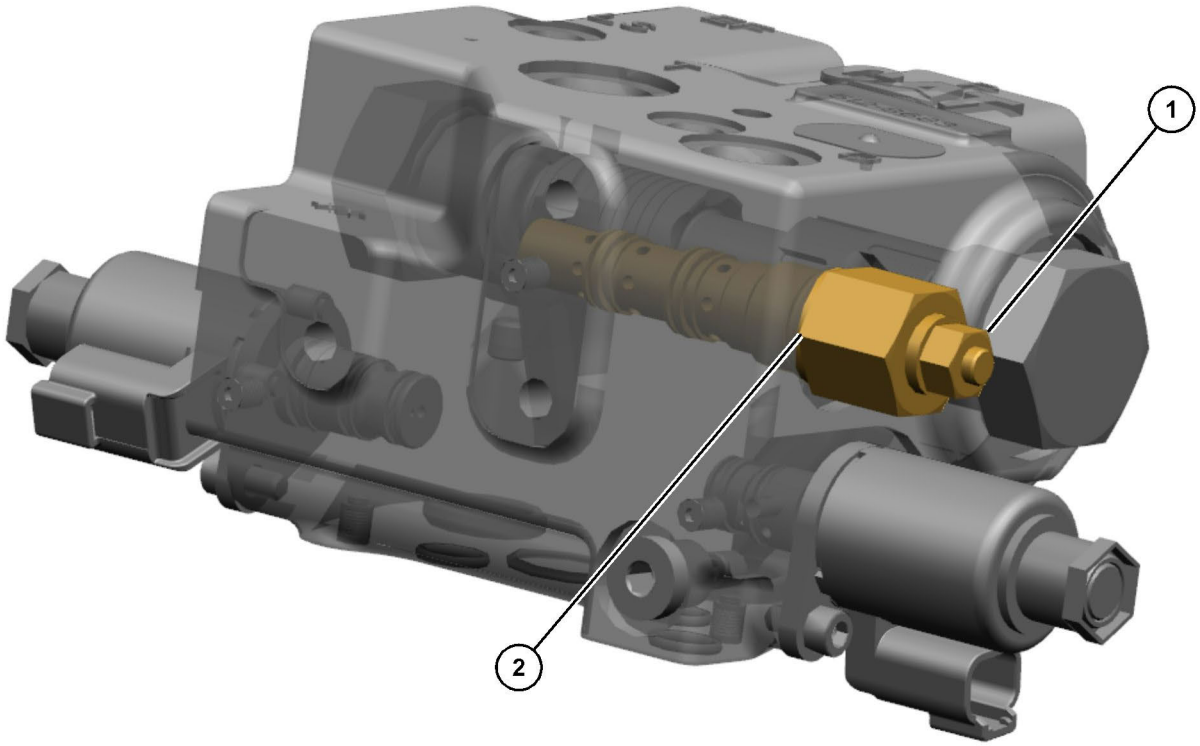

Illustration 15 g06308044

Table 10

Item	Qty	Part	Specification Description
1	1	-	Torque nut to 24 ± 2 N·m (212 ± 18 lb in).
2	1	-	Torque to 60 ± 2 N·m (44 ± 1 lb ft).
-	-	-	Before assembly, Lubricate the backup seals and O-Ring seals with the lubricant being sealed.

i07694169

Pressure Reducing Valve (Steering)

SMCS Code: 4337

Part No.: 345-4472

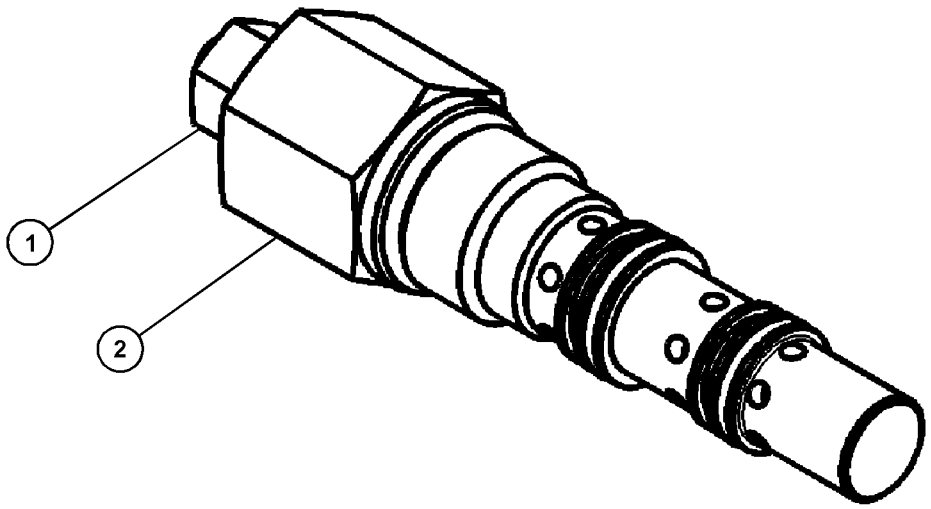

Illustration 16 g06258522

Table 11

Specification for 345-4472 Valve Gp Pressure Reducing			
Item	**Qty**	**Part**	**Specification description**
1	-	-	Tighten the locknut to 12 ± 1.2 N·m (106 ± 10.6 lb in).
2	-	-	Installation torque to 63 ± 3 N·m (46 ± 2 lb ft).
-	-	-	Relief valve pressure at a flow of 4.0 ± 0.5 L/min (1.0 ± 0.13 US gpm). Relief valve pressure 1100 ± 150 kPa (160 ± 22 psi). At a Temperature of 49° ± 3°C (88° ± 5.5°F).

i04546373

Shuttle Valve

SMCS Code: 5079

Part No.: 6R-7605

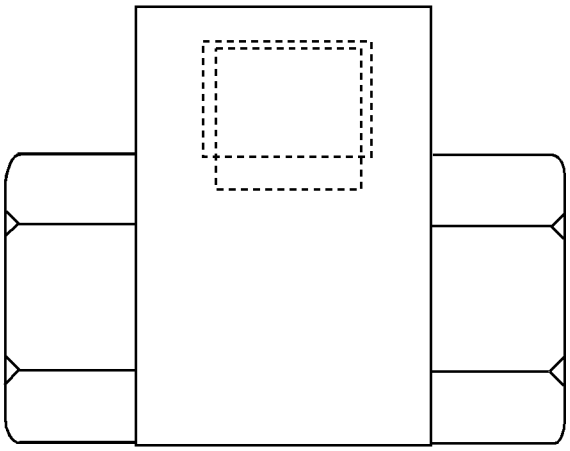

Illustration 17 g02720241

Table 12

Specification for 6R-7605 Shuttle Valve			
Item	**Qty**	**Part**	**Specification Description**
-	-	6R-7605 Shuttle Valve	Maximum operating pressure is 24132 kPa (3500 psi)

i04894401

Control Manifold (Steering Pilot Oil Backup)

SMCS Code: 5051; 5264

Part No.: 254-3415

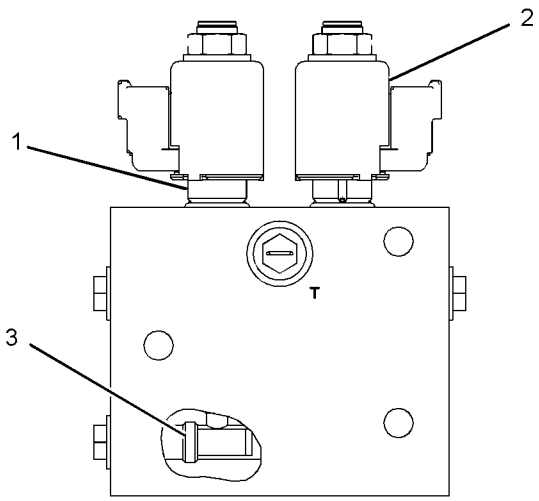

Illustration 18 g03036161

Table 13

Specification for 254-3415 Control Manifold Gp			
Item	**Qty**	**Part**	**Specification Description**
1	2	310-7060 Solenoid Valve Gp -	Torque to 50 ± 5 N·m (37 ± 4 lb ft).
			Torque for nut 13 ± 1.5 N·m (115 ± 13 lb in).
2	2	323-9533 Coil	Nominal Voltage is 12 VDC
			Resistance at 25 °C (77 °F) is 2.2 ± 0.2 ohms
Orient coils (1) according to Illustration 18 .			
3	1	6E-5066 Screen	Torque to 6.7 ± 0.7 N·m (59.3 ± 6.2 lb in).

i06183052

Accumulator (Blade Cushion)

SMCS Code: 5077

Part No.: 219-8035

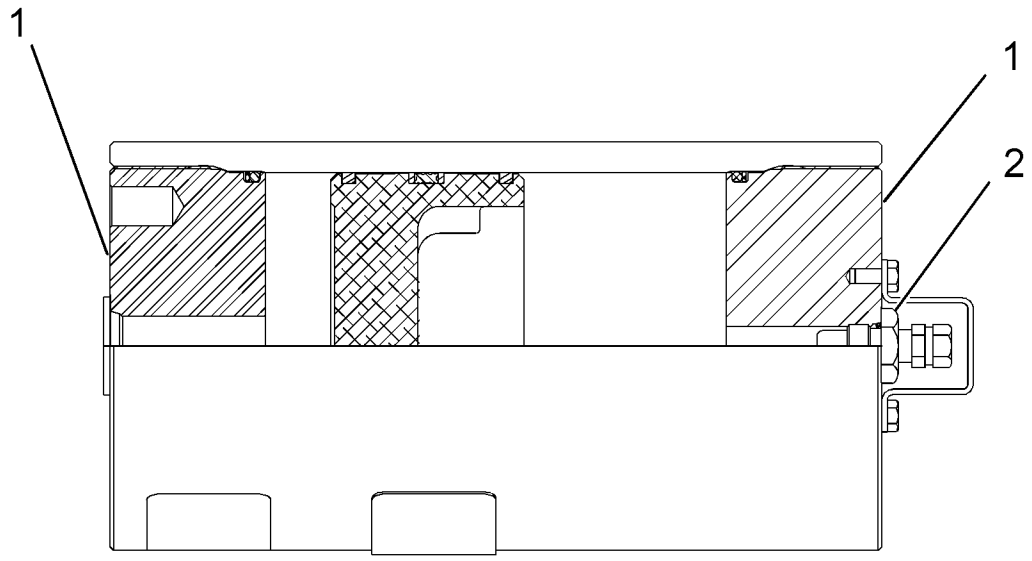

Illustration 19 g03840479

Table 14

Specification for the 219-8035 Hydraulic Accumulator Gp[1]			
Item	**Qty**	**Part**	**Specification Description**
1	2	-	Tighten the heads to 217 ± 10 N·m (160 ± 7 lb ft).
2	1	222-2367 Accumulator Charging Valve	Torque to 35.0 ± 1.5 N·m (25.8 ± 1.1 lb ft).

(1) Note: For more information on the hydraulic accumulator group, refer to Testing & Adjusting, “Accumulator (Blade Cushion) - Test and Charge”.

i06553974

Solenoid Valve
(Implement Control Valve)

SMCS Code: 5479

Part No.: 278-1799

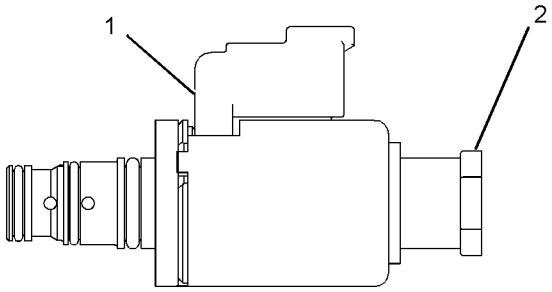

Illustration 20 g01213432

Table 15

Specification for 278-1799 Solenoid Valve Gp			
Item	**Qty**	**Part**	**Specification Description**
1	1	226-9622 Solenoid Coil As	24VDC
			8.7 ± 4 ohms at 25 °C (77 °F)
2	1	278-1799 Solenoid Valve Gp	Torque nut to 5.5 ± 1.5 N·m (50 ± 13 lb in).

i06183064

Solenoid Valve and Manifold (Variable Blade Float)
(If Equipped)

SMCS Code: 5264-JV

Part No.: 279-6521
S/N: B9H1–Up

Part No.: 279-6521
S/N: R9H1–Up

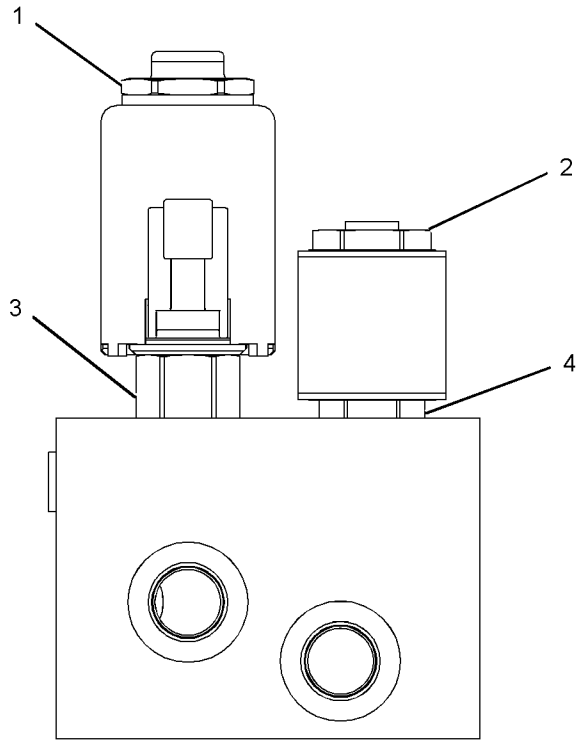

Illustration 21 g03840488

Table 16

Specifications for 279-6521 Solenoid Valve and Manifold Gp			
Item	**Qty**	**Part**	**Specification Description**
1	1	Nut	Torque to 11.55 ± 2.05 N·m (102.23 ± 18.14 lb in).
2	1	Nut	Torque to 8.0 ± 1.5 N·m (70.8 ± 13.3 lb in).
3	1	283-9570 Solenoid Valve Gp	Torque to 34.5 ± 1.3 N·m (25.5 ± 1.0 lb ft).
4	1	283-9557 Solenoid Valve Gp	Torque to 25.85 ± 1.35 N·m (228.79 ± 11.95 lb in).

i03770649

Solenoid Valve (Blade Cushion)

SMCS Code: 5479

Part No.: 253-1320

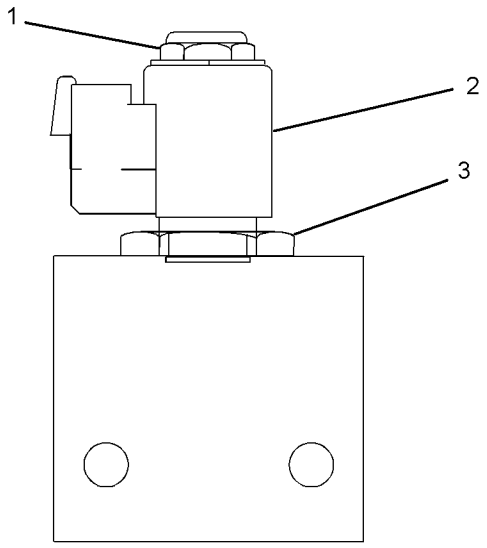

Illustration 22 g01566453

(1) Torque for nut . . . . . 9.5 ± 1.5 N·m ((85 ± 13 lb in))

(2) 249-0981 Coil

Nominal voltage . . . . . 24 VDC
Resistance at 25 °C (77 °F) . . . 41.9 ± 2.1 ohms

(3) Installation torque . . .169 ± 7 N·m ((125 ± 5 lb ft))

i04020261

Springs (Control Valves)

SMCS Code: 1108-Q4; 5051-Q4

Part No.: 212-4961, 284-3555, 284-3556, 6E-3007

Table 17

Part Number	First Test Length mm (inch)	First Test Force N (lb)	Second Test Length mm (inch)	Second Test Force N (lb)	Free Length mm (inch)	Outside Diameter mm (inch)
284-3555	28.5 mm (1.12 inch)	261 ± 21 N (58.7 ± 4.7 lb)	24.0 mm (0.95 inch)	666 ± 53 N (149.7 ± 11.9 lb)	31.4 mm (1.24 inch)	19.36 mm (0.762 inch)
284-3556	44 mm (1.73 inch)	177 ± 15 N (39.8 ± 3.4 lb)	35.00 mm (1.378 inch)	609 ± 48 N (136.9 ± 10.8 lb)	47.69 mm (1.878 inch)	19.36 mm (0.762 inch)
212-4961	23.9 mm (0.94 inch)	14.25 ± 21 N (3.205 ± 4.721 lb)	N/A	N/A	27.24 mm (1.072 inch)	7.5 mm (0.30 inch)
6E-3007	8.60 mm (0.339 inch)	0.234 ± 0.024 N (0.053 ± 0.005 lb)	N/A	N/A	10.0 mm (0.39 inch)	4.6 mm (0.18 inch)

i04020249

Control Valve (Articulation)

SMCS Code: 5051; 5266

Part No.: 259-6912

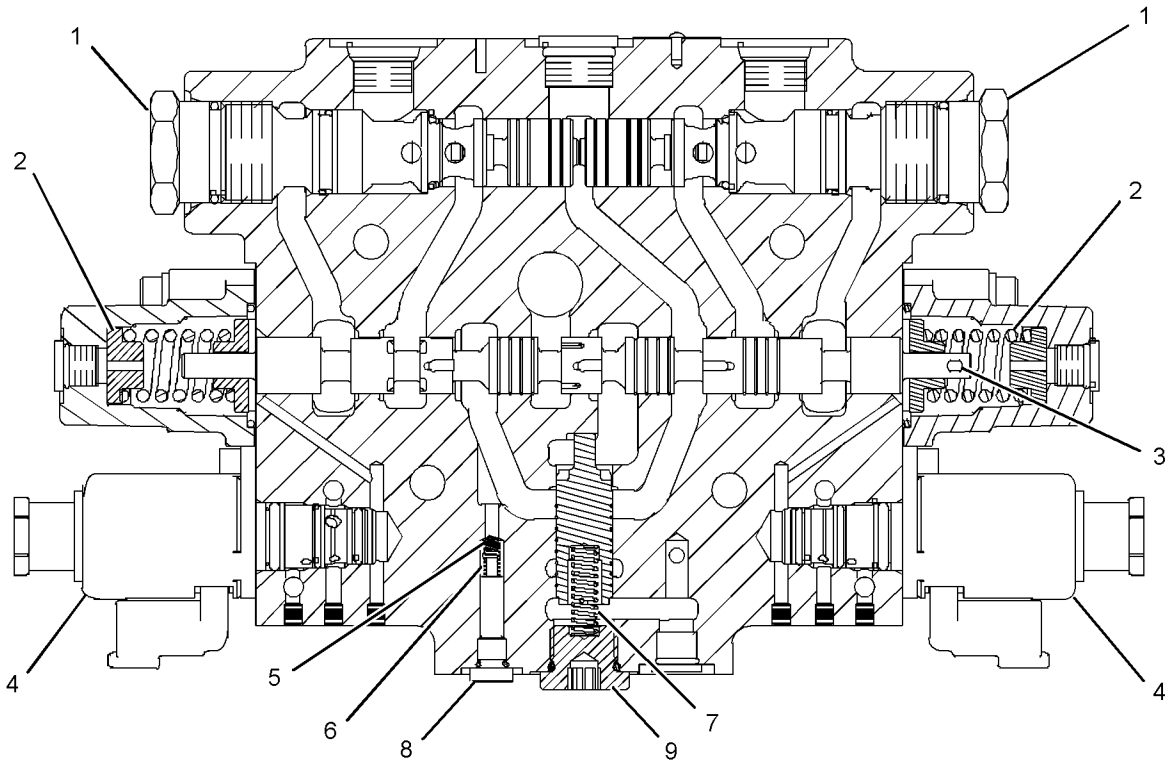

Illustration 23 g01406910

(1) 321-6908 Check Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . 2240 ± 350 kPa ((325 ± 51 psi))

Note: Lubricate the seals on valve (1) lightly with the lubricant that is being sealed.

(2)284-3555 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(3) Assemble the cutout in the stem on this end, as shown.

(4)278-1799 Solenoid Valve Gp

Reference: Refer to Specifications, “Solenoid Valve (Implement Control Valve)” for additional information.

(5) Gently seat the ball into the valve body.

(6)6E-3007 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(7)212-4961 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(8) Torque for plug . . . . . 5 ± 1 N·m ((44 ± 9 lb in))

(9) Torque for plug . . . . . .70 ± 7 N·m ((50 ± 5 lb ft))

i04020250

Control Valve (Centershift)

SMCS Code: 5051; 5220

Part No.: 261-3270
S/N: B9H1–Up

Part No.: 261-3270
S/N: R9H1–Up

Part No.: 259-6906
S/N: B9J1–Up

Part No.: 259-6906
S/N: R9J1–Up

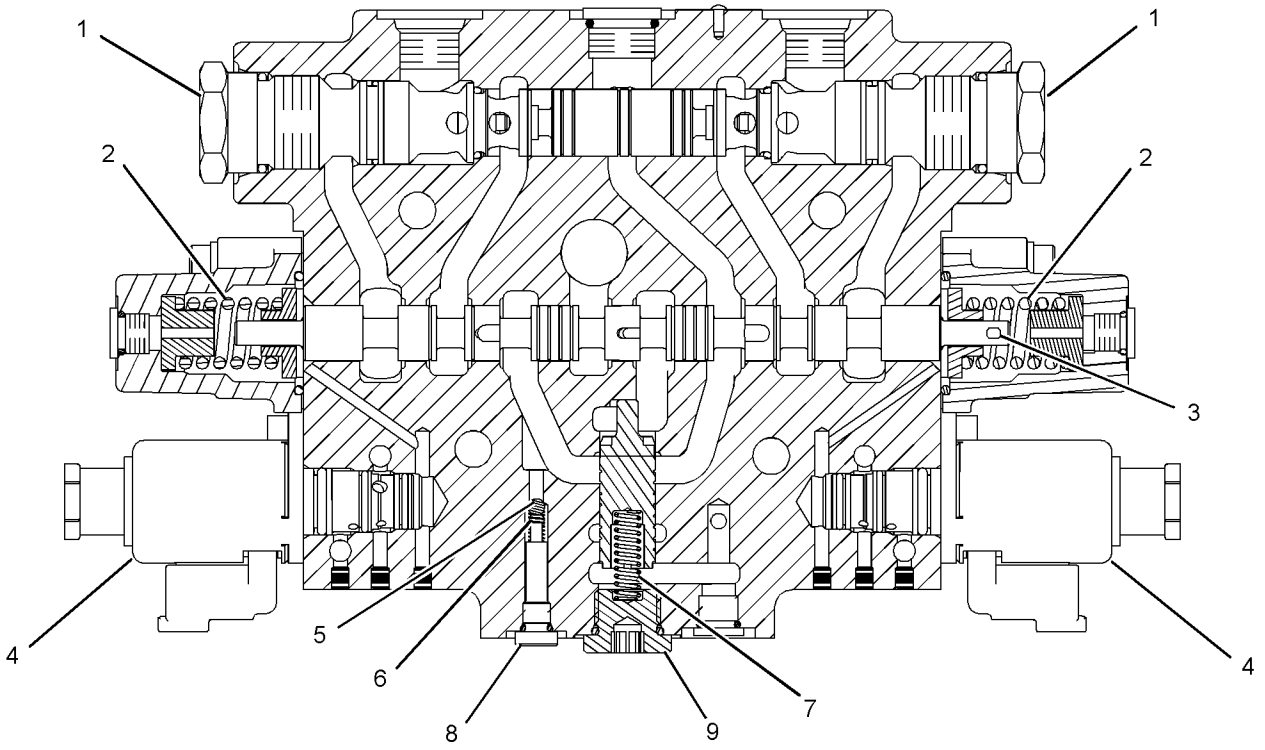

Illustration 24 g01342275

(1) 318-3115 Check Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (1) lightly with the lubricant that is being sealed.

(2)284-3555 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(3) Assemble the cutout in the stem on this end, as shown.

(4)278-1799 Solenoid Valve Gp

Reference: Refer to Specifications, “Solenoid Valve (Implement Control Valve)” for additional information.

(5) Gently seat the ball into the valve body.

(6)6E-3007 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(7)212-4961 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(8) Torque for plug . . . . . 5 ± 1 N·m ((44 ± 9 lb in))

(9) Torque for plug . . . . . .70 ± 7 N·m ((50 ± 5 lb ft))

i04020252

Control Valve (Circle Drive)

SMCS Code: 5051; 5207

Part No.: 259-6907

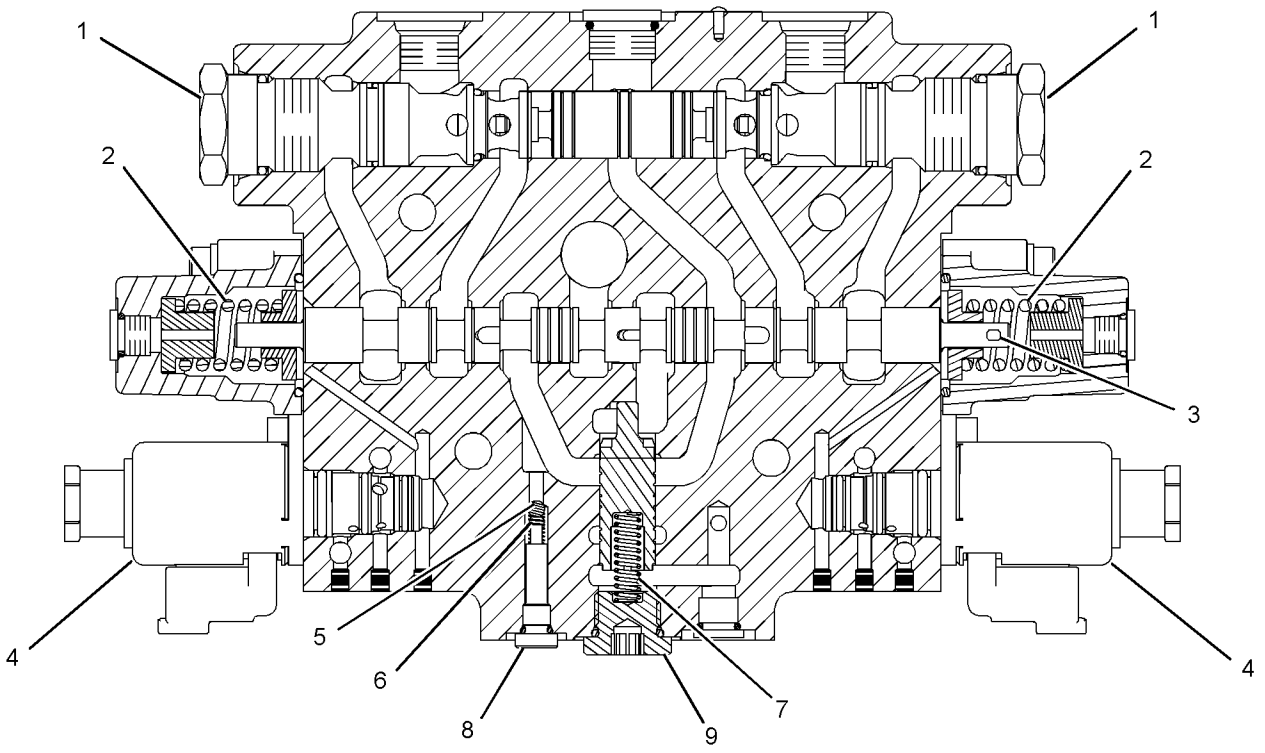

Illustration 25 g01342287

(1) 318-3115 Check Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (1) lightly with the lubricant that is being sealed.

(2)284-3555 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(3) Assemble the cutout in the stem on this end, as shown.

(4)278-1799 Solenoid Valve Gp

Reference: Refer to Specifications, “Solenoid Valve (Implement Control Valve)” for additional information.

(5) Gently seat the ball into the valve body.

(6)6E-3007 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(7)212-4961 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(8) Torque for plug . . . . . 5 ± 1 N·m ((44 ± 9 lb in))

(9) Torque for plug . . . . . .70 ± 7 N·m ((50 ± 5 lb ft))

i04896812

Control Valve (Wheel Lean)

SMCS Code: 5051; 5226

Part No.: 261-3271
S/N: B9H1–Up

Part No.: 261-3271
S/N: R9H1–Up

Part No.: 259-6908
S/N: B9J1–Up

Part No.: 259-6908
S/N: R9J1–Up

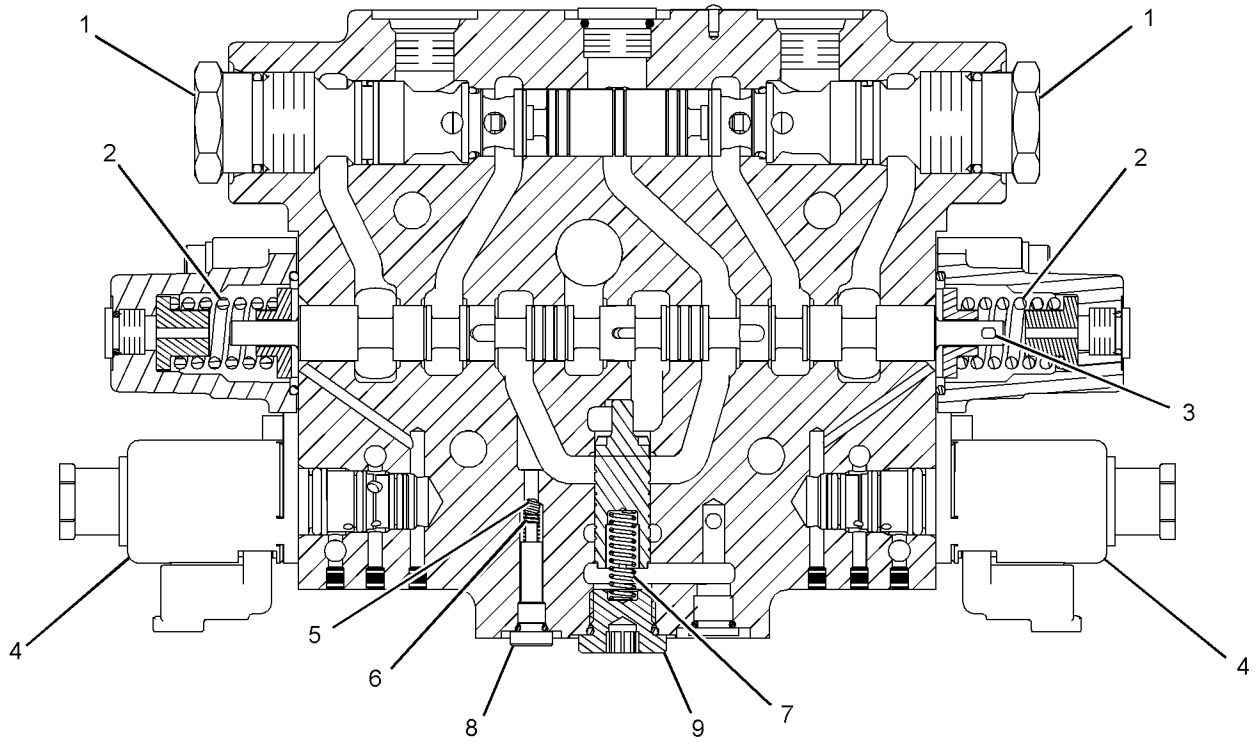

Illustration 26 g01400162

Table 18

Specifications for 245-9539 Control Valve Gp			
Item	**Qty**	**Part**	**Specification Description**
1	2	318-3115 Check Valve Gp	Torque to 80 ± 15 N·m (59 ± 11 lb ft).
			Lubricate the seals lightly with the lubricant being sealed.
2	2	284-3555 Spring	Length under first test force is 28.5 mm (1.12 inch).
			First test force is 261 ± 21 N (58.7 ± 4.7 lb).

(continued)

(Table 18, contd)

			Length under second test force is 24 mm (0.95 inch).
			Second test force is 666 ± 53 N (149.7 ± 11.9 lb).
			Free length after test 31.4 mm (1.24 inch).
3	1	254-3951 Stem	Assemble the cutout in the stem, as shown.
4	2	278-1799 Solenoid Valve Gp	Torque nut to 5.5 ± 1.5 N·m (48.7 ± 13.3 lb in).
5	1	5B-9318 Ball	Gently seat into valve body.
6	1	6E-3007 Spring	Length under test force is 8.60 mm (0.339 inch)
			Test force is 0.234 ± 0.024 N (0.053 ± 0.005 lb)
			Free length after test 10.0 mm (0.39 inch)
7	1	212-4961 Spring	Length under test force is 23.9 mm (0.94 inch)
			Test force is 14.25 ± 0.72 N (3.205 ± 0.162 lb)
			Free length after test 27.24 mm (1.072 inch)
8	1	244-2579 Plug	Torque to 5 ± 1 N·m (44 ± 9 lb in).
9	1	242-9264 Orifice Plug	Torque to 70 ± 7 N·m (50 ± 5 lb ft).

i04020254

Control Valve (Blade Lift)

SMCS Code: 5051; 5136

Part No.: 261-3268

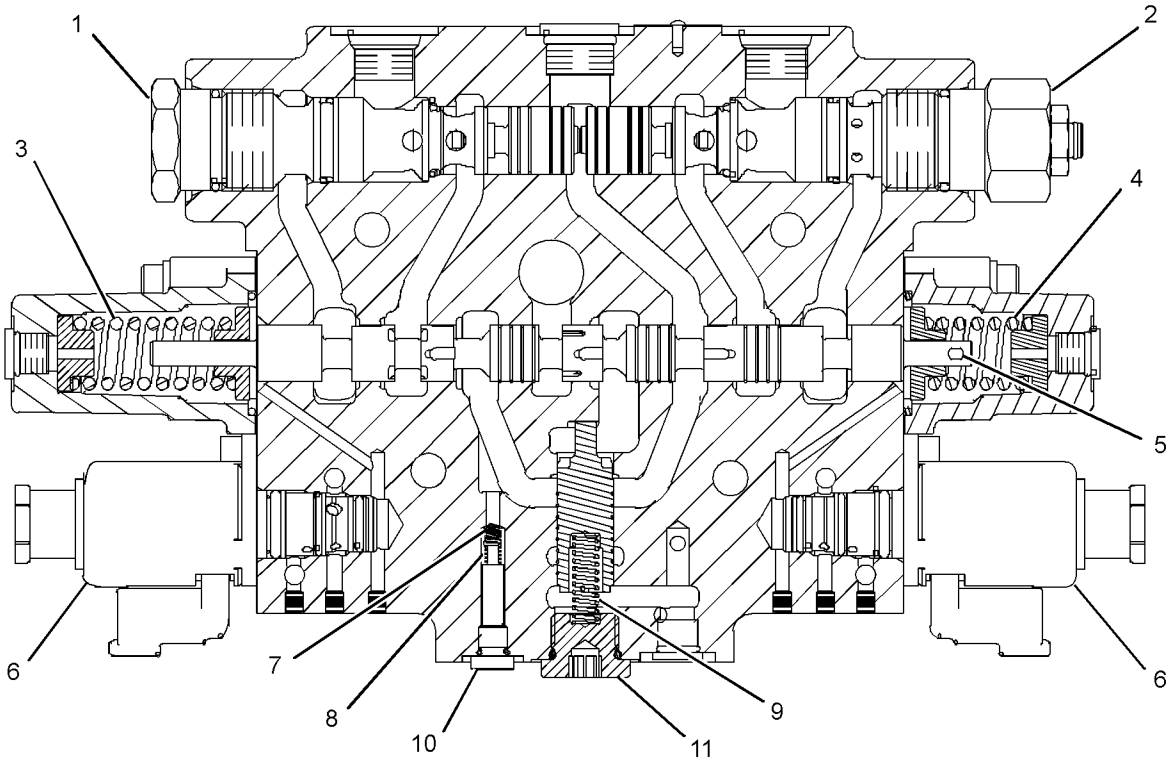

Illustration 27 g01342292

(1) 318-3115 Check Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (1) lightly with the lubricant that is being sealed.

(2) 318-3052 Check and Relief Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (2) lightly with the lubricant that is being sealed.

(3)284-3556 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(4)284-3555 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(5) Assemble the cutout in the stem on this end, as shown.

(6)278-1799 Solenoid Valve Gp

Reference: Refer to Specifications, “Solenoid Valve (Implement Control Valve)” for additional information.

(7) Gently seat the ball into the valve body.

(8)6E-3007 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(9)212-4961 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(10) Torque for plug . . . . . 5 ± 1 N·m ((44 ± 9 lb in))

(11) Torque for plug . . . . . .70 ± 7 N·m ((50 ± 5 lb ft))

i04020255

Control Valve (Blade Tip)

SMCS Code: 5051; 5136

Part No.: 259-6896

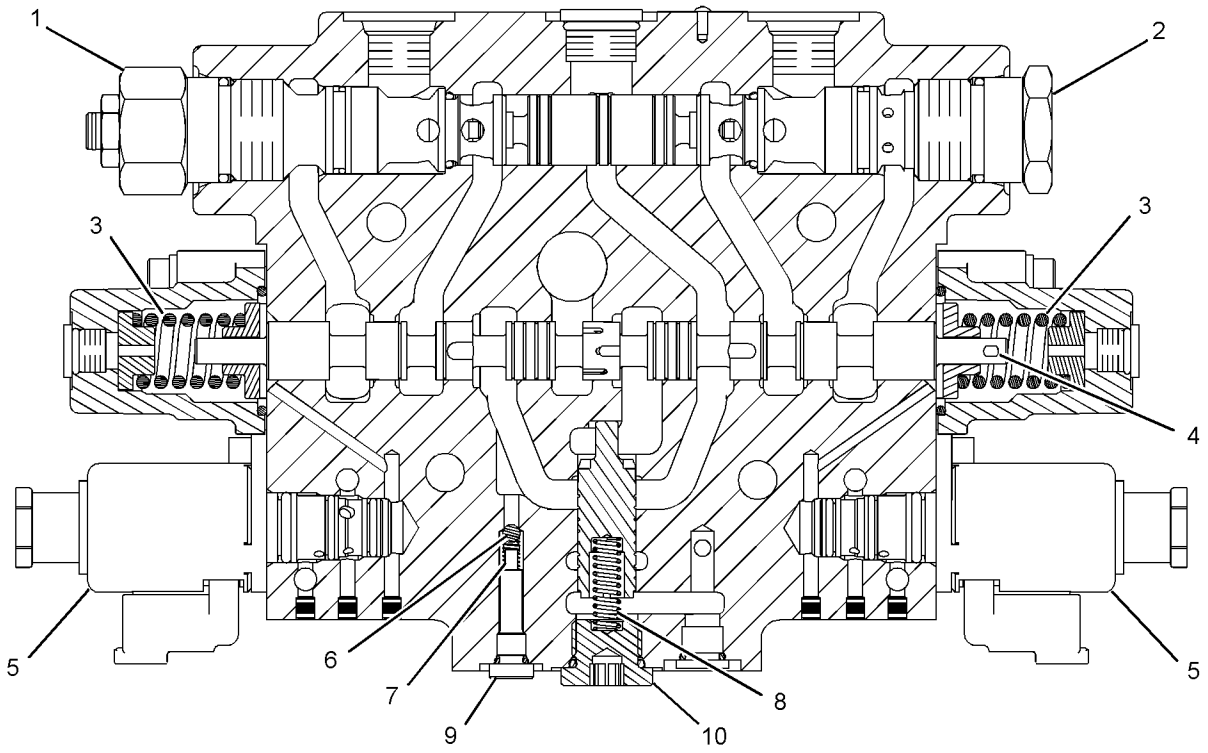

Illustration 28 g01402977

(1) 318-3115 Check Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (1) lightly with the lubricant that is being sealed.

(2) 318-3040 Check and Relief Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (2) lightly with the lubricant that is being sealed.

(3)284-3555 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(4) Assemble the cutout in the stem on this end, as shown.

(5)278-1799 Solenoid Valve Gp

Reference: Refer to Specifications, “Solenoid Valve (Implement Control Valve)” for additional information.

(6) Gently seat the ball into the valve body.

(7)6E-3007 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(8)212-4961 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(9) Torque for plug . . . . . 5 ± 1 N·m ((44 ± 9 lb in))

(10) Torque for plug . . . . . .70 ± 7 N·m ((50 ± 5 lb ft))

i04020256

Control Valve (Ripper)

SMCS Code: 5051; 5351

Part No.: 259-6913

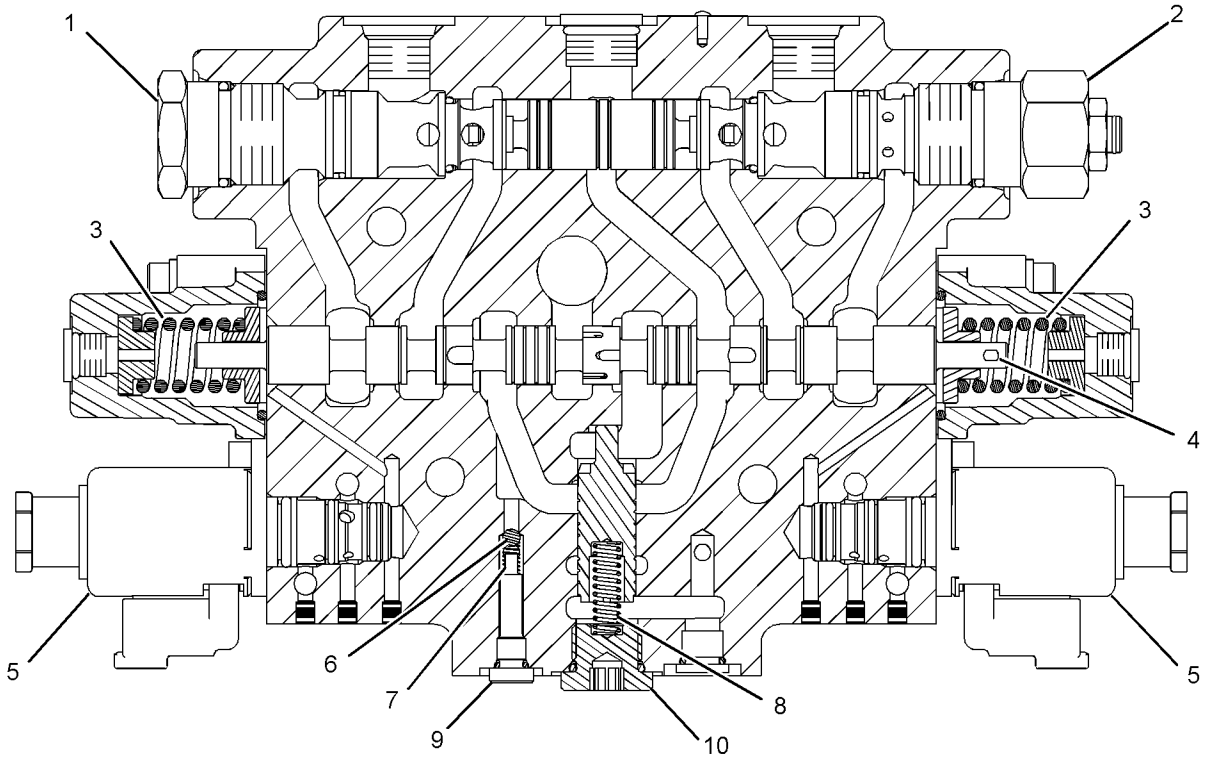

Illustration 29 g01342342

(1) 318-3115 Check Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (1) lightly with the lubricant that is being sealed.

(2) 318-3040 Check and Relief Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (2) lightly with the lubricant that is being sealed.

(3)284-3555 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(4) Assemble the cutout in the stem on this end, as shown.

(5)278-1799 Solenoid Valve Gp

Reference: Refer to Specifications, “Solenoid Valve (Implement Control Valve)” for additional information.

(6) Gently seat the ball into the valve body.

(7)6E-3007 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(8)212-4961 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(9) Torque for plug . . . . . 5 ± 1 N·m ((44 ± 9 lb in))

(10) Torque for plug . . . . . .70 ± 7 N·m ((50 ± 5 lb ft))

i04020257

Control Valve (Sideshift)

SMCS Code: 5051-JI

Part No.: 259-6903

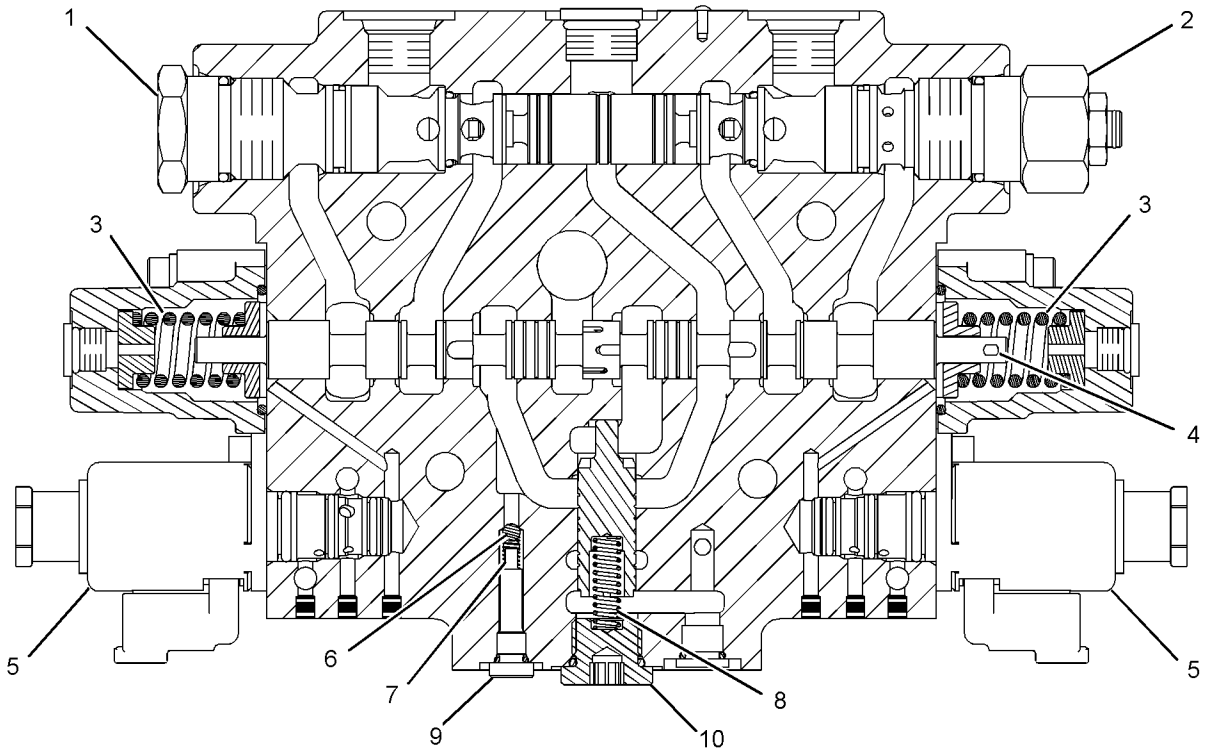

Illustration 30 g01342505

(1) 318-3115 Check Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (1) lightly with the lubricant that is being sealed.

(2) 318-3040 Check and Relief Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (2) lightly with the lubricant that is being sealed.

(3)256-9773 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(4) Assemble the cutout in the stem on this end, as shown.

(5)278-1799 Solenoid Valve Gp

Reference: Refer to Specifications, “Solenoid Valve (Implement Control Valve)” for additional information.

(6) Gently seat the ball into the valve body.

(7)6E-3007 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(8)212-4961 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(9) Torque for plug . . . . . 5 ± 1 N·m ((44 ± 9 lb in))

(10) Torque for plug . . . . . .70 ± 7 N·m ((50 ± 5 lb ft))

i04896673

Control Valve (Snow Plow/Dozer Lift)

SMCS Code: 5051; 5115

Part No.: 259-6909

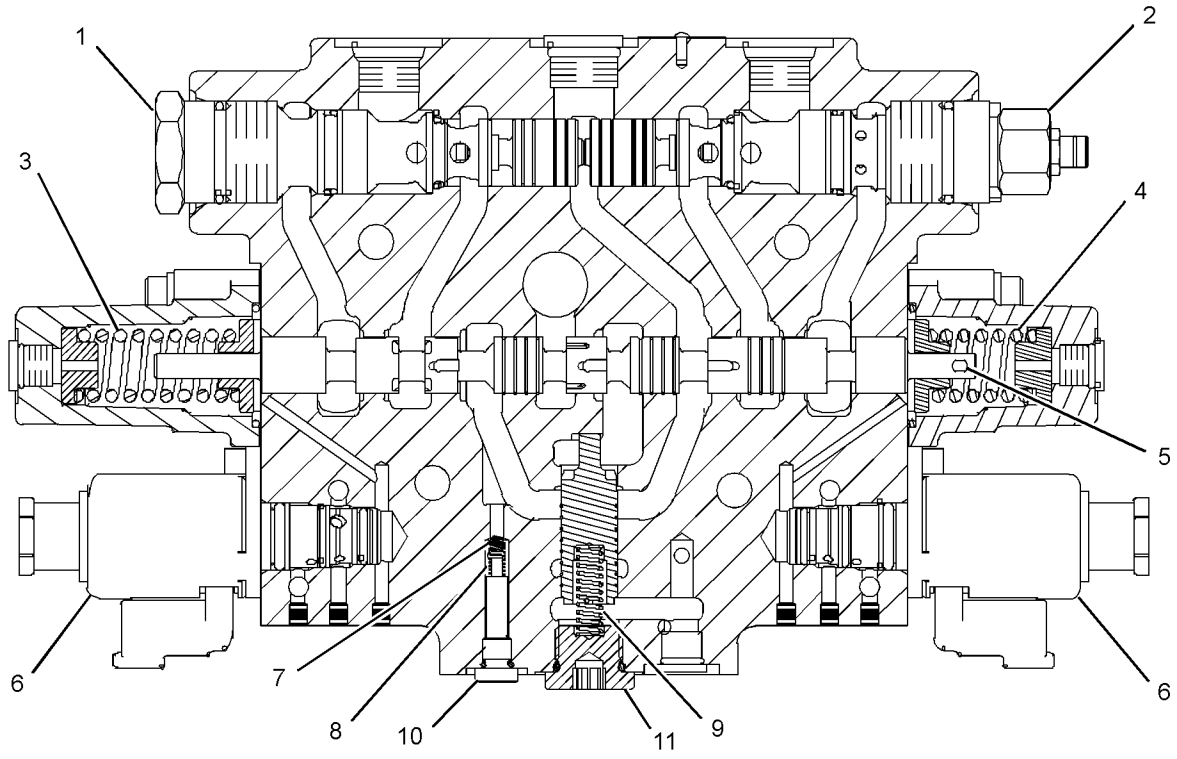

Illustration 31 g02035333

Table 19

Specifications for 245-9544 Control Valve Gp			
Item	**Qty**	**Part**	**Specification Description**
1	1	318-3115 Check Valve Gp	Torque to 80 ± 15 N·m (59 ± 11 lb ft).
			Lubricate the seals lightly with the lubricant being sealed.
2	1	318-3052 Check and Relief Valve Gp	Torque nut to 12 ± 2 N·m (106 ± 18 lb in).
			Torque to 80 ± 5 N·m (59 ± 3.7 lb ft).
			Lubricate the seals lightly with the lubricant being sealed.
3	1	284-3556 Spring	Length under first test force is 44 mm (1.732 inch).
			First test force is 177 ± 15 N (39.79137 ± 3.37215 lb).
			Length under second test force is 35.00 mm (1.378 inch).
			Second test force is 609 ± 48 N (136.9 ± 10.8 lb).

(continued)

(Table 19, contd)

			Free length after test 47.69 mm (1.878 inch).
4	1	284-3555 Spring	Length under first test force is 28.5 mm (1.12 inch).
			First test force is 261 ± 21 N (58.7 ± 4.7 lb).
			Length under second test force is 24 mm (0.95 inch).
			Second test force is 666 ± 53 N (149.7 ± 11.9 lb).
			Free length after test 31.4 mm (1.24 inch).
5	1	254-3951 Stem	Assemble the cutout in the stem, as shown.
6	2	278-1799 Solenoid Valve Gp	Torque nut to 5.5 ± 1.5 N·m (48.7 ± 13.3 lb in).
7	1	5B-9318 Ball	Gently seat into valve body.
8	1	6E-3007 Spring	Length under test force is 8.60 mm (0.339 inch)
			Test force is 0.234 ± 0.024 N (0.053 ± 0.005 lb)
			Free length after test 10.0 mm (0.39 inch)
9	1	212-4961 Spring	Length under test force is 23.9 mm (0.94 inch)
			Test force is 14.25 ± 0.72 N (3.205 ± 0.162 lb)
			Free length after test 27.24 mm (1.072 inch)
10	1	244-2579 Plug	Torque to 5 ± 1 N·m (44 ± 9 lb in).
11	1	242-9264 Orifice Plug	Torque to 70 ± 7 N·m (50 ± 5 lb ft).

i04896646

Control Valve (Wing Lift)

SMCS Code: 5051

Part No.: 259-6914

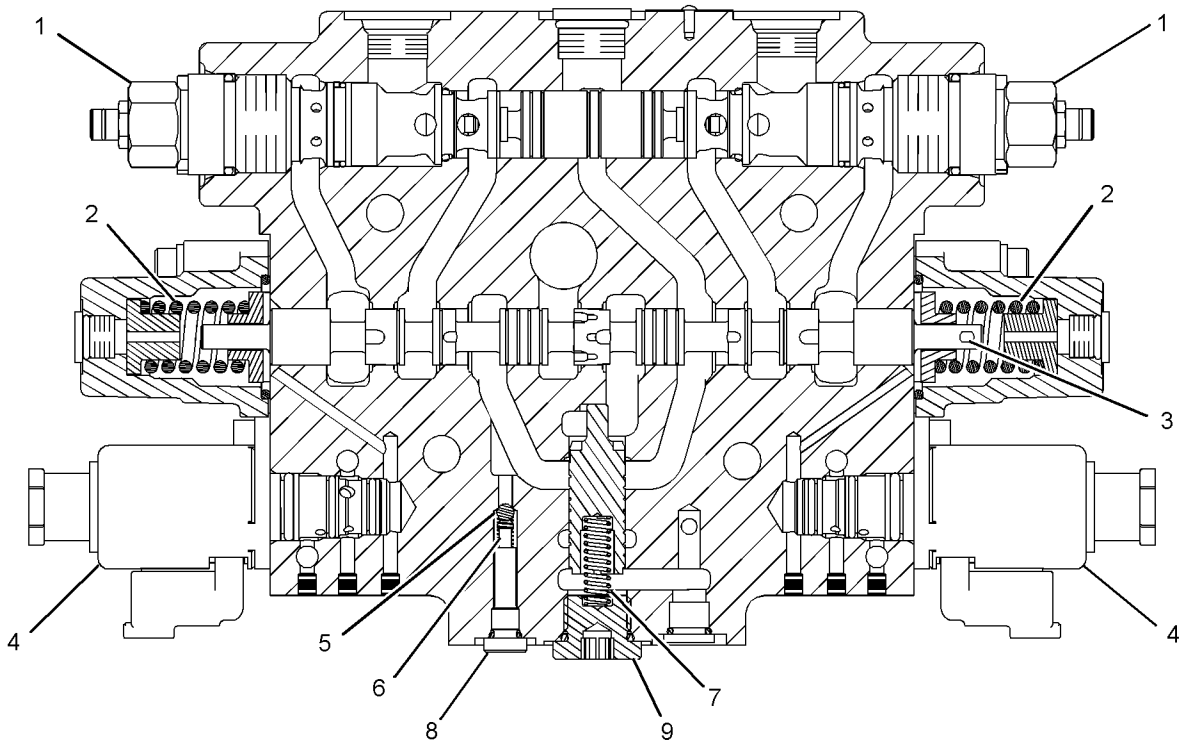

Illustration 32 g02035453

Table 20

Specifications for 245-9543 Control Valve Gp			
Item	**Qty**	**Part**	**Specification Description**
1	2	318-3040 Check and Relief Valve Gp	Torque nut to 12 ± 2 N·m (106 ± 18 lb in).
			Torque to 80 ± 15 N·m (59 ± 11 lb ft).
			Lubricate the seals lightly with the lubricant being sealed.
2	2	284-3555 Spring	Length under first test force is 28.5 mm (1.12 inch)
			First test force is 261 ± 21 N (58.7 ± 4.7 lb)
			Length under second test force is 24 mm (0.95 inch)
			Second test force is 666 ± 53 N (149.7 ± 11.9 lb)
			Free length after test 31.4 mm (1.24 inch)
3	1	254-3951 Stem	Assemble the cutout in the stem, as shown.
4	2	278-1799 Solenoid Valve Gp	Torque nut to 5.5 ± 1.5 N·m (48.7 ± 13.3 lb in).

(continued)

(Table 20, contd)

5	1	5B-9318 Ball	Gently seat into valve body.
6	1	6E-3007 Spring	Length under test force is 8.60 mm (0.339 inch)
			Test force is 0.234 ± 0.024 N (0.053 ± 0.005 lb)
			Free length after test 10.0 mm (0.39 inch)
7	1	212-4961 Spring	Length under test force is 23.9 mm (0.94 inch)
			Test force is 14.25 ± 0.72 N (3.205 ± 0.162 lb)
			Free length after test 27.24 mm (1.072 inch)
8	1	244-2579 Plug	Torque to 5 ± 1 N·m (44 ± 9 lb in).
9	1	242-9264 Orifice Plug	Torque to 70 ± 7 N·m (50 ± 5 lb ft).

i04020259

Control Valve (Wing Tilt)

SMCS Code: 5051

Part No.: 259-6915

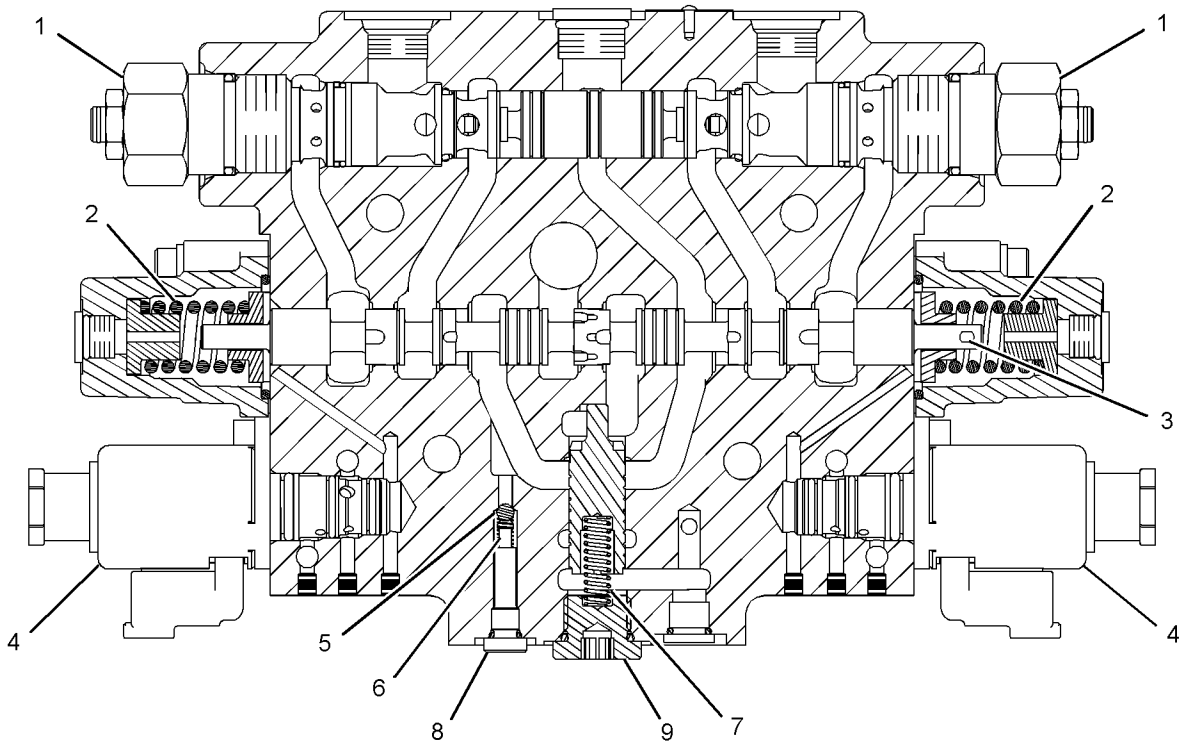

Illustration 33 g01342563

(1) 318-3040 Check and Relief Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lubricate the seals on valve (1) lightly with the lubricant that is being sealed.

(2)284-3555 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(3) Assemble the cutout in the stem, as shown.

(4)278-1799 Solenoid Valve Gp

Reference: Refer to Specifications, “Solenoid Valve (Implement Control Valve)” for additional information.

(5) Gently seat the ball into the valve body.

(6)6E-3007 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(7)212-4961 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(8) Torque for plug . . . . . 5 ± 1 N·m ((44 ± 9 lb in))

(9) Torque for plug . . . . . .70 ± 7 N·m ((50 ± 5 lb ft))

i04020260

Control Valve (Snow Plow/Dozer Angle)

SMCS Code: 5051; 5115

Part No.: 259-6910

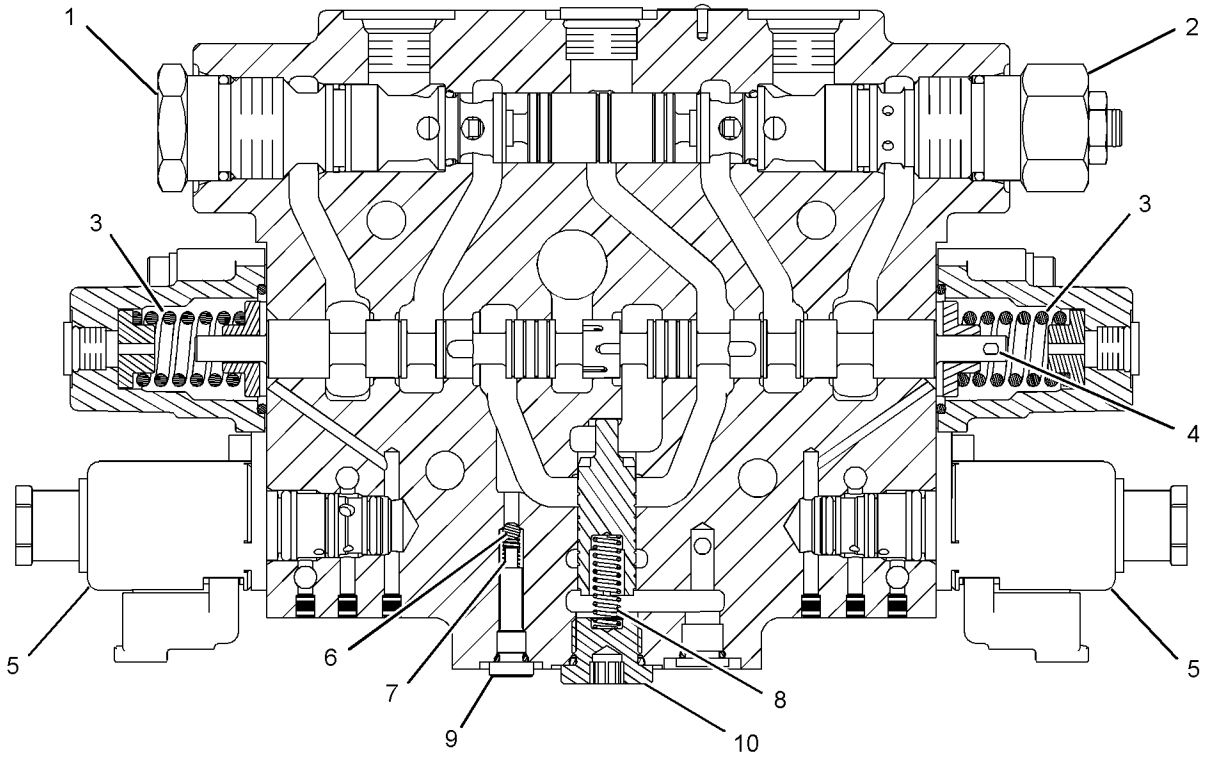

Illustration 34 g01342575

(1) 318-3115 Check Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lightly lubricate the seals in valve (1) with the lubricant that is being sealed.

(2) 318-3040 Check and Relief Valve Gp

Torque for check valve . . . . . 80 ± 15 N·m ((59 ± 11 lb ft))
Cracking pressure . . . . . .283 ± 35 kPa ((41.0 ± 5.0 psi))

Note: Lightly lubricate the seals in valve (2) with the lubricant that is being sealed.

(3)284-3555 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(4) Assemble the cutout in the stem on this end, as shown.

(5)278-1799 Solenoid Valve Gp

Reference: Refer to Specifications, “Solenoid Valve (Implement Control Valve)” for additional information.

(6) Gently seat the ball into the valve body.

(7)6E-3007 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(8)212-4961 Spring

Reference: Refer to Specifications, “Springs (Control Valves)” for additional information.

(9) Torque for plug . . . . . 5 ± 1 N·m ((44 ± 9 lb in))

(10) Torque for plug . . . . . .70 ± 7 N·m ((50 ± 5 lb ft))

i02665132

Relief Valve (Steering Cylinder Crossover)

SMCS Code: 4322

Part No.: 308-0936
S/N: B9H1–Up

Part No.: 308-0936
S/N: R9H1–Up

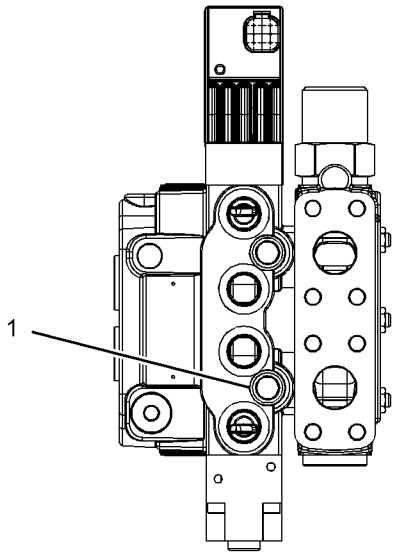

Illustration 35 g01339238

(1) 260-3004 Relief Valve Gp . . . . . 40 ± 3 N·m ((30 ± 2 lb ft))

Cross over relief valve pressure . . . . . .26500 + 2000 − 0 kPa ((3850 + 290 − 0 psi))

Main relief valve pressure . . . 27600 kPa ((4000 psi))

Maximum steering pressure . . . . . 20500 kPa ((3000 psi))

i02665135

Relief Valve (Steering Cylinder Crossover)

SMCS Code: 4322

Part No.: 308-0935
S/N: B9J1–Up

Part No.: 308-0935
S/N: R9J1–Up

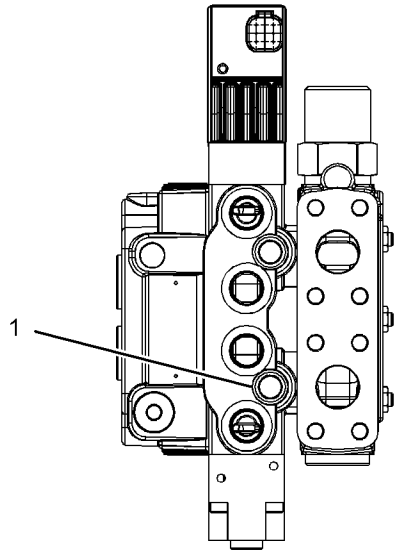

Illustration 36 g01339242

(1) 301-6821 Relief Valve Gp . . . . . 40 ± 3 N·m ((30 ± 2 lb ft))

Cross over relief valve pressure . . . . . .21000 + 2000 − 0 kPa ((3050 + 290 − 0 psi))

Main relief valve pressure . . . 27600 kPa ((4000 psi))

Maximum steering pressure . . . . . 17000 kPa ((2450 psi))

i04020775

Articulation Cylinder

SMCS Code: 5265

Part No.: 303-9598
S/N: B9J1–Up

Part No.: 303-9598
S/N: R9J1–Up

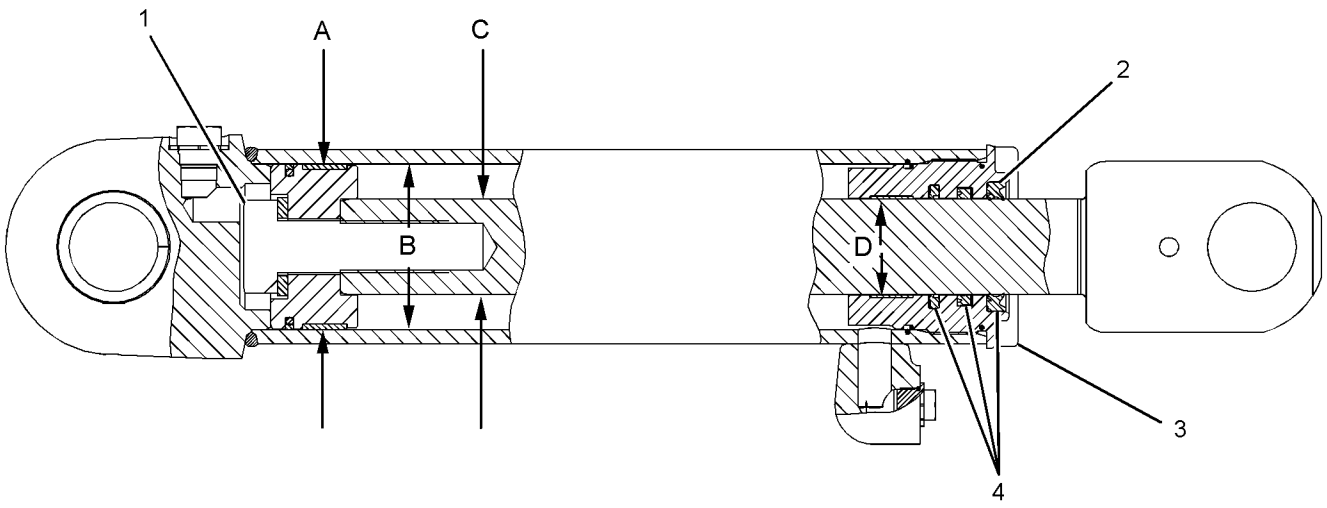

Illustration 37 g02195314

(A) Outer diameter of new piston over two lands
. . . . . 94.50 ± 0.03 mm ((3.721 ± 0.001 inch))

(B) Bore of new cylinder assembly
. . . . . 95.00 ± 0.08 mm ((3.740 ± 0.003 inch))

(C) Outer diameter of new rod . . 55.000 ± 0.038 mm ((2.1654 ± 0.0015 inch))

(D) Bore of new head over four lands
. . . . . 55.33 ± 0.03 mm ((2.178 ± 0.001 inch))

(1) Torque for bolt . . . . . 1800 ± 200 N·m ((1328 ± 148 lb ft))

(2) Apply Loctite 609 to the groove for the wiper seal prior to assembly.

(3) Lubricate the threads with clean grease. Torque for head . . . . . 600 ± 130 N·m ((445 ± 95 lb ft))

(4) Lubricate the sealing lips lightly with the lubricant that is being sealed.

i04020785

Articulation Cylinder

SMCS Code: 5265

Part No.: 290-8074
S/N: B9H1–Up

Part No.: 290-8074
S/N: R9H1–Up

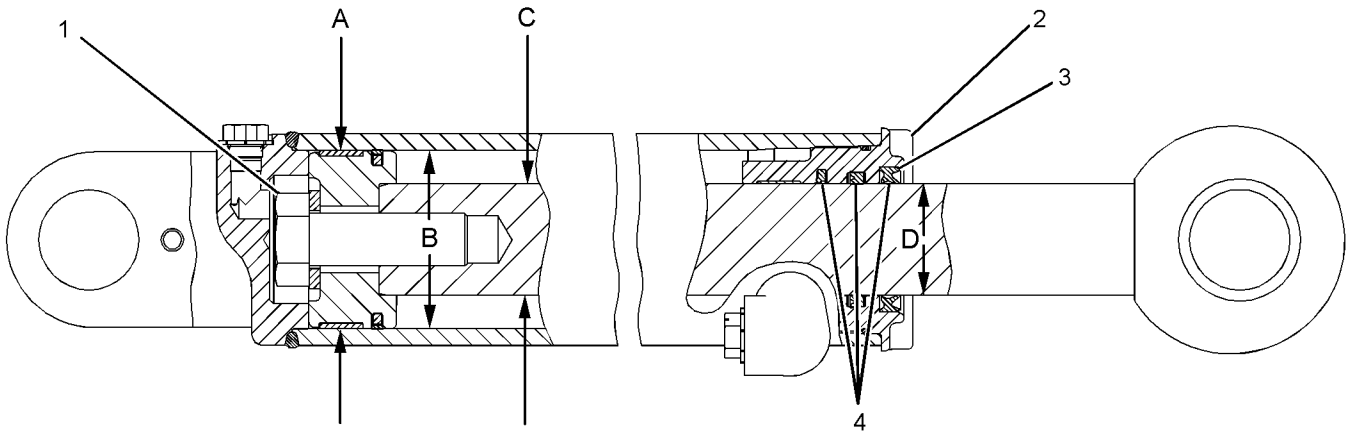

Illustration 38 g02195393

(A) Outer diameter of new piston over two lands
. . . . . 101.10 ± 0.03 mm ((3.980 ± 0.001 inch))

(B) Bore of new cylinder assembly
. . . . . 101.60 ± 0.08 mm ((4.000 ± 0.003 inch))

(C) Outer diameter of new rod . . . . 63.45 ± 0.04 mm
((2.498 ± 0.002 inch))

(D) Bore of new head over four lands
. . . . . 63.83 ± 0.03 mm ((2.513 ± 0.001 inch))

(1) Torque for bolt . . . . . 1800 ± 200 N·m
((1328 ± 148 lb ft))

(2) Lubricate the threads with clean grease. Torque for head . . . . . 600 ± 130 N·m ((443 ± 96 lb ft))

(3) Apply Loctite 609 to the groove for the wiper seal prior to assembly.

(4) Lubricate the sealing lips lightly with the lubricant that is being sealed.

i04020834

Blade Lift Cylinder

SMCS Code: 5102

Part No.: 270-7536
S/N: B9J1–Up

Part No.: 270-7536
S/N: R9J1–Up

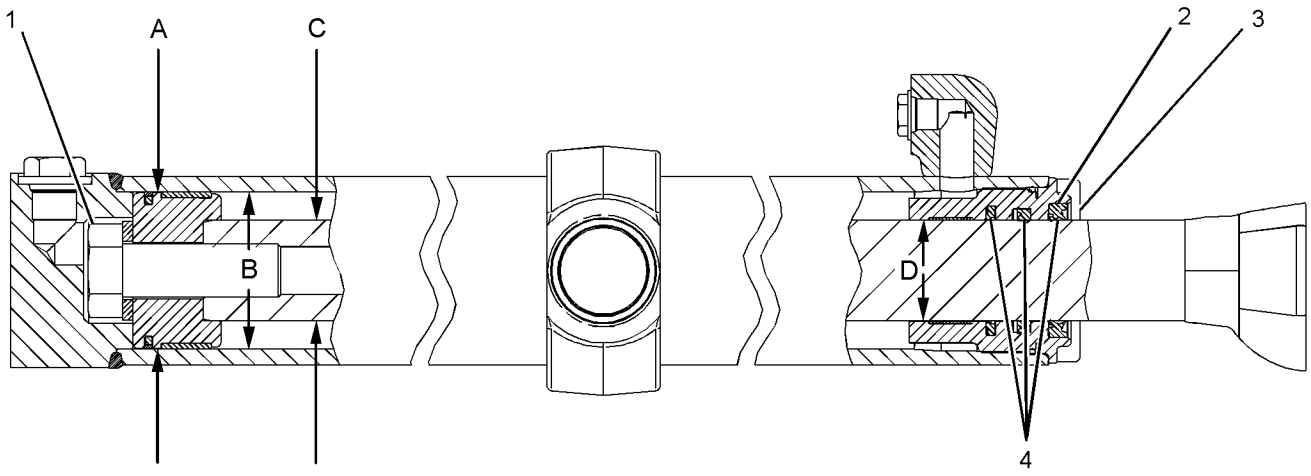

Illustration 39 g02195694

(A) Outer diameter of new piston over two lands
. . . . . 88.40 ± 0.03 mm ((3.480 ± 0.001 inch))

(B) Bore of new cylinder assembly
. . . . . 88.90 ± 0.08 mm ((3.500 ± 0.003 inch))

(C) Outer diameter of new rod . . 57.100 ± 0.038 mm
((2.2480 ± 0.0015 inch))

(D) Bore of new head over four lands
. . . . . 57.48 ± 0.03 mm ((2.263 ± 0.001 inch))

(1) Torque for bolt . . . . . 1800 ± 200 N·m
((1330 ± 150 lb ft))

(2) Apply Loctite 609 to the groove for the wiper seal prior to assembly.

(3) Lubricate the threads with clean grease. Torque for head . . . . . 600 ± 130 N·m ((445 ± 95 lb ft))

(4) Lubricate the sealing lips lightly with the lubricant that is being sealed.

i04020844

Blade Lift Cylinder

SMCS Code: 5102

Part No.: 270-7538
S/N: B9H1–Up

Part No.: 270-7538
S/N: R9H1–Up

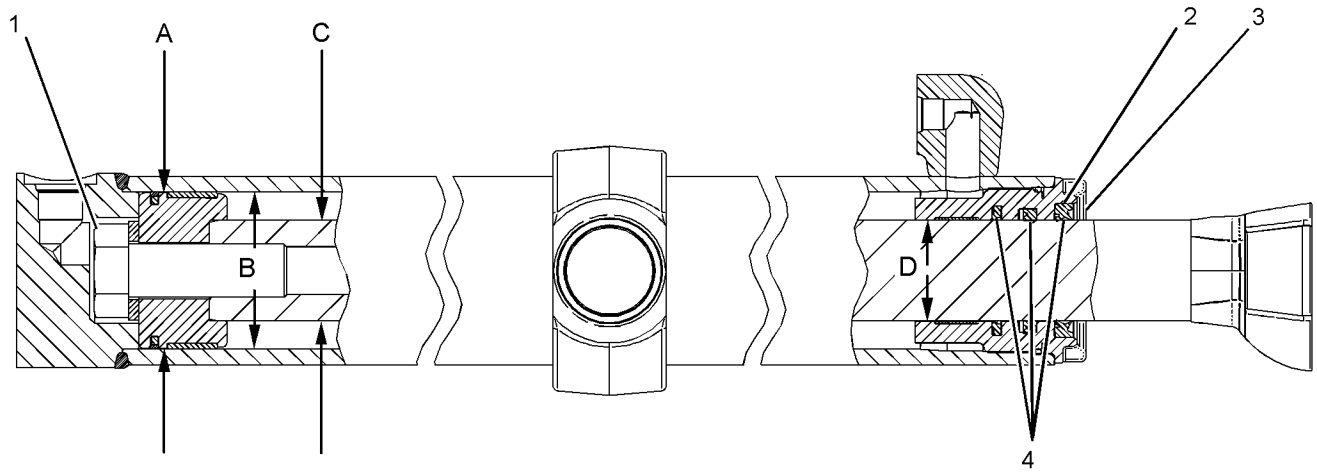

Illustration 40 g02195773

(A) Outer diameter of new piston over two lands
. . . . . 101.10 ± .03 mm ((3.980 ± 0.001 inch))

(B) Bore of new cylinder assembly
. . . . . 101.60 ± .08 mm ((4.000 ± 0.003 inch))

(C) Outer diameter of new rod . . . 63.450 ± .038 mm
((2.4980 ± 0.0015 inch))

(D) Bore of new head over four lands
. . . . . 63.83 ± .03 mm ((2.513 ± 0.001 inch))

(1) Torque for bolt . . . . . 1800 ± 200 N·m
((1330 ± 150 lb ft))

(2) Apply Loctite 609 to the groove for the wiper seal prior to assembly.

(3) Lubricate the threads with clean grease. Torque for head . . . . . 600 ± 130 N·m ((445 ± 95 lb ft))

(4) Lubricate the sealing lips lightly with the lubricant that is being sealed.

i06713446

Blade Tip Cylinder

SMCS Code: 5106

Part No.: 9T-8944

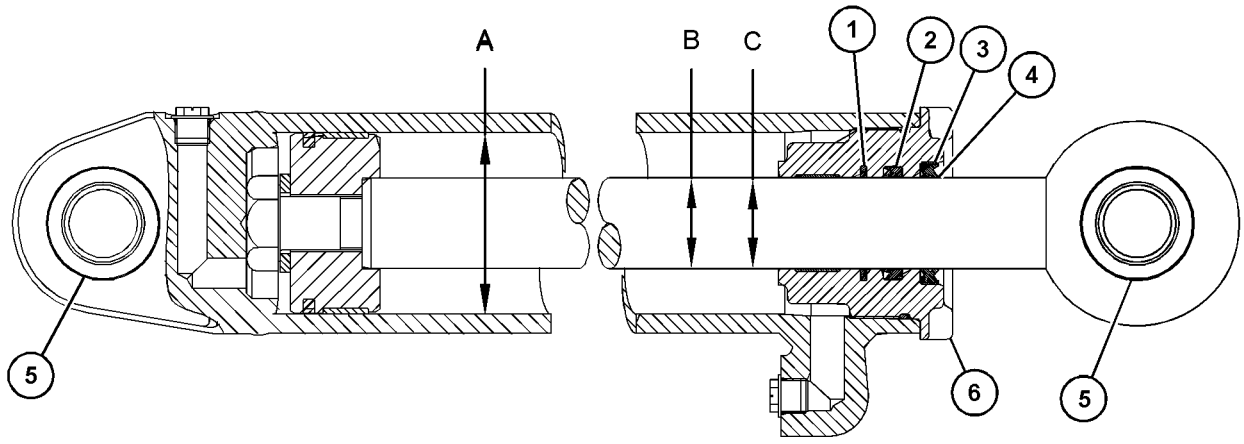

Illustration 41 g06087352

Table 21

Specification for 9T-8944 Blade Tip Cylinder			
Item	**Qty**	**Part**	**Specification Description**
A	1	9T-8943 Cylinder As	Bore is 101.60 ± 0.08 mm (4.000 ± 0.003 inch).
B	1	6E-1049 Rod As	Diameter is 50.750 ± 0.038 mm (1.9980 ± 0.0015 inch).
1	1	289-2935 Buffer Seal As	Lubricate the sealing lips lightly with the lubricant that is being sealed.
2	1	289-2946 U-Cup Seal	Lubricate the sealing lips lightly with the lubricant that is being sealed.
3	1	308-1845 Wiper Seal	Lubricate the sealing lips lightly with the lubricant that is being sealed.
4	-	-	Before assembly, apply Loctite 648 to the groove for the wiper seal prior to assembly.
5	1	6E-0775 Head As	Bore (C) over four lands is 51.13 ± 0.03 mm (2.013 ± 0.001 inch). Lubricate the threads with clean grease. Torque to 600 ± 130 N·m (443 ± 96 lb ft).
6	2	4D-0298 Bearing	Bore before assembly is 38.1 mm (1.50 inch). Installation depth is 11.2 ± 0.5 mm (0.44 ± 0.02 inch).

i06153114

Centershift Cylinder

SMCS Code: 5223

Part No.: 262-1905
S/N: B9H1–Up

Part No.: 262-1905
S/N: R9H1–Up

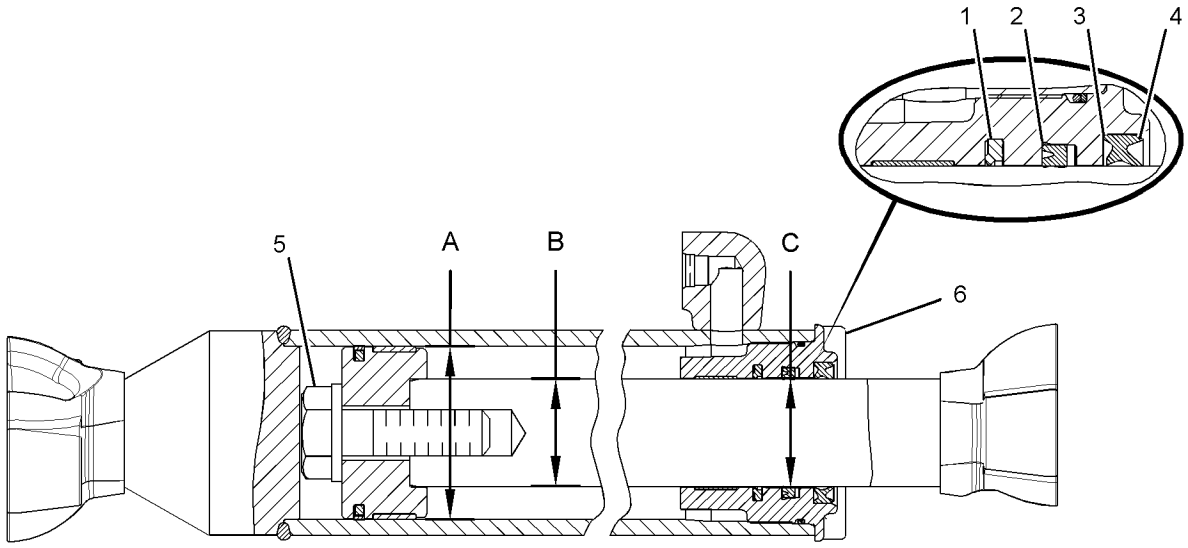

Illustration 42 g03830648

Table 22

Specification for 262-1905 Centershift Cylinder			
Item	**Qty**	**Part**	**Specification Description**
1	1	167-2201 Buffer Seal As	Lubricate lightly with the lubricant that is being sealed.
2	1	167-2312 U-Cup Seal	Lubricate lightly with the lubricant that is being sealed.
3	1	225-3281 Wiper Seal	Lubricate lightly with the lubricant that is being sealed.
4	-	-	Before assembly, apply green Loctite 609 to the wiper seal groove.
5	1	173-9683 Bolt	Torque to 1800 ± 200 N·m (1328 ± 148 lb ft).
A	1	262-1929 Cylinder As	Bore is 101.60 ± 0.08 mm (4.000 ± 0.003 inch).
B	1	262-1924 Rod As	Diameter is 63.450 ± 0.038 mm (2.4980 ± 0.0015 inch).
6	1	172-9981 Head	Bore (C) over four lands is 63.83 ± 0.03 mm (2.513 ± 0.001 inch).
			Lubricate the threads with clean grease. Torque to 600 ± 130 N·m (443 ± 96 lb ft).

i06713426

Centershift Cylinder

SMCS Code: 5223

Part No.: 262-1906
S/N: B9J1–Up

Part No.: 262-1906
S/N: R9J1–Up

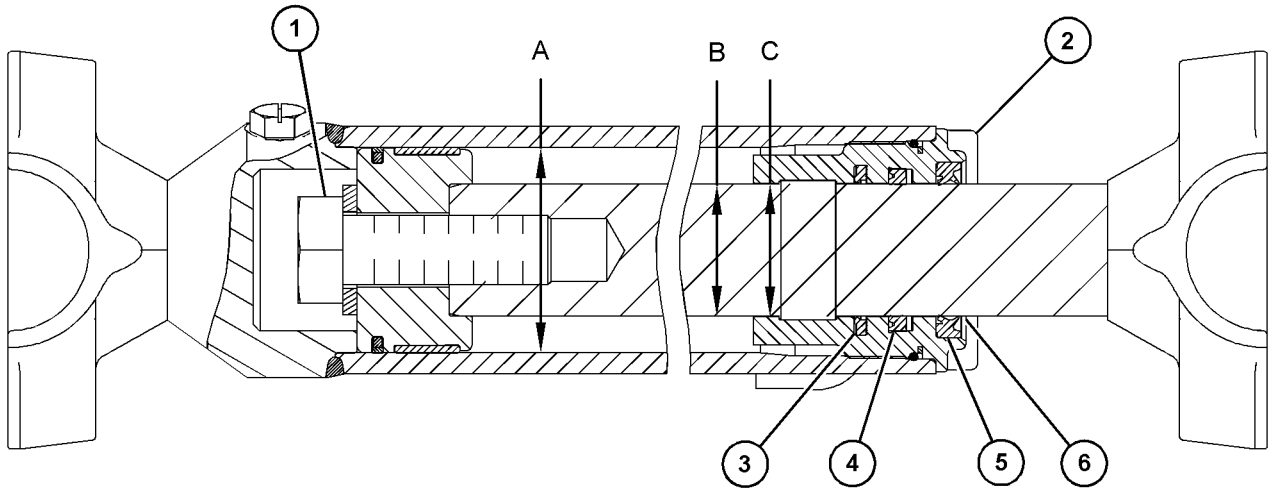

Illustration 43 g06087340

Table 23

Specification for 262-1906 Centershift Cylinder			
Item	**Qty**	**Part**	**Specification Description**
1	1	173-9683 Bolt	Torque to 1800 ± 200 N·m (1328 ± 148 lb ft).
A	1	262-1928 Cylinder As	Bore is 88.90 ± 0.08 mm (3.500 ± 0.003 inch).
B	1	262-1922 Rod As	Diameter is 57.100 ± 0.038 mm (2.2480 ± 0.0015 inch).
2	1	6E-4975 Head As	Lubricate the sealing lips lightly with the lubricant that is being sealed. Bore (C) over four lands is 57.48 ± 0.03 mm (2.263 ± 0.001 inch). Torque to 600 ± 130 N·m (443 ± 96 lb ft).
3	1	167-2200 Seal As	Lubricate the sealing lips lightly with the lubricant that is being sealed.
4	1	167-2307 U-Cup Seal	Lubricate the sealing lips lightly with the lubricant that is being sealed.
5	1	231-3538 Wiper Seal	Lubricate the sealing lips lightly with the lubricant that is being sealed.
6	-	-	Apply Loctite 648 to the groove for the wiper seal prior to assembly.

i04023141

Centershift Lock

SMCS Code: 5221

Part No.: 298-2600
S/N: B9J1–Up

Part No.: 298-2600
S/N: R9J1–Up

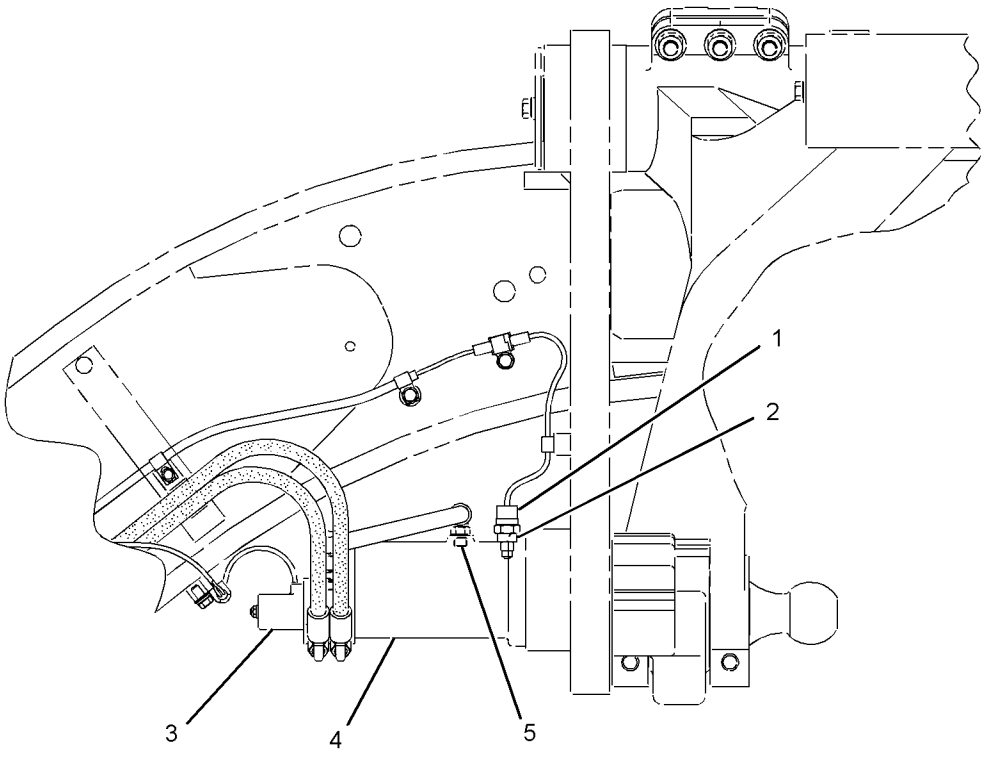

Illustration 44 g02202697

Note: At assembly, coat all seals and mating parts with hydraulic oil.

(1) Installation torque for ball switch . . 9.5 ± 0.5 N·m ((84 ± 4 lb in))

(2) Shims

Quantity 10
Thickness . . . . . 0.127 mm ((0.0050 inch))

Note: Use the minimum number of shims that is required. Screw in switch (1) until the switch closes. After switch (1) closes, the switch should be turned one-half turn. Install the minimum number of shims that fills the gap. Tighten switch (1) to the specified torque.

Reference: Refer to Disassembly and Assembly, “Centershift Lock - Install” for the proper shimming procedure.

(3)152-8346 Solenoid Valve Gp

Reference: For more information on the 152-8346 Solenoid Valve Gp, refer to the “Solenoid Valve (Centershift Lock)” story in this manual.

(4) Cylinder

(5) Assemble the cylinder on the machine with the pipe plug on the top.

i06160451

Centershift Lock

SMCS Code: 5221

Part No.: 249-6537
S/N: B9H1–Up

Part No.: 249-6537
S/N: R9H1–Up

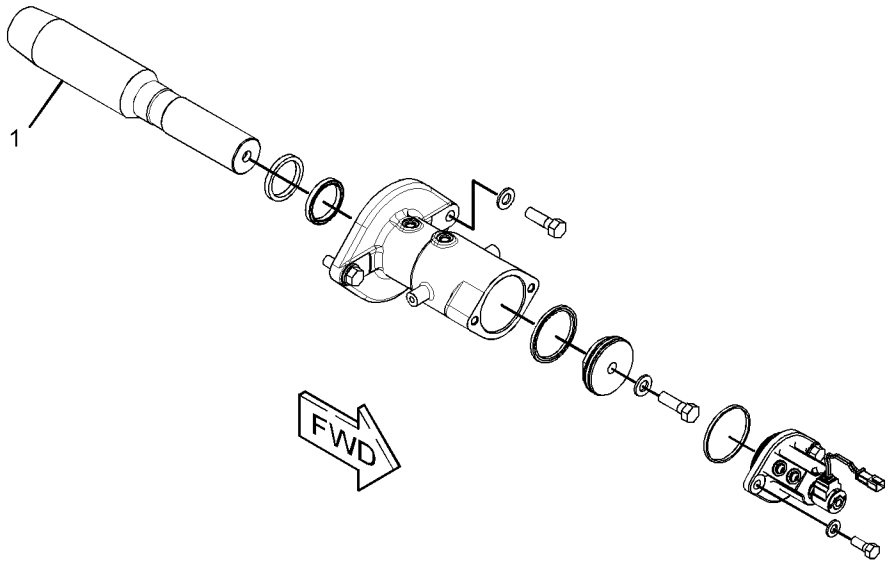

Illustration 45 g03833094

Table 24

Specifications for 249-6537 Centershift Lock Gp			
Item	**Qty**	**Part**	**Specification Description**
-	Before assembly, coat all seals and mating parts with hydraulic oil.		
1	1	370-6682 Pin	Diameter is 57.075 ± 0.025 mm (2.2470 ± 0.0010 inch).

i03902258

Solenoid Valve (Centershift Lock)

SMCS Code: 5220; 5479

Part No.: 152-8346

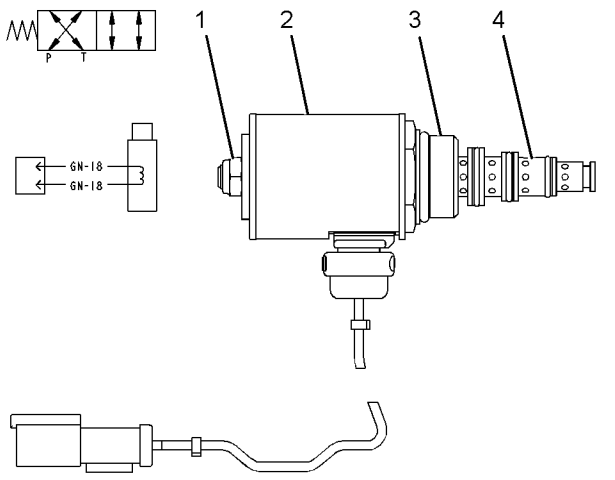

Illustration 46 g01398527

(1) Final installation torque for the locknut . . . . . 9.0 ± 0.5 N·m ((80 ± 4 lb in))

(2) 218-9894 Coil

Nominal voltage . . . . . 24 VDC
Maximum voltage at 25 °C (77 °F) ambient temperature and 121 °C (250 °F) fluid temperature . . . . . 28.5 VDC
Coil resistance at 25 ± 5 °C (77 ± 9 °F) . . 32.6 ± 1.6 ohms

Operating temperature range . . . . . −40 to 121 °C ((−40 to 250 °F))

(3) Final installation torque for the solenoid valve group . . . . . 115 ± 7 N·m ((85 ± 5 lb ft))

Note: Position the lead wire of the solenoid valve at a minimum of 15 degrees lower than horizontal. Positioning the lead wire lower will reduce the entry of moisture into the solenoid valve.

(4)170-7485 Valve Spool As

At a pressure drop of 690 kPa (100 psi), you will achieve the following flow with SAE 10 oil at 105 °C (221 °F). . . . . 8.1 L/min ((2.1 US gpm))

i04021114

Ripper Lift Cylinder

SMCS Code: 5352

Part No.: 113-5264

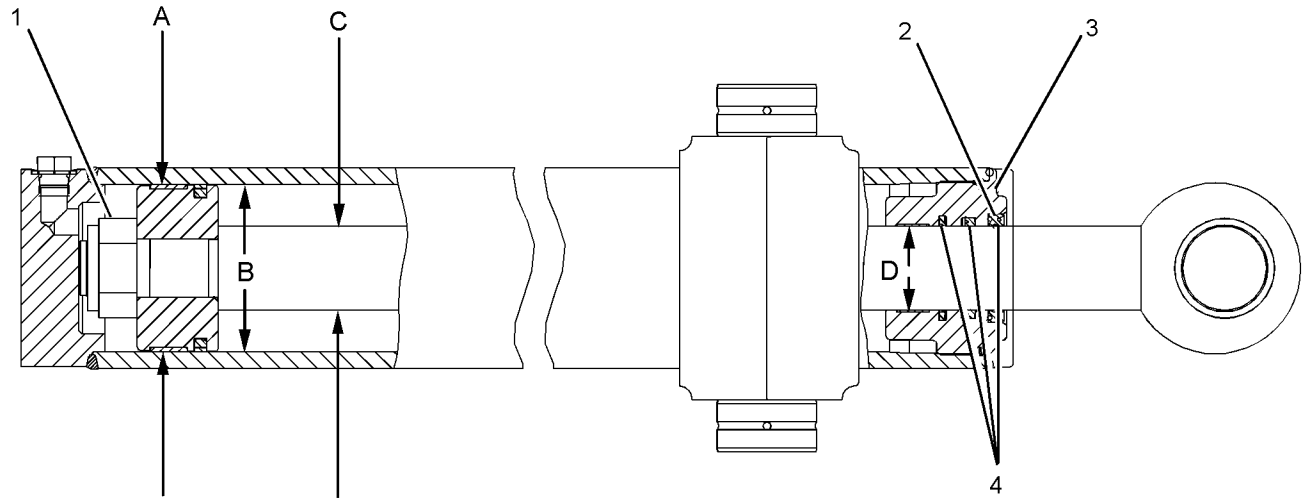

Illustration 47 g02196978

(A) Outer diameter of new piston over two lands
. . . . . 126.50 ± 0.03 mm ((4.980 ± 0.001 inch))

(B) Bore of new cylinder assembly
. . . . . 127.00 ± 0.08 mm ((5.000 ± 0.003 inch))

(C) Outer diameter of new rod . . 63.450 ± 0.038 mm ((2.4980 ± 0.0015 inch))

(D) Bore of new head over four lands
. . . . . 63.78 ± 0.03 mm ((2.511 ± 0.001 inch))

(1) Lubricate the threads with clean grease. Torque for nut . . . . . 3000 ± 300 N·m ((2213 ± 221 lb ft))

(2) Apply Loctite 609 to the groove for the wiper seal prior to assembly.

(3) Lubricate the threads with clean grease. Torque for head . . . . . 600 ± 130 N·m ((443 ± 96 lb ft))

(4) Lubricate the sealing lips lightly with the lubricant that is being sealed.

i06153535

Sideshift Cylinder

SMCS Code: 5229

Part No.: 257-5083

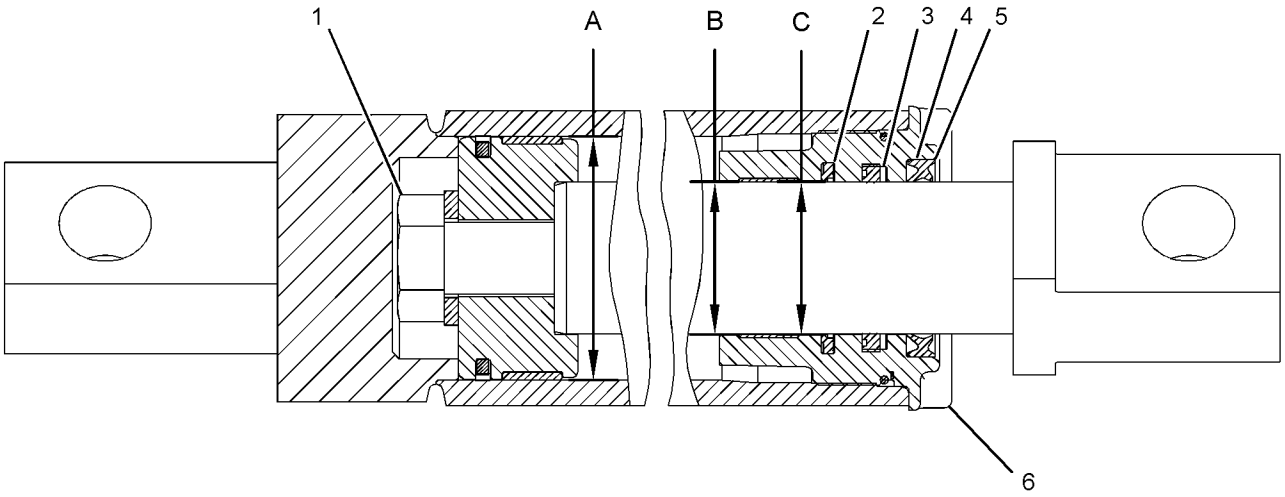

Illustration 48 g03830790

Table 25

Specification for 257-5083 Sideshift Cylinder Gp			
Item	**Qty**	**Part**	**Specification Description**
1	1	173-9683 Bolt	Torque to 1800 ± 200 N·m (1328 ± 148 lb ft).
A	1	257-5084 Cylinder As	Bore is 101.60 ± 0.08 mm (4.000 ± 0.003 inch).
B	1	257-5085 Rod As	Diameter is 63.449 ± 0.038 mm (2.4980 ± 0.0015 inch).
2	1	167-2201 Buffer Seal As	Lubricate lightly with the lubricant that is being sealed.
3	1	167-2312 U-Cup Seal	Lubricate lightly with the lubricant that is being sealed.
4	1	225-3281 Wiper Seal	Lubricate lightly with the lubricant that is being sealed.
5	-	-	Before assembly, apply green Loctite 609 to the wiper seal groove.
6	1	172-9981 Head	Bore (C) over four lands is 63.83 ± 0.03 mm (2.513 ± 0.001 inch).
			Lubricate the threads with clean grease. Torque to 600 ± 130 N·m (443 ± 96 lb ft).

i04022117

Steering Cylinder

SMCS Code: 4303

Part No.: 276-5682
S/N: B9J1–Up

Part No.: 276-5682
S/N: R9J1–Up

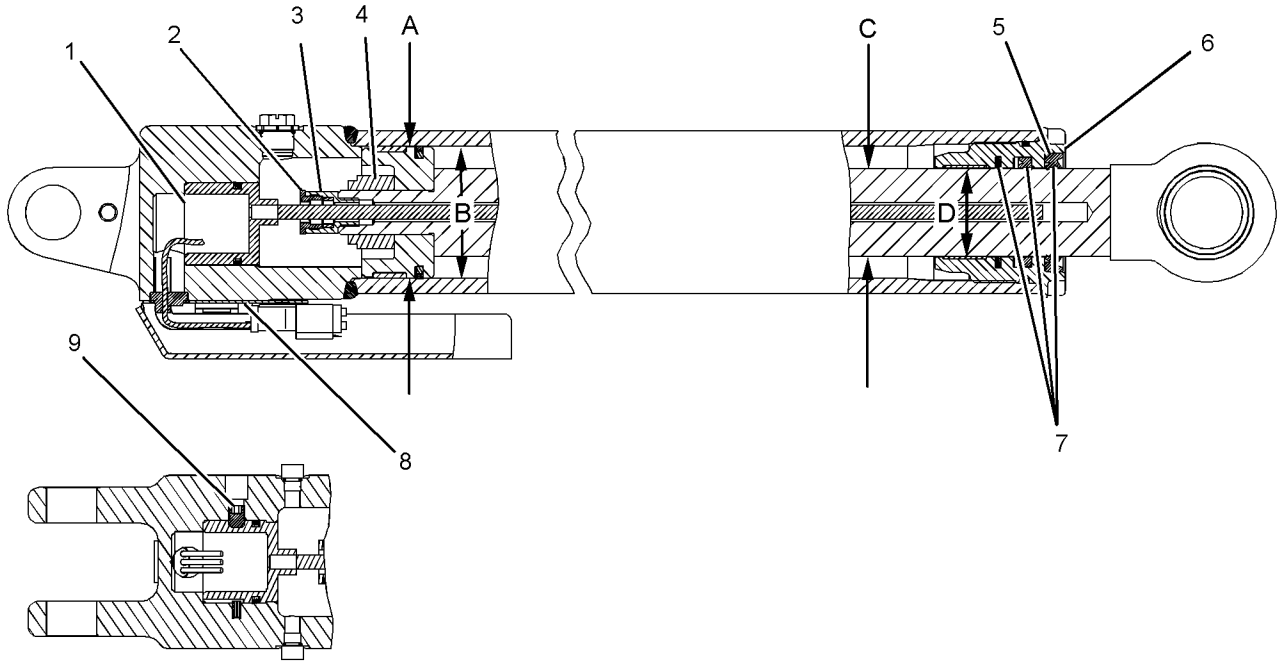

Illustration 49 g02199574

(A) Outer diameter of new piston over two lands . . . . . 75.69 ± 0.03 mm ((2.980 ± 0.001 inch))

(B) Bore of new cylinder assembly . . . . . 76.20 ± 0.08 mm ((3.000 ± 0.003 inch))

(C) Outer diameter of new rod . . 50.750 ± 0.038 mm ((1.9980 ± 0.0015 inch))

(D) Bore of new head over four lands . . . . . 51.13 ± 0.03 mm ((2.013 ± 0.001 inch))

(1)249-5193 Position Sensor Gp

Reference: For more information on the 249-5193 Position Sensor Gp, refer to the “Position Sensor (Steering Cylinder)” story in this manual.

(2) Torque for retaining ring . . . . . 35 ± 5 N·m ((26 ± 4 lb ft))

(3) Torque for carrier for the magnet . . . . 35 ± 5 N·m ((26 ± 4 lb ft))

(4) Torque for nut . . . . 600 ± 20 N·m ((443 ± 15 lb ft))

(5) Apply Loctite 609 to the groove for the wiper seal prior to assembly.

(6) Lubricate the head with clean grease. Torque for head . . . . . 600 ± 130 N·m ((443 ± 96 lb ft))

(7) Lubricate the sealing lips lightly with the lubricant that is being sealed.

(8) Apply Loctite 271 on the bottom of the component prior to assembly.

(9) Torque for set screw . . . . . 25 ± 3 N·m ((220 ± 27 lb in))

i04022132

Steering Cylinder

SMCS Code: 4303

Part No.: 276-5681
S/N: B9J1–Up

Part No.: 276-5681
S/N: R9J1–Up

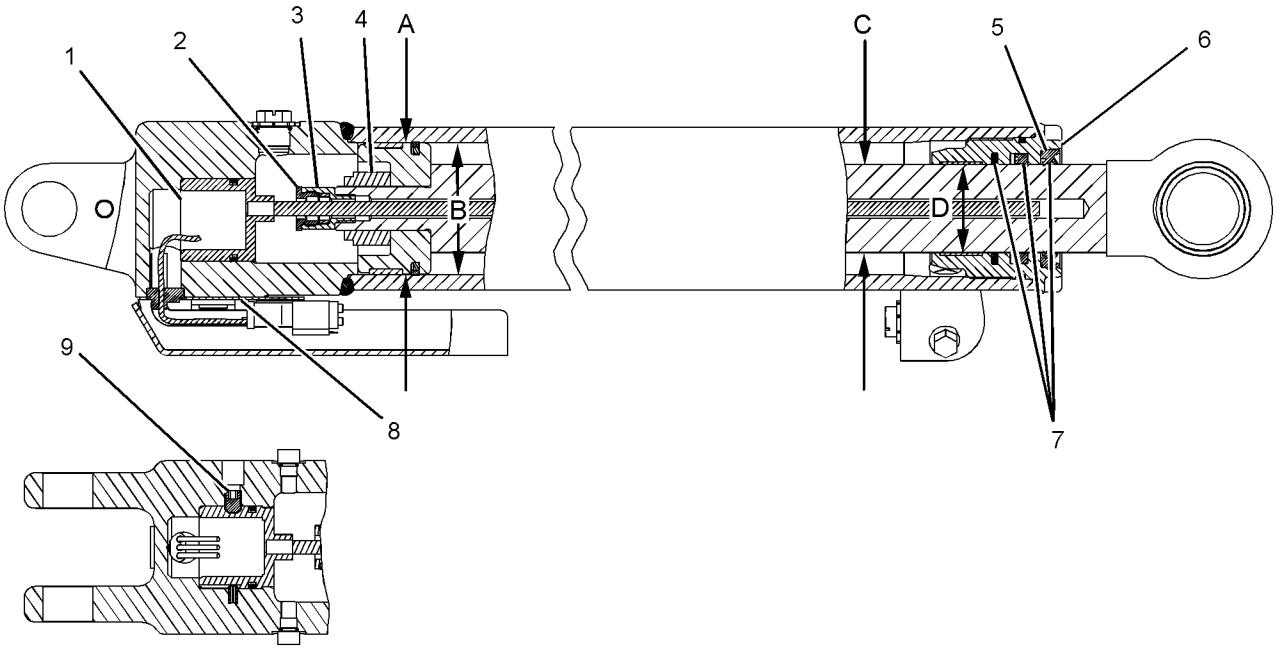

Illustration 50 g02199676

(A) Outer diameter of new piston over two lands . . . . . 75.69 ± 0.03 mm ((2.980 ± 0.001 inch))

(B) Bore of new cylinder assembly . . . . . 76.20 ± 0.08 mm ((3.000 ± 0.003 inch))

(C) Outer diameter of new rod . . 50.750 ± 0.038 mm ((1.9980 ± 0.0015 inch))

(D) Bore of new head over four lands . . . . . 51.13 ± 0.03 mm ((2.013 ± 0.001 inch))

(1)249-5193 Position Sensor Gp

Reference: For more information on the 249-5193 Position Sensor Gp, refer to the “Position Sensor (Steering Cylinder)” story in this manual.

(2) Torque for retaining ring . . . . . 35 ± 5 N·m ((26 ± 4 lb ft))

(3) Torque for carrier for the magnet . . . . 35 ± 5 N·m ((26 ± 4 lb ft))

(4) Torque for nut . . . . 600 ± 20 N·m ((443 ± 15 lb ft))

(5) Apply Loctite 609 to the groove for the wiper seal prior to assembly.

(6) Lubricate the head with clean grease. Torque for head . . . . . 600 ± 130 N·m ((443 ± 96 lb ft))

(7) Lubricate the sealing lips lightly with the lubricant that is being sealed.

(8) Apply Loctite 271 on the bottom of component prior to assembly.

(9) Torque for set screw . . . . . 25 ± 3 N·m ((220 ± 27 lb in))

i04022138

Steering Cylinder

SMCS Code: 4303

Part No.: 267-3863
S/N: B9H1–Up

Part No.: 267-3863
S/N: R9H1–Up

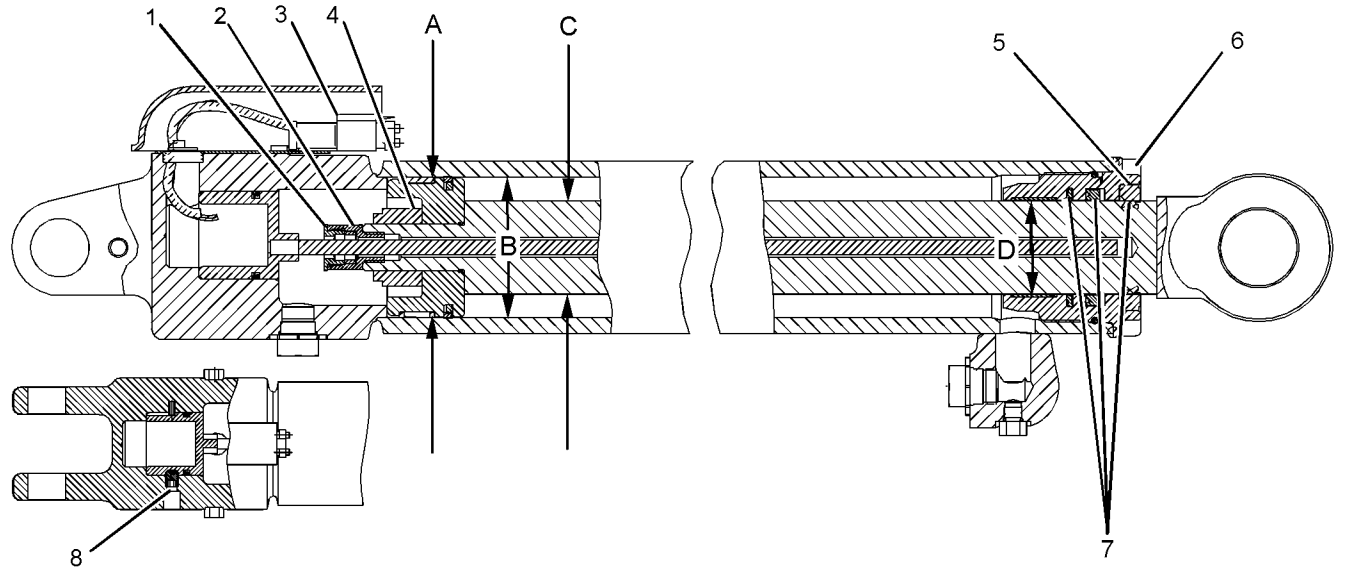

Illustration 51 g02199695

(A) Outer diameter of new piston over two lands . . . . . 75.69 ± 0.03 mm ((2.980 ± 0.001 inch))

(B) Bore of new cylinder assembly . . . . . 76.20 ± 0.08 mm ((3.000 ± 0.003 inch))

(C) Outer diameter of new rod . . 50.750 ± 0.038 mm ((1.9980 ± 0.0015 inch))

(D) Bore of new head over four lands . . . . . 51.13 ± 0.03 mm ((2.013 ± 0.001 inch))

(1) Torque for retaining ring . . . . . 35 ± 5 N·m ((26 ± 4 lb ft))

Note: Apply 5P-3413 Pipe Sealant to the threads prior to assembly.

(2) Torque for carrier for the magnet . . . . 35 ± 5 N·m ((26 ± 4 lb ft))

Note: Apply 5P-3413 Pipe Sealant to the threads prior to assembly.

(3)267-5257 Position Sensor Gp

Reference: For more information on the 267-5257 Position Sensor Gp, refer to the “Position Sensor (Steering Cylinder)” story in this manual.

(4) Torque for nut . . . . 600 ± 20 N·m ((445 ± 15 lb ft))

(5) Apply Loctite 609 to the groove for the wiper seal prior to assembly.

(6) Lubricate the threads with clean grease. Torque for head . . . . . 600 ± 130 N·m ((445 ± 95 lb ft))

(7) Lubricate the sealing lips lightly with the lubricant that is being sealed.

(8) Torque for set screw . . . . . 25 ± 3 N·m ((220 ± 27 lb in))

i02389270

Position Sensor (Steering Cylinder)

SMCS Code: 4303-PSN; 430S-PSN

Part No.: 267-5257
S/N: B9H1–Up

Part No.: 267-5257
S/N: R9H1–Up

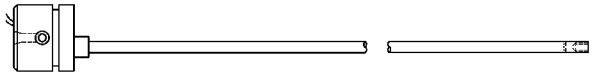

Illustration 52 g01182485

(1) Specifications for the 267-5257 Position Sensor Gp

Supply voltage	10 + 1 − 3 VDC
Maximum supply current	100 mA
Operating temperature	−40° to 120° C ((−40° to 248° F))
Output frequency	500 ± 100 Hz
Highest voltage	3.9 VDC
Lowest voltage	1 VDC
Maximum Continuous Pressure	44000 kPa ((6400 psi))

i02389289

Position Sensor (Steering Cylinder)

SMCS Code: 4303-PSN; 430S-PSN

Part No.: 249-5193
S/N: B9J1–Up

Part No.: 249-5193
S/N: R9J1–Up

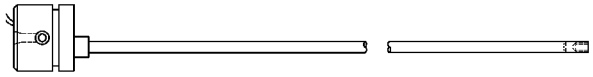

Illustration 53 g01182485

(1) Specifications for the 249-5193 Position Sensor Gp

Supply voltage	10 + 1 − 3 VDC
Maximum supply current	100 mA
Operating temperature	−40° to 120° C ((−40° to 248° F))
Output frequency	500 ± 100 Hz
Highest voltage	3.9 VDC
Lowest voltage	1 VDC
Maximum Continuous Pressure	44000 kPa ((6400 psi))

i04895671

Wheel Lean Cylinder

SMCS Code: 5211

Part No.: 249-5299
S/N: B9J1–Up

Part No.: 249-5299
S/N: R9J1–Up

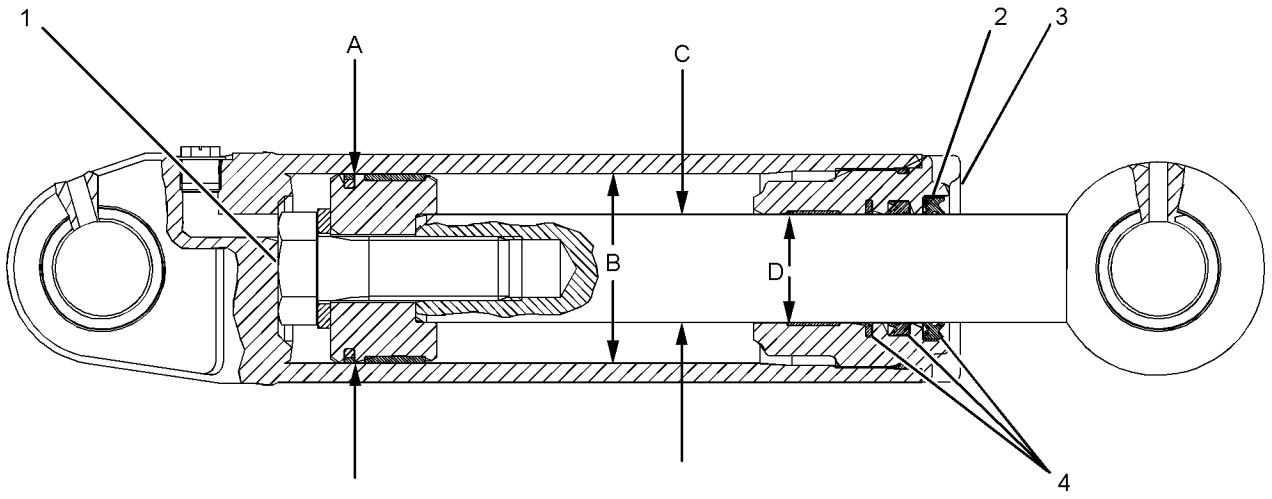

Illustration 54 g02156529

Table 26

Specifications for 249-5299 Wheel Lean Cylinder			
Item	**Qty**	**Part**	**Specification Description**
A	-	-	Outer diameter of new piston over two lands 88.40 ± 0.05 mm (3.480 ± 0.002 inch)
B	-	-	Bore of new cylinder assembly 88.90 ± 0.08 mm (3.500 ± 0.003 inch)
C	-	-	Outer diameter of new rod 50.750 ± 0.038 mm (1.9980 ± 0.0015 inch)
D	-	-	Bore of new head over four lands 51.13 ± 0.03 mm (2.013 ± 0.001 inch)
1	1	173-9683 Bolt	Torque to 1800 ± 200 N·m (1320 ± 150 lb ft).
2	1	-	Apply Loctite 609 to the groove for the wiper seal prior to assembly.
3	1	6E-4974 Head	Lubricate the threads with clean grease. Torque to 600 ± 130 N·m (440 ± 95 lb ft).
4	3	-	Lubricate the sealing lips lightly with the lubricant that is being sealed.

i06183119

Wheel Lean Cylinder

SMCS Code: 5211

Part No.: 289-3054
S/N: B9H1–Up

Part No.: 289-3054
S/N: R9H1–Up

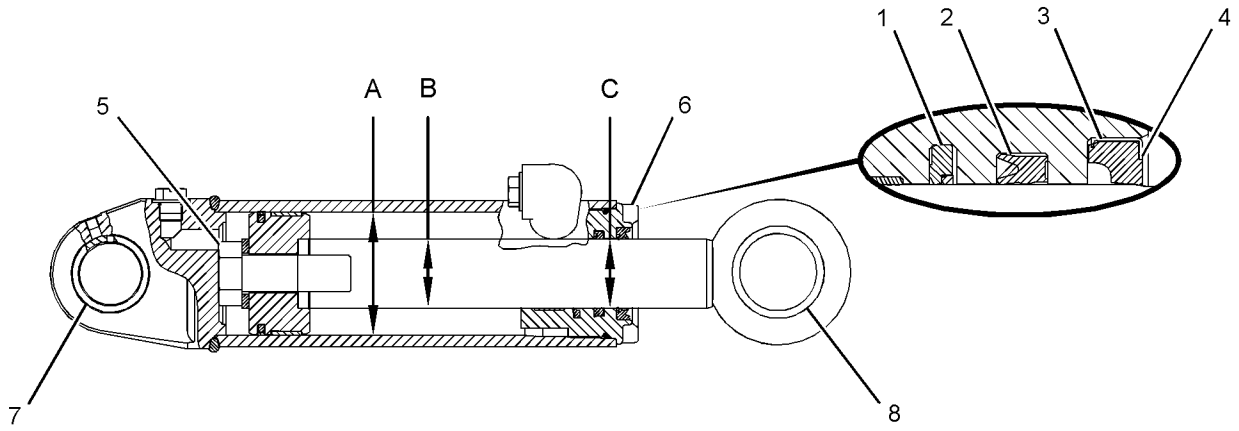

Illustration 55 g03840573

Table 27

Specification for 289-3054 Wheel Lean Cylinder			
Item	**Qty**	**Part**	**Specification Description**
1	1	167-2200 Seal As	Lubricate the sealing lips lightly with the lubricant that is being sealed.
2	1	362-3819 U-Cup Seal	Lubricate the sealing lips lightly with the lubricant that is being sealed.
3	1	231-3538 Wiper Seal	Lubricate the sealing lips lightly with the lubricant that is being sealed.
4	-	-	Before assembly, apply green Loctite 609 to the groove for the wiper seal prior to assembly.
5	1	173-9683 Bolt	Torque to 1800 ± 200 N·m (1320 ± 150 lb ft).
A	1	289-3055 Cylinder As	Bore is 101.60 ± 0.08 mm (3.999 ± 0.003 inch).
B	1	121-9247 Rod As	Diameter is 57.100 ± 0.038 mm (2.2480 ± 0.0015 inch).
6	1	6E-4977 Head	Before assembly, apply green Loctite 609 to the groove for the wiper seal prior to assembly. Bore of new head over four lands (C) is 57.48 ± 0.03 mm (2.263 ± 0.001 inch). Lubricate the threads with clean grease. Torque to 600 ± 130 N·m (440 ± 95 lb ft).
7	1	2G-8635 Bushing	Bore before assembly is 53.42 ± 0.99 mm (2.103 ± 0.039 inch). Installation depth is 8.3 ± 0.5 mm (0.33 ± 0.02 inch).
8	1	2G-8635 Bushing	Bore before assembly is 53.42 ± 0.99 mm (2.103 ± 0.039 inch). Installation depth is 7.8 ± 0.5 mm (0.31 ± 0.02 inch).

i05857743

Circle Drive

SMCS Code: 5207

Part No.: 265-6725
S/N: B9H1–Up

Part No.: 265-6725
S/N: R9H1–Up

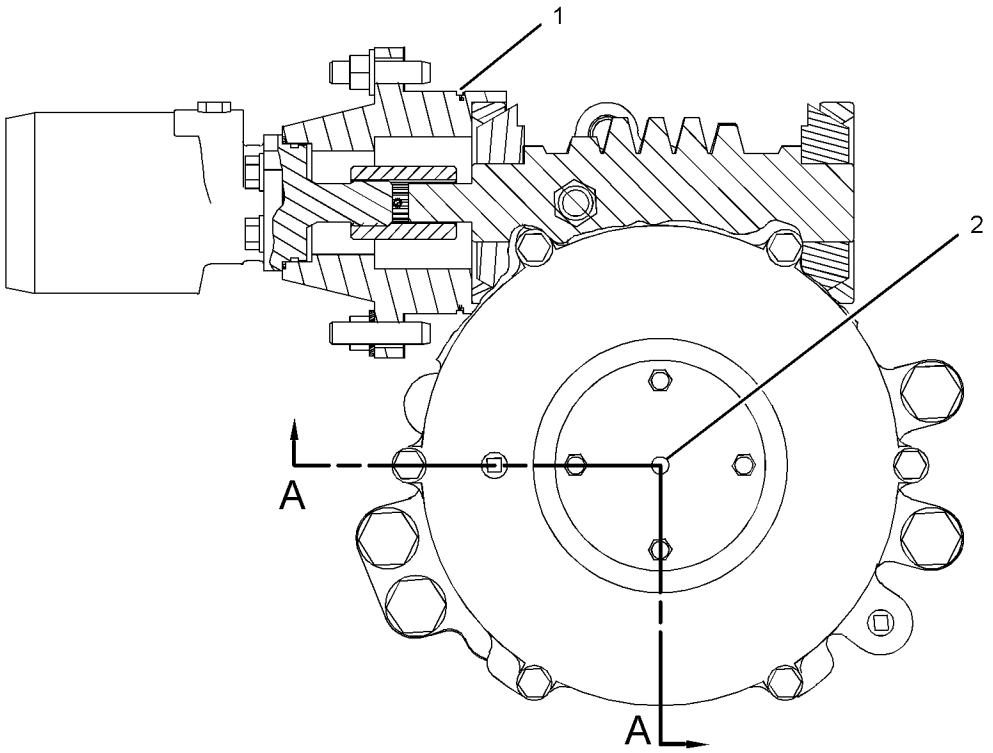

Illustration 56 g01286203

(1) Lubricate the bore lightly with the lubricant that is being sealed.

(2) 8T-0336 Pressure Relief Fitting

Minimum relief pressure . . . . . 52 kPa ((8 psi))
Maximum relief pressure . . . . . 105 kPa ((15 psi))

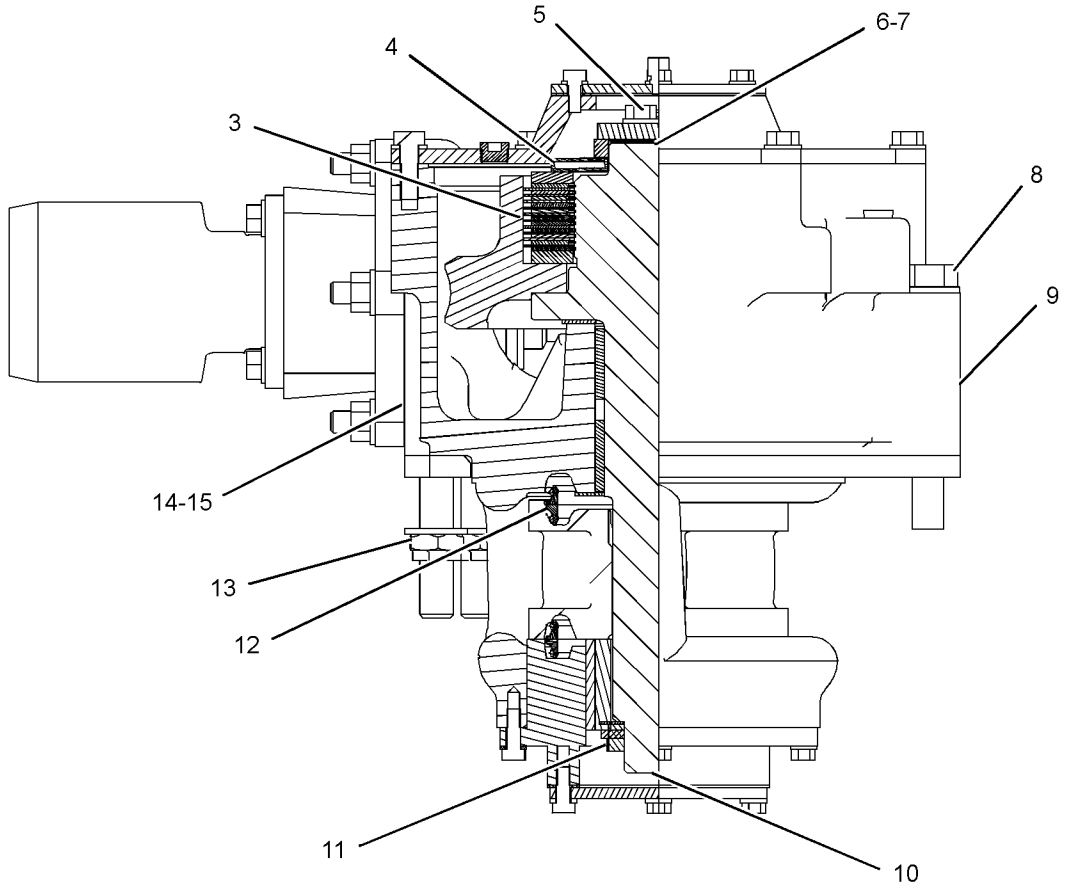

Illustration 57 g01338805

Section A-A

(3) Clutch Pack

2G-0478 Friction Disc
Quantity 10
Thickness of one new disc . . . . . .1.52 ± .13 mm ((0.060 ± 0.005 inch))

6Y-7953 Friction Disc
Quantity 11
Thickness of one new disc . . . . . .2.87 ± 0.08 mm ((0.113 ± 0.003 inch))
Minimum reusable thickness (total) . . . 2.44 mm ((0.096 inch))
Minimum reusable thickness (one side of friction material) . . . . . 0.20 mm ((0.0079 inch))

(4) 6G-6122 Disc Spring

Test height . . . . . 10.63 mm ((0.419 inch))
Load at test height . . . . . 98500 ± 19700 N ((22140 ± 4430 lb))
Height after test . . . . . 12.94 mm ((0.509 inch))
Outside diameter . . . . . .150.11 ± 0.25 mm ((5.910 ± 0.010 inch))

Torque three bolts (5) to 120 N·m (90 lb ft). Then, torque three bolts (5) to 240 ± 40 N·m (180 ± 30 lb ft).

(6) 6G-5543 Shim

Thickness of one shim . . 0.13 mm ((0.005 inch))

(7) 6G-5544 Shim

Thickness of one shim . . 0.25 mm ((0.010 inch))

As required, use shims (6) and (7) in order to obtain a 2.54 ± 0.25 mm (0.100 ± 0.010 inch) deflection of spring (4).

Reference: Refer to Testing and Adjusting, “Disc Pack Preload for Circle Drive - Adjust” for more information on the Circle Drive.

(8) Torque for four bolts . . . . . 800 ± 100 N·m ((590 ± 74 lb ft))

(9)265-6723 Drive Housing

(10) Lubricate the bearing area of the shaft with the lubricant that is being used.

(11) Torque for one nut . . . . . 325 ± 27 N·m ((240 ± 20 lb ft))

(12)5K-5288 Duo-Cone Seal Gp

All surfaces must be clean and dry during assembly. Lubricate the rubber seals and lubricate the metal seals with a thin film of oil prior to assembly.

(13) Torque for four bolts . . . . . 800 ± 100 N·m ((590 ± 74 lb ft))

(14) 8D-4522 Shim

Thickness of one shim . . 0.13 mm ((0.005 inch))

(15) 8D-4523 Shim

Thickness of one shim . . 0.25 mm ((0.010 inch))

As required, use shims (14) and (15) in order to obtain 0.065 ± 0.05 mm (0.0025 ± 0.002 inch) preload on the bearing.

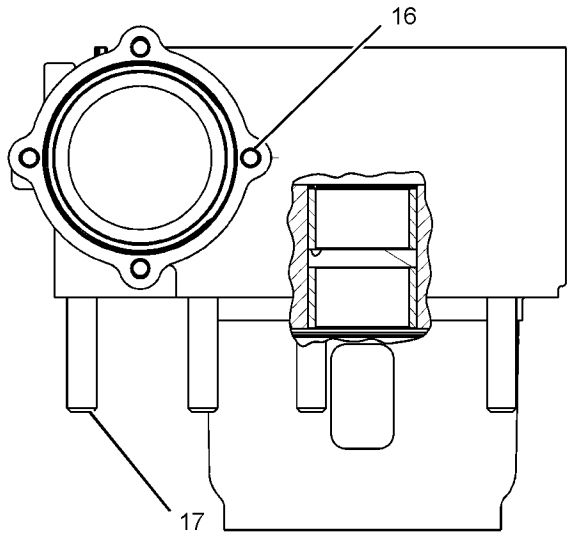

Illustration 58 g01194323

View of housing assembly (9)

(16) Torque for four studs . . . . . 100 ± 15 N·m ((75 ± 11 lb ft))

(17) Torque for four studs . . . . . 300 ± 40 N·m ((220 ± 30 lb ft))

i06713494

Circle Drive

SMCS Code: 5207

Part No.: 259-5580, 423-4971
S/N: B9J1–Up

Part No.: 259-5580, 423-4971
S/N: R9J1–Up

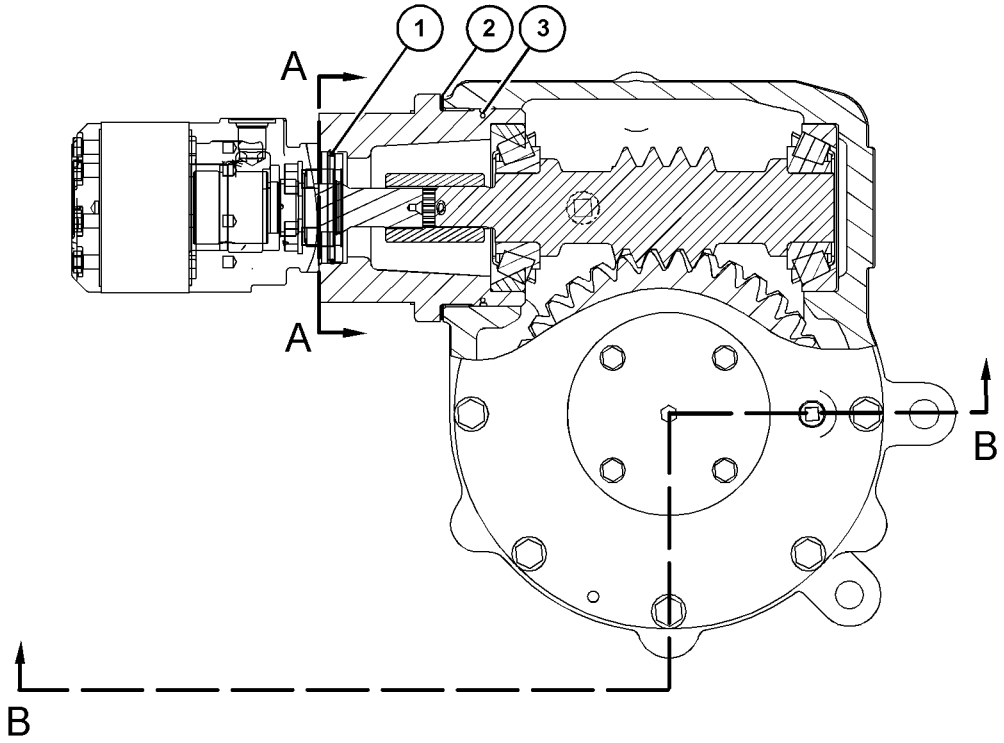

Illustration 59 g06087730

Table 28

Specification for 423-4971 Circle Drive Gp			
Item	**Qty**	**Part**	**Specification Description**
1	1	1H-7339 O-Ring Seal	Lubricate the seal lightly with the lubricant that is being sealed.
2	As required, use the following shims in order to obtain the preload on the bearings.		
	10	7D-8983 Shim	Thickness is 0.127 mm (0.0050 inch).
	6	7D-8984 Shim	Thickness is 0.178 mm (0.0070 inch).
3	1	2H-3935 O-Ring Seal	Lubricate the seal lightly with the lubricant that is being sealed.

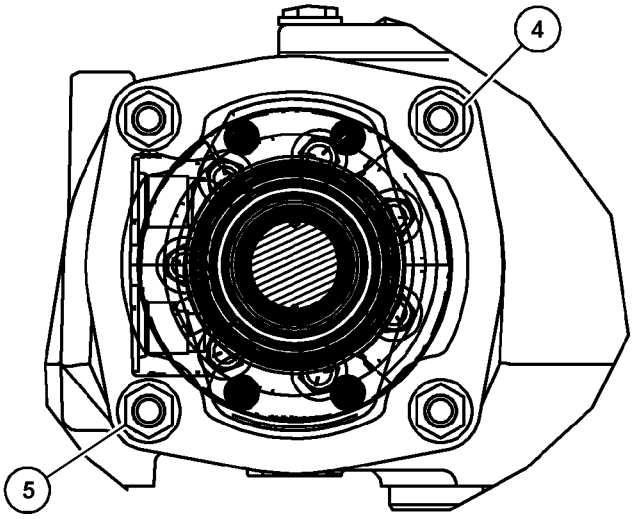

Illustration 60 g06087731

Section A-A

Table 29

Item	Qty	Part	Specification Description
-	4	1F-7958 Full Nut	Use the following procedure in order to tighten the nuts : 1. Tighten the nut (4) to 20 N·m (177 lb in) and nut (5) to 40 N·m (30 lb ft) and again, tighten the nut (4) to 80 N·m (59 lb ft) and nut (5) to 80 N·m (59 lb ft). 2. Rotate the worm three revolutions then back off the nuts. 3. Tighten the nut (4) to 20 N·m (177 lb in) and nut (5) to 40 N·m (30 lb ft) and then tighten the nut (4) to 40 N·m (30 lb ft) and rotate the worm to three revolutions. 5. Tighten the nut (4) to 40 N·m (30 lb ft) and tighten the nut (5) to 40 N·m (30 lb ft). 6. Measure the average gap between the housing and adapter at the locations being torqued. Subtract 0.145 ± 0.065 mm (0.0057 ± 0.0026 inch) to obtain the desire shim pack thickness.

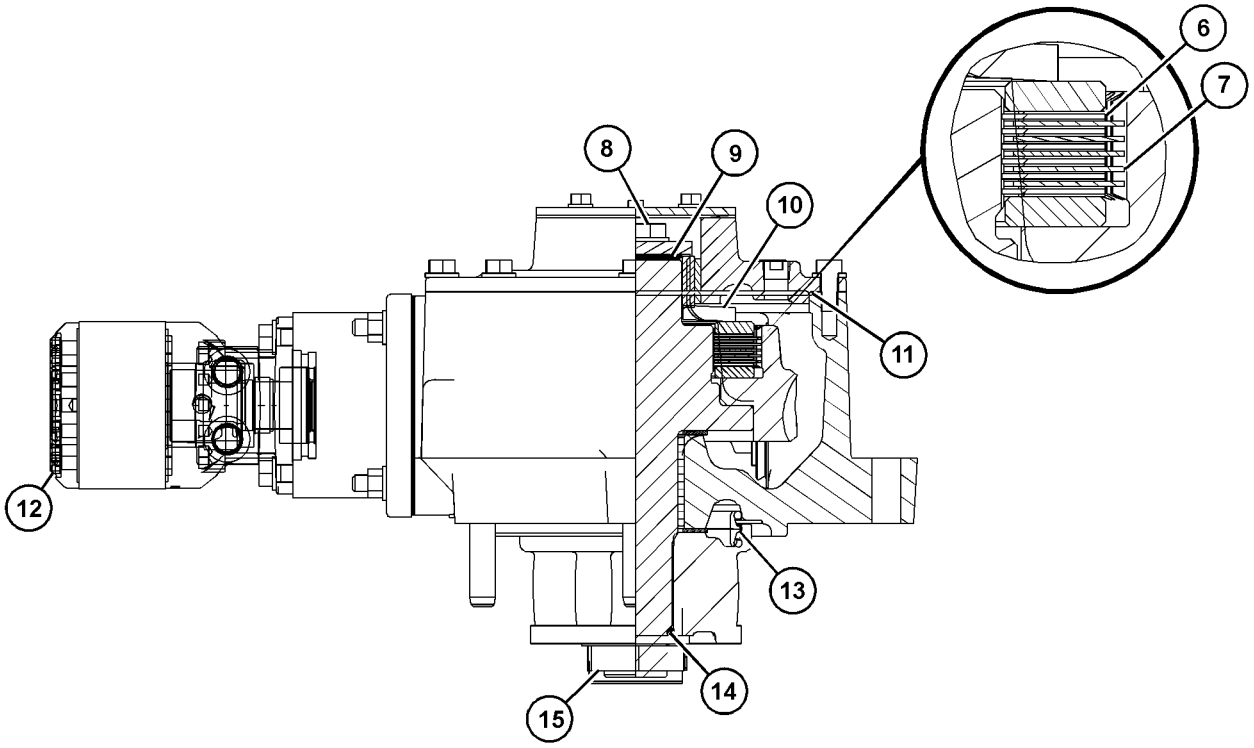

Illustration 61 g06087732

Section B-B

Table 30

Item	Qty	Part	Specification Description
6	6	6Y-7953 Friction Disc	Thickness of 11 new friction discs is 24.82 ± 1.13 mm (0.977 ± 0.044 inch) Thickness of friction disc (6) is 2.87 ± 0.08 mm (0.113 ± 0.003 inch). Thickness of friction disc (7) is 1.52 ± 0.13 mm (0.060 ± 0.005 inch).
7	5	2G-0478 Friction Disc	
8	3	6V-5686 Bolt	Use the following bolt tightening procedure to tighten the bolts : 1. Tighten the bolts to 150 ± 20 N·m (111 ± 15 lb ft). 2. Remove the bolts after 45 minutes in order to add the shims (9). 3. Install the bolts, and tighten to 150 ± 20 N·m (111 ± 15 lb ft). 4. Again tighten to 240 ± 40 N·m (177 ± 30 lb ft). 5. Confirm the torque is 240 ± 40 N·m (177 ± 30 lb ft).
9	As required, use shim (9) in order to obtain a 2.30 ± 0.25 mm (0.091 ± 0.010 inch) deflection of disc spring (10).		
	4	307-1959 Shim	Thickness is 0.13 mm (0.005 inch).
	1	307-1960 Shim	Thickness is 0.25 mm (0.010 inch).
	5	307-1962 Shim	Thickness is 0.5 mm (0.02 inch).
10	1	6G-6122 Disc Spring	Length under test force is 10.63 mm (0.419 inch). Test force is 98490 ± 19700 N (22142 ± 4429 lb). Free length after test is 12.94 mm (0.509 inch).
11	1	5P-2861 O-Ring Seal	Lubricate the O-ring seal lightly with the lubricant that is being sealed.
12	7	9T-8052 Bolt	Torque to 68 ± 7 N·m (50 ± 5 lb ft).

(continued)

(Table 30, contd)

Item	Qty	Part	Specification Description
13	1	5K-5288 Duo-Cone Seal Gp	Rubber toric seals and all surfaces in contact with the seals must be clean and dry at assembly. Apply a thin layer of oil on the surfaces of the metal seals that are in contact just before installation. The metal seal must be assembled square with the bore. The rubber toric seals must not bulge. The rubber toric seals must not be twisted.
14	1	484-7654 O-Ring Seal	Lubricate the seal lightly with the lubricant that is being sealed.
15	1	1A-1415 Nut	Torque to 160 ± 30 N·m (118 ± 22 lb ft).

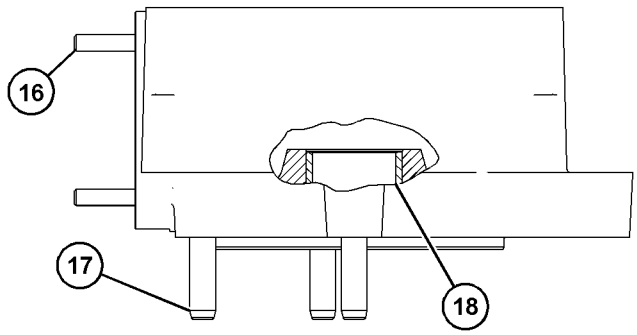

Illustration 62 g06087734

259-4481 Housing As

Table 31

Item	Qty	Part	Specification Description
16	4	2D-8154 Taperlock Stud	Torque to 55 ± 10 N·m (41 ± 7 lb ft).
17	4	425-8257 Taperlock Stud	Torque to 170 ± 30 N·m (125 ± 22 lb ft).
18	1	281-9452 Bushing	Bore before assembly is 69.85 ± 0.25 mm (2.750 ± 0.010 inch). Installation depth is 2.0 ± 0.5 mm (0.08 ± 0.02 inch).

i07517395

Swivel

SMCS Code: 5060

Part No.: 260-6502

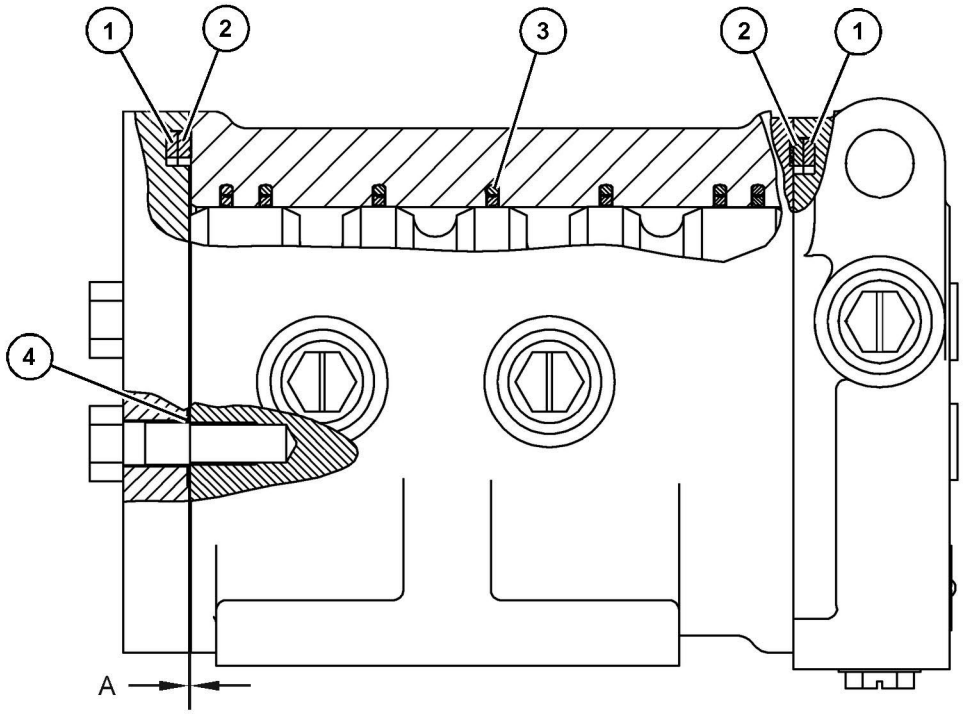

Illustration 63 g06346116

Table 32

Item	Qty	Part	Specification Description
1	2	4J-9964 Seal	Lubricate the seals lightly with fluid that is being sealed.
2	2	173-1007 Seal	Lubricate the seals lightly with fluid that is being sealed.
3	7	8J-2331 Seal	Lubricate the seals lightly with fluid that is being sealed.
4	6	5J-1246 Shim	Thickness of one shim is 0.13 mm (0.005 inch).
			As required, to maintain a gap (A) between body and rotor . The distance of the gap should be 0.13 to 0.50 mm (0.005 to 0.019 inch).

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