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Carter[®] Ground Fueling

SM64227

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Applicable addition manuals:
N/A

Maintenance & Repair Manual

3" Emergency Breakaway Coupling

Model 64227

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Maintenance, Overhaul & Test Instructions
Model 64227
3 Inch Emergency Breakaway Coupling

1.0 Introduction

This service manual is provided as a guideline for users of Eaton's Carter brand Model 64227 3" breakaway coupling. The coupling was

designed to provide a safe and environmentally friendly means for hot refueling applications using a pantograph.

2.0 Description

Model 64227 Emergency Breakaway Coupling is a 3 inch emergency dry breakaway coupling with male NPT inlet (for connection to the hard piping on the pantograph) and female NPT outlet (for connection to the hose).

The 64227 Coupling consists of two poppet dry break halves; the inlet half (female) and the outlet half (male). The two halves are connected by 16 ball bearings. When connected, both halves will open to allow flow through the assembly. An interface O-ring seals between the two halves to form a leak free assembly against the atmosphere.

When the coupling is disconnected or separated in case of an emergency, the two halves will independently form a dry break to stop spillage from both the pantograph and the hose.

The ball bearings connecting the two halves facilitate the breakaway mechanism of the Emergency Breakaway Coupling. The interface of

the two halves is designed so that the ball bearings will be disengaged while the coupling is subjected to a specific load directed at its centerline.

The coupling meets or exceeds all the requirements of the Naval Air Systems Command Aircraft Refueling NATOPS Manual, NAVAIR 00-80T-109 and is listed as approved for use in Appendix D of their manual.

When the connected assembly is subjected to a straight pull load of approximately 360 pounds, the two halves separate and the poppets in each half spring closed, securing the fuel in each half, resulting in almost no spillage. This emergency breakaway function is fully automatic and can be achieved without human interaction. Upon breakaway, in an emergency situation, the two halves can be re-connected manually; the same as a normal fueling operation; without any repair to the coupling and without the use of any tools. The refueling operation can be resumed immediately.

3.0 Table of Options

Option Letter	Description	Option Letter	Description
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Note: Table intentionally left blank. There are no options available for the 64227 at this time.

4.0 Operation

4.1 Specifications

4.1.1 Model 64227 is constructed of aluminum with a diameter of 5 inches, a length of 10.75 inches and a weight of approximately 9.5 pounds.

4.1.2 The coupling is compatible for use with aviation jet fuels JP-5, JP-8, Jet A-1, Jet A, TS-1, JP-4 and Jet B.

4.1.3 The coupling has a pressure drop of 2.2 PSID at 300 GPM and a pressure drop of 8.5 PSID at a flow rate of 600 GPM.

4.1.4 The coupling is designed for use in temperatures ranging from -45° F to +165° F.

4.2 Connection and Disconnection

4.2.1 The two halves are manually connected by simply retracting the Collar (1-20) and pushing the Male half into the Female half then releasing the collar. Push the Retaining Ring (1-28) into the groove of the Connector (1-3).

4.2.2 Disconnection is accomplished by removing the Retaining Ring (1-28) from the groove of the Connector (1-3) and sliding upwards towards the flange then retracting the Collar (1-20) and pulling the Male half from the Female half then releasing the collar.

5.0 Disassembly

5.1 Remove Retaining Ring (1-28) from the groove in Connector (1-3). Slide upward toward flange of Connector (1-3). Separate the Male half of the coupling from the Female half and set the Male half aside.

5.2 With the Female half resting on its side, remove and set aside for re-use only the Locknut (1-10) and the Washer (1-11) found on the Female

Poppet Shaft (1-17) visible from inside the body, while holding the rest of the female poppet assembly in place with the other hand.

5.2.1 While holding the female poppet assembly in place, compress the Sleeve Assembly (1-16) enough to release and remove the remainder of the female poppet assembly.

- 5.2.2 Remove and set aside for re-use the second Locknut (1-10) and second Washer (1-11).
- 5.2.3 Slide the Male Poppet (1-19) off the Female Poppet Shaft (1-17). Inspect poppet surface and edges for any nicks, scratches, voids or deformations that might cause leakage. It may be re-used if no damage is found.
- 5.2.4 Remove and discard O-ring (1-18) from the Female Poppet Shaft (1-17).
- 5.3 Remove the Sleeve Assembly (1-16) and the Sleeve Spring (1-15). Inspect the inside and outside diameter of the beveled end of the Sleeve Assembly (1-16) for any nicks, scratches, voids or deformations that might prohibit sealing against the poppet. Discard and replace if necessary.
- 5.4 Retrieve the Male half and couple the two halves together with the Female half on top.
- 5.5 Remove the Male Coupling (1-1) from the Female half by removing the six Bolts (1-2) from the flange. Bolt (1-2) is a self locking type bolt and is designed to be reused several times before losing its locking effectivity. Discard and replace as necessary.
- 5.6 Remove and discard the first visible O-ring (1-8) from the Female Body (1-12).
- 5.7 **WARNING: THE BREAKAWAY SPRING (1-7) IS UNDER 300 POUNDS OF COMPRESSION! EXERCISE CARE WHILE DECOMPRESSING THE SPRING. FAILURE TO DO SO COULD RESULT IN SERIOUS PERSONAL INJURY.**
- Install the TF64227-1 by placing the spring compression plate shoulder down on top of the Spring Retainer Ring (1-6). Align the holes of the plate with any three holes on the Connector (1-3). Using the hardware from TF64227-3; thread the three nuts along with the three washers onto the screw rods via top side of the plate. Leave an empty hole between each threaded Screw Rod. Fully thread all three of the screw rods into the corresponding hole on the Connector (1-3) until firmly seated.
- 5.7.1 Once the Spring (1-7) is fully compressed, install TF64227-2 Assembly Sleeve shroud over the Female Body (1-12). Remove the Retaining Ring (1-5) by catching bottom edge of the ring with the blade of a screwdriver or hand to force the edge out of the groove in the body. Use the flat edge of the screwdriver blade or fingers between the layers of the ring to "walk" the ring up the Assembly Sleeve shroud and off the unit.
- 5.7.2 Remove TF64227-2 Assembly Sleeve shroud.
- 5.7.3 Separate the Male half from the Female half setting the Male half aside.
- 5.7.4 Gradually loosen the nuts on TF64227-1 EVENLY, in a crisscross pattern, keeping the spring compression plate as level as possible, until all compression is off the Spring (1-7). Once all compression is off the spring the compression tool can be removed from the Connector (1-3).
- 5.8 Remove Spring Retaining Ring (1-6), but before setting it aside, remove and discard O-ring (1-4).
- 5.9 Remove and set aside Spring (1-7).
- 5.10 Remove the four Bolts (1-27) joining the Connector (1-3) to the Collar (1-20). Discard any bolts damaged during removal. Set the Connector (1-3) aside.
- 5.11 Remove and set aside the Collar Spring (1-9) and the Collar (1-20).
- 5.12 Remove and discard the second and third O-rings (1-8) from the grooves in the Female Body (1-12).
- 5.13 Remove and set aside for re-use the sixteen Ball Bearings (1-13) from the Female Body (1-12).
- 5.14 Flip the Female Body (1-12) over and remove and discard the Spring Energized Seal (1-14) from the housing's interior.
- 5.15 Retrieve the Male half of the coupling.
- 5.15.1 Remove the Adapter Assembly (1-22) from the Female Coupling (1-26) by removing the six Bolts (1-2) from the flange. Bolt (1-2) is a self locking type bolt and is designed to be reused several times before losing their locking effectivity. Discard and replace as necessary.
- 5.16 Remove and discard the O-ring (1-23) from the shoulder of Female Coupling (1-26).
- 5.17 Remove and set aside Poppet Spring (1-25).
- 5.18 Remove Male half Poppet Assembly (1-24). Inspect poppet surface and edges for any nicks, scratches, voids or deformations that might cause leakage. It may be re-used if no damage is found.
- 5.19 Flip the Adapter Assembly onto its flange and remove and discard the inside diameter O-ring (1-21).
- Disassembly of the 64227 is now complete.

6.0 Inspection

- The Breakaway Coupling Assembly halves should be periodically inspected and tested to ensure the equipment is in satisfactory working condition.
- 6.1 Periodic Inspections
- The dry break sealing surfaces of both halves should be visually inspected for scratches and any surface imperfections. Damage to the poppet sealing surfaces can cause leakage during the fueling process.
- 6.2 The coupling should be periodically hydrostatic pressure tested for any evidence of damage or leakage. Repair or replace seals and components, as necessary, in accordance with this service manual. Hydrostatic pressure tests shall be conducted at 120 psig for one minute.
- 6.3 Overhaul Inspections
- 6.3.1 During the overhaul process, all components should be visually inspected for cracks, excessive

- wear, damage or distortion which could inhibit proper function and movement of the part.
- 6.3.2 Replace any parts identified as damaged, with new Carter brand parts.
- 6.3.3 When reusing parts during an overhaul ensure that they are free of old grease, debris and/or contaminants, prior to and during reassembly.
- 6.3.4 Particular attention should be paid to all sealing surfaces before reassembly. Items (1-16) Sleeve Assembly, (1-19) Male Poppet and (1-24) Poppet
- 6.3.5 Bolt (1-2) is a self locking type bolt. They are designed to be reused several times before losing their locking effectivity. It is recommended that the user maintain some spares and replace bolts as needed.

7.0 Reassembly

- 7.1 During reassembly it is recommended that a light coating of petroleum jelly be used on all new O-rings and seals being installed.
- 7.2 Begin reassembly by placing Adapter Assembly (1-22) shoulder side down on the work surface with the flange facing up.
- 7.2.1 Insert the Poppet Assembly (1-24) into the Adapter Assembly (1-22) with the shaft pointing upward toward the ceiling.
- 7.2.3 Place the Poppet Spring (2-25) over the shaft of Poppet Assembly (1-24).
- 7.2.4 Install the lightly lubricated O-ring (1-23) over the short shoulder (inlet end) of the Female Coupling (1-26).
- 7.2.5 Apply a light coating of petroleum jelly to the inside diameter of the Adapter Assembly (1-22) where the O-ring (1-23) will seat. Install Female Coupling (1-26) onto the Adapter Assembly (1-22) and align bolt patterns.
- 7.2.6 Install the six Bolts (1-2) incrementally, in a repeating star pattern before final torque is accomplished. The final torque of Bolts (2-2) should be 23 ± 3 in.-lbs. (27.0 ± 3.5 kg-cm).
- 7.2.7 Flip the assembled Male half over and install the lightly lubricated O-ring (1-21) into the O-ring groove in the inside diameter, inlet side of the Adapter Assembly (1-22). Set aside.
- 7.3 Begin assembly of the Female half by carefully installing the lubricated Spring Energized Seal (1-14) into the seal groove in the interior of the Female Body housing (1-12). Install the seal so that the cupped area where the spring is visible will be facing the inlet end of the body. Do not use any tools or picks as they could cause damage to the seal and allow leakage to occur.
- 7.4 With the housing resting with ball bearing holes nearest the table, insert the 16 Ball Bearings (1-13) into the holes in the Female Body (1-12).
- 7.5 Place the Collar (1-20) over the Female Body (1-12) with the four slotted grooves nearest the ceiling.
- 7.6 Place a lightly lubricated O-ring (1-8) in each of the designated grooves on the Female Body (1-12) [Refer to Figure 1].
- 7.7 Place the Collar Spring (1-9) over the Female Body (1-12).
- 7.7.1 Install Retaining Ring (1-28) onto Connector (1-3). Placement should be in between groove and flange.
- 7.8 With the flanged side of the Connector (1-3) facing upward, place it over the Collar Spring (1-9) and align the four bolt holes to the slots in the Collar (1-20).
- 7.8.1 Apply Loctite[®] adhesive to each of the four Bolts (1-27) and tighten each incrementally in an alternating pattern. Final Torque will be 23 ± 3 in.-lbs. (27.0 ± 3.5 kg-cm).
- 7.9 Place Spring (1-7) over the Female Body (1-12).
- 7.10 Place the lubricated O-ring (1-4) into the groove in the Spring Retainer Ring (1-6) then place it over the top of Spring (1-7).
- 7.11 Connect the partially assembled female half to the previously assembled male half by retracting the Collar (1-20) and pushing the female assembly onto the male assembly then releasing the Collar (1-20).
- 7.12 Next compress the Spring (1-7) using test fixtures TF64227-1 and TF64227-3.
- WARNING: Assembled, the breakaway spring (1-7) is under 300 pounds of compression! Exercise care while compressing the spring. Failure to do so could result in serious personal injury.**
- 7.12.1 Install the TF64227-1 by placing the spring compression plate shoulder down on top of the Spring Retainer Ring (1-6). Align the holes of the plate with any three holes on the Connector (1-3). Then, using the hardware from TF64227-3, thread the three nuts, along with the three washers, onto the screw rods. Fully thread all three of the screw rods into the corresponding hole on the Connector (1-3) until firmly seated leaving an empty hole between each threaded Screw Rod.
- 7.12.2 Gradually tighten the nuts EVENLY, in a crisscross pattern, until the groove in the Female Body (1-12) for the Spring Retaining Ring (1-5) is fully visible from top to bottom and 360 degrees around. NOTE: Particular care must be given, during the compression process, while the Spring Retainer Ring (1-6) is clearing the inside diameter of the Connector (1-3).
- 7.12.3 When the Spring (1-7) is fully compressed, install TF64227-2 Assembly Sleeve shroud over the Female Body (1-12). Install the Retaining Ring

- (1-5) by catching bottom edge of ring with the blade of a screwdriver or hand to force the edge into the groove in the body. Use the flat edge of the screwdriver blade or fingers between the layers of the ring to "walk" the ring down the Assembly Sleeve shroud and into its groove.
- 7.12.4 Remove TF64227-2 Assembly Sleeve shroud.
- 7.12.5 Loosen the nuts holding the spring compression test fixture enough to where the shoulder on the plate is clear of the Connector (1-3). Unscrew the three screw rods and remove the plate.
- 7.13 Install third and last lightly lubricated O-ring (1-8) in uppermost O-ring groove of Female Body (1-12).
- 7.14 Install the Male Coupling (1-1) over the assembly flange to flange aligning the bolt hole pattern of each. Apply a light coating of petroleum jelly to the inside diameter of the Male Coupling (1-1) where the O-ring (1-8) will seat.
- 7.14.1 Install the six Bolts (1-2) incrementally, in a repeating star pattern before final torque is accomplished. The final torque of Bolts (2-2) should be 23 ± 3 in.-lbs. (27.0 ± 3.5 kg-cm).
- 7.15 Retract Collar (1-20) and separate the Female half from the Male half setting the Male half aside.
- 7.16 Install the lubricated O-ring (1-18) onto the Female Poppet Shaft (1-17) seating it in its groove.
- 7.16.1 Install the Male Poppet (1-19) over the end of the shaft to catch the O-ring (1-18).
- 7.16.2 Place one Washer (1-11) over the top of the shaft visible through the top of the Male Poppet (1-19).
- 7.16.3 Install one Locknut (1-10) on top of the Washer (1-11). Secure to hand tight only at this time.
- 7.17 Turn the Female assembly over so the Male Coupling (1-1) is resting on the work surface and insert the Sleeve Spring (1-15) into the housing of the Female Body (1-12).
- 7.17.1 Place the Sleeve Assembly (1-16) over the Sleeve Spring (1-15) with the beveled end toward the ceiling.
- 7.17.2 While compressing the sleeve and spring with one hand, place the assembled female poppet into the cavity, poppet side up. Continue to compress the Sleeve Spring (1-15) and the Sleeve Assembly (1-16) while holding the poppet assembly in place for the next step.
- 7.17.3 Turn the assembly over enough to install the second Washer (1-11) over the other end of the Female Poppet Shaft (1-17) and secure it with the second Locknut (1-10).
- 7.17.4 With the assembly resting on its side, simultaneously tighten both Locknuts (1-10). The final torque should be 142 ± 10 in.-lbs. (163.6 ± 11.5 kg-cm).
- 7.17.5 Slide Retaining Ring (1-28) into groove of Connector (1-3).
- Reassembly of the 64227 is complete and ready for testing. If immediate testing will not occur, cover the unit's inlet and outlet with a protective covering to prevent contamination.

8.0 Testing

- 8.1 Hydrostatic pressure test the coupling at 120 PSI for one minute using a test fluid in accordance with MIL-C-7024.

9.0 Illustrated Parts Catalog

Table 1.0
64227 3" Emergency Breakaway Coupling

Item No.	Part Number	Description	Qty/Unit	Spares/10 Units/Yr
1	221962	Coupling, Male EQD, 3"	1	-
2	GF16998-28L	Bolt	12	30
3	221964	Connector, EQD.	1	-
4	MS29513-241	O-ring	1	10
5	WS-287-S02	Ring, Retaining	1	-
6	221963	Ring, Spring Retainer	1	-
7	221997	Spring	1	-
8	MS29513-231	O-ring	3	30
9	221967	Spring, Collar	1	-
10	GF21044-C5	Locknut	2	10
11	5710-78-30	Washer, Flat	2	-
12	221968	Body, Female, EQD	1	-
13	GF19060-4818	Ball, Bearing	16	-
14	M-15120	Spring Energized Seal	1	10
15	221984	Spring, Sleeve	1	-
16	47621	Sleeve Assembly	1	-
17	221975	Shaft, Poppet, Female	1	-

Item No.	Part Number	Description	Qty/Unit	Spares/10 Units/Yr
18	201201-012	O-ring	1	10
19	221974	Poppet, Male	1	2
20	221969	Collar, EQD	1	-
21	MS29513-236	O-ring	1	10
22	47623	Adapter Assy	1	-
23	MS29513-242	O-ring	1	10
24	47726	Poppet Assy	1	2
25	72193S	Spring, Poppet	1	-
26	221971	Coupling, Female, EQD	1	-
27	92196A266	Bolt	4	12
28	WS-450-S02	Ring, Retaining	1	-

Table 2.0
64227 Test Fixtures

Test Fixture Number	Part Number	Description	Qty/Unit
TF64227-1	N/A	Assembly Tool (to compress spring)	1
TF64227-2	N/A	Assembly Sleeve.	1
TF64227-3	-	Assembly Tool Hardware (to compress spring)	1
	90575A433	Threaded Rod	3
	90480A195	Nut(s)	3
	91201A011	Washer(s)	3

Table 3.0
Torque Specifications 64227

Fig.	Item	Part Number	Description	Torque in.-lbs.
1	2	GF16998-28L	Bolt(s)	23 ± 3 in.-lbs. (27.0 ± 3.5 kg-cm)
1	29	92196A266	Bolt(s)	23 ± 3 in.-lbs. (27.0 ± 3.5 kg-cm)
1	10	GF21044-C5	Locknut(s)	142 ± 10 in.-lbs. (163.6 ± 11.5 kg-cm)
		KD64227-1	Kit – Contains all soft goods (seals) and other necessary parts to overhaul both male and female halves of a 64227. Contains items – 1-4, 1-8, 1-14, 1-18, 1-21 & 1-23.	
		KD64227-2	Kit – Contains the parts necessary to replace the sleeve assembly in the female half of the 64227. Contains item – 1-16.	
		KD64227-3	Kit – Contains the parts necessary to replace the poppet assembly in the male half of the 64227. Contains item – 1-24.	
		KD64227-4	Kit – Contains Test Fixture to compress the collar spring during overhaul of a 64227. Contains item – TF64227-1. See Note 1 below.	
		KD64227-5	Kit – Contains Test Fixture to protect a primary sealing surface of female half during overhaul of a 64227. Contains items – TF64227-2. See Note 1 below.	
		KD64227-6	Kit – Contains Test Fixture hardware for use with TF64227-1 to aid with spring compression during overhaul a 64227. Contains item – TF64227-3 (Refer to Table 2.0 for more specific contents). See Note 1 below.	

Note: 1.0 To rebuild the female half of the 64227 all test fixture assembly tool kits above are required (-4, -5, & -6).

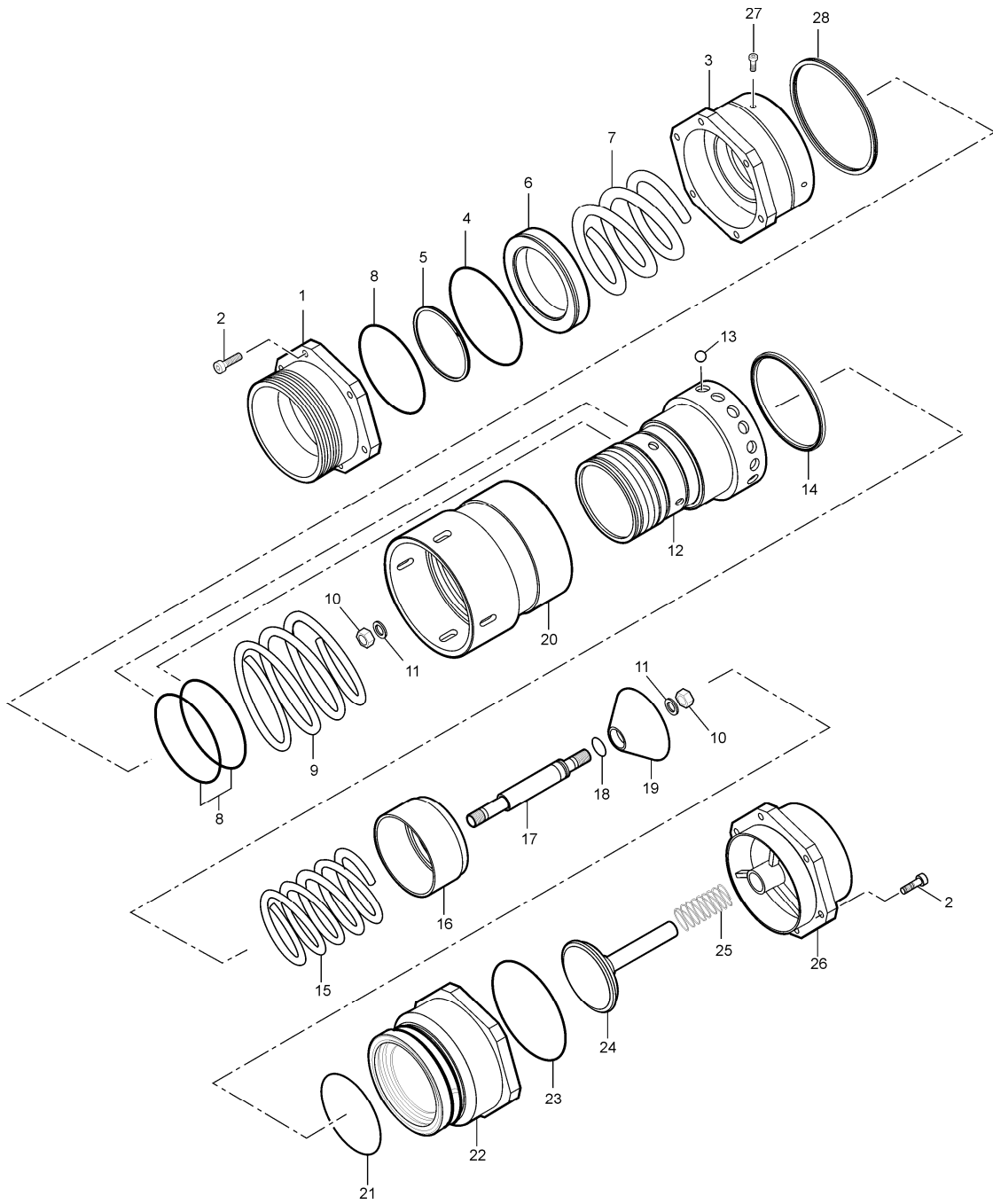


Figure 1
3" Emergency Quick Disconnect Coupling

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