

LORD[®] Axial Isolator

Use and Maintenance Manual Patent No.: US 10,480,260 B2



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LORD Axial Isolator Use and Maintenance Manual

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(refer to Table 9)

(refer to Table 16)

LORD[®] Axial Isolator

Use and Maintenance Manual

1.0 Introduction

The patented LORD J-28348-52 MWD Tool Axial Isolator is designed for service in air, foam, or mud drilling operations. Its use and maintenance requirements are summarized in this document.

2.0 Function

The LORD J-28348-52 MWD Tool Axial Isolator (herein referred to as the Isolator) is designed to protect the sensitive electronics in an MWD string by isolating these components from mid-range and high frequency vibrations. The isolator will also attenuate certain levels of shock inputs.

3.0 Assembly into MWD/LWD Tool String

3.1 Mechanical

The Isolator has been designed to be assembled and disassembled to MWD String with 1-7/8 inch (1.875 inch) diameter friction wrenches and/or friction vise.

3.2 Pressure Conduit

The Isolator is designed to be used as fluid conduit for use with a pulser.

3.3 Location in MWD String

The Isolator has been designed to support the MWD string and be located directly between the pulser driver and lower end.

4.0 Operating Parameters

4.1 Maximum Operating Conditions

The Isolator was designed for the operating conditions shown in Table 1.

Table 1: Maximum Operating Conditions

Temperature	350°F maximum
Pressure	N/A

The Isolator can withstand temperatures of 350°F and beyond; however, extended periods of exposure to this extreme condition should be avoided. Prolonged exposure to consistent elevated temperatures (>300°F) will accelerate the degradation of the elastomer package, reducing the elastomer's overall useful life. Elastomer Kits rated for high temperature use are available, please contact your LORD representative for details.

The Isolator has no pressure rating limitations as it is pressure compensated with the downhole environment.

4.2 Maximum Static Loads

The maximum loads for the Isolator are shown in Table 2. Note that the recommended assembly torque is 250 ft-lbs, well below the maximum torque.

Table 2: Maximum Static Loads

Maximum Torque	400 ft-lb
Axial Load (Fishing Load)	5,000 lb

4.3 Explosive Decompression

The Isolator was not designed to function following an explosive decompression event. If any such event should occur, the Isolator should be removed from use, completely broken down, assessed for damage, and any damaged components replaced.



Pulser Driver

LORD Axial Isolator

Lower End



5.0 Parts List

The Isolator consists of the items shown below, in Table 3. An Illustrated Parts List (IPL) is shown in Figure 3, Section 8.0.

Table 3: Parts List

Part Number	Quantity	Full Item Description
J-28348-52	Х	Axial Isolator
J-28460-39	1	Sealing Sub Assembly
97725A125		Crush Washer, Copper
Y-63700-140-1		Sealing Sub, Body
Y-63700-141-1		Sealing Sub, Nut
Y-63700-142-1		Sealing Sub, Ceramic Insert
Y-63700-90-1*	0	Sealing Sub
Y-63700-134-1	1	Pin Catch
Y-63700-103-1	1	Inner Member Shaft
Y-63700-104-1	1	Outer Housing
Y-63700-105-1	1	Tapered Drive Washer
Y-63700-106-1	1	Anti-Rotation Sub (Female)
Y-63700-106-2**	0	Anti-Rotation Sub (Female), QPQ
Y-63700-107-1	1	Anti-Rotation Inner Member (Male)
Y-63700-107-2**	0	Anti-Rotation Inner Member (Male), QPQ
J-28460-34	1	Elastomer Kit
J-28460-38***	0	Elastomer Kit, High Temperature
J-28460-35	1	Redress Kit
Y-63700-58-1		Threaded Seal Piston (TSP)
J-28460-36		T-Seal Kit (2 T-Seals)
J-28460-37		Dowel Pin Kit (6 Dowel Pins)
Y-63700-138-1		Guide Band (Peek)
J-28460-7	1	Thread Protector Set
2-127-V0709-90	2	-127 O-Ring, 1.424 ID, VITON, 90 Shore
2-125-V0709-90	1	-125 O-Ring, 1.299 ID, VITON, 90 Shore
	-	KOPR KOTE
	-	DOW Corning 111 Lubricant
	-	LOCTITE 243 -or- LOCTITE 262

* Y-63700-90-1 Sealing Sub is the Generation 3.3 configuration, in which the metal housing and ceramic insert are permanently assembled into a single piece which can be used in place of the J-28460-39 Assembly.

** Y-63700-106-1 Anti-Rotation Sub (Female) and Y-63700-107-1 Anti-Rotation Inner Member (Male) are available with an alternative hardening process, Quench-Polish-Quench (QPQ), designated by changing the final dash number to a -2.

*** Alternative to J-28460-34 Elastomer Kit.

6.0 Redress Kits

Certain components on the Isolator are intended to be replaced on a regular basis. These Items can be purchased as part of a basic redress kit, see Table 4. Additionally, major metals are available for purchase - refer to the Y-63700-XX Part Numbers listed in Table 3.

Kit Number	Kit Description	Qty	Component Part Number	Description
1 20460 24	Elastomer Kit	4	J-28348-53	Elastomer Stack, Compression
J-20400-34		2	J-28348-45	Elastomer Stack, Rebound
J-28460-35	Redress Kit	1	J-28460-36	T-Seal Kit
		1	Y-63700-58-1	Threaded Seal Piston
		1	J-28460-37	Pin Kit
		1	Y-63700-138-1	Guide Band, Peek
J-28460-36	T-Seal Kit	2	N031B085TP009	T-Seal – HNBR, Peek
J-28460-37	Pin Kit	6	LSTP9-18-10	Dowel Pins

Table 4: Basic Redress Kits

7.0 Recommended Service Kit Stock

Parker LORD recommends that certain service kit items be put in stock by the users of the Isolator to facilitate quick repair or replacement of wear items. This section will detail the recommended kits and quantities that should be kept on hand.

Quantities of each kit are given per number of Isolators in service (see Table 5). For example, for each Isolator in service, five (5) Redress Kits are recommended to be kept in stock. For some lower wear items, a single kit can support several Isolators.

Table 5: Suggested Stock

		Suggest	ed Stock
Part Number	Short Description	Quantity	per Axial Isolator(s)
J-28460-34**	Elastomer Kit	1	1
J-28460-35*	Redress Kit	5	1
J-28460-36	T-Seal Kit	5	1
Y-63700-103-1	Inner Member Shaft	1	2
Y-63700-106-1**	Anti-Rotation Sub	1	2
Y-63700-107-1**	Anti-Rotation Inner Member	1	2

* Customer's discretion to be used, alternatively stock 1 each of J-28460-36, J-28460-37, Y-63700-58-1, and Y-63700-138-1 in place of J-28460-35.

**Alternative versions could be stocked in place.





П

Joint G

Figure 5: J-28348-52 Axial Isolator Internal Joints

Table 6: Thread Lubricants & Locker/Sealant

Joint	Lubricant/Thread Locker/Thread Sealant		
А	KOPR KOTE		
В	KOPR KOTE		
С	KOPR KOTE		
D	LOCTITE 243 -or- LOCTITE 262		
Е	LOCTITE 243		
F	LOCTITE 243		
G	LOCTITE 243		

9.0 Field Checks and Maintenance

9.1 Service Intervals

Maintenance and replacement of key wear items is critical to maintaining performance of the Isolator. Recommended service intervals for the Isolator components are shown in Table 8.

Table 8: Service Intervals

Service Level	Frequency	Section	Page
Level I	Every run	11.1.1	14
Level II	Upon Elastomer Replacement based on OAL	11.1.2	14

Level I Service should be performed regularly and incorporated into a regular maintenance schedule.

*Level II Service should be performed as needed based on inspection criteria in Section 9.2.

Table 7: Installation Torque

Joint	Installation Torque		
А	350 ft-lb*		
В	350 ft-lb*		
С	350 ft-lb*		
D	Hand Tight		
Е	Hand Tight		
F	100 ft-lb		
G	100 ft-lb		

*Installation torque is intended to be typical installation torque used on entire MWD Tool. Install using established best practices.



Figure 6: J-28348-52 Shoulder-to-Shoulder Length

9.2 Overall Length (OAL) Inspection [Shoulder-to-Shoulder]

The nominal starting length of the Isolator is $35-1/4 \pm 1/16$ inches long when measured shoulder-to-shoulder as shown in Figure 6. Between runs, the length can be checked using the below method. When the OAL falls near or below the minimum, the Isolator requires a full elastomer replacement, Level II Service.

Table 9: OAL Shoulder-to-Shoulder

Nominal	35-1/4 inches
Minimum	34-1/4 inches

The anti-rotation feature should also be checked before the Isolator is run below the rotary table. To do so, attempt to manually rotate the Isolator. If the part rotates, tear down the Isolator and ensure pins are installed and are in working condition.

10.0 Service Tools

10.1 Standard Tools

The Isolator was designed to be assembled and disassembled using primarily standard tools.

Pipe wrenches shall NOT be used during assembly or disassembly of the Isolator. Additionally, torches or similar heat generating devices shall NOT be used in an attempt to loosen joints.

Table 10: Required Standard Tools

Size	Tool Description	Service Level
1-7/8 inch	Friction and Jaws	Level I
1-7/8 inch	Friction Wrench	Level I
7/8 inch	Friction Wrench	Level II
7/8 inch	Locking Pliers	Level II
1-1/2 inch	Open-End Wrench/ Adjustable Wrench	Level II

10.2 Special Tools

Specialized tools are used to assist in the assembly of the Isolator and are provided directly from LORD. These tools are shown in Table 11.

Table 11: Special Tools

Tool Number	Tool Description	Service Level
FAS-60530	T-Seal Funnel	Level I, Level II
FAS-61430	Torque Wrench Adapter	Special Cases

FAS-60530 is a funnel used to install the T-Seals.



Figure 8: FAS-60530 T-Seal Funnel

FAS-61430 is a torque wrench adapter used to install and/or remove the nut from the Sealing Sub Assembly, which is only required if the ceramic insert requires replacing.



Figure 9: FAS-61430 Torque Wrench Adapter



Figure 7: Standard Tools

11.0 Service Instructions

This section provides detailed instructions on assembling, disassembling, and servicing the Isolator. Included are photographs depicting these processes.

11.1 Service Levels

11.1.1 Level | Service

Level I Service includes:

- Replacing O-Rings on the Sealing Sub (-125 and -127 O-Rings)
- Axial Redress Kit [J-28460-35]
 - o Replacing the two (2) T-Seals [J-28460-36]
 - o Replacing the Threaded Seal Piston (TSP) [Y-63700-58-1]
 - o Replace the six (6) Dowel Pins [J-28460-37]
 - o Replacing Guide Band, PEEK [Y-63700-138-1]

Purchase Axial Redress Kit [J-28460-35] to perform Level I Service.

11.1.2 Level II Service

Level II Service includes:

- Replacing O-Rings on the Sealing Sub (-125 and -127 O-Rings)
- Axial Redress Kit [J-28460-35]
 - o Replacing the two (2) T-Seals [J-28460-36]
 - o Replacing the Threaded Seal Piston (TSP) [Y-63700-58-1]
 - o Replace the six (6) Dowel Pins [J-28460-37]
 - o Replacing Guide Band, PEEK [Y-63700-138-1]
- Axial Elastomer Kit [J-28460-34]
 - o Replace the Elastomer Package (four (4) compression stacks [J-28348-53] and two (2) rebound stacks [J-28348-45])
- Replace Items as required due to wear/wash

Purchase Axial Elastomer Kit [J-28460-34], and Axial Redress Kit [J-28460-35] to perform Level II Service.

11.2 Disassembly

1. Secure Housing in vise.



2. Remove Sealing Sub from Outer Housing [Joint A].



- 3. Loosen, but do not fully remove, Pin Catch [Joint C].
- Break Anti-Rotation Sub (ARS) from Outer Housing and remove [Joint B].



 Place Anti-Rotation Sub in a friction vise (or utilize a friction tong) and remove Threaded Seal Piston (TSP) using locking pliers [Joint D].



6. Remove (4) Elastomer Compression Stacks.



7. Utilize open end wrench to remove Tapered Drive Washer [Joint E].



8. Remove (2) Elastomer Rebound Stacks.



9. Utilize 7/8" friction tong to remove Inner Member Shaft from Anti-Rotation Sub [Joint F].



10. Remove Pin Catch and (6) Pins [Joint C].



11. Remove Guide Band from Pin Catch.



11.3 Assembly

1. Install Guide Band into Pin Catch.





2. Slide Pin Catch over Anti-Rotation Inner Member.



3. Apply grease to cavities.



4. Place (6) Pins in cavities.



5. Slide Anti-Rotation Sub over Anti-Rotation Inner Member.



- 6. Hand-tighten Pin Catch [Joint C].
- 7. Secure Anti-Rotation Sub in friction vise.
- 8. Apply LOCTITE 243 to Inner Member Shaft.



 Join Inner Member Shaft and Anti-Rotation Inner Member [Joint 4] through Anti-Rotation Sub. Kopr-Kote may be added to tip of Inner Member shaft to lubricate tapered shoulder for assembly.



 Use 7/8" friction wrench, securing IM Shaft to Anti-Rotation IM [Joint F].



11. [Optional] Joint F can be verified to be fully seated by disconnecting the Pin Catch from the Anti-Rotation Sub, exposing Joint F, and confirming undercut/thread relief on Inner Member Shaft is 50% exposed Inner Member Shaft.



12. Slide on (2) Rebound Stacks.



 Apply LOCTITE 243 to threads on center thread of Inner Member Shaft.



14. Install Tapered Drive Washer [Joint E].

Ensure the undercut/thread relief on Inner Member Shaft is 50% exposed.



15. Install (4) Compression Stacks.



16. Apply LOCTITE 243 or LOCTITE 262 to Threaded Seal Piston (TSP).



- 17. Hand tighten TSP to End of Inner Member Shaft [Joint D].
- 18. Use FAS-60530 (can be obtained from LORD) to install (2) T-Seals.



- 19. Secure Outer Housing in vise.
- 20. Insert Assembly into Outer Housing.



- 21. Torque Pin Catch to Anti-Rotation Sub [Joint C].
- 22. Torque Anti-Rotation Sub to Outer Housing [Joint B].
- 23. Apply Dow Corning 111 to TSP, thoroughly covering T-Seals.





24. Install Sealing Sub to Outer Housing Engaging T-Seals [Joint A].It is critical to apply ample thread lubricant per Table 6 to this joint to avoid galling as pre-compression is applied to the elastomer section.



25. Install O-Rings onto Sealing Sub and install Thread Protectors.

11.4 J-28460-39 Sealing Sub Assembly/Disassembly

If replacement of the ceramic insert due to damage, or the sealing sub body due to wash or wear is required LORD can disassemble and re-assemble the components if the customer purchases required components.

11.4.1 J-28460-39 Disassembly

Disassembly can be accomplished with the FAS-61430, friction vise, arbor press, 1" dowel rod, and torch. The torch is required to break down the LOCTITE 243 as well as to swell the body to aid in disassembly.









11.4.2 J-28460-39 Assembly

Assembly requires a friction vise, FAS-61430, LOCTITE 243, a fresh 97725A125 Crush Washer, and torque wrench with a $\frac{1}{2}$ " drive.

Apply LOCTITE 243 to OD of Ceramic Insert and insert it into the body. Insert the Crush Washer, apply LOCTITE 243 to the nut and install to a torgue of 100 ft-lbs.

12.0 Fin Kit for Axial Isolator

12.1 Overview

The LORD J-28348-52-FIN variation of the LORD Axial Isolator, is now available. The J-28348-52-FIN integrates bolt-on centralizing fins to the Axial Isolator for increased lateral support and tool centralization. A new tool can be purchased in the -FIN configuration, or an existing tool can be converted by replacing the standard J-28460-39 Sealing Sub Assembly with the J-28460-40 Sealing Sub Assembly and installing a J-28460-64-x Fin Kit. This document explains the process and kits needed to service the tools.

The fins are capable of withstanding temperatures up to 400°F. However, long periods of exposure to temperatures over 300°F will accelerate the degradation process.

12.2 Finned Sealing Sub Assembly Parts List



Figure 10. Sealing Sub Section View



Table 12: J-28460-40 Sealing Sub Assembly Parts List

	Part Number	Quantity	Item Description
Y-63700-153-1: Body	Y-63700-153-1	1	Sealing Sub Body
	Y-63700-142-1	1	Ceramic Insert
	9725A125	1	Crush Washer
	Y-63700-141-1	1	Nut
	0-142-1: Ceramic Insert 97725A125: Cru 0 Y-63700-	ish Washer 141-1: Nut	
Figure 12: J-28460-40 Sealing Sub Assembly	-		



12.4 Fin Kit Sizes and Installed Diameter

Table 14: Fin Kit Part Number, Fin Part Number and Installed Diameter

Fin Kit Part Number	Individual Fin Part Number	Installed Diameter "A"
J-28460-64-1	J-28735-1	3-1/4 inches
J-28460-64-2	J-28735-2	2-13/16 inches
J-28460-64-3	J-28735-3	2-11/16 inches
J-28460-64-4	J-28735-4	3-1/2 inches
J-28460-64-5	J-28735-5	4 inches



Figure 14: Installed Diameter "A"

12.5 Installation Torque Values



Figure 15. J-28348-52-FIN Axial Isolator External Joints

Table 15: Installation Torque and Thread Lubricants / Sealant

Thread Type	Lubricant	Installation Torque
Joint A	KOPR KOTE	350 ft-lb
Fin Socket Head Cap Screws	LOCTITE 243	6-8 ft-lb

12.6 Overall Length Inspection (OAL)

The J-28460-40 Sealing Sub Assembly is available for use with the Standard LORD Axial Isolator, J-28348-52. Utilization of the Finned Sealing Sub changes the overall length of the Axial Isolator, increasing the nominal length.

The nominal starting length of the isolator is $38 \frac{1}{2}$ inches when measured from shoulder-to-shoulder as shown in Figure 16.



Figure 16: J-28348-52 Shoulder-to-Shoulder Length with Finned Sealing Sub

Table 16: OAL Shoulder-to-Shoulder with Finned Sealing Sub

Nominal	38-1/2 inches
Minimum	37-1/2 inches

12.7 Fin Installation

The fins are designed to be installed on Sealing Sub Assembly J-28460-40. The Y-63700-153-1 Sealing Sub Body is designed so that it can replace Sealing Sub Body, Y-63700-140-1, on the standard isolator. The ceramic and nut can be converted over from J-28460-39 Sealing Sub Assembly. Section 11.4 is applicable to reclaim Y-63700-142-1 Ceramic Insert and/ or repair a J-28460-40 Sealing Sub Assembly.

1. Secure Outer Housing Y-63700-104-1 in a vise.



2. Remove Sealing Sub Assembly J-28460-39 from Outer Housing Y-63700-104-1.



3. Apply KOPR-KOTE to the threads and install the new Sealing Sub Assembly J-28460-40 into the Outer Housing Y-63700-104-1 without the fins attached.



4. Apply LOCTITE 243 to threaded fin holes on Sealing Sub Assembly J-28460-40.



5. Install Centralizer Fin J-28735-X to Sealing Sub Assembly J-28460-40 by using the 1/8 inch Hex Key and tighten the SHCS Screws, LSTS63-11-3, to 6-8 ft-lbs.

> Blunt edge of the fin is closest to the upstream thread protector with the tapered edge facing downstream.





Values stated in this document represent typical values as not all tests are run on each lot of material produced. For formalized product specifications for specific product end uses, contact the Customer Support Center

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