



MacDon

D65, D1 Series, D1X Series, D1XL Series, FD75, and FD1 Series Draper Headers and FlexDraper™ Headers

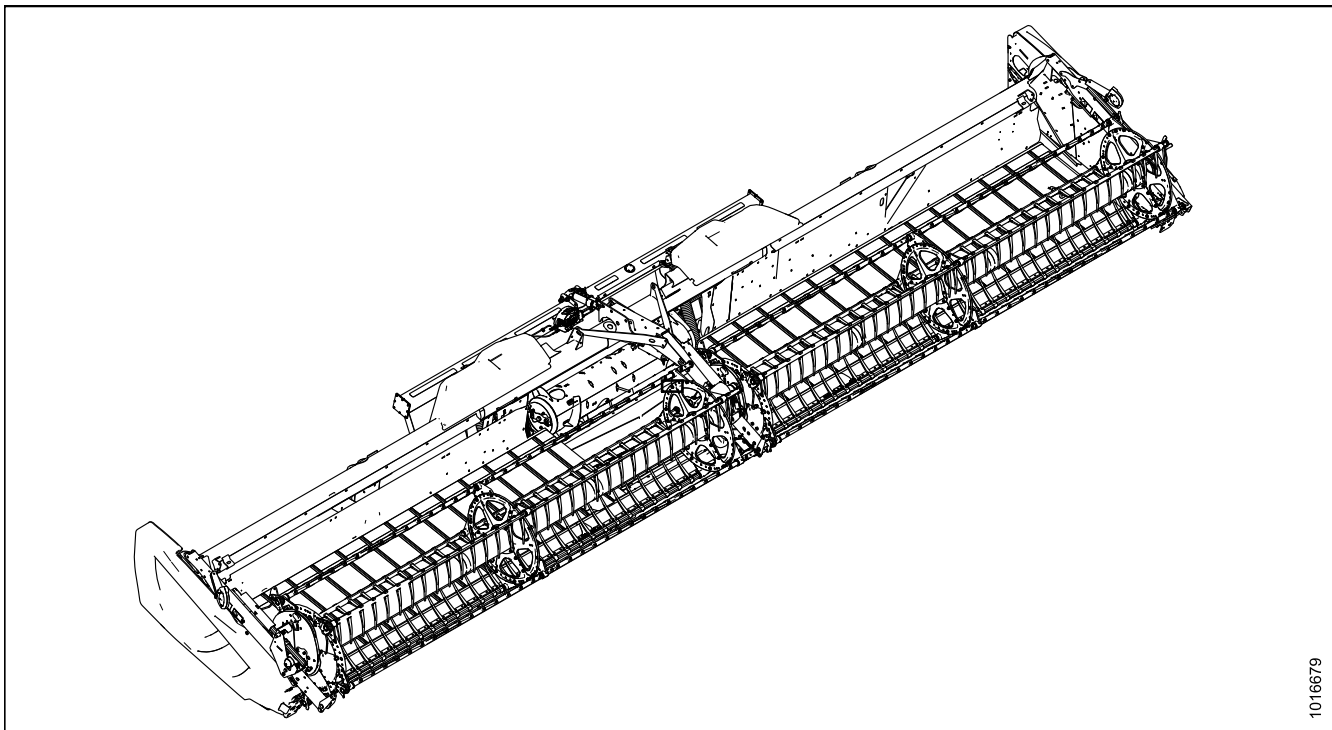
**Reel Cam Shim Kit (MD #294631)
Installation Instructions**

214579 Revision A
Original Instruction

Featuring MacDon FLEX-FLOAT Technology™

The harvesting specialists.

FD1 Series FlexDraper® Header and FM100 Float Module



1016679

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Introduction

The Reel Cam Shim kit (MD #294631) provides the parts needed to install alignment shims into the reel cam system to improve the clearance between the cam arms and the cam disc. This kit can be installed on the following MacDon header models:

- D65 Draper Headers
- D1 Series Draper Headers
- D1X Series Draper Headers
- D1XL Series Draper Headers
- FD75 FlexDraper® Headers
- FD1 Series FlexDraper® Headers

This document explains how to install the kit. A list of parts included in the kit is provided in Chapter *2 Parts List*, page 5.

Installation Time

Installation time for this kit is approximately 3 hours.

Conventions

The following conventions are used in this document:

- Right and left are determined from the operator's position. The front of the header is the side that faces the crop; the back of the header is the side that connects to the combine or windrower.
- Unless otherwise noted, use the standard torque values provided in the header operator's manual and technical manual.

NOTE:

Keep your MacDon publications up-to-date. The most current version of this instruction can be downloaded from our Dealer-only site (<https://portal.macdon.com>) (login required).

NOTE:

This document is currently available in English only.

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1 Safety

1.1 Signal Words

Three signal words, **DANGER**, **WARNING**, and **CAUTION**, are used to alert you to hazardous situations. Signal words are selected using the following guidelines:

DANGER

Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury. It may also be used to alert against unsafe practices.

CAUTION

Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may be used to alert against unsafe practices.

1.2 General Safety

CAUTION

The following are general farm safety precautions that should be part of your operating procedure for all types of machinery.

Protect yourself.

- When assembling, operating, and servicing machinery, wear all protective clothing and personal safety devices that could be necessary for job at hand. Do **NOT** take chances. You may need the following:
 - Hard hat
 - Protective footwear with slip resistant soles
 - Protective glasses or goggles
 - Heavy gloves
 - Wet weather gear
 - Respirator or filter mask
- Be aware that exposure to loud noises can cause hearing impairment or loss. Wear suitable hearing protection devices such as earmuffs or earplugs to help protect against loud noises.



Figure 1.1: Safety Equipment



Figure 1.2: Safety Equipment

- Provide a first aid kit for use in case of emergencies.
- Keep a fire extinguisher on the machine. Be sure fire extinguisher is properly maintained. Be familiar with its proper use.
- Keep young children away from machinery at all times.
- Be aware that accidents often happen when Operator is tired or in a hurry. Take time to consider safest way. Never ignore warning signs of fatigue.

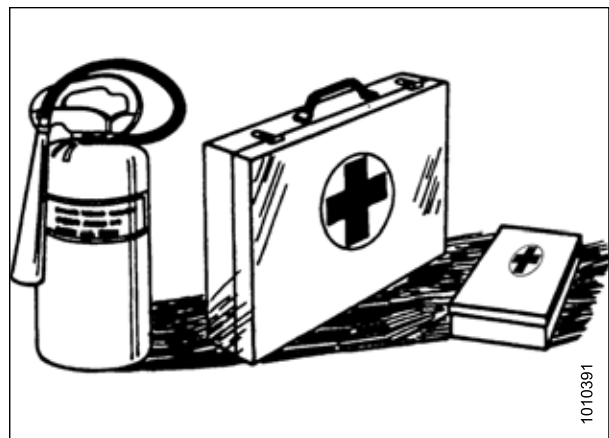


Figure 1.3: Safety Equipment

SAFETY

- Wear close-fitting clothing and cover long hair. Never wear dangling items such as scarves or bracelets.
- Keep all shields in place. **NEVER** alter or remove safety equipment. Make sure driveline guards can rotate independently of shaft and can telescope freely.
- Use only service and repair parts made or approved by equipment manufacturer. Substituted parts may not meet strength, design, or safety requirements.



Figure 1.4: Safety around Equipment

- Keep hands, feet, clothing, and hair away from moving parts. **NEVER** attempt to clear obstructions or objects from a machine while engine is running.
- Do **NOT** modify machine. Unauthorized modifications may impair machine function and/or safety. It may also shorten machine's life.
- To avoid bodily injury or death from unexpected startup of machine, **ALWAYS** stop the engine and remove the key from the ignition before leaving the operator's seat for any reason.

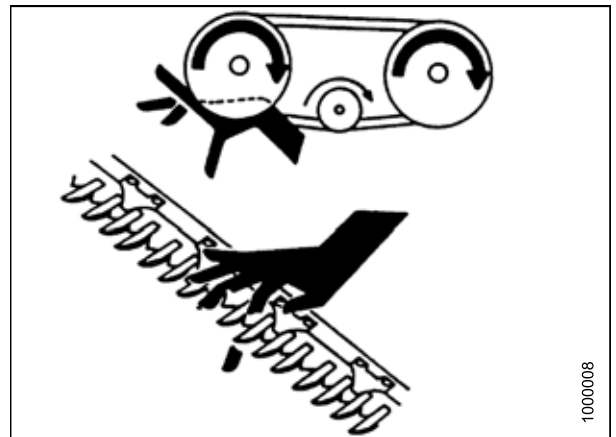


Figure 1.5: Safety around Equipment

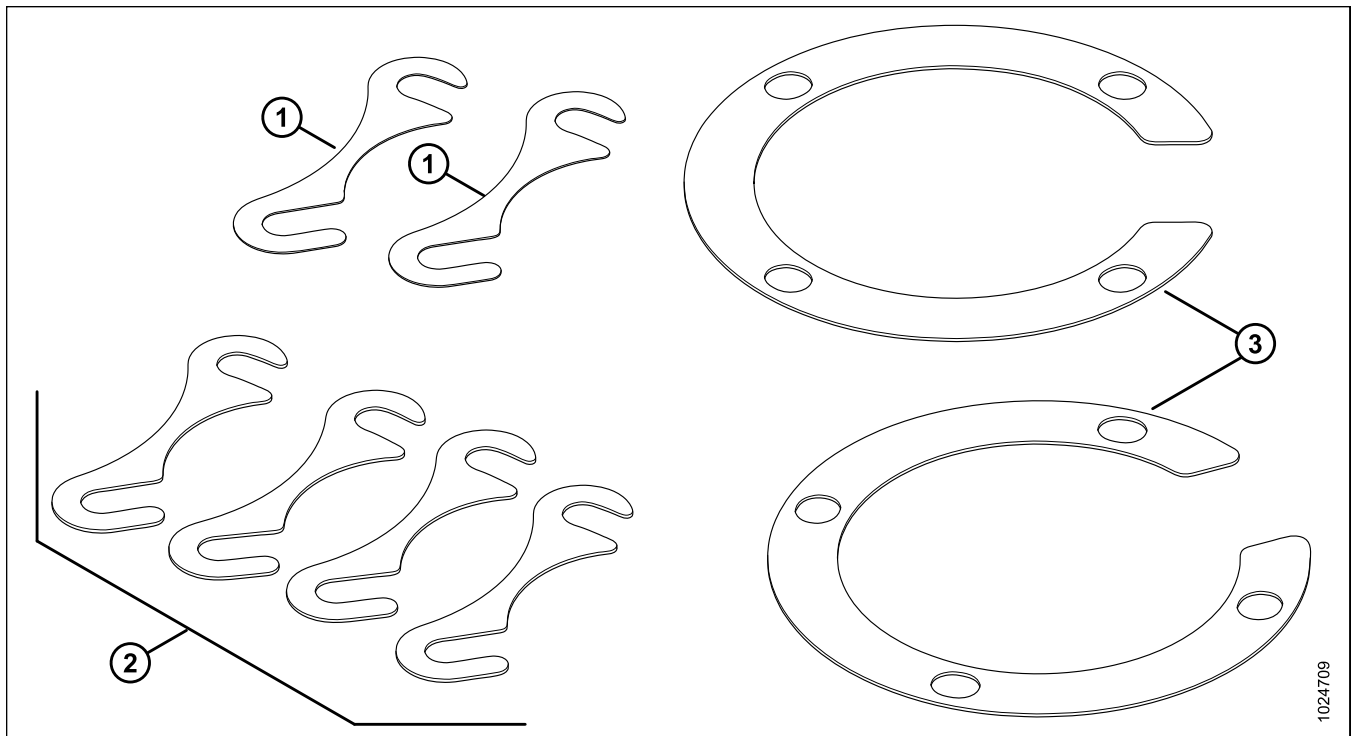
- Keep service area clean and dry. Wet or oily floors are slippery. Wet spots can be dangerous when working with electrical equipment. Be sure all electrical outlets and tools are properly grounded.
- Keep work area well lit.
- Keep machinery clean. Straw and chaff on a hot engine is a fire hazard. Do **NOT** allow oil or grease to accumulate on service platforms, ladders, or controls. Clean machines before storage.
- **NEVER** use gasoline, naphtha, or any volatile material for cleaning purposes. These materials may be toxic and/or flammable.
- When storing machinery, cover sharp or extending components to prevent injury from accidental contact.



Figure 1.6: Safety around Equipment

2 Parts List

The following parts are included in this kit.



Ref	Part Number	Description	Quantity
1	245199	SHIM – HUB TO CAM	2
2	164061	SHIM – HUB TO CAM	4
3	137753	SHIM RING – 4 BOLT FLANGE	2

3 Installation Instructions

To install the Reel Cam Shim kit (MD #294631), follow these procedures in order.

WARNING

To avoid bodily injury or death from unexpected startup of machine, always stop engine and remove key before making adjustments to machine.

3.1 Checking Cam Disc (Removed from Reel)

This procedure explains how to check if the cam disc is parallel to the hub mating face, and add shim(s) if required.

1. Measure the distance between hub mating face (A) and outer ring (B) on cam disc (D) at C1, C2, C3, and C4 (approximately 90° to each other) using the holes in the cam face as a guide. The measurement should be 57–64 mm (2-1/4–2-1/2 in.).
2. Write down each measurement. .
3. Subtract measurements C1 from C3. The difference between the two numbers determines how many shims are required. The side with the higher number determines the shim location. Refer to Table 3.1, page 7
4. Once completed, repeat Step 2, page 7 and subtract measurements C2 from C4 to see if any shim(s) are required.

NOTE:

There are two shims available—MD #245199 with thickness of 0.6 mm (0.02 in.), and MD #164061 with thickness of 1.2 mm (0.05 in.).

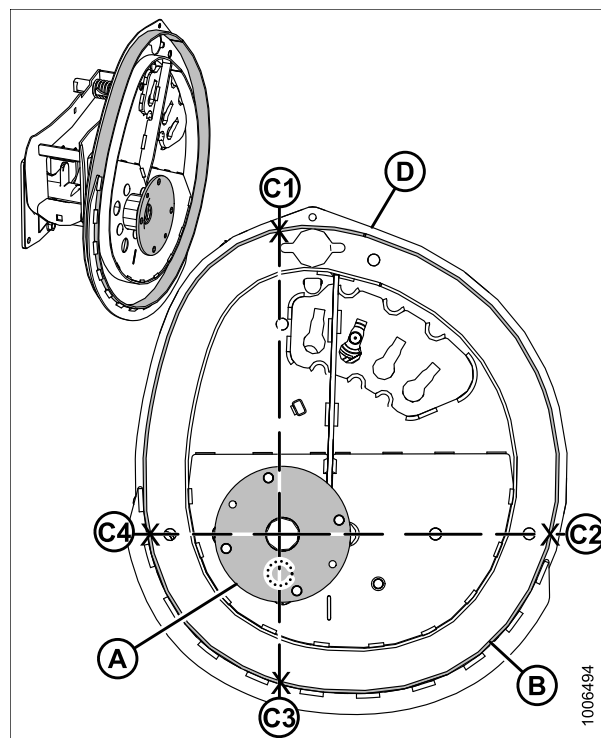


Figure 3.1: Cam Disc – Inspection Locations

Table 3.1 Shims Required

Shims	C1–C3	C2–C4
No shims	0–2 mm (0–0.08 in.)	0–2 mm (0–0.08 in.)
Shim MD #245199 (quantity: 1)	2–3 mm (0.08–0.12 in.)	2–3 mm (0.08–0.12 in.)
Shim MD #164061 (quantity: 1)	3–4 mm (0.12–0.16 in.)	3–4 mm (0.12–0.16 in.)
Shim MD #164061 (quantity: 2)	4–5 mm (0.16–0.20 in.)	4–5 mm (0.16–0.20 in.)

INSTALLATION INSTRUCTIONS

5. If shims are required, refer to [3.3 Installing Cam Disc Shim](#), page 12 for the installation procedure.

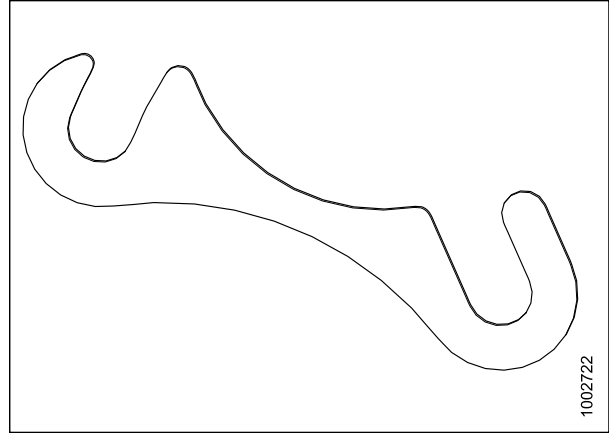


Figure 3.2: Shim

INSTALLATION INSTRUCTIONS

3.2 Checking Cam Disc (on Reel)

To prevent the cam arms from contacting the cam disc during operation, maintain sufficient clearance between the cam arms and cam disc. If contact is evident, align the cam disc and/or adjust the clearance between the cam arms and cam disc.

WARNING

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under machine for any reason.

1. Lower the header onto 150 mm (6 in.) wooden blocks or the equivalent.
2. Lower the reel fully and place in full forward position.
3. Shut down the engine and remove the key.
4. Choose one reel arm and mark it.
5. On the cam disc (A), locate and mark each inspection location (C1, C2, C3, C4).

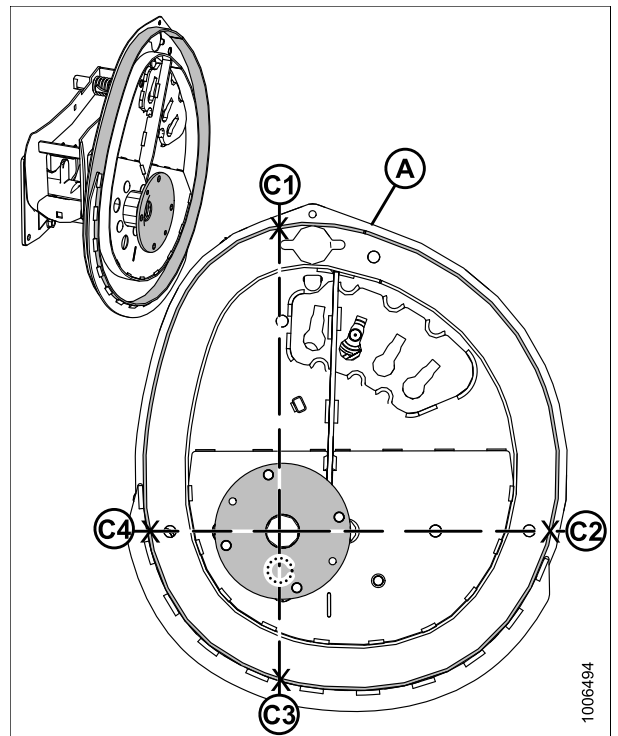


Figure 3.3: Cam Disc – Inspection Locations

INSTALLATION INSTRUCTIONS

6. Rotate the reel and measure clearance (C) between cam arm (B) and outer cam ring (A) at each inspection location.
7. Determine the cam tilt using the dimensions in Table 3.2, page 10.
8. Subtract measurements C1 from C3. The difference between the two numbers determines how many shims are required. The inspection point with the higher number determines the shim location. Refer to Table 3.2, page 10.
9. Once completed, repeat Step 8, page 10 and subtract measurements C2 from C4 to see if any shims are required.

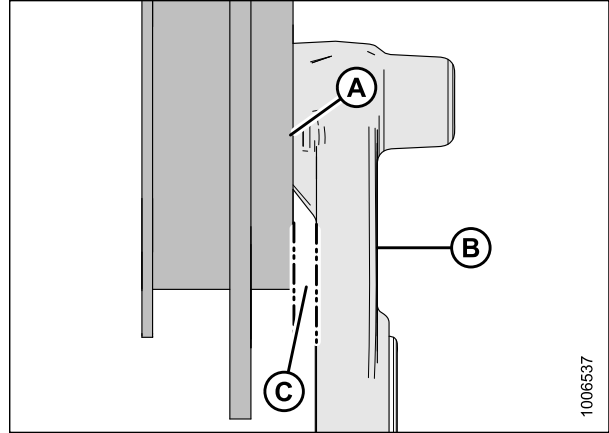


Figure 3.4: Cam Ring and Cam Arm

Table 3.2 Shims Required

Shims	C1–C3	C2–C4
No shims	0–2 mm (0–0.08 in.)	0–2 mm (0–0.08 in.)
Shim MD #245199 (quantity: 1)	2–3 mm (0.08–0.12 in.)	2–3 mm (0.08–0.12 in.)
Shim MD #164061 (quantity: 1)	3–4 mm (0.12–0.16 in.)	3–4 mm (0.12–0.16 in.)
Shim MD #164061 (quantity: 2)	4–5 mm (0.16–0.20 in.)	4–5 mm (0.16–0.20 in.)

10. If shims are required, refer to [3.3 Installing Cam Disc Shim, page 12](#) for the installation procedure.

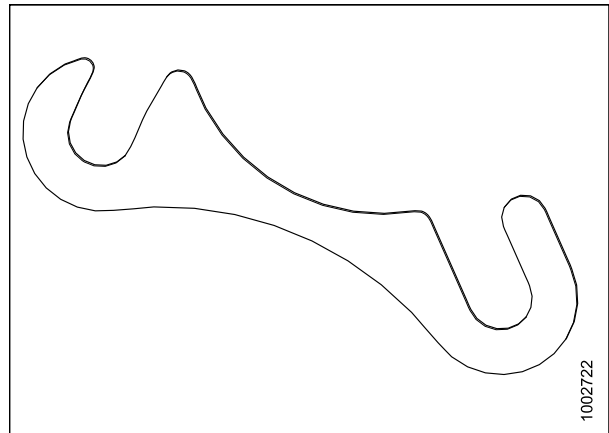


Figure 3.5: Shim

INSTALLATION INSTRUCTIONS

11. If no shims are required and there is excessive clearance; that is, clearance (C) > 9 mm (3/8 in.), refer to [3.5 Inspecting Roller Bearing and Adjusting Gap, page 23](#).

If no shims are required and there is still contact or insufficient clearance between the cam arm (B) and the cam disc ring (A), refer to [3.4 Installing C-Shims, page 14](#).

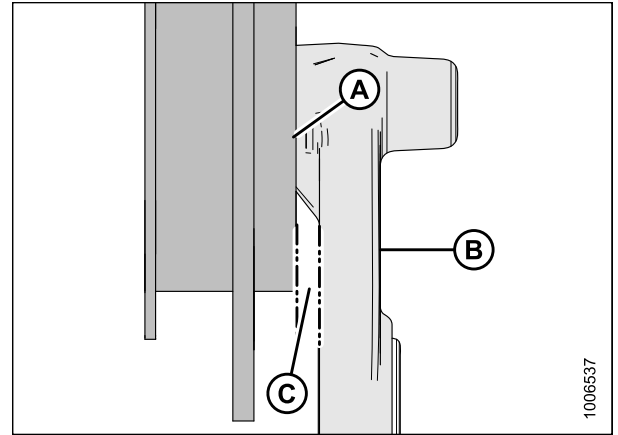


Figure 3.6: Cam Ring and Cam Arm

3.3 Installing Cam Disc Shim

⚠ WARNING

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under machine for any reason.

Before proceeding, check if cam disc requires shim(s). If reel is on header, refer to [3.2 Checking Cam Disc \(on Reel\), page 9](#).

If reel is off header and has been dismantled, refer to [3.1 Checking Cam Disc \(Removed from Reel\), page 7](#).

IMPORTANT:

For machines with the reel on the header, use an appropriate lifting device that can support approximately 454 kg (1000 lb.) to support the reel(s).

1. Loosen the four nuts that secure cam disc (D) to reel drive hub (A).
2. Using the measurements from [3.2 Checking Cam Disc \(on Reel\), page 9](#), follow Table 3.3, [page 12](#) and insert shim(s) at location(s) (1, 2, 3, and 4) between the reel drive hub and the cam disc according to the table.

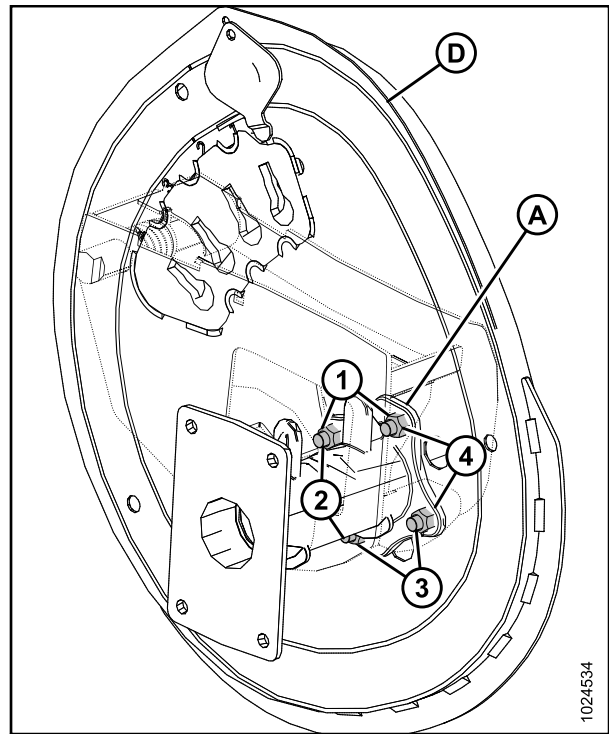


Figure 3.7: Shim Location

Table 3.3 Shims Required

Shims	C1–C3	C2–C4
No shims	0–2 mm (0–0.08 in.)	0–2 mm (0–0.08 in.)
Shim MD #245199 (quantity: 1)	2–3 mm (0.08–0.12 in.)	2–3 mm (0.08–0.12 in.)
Shim MD #164061 (quantity: 1)	3–4 mm (0.12–0.16 in.)	3–4 mm (0.12–0.16 in.)
Shim MD #164061 (quantity: 2)	4–5 mm (0.16–0.20 in.)	4–5 mm (0.16–0.20 in.)

INSTALLATION INSTRUCTIONS

Table 3.3 Shims Required (continued)

Shims	C1–C3	C2–C4
Shim location, refer to figure above.	If $C1 > C3$, insert at # 1	If $C2 > C4$, insert at # 2
	If $C1 < C3$, insert at # 3	If $C2 < C4$, insert at # 4

3. Tighten four nuts. Torque to 102 Nm (75 lbf-ft).

NOTE:

If reel is not assembled, complete the next two steps when assembling the cam disc on the reel tube.

4. Manually rotate the reel and recheck clearances between the cam arms and the outer cam ring.
5. If there is excessive clearance between the cam arm and the cam disc ring, refer to [3.5 Inspecting Roller Bearing and Adjusting Gap, page 23](#).
6. If shims are not required and there is still contact or insufficient clearance between the cam arm and the cam disc ring, refer to [3.4 Installing C-Shims, page 14](#).

INSTALLATION INSTRUCTIONS

3.4 Installing C-Shims

C-shims can help achieve the required gap between the cam edge and the linkage. The target gap is 5 mm (0.2 in.) (0.25 mm [0.01 in.] minimum), and should be approximately equal at all locations around the cam.

WARNING

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under machine for any reason.

1. Manually rotate reel and determine the minimum clearance (A) between the cam disc and the cam arm.
2. Determine the quantity of C-shims (MD #137753) needed to achieve the required gap.

Example: If the minimum clearance is less than 0.01 in. (0.25 mm), adding one shim (1 mm [0.04 in.]) will increase the clearance to at least 1 mm (0.04 in.). Adding two shims will increase the clearance to at least 2 mm (0.08 in.).

To install C-shim, refer to [3.4.2 Installing C-Shim on a Single-Reel Header, page 19](#) or [3.4.1 Installing C-Shim on a Double-Reel Header, page 14](#).

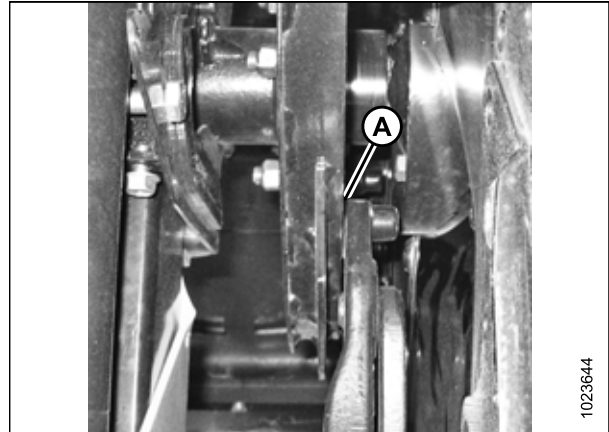


Figure 3.8: Reel Cam Assembly

3.4.1 Installing C-Shim on a Double-Reel Header

WARNING

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under machine for any reason.

Left Reel

IMPORTANT:

Use an appropriate lifting device that can support approximately 454 kg (1000 lb.).

1. Rotate reel to line up bolts attaching cam hub to reel tube with access holes (A) in cam disc at center arm location. This allows access to the bolts with a socket and extension.

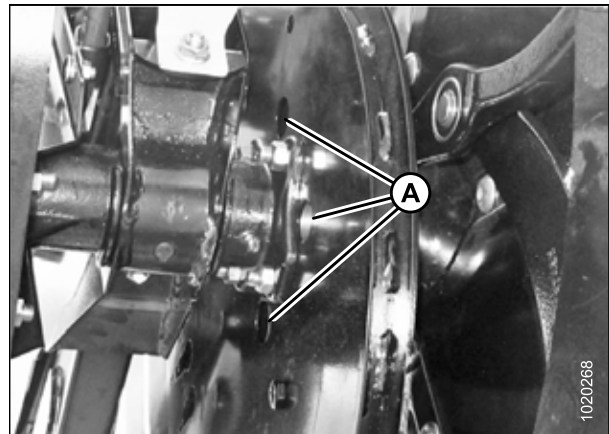


Figure 3.9: Cam at Center Arm

INSTALLATION INSTRUCTIONS

- Loosen bolt (A) on each brace (B) at center arm (C) so that right reel can move away from left reel.

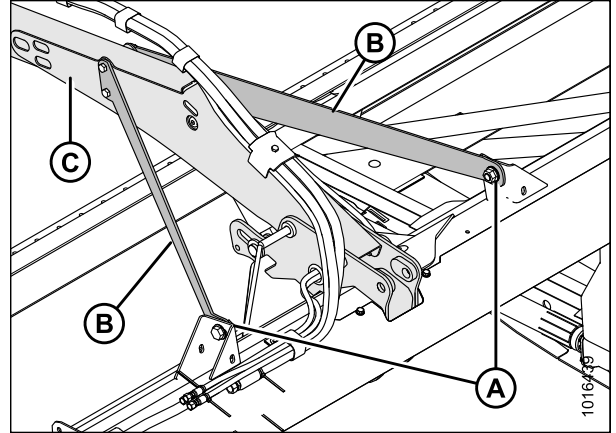


Figure 3.10: Reel Center Support Arm

CAUTION

Reel may shift as last bolt is removed. Keep hands and fingers clear of work area.

- Remove four 1/2 in. bolts and washers (A) attaching cam hub to reel tube using access hole in cam disc. Rotate reel as required. Reposition lifting device if necessary to allow reel to rotate.
- Install two 1/2 in. bolts into jacking holes in cam hub and turn them to move cam hub away from reel tube.
- Continue to move reel outboard until shaft flange is exposed.

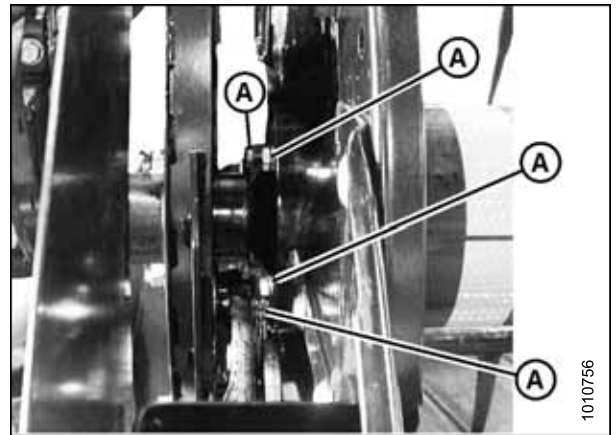


Figure 3.11: Cam Hub and Reel Tube

- Place a sling (A) around right reel tube at approximately the center disc and attach to a forklift or equivalent, or place forks under reel tube and secure tube to forklift with a chain.

IMPORTANT:

A cradle is required to support round tube. Do **NOT** use a flat support as this will dent the tube and result in tube failure.

- Raise forks slightly to take weight off reel.

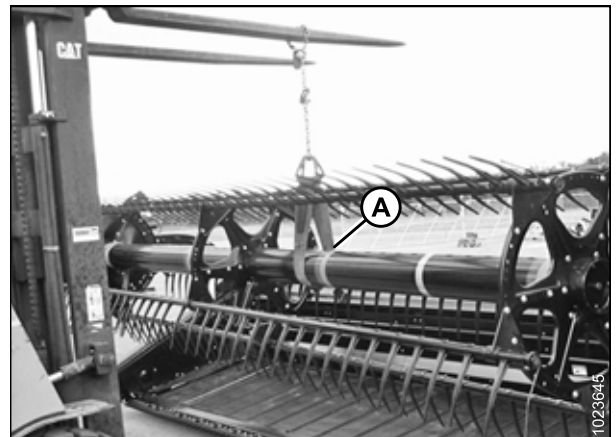


Figure 3.12: Sling around Reel Tube

INSTALLATION INSTRUCTIONS

CAUTION

Ensure reel is supported when shaft and reel are moved apart. Do NOT pull reel completely off shaft.

8. Remove bolts from jacking holes.
9. Apply medium-strength threadlocker (Loctite® 243 or equivalent) to the four 1/2 in. bolts and install with lock washers through hub.
10. Install C-shims (A) as determined in .

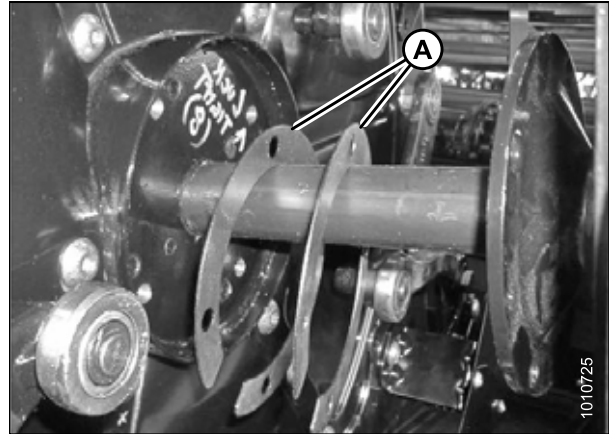


Figure 3.13: C-Shims

11. Align bolts with holes in reel tube and slide reel onto shaft while engaging tine bar rollers into cam disc.
12. Install bolts (A) into reel tube, ensuring shims are in place.
13. Torque bolts to 108 Nm (80 lbf·ft).
14. Remove sling/lifting forks from reel tube.
15. Manually rotate reel and check for interference with moving parts.

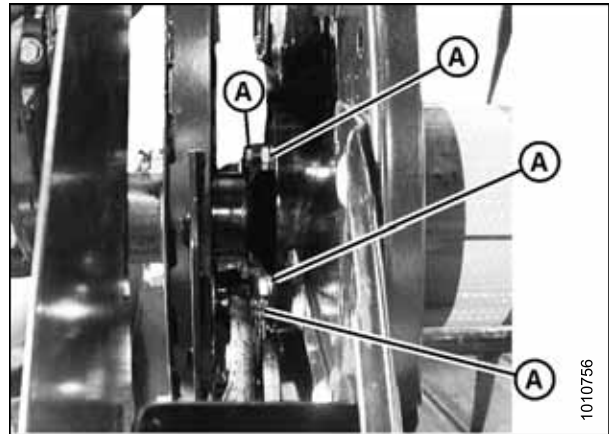


Figure 3.14: Cam Hub and Reel Tube

INSTALLATION INSTRUCTIONS

- Center the reel and tighten bolts (A) at header back tube braces (B). Torque to 359 Nm (265 lbf-ft).

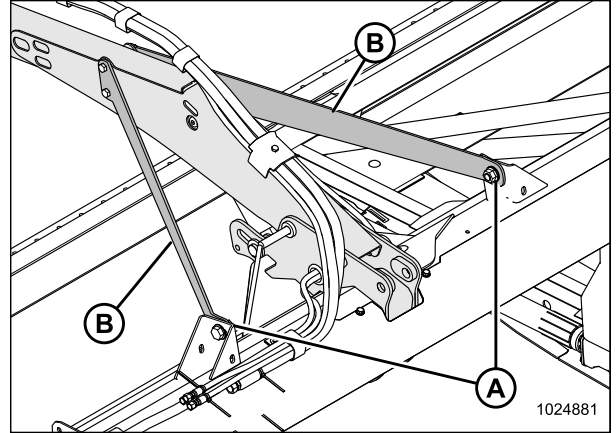


Figure 3.15: Reel Center Support Arm

Right Reel

- Place a sling (A) around right reel tube at approximately the center disc and attach to a forklift or equivalent, or place forks under reel tube and secure tube to forklift with a chain.

IMPORTANT:

A cradle is required to support round tube. Do **NOT** use a flat support as this will dent the tube and result in tube failure.

- Raise forks slightly to take weight off reel.
- Loosen bolt (A) on each brace (B) at back tube brackets so that left reel can move away from right reel.

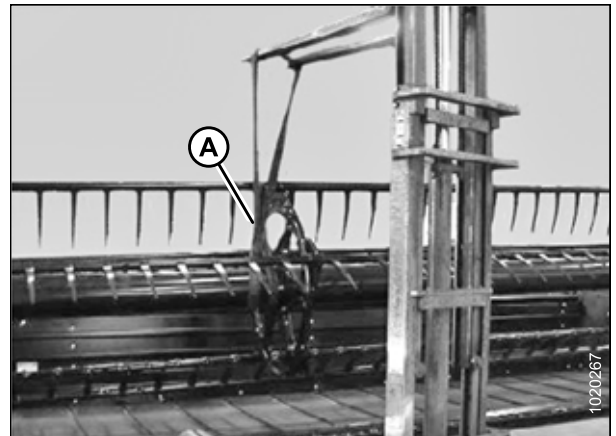


Figure 3.16: Sling around Reel Tube

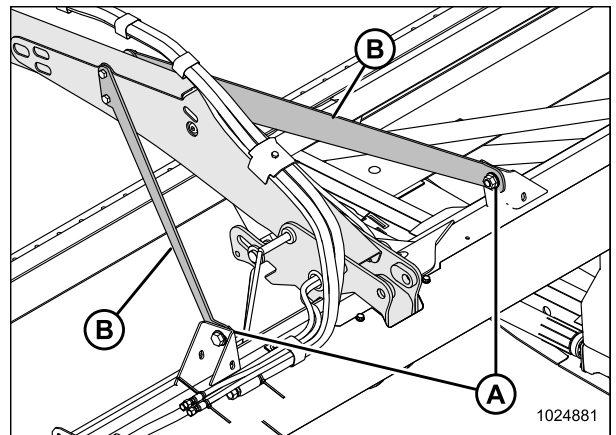


Figure 3.17: Reel Center Support Arm

INSTALLATION INSTRUCTIONS

- At cam end, rotate reel to line up bolts attaching cam hub to reel tube with access holes (A) in cam disc. This allows access to the bolts with a socket and extension.

CAUTION

Reel may shift as last bolt is removed. Keep hands and fingers clear of work area.

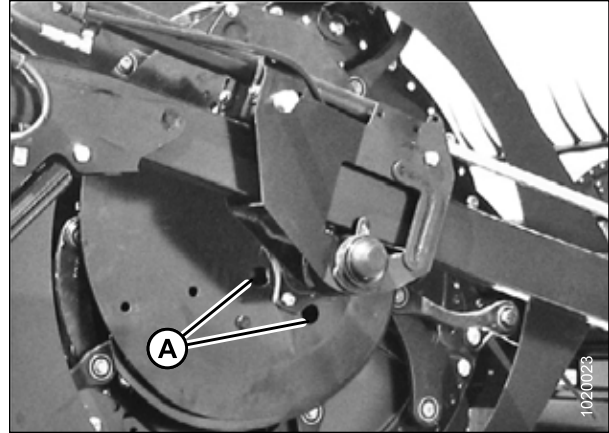


Figure 3.18: Reel Arm and Cam Disc

- Remove four 1/2 in. bolts and washers (A) attaching cam hub to reel tube using access hole in cam disc. Rotate reel as required. Reposition lifting device if necessary to allow reel to rotate.
- Install two 1/2 in. bolts into jacking holes in cam hub and turn them to move cam hub away from reel tube.
- Continue to move reel outboard until shaft flange is exposed.

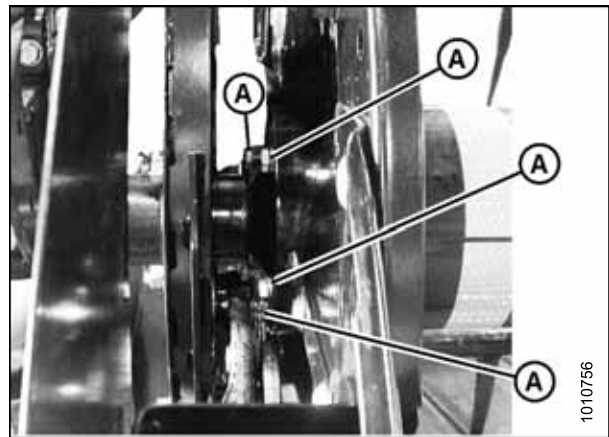


Figure 3.19: Cam Hub and Reel Tube

CAUTION

Ensure reel is supported when shaft and reel are moved apart. Do NOT pull reel completely off shaft.

- Remove bolts from jacking holes.
- Install C-shims (A) as determined in .
- Apply medium-strength threadlocker (Loctite® 243 or equivalent) to the four 1/2 in. bolts and install with lock washers through hub.

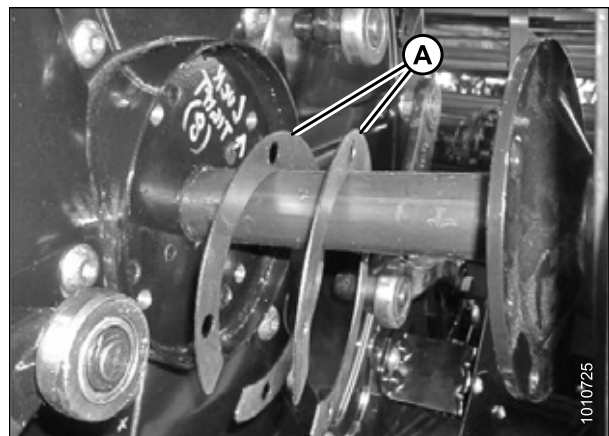


Figure 3.20: C-Shims

INSTALLATION INSTRUCTIONS

11. Align bolts with holes in reel tube and slide reel onto shaft while engaging tine bar rollers into cam disc.
12. Install bolts (A) into reel tube, ensuring shims are in place.
13. Torque bolts to 108 Nm (80 lbf·ft).
14. Remove sling/lifting forks from reel tube.
15. Manually rotate reel and check for interference with moving parts.

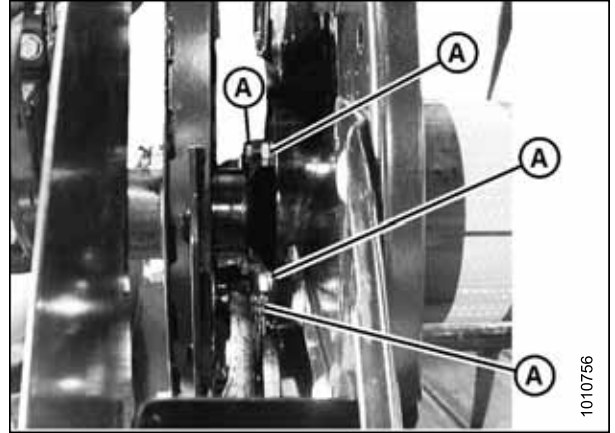


Figure 3.21: Cam Hub and Reel Tube

16. Center the reel and tighten bolts (A) at header back tube braces (B). Torque to 359 Nm (265 lbf·ft).

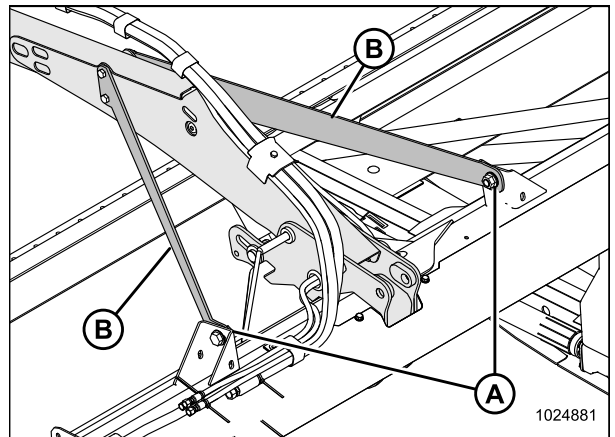


Figure 3.22: Reel Center Support Arm

3.4.2 Installing C-Shim on a Single-Reel Header

WARNING

To avoid bodily injury or death from unexpected start-up or fall of raised machine, always stop engine, remove key, and engage safety props before going under machine for any reason.

IMPORTANT:

Use an appropriate lifting device that can support approximately 454 kg (1000 lb.).

INSTALLATION INSTRUCTIONS

1. Remove nut, washers, spacer, and bolt (A) in left reel arm brace so that reel arm and reel are free to move.

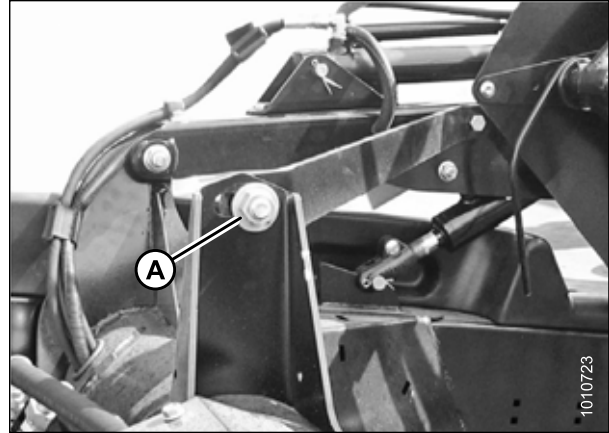


Figure 3.23: Reel Brace

2. At cam end, rotate reel to line up bolts attaching cam hub to reel tube with access holes (A) in cam disc. This allows access to the bolts with a socket and extension.

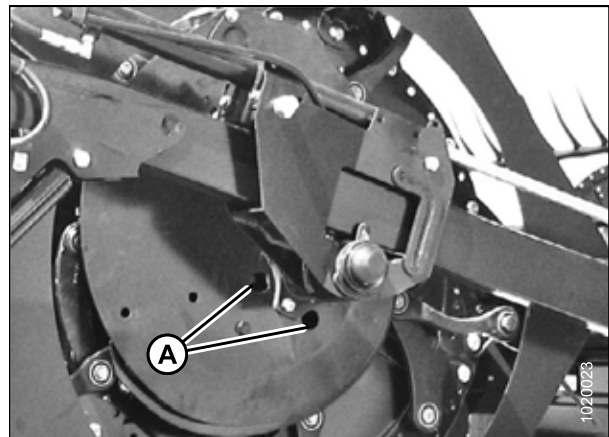


Figure 3.24: Reel Arm and Cam Disc

3. Place forks under reel tube at approximately the center disc (A) and secure tube to forklift with a chain or place a sling (B) around reel tube and attach to a forklift or equivalent.

IMPORTANT:

A cradle is required to support round tube. Do **NOT** use a flat support as this will dent the tube and result in tube failure.

4. Raise forks slightly to take weight off reel.

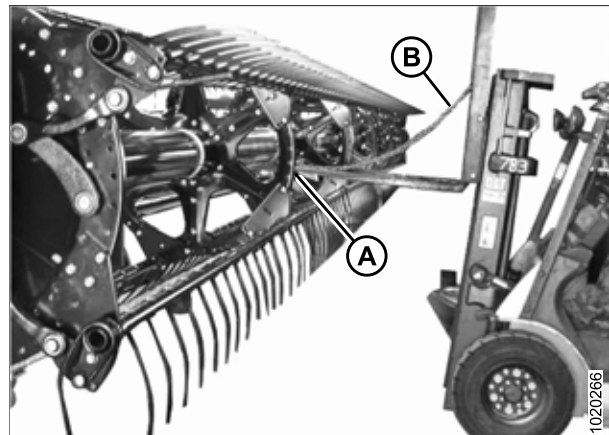


Figure 3.25: Forklift and Reel

INSTALLATION INSTRUCTIONS

CAUTION

Reel may shift as last bolt is removed. Keep hands and fingers clear of work area.

5. Remove four 1/2 in. bolts and washers (A) attaching cam hub to reel tube using access hole in cam disc. Rotate reel as required. Reposition lifting device if necessary to allow reel to rotate.
6. Install two 1/2 in. bolts into jacking holes in cam hub and turn them to move cam hub away from reel tube.
7. Continue to move reel outboard until shaft flange is exposed.

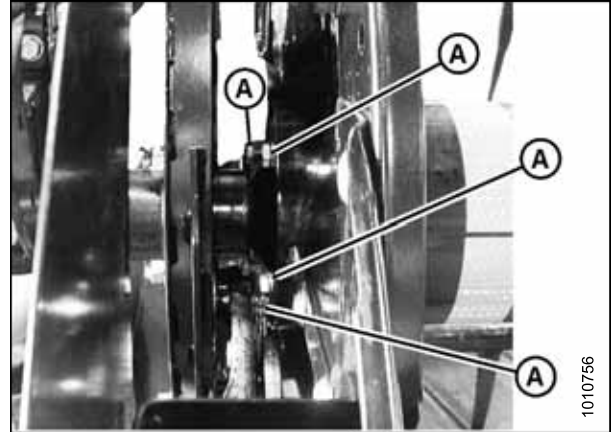


Figure 3.26: Cam Hub and Reel Tube

CAUTION

Ensure reel is supported when shaft and reel are moved apart. Do NOT pull reel completely off shaft.

8. Remove bolts from jacking holes.
9. Install C-shims (A) as determined in [3.4 Installing C-Shims, page 14](#).
10. Apply medium-strength threadlocker (Loctite® 243 or equivalent) to the four 1/2 in. bolts and install with lock washers through hub.

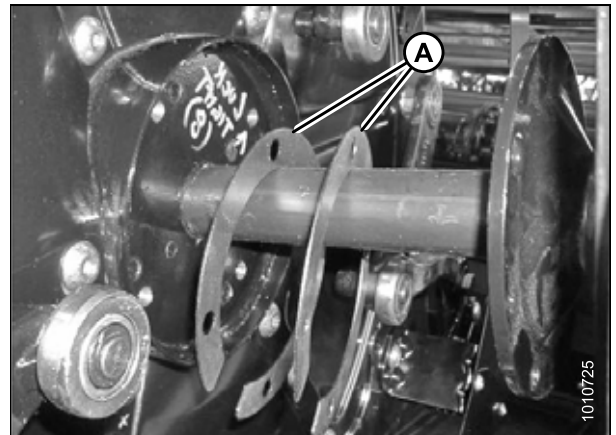


Figure 3.27: C-Shims

INSTALLATION INSTRUCTIONS

11. Align bolts with holes in reel tube and slide reel onto shaft while engaging tine bar rollers into cam disc.
12. Install bolts (A) into reel tube, ensuring shims are in place.
13. Torque bolts to 108 Nm (80 lbf·ft).
14. Remove sling/lifting forks from reel tube.
15. Manually rotate reel and check for interference with moving parts.

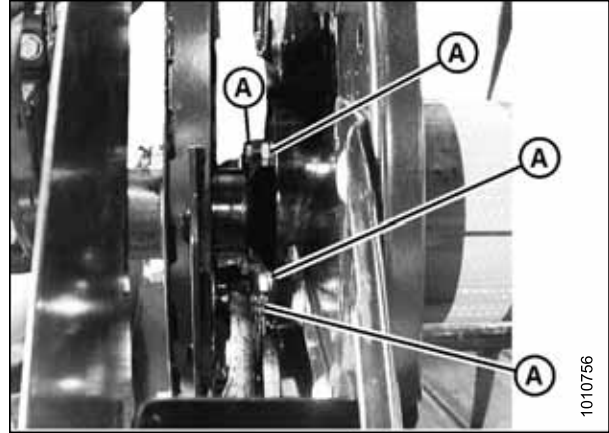


Figure 3.28: Cam Hub and Reel Tube

16. Reattach reel arm brace to frame with 3/4 in. hex head bolt, spacer, washers, and nut (A). Torque to 366 Nm (282 lbf·ft).

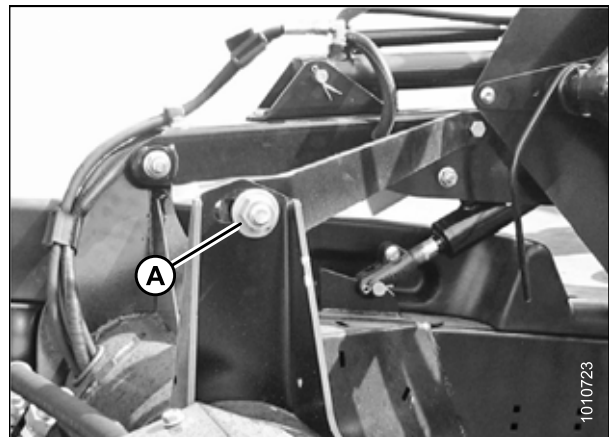


Figure 3.29: Reel Brace

3.5 Inspecting Roller Bearing and Adjusting Gap

NOTE:

Use an appropriate lifting device that can support approximately 454 kg (1000 lb.) to support the reel(s).

1. Using the reel arm and inspection locations found in [3.2 Checking Cam Disc \(on Reel\)](#), [page 9](#), rotate the reel and measure gap (C) between the inside edge of the cam arm roller bearing (A) and the outer edge of cam disc ring (B) at each inspection point.
2. Inspect the cam arm roller bearing. If it is 2 mm (0.08 in.) or closer to the edge of the cam disc, install shim (MD #164061) at two locations.

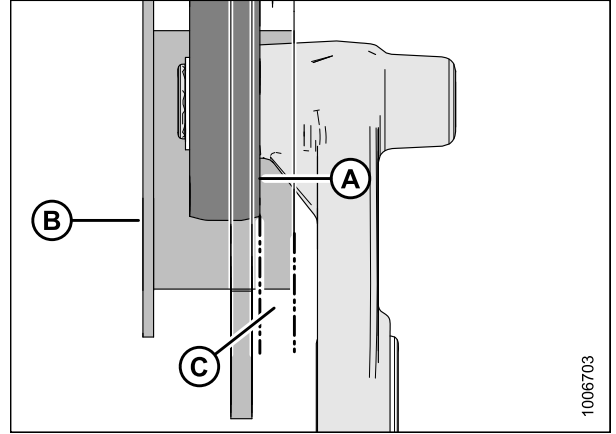


Figure 3.30: Cam Arm Roller Bearing

3. Install the shims (A) between reel drive hub and cam disc at locations (B) and (C). These shims will push the cam into the cam arms.
4. Retighten nuts and manually rotate the reel to check that the rollers are sitting inside the cam disc 2 mm (0.08 in.) or more.
5. Torque nuts to 102 Nm (75 lbf·ft).
6. Manually rotate reel and recheck clearances between cam arm bearings and outer cam disc ring.

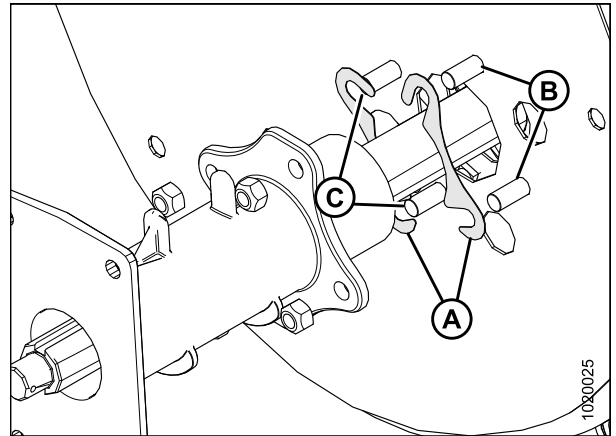


Figure 3.31: Shims on Reel Drive Hub and Cam Disc

3.6 Run-Up Check

 **CAUTION**

Check to be sure all bystanders have cleared the area.

 **CAUTION**

Keep all shields in place. Never alter or remove safety equipment. Make sure driveline guards can rotate independently of the shaft and can telescope freely.

 **CAUTION**

Before investigating an unusual sound or attempting to correct a problem, shut off engine, engage parking brake, and remove key.

 **CAUTION**

Do not start the machine until work area is clear of tools, slings, chains, etc.

1. Confirm that the header and reel are fully assembled and that the area is clear of tools, etc.
2. Start engine and run header slowly for 5 minutes.
3. Shut down engine and check cam ends of reel for evidence of cam arms rubbing on cam or other interfering parts.
4. Readjust as required.

MacDon Industries Ltd.

680 Moray Street
Winnipeg, Manitoba
Canada R3J 3S3
t. (204) 885-5590
f. (204) 832-7749

MacDon, Inc.

10708 N. Pomona Avenue
Kansas City, Missouri
United States 64153-1924
t. (816) 891-7313
f. (816) 891-7323

MacDon Australia Pty. Ltd.

A.C.N. 079 393 721
P.O. Box 243, Suite 3, 143 Main Street
Greensborough, Victoria, Australia 3088
t. 03 9432 9982
f. 03 9432 9972

MacDon Brasil Agribusiness Ltda.

Rua Grã Nicco, 113, sala 202, B. 02
Mossunguê, Curitiba, Paraná
CEP 81200-200 Brasil
t. +55 (41) 2101-1713
f. +55 (41) 2101-1699

LLC MacDon Russia Ltd.

123317 Moscow, Russia
10 Presnenskaya nab, Block C
Floor 5, Office No. 534, Regus Business Centre
t. +7 495 775 6971
f. +7 495 967 7600

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