

**845B VHP  
865B VHP  
885B VHP  
865B AWD  
885B AWD  
Motor Graders**

**Service Manual**

**Part Number**  
**48050419D**  
4<sup>th</sup> Edition  
English 10/2017

**CASE**  
CONSTRUCTION



## **SERVICE MANUAL**

**845B Direct drive transmission, Tier 3, made in Brazil [HBZN0845VBAF00184 - ], 845B Torque converter transmission, Tier 3, made in Brazil [HBZN0845VCAF01093 - ], 865B Direct drive transmission, Tier 3, made in Brazil [NBAF15000 - ], 865B Torque converter transmission, Tier 3, made in Brazil [NBAF14004 - ], 865B AWD Direct drive transmission, All wheel drive (AWD), Tier 3, made in Brazil [HBZN0865TBAF00840 - ], 885B Direct drive transmission, Tier 3, made in Brazil [HBZN0885LBAF00098 - ], 885B Torque converter transmission, Tier 3, made in Brazil [HBZN0885PCAF00871 - ], 885B AWD Direct drive transmission, All wheel drive (AWD), Tier 3, made in Brazil [HBZN0885TBAF00558 - ]**

## Link Product / Engine

<b>Product</b>	<b>Market Product</b>	<b>Engine</b>
845B Transmissão de acionamento direto, Tier 3, produzido no Brasil [HBZN0845VBAF00184 - ]	Australia New Zealand	F4HE9687W*J101
845B Transmissão de acionamento direto, Tier 3, produzido no Brasil [HBZN0845VBAF00184 - ]	Latin America	F4HE9687W*J101
845B Transmissão de acionamento direto, Tier 3, produzido no Brasil [HBZN0845VBAF00184 - ]	Asia Pacific	F4HE9687W*J101
845B Transmissão de acionamento direto, Tier 3, produzido no Brasil [HBZN0845VBAF00184 - ]	Middle East Africa	F4HE9687W*J101
845B Transmissão de acionamento direto, Tier 3, produzido no Brasil [HBZN0845VBAF00184 - ]	North America	F4HE9687W*J101
845B Transmissão do conversor de torque, Tier 3, produzido no Brasil [HBZN0845VCAF01093 - ]	Australia New Zealand	F4HE9687W*J101
845B Transmissão do conversor de torque, Tier 3, produzido no Brasil [HBZN0845VCAF01093 - ]	North America	F4HE9687W*J101
845B Transmissão do conversor de torque, Tier 3, produzido no Brasil [HBZN0845VCAF01093 - ]	Latin America	F4HE9687W*J101
845B Transmissão do conversor de torque, Tier 3, produzido no Brasil [HBZN0845VCAF01093 - ]	Asia Pacific	F4HE9687W*J101
845B Transmissão do conversor de torque, Tier 3, produzido no Brasil [HBZN0845VCAF01093 - ]	Middle East Africa	F4HE9687W*J101
865B Transmissão de acionamento direto, Tier 3, produzido no Brasil [NBAF15000 - ]	Latin America	F4HE9687C*J100
865B Transmissão de acionamento direto, Tier 3, produzido no Brasil [NBAF15000 - ]	Australia New Zealand	F4HE9687C*J100
865B Transmissão de acionamento direto, Tier 3, produzido no Brasil [NBAF15000 - ]	Asia Pacific	F4HE9687C*J100
865B Transmissão de acionamento direto, Tier 3, produzido no Brasil [NBAF15000 - ]	Middle East Africa	F4HE9687C*J100
865B Transmissão de acionamento direto, Tier 3, produzido no Brasil [NBAF15000 - ]	North America	F4HE9687C*J100
865B Transmissão do conversor de torque, Tier 3, produzido no Brasil [NBAF14004 - ]	Asia Pacific	F4HE9687C*J100

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<b>Product</b>	<b>Market Product</b>	<b>Engine</b>
865B Transmissão do conversor de torque, Tier 3, produzido no Brasil [NBAF14004 - ]	North America	F4HE9687C*J100
865B Transmissão do conversor de torque, Tier 3, produzido no Brasil [NBAF14004 - ]	Australia New Zealand	F4HE9687C*J100
865B Transmissão do conversor de torque, Tier 3, produzido no Brasil [NBAF14004 - ]	Middle East Africa	F4HE9687C*J100
865B Transmissão do conversor de torque, Tier 3, produzido no Brasil [NBAF14004 - ]	Latin America	F4HE9687C*J100
865B AWD Transmissão de acionamento direto, tração em todas as rodas (AWD), Tier 3, produzido no Brasil [HBZN0865TBAF00840 - ]	North America	F4HE9687C*J100
885B Transmissão de acionamento direto, Tier 3, produzido no Brasil [HBZN0885LBAF00098 - ]	Middle East Africa	F4HE9684L*J100
885B Transmissão de acionamento direto, Tier 3, produzido no Brasil [HBZN0885LBAF00098 - ]	Latin America	F4HE9684L*J100
885B Transmissão de acionamento direto, Tier 3, produzido no Brasil [HBZN0885LBAF00098 - ]	North America	F4HE9684L*J100
885B Transmissão de acionamento direto, Tier 3, produzido no Brasil [HBZN0885LBAF00098 - ]	Asia Pacific	F4HE9684L*J100
885B Transmissão de acionamento direto, Tier 3, produzido no Brasil [HBZN0885LBAF00098 - ]	Australia New Zealand	F4HE9684L*J100
885B Transmissão do conversor de torque, Tier 3, produzido no Brasil [HBZN0885PCAF00871 - ]	Australia New Zealand	F4HE9687K*J105
885B Transmissão do conversor de torque, Tier 3, produzido no Brasil [HBZN0885PCAF00871 - ]	Middle East Africa	F4HE9687K*J105
885B Transmissão do conversor de torque, Tier 3, produzido no Brasil [HBZN0885PCAF00871 - ]	Latin America	F4HE9687K*J105
885B Transmissão do conversor de torque, Tier 3, produzido no Brasil [HBZN0885PCAF00871 - ]	North America	F4HE9687K*J105
885B Transmissão do conversor de torque, Tier 3, produzido no Brasil [HBZN0885PCAF00871 - ]	Asia Pacific	F4HE9687K*J105
885B AWD Transmissão de acionamento direto, tração em todas as rodas (AWD), Tier 3, produzido no Brasil [HBZN0885TBAF00558 - ]	North America	F4HE9684L*J100

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## **INTRODUCTION**

## Safety rules - Batteries

845B	
865B	
885B	

### **⚠ WARNING**

Improper operation or service of this machine can result in an accident.  
 Before working on any component(s) of the electrical circuit, put the starter switch key in the off (shut down) position. When disconnecting batteries, always disconnect the negative (-) cable first. When reconnecting batteries, always connect the negative (-) cable last.  
 Failure to comply could result in death or serious injury.

W0264A

### **⚠ WARNING**

Electrical shock hazard!  
 Before working on any part of the electrical system, disconnect the battery ground cable. Complete all electrical work before connecting the cable.  
 Failure to comply could result in death or serious injury.

W0129A

### **⚠ WARNING**

Battery gas can explode!  
 To prevent an explosion: 1. Always disconnect the negative (-) battery cable first. 2. Always connect the negative (-) battery cable last. 3. Do not short circuit the battery posts with metal objects. 4. Do not weld, grind, or smoke near a battery.  
 Failure to comply could result in death or serious injury.

W0011A

### **⚠ WARNING**

Explosion hazard!  
 When jump-starting the machine, connect and disconnect the jumper cables exactly as indicated in this manual. DO NOT connect the jumper cables to the machine battery terminals. Make sure no persons are near the connecting points before starting the engine. Start the engine from the operator's seat.  
 Failure to comply could result in death or serious injury.

W0342A

### **⚠ WARNING**

Explosive gas!  
 Batteries emit explosive hydrogen gas and other fumes while charging. Ventilate the charging area. Keep the battery away from sparks, open flames, and other ignition sources. Never charge a frozen battery.  
 Failure to comply could result in death or serious injury.

W0005A

### **⚠ WARNING**

Hazardous chemicals!  
 Battery electrolyte contains sulfuric acid. Contact with skin and eyes could result in severe irritation and burns. Always wear splash-proof goggles and protective clothing (gloves and aprons). Wash hands after handling.  
 Failure to comply could result in death or serious injury.

W0006A

**⚠ WARNING**

**Battery gas can explode!**

To prevent an explosion: 1. Always disconnect the negative (-) battery cable first. 2. Always connect the negative (-) battery cable last. 3. Do not short circuit the battery posts with metal objects. 4. Do not weld, grind, or smoke near a battery.

Failure to comply could result in death or serious injury.

W0011A

**⚠ WARNING**

**Explosion hazard!**

If battery electrolyte is frozen, attempting to charge the battery or jump-start the engine can cause the battery to explode. Always keep batteries at full charge to prevent frozen battery electrolyte. Never charge a frozen battery.

Failure to comply could result in death or serious injury.

W0203A

**⚠ WARNING**

**Improper operation or service of this machine can result in an accident.**

An error connecting auxiliary starting cables or short-circuiting battery terminals can cause an accident. Connect auxiliary starting cables as instructed in this manual.

Failure to comply could result in death or serious injury.

W0263A

**⚠ WARNING**

**Explosion hazard!**

Batteries emit explosive gases. Always ventilate when using in an enclosed area or when charging. Keep the battery away from sparks, open flames, and other ignition sources.

Failure to comply could result in death or serious injury.

W0369A

**⚠ WARNING**

**Eye injury hazard!**

Wear eye protection when jump-starting the machine and when charging the battery.

Failure to comply could result in death or serious injury.

W0382A

**⚠ WARNING**

**Chemical hazard!**

Battery acid can cause severe burns. Some batteries have a ventilation tube. If there is battery acid in the tube, this acid can be released when the battery is turned upside down. If you turn the battery upside down, point the ventilation tube away from you and any other people in the area.

Failure to comply could result in death or serious injury.

W1084A

## Variable displacement pump - Safety rules

845B	ANZ --- APAC --- LA --- MEA --- NA
865B AWD Direct drive transmission, All wheel drive (AWD), Tier 3, made in Brazil [HBZN0865TBAF00840 - ]	NA
865B	ANZ --- APAC --- LA --- MEA --- NA
885B AWD Direct drive transmission, All wheel drive (AWD), Tier 3, made in Brazil [HBZN0885TBAF00558 - ]	NA
885B	ANZ --- APAC --- LA --- MEA --- NA

### Personal safety



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible death or injury.

Throughout this manual and on machine safety signs, you will find the signal words DANGER, WARNING, and CAUTION followed by special instructions. These precautions are intended for the personal safety of you and those working with you.

Read and understand all the safety messages in this manual before you operate or service the machine.

**!** DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury. The color associated with DANGER is RED.

**!** WARNING indicates a hazardous situation that, if not avoided, could result in death or serious injury. The color associated with WARNING is ORANGE.

**!** CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. The color associated with CAUTION is YELLOW.

## FAILURE TO FOLLOW DANGER, WARNING, AND CAUTION MESSAGES COULD RESULT IN DEATH OR SERIOUS INJURY.

### Machine safety

**NOTICE:** Notice indicates a situation that, if not avoided, could result in machine damage or property damage. The color associated with Notice is BLUE.

Throughout this manual you will find the signal word Notice followed by special instructions to prevent machine damage or property damage. The word Notice is used to address practices not related to personal safety.

### Information

**NOTE:** Note indicates additional information that clarifies steps, procedures, or other information in this manual.

Throughout this manual you will find the word Note followed by additional information about a step, procedure, or other information in the manual. The word Note is not intended to address personal safety or property damage.



## **SERVICE MANUAL**

### **Transmission**

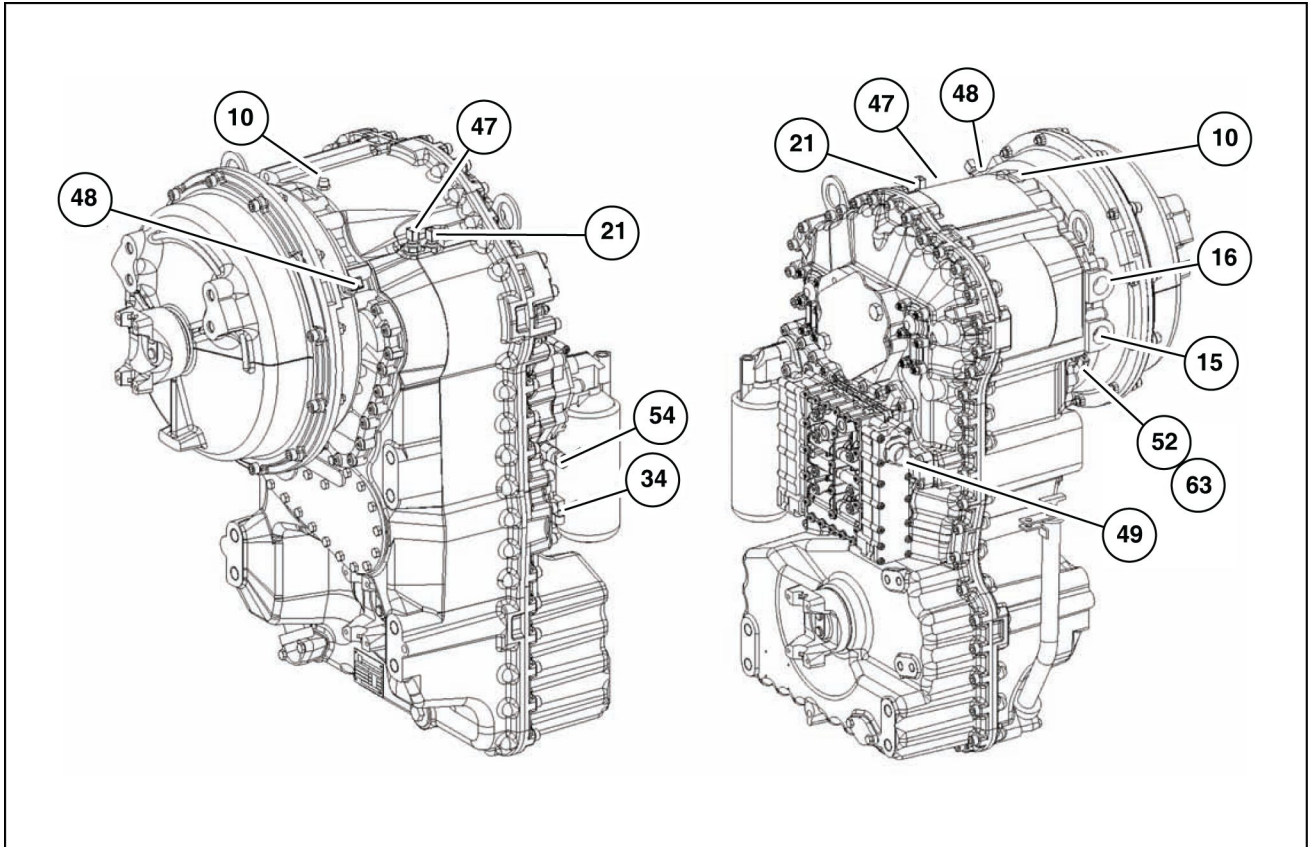
**845B Direct drive transmission, Tier 3, made in Brazil [HBZN0845VBAF00184 - ], 845B Torque converter transmission, Tier 3, made in Brazil [HBZN0845VCAF01093 - ], 865B Direct drive transmission, Tier 3, made in Brazil [NBAF15000 - ], 865B Torque converter transmission, Tier 3, made in Brazil [NBAF14004 - ], 865B AWD Direct drive transmission, All wheel drive (AWD), Tier 3, made in Brazil [HBZN0865TBAF00840 - ], 885B Direct drive transmission, Tier 3, made in Brazil [HBZN0885LBAF00098 - ], 885B Torque converter transmission, Tier 3, made in Brazil [HBZN0885PCAF00871 - ], 885B AWD Direct drive transmission, All wheel drive (AWD), Tier 3, made in Brazil [HBZN0885TBAF00558 - ]**

## Powershift transmission - Pressure test

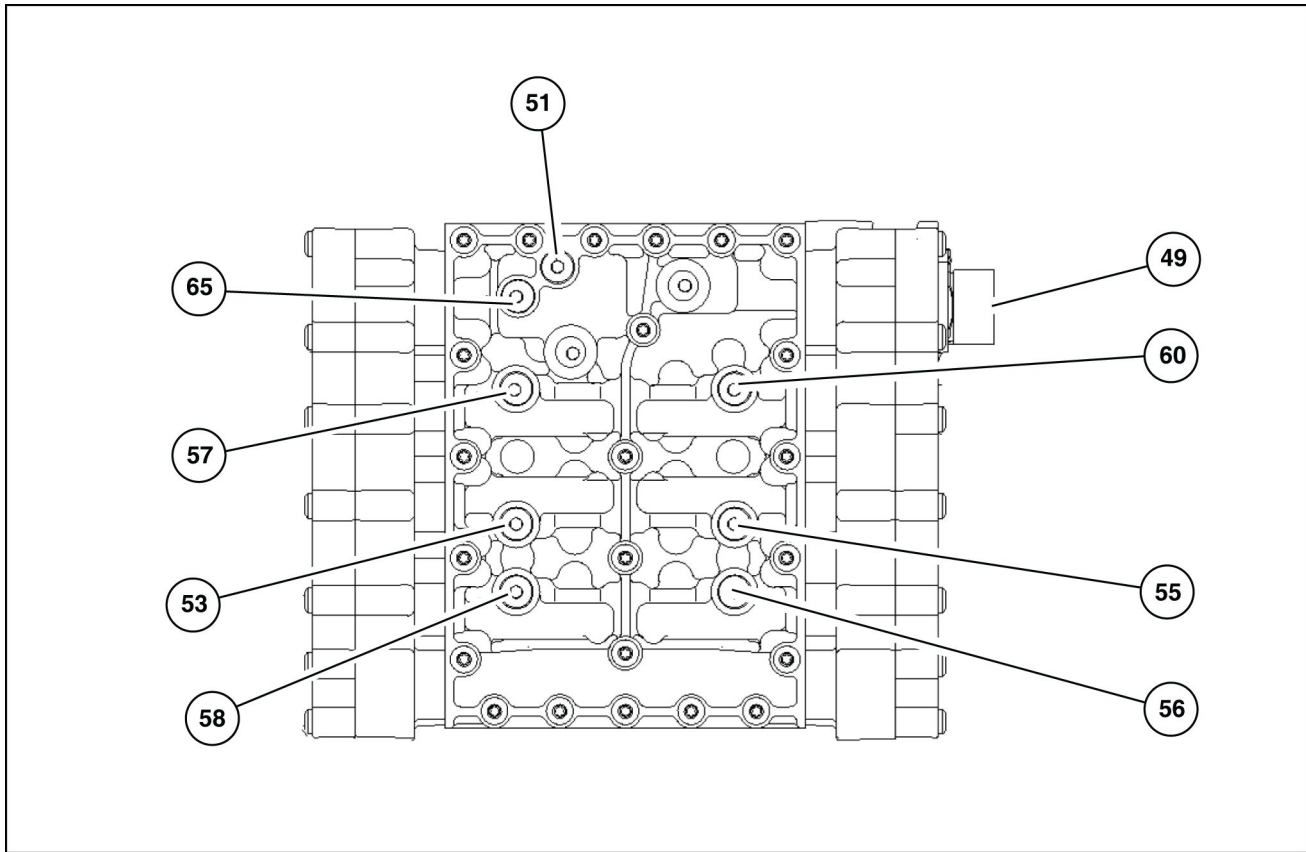
845B Torque converter transmission, Tier 3, made in Brazil [HBZN0845VCAF01093 - ]	(6 x 3 torque converter) OR (Tier 1) OR (Tier 3-VHP)
865B Torque converter transmission, Tier 3, made in Brazil [NBAF14004 - ]	(6 x 3 torque converter) OR (Tier 2) OR (Tier 3-VHP) OR (Tier 0)

### Measuring points

**NOTE:** Carry out measurements when the transmission has reached operating temperature (approx. 80 – 90 °C) can be varied.



LAIL11MG1492F0A 1



LAIL11MG1493F0A 2

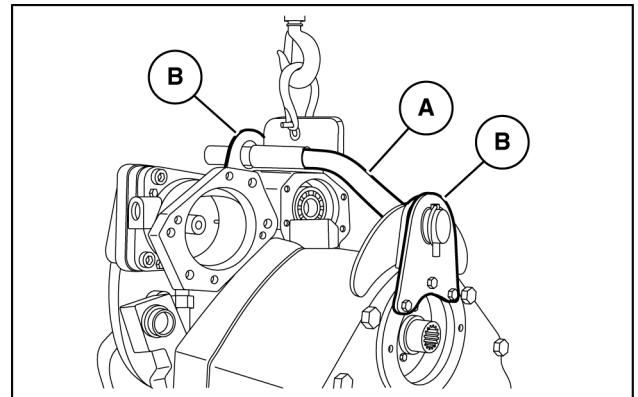
No.	Denomination of item	Connection	Designation at valve block
<b>Measuring points for oil pressure and temperature</b>			
51	Before the converter (opening pressure) – 11 – 13 bar	M10 x 1.0	H
52	Before the converter (opening pressure) – 4.3 – 7.3 bar	M10 x 1.0	
53	Front clutch (KV) – 16 – 18 bar	M10 x 1.0	B
55	Reverse clutch (KR) – 16 – 18 bar	M10 x 1.0	AND
56	Clutch (K1) – 16 – 18 bar	M10 x 1.0	D
57	Clutch (K2) – 16 – 18 bar	M10 x 1.0	A
58	Clutch (K3) – 16 – 18 bar	M10 x 1.0	C
60	Clutch (K4) – 16 – 18 bar	M10 x 1.0	F
63	After the converter, Temperature 100 °C, short-term 120 °C	M14 x 1.5	
65	System pressure – 16 – 18.5 bar	M10 x 1.0	K
<b>Measuring points for flow rates</b>			
15	Connection to heat exchanger	1-5/16 in - 12 UN-2B	
16	Connection from heat exchanger	1-5/16 in - 12 UN-2B	
<b>Inductive sensor, impulse sensor, speed sensor and switch</b>			
21	Inductive sensor – Turbine rotation	M18 x 1.5	
34	Speed sensor – Output		
47	Inductive sensor – Central gear chain	M18 x 1.5	
48	Inductive sensor – Engine speed	M18 x 1.5	
54	Differential pressure switch for pressure filter	M14 x 1.5	
<b>Connecting</b>			
10	Vent	M10 x 1	
49	Plug connection at electro-hydraulic control unit		

## Powershift transmission - Service instruction

845B Direct drive transmission, Tier 3, made in Brazil [HBZN0845VBAF00184 - ]	(8 x 8 direct drive) OR (Tier 1) OR (Tier 3-VHP)
865B AWD Direct drive transmission, All wheel drive (AWD), Tier 3, made in Brazil [HBZN0865TBAF00840 - ]	
865B Direct drive transmission, Tier 3, made in Brazil [NBAF15000 - ]	(8 x 8 direct drive) OR (Tier 2) OR (Tier 3-VHP) OR (Tier 0) OR (AWD)

### Transmission lifting procedure

1. Use a lift sling similar to (A).
2. It should hold the transmission level without bending the lift hangers (B).



LAIL11MG2000A0A 1

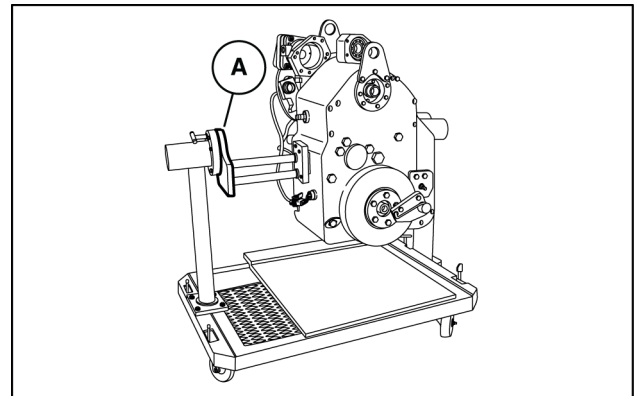
### Repair stand

**NOTE:** The repair stand (A) used in this manual is an OTC DIVISION product, part number 1735, and its capacity is 907 kg (2000 lb).

When any other stand is used, consult the Manufacturer's instructions for mounting.

The approximate empty weight is 545 kg (1202 lb).

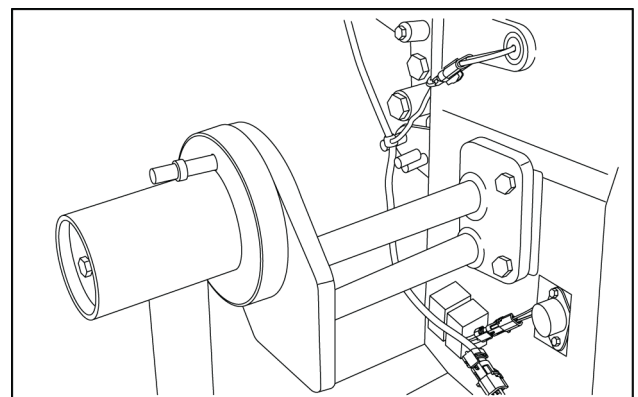
**NOTE:** The exact weights depend on the options included.



LAIL11MG1372A0A 2

### Fixing the transmission to the repair stand

**NOTE:** See "Special Tools" for the Assembly Stand Plate drawings.



LAIL11MG1654A0A 3

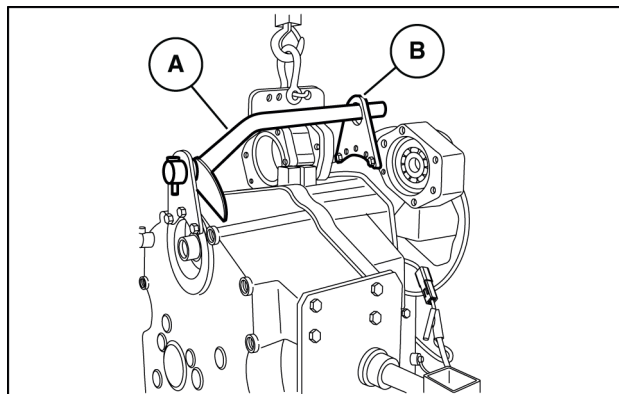
## Powershift transmission - Service instruction

885B AWD Direct drive transmission, All wheel drive (AWD), Tier 3, made in Brazil [HBZN0885TBAF00558 - ]

885B Direct drive transmission, Tier 3, made in Brazil [HBZN0885LBAF00098 - ] (8 x 8 direct drive) OR (Tier 2) OR (Tier 3-VHP) OR (Tier 0) OR (AWD)

### Transmission lifting procedure

1. Use a lift sling similar to **(A)**.
2. It should hold the transmission level without bending the lift hangers **(B)**.



LAIL11MG2012A0A 1

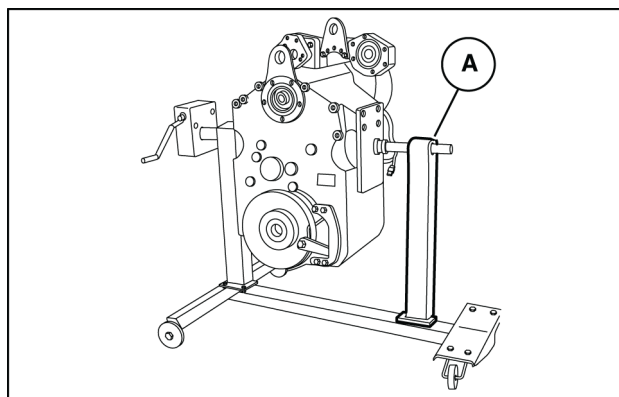
### Repair stand

**NOTE:** The repair stand **(A)** used in this manual is an OTC DIVISION product, part number 1735, and its capacity is 907 kg (2000 lb).

When any other stand is used, consult the Manufacturer's instructions for mounting.

The approximate empty weight is 703 kg (1550 lb).

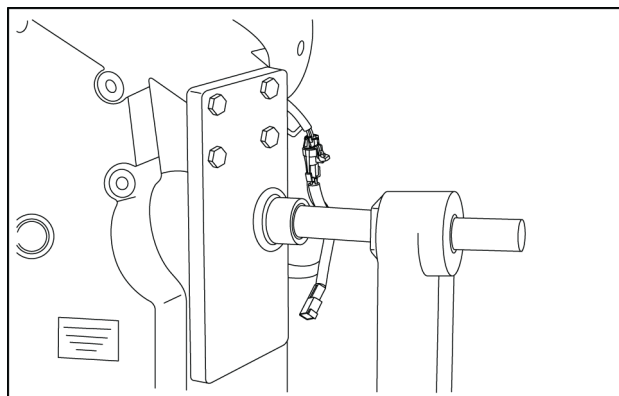
**NOTE:** The exact weights depend on the options included.



LAIL11MG2013A0A 2

### Fixing the transmission (DF series) to the repair stand

**NOTE:** See "Special Tools" for the Assembly Stand Plate drawings.



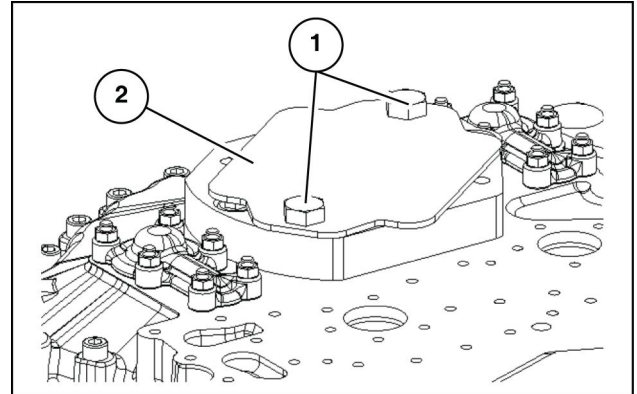
LAIL11MG1916A0A 3

## Powershift transmission - Disassemble

845B Torque converter transmission, Tier 3, made in Brazil [HBZN0845VCAF01093 - ]	(6 x 3 torque converter) OR (Tier 1) OR (Tier 3-VHP)
865B Torque converter transmission, Tier 3, made in Brazil [NBAF14004 - ]	(6 x 3 torque converter) OR (Tier 2) OR (Tier 3-VHP) OR (Tier 0)

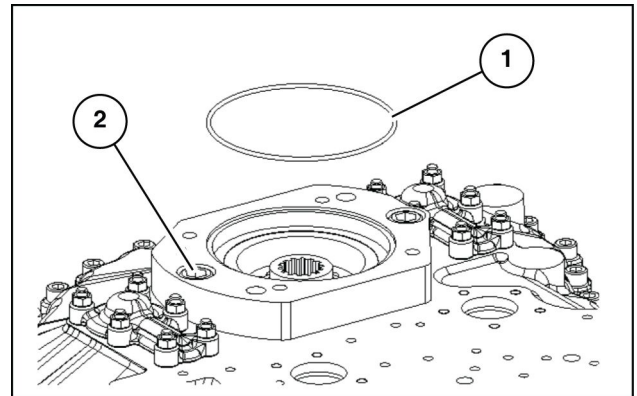
### P.T.O.

1. Loosen the hexagonal headed bolts (1) and remove the cover (2).



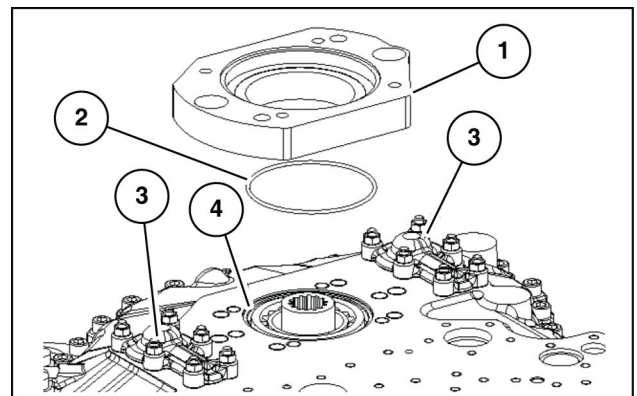
LAIL11MG0137A0A 1

2. Remove the O-ring (1) from the cover and loosen the Allen screws (2).



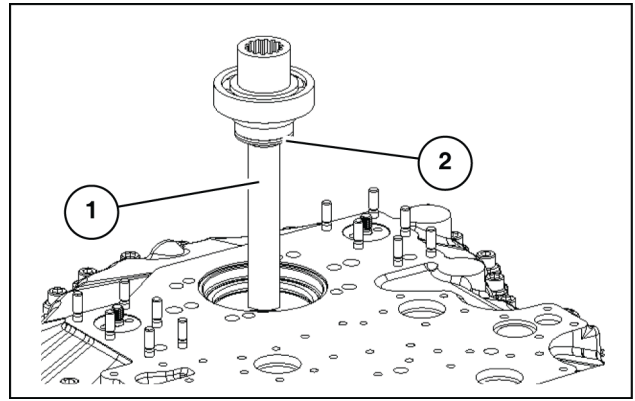
LAIL11MG0138A0A 2

3. Remove the flange (1) and the O-ring (2).
4. Loosen the hex nuts and remove both covers (3) with the O-rings.
5. Remove circlip (4).



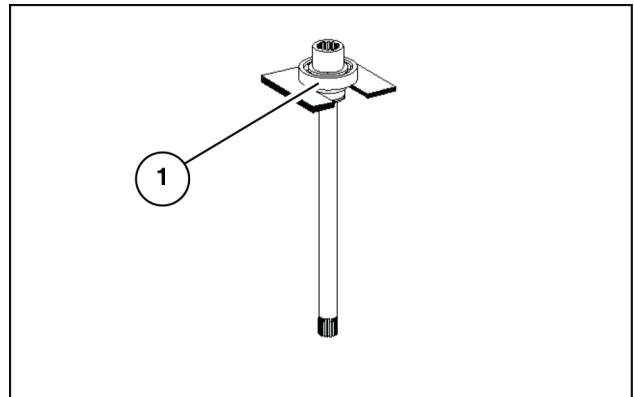
LAIL11MG0139A0A 3

6. Pull the pump shaft (1) out of the housing bore.
7. Remove the rectangular ring (2).



LAIL11MG0140A0A 4

8. Press the ball bearing (1) off the pump shaft.



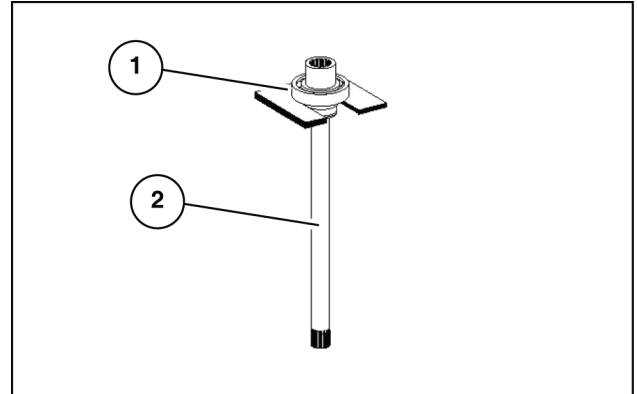
LAIL11MG0141A0A 5

## Powershift transmission - Assemble

845B Torque converter transmission, Tier 3, made in Brazil [HBZN0845VCAF01093 - ]	(6 x 3 torque converter) OR (Tier 1) OR (Tier 3-VHP)
865B Torque converter transmission, Tier 3, made in Brazil [NBAF14004 - ]	(6 x 3 torque converter) OR (Tier 2) OR (Tier 3-VHP) OR (Tier 0)

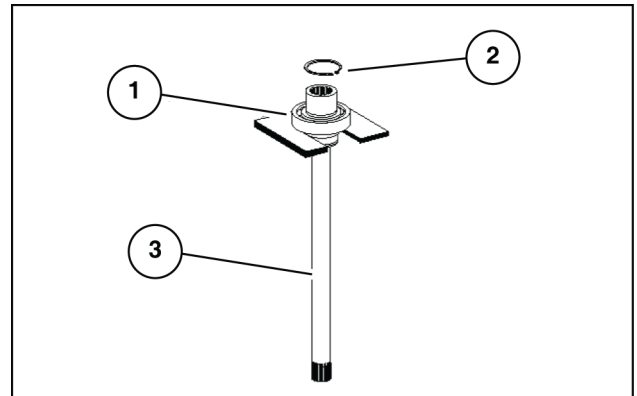
### P.T.O.

1. For a shaft pump without a “Lock-up” clutch, press the ball bearing (1) into the pump bearing (2) until contact is made.



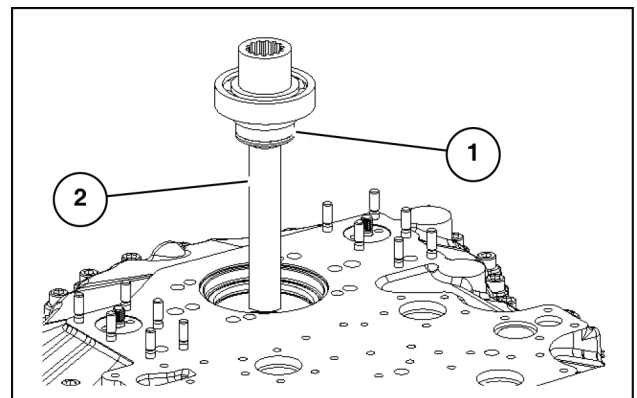
LAIL11MG0161A0A 1

2. For a shaft pump with a “Lock-up” clutch, install the four-point bearing (1) in the pump shaft.
3. Press the lower bearing inner ring to the contact position.
4. Position the ball bearing.
5. Press the upper bearing inner ring to the contact position.
6. Adjust the axial play of **0.0 – 0.05 mm** using a retaining ring (2), with a thickness of between **2.2 – 2.5 mm** (in steps of **0.05 mm**).



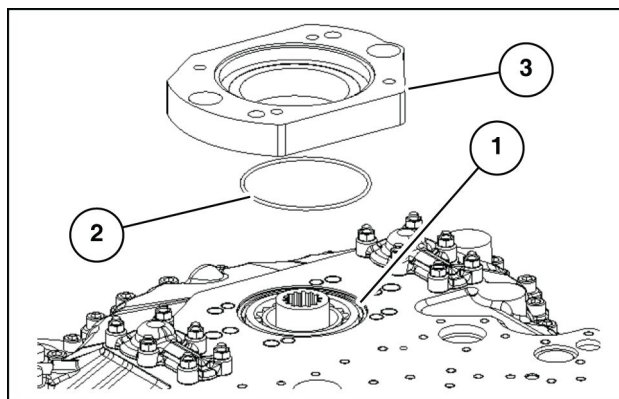
LAIL11MG0162A0A 2

7. Install the rectangular ring (1).  
50 x 2.5 without a Lock-up clutch  
60 x 3 with a Lock-up clutch
8. Grease and centrally align rectangular ring.
9. Install the pump shaft (2) until contact is obtained.



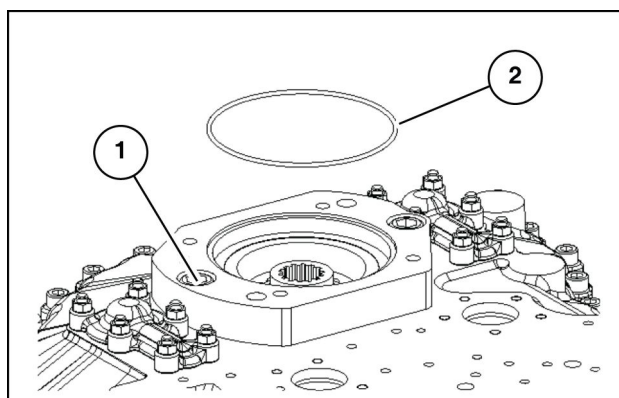
LAIL11MG0163A0A 3

10. Fix the pump shaft by means of an 85 x 3 retaining ring (1).
11. Install the O-ring 104 x 3 (2) onto the flange (3) and then grease it and bring it into the contact position on the rear part of the housing.



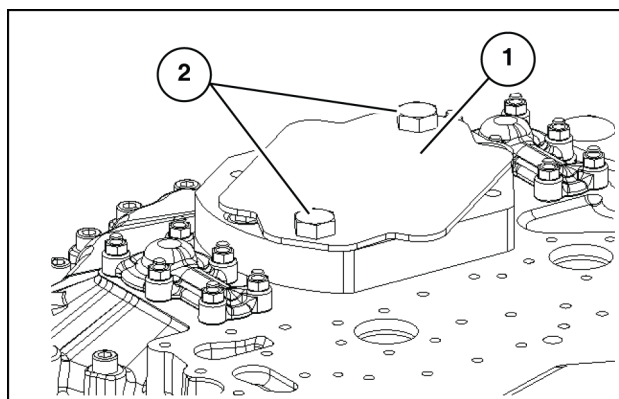
LAIL11MG0164A0A 4

12. Fix the flange with Allen screws (1).
13. Insert the O-ring 130 x 3 (2) into the hole of the flange and grease it.  
Tightening torque (M16/8.8 x 30) MA = **195 N·m**



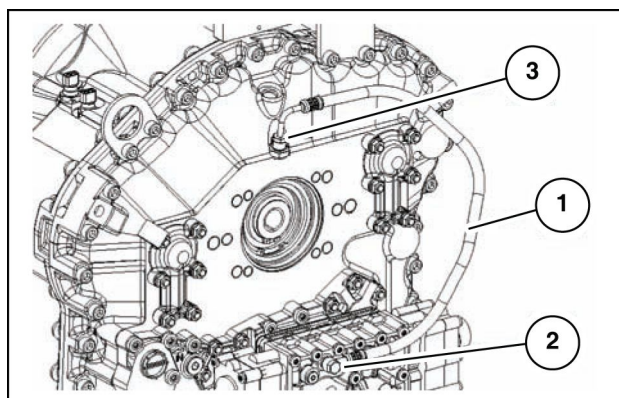
LAIL11MG0165A0A 5

14. Place the cover sheet (1) on the flange and fix it with hex screws (2).  
Tightening torque (M16/8.8 x 20) MA = **46 N·m**



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15. For the lubrication line for the version with a "Lock-up" clutch, install the PTO for the lubrication line  
(1) Lubrication line PTO.  
(2) Banjo bolt (6 – DIN 7643) seal ring (A-10 CU).  
(3) Screw neck (SDS-L6 10 X 1) O-ring (10 X 1).



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## Powershift transmission - Calibrate

845B Direct drive transmission, Tier 3, made in Brazil [HBZN0845VBAF00184 - ]	(8 x 8 direct drive) OR (Tier 1) OR (Tier 3-VHP)
865B AWD Direct drive transmission, All wheel drive (AWD), Tier 3, made in Brazil [HBZN0865TBAF00840 - ]	
865B Direct drive transmission, Tier 3, made in Brazil [NBAF15000 - ]	(8 x 8 direct drive) OR (Tier 2) OR (Tier 3-VHP) OR (Tier 0) OR (AWD)
885B AWD Direct drive transmission, All wheel drive (AWD), Tier 3, made in Brazil [HBZN0885TBAF00558 - ]	
885B Direct drive transmission, Tier 3, made in Brazil [HBZN0885LBAF00098 - ]	(8 x 8 direct drive) OR (Tier 2) OR (Tier 3-VHP) OR (Tier 0) OR (AWD)

### Transmission Calibration

Reasons to calibrate the transmission:

1. To make the Transmission Control Unit (TCU) work with the transmission.
2. To reduce the impact of manufacturing tolerances.
3. To provide consistency between machines. The calibration process ensures that each transmission clutch is activated from the same point, before the clutch coupling.

When to calibrate:

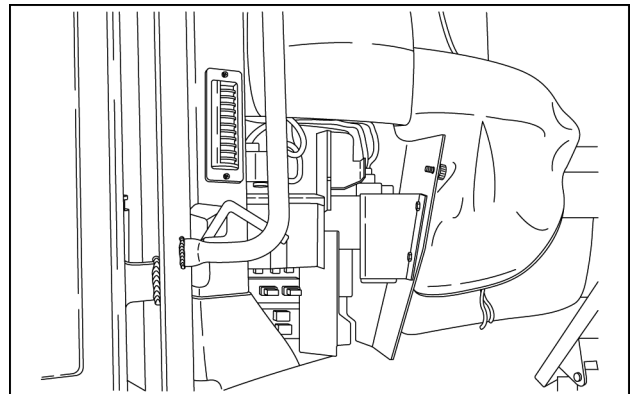
1. If the solenoid valve assembly has been replaced.
2. After repairs that involve the transmission gears.
3. If the Transmission Control Unit (TCU) has been replaced.
4. If shifting quality deteriorates.

### Calibration of the Transmission Clutches

1. Start the engine on a flat, level, firm surface away from any obstacles. Move the machine back and forth to warm up the transmission oil.

**NOTE:** The transmission oil temperature should be between **60 – 71 °C (140 – 160 °F)** for the calibration to be effective.

2. Bring the machine to a stop.
3. Support the implements on the ground.
4. Set the parking brake. Put the ignition switch in the "OFF" position.
5. Clear the area of unauthorized personnel.
6. The fuse compartment is located on the bottom of the right-hand console in the operator's cab. Open the compartment to access connectors **(X36)** and **(X37)**.



COIL15GRD0040AA 1



**Suggest:**

**If the above button click is invalid.**

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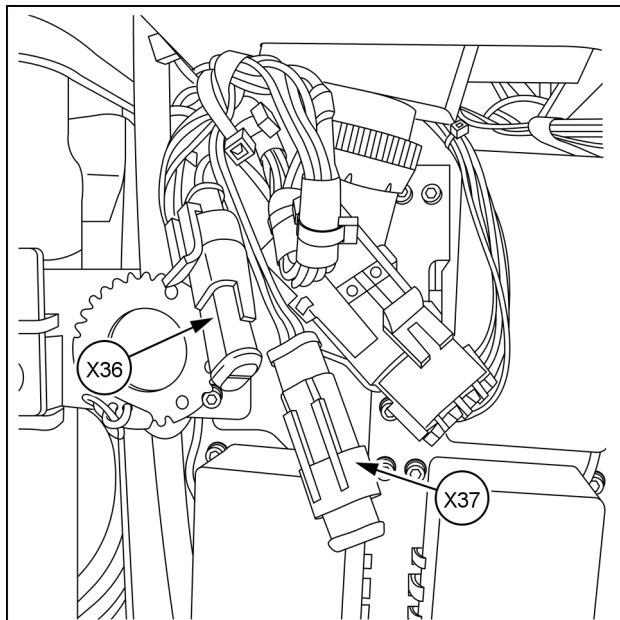
**first, and then click the above link**

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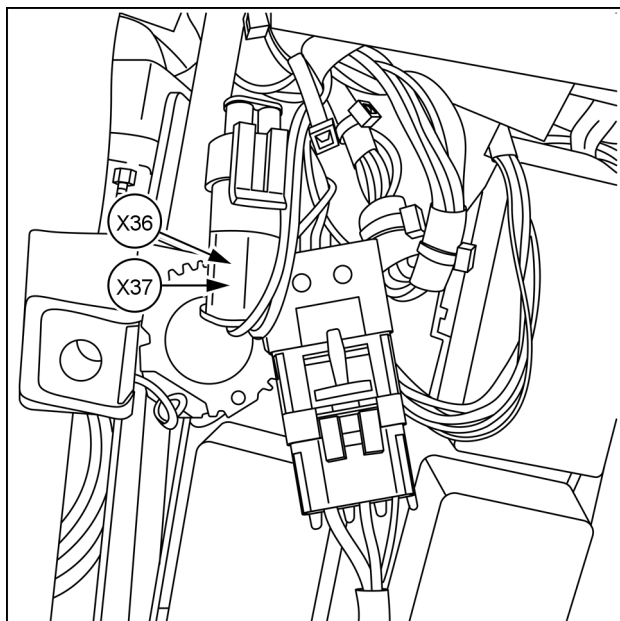
**Thank you so much for reading**

7. Remove the seal from connector (X37).
8. Connect a connector (X37) that makes a bridge [connects pin (A) to pin (B)] on the calibration connector of the machine's wiring harness (X36).

**ATTENTION:** Any error that appears during calibration will cause the process to terminate. You must re-start the calibration process from the beginning.



COIL15GRD0059BA 2



COIL15GRD0039BA 3

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