

# TM113419 - X115R, X135R, X155R, 92H, 107H Tractors

## Install Oil Pump Single Cylinder

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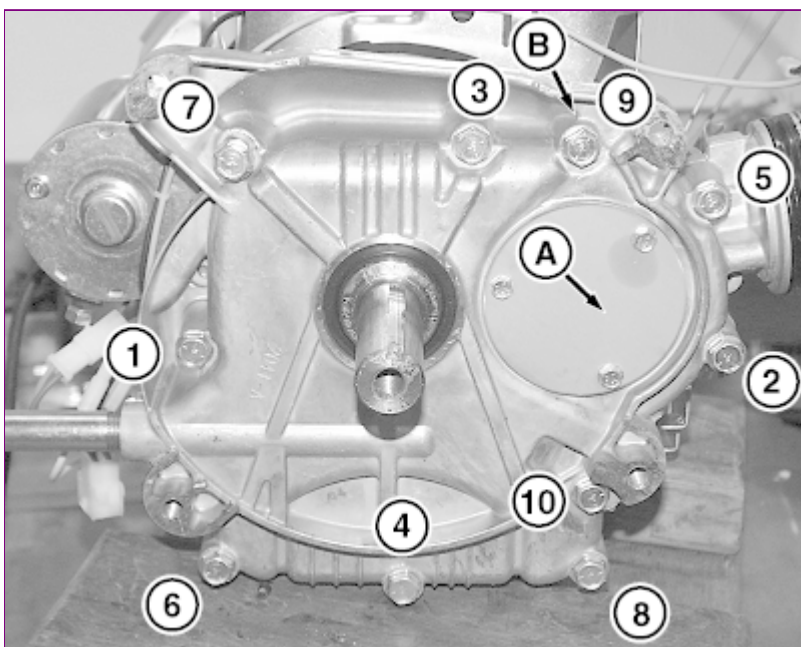
### Install Oil Pump Single Cylinder

1. **IMPORTANT:**

Oil pump cover (A) should be removed when installing sump.

Install sump and gasket.

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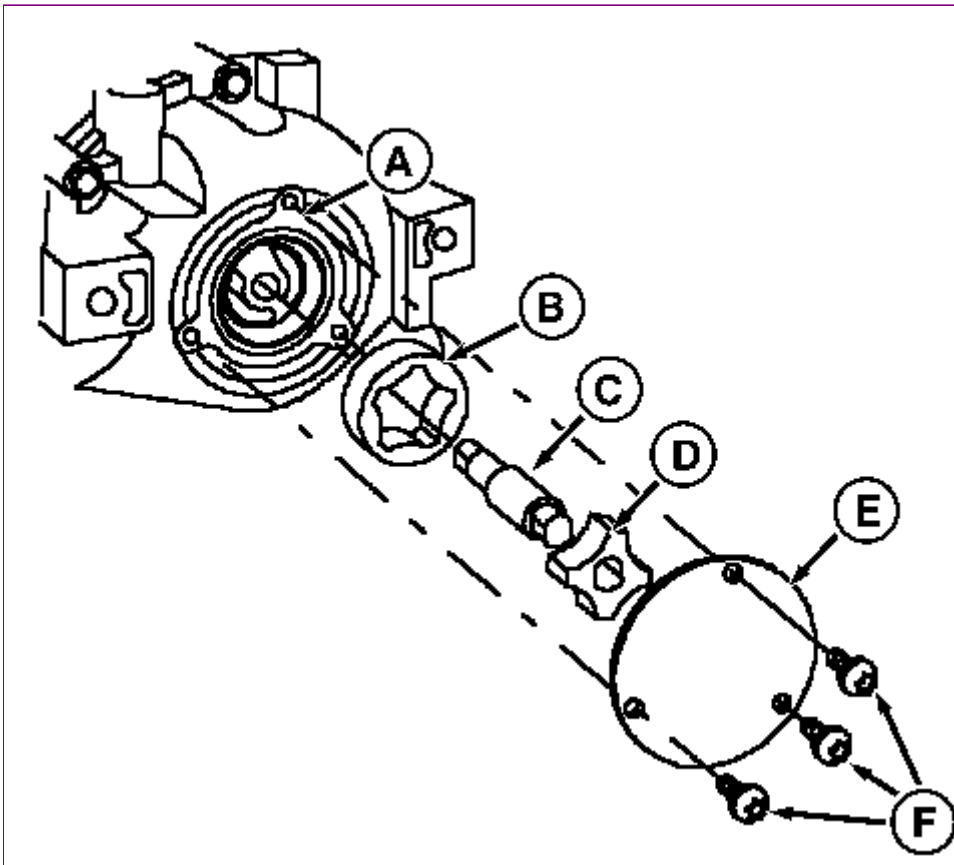


2. GXT001600-UN: Cover Torque Sequence

Tighten all screws, using the pattern shown, to specification.

Item	Measurement	Specification
Oil Sump Cover Screws	Torque	20 N·m (175 lb.-in.)

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3. MXT002447-UN: Oil Pump Cover

**LEGEND:**

- A - O-ring
- B - Inner Rotor
- C - Drive Shaft
- D - Outer Rotor
- E - Cover
- F - Screws

Install the oil pump drive shaft (C), ensuring that it engages with camshaft.

4. Lightly coat the rotors with new motor oil. Install the inner (D) then the outer (B) rotor.
5. Insert the O-ring (A) into the O-ring groove in the sump and secure cover (E) with the 3 screws (F). Tighten the screws to specification.

Item	Measurement	Specification
Oil Pump Cover Screws	Torque	6 N·m (50 lb.-in.)

6. Complete installation of remaining governor linkage and carburetor.
7. Adjust governor. (See [Governor Static Adjustment](#) and [Governor Dynamic Adjustment](#) .)

**NOTE:**

*Engine oil pressure will vary with oil viscosity, ambient air temperature differences, operating temperatures and engine load.*

8. Check that engine oil pressure meets specification.

<b>Item</b>	<b>Measurement</b>	<b>Specification</b>
Oil pressure	Pressure	103—345 kPa (15—50 psi)

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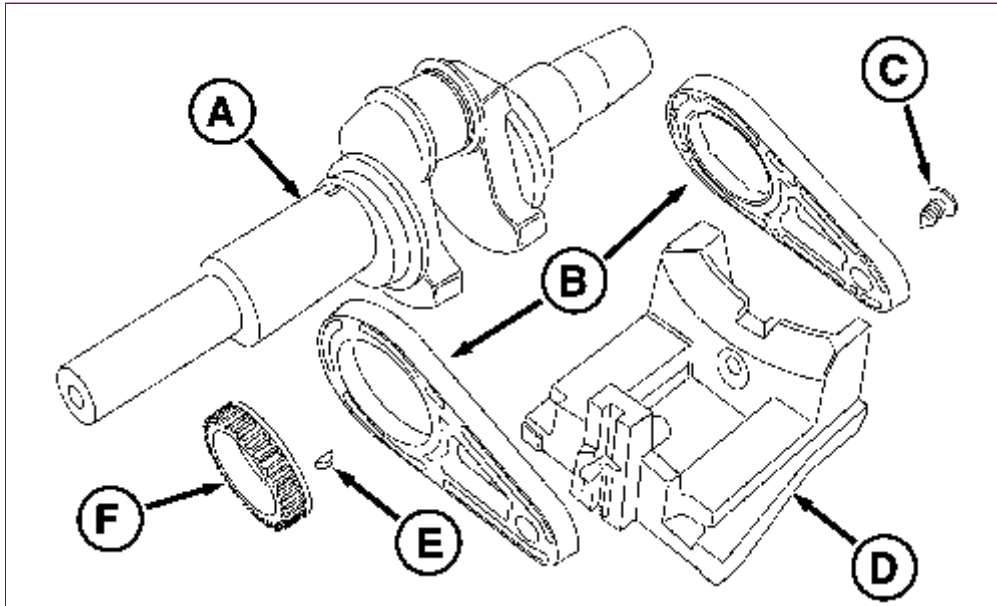
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## TM113419 - X115R, X135R, X155R, 92H, 107H Tractors Remove Balance System Single Cylinder

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### Remove Balance System Single Cylinder

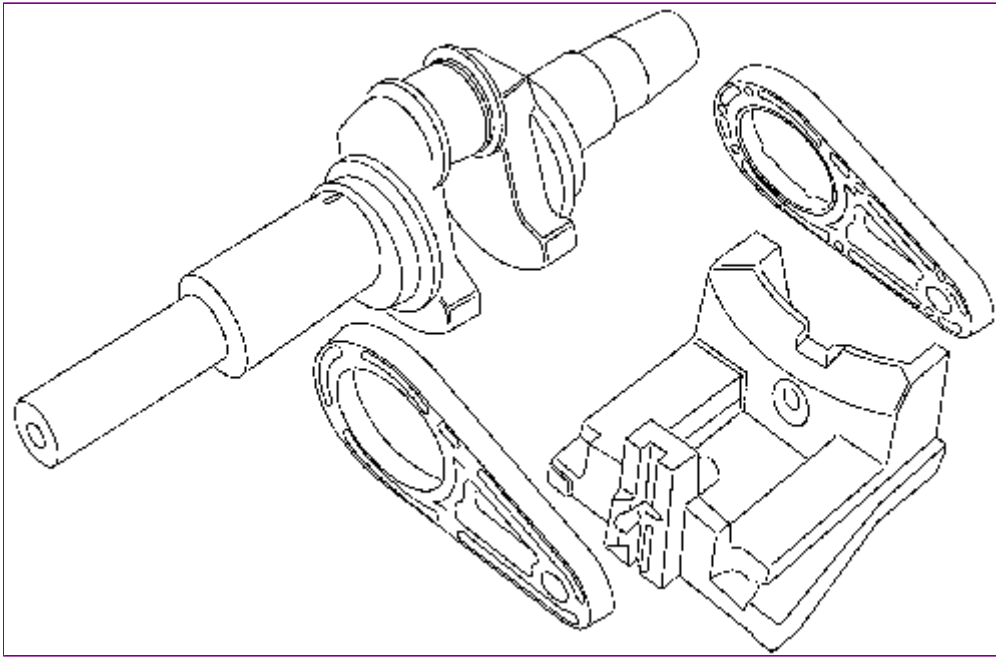


MXT003049-UN: Crankshaft and Balance System

#### LEGEND:

- A - Crankshaft
- B - Counterweight Links
- C - Alignment Plug
- D - Counterweight
- E - Woodruff Key
- F - Crankshaft Gear

1. Remove crankshaft.
  2. Remove the crankshaft gear (F) from the crankshaft (A). If the gear is tight pry it off using two screwdrivers, being careful not to damage the gear.
  3. Remove the woodruff key (E) from the crankshaft.
  4. Remove and discard the plastic alignment plug (C) from the magneto side of the counterweight (D). Slide the counterweight from the counterweight links (B).
  5. Remove the counterweight links from the crankshaft.
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6. MXT003050-UN: Crankshaft, Links, and Counterweight

Check counterweight pins, counterweight link bearing surfaces, and crankshaft eccentric surfaces for wear.

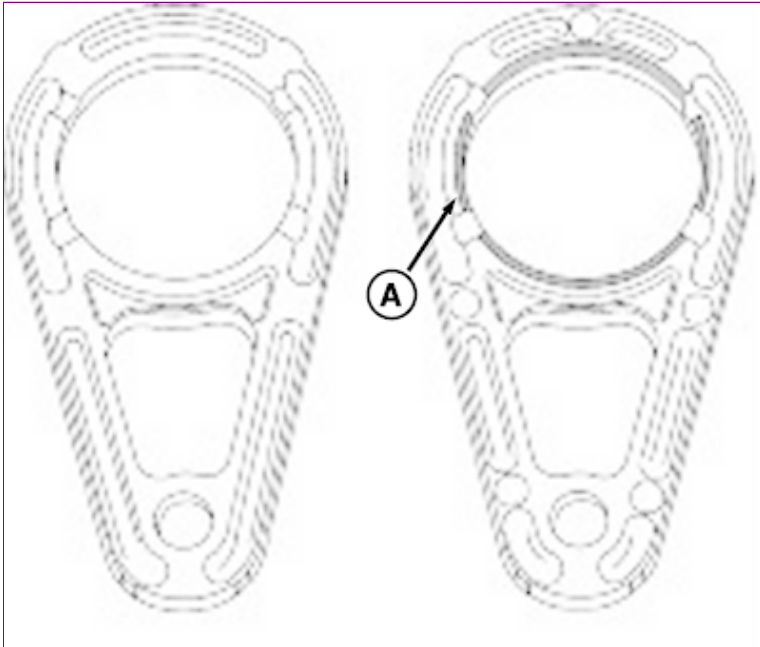
7. If counterweight link bearing surfaces are discolored, scored or worn to or over reject size, the links must be replaced.

Item	Measurement	Specification
<b>Balance System Wear Limits</b>		
Crankshaft Eccentric Journal	OD	55.93 mm (2.202 in.)
Counterweight Link Bearing	ID	56.13 mm (2.210 in.)

## TM113419 - X115R, X135R, X155R, 92H, 107H Tractors Install Balance System Single Cylinder

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### Install Balance System Single Cylinder



MXT003051-UN: Counterweight Links

#### LEGEND:

A - Chamfer

1. Lubricate bearing surfaces with new engine oil.
2. **NOTE:**

*Both counterweight links must be installed with the chamfer (A), facing the crankshaft throw. The sides of the link without a chamfer face the outside of the engine.*

Slide the counterweight links onto the crankshaft eccentrics.

3. Slide the counterweight into the counterweight links.
4. **NOTE:**

*The plastic alignment plug aids in the assembly of the counter-weight assembly. Replace this plug whenever it is removed from the counterweight.*

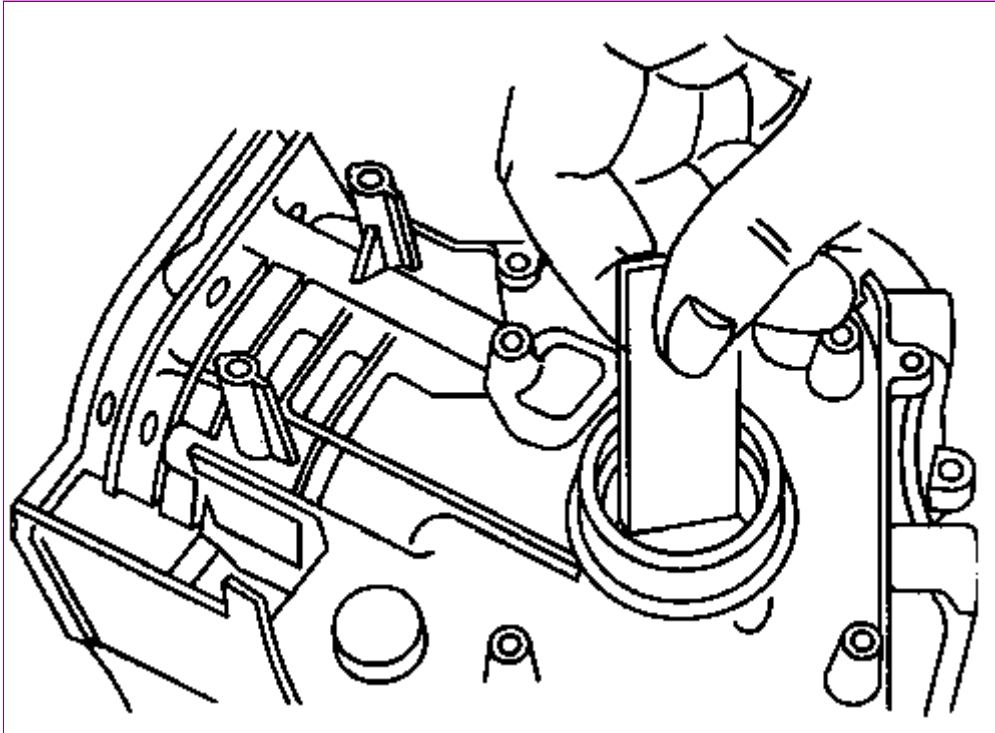
Press a new plastic alignment plug into the magneto side of the counterweight.

5. Install the woodruff key to the crankshaft.
6. Install the crankshaft gear to the crankshaft. The flange of the gear must face the counterweight link.

## TM113419 - X115R, X135R, X155R, 92H, 107H Tractors Inspect Magneto and Cam Bearing Single Cylinder

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### Inspect Magneto and Cam Bearing Single Cylinder

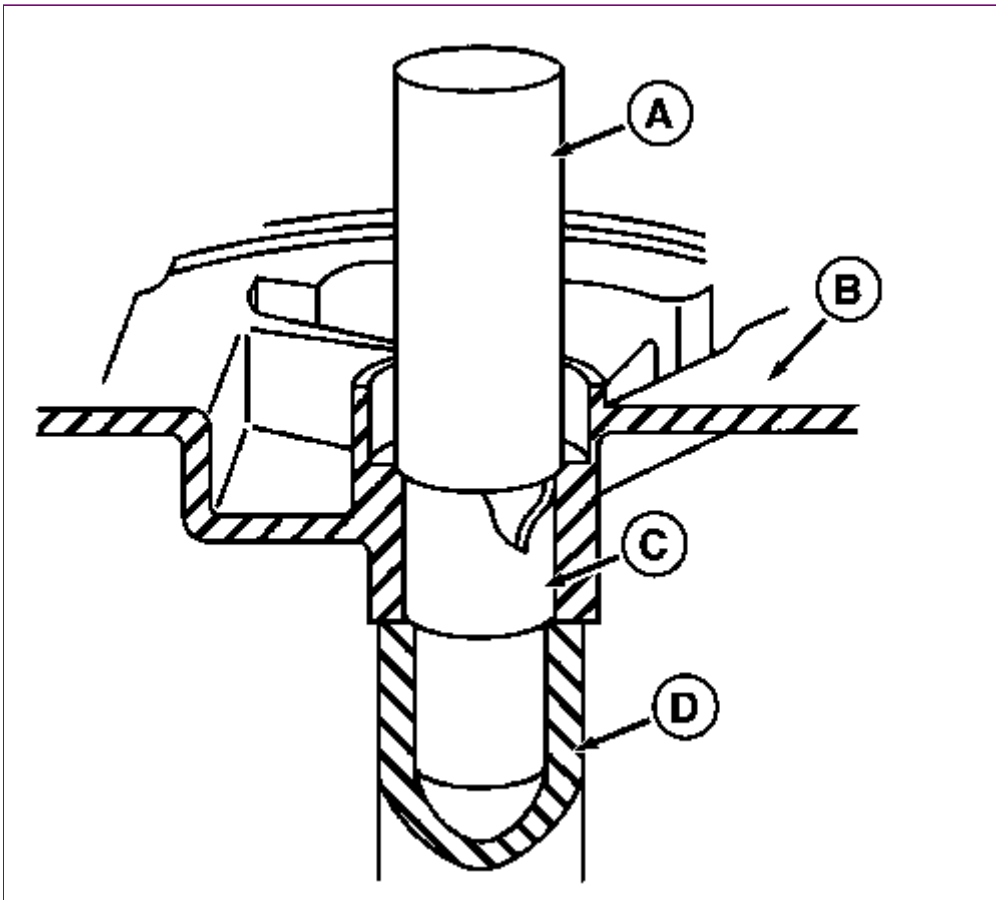


MXT003053-UN: Magneto Bearing Measure

1. When checking the main magneto bearing, it should be replaced if scored or if not within specification.

Item	Measurement	Specification
Magneto Bearing Wear Limit	ID	35.13 mm (1.383 in.)

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2.

MXT003054-UN: Bushing Driver

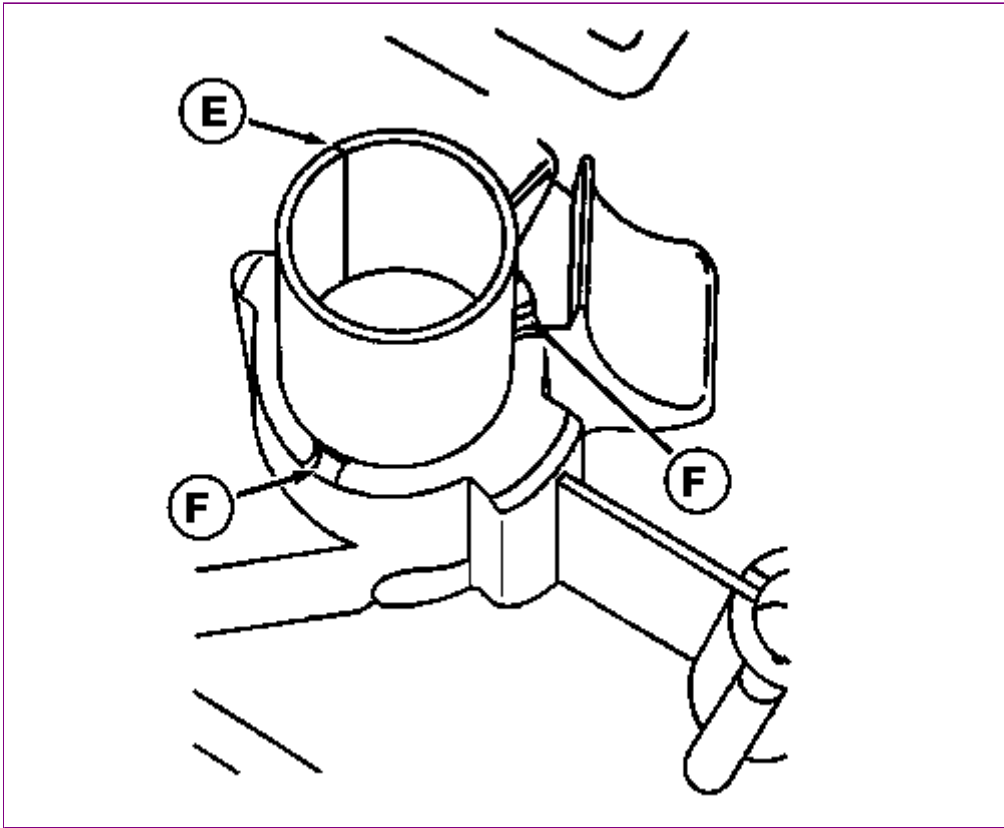
LEGEND:

- A - Bushing Driver
- B - Cylinder Block
- C - Bearing
- D - Support

Place cylinder support (D) under cylinder block (B). Use a bushing driver (A) to press bearing (C) out toward the inside of the block.

3. Lubricate outside surface of bearing and place on inside of block.

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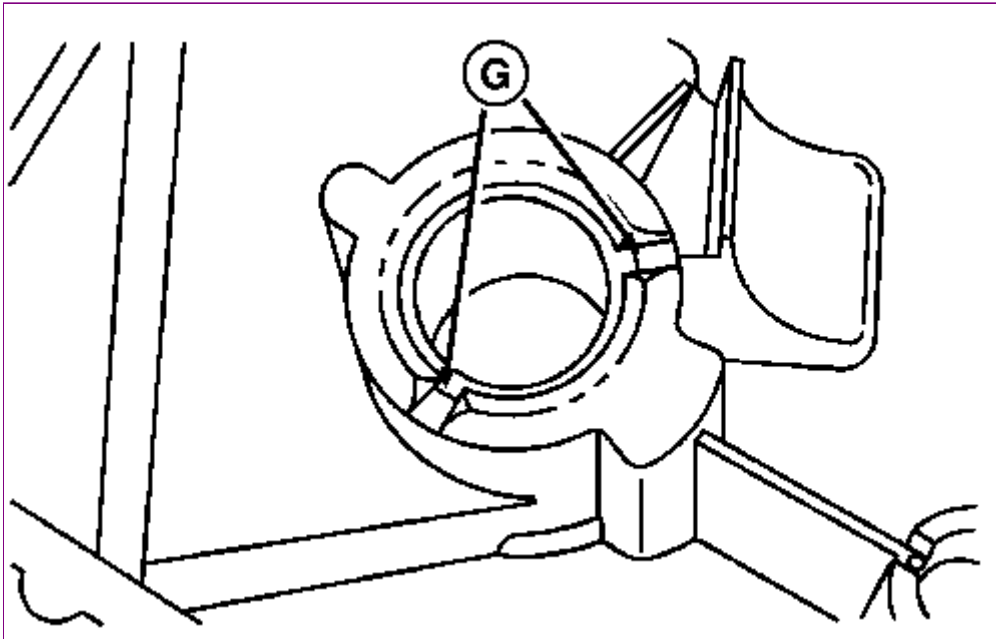
4. MXT003055-UN: Bearing Install

LEGEND:

- E - Split Line  
F - Stake Grooves

Position bearing with split line (E) away from stake grooves (F).

5. Press bearing in until **2.78 mm (0.109 in.)** below surface of block.
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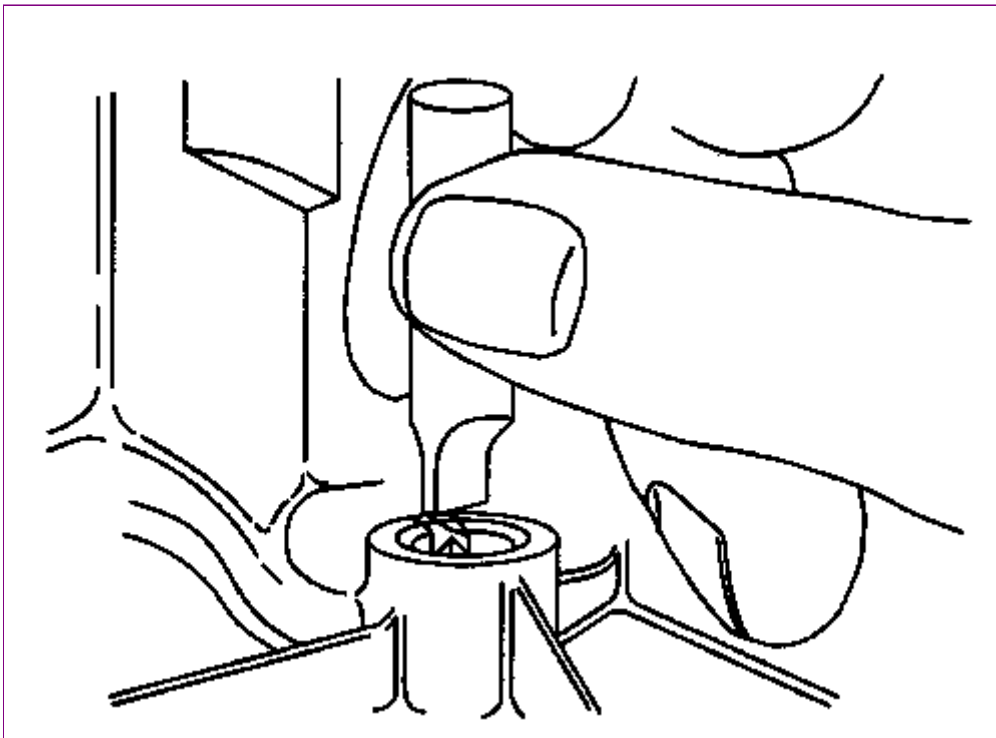
6. MXT003056-UN: Stake Locations

LEGEND:

G - Stake Locations

Stake new bearing into position at locations shown (G).

7. When installing new magneto side oil seal, properly support cylinder. Press in seal until it is **1.5 mm (0.059 in.)** below mounting surface.



8. MXT003057-UN: Cam Gear Bearing

Measure cam gear bearing.

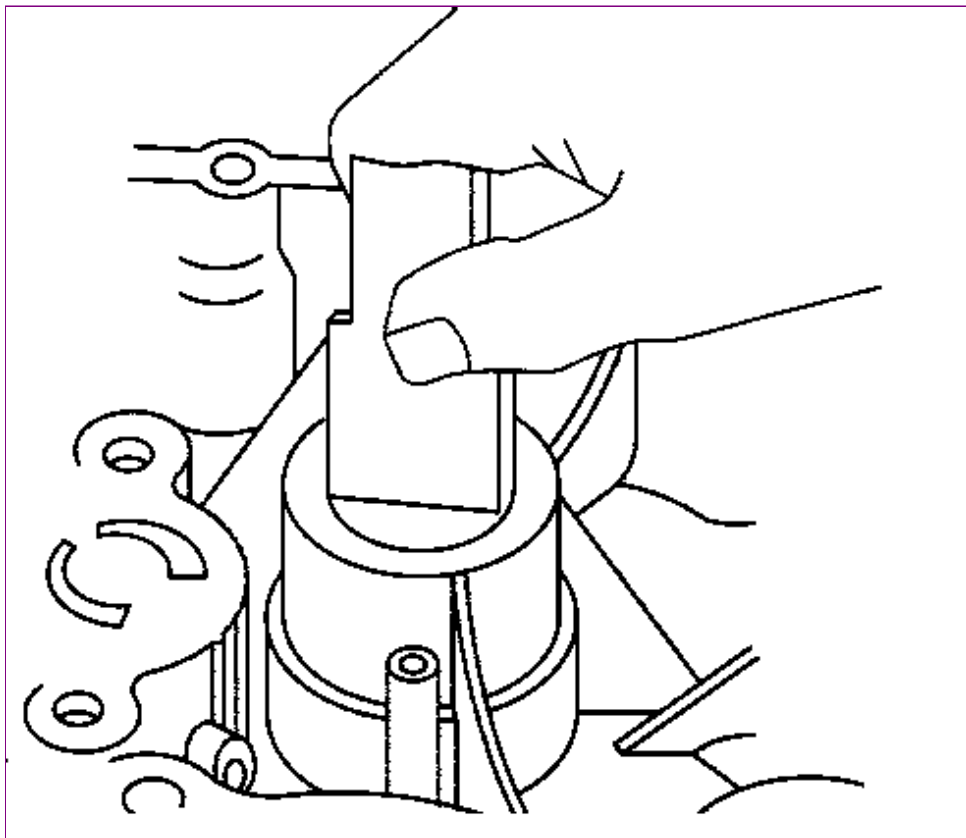
<b>Item</b>	<b>Measurement</b>	<b>Specification</b>
Cam Bearing Wear Limit	ID	12.80 mm (0.504 in.)

9. If bearing is worn beyond specification the, cylinder, crankcase cover, or sump must be replaced.

## TM113419 - X115R, X135R, X155R, 92H, 107H Tractors Inspect PTO Journal Single Cylinder

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### Inspect PTO Journal Single Cylinder



MXT002251-UN: PTO and Cam Bearing

1. From the inside, press the oil seal out of the PTO journal.
2. Inspect PTO bearing and cam bearing. The crankcase cover must be replaced if PTO bearing or cam bearing is scored or if dimensions exceed reject size.

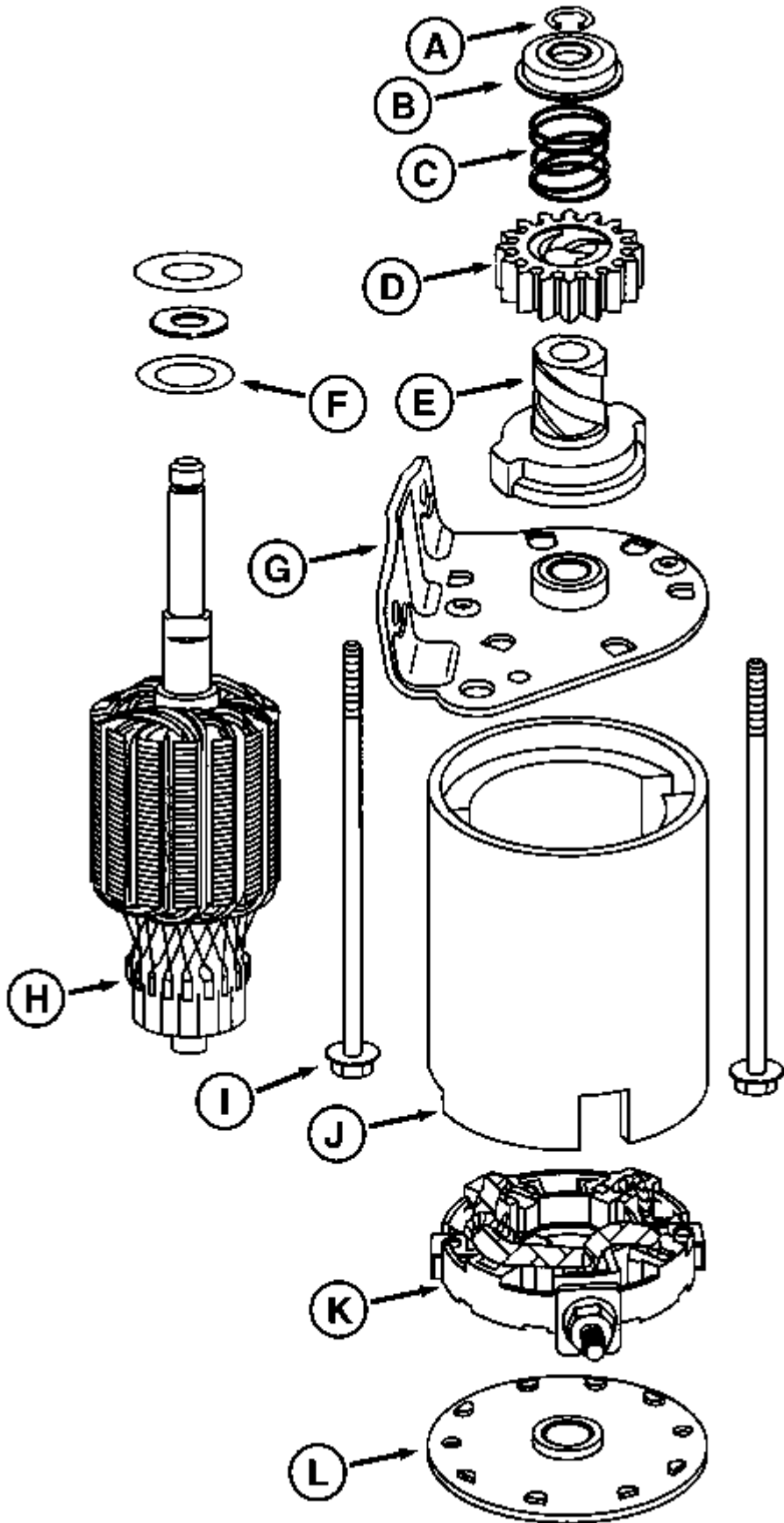
Item	Measurement	Specification
<b>PTO Journal and Oil Seal</b>		
PTO Journal Wear Limit	ID	41.37 mm (1.629 in.)
Oil Seal	Depth	Flush

3. Replace the crankcase cover or sump if the journal is worn beyond specification.
4. Support crankcase cover and install new oil seal. Press in seal until it is flush with mounting surface.

**TM113419 - X115R, X135R, X155R, 92H, 107H Tractors  
Inertia Starting Motor Components Single Cylinder**

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**Inertia Starting Motor Components Single Cylinder**



## MXT002890-UN: Starting Motor Components

### LEGEND:

- A - C-Ring
- B - Retainer
- C - Spring
- D - Drive Gear
- E - Helix Starter Clutch
- F - Wave Washer
- G - Drive End Head
- H - Armature
- I - Through Bolt
- J - Housing
- K - Brush Holder
- L - End Cap

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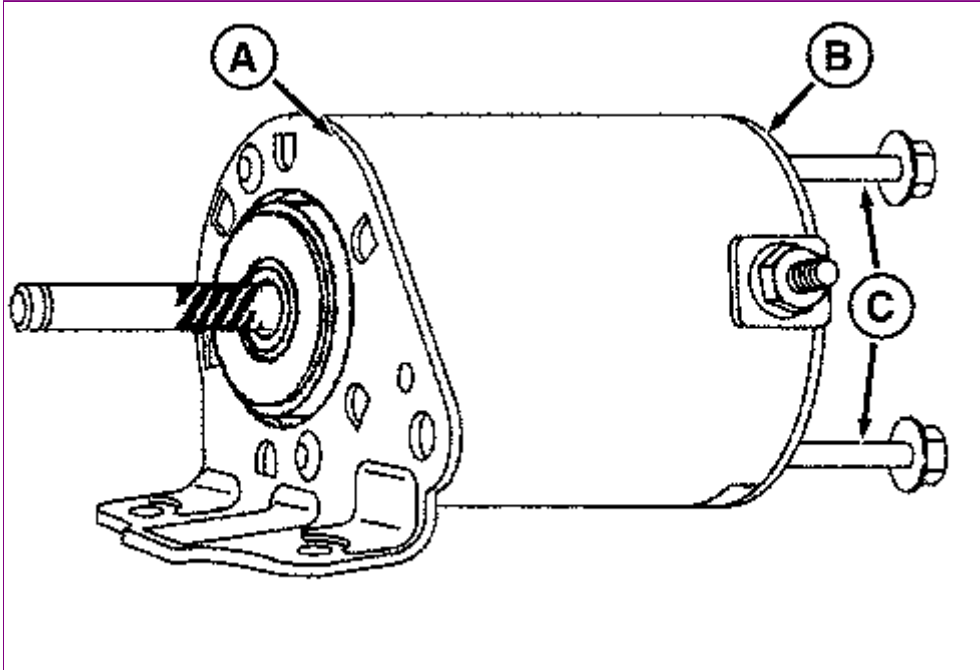
# TM113419 - X115R, X135R, X155R, 92H, 107H Tractors Disassemble Inertia Starting Motor Single Cylinder

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## Disassemble Inertia Starting Motor Single Cylinder

1. **IMPORTANT:**

**DO NOT** clamp motor housing in a vise or strike with a steel hammer. Starting motors contain two powerful magnets that can be broken or cracked if the motor housing is deformed or dented.



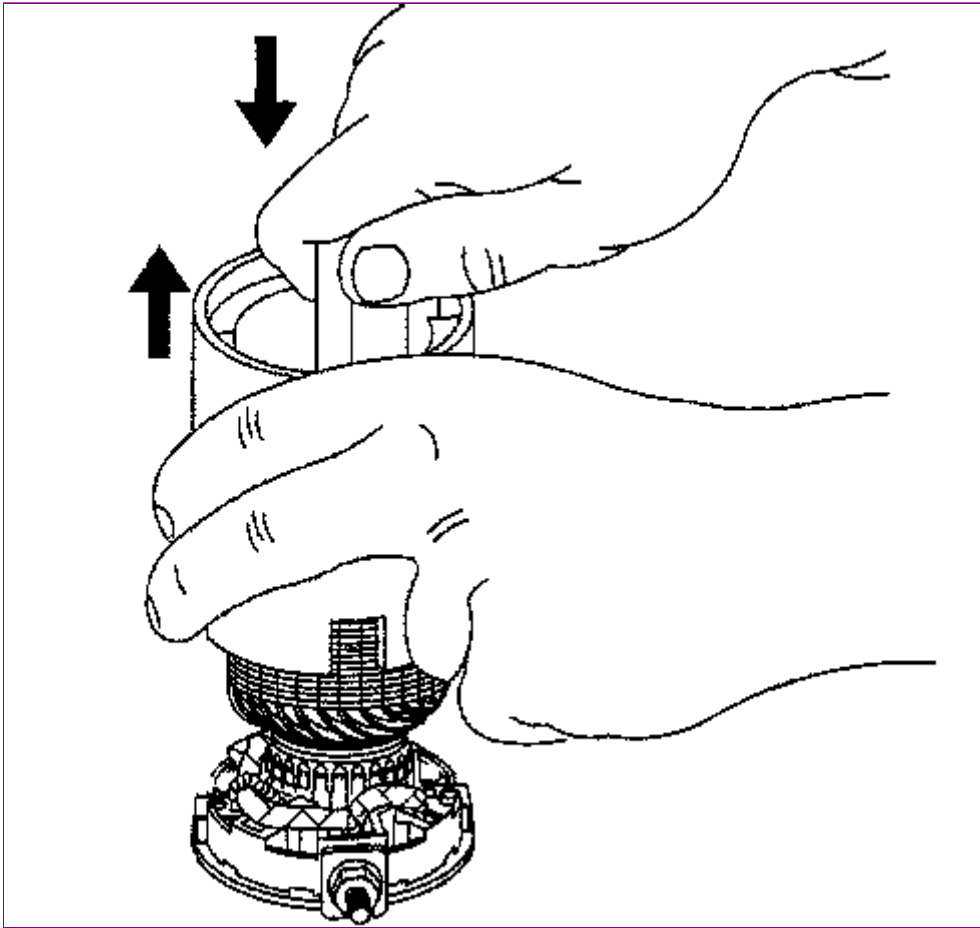
MXT002259-UN: Starting Motor - Inertia

LEGEND:

- A - Drive End Head
- B - End Cap
- C - Bolts

Remove pinion gear assembly.

2. Mark drive end head (A) and end cap (B) and housing using a marker. This will assure proper orientation of the drive end head and end cap when assembling starter.
  3. Remove bolts (C) and inspect bushing for wear. If worn, replace drive head end assembly.
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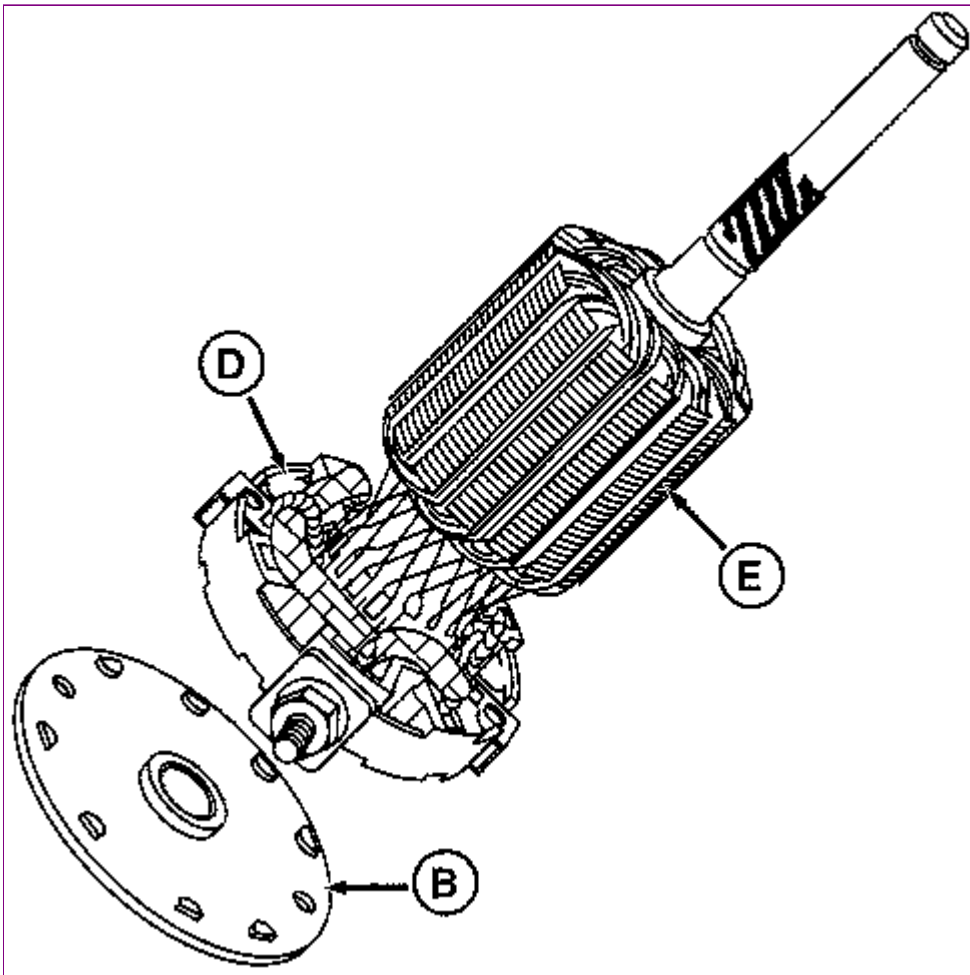


4.

#### MXT002260-UN: Armature and Housing

Hold the armature and bearing end cap against a work surface while sliding housing off the armature. (This allows the armature to remain in the bearing end cap and brush holder for inspection of brush contact to armature.)

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5. MXT002261-UN: Armature and Brush Holder

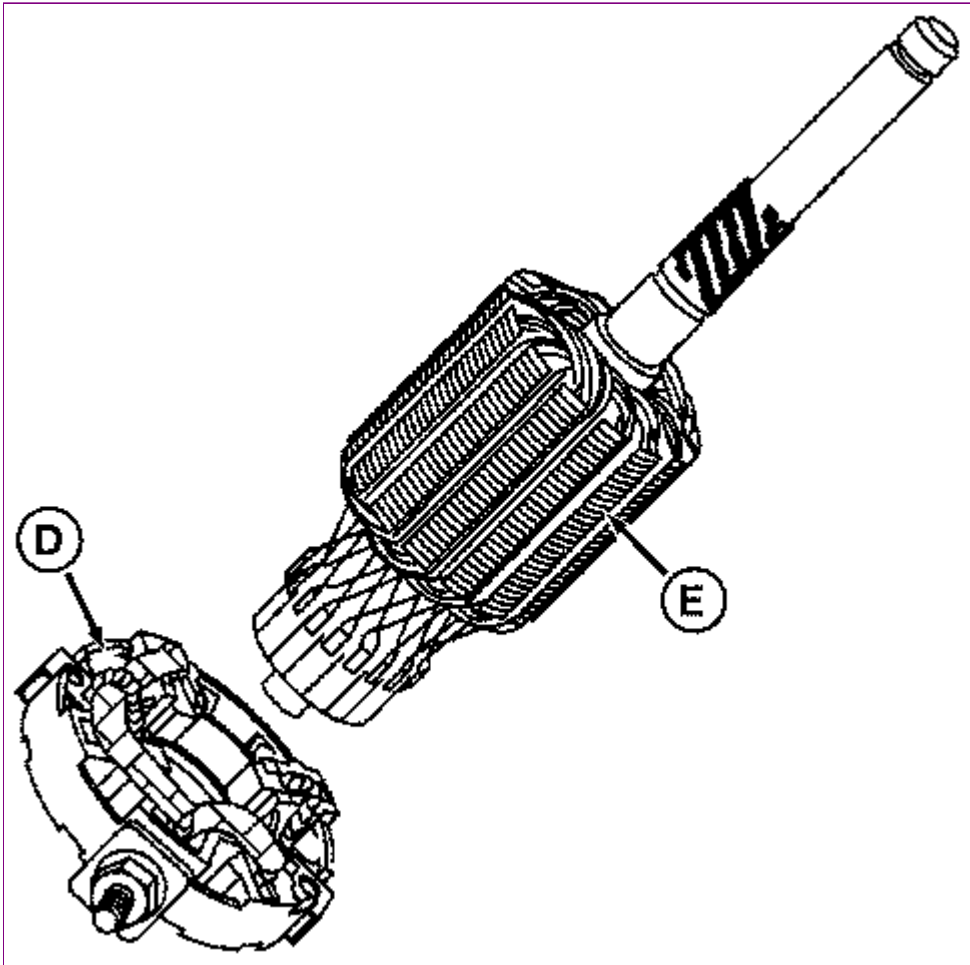
LEGEND:

B - End Cap  
D - Brush Holder  
E - Armature

While holding brush holder (D) and armature (E), remove bearing end cap (B) from armature.

- 
6. **IMPORTANT:**

**DO NOT** use emery cloth to clean the commutator. The particles from the cloth will become embedded in the commutator and cause rapid brush wear.



MXT002262-UN: Armature and Brush Holder

LEGEND:

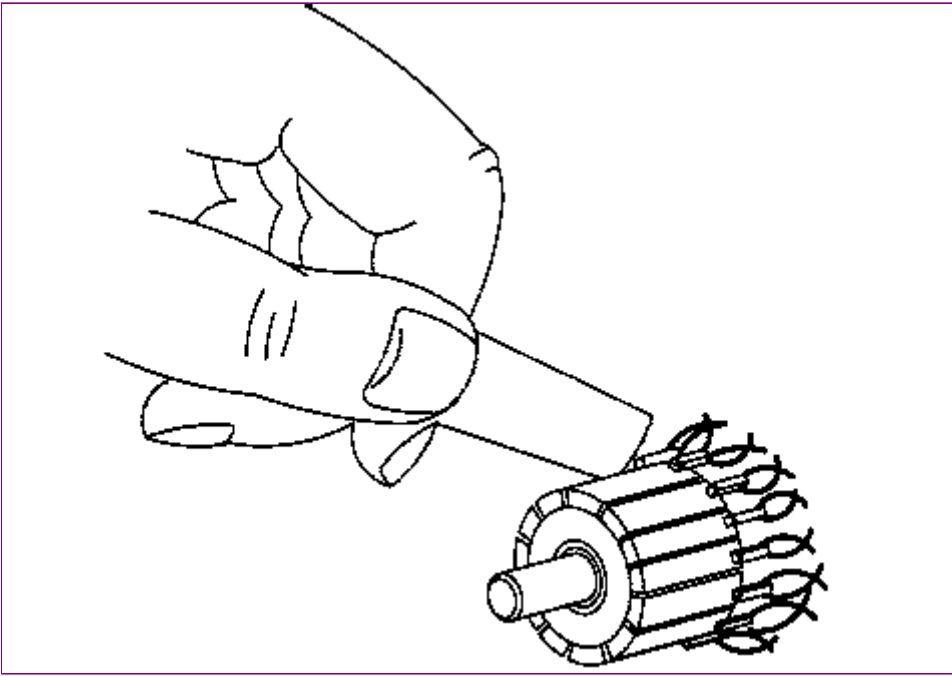
- D - Brush Holder
- E - Armature

Remove brush holder (D) from armature commutator (E).

7.

NOTE:

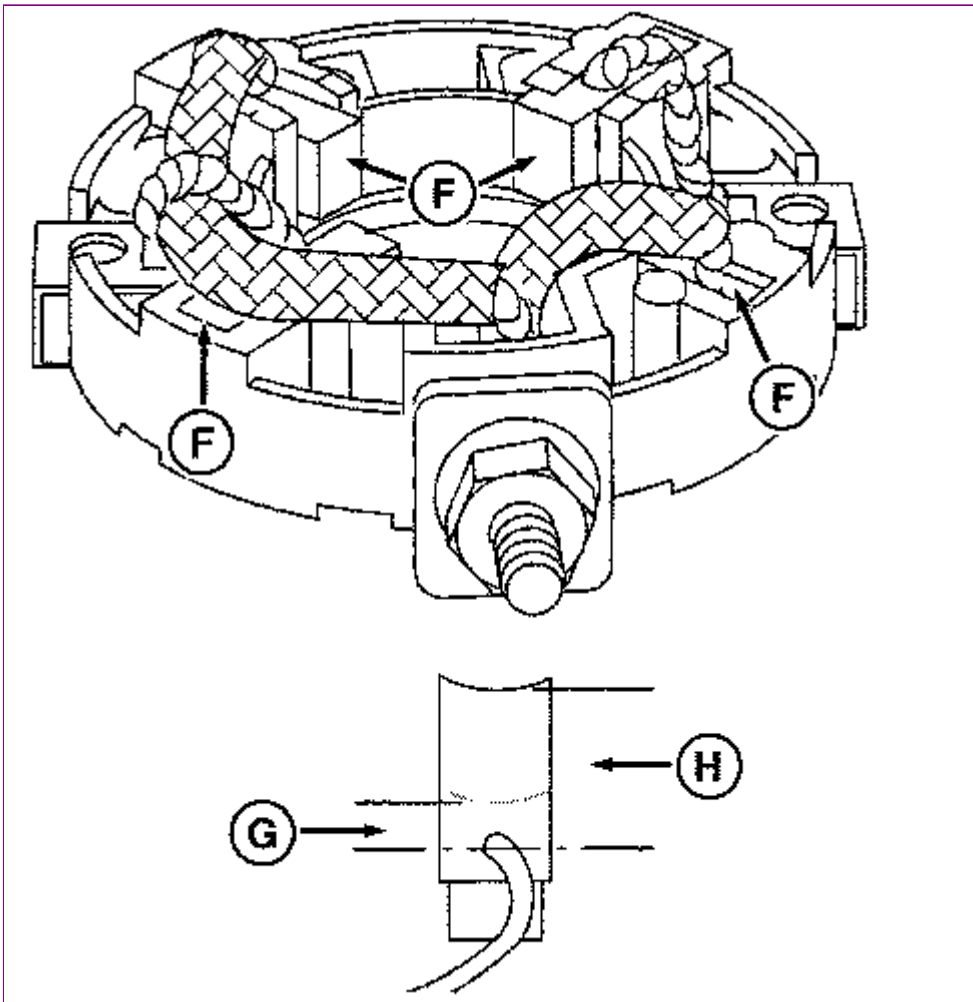
*The bearing housing and armature should not be soaked in a cleaning solution. Fine sandpaper, such as crocus cloth, can be used to clean the armature. The commutator may also be machined with the use of a diamond cutting tool to no less than 31.24 mm (1.23 in.) outside diameter.*



MXT002263-UN: Commutator

Slots between the commutator bars should be cleaned as shown using a broken piece of hacksaw blade.

8. If it is suspected that the armature field coil, magnets or motor housing is defective, a new part should be tried in the motor. If proper testing equipment is available, check the suspected armature or field coil to determine if it is defective (opens or grounds).
-



9. MXT002264-UN: Starting Motor Brushes

**LEGEND:**

- F - Brushes
- G - New Length
- H - Worn Length

The brushes (F) should be checked for proper seating, weak brush springs, dirt, oil or corrosion.

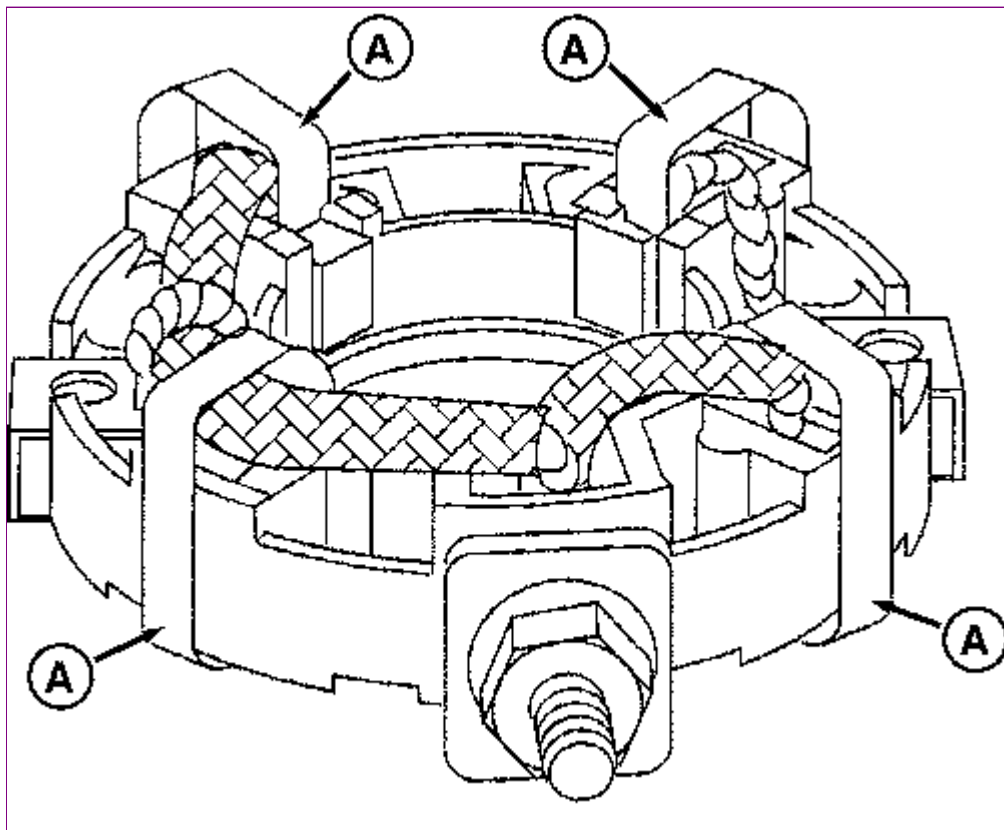
10. Comparing to normal length when new (H), if brushes are worn to **3.2 mm (0.125 in.)** (G), replace brushes. When all parts have been thoroughly cleaned, lightly lubricate the bearings.

Item	Measurement	Specification
Starter (Inertia) Minimum Brush	Length	3.2 mm (0.125 in.)

## TM113419 - X115R, X135R, X155R, 92H, 107H Tractors Assemble Inertia Starting Motor Single Cylinder

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### Assemble Inertia Starting Motor Single Cylinder



MXT002265-UN: Brush Retainers

#### LEGEND:

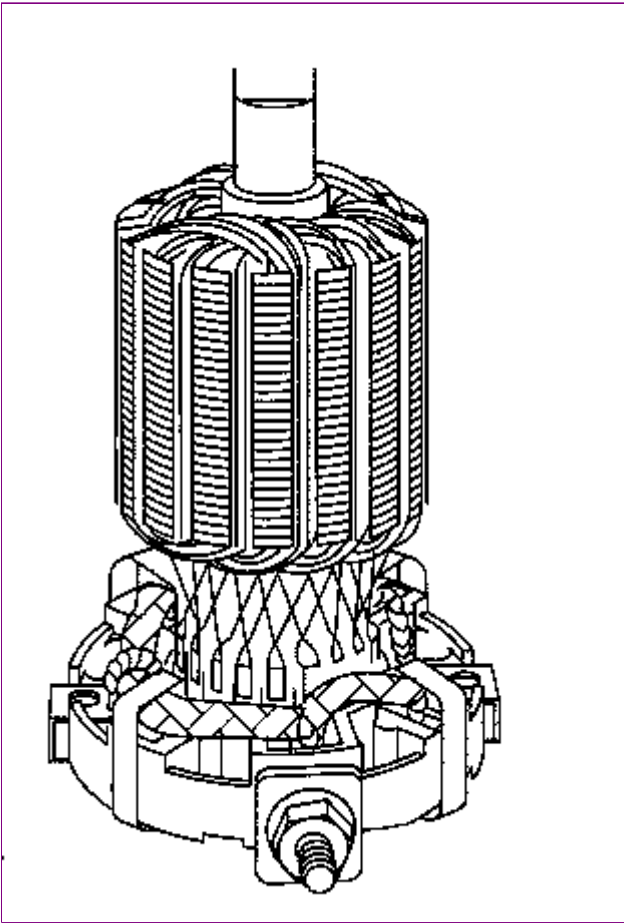
A - Retainers

1. *NOTE:*

*Brush retainers (A) can be made from standard size paperclips. Straighten and cut to length 2-1/2 in. Bend into a U-shape with sides of 1 in. and bottom 1/2 in. in length.*

Place brushes in their slots and hold brushes with retainers.

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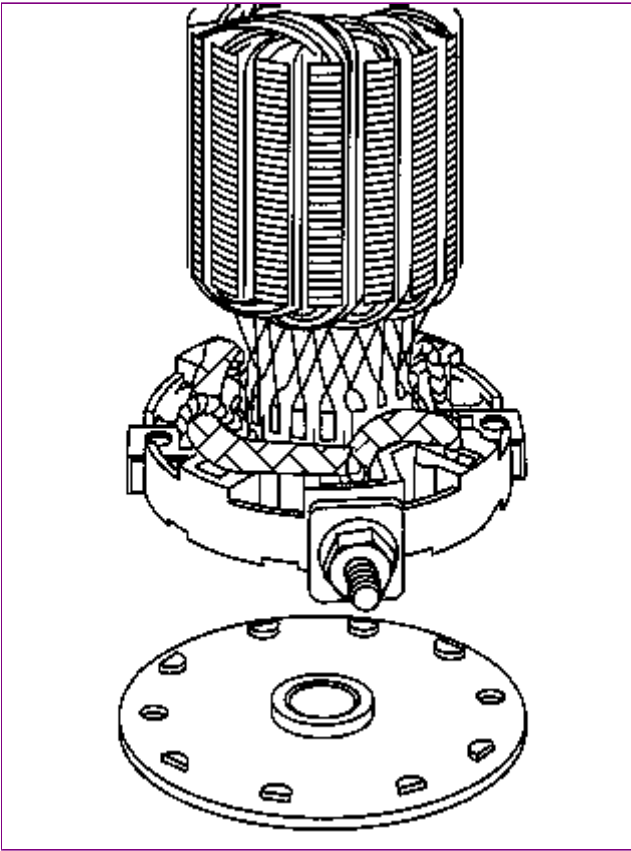


2.

MXT002266-UN: Armature and Brush Holder

Place armature commutator in brush holder and remove brush retainers.

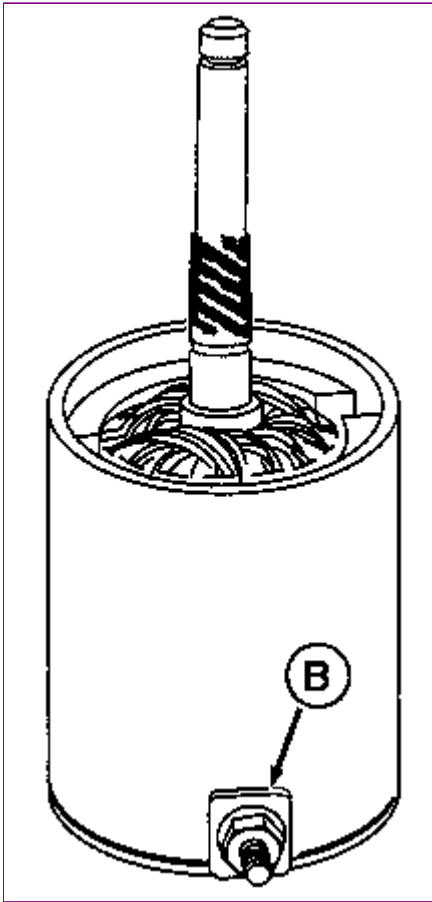
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3. MXT002267-UN: Armature and End Plate

Install bearing end plate on armature commutator journal making sure plate indexes with brush holder.

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4. MXT002268-UN: Starting Motor Housing

LEGEND:

B - Notch

Slide motor housing over armature with the notch (B) toward brush holder.

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**Suggest:**

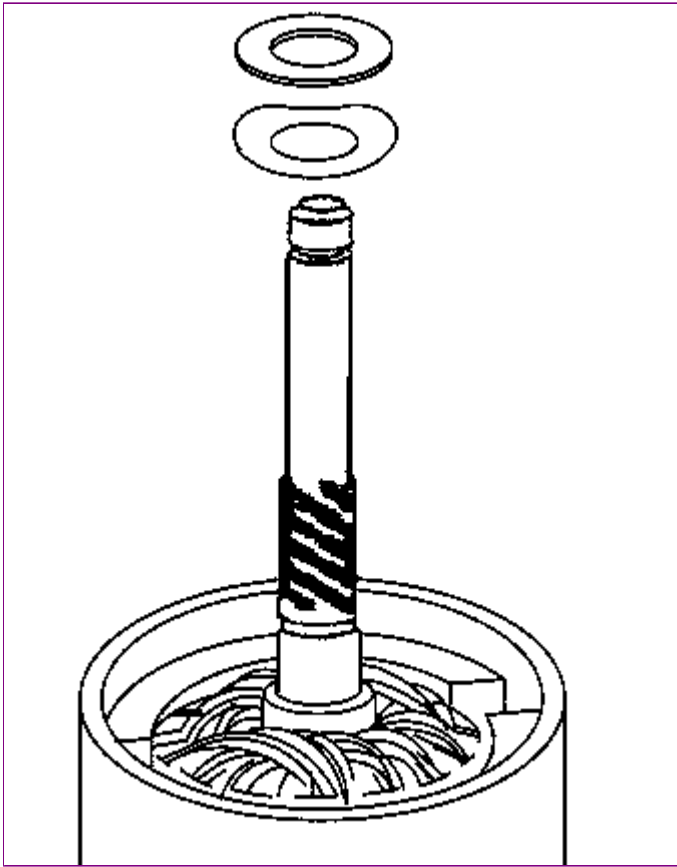
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5.

MXT002269-UN: Starting Motor - Inertia Washers

Place wave washer on armature shaft with concave side up. Then place flat washer on armature.

6. Place drive end cap on starting motor housing making sure that marks on drive end head and end cap line up with housing mark.

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