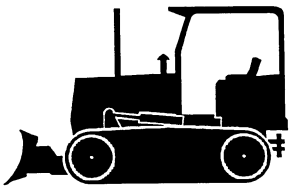
CEBM789H04

# Shop Manual



# TD7H
# TD8H
# TD9H
## CRAWLER TRACTOR

SERIAL NUMBERS
TD7H - 25501
TD8H - 35501 and up
TD9H - 45501

**DRESSTA Co. Ltd.**

# PRODUCT PUBLICATIONS INFORMATION

VARIOUS PRODUCT PARTS & SERVICE PUBLICATIONS ARE AVAILABLE TO ALL **DRESSER** CONSTRUCTION EQUIPMENT OWNERS, INCLUDING OPERATION & MAINTENANCE MANUALS, PARTS BOOKS AND SHOP MANUALS.

SPECIAL PUBLICATIONS SUCH AS SERVICE TOOLS, AIR CONDITIONING, AND TURBOCHARGER SHOP MANUALS ARE ALSO AVAILABLE AS WELL AS SELECTED OPERATION & SHOP MANUALS IN FOREIGN LANGUAGES.

THE PUBLICATIONS LISTED BELOW ARE AVAILABLE FOR THESE PARTICULAR MACHINES.

| DESCRIPTION | FORM NUMBER |
|---|---|
| **PARTS BOOK - PAPER:** | |
| TD7H - ENGINE AND CHASSIS | BEPB470010 |
| TD8H - ENGINE AND CHASSIS | BEPB471010 |
| TD9H - ENGINE AND CHASSIS | BEPB472010 |
| **PARTS BOOK - MICROFICHE:** | |
| TD7H - ENGINE AND CHASSIS | BEPM470010 |
| TD8H - ENGINE AND CHASSIS | BEPM471010 |
| TD9H - ENGINE AND CHASSIS | BEPM472010 |
| **OPERATION AND MAINTENANCE MANUAL:** | |
| TD7H - ENGINE AND CHASSIS | CEAM470010 |
| TD8H - ENGINE AND CHASSIS | CEAM471010 |
| TD9H - ENGINE AND CHASSIS | CEAM472010 |
| **SHOP MANUAL:** | |
| CHASSIS | CEBM789H03 |
| SUPPLEMENT ONLY | CEBM789H01S |
| SUPPLEMENT ONLY | CEBM789H02S |
| SUPPLEMENT ONLY | CEBM789H03S |
| ENGINE SET (INCLUDES FOLLOWING MANUALS) | CEBM610002 |
| SHOP | CEBM610SH0 |
| SPECIFICATIONS | CEBM610SP0 |
| TROUBLESHOOTING AND REPAIR | CEBM610TR0 |
| ALTERNATIVE REPAIR | CEBM610AR0 |
| SERVICE TOOL MANUAL | 1128166R2 |
| **SAFETY MANUAL** | CLT80-1 |

**PARTS AND SERVICE PUBLICATIONS CAN ONLY BE ACQUIRED BY AUTHORIZED DRESSER DISTRIBUTORS, USING THE PARTS INFORMATION PROCESSING SYSTEM (PIPS).**

**IF THE PIPS SYSTEM IS NOT AVAILABLE AT THE DISTRIBUTOR LOCATION, THEN THE FOLLOWING REQUISITION FOR FOR TECHNICAL SERVICE PUBLICATIONS AND SERVICE FORMS CAN BE USED. FORM KDC91D IS SHOWN ON THE REVERSE SIDE OF THIS PAGE.**

sion and apply the parking brake. Turn off the electrical system master switch. Remove the key.

Read and know your OPERATION & MAINTENANCE MANUAL and SHOP MANUAL before performing any work on the machine. Read ALL product graphics and safety precautions. Never work beneath the blade without proper blocking and/or a safety bar properly installed. Improper blocking could result in serious injuries.

Do not attempt to make repairs that you do not understand. Consult your distributor. Use only approved parts for repairs and maintenance. Failure to do so could compromise your personal safety and machine performance and reliability. The rollover protective structure (ROPS) provides operator protection in the event of machine rollover or upset. This structure is designed to bend during a rollover to protect the operator from sudden impact loads. Do not attempt to repair a protective structure after an accident.

Repaired structures do not provide the original strength and protection. Contact your distributor for information on structure replacement. Do not operate the machine again until the ROPS has been replaced. Use only replacement parts shown in your PARTS BOOK.

Do not cut, grind, weld, drill or tap holes in the ROPS. This could weaken the structure, or affect the overall energy absorption capabilities.

Do not smoke when refueling or servicing the machine. A fire could result. Never place gasoline or diesel fuel in an open pan. Never remove the fuel tank filler cap or refill the fuel tank while the engine is operating or hot or when the machine is indoors. The fumes are dangerous and a spark or flame could result in a fire or explosion.

Loosen the radiator cap slowly to relieve all pressure in the system and use caution when removing the caps.

Pressurized Reservoir; Loosen the filler cap slowly to relieve reservoir pressure to prevent possible injury. Always vent the hydraulic system before working on any hydraulic component. Have all equipment resting on the ground or blocked before removing any component.

When service or maintenance requires access to areas that cannot be reached from the ground, use a ladder or platform. If such ladders or platforms are not available, use the machine hand holds and steps provided. Perform all service or maintenance carefully.

Never align holes with fingers or hands. Use a proper aligning tool. Be sure all tools are in good condition. Do not use tools which are worn, bent or have mushroomed heads. Use the proper tool for the job. Remove sharp edges and burrs from reworked parts.

Before working on the machine, tag and lock the electrical system master switch so no one will start it unexpectedly.

For field service, move machine to level ground if possible and block the tracks. If work is absolutely necessary on an incline, block the machine and its attachments securely. Move the machine to level ground as soon as possible.

Do not carry loose objects in pockets that might catch on the machine or fall unnoticed into open compartments.

Before working on any part of the engine or electrical system, disconnect the battery ground cable. Tag the cable and all controls to alert personnel that work is in progress.

When it is necessary to make any checks or adjustments with the engine operating, always use two people. One trained person must be in the operator's seat to safeguard the second person making the checks or adjustment. As an added precaution, when making checks or adjustments with the engine operating, make sure the transmission shift lever is locked in neutral (N).

Never stand on the tracks or near the blade while engine is operating. If the engine is running and the side doors are open or removed be careful of rotating parts such as the fan and belts that can cause serious injury. Never run the engine when cleaning or lubricating the machine. Serious injury could result from contacting moving parts.

Use a non toxic, nonflammable commercial solvent for cleaning parts, unless otherwise specified. Never use gasoline, diesel fuel, kerosene or other flammable solvents for cleaning parts. Excessive or repeated skin contact with sealants or solvents may cause skin irritation. In case of skin contact, remove sealant or solvent promptly by washing with soap and water. Follow the manufacturer's advise whenever cleaning agents or other chemicals are used.

Lower the blade before making hydraulic adjustments. To prevent personal injury, be sure personnel are not standing in the way of the blade when it is being lowered. Never allow anyone to walk under or be near unblocked raised equipment.

Provide proper ventilation when operating in a closed building to avoid danger of exhaust gases. Exhaust gases are dangerous and can cause unconsciousness and death.

**DESCRIPTION** **PAGE**

## HYDRAULIC TUBES AND FITTINGS

The torque figures are recommended for plain, cadmium or zinc plated fittings, dry or wet installations. Swivel nuts either swaged or brazed. Figures are for tube nuts used with 37° flared fittings and JIC - 37° seat O-Ring boss plugs and swivel nuts.

| TUBE NUTS | | | | O - RING BOSS PLUGS AND SWIVEL NUTS | | |
|---|---|---|---|---|---|---|
| FOR 37° FLARED FITTINGS | | | | JIC - 37° SEAT | | |
| SIZE | TUBING O.D. | THREAD SIZE | MINIMUM lbf ft | MAXIMUM lbf ft | MINIMUM N•m | MAXIMUM N•m |
| 4 | 1/4 | 7/16-20 | 9 | 12 | 12 | 16 |
| 5 | 5/16 | 1/2-20 | 12 | 15 | 16 | 20 |
| 6 | 3/8 | 9/16-18 | 21 | 24 | 29 | 33 |
| 8 | 1/2 | 3/4-16 | 35 | 40 | 47 | 54 |
| 10 | 5/8 | 7/8-14 | 53 | 58 | 72 | 79 |
| 12 | 3/4 | 1-1/16-12 | 77 | 82 | 104 | 111 |
| 14 | 7/8 | 1-3/16-12 | 90 | 100 | 122 | 136 |
| 16 | 1 | 1-5/16-12 | 110 | 120 | 149 | 163 |
| 20 | 1-1/4 | 1-5/8-12 | 140 | 150 | 190 | 204 |
| 24 | 1-1/2 | 2-1/2-12 | 162 | 175 | 217 | 237 |
| 32 | 2 | 2-1/2-12 | 225 | 240 | 305 | 325 |

## HOSE CLAMPS

The following chart provides the tightening torques for hose clamps used in all rubber applications (radiator, air cleaner, operating lever boots, hydraulic system, fuel systems etc.).

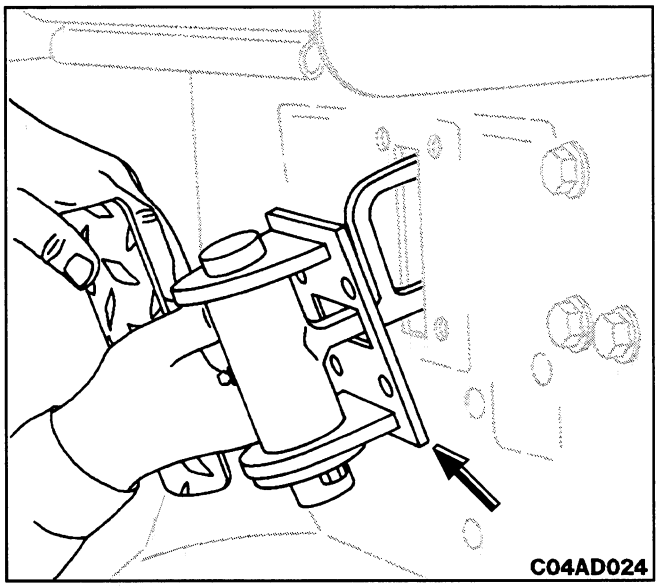
| CLAMP TYPE AND SIZE | TORQUE ± 5 lbf in (0.6 N•m) | | | |
|---|---|---|---|---|
| | RADIATOR, AIR CLEANER, BOOTS, ETC. | | HYDRAULIC SYSTEM | |
| | N•m | lbf in | N•m | lbf in |
| T Bolt | 6.2 to 7.3 | 55 to 65 | ----- | ----- |
| Worm Drive - 1-¾ in Open Diameter and Under | 2.2 to 3.3 | 20 to 30 | 4.5 to 5.6 | 40 to 50 |
| Worm Drive - Over 1-¾ in Open Diameter | 4.5 to 5.6 | 40 to 50 | ------ | ------ |
| Worm Drive - All Ultra-Tite | 10.7 to 11.8 | 95 to 105 | 4.5 to 5.6 | 40 to 50 |

## SPLIT FLANGE CONNECTIONS

The following chart provides the tightening torques for split flange connections used in hydraulic systems. Flanges and fitting shoulders should fit squarely. Install all bolts, finger tight, then torque evenly. Over torquing bolts will damage the flanges and/or bolts, which may cause leakage.

| FLANGE SIZE | BOLT SIZE | BOLT TORQUE | |
|---|---|---|---|
| | | N•m | lbf ft |
| 1/2 | 5/16 | 20 to 24 | 15 to 18 |
| 3/4 | 3/8 | 30 to 37 | 22 to 27 |
| 1 | 3/8 | 37 to 47 | 27 to 35 |
| 1-1/4 | 7/16 | 47 to 61 | 35 to 45 |
| 1-1/2 | 1/2 | 62 to 79 | 46 to 58 |
| 2 | 1/2 | 75 to 88 | 55 to 65 |
| 2-1/2 | 1/2 | 107 to 123 | 79 to 91 |
| 3 | 5/8 | 187 to 203 | 138 to 150 |
| 3-1/2 | 5/8 | 159 to 180 | 117 to 133 |

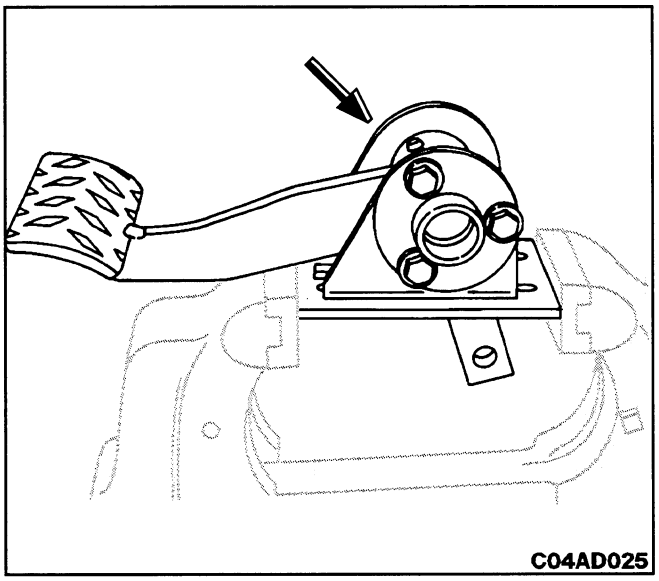
5. Rotate pedal and bracket 90° sideways and remove from dashboard.



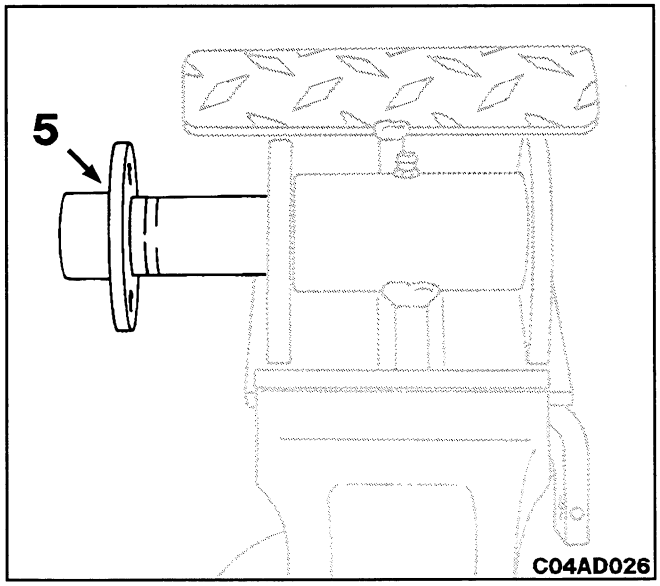

## SERVICE

***NOTE: Callouts from exploded and flat section views correspond with callouts in following steps.***

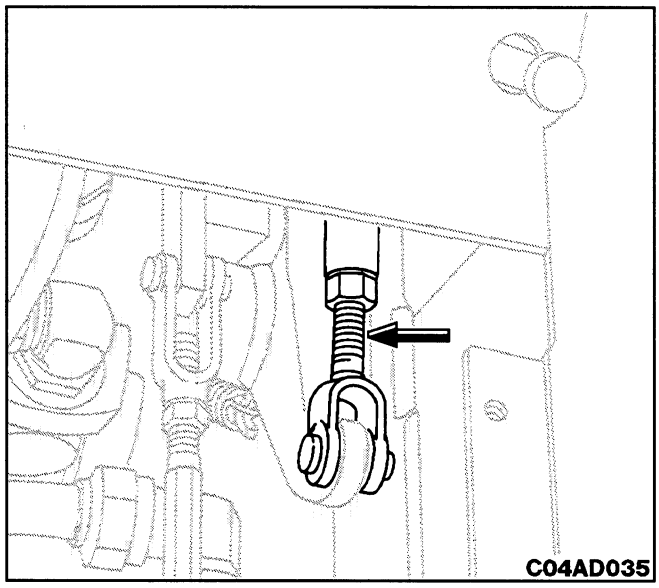
1. Position assembly in vise. Remove cross shaft mounting hardware.



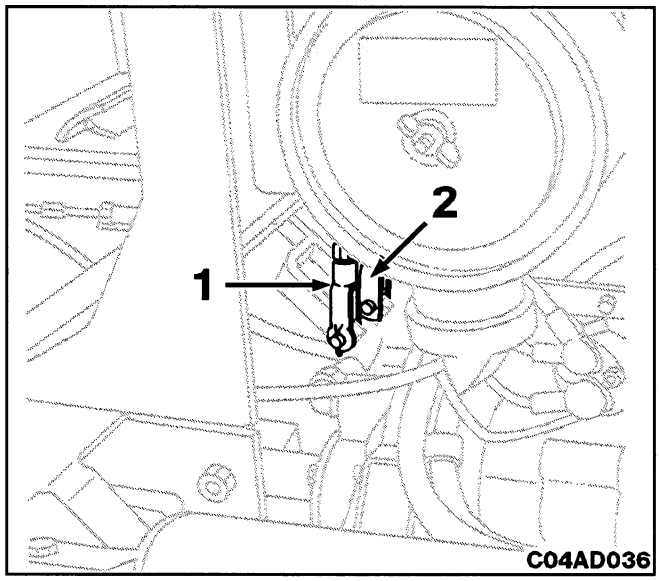

2. Remove cross shaft (5) from bracket.



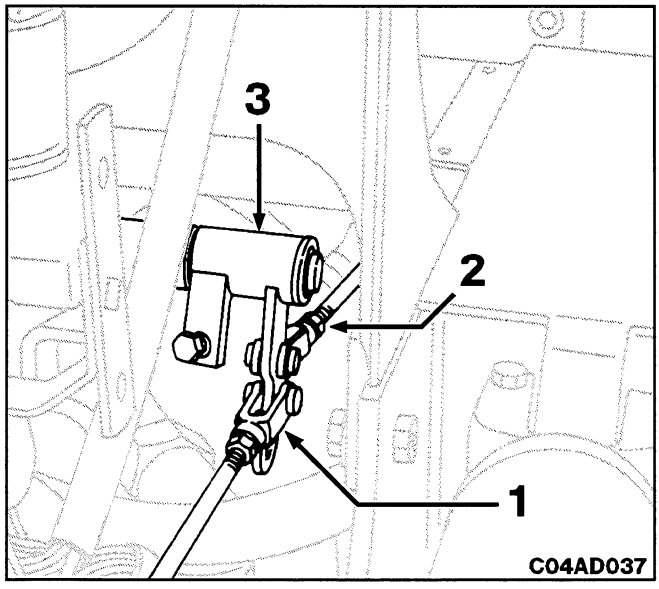
4. Disconnect and remove final brake rod from brake support plate and brake pad.



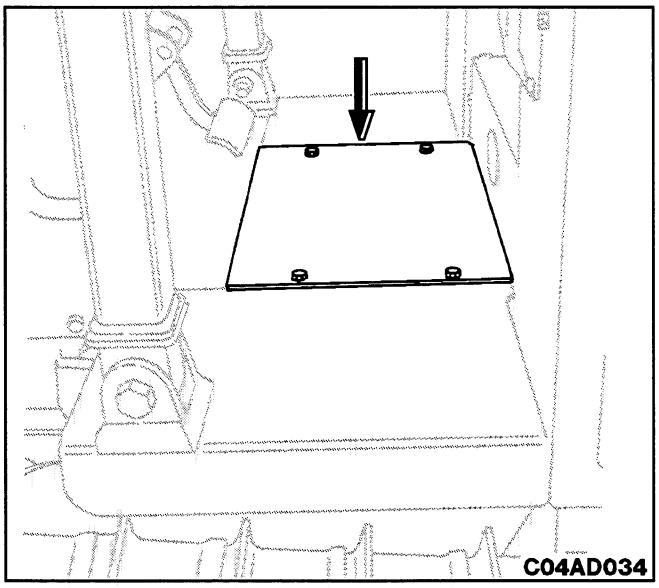

5. Disconnect brake rod (1) and decelerator over travel rod (2) from support plate linkage.



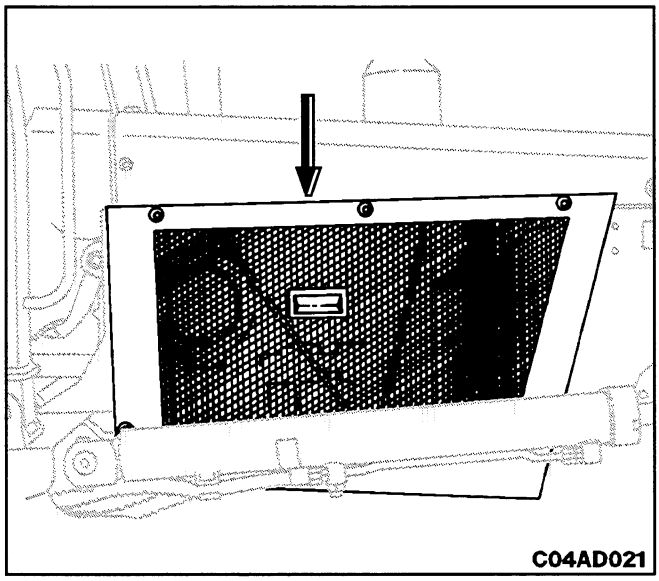

6. Disconnect pump control rod (1) and over travel throttle (2) from linkage (3).



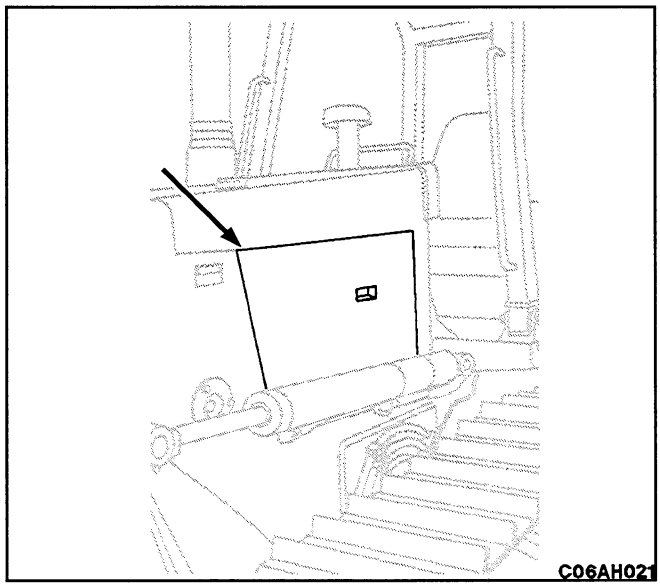
6. Install operators compartment floor plate and secure with hardware. Torque bolts to 28 lbf ft (38 N•m) ±10%.



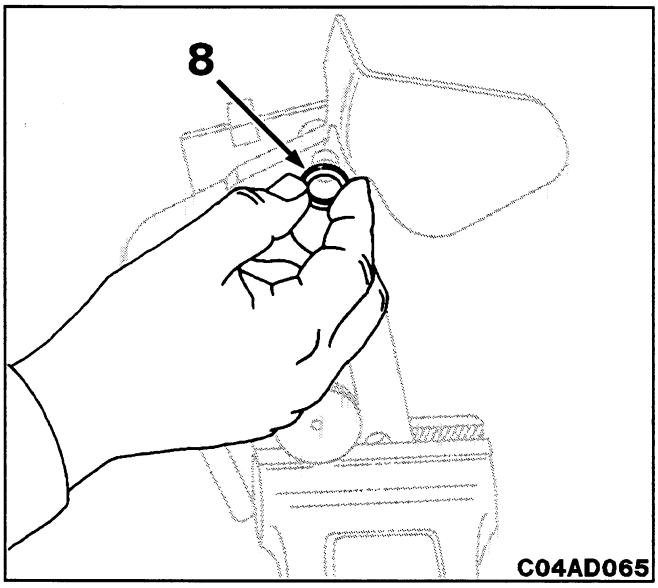

7. Install right engine side door and secure with hardware. Torque bolts to 28 lbf ft (38 N•m) ±10%.



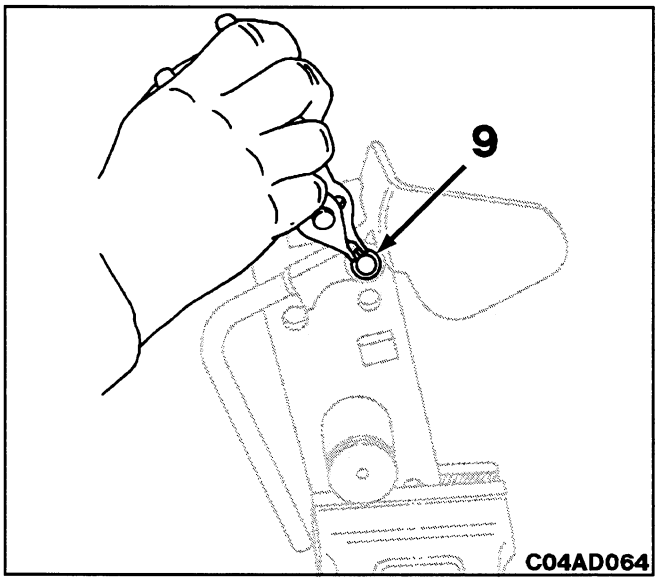

8. Install left engine side door and secure with hard ware. Torque bolts to 28 lbf ft (38 N•m) ±10%.



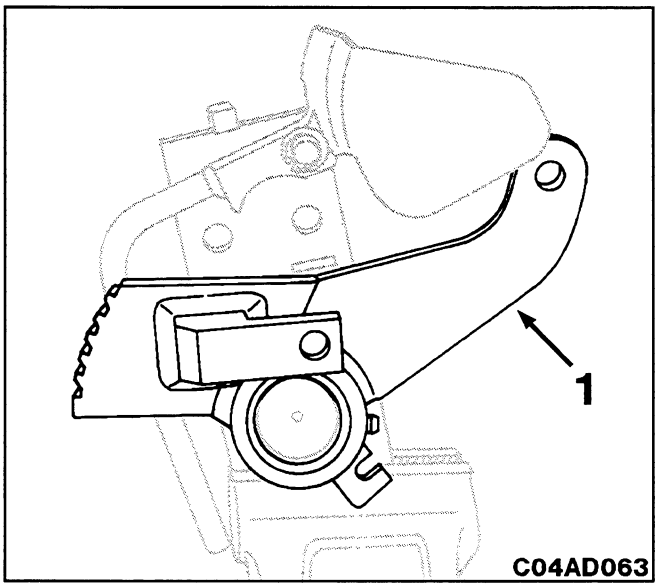
13. Install spacer washer (8) on shaft.




14. Install outer retaining ring (9) to shaft.




15. Install final bellcrank (1) to mounting bracket shaft.

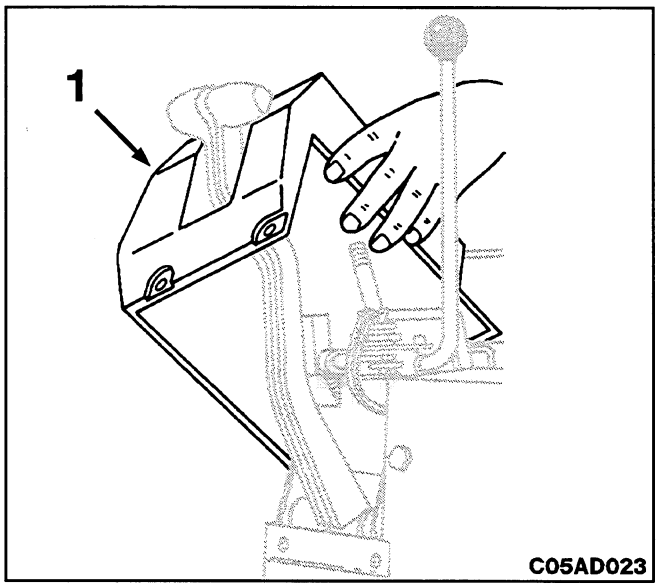


## REMOVAL

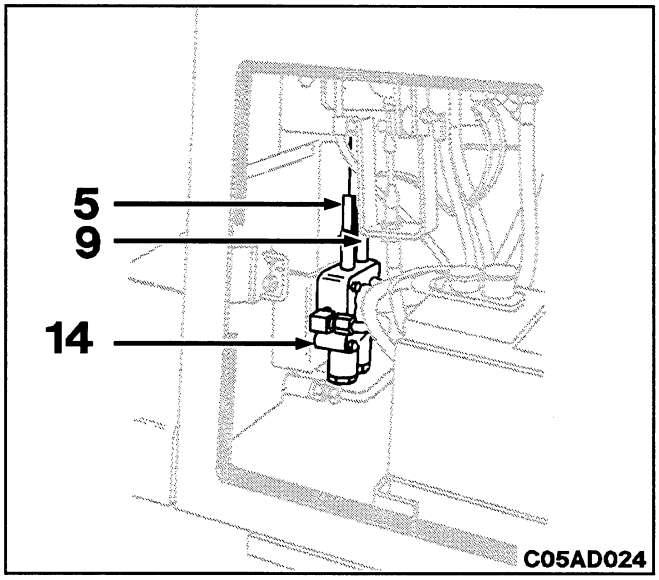
**WARNING! Be sure blade and any rear mounted equipment has been lowered to the ground or on suitable blocking. Turn the master switch to the off position and remove key or remove one of the cables from the master switch to prevent accidental starting.**

***NOTE: Callouts from exploded view correspond with callouts in following steps.***

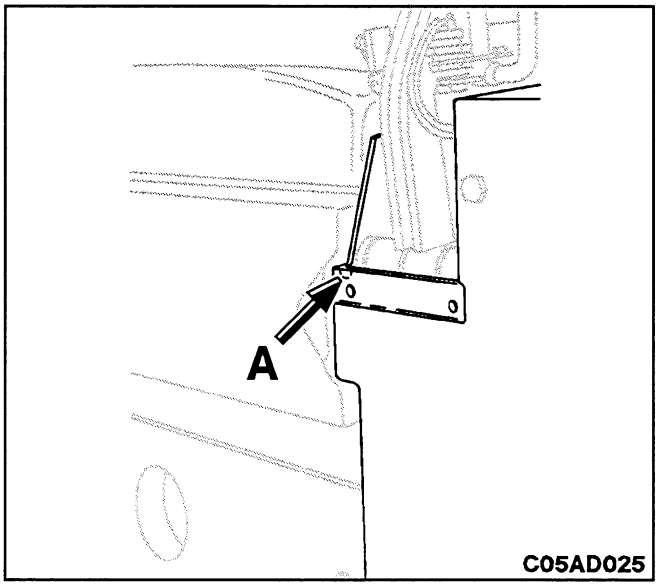
1. Remove hardware and left console (1).

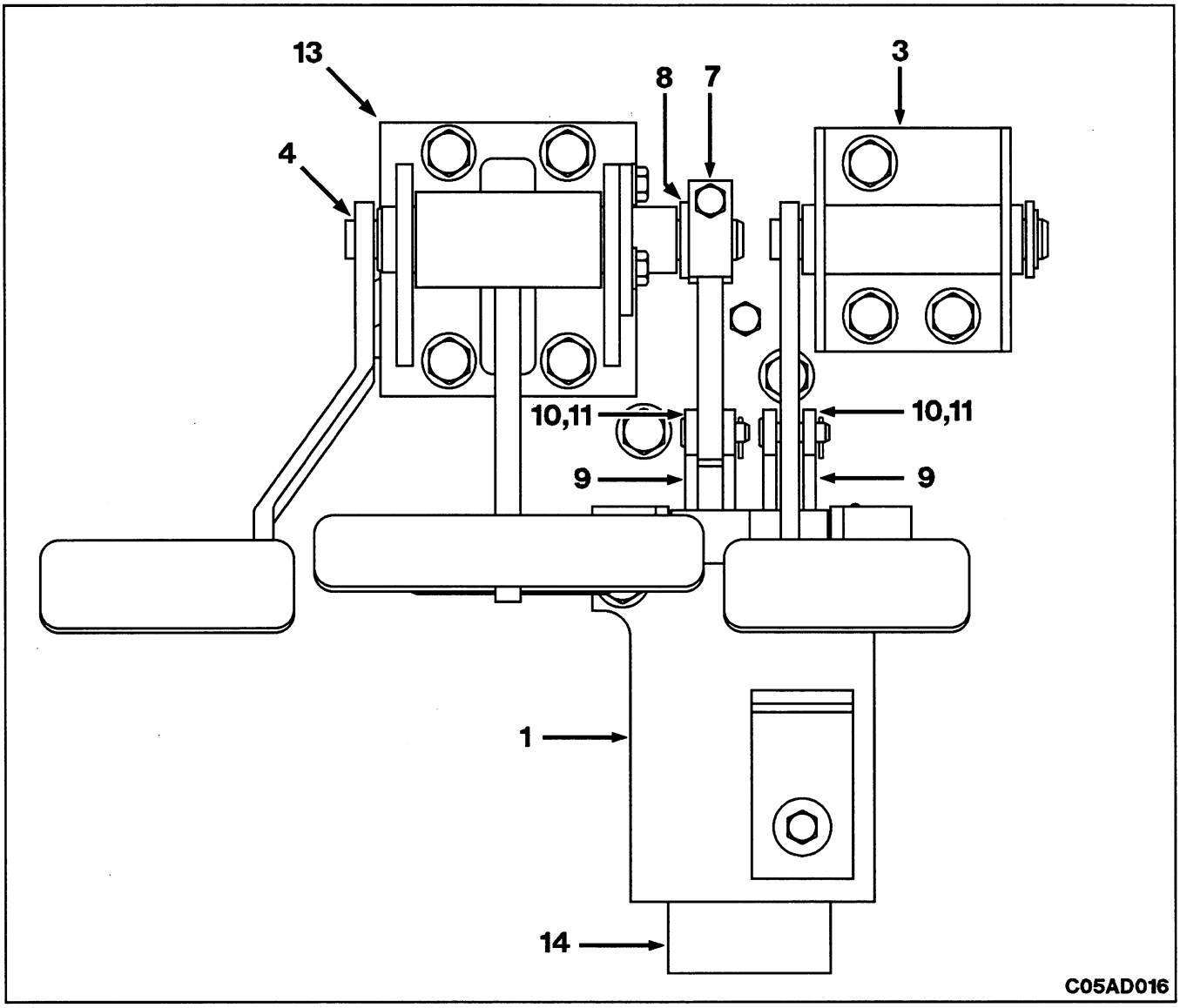



2. Disconnect linkage (5 and 9) or (11) at steering valve (14).




3. Earlier Versions; Notch out half circle (A) on left console. This will aide in removing roll pin.






FLAT VIEW OF FOOT STEERING

**REMOVAL**

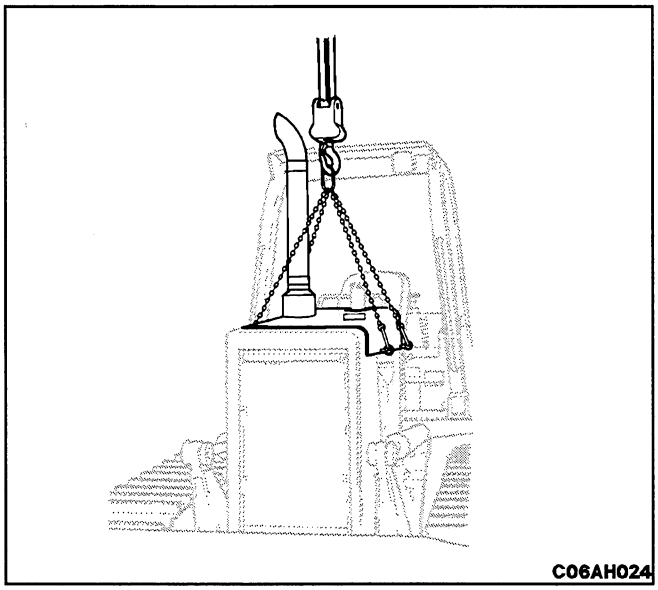
**WARNING! Be sure blade and any rear mounted equipment has been lowered to the ground or on suitable blocking. Turn the master switch to the off position and remove key or remove one of the cables from the master switch to prevent accidental starting.**

***NOTE: Callouts from exploded and flat views correspond with callouts in following steps.***

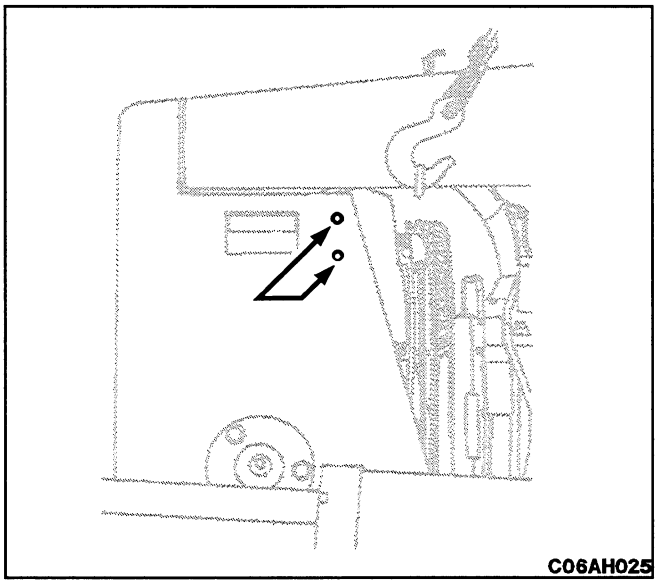
1. Remove engine side doors from each side of machine. From behind dashboard, unhook and remove return springs (2).
2. Remove bolt from clamped lever (7). Pull left steering pedal (4) from brake pedal bracket (13) catching flat washer (8) and key.
3. Disconnect clamped lever (7) from rod end clevis (11) and remove.
4. Disconnect right steering pedal (3) from rod end clevis (11). Unbolt pedal assembly and remove from machine.
5. Remove steering valve (14) with hoses from mounting bracket (1) and position out of way. Remove hardware from bracket (1) and detach from machine.

**DESCRIPTION** **PAGE**

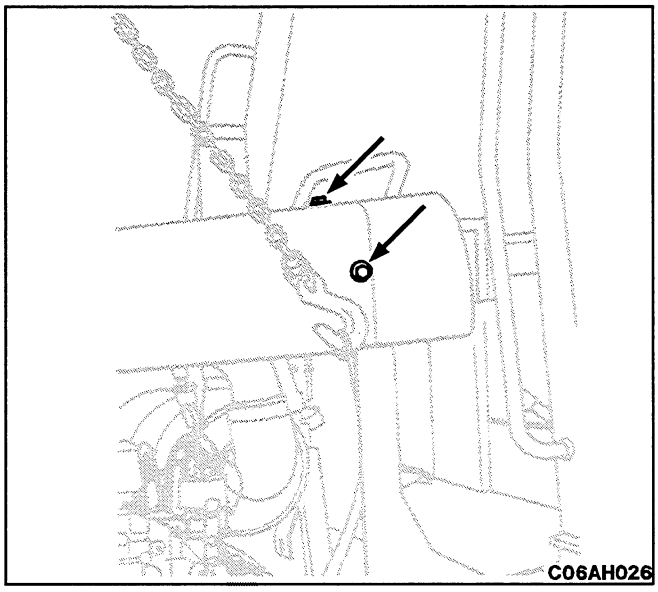
7. Install hoist to eyebolts.



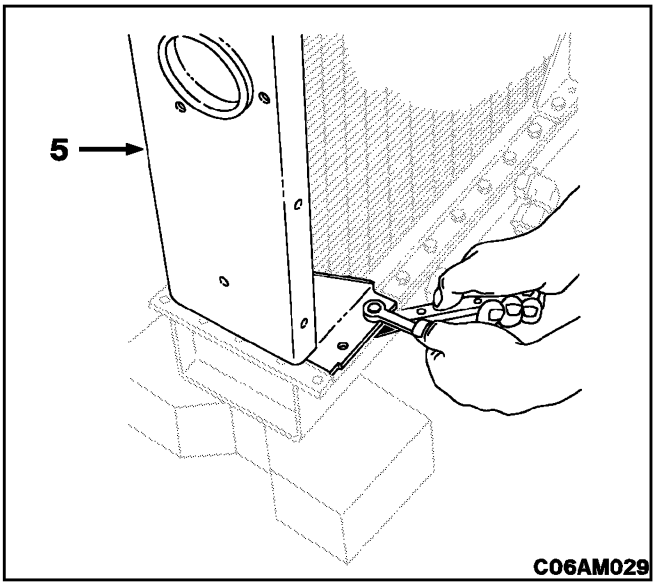

8. Remove hood tie down bracket bolts. Remove hook rod, ball and bracket together.



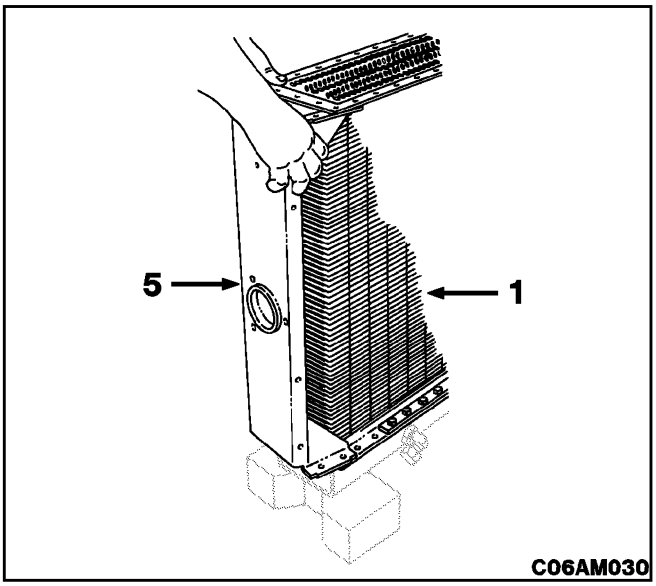

9. Remove hood rear mounting hardware.



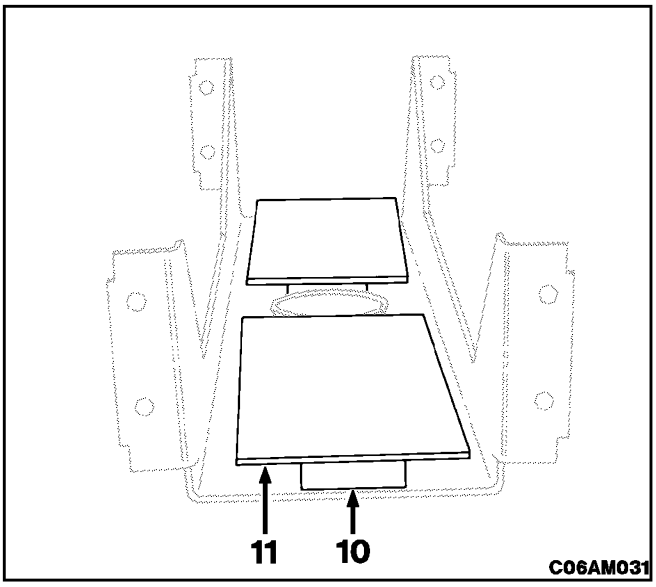
11. Remove left side bracket (5) front and rear mounting hardware.



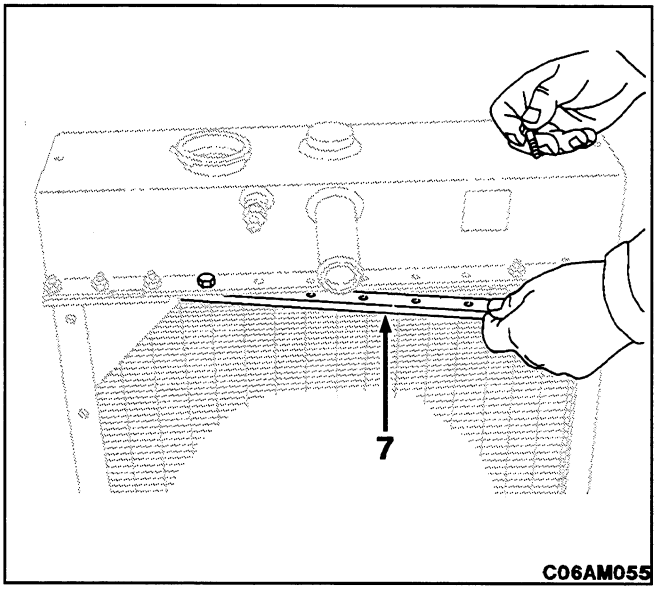

12. Carefully slide left side bracket (5) out from core and header (1).



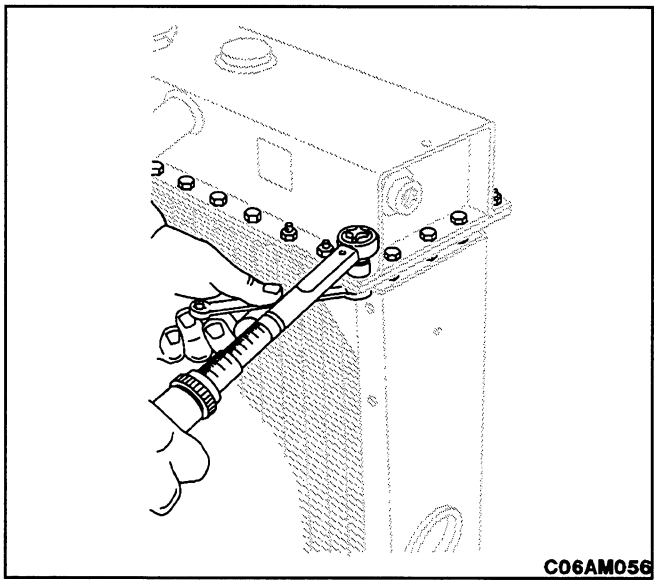

13. Check condition of core support (10) and core side (11) and replace as necessary.



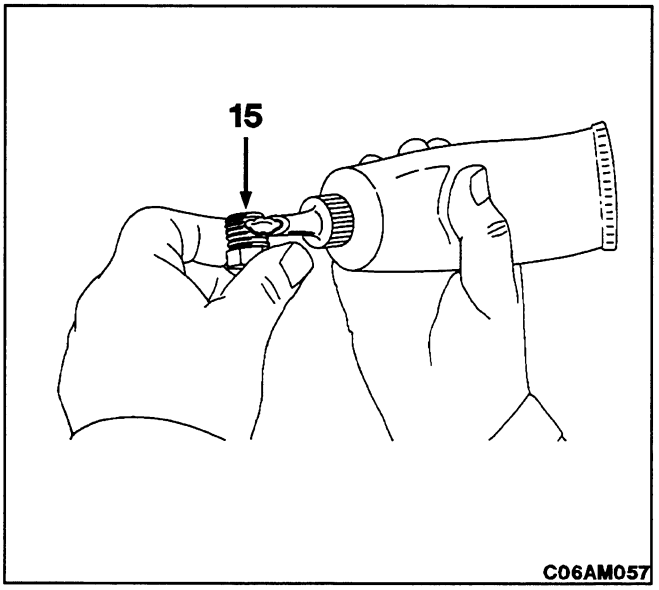
16. Install front and rear bolting bars (7), bolts facing down.



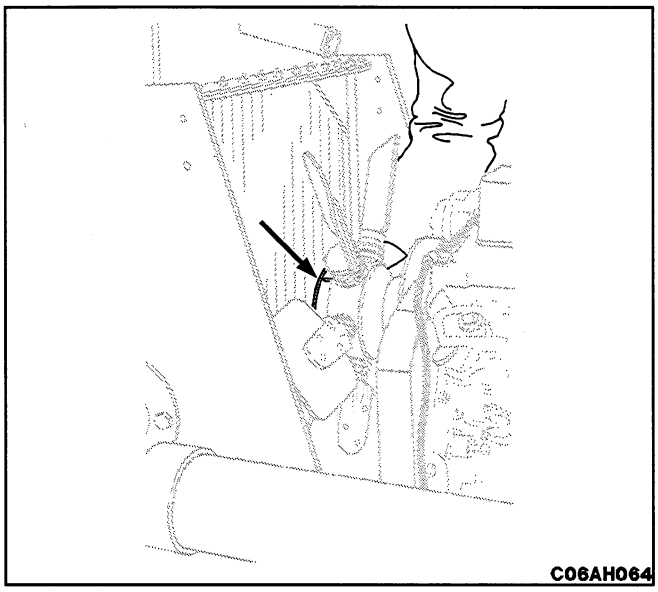

17. Torque all original mounting bolts to 13 lbf ft (18 N•m) ±10% or replacement mounting bolts to 16 lbf ft (21 N•m) ±10%.



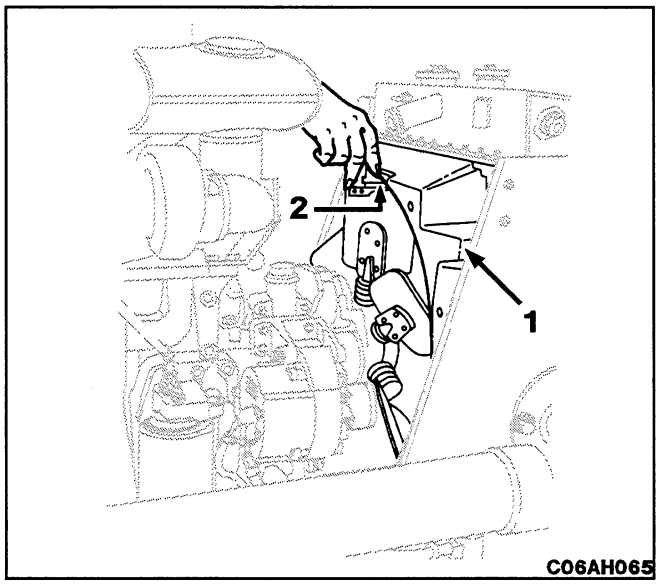

18. Coat sight glass (15) with Loctite pipe sealant and install to top tank.



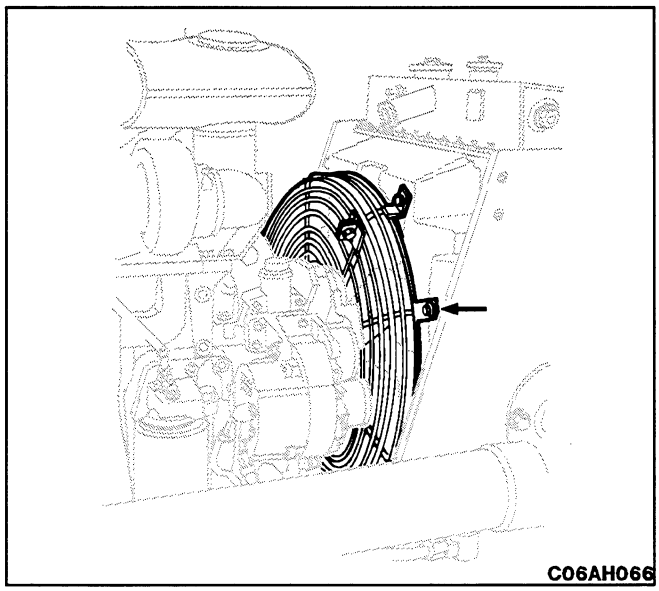
25. Install fan cover.

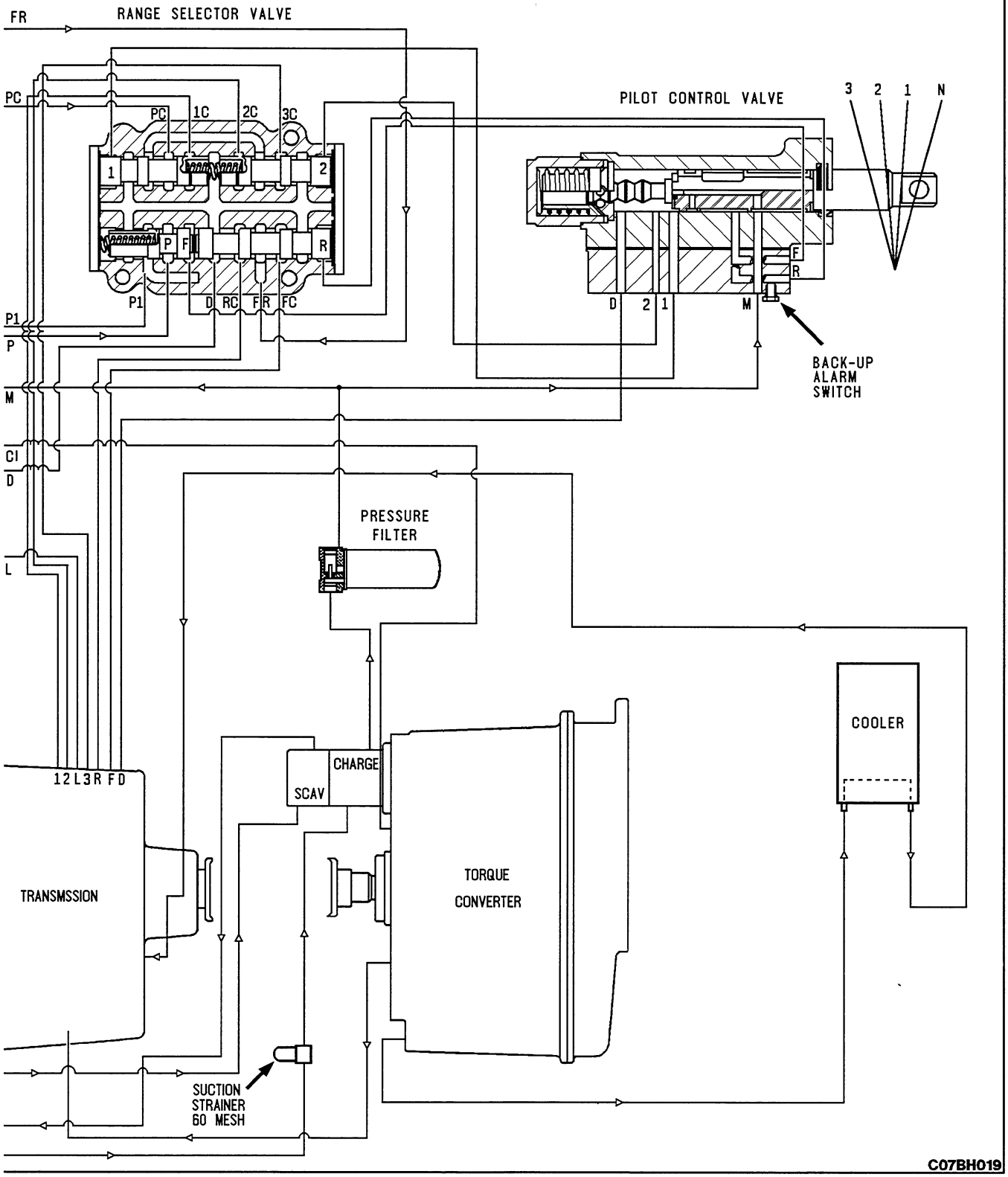



26. Install top fan shroud (1). Measure fan to shroud clearance (2) and equalize gap around fan and secure shrouding. Torque bolts to 28 lbf ft (38 N•m) ±10%.




27. Install left and right fan guard. Torque bolts to 16 lbf ft (21 N•m) ±10%.






DRIVE TRAIN SCHEMAITIC

| PROBLEM | probable cause |
|---|---|
| 10. Pressure at both 1st and 2nd simultaneously | Pilot control valve worn or leaking internally. Tee in a 400 PSI (2760 kPa) gauge at both 1st and 2nd port on range selector valve and check for signal pressure at both ports. |
| | Leaking manifold seal. |
| 11. Pressure at both 1st and 3rd simultaneously. | Leaking manifold seal. |
| 12. No pressure at forward, reverse, 1st, 2nd, or 3rd. | Low main pressure (See Problem 5). |
| | Main pressure supply line to pilot control valve plugged or restricted. |

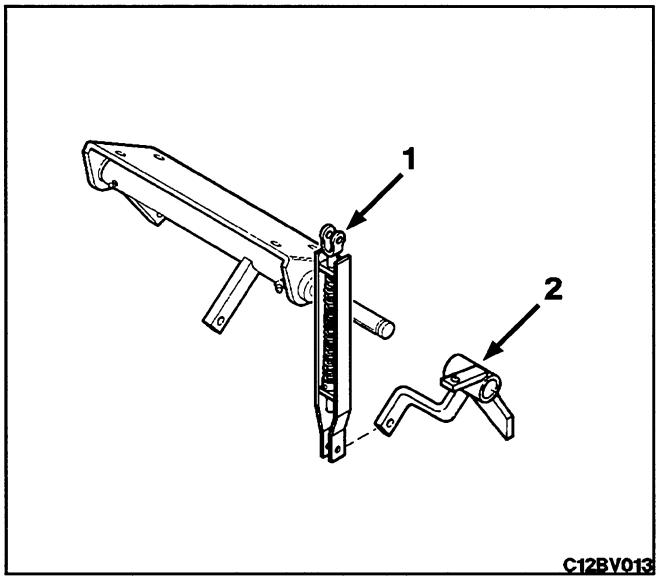
## CONVERTER STALL SPEED

### Stall Speed Check

1. Remove left engine side cover. Unpin over travel decelerator (1) from decelerator offset (2).

***NOTE: Following check should be performed with engine running at full throttle and oil at operating temperature.***

2. Connect Timing Light, DR02-3005. With engine speed at full throttle and foot brake applied, shift transmission into 3rd forward and register stall speed RPM. If stall speed meets specifications, proceed with DRIVE TRAIN CLUTCH TEST. If stall speed does not meet specifications, refer to DIAGNOSTIC CHART.




### Diagnostic Chart

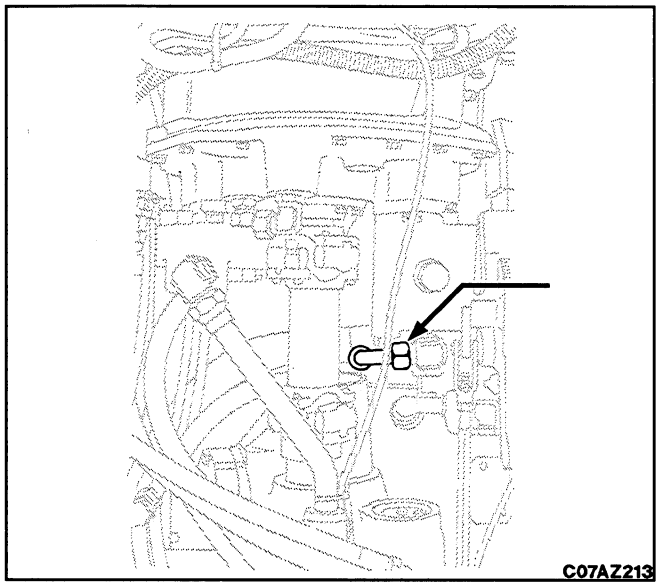
| PROBLEM | PROBABLE CAUSE |
|---|---|
| 1. Stall speed too high. | Torque converter malfunction. |
| | Injection pump defective or improperly adjusted. |
| | Incorrect injection pump for application after rebuild. |
| | Excessive injection pump fuel delivery (overfueling). |
| | Test equipment malfunctioning. |

**SERVICE DIAGNOSIS - Continued**

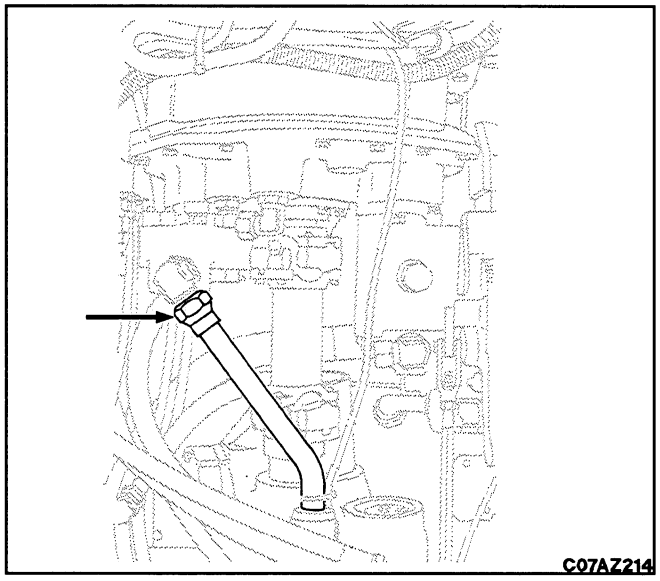
| | |
|---|---|
| **Slow or Erratic Clutch Engagement** | |
| Low oil pressure. | Refer to CHECKING DRIVE TRAIN PRESSURES. |
| Binding of main pressure spool in regulator valve housing. | Check spool. |
| Stuck spool in modulating valve. | Check valve. Install new valve body gasket. |
| Sticky spools in range selector valve. | Clean valve bores and spools. |
| Sticky spools in inching valve. | Clean valve bores and spools. |
| **Transmission Shift Lever Jumps out of Gear** | |
| Clogged drain line on pilot control valve. | Remove and clean or replace. |
| **Machine Fades to One Side** | |
| Brake disc dragging. | Adjust. Refer to SECTION 7E. |
| Steering valve malfunction. | Refer to SECTION 7E. |
| Steering cylinder malfunction. | Repair or replace. Refer to SECTION 7E. |
| Clutch out of adjustment. | Adjust. Refer to SECTION 7E. |
| Clutch disc pad worn out. | Replace. Refer to SECTION 7E. |
| **Machine Will Not Pivot Turn.** | |
| Brakes out of adjustment. | Adjust. Refer to SECTION 7E. |
| Clutch out of adjustment. | Adjust. Refer to SECTION 7E. |
| Clutch disc pads worn out. | Replace. Refer to SECTION 7E. |
| Steering valve malfunctions. | Refer to SECTION 7E. |
| Steering cylinder malfunction. | Repair or replace. Refer to SECTION 7E. |
| **Machine Will Not Move** | |
| Low transmission oil pressure. | Refer to CHECKING DRIVE TRAIN PRESSURES. |
| Low steering drive oil pressure. | Refer to CHECKING DRIVE TRAIN PRESSURES. |
| Slipping clutch packs. | Repair or replace. Refer to SECTION 7C. |

**DESCRIPTION** **PAGE**

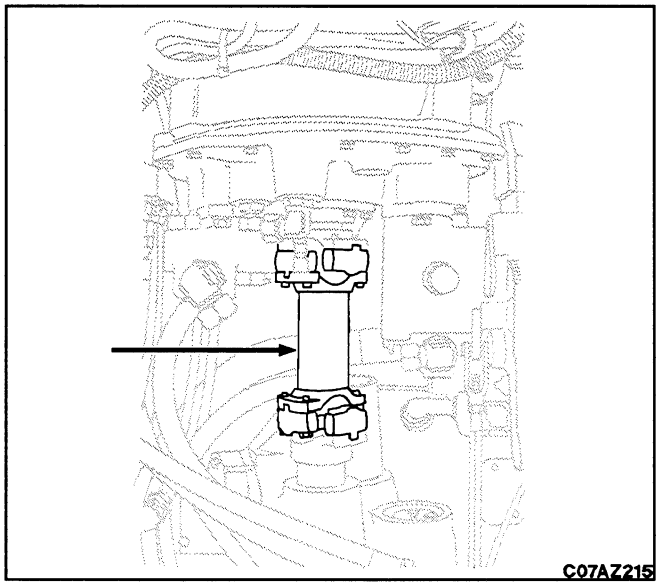
16. Disconnect, cap and plug pump to rear main frame hose at rear port of charge and scavenge pump.



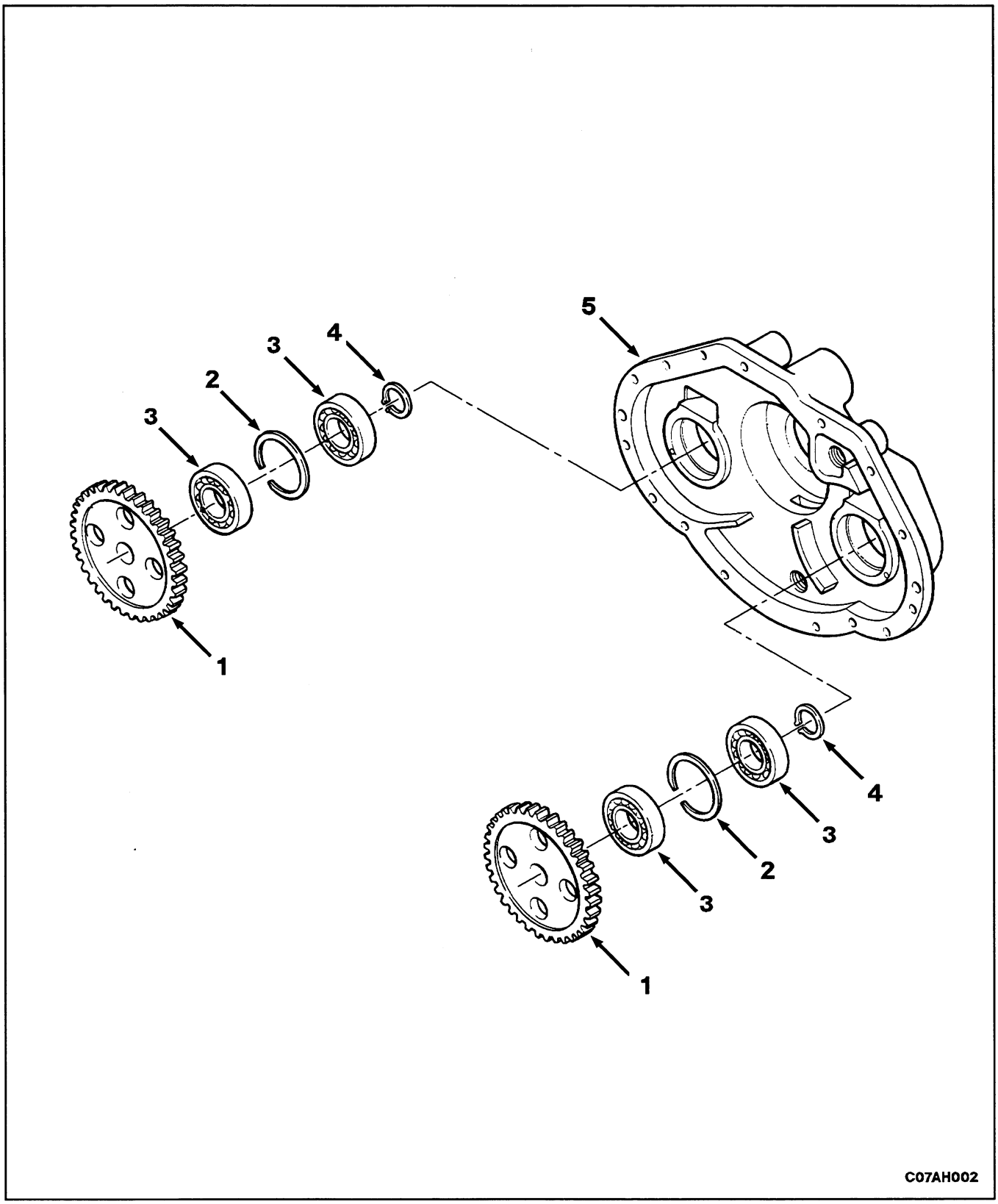

17. Disconnect, cap and plug front half of reservoir to pump tube at top port of equipment pump. Remove front tube.




18. Remove mounting hardware and drive shaft.



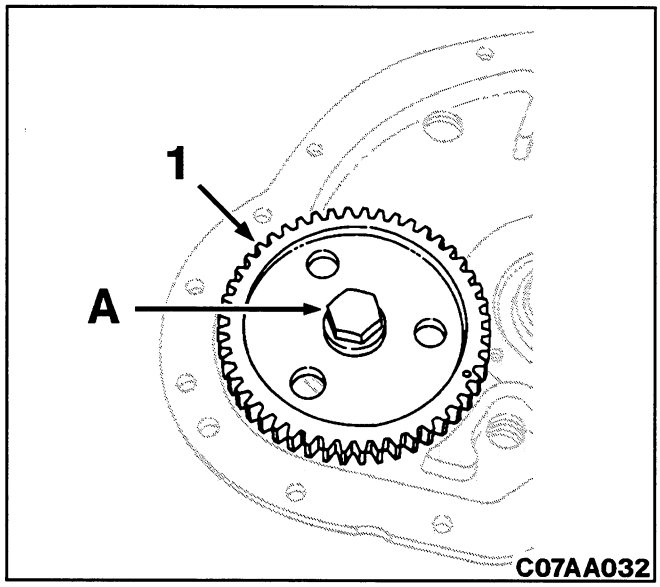
**Rear Housing**



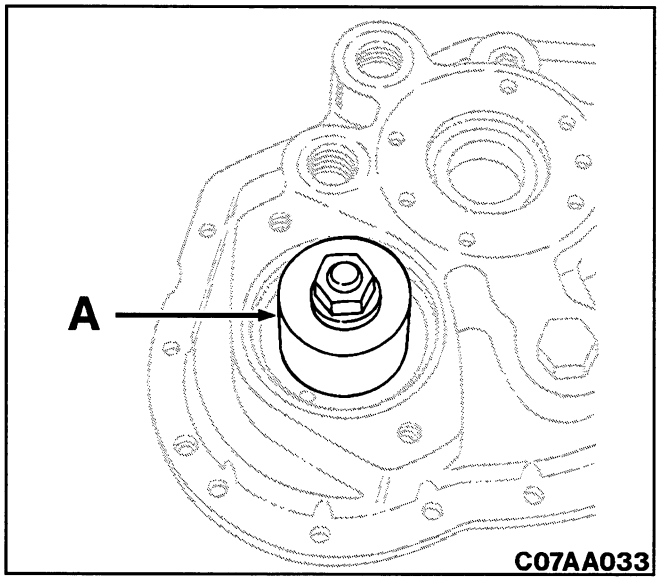

EXPLODED VIEW OF REAR HOUSING

11. From under side of housing position pump gear (1) with bolt and washer (A) from, DR04-719 through bearing.

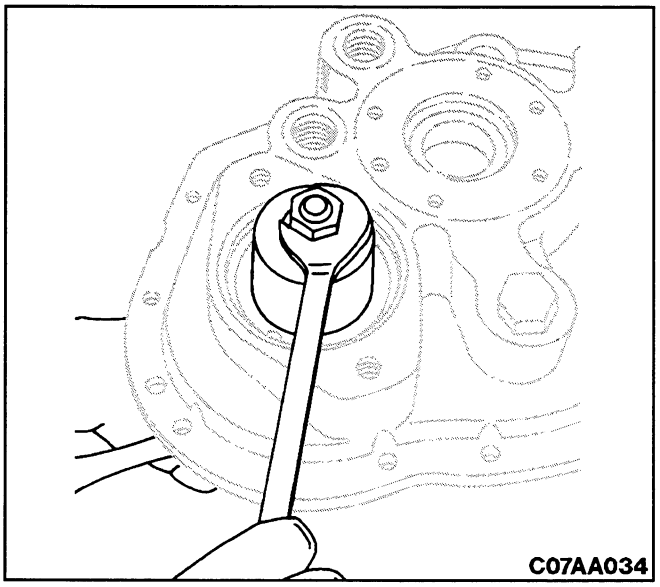
***NOTE: Rear housing rotated 180° for clarity.***



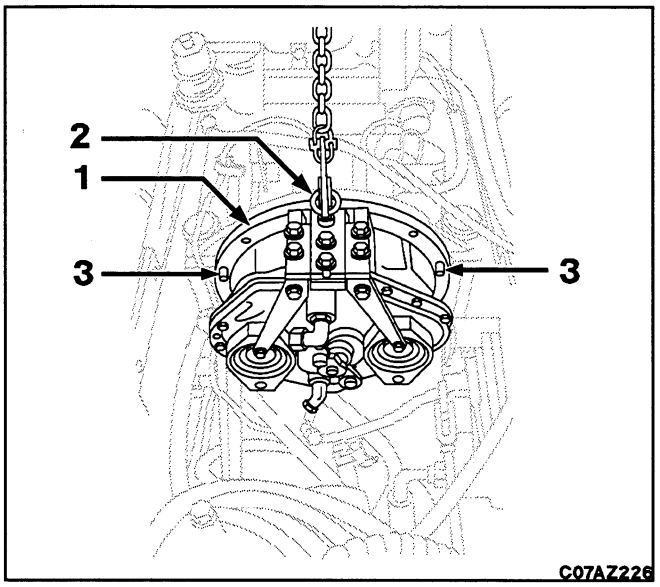

12. Position driver (A), DR04-719 on bearing inner race and secure with washer and nut.



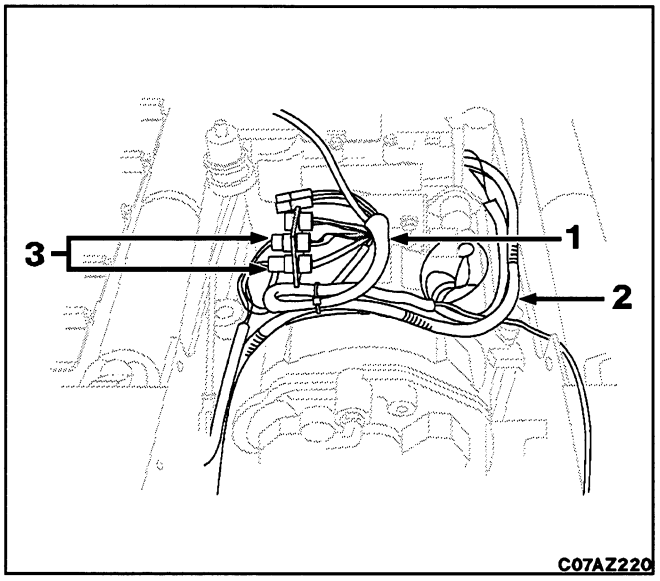

13. Tighten installing tool until inner bearing bottoms against large retaining ring.



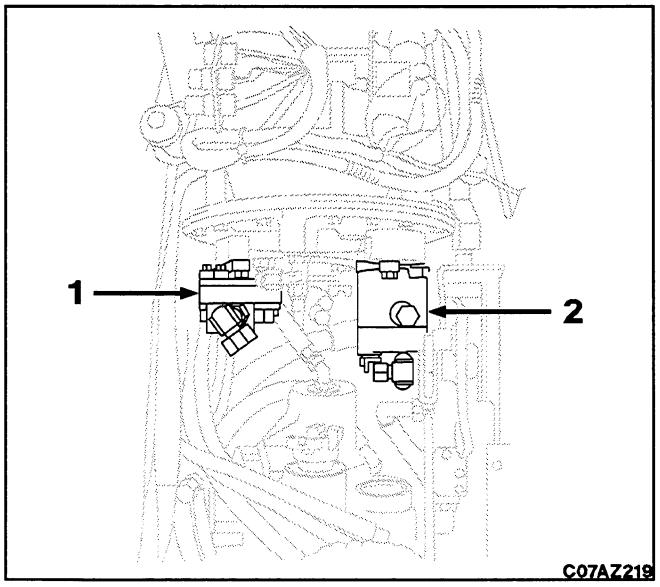
4. Position damper (1) in frame. Slide up on dowels (3) aligning output shaft splines with splines in damper plate. Rotate output yoke for spline alignment. Continue to slide in until output shaft engages and seats in flywheel bushing. Secure with half of the metric bolts. Remove lifting (2) tool and dowels. Install remaining mounting bolts and torque all to 32 lbf ft (43 N•m).




5. Reclip harness (1) and battery cable (2) to damper. Apply electrical sealing grease, Grafo 112-X to two bottom terminal connectors (3) and install to mounting bracket. Tie strap harness to battery cable.




6. Install new o-ring to equipment pump (1) and slide in damper and secure with hardware. Install new o-ring to charge and scavenge pump (2) and slide in - damper and secure with hardware. Torque bolts to 70 lbf ft (92 N•m) ±10%.



A. Inching Pedal Upright Position
B. Inching Pedal Partially Depressed
C. Inching Pedal Fully Depressed
1. Input Spool
2. Metering Spool
3. Double Return Spring Arrangement
4. Fluid from Rate of Rise Valve
5. Fluid to Drain
6. Fluid from Speed Clutch (1st, 2nd or 3rd)

## GENERAL

The inching valve performs three functions in the drive train hydraulic system.

The first function, pedal upright, is to allow full engagement of one of the speed clutch (1st, 2nd or 3rd).The second function, pedal partially depressed, is to allow slippage of one of the speed clutch (1st, 2nd or 3rd). The third function, pedal fully depressed, is to allow no engagement of one of the speed clutch (1st, 2nd or 3rd).

## THEORY OF OPERATION

***NOTE: Callouts from cross section view correspond with callouts in following text.***

### Inching Pedal Upright (A)

When the inching pedal is fully upright position (no depression), the input spool (1) is positioned down against its stop. Pressurized fluid from the rate of rise valve enters the CL port past the metering spool (2) and out the PC port. The metering spool is unable to move because of mechanical stack up of its internal components. From the PC port fluid enters back to rate of rise valve and is directed onward to the range selector valve speed packs (1st, 2nd or 3rd).

### Inching Pedal Partially Depressed (B)

When the inching pedal is in the partially depressed position, the input spool (1) is pulled up off its mechanical stop. Pressurized fluid from the rate of rise valve enters the CL port around the metering spool (2). Oil enters the drilled passage moving the metering spool upwards. As the metering spool shifts, the D (drain) port is slightly open, dropping the pressure in the speed clutch, allowing partial engagement of the clutch. As the partial drain off of fluid occurs, pressure will drop at the PC port of the metering spool allowing the double return spring arrangement (3) to shift the metering spool back down and shut off D port. The metering spool fluctuates rapidly between both positions allowing precise control of machine speed.

### Inching Pedal Fully Depressed (C)

When the inching pedal is in the fully depressed position, the input spool (1) is pulled up off its mechanical stop. Pressurized fluid from the rate of rise valve enters the CL port around the metering spool (2). Oil enters the drilled passage moving the metering spool upwards. As the metering spool shifts, the D (drain) port is fully open, dropping the pressure in the PC (port), range clutch, allowing full disengagement of the speed clutch. The D port has a drilled passage to the spring side of the metering spool for lubrication of the valve components.

## SPECIFICATIONS

Metering Spool Outer Spring (7):
- Free Length ..... 1.403 in (35.64 mm)
- Test Length ..... 0.970 in (23.04 mm)
- Work Length ..... 0.970 to 1.390 in (23.04 to 35.31 mm)
- Test Load ..... 12.1 lbf (17.52 N)
- Number of Working Coils ..... 12

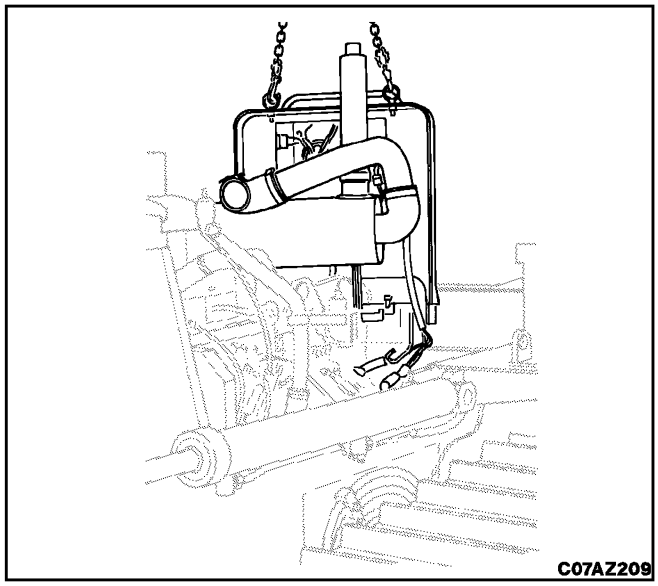
Input Spool Return Spring (9):
- Free Length ..... 2.513 in (63.83 mm)
- Test Length ..... 1.830 in (46.48 mm)
- Work Length ..... 1.306 to 1.830 in (33.17 to 46.48 mm)
- Test Load ..... 70 lbf (311.37 N)
- Number of Working Coils ..... 6

Metering Spool Inner Spring (15):
- Free Length ..... 1.025 in (26.04 mm)
- Test Length ..... 0.885 in (22.48 mm)
- Work Length ..... 0.885 to 1.025 in (22.48 to 26.04 mm)
- Test Load ..... 8.5 ±5 lbf (37.81 ±22 N)
- Number of Working Coils ..... 7.5

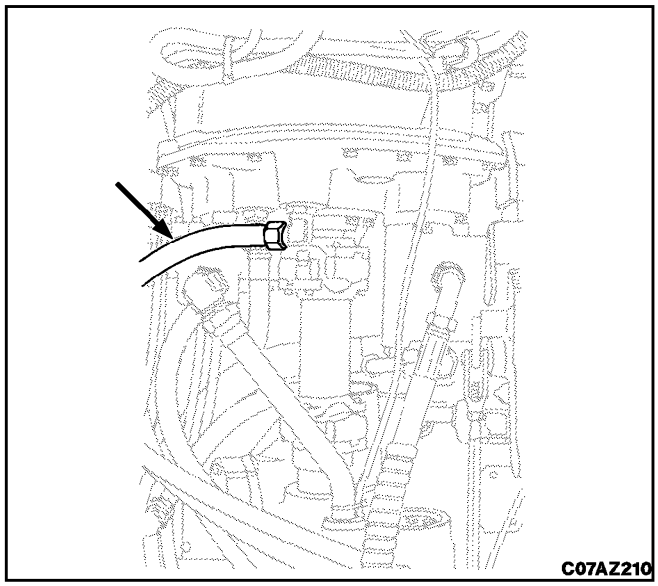
**DESCRIPTION** **PAGE**

13. On units with foot steering, disconnect six hoses at steering valve and position out of the way. Install two lifting eyes to dashboard and connect hoist. Remove four lower mounting bolts and lift dashboard from machine.

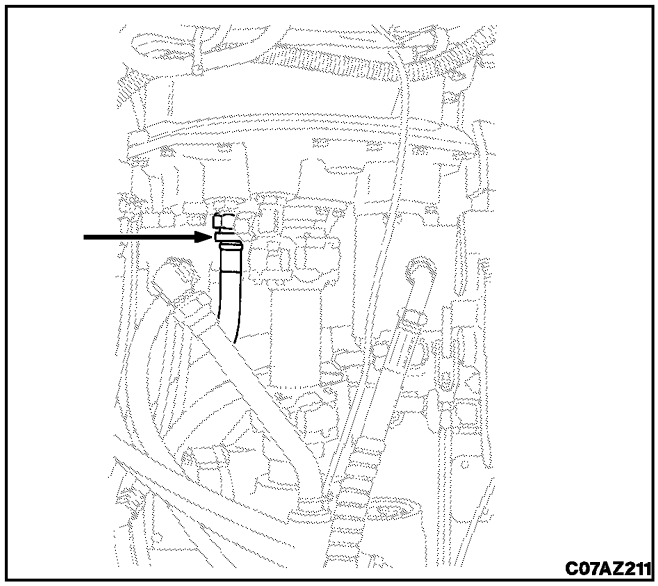
*NOTE: ON SOME MODELS THERE WILL BE SHIMS BETWEEN DASHBOARD AND MAIN FRAME. KEEP SHIMS WITH SIDES THEY WERE REMOVED FROM.*


C07AZ209

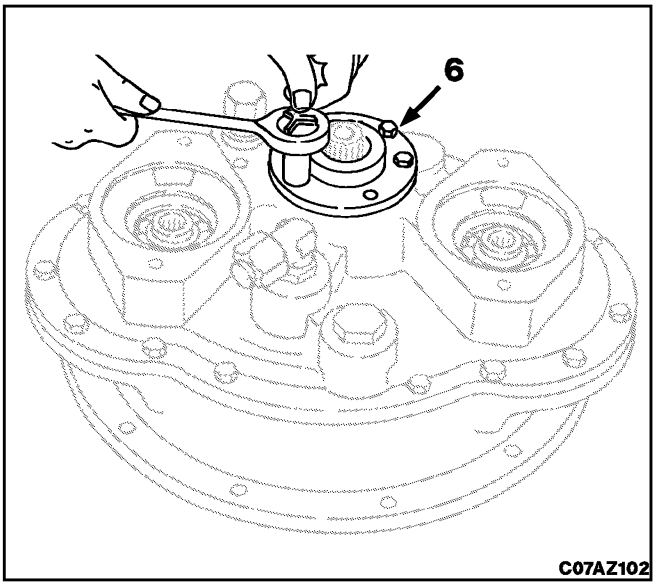
14. Disconnect, cap and plug converter inlet hose at torque converter.


C07AZ210

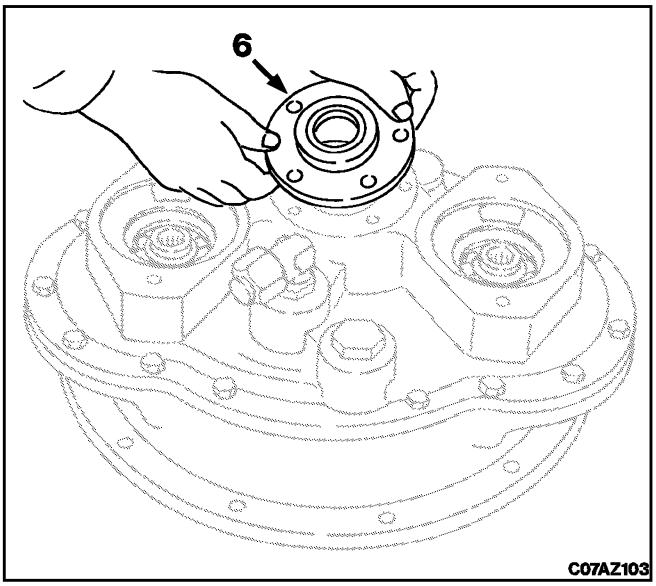
15. Disconnect, cap and plug converter drain hose at torque converter.


C07AZ211

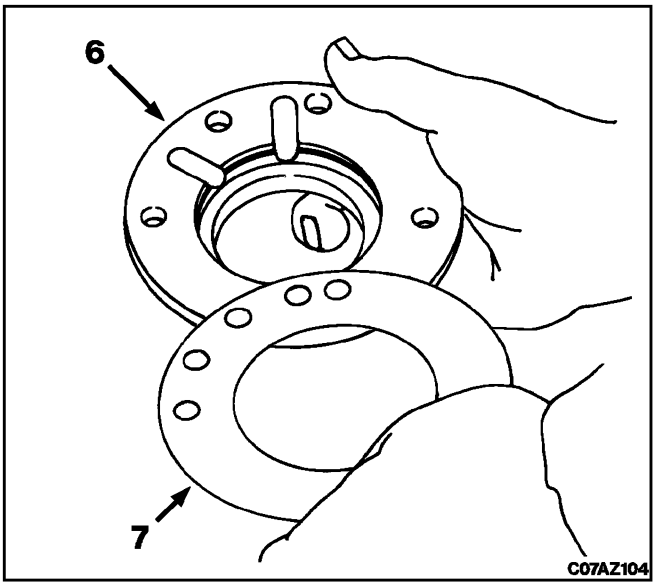
4. Remove bearing retainer (6) mounting hardware.



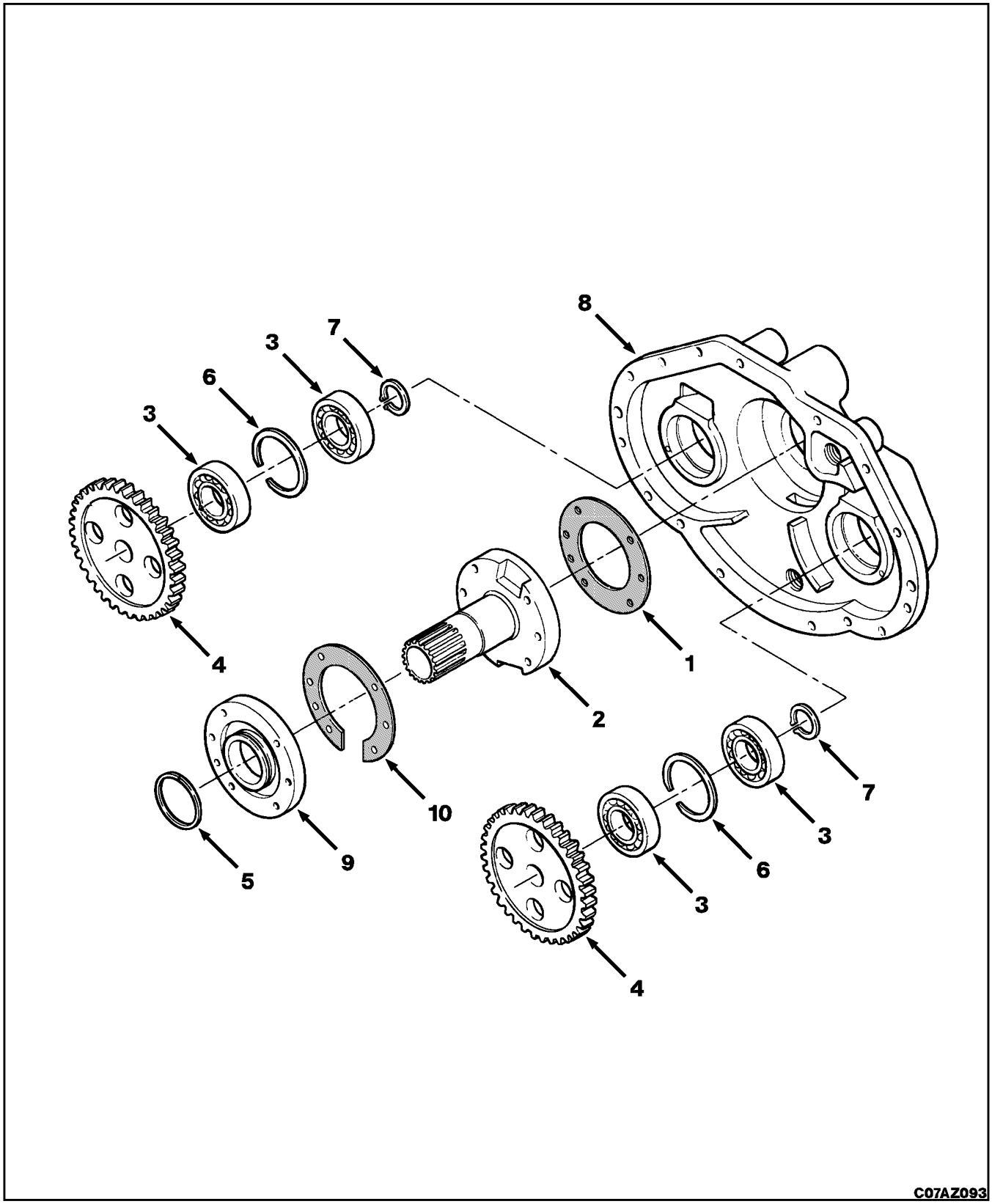

5. Remove bearing retainer (6).




6. Separate gasket (7) from bearing retainer (6) and discard.

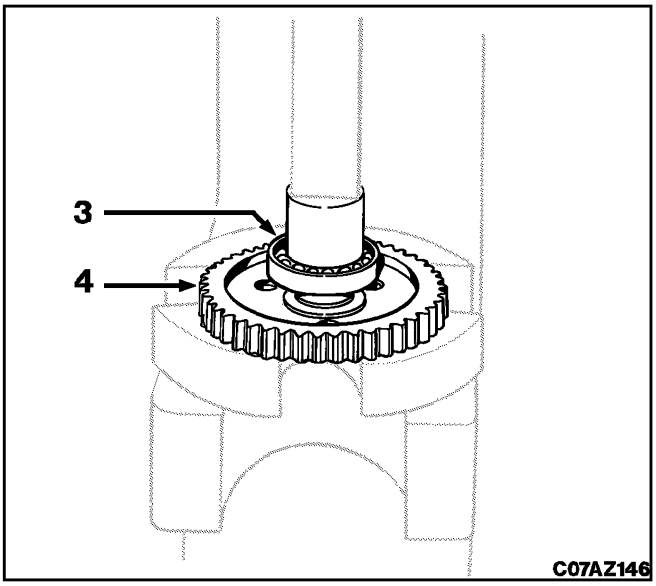


## REAR HOUSING



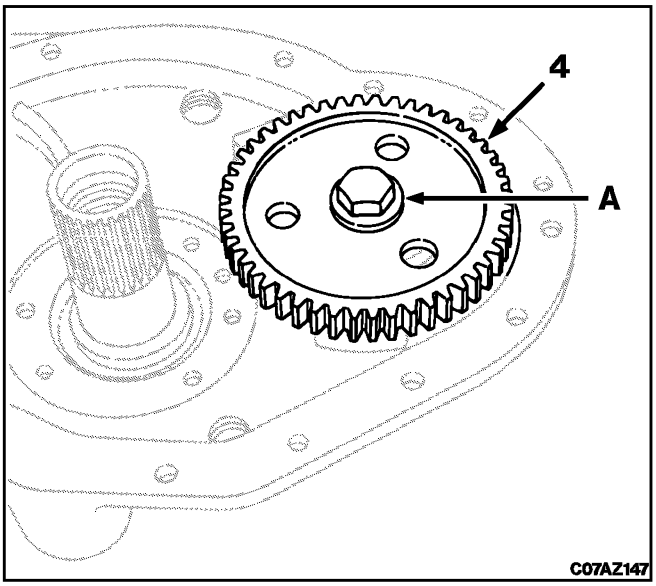

EXPLODED VIEW OF REAR HOUSING

8. Position pump gear (4) in press. Press inner bearing (3) onto gear until it bottoms.

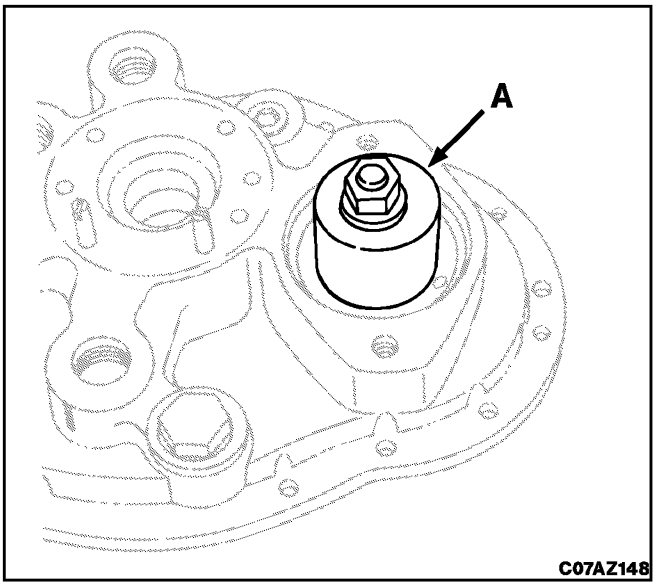



9. From under side of housing position pump gear (4) with bolt and washer (A) from, DR04-719 through bearing.

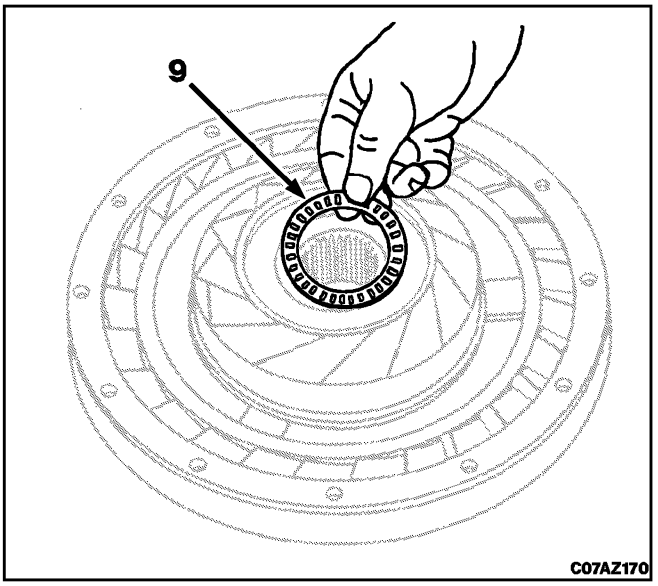
*NOTE: REAR HOUSING ROTATED 180° FOR CLARITY.*



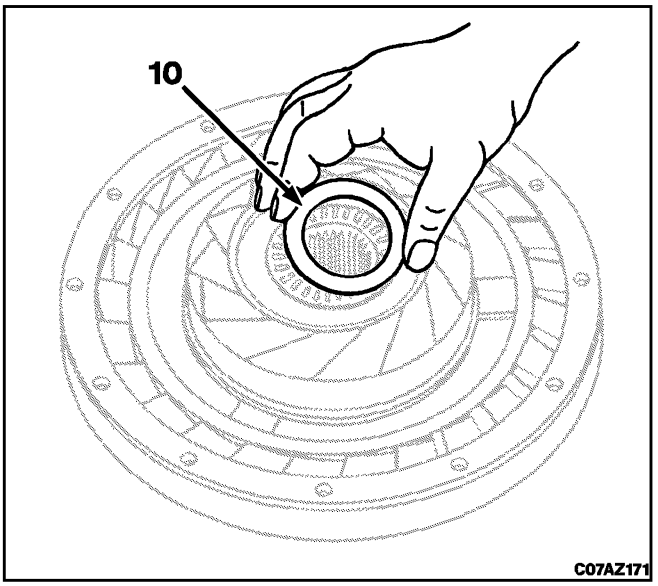

10. Position driver (A), DR04-719 on bearing inner race and secure with washer and nut.



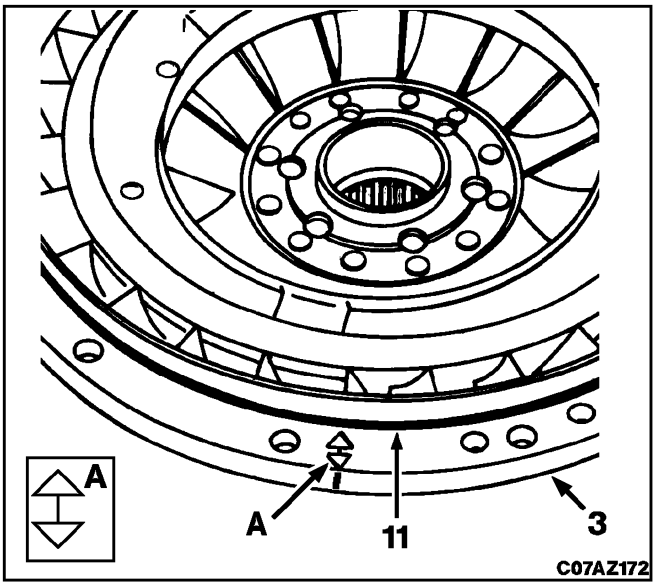
14. Install thrust bearing (9) onto thrust washer.



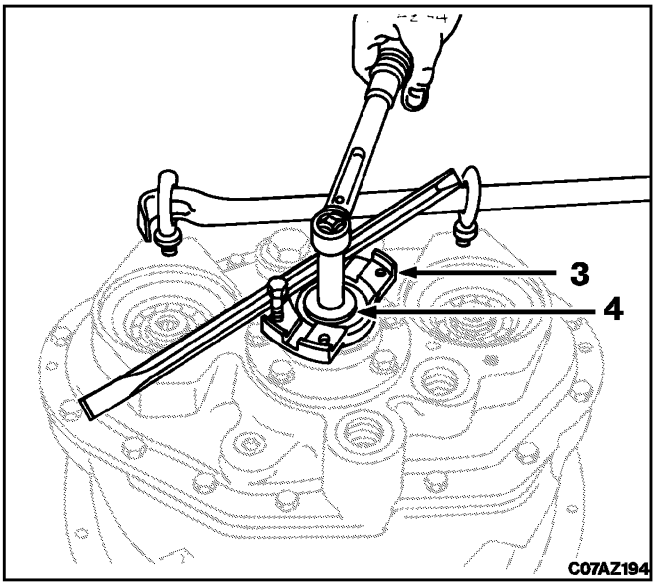

15. Install outer thrust washer (10), smaller OD, onto thrust bearing. Liberally coat with clean oil.



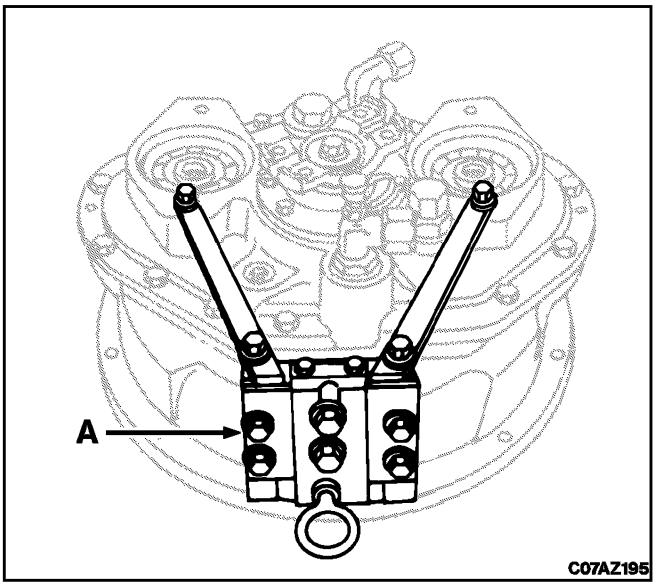

16. Locate heavy mark (A) on impeller (3) and mark line to side. Install O-Ring (11) on impeller.



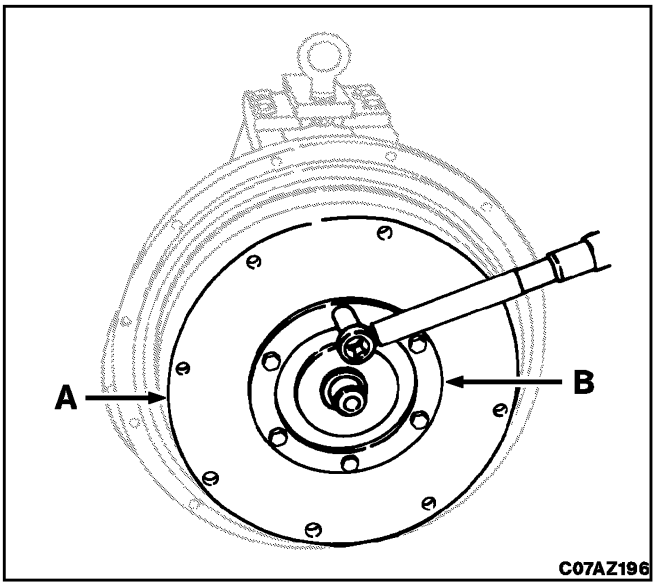
21. Install output yoke (3), flat washer (4) and hardware. Install eye bolts and bolt and secure with pry bars. Torque bolt to 54 to 65 lbf ft (73 to 88 N•m).



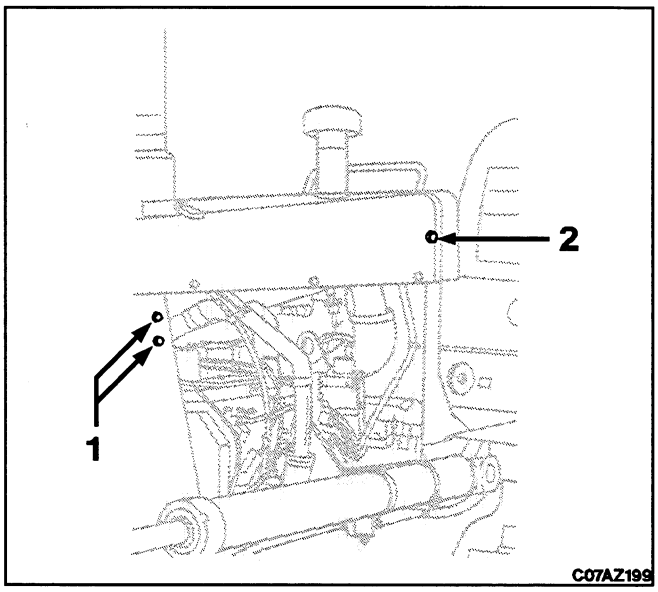

22. Install fittings with new o-rings to rear housing at marked positions. Install lifting device (A), DR04-718 to torque converter.



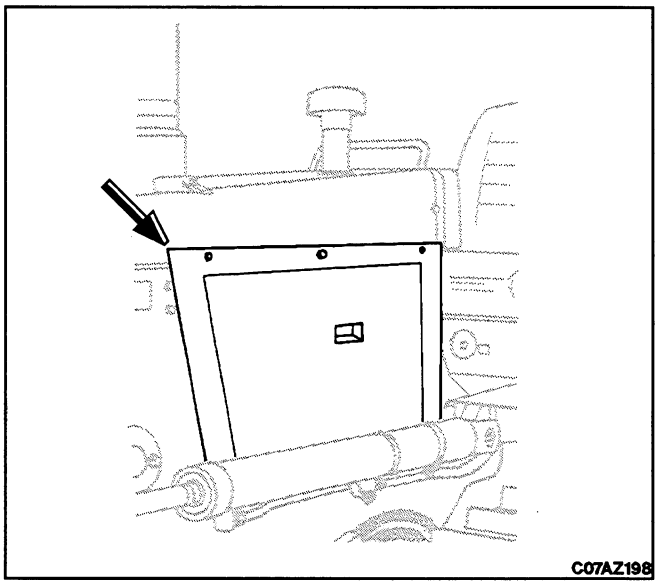

23. Install flex plate (A) and lock plate (B) and secure with hardware. Torque bolts to 36 to 43 lbf ft (49 to 58 N•m).



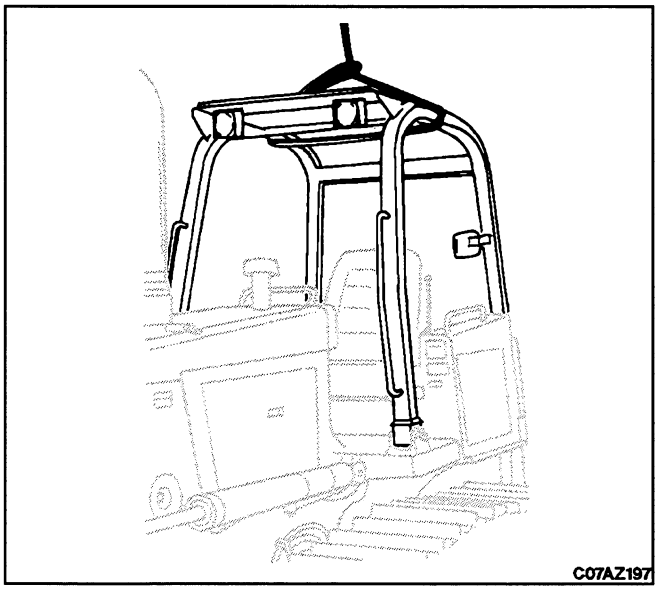
28. From inside of engine compartment, install hood tie down brackets (1). Torque bolts to 8 lbf ft (10 N•m) ±10%. Install hook rod, ball and bracket and tighten until ball compresses. Repeat for opposite side. Install hood rear mounting hardware (2). Torque bolts to 70 lbf ft (92 N•m) ±10%.




29. Install engine left and right side doors and secure with hardware. Torque bolts to 28 lbf ft (38 N•m) ±10%.

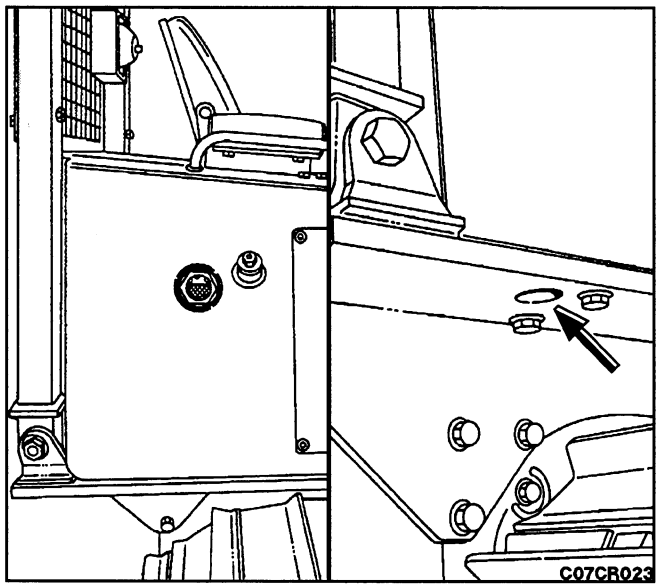



30. Using hoist install ROPS on machine securing with hardware (nuts inward) and torque to 605 ±35 lbf ft (822 ±47 N•m). Connect ROPS light connections at rear left leg. Refill hydraulic and drive train systems with proper fluid, refer to the OPERATION & MAINTENANCE MANUAL.

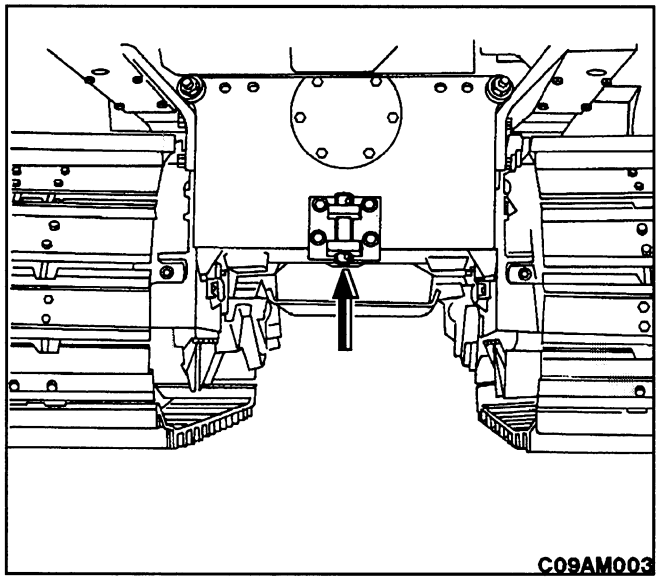


**WARNING! Be sure blade and any rear mounted equipment has been lowered to the ground or on suitable blocking. Turn the master switch to the off position and remove key or remove one of the cables from the master switch to prevent accidental starting.**

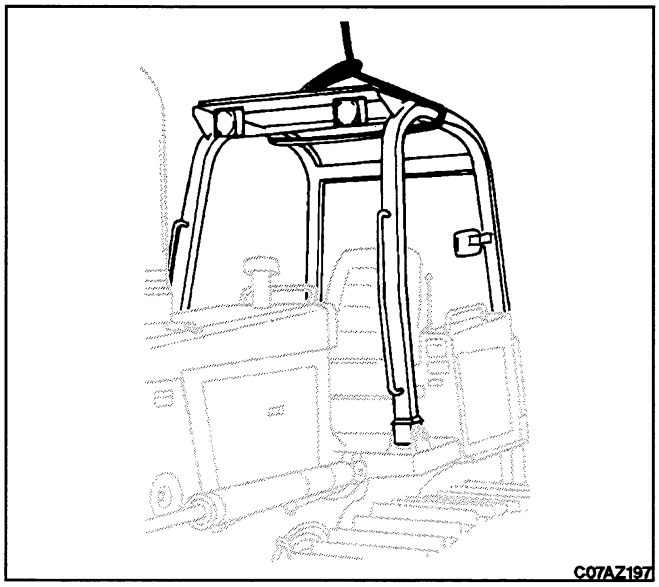
1. Drain hydraulic reservoir. Refer to the OPERATION & MAINTENANCE MANUAL.



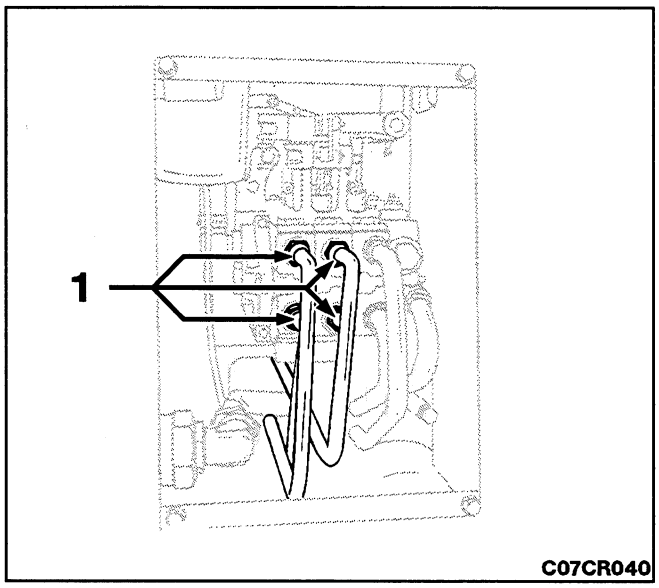

2. Drain transmission system. Refer to the OPERATION & MAINTENANCE MANUAL.



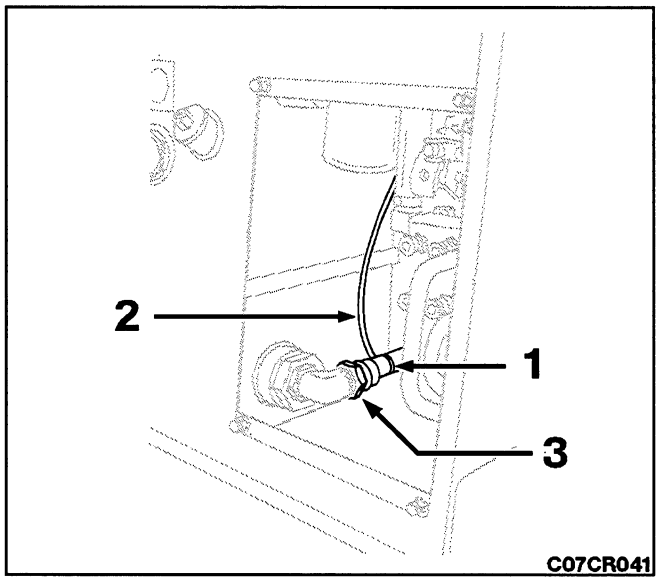

3. Disconnect ROPS light harness at bottom rear left leg. Attach hoist to center of ROPS canopy. Remove mounting hardware and lift from machine.



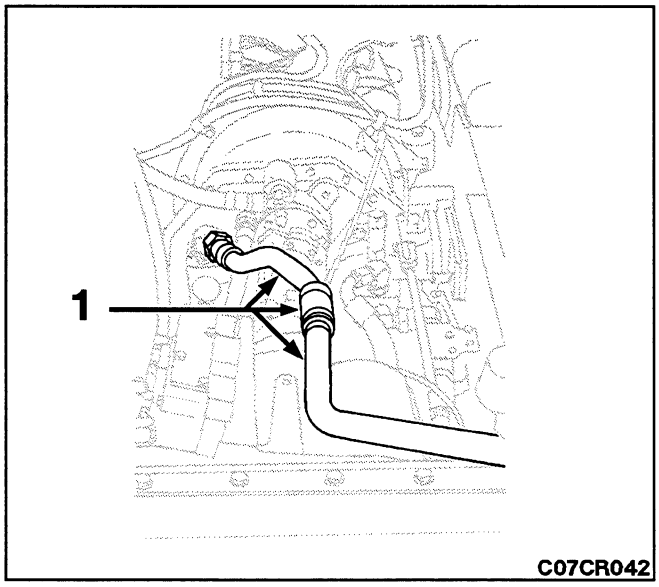
31. Remove valve bank access panel. Remove upper and lower rear tubes (1) from valve bank.



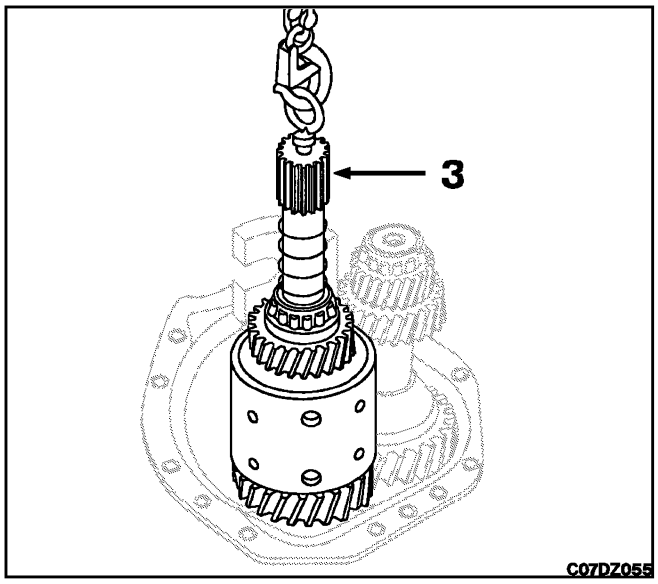

32. Cut tie strap (1) from harness (2). Disconnect rear equipment suction tube (3) from fitting and cap.



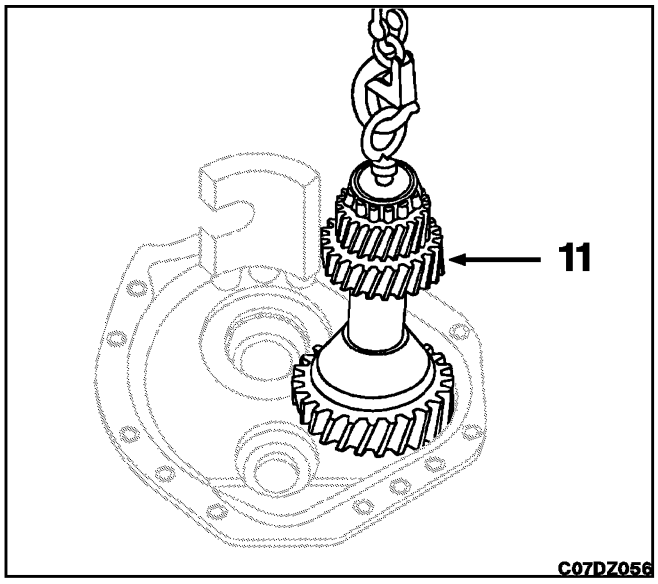

33. Disconnect suction tube assembly (1) from pump and remove.



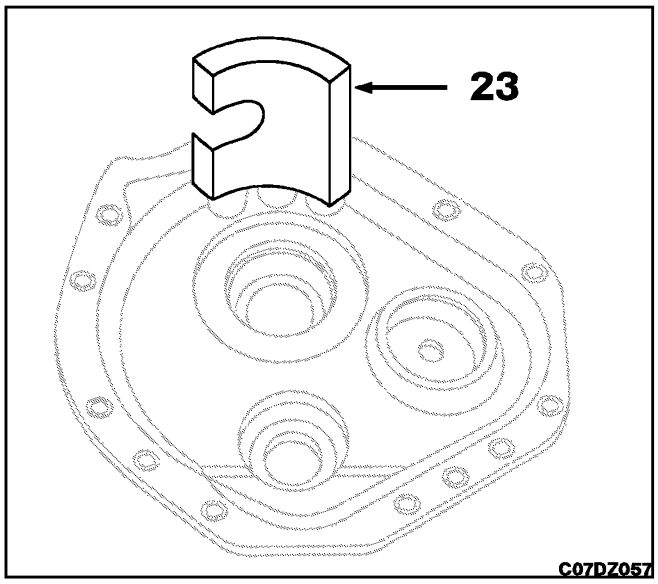
14. Attach eye bolt to directional (input) shaft (3) and remove. Refer to DIRECTIONAL (INPUT) SHAFT for service.



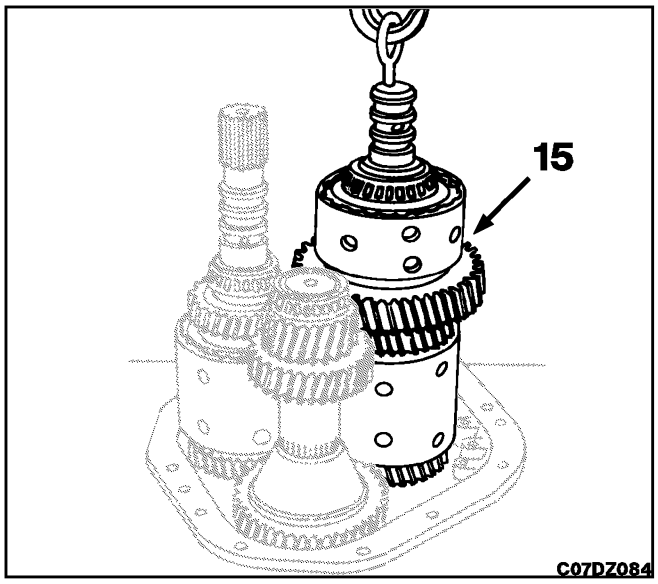

15. Attach eye bolt to countershaft (11) and remove. Refer to COUNTERSHAFT for service.



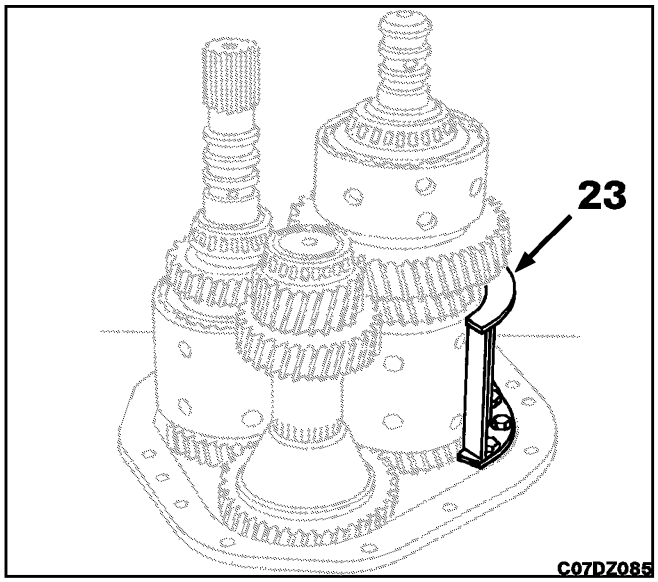

16. Remove scavenge tube baffle (23).



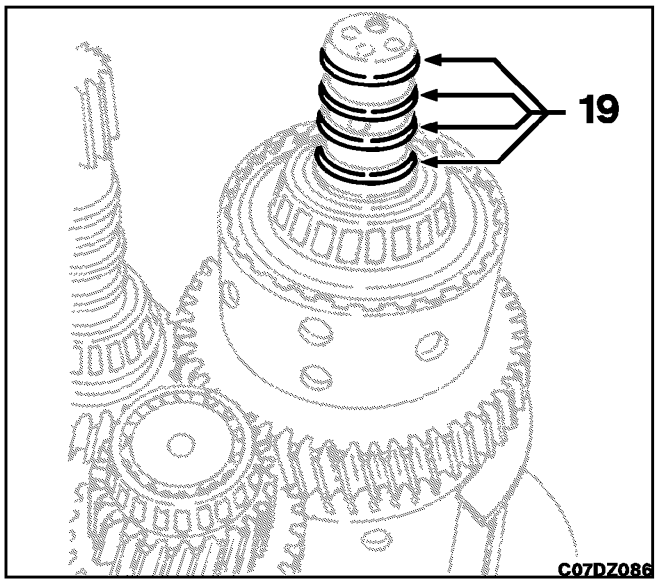
10. Install range (output) shaft (15) into bearing cup in rear cover.




11. Install scavenge tube baffle (23) and secure with hardware. Torque to 28 lbf ft (38 N•m) ±10%.

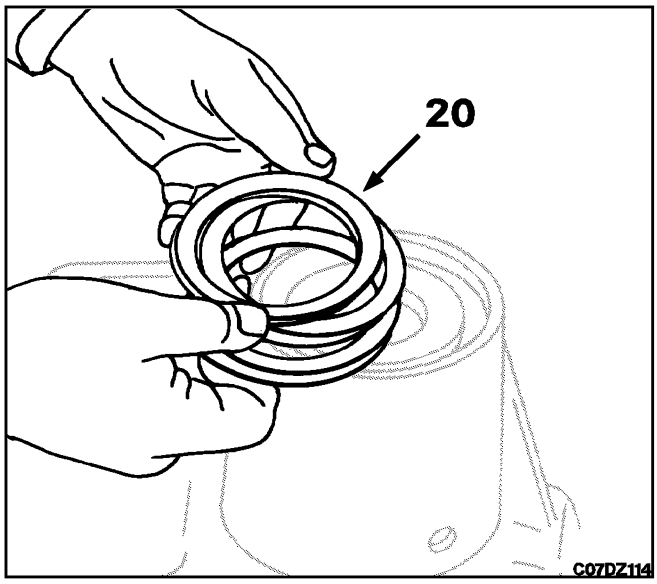



12. Install new seal rings (19) to range (output) shaft.

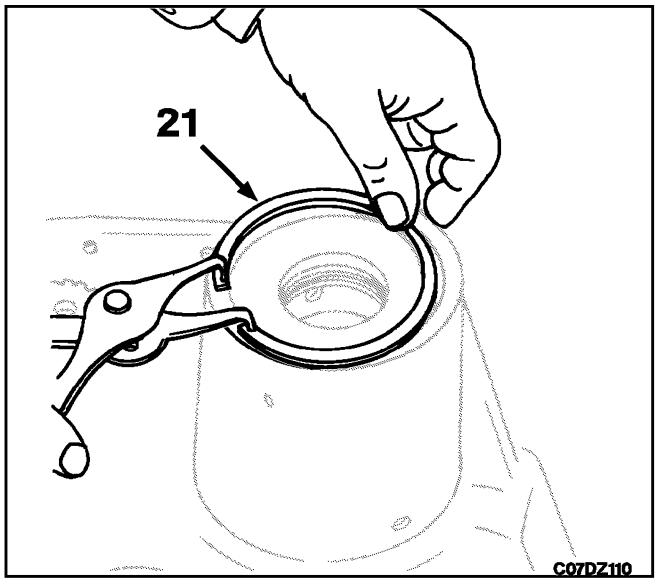


40. Determine shim pack (20) as follows;

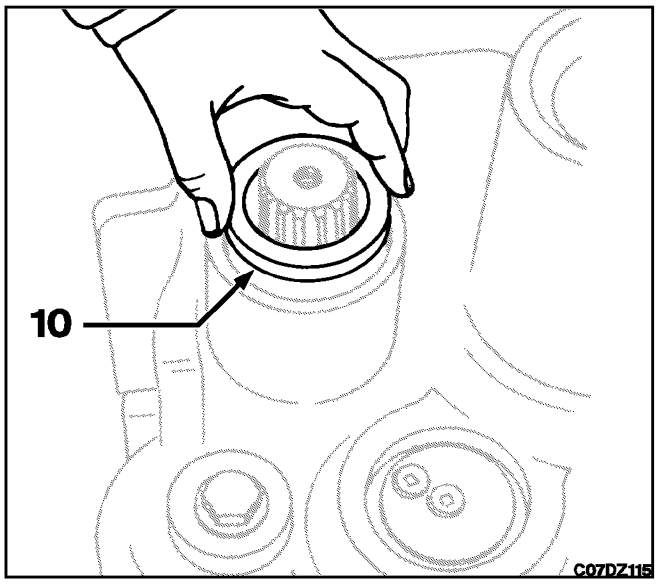
    Subtract 0.007 to 0.012 in (0.178 to 0.508 mm) from reading recorded in Step 39. This thickness is range (output) shaft shim pack. Shim pack must include at least one 0.030 in (0.762 mm) shim to be placed against retaining ring. Remove retaining ring and install shim pack.

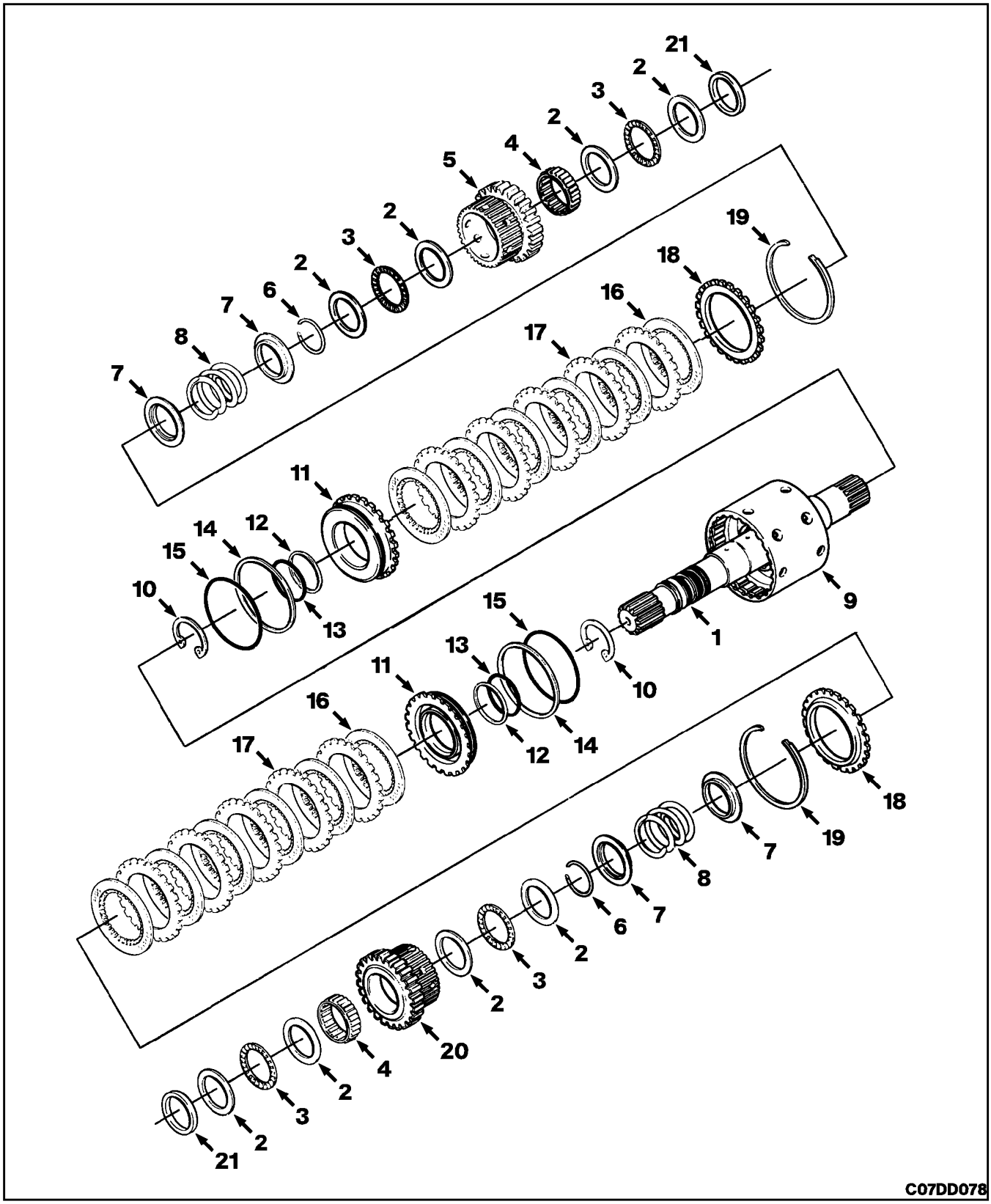



41. Install retaining ring (21) up against 0.030 in (0.762 mm) shim into groove in housing.



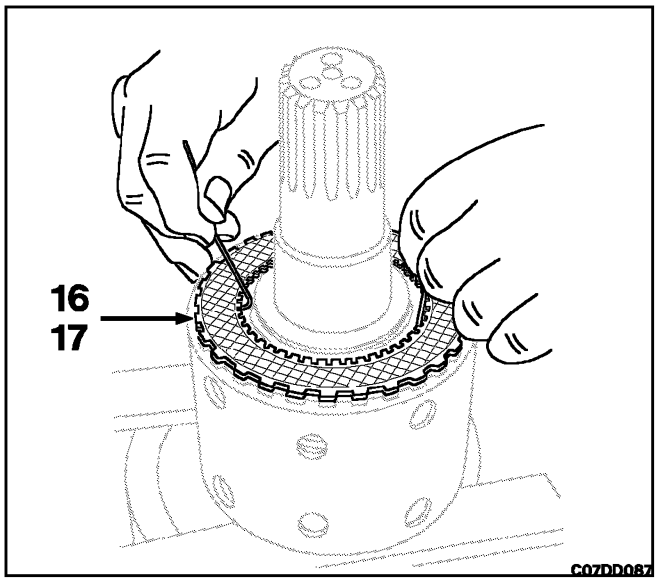

42. Install new oil seal (10) flush with transmission housing.





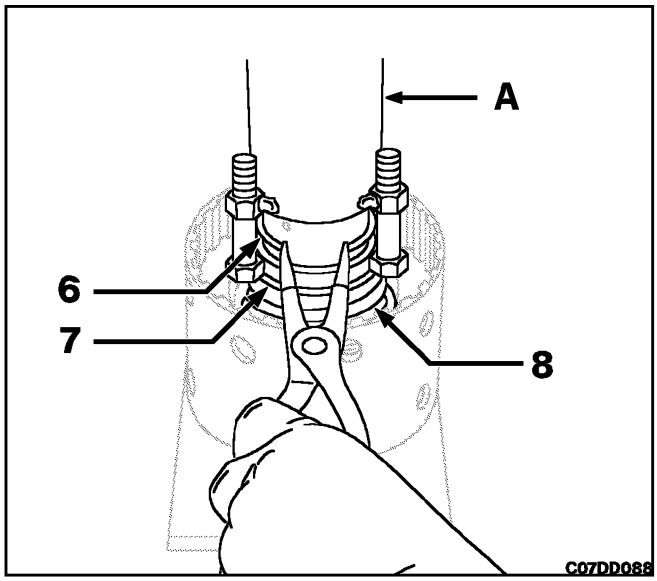

EXPLODED VIEW OF DIRECTIONAL (INPUT) SHAFT

27. Remove friction discs (16) and separator plates (17).

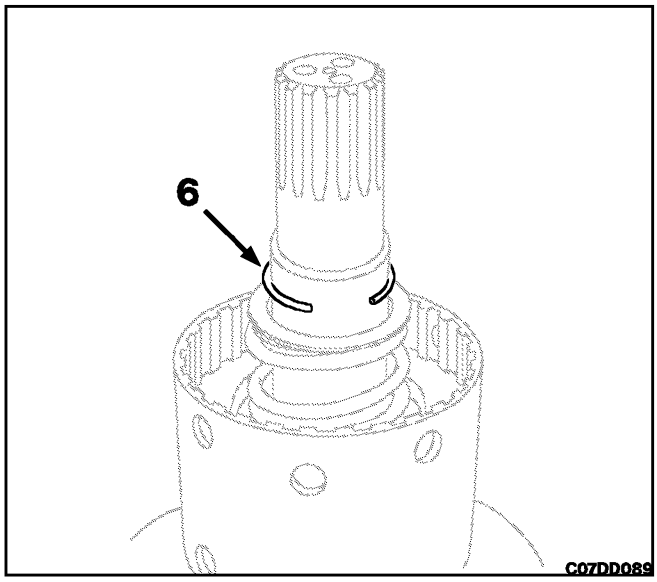



28. Position assembly in press and install spring compressor tool (A), DR04-721-6 on spring retainer (7). Activate press to move retainer below retaining ring (6). Move ring out of groove and up on shaft. Slowly let off press until spring (8) fully decompresses. Turn assembly over in press and repeat for remaining side.

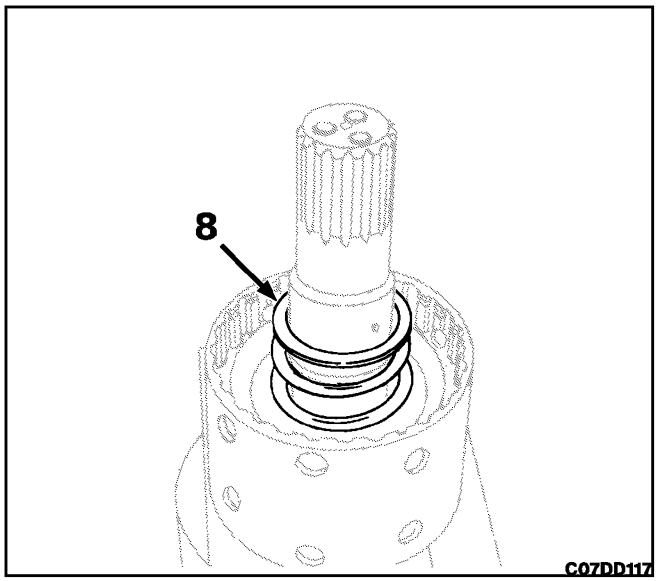
**WARNING! Spring loaded assembly. Assembly must be held to relieve spring pressure. Use extreme care when disassembling.**



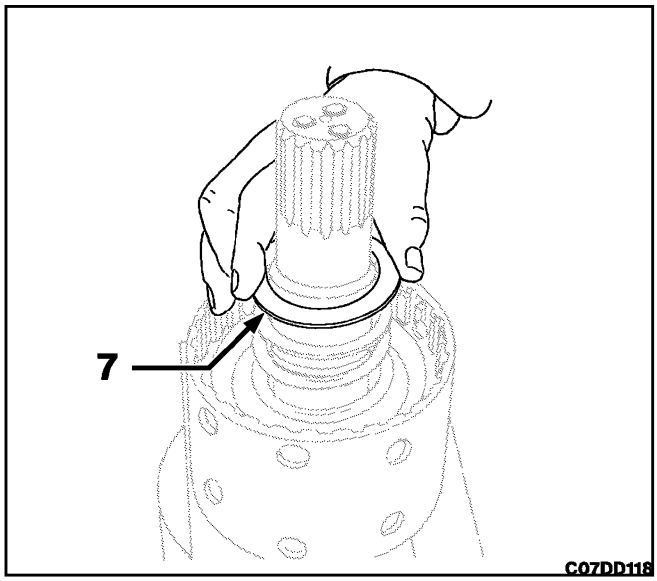

29. Position assembly back in stand seal ring groove side down (reverse). Remove retaining ring (6) from shaft.



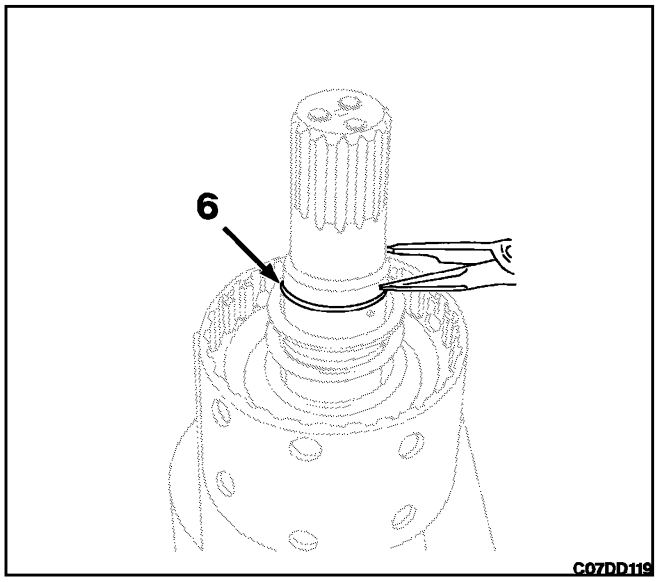
13. Install piston return spring (8).



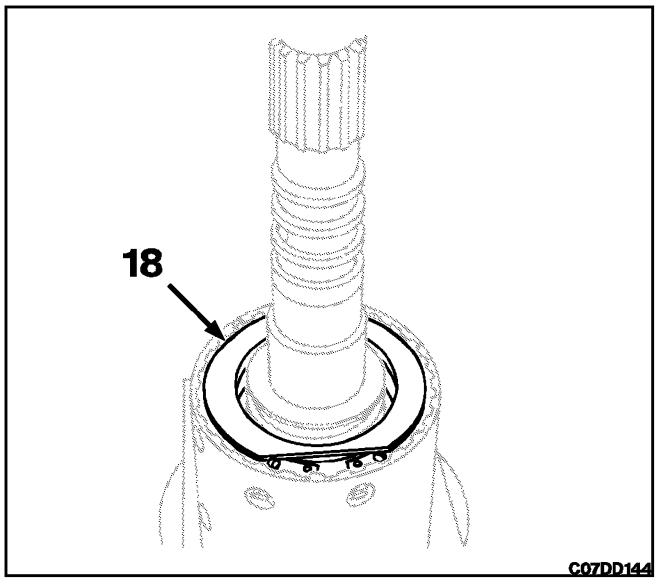

14. Install outer spring retainer (7).



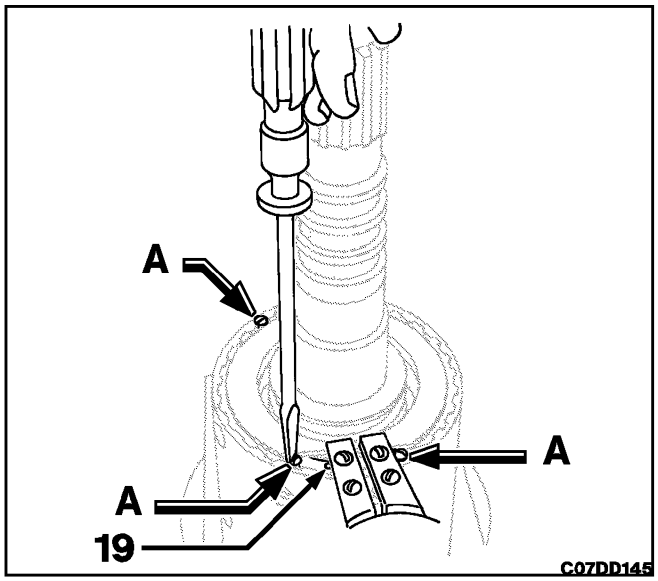

15. Position retaining ring (6) on shaft.



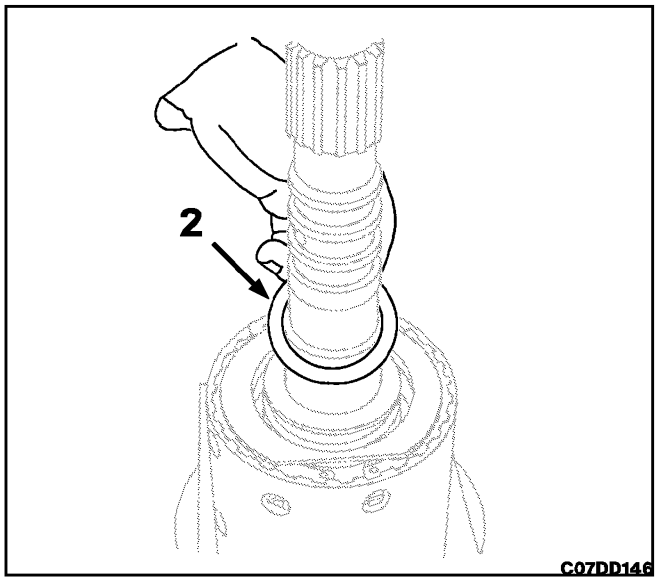
43. Install support plate (18) into assembly.



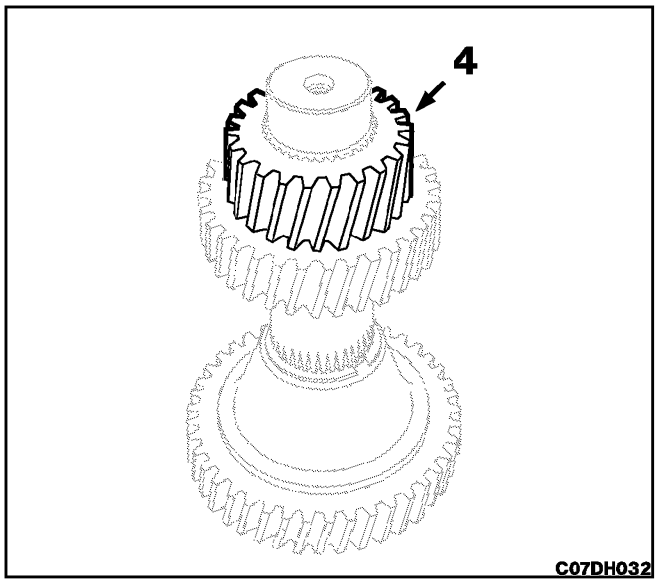

44. Retract retaining ring (19) and remove four screws (A). Carefully let off retaining ring until it seats in groove in drum.



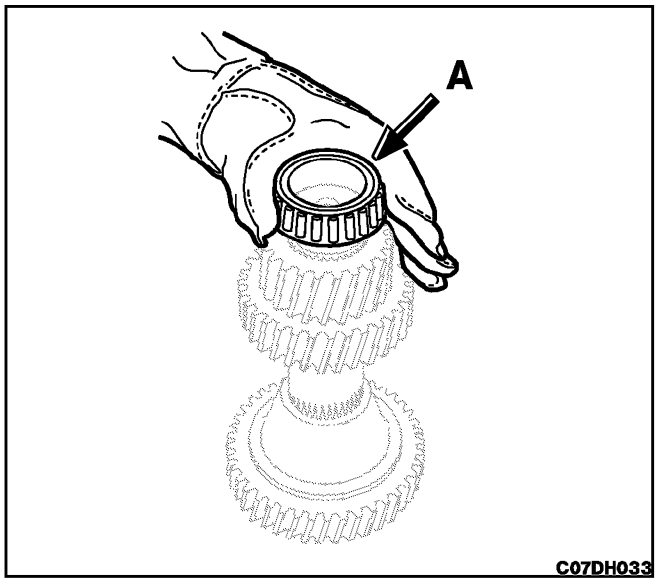

45. Install inner thrust race (2).



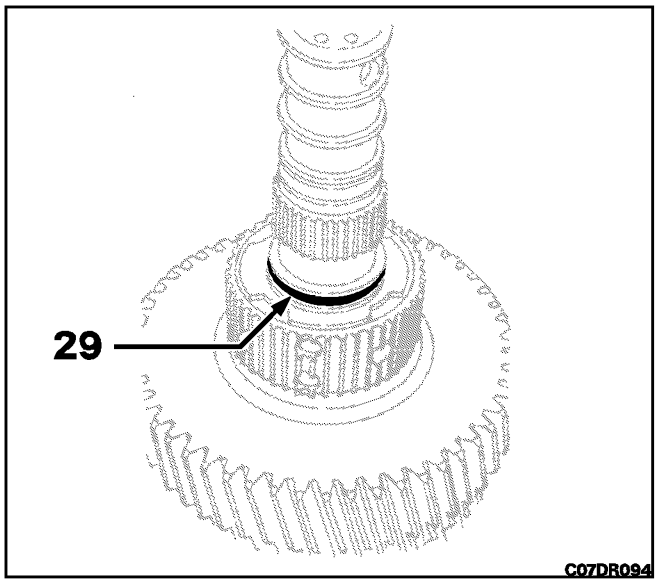
7. Install 1st speed gear (4) on countershaft against 2nd speed gear.




8. Heat bearing cone (A) to 275°F (135°C) for 45 minutes. Install on shaft and bottom. To insure cone is seated, keep pressure against cone until it cools.



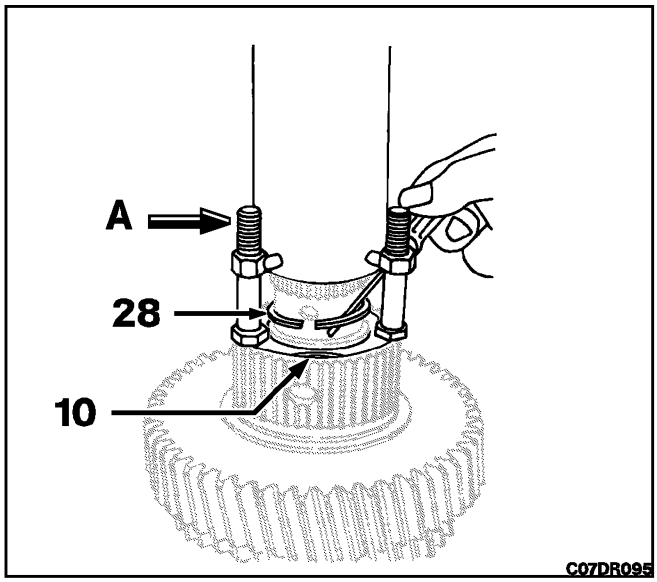
20. Remove seal ring (29) from groove in shaft.



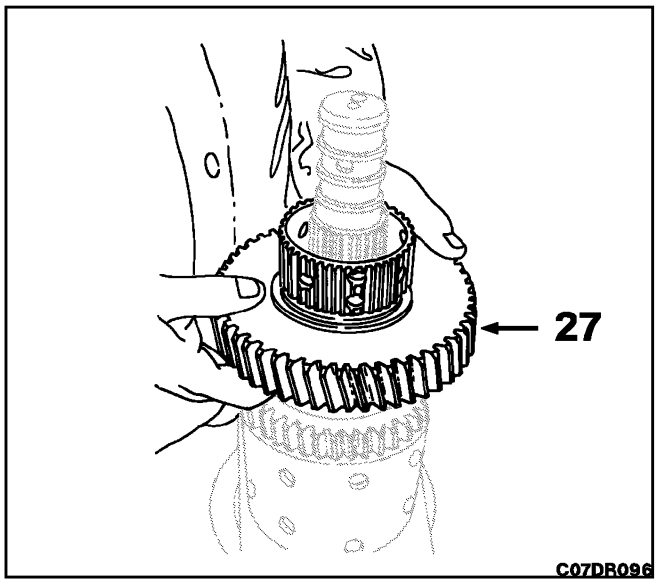

21. Position assembly in press and install spring compressor tool (A), DR04-721-6 on lube sleeve (10). Activate press to move retainer below retaining ring (28). Move ring out of groove and up on shaft. Slowly let off press until spring fully decompresses. Remove tool and retaining ring from shaft.

**WARNING! Spring loaded assembly. Assembly must be held to relieve spring pressure. Use extreme care when disassembling.**

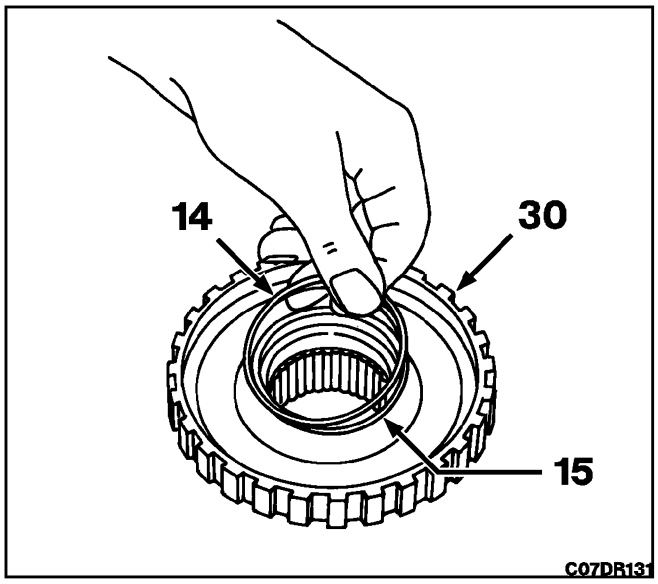
Remove lube sleeve (10), spring (9), spring retainer (8) and retaining ring (3) from assembly.



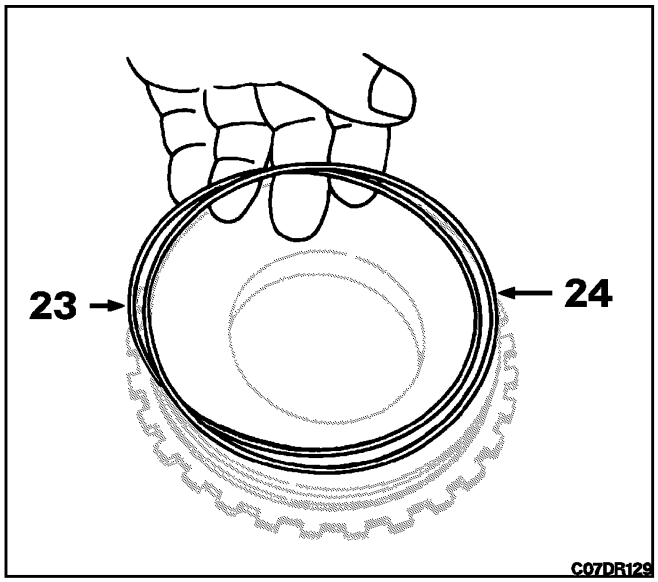

22. Remove 1st speed gear and hub (27).



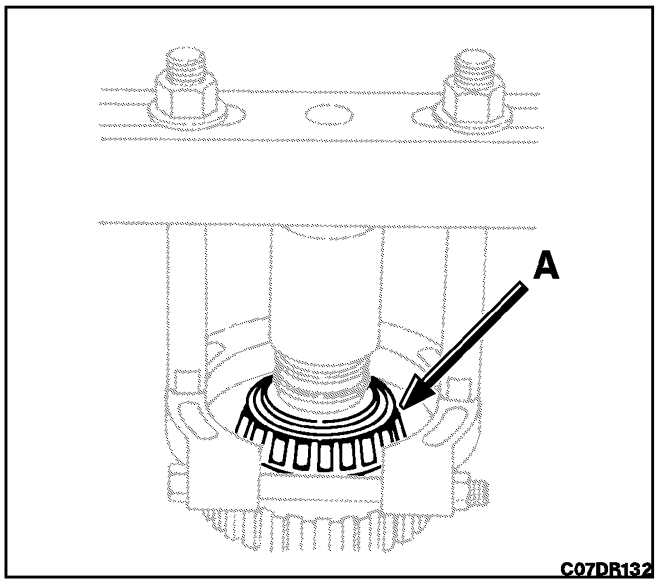
50. Remove piston seal (14) and seal ring (15) from 1st piston housing (30).



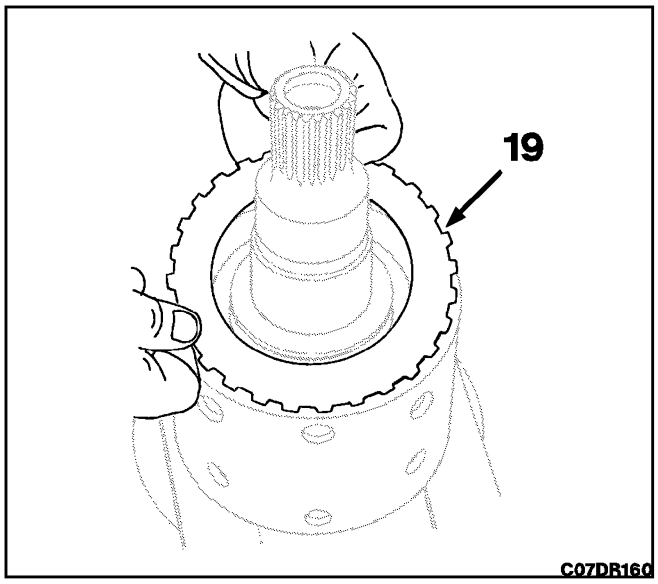

51. Remove piston seal (23) and seal ring (24 ) from 1st speed piston (22).



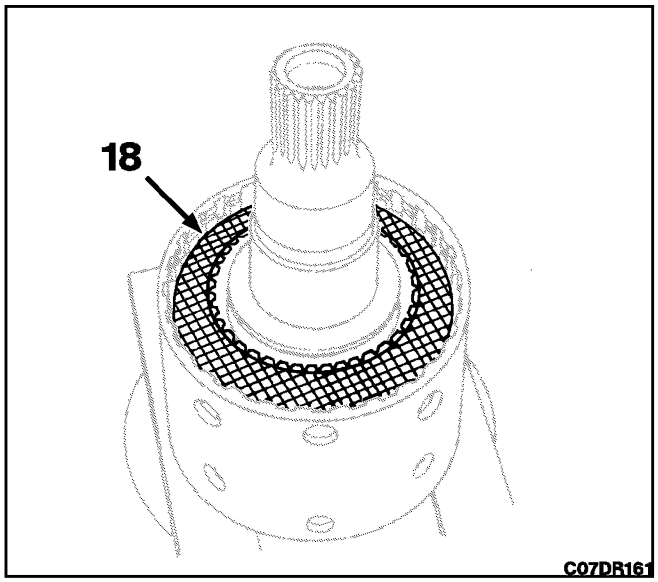

52. Install puller arrangement to bearing (A) and remove.



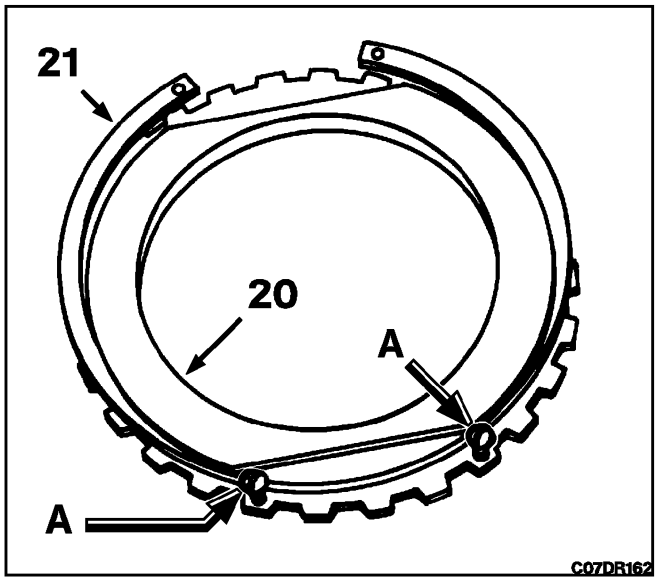
28. Install separator plate (19).



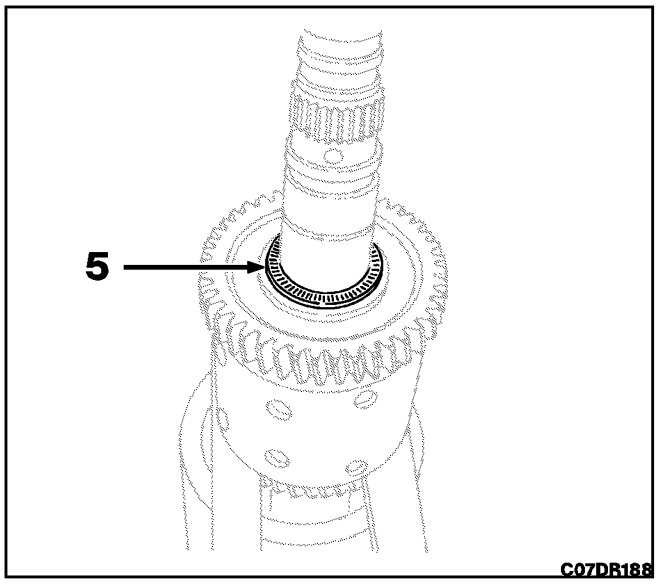

29. Alternately install friction disc and separator plates ending with friction disc (18). A total of seven friction discs and six separator plates are to be used.



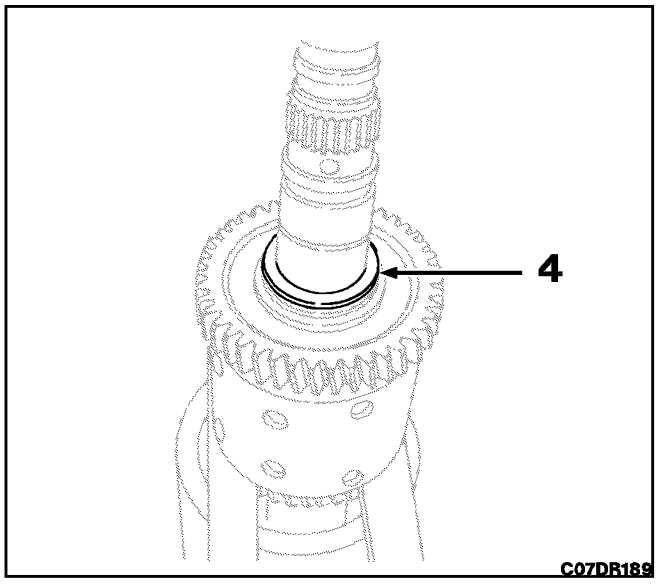

30. Position captured retaining ring (21) into support plate (20). Install two #6-32 screws (A) at opposite side of retaining ring opening.



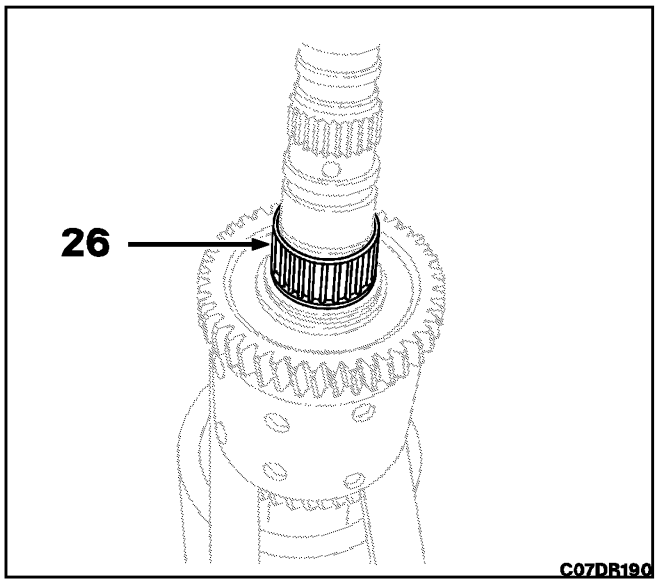
58. Install thrust bearing (5) to race. Coat bearing needles with clean oil.



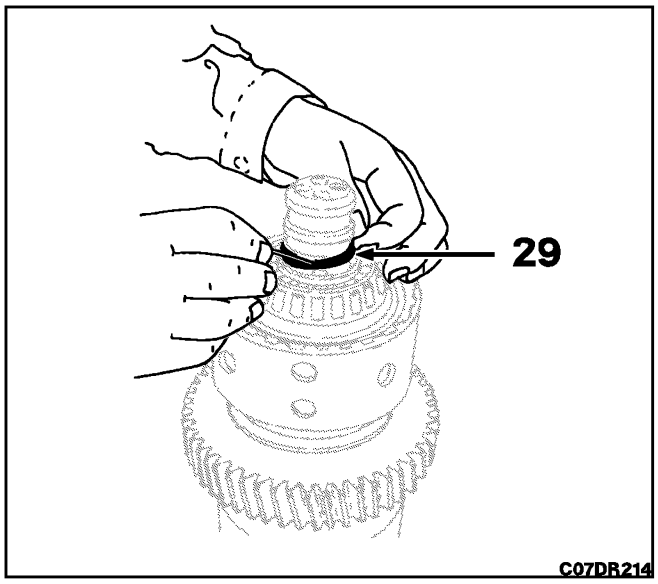

59. Install outer thrust race (4).



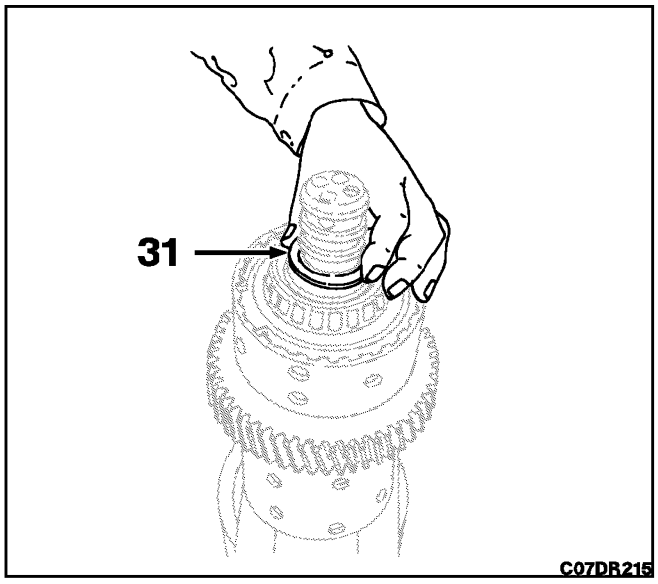

60. Install gear needle bearing (26). Coat bearing needles with clean oil.



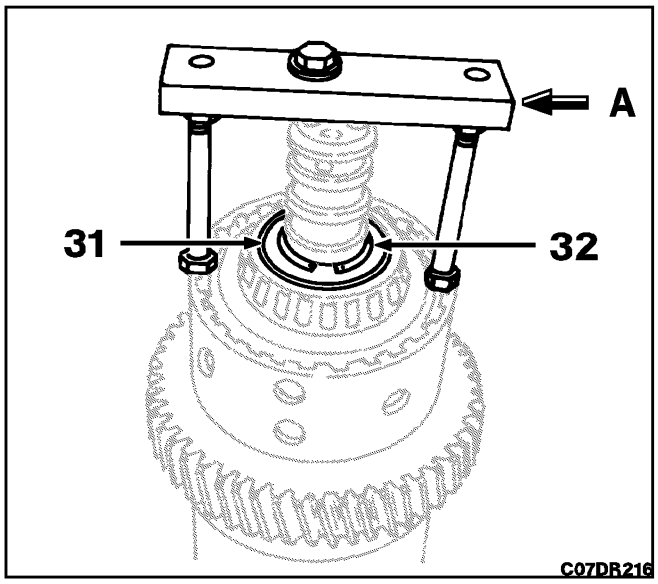
88. Install seal ring (29) under 1st piston housing up against step on shaft.




89. Install ring spacer (31) against seal ring.



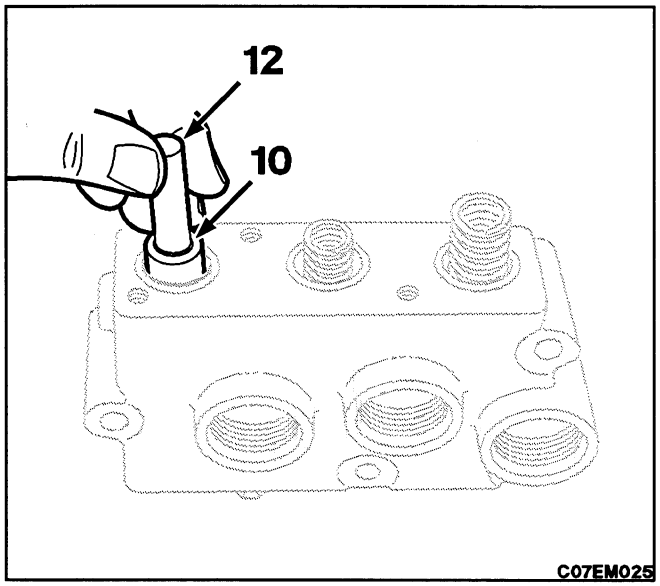

90. Start retaining ring (32) on shaft and position next to ring spacer (31). Install compression tool, DR04-721-7, (A) and move clutch assembly down until retaining ring can be inserted into groove on shaft. Insert. Remove tool.



5. Remove lube spool (12) with spring shims (10). Keep removed amount of shims with spool.

***NOTE: A total quantity of 3 shims can used under spool spring. Each shim added or deleted will raise or lower lube pressure by 1 PSI (6.9 kPa).***

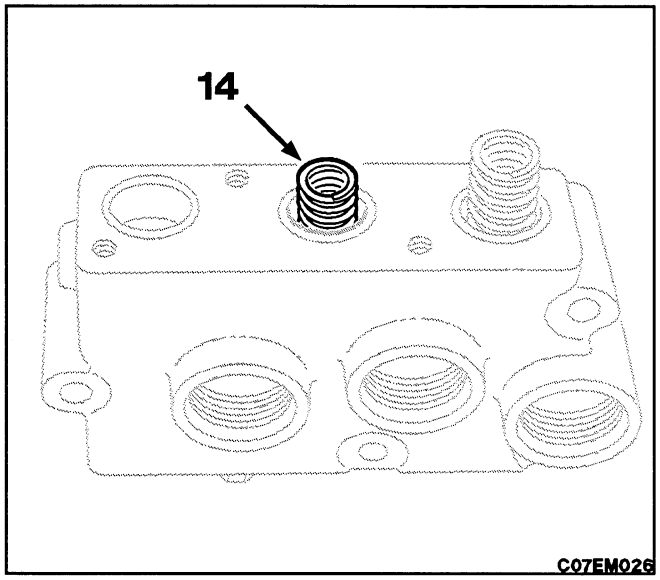
***NOTE: Lube spool (12) and converter or cooler/rear damper housing lube spool (13) are interchangeable. Do not switch spools in each others housing bore.***




6. Torque Converter Machines; Remove converter spool spring (14). Identify spring for ease of testing and reassembly.

6. Direct Drive Machines; Remove cooler/rear damper housing lube spool spring (14). Identify spring for ease of testing and reassembly.

***NOTE: Check spring for damage and fatigue against those values shown in specifications.***

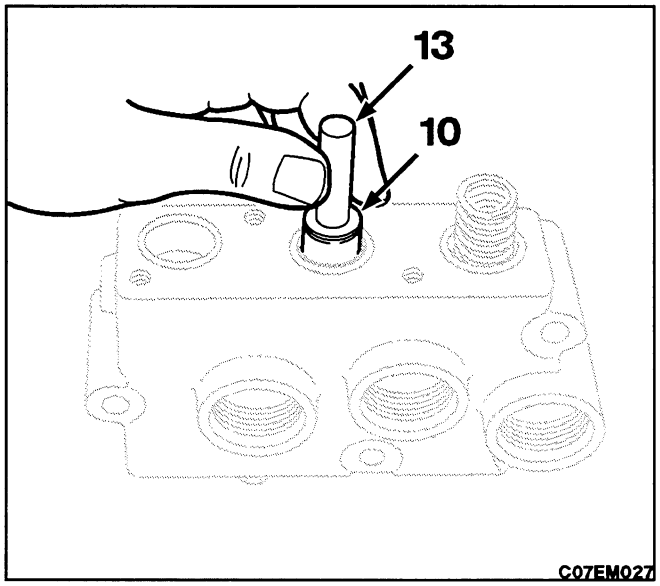



7. Torque Converter Machines; Remove converter spool (13) with spring shims (10). Keep removed amount of shims with spool.

7. Direct Drive Machines; Remove cooler/rear damper housing lube spool (13) with spring shims (10). Keep removed amount of shims with spool.

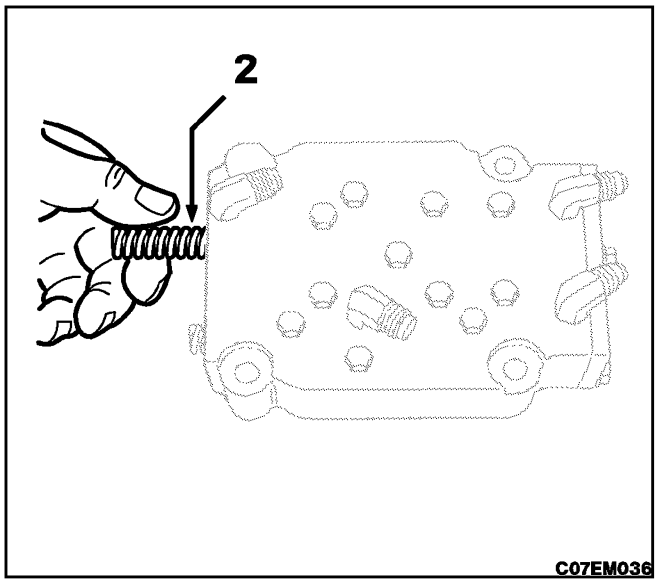
***NOTE: A total quantity of 5 shims can used under spool spring. Each shim added or deleted will raise or lower converter or cooler/rear damper housing lube pressure by 3.5 PSI (24 kPa).***

***NOTE: Lube spool (12) and converter or cooler/rear damper housing lube spool (13) are interchangeable. Do not switch spools in each others housing bore.***



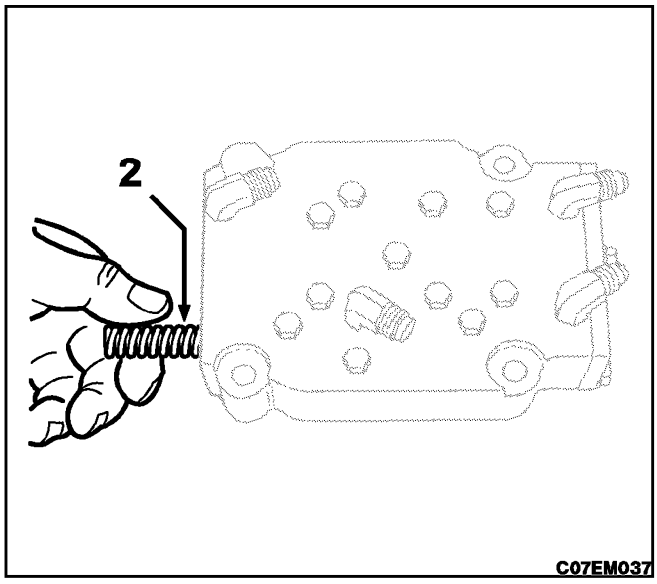
3. Remove speed spool return spring (2) from housing bore.

*NOTE: CHECK SPRING FOR DAMAGE AND FATIGUE AGAINST THOSE VALUES SHOWN IN SPECIFICATIONS.*



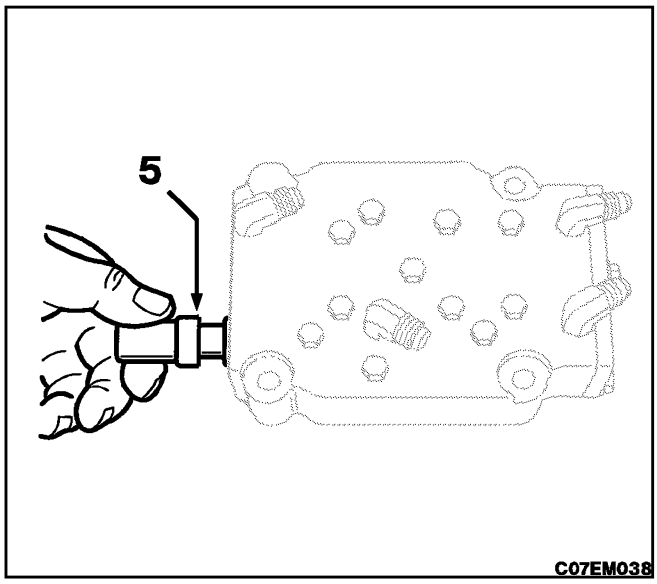

4. Remove directional spool return spring (2) from housing bore.

*NOTE: CHECK SPRING FOR DAMAGE AND FATIGUE AGAINST THOSE VALUES SHOWN IN SPECIFICATIONS.*

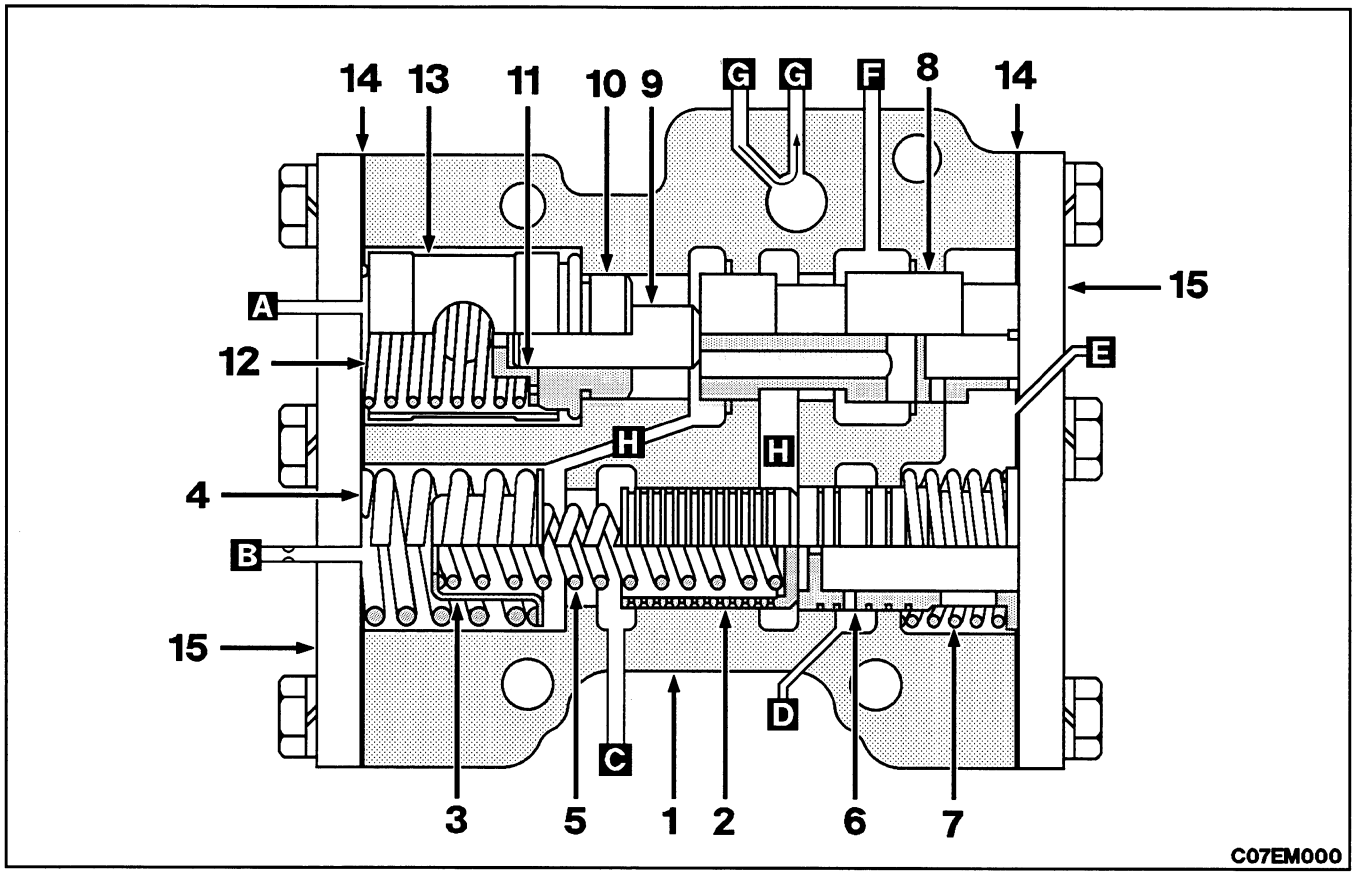



5. Remove short directional spool (5) from housing bore.

*NOTE: SPOOL IS TO BE KEPT WITH HOUSING BORE SIDE THAT IT WAS REMOVED FROM.*



**DIRECT DRIVE MACHINES**




CROSS SECTION VIEW OF RATE OF RISE VALVE

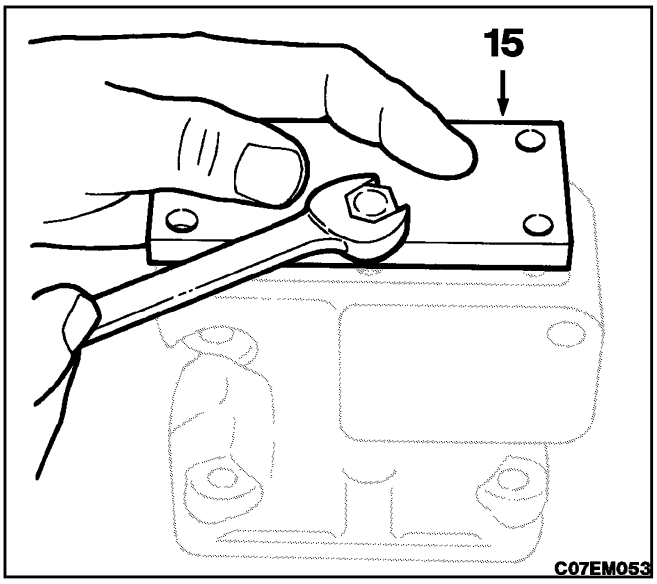
A. Main Pressure Oil
B. Orificed Main Pressure Oil
C. Drain Port
D. Main Pressure Oil from Short Directional Spool
E. Main Oil Pressure to Directional Spool
F. Main Oil Pressure to Inching Valve
G. Main Oil Pressure from Inching Valve to Range Spools
H. Internal Passages

1. Valve Housing
2. Modulating Piston
3. Piston Spring Retainer
4. Outer Piston Spring
5. Inner Piston Spring
6. Reducing Spool
7. Reducing Spool Spring
8. Sequence Spool
9. Dowel Pin
10. Sequence Spool Spacer
11. Sequence Spool Disc
12. Sequence Spool Spring
13. Tube Spacer
14. End Cover Gasket
15. End Cover

**Description**

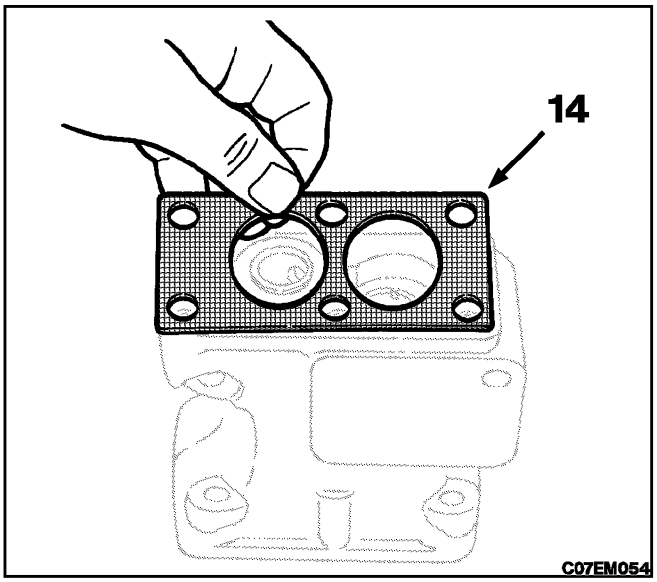
The rate of rise valve is a sequencing, pressure regulating valve used to provide a smooth shift without shock. This valve controls the length of time that it takes to fully pressurize a clutch pack and also allows the directional clutch pack to engage before the range pack clutch. The rate of rise valve has seven ports (A to G) and two passages (H) which are located on the bottom and top of the valve but which are shown in cross section on the sides of the valve, for clarity. Main pressure oil from the main regulator valve enters the left hand upper cavity through port A and keeps this cavity at main pressure whenever the engine is running. Main pressure oil from the main regulator valve enters the left hand lower cavity through port B. This port contains an orifice that limits the flow of oil into this cavity. This lower cavity is open to drain port C. The modulating piston (2) acts as a variable orifice for this drain to control pressure in this cavity. Main pressure oil from the range selector valve enters the right side of the lower cavity through port D only when the short directional spool in the range selector valve is shifted. This oil is directed out of the rate of rise valve through ports E and F. Port E directs oil to the directional spool of the range selector valve. Port F directs oil to the inching valve but its flow is controlled by the sequence spool (8). Port H directs oil from the inching valve to the speed spools of the range selector valve.

11. Slowly remove end cover (15) hardware until all spring tension is released. Remove cover.

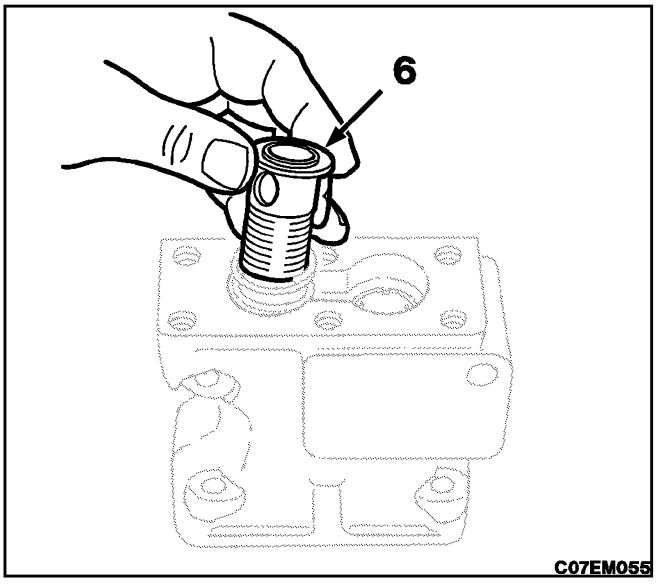



**WARNING! Spring loaded assembly. Assembly must be contained to relieve spring pressure. Use extreme caution when disassembling.**

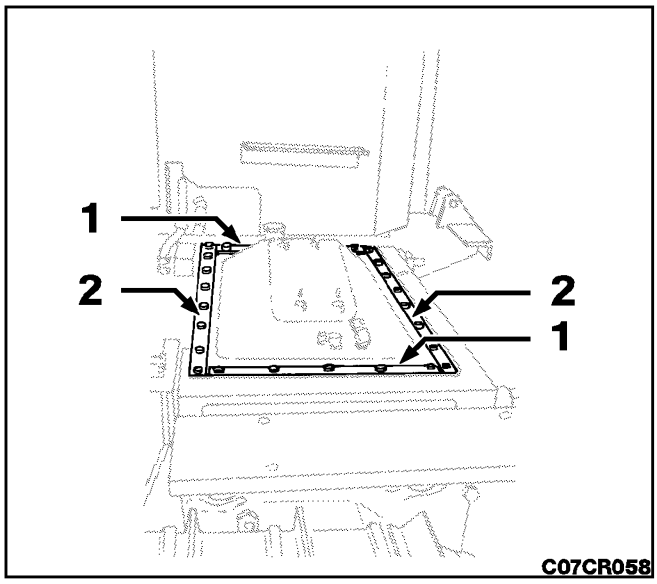
12. Remove and discard end cover gasket (14).



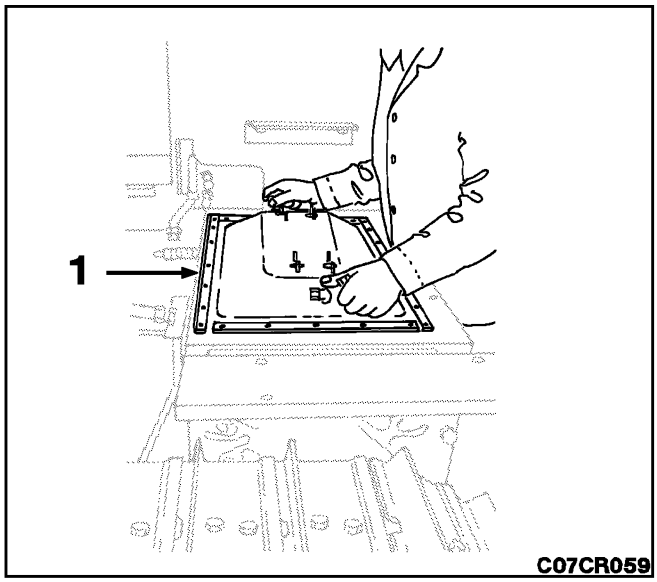

13. Remove reducing spool (6) from housing bore.



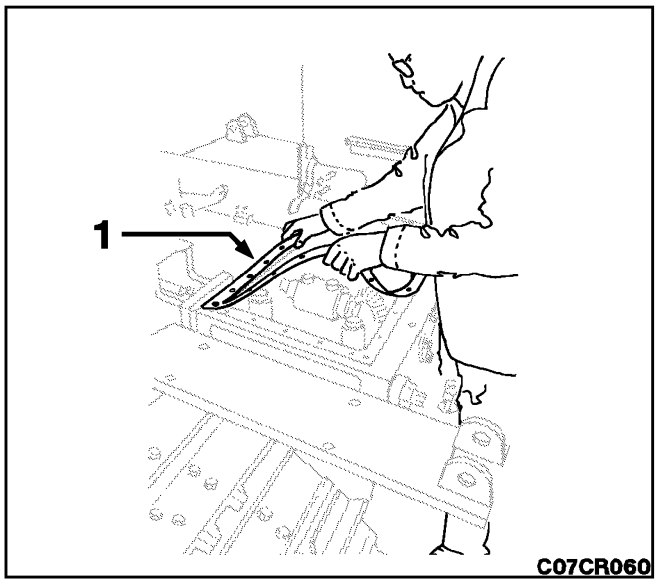
7. Remove hardware and side (1) and front and back (2) stiffeners.




8. Remove rear frame cover (1).

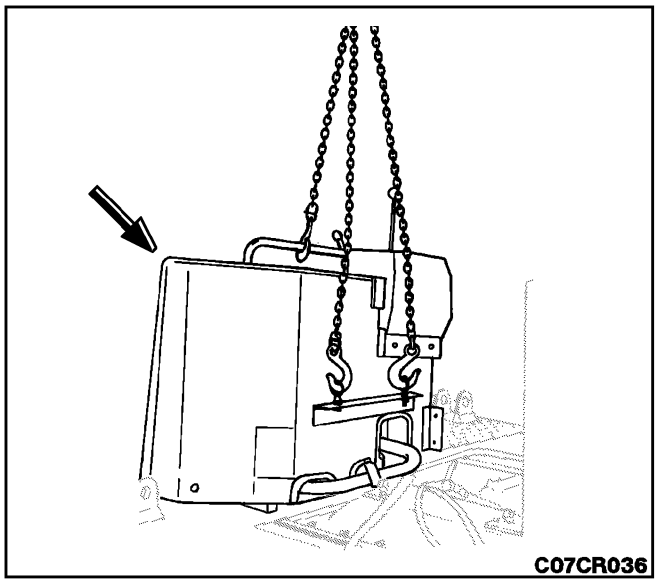



9. Remove and discard rear frame cover gasket (1). Replace gasket with new.

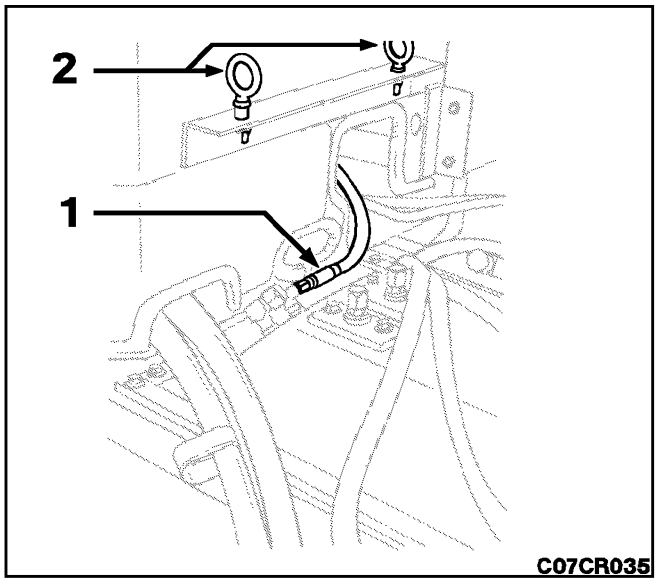


36. Position battery box in place on fender with shims that were removed with it and secure with hardware. Torque bolts to 140 lbf ft (180 N•m) ±10%.

*NOTE: WHEN INSTALLING BATTERY BOX, MAKE SURE CROSSOVER TUBES AT LEFT FRONT OF REAR FRAME CLEAR BOTTOM FLOOR PLATE OF BOX. TUBES GO INSIDE BOX.*

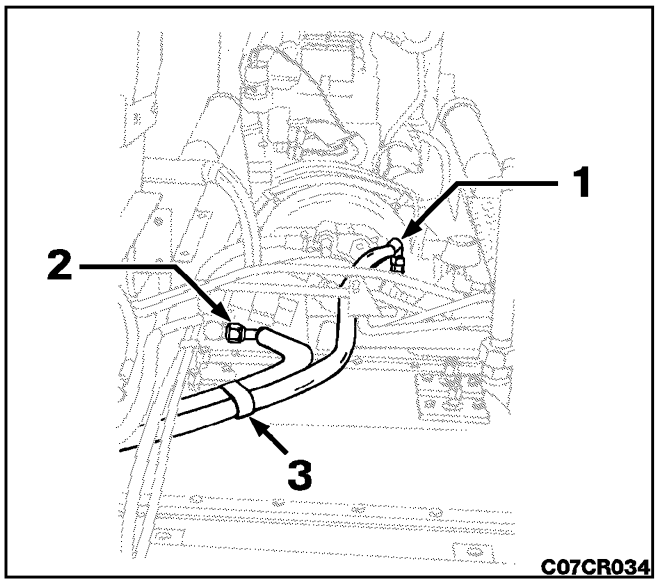

C07CR036

37. Connect pilot valve drain hose (1) to elbow at rear cover. Remove eye bolts (2).

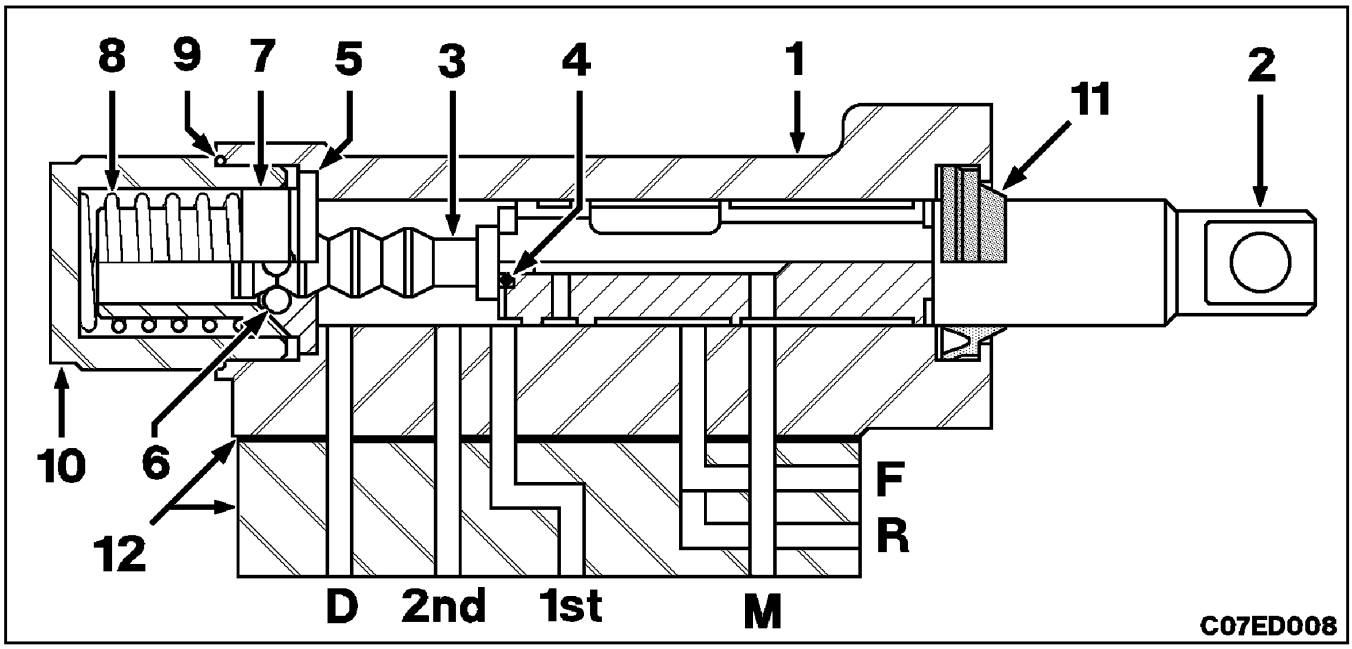


C07CR035

38. Install filter inlet hose (1) to top of pump. Install filter outlet hose (2) to tee at main regulator valve. Reclip (3) hoses at steering fitting seal flange. Torque lock nut to 12 to 15 lbf ft (16 to 20 N•m).



C07CR034




CROSS SECTION VIEW OF PILOT CONTROL VALVE

1. Valve Housing
2. Valve Spool
3. Detent Cam
4. O-Ring
5. Ball Retainer
6. Detent Ball
7. Detent Sleeve
8. Detent Spring
9. O-Ring
10. Detent Housing
11. Spool Wiper Seal
12. Gasket and Manifold

**DESCRIPTION**

Pilot control valve is a manually controlled directional control valve used to direct main pressure oil to range selector valve to shift those spools. Pilot control valve spool incorporates a detent mechanism to keep shift lever in desired position.

**THEORY OF OPERATION**

Main pressure oil from main regulator valve enters pilot valve at port M and flows around and through spool (2). When shift control lever is in NEUTRAL position, oil is blocked from directional and speed ports. When shift lever is moved, spool (2) is rotated and moved back and forth in valve housing (1). Rotation of spool will align oil at front of valve with either F (FORWARD) or R (REVERSE) ports. When spool moves back, oil flowing through spool will be aligned with either port 1 or 2 or will be blocked off for third speed. Main oil pressure directed out F or R ports and 1 or 2 ports is directed to range selector valve to shift directional spools. Some oil is allowed to leak past spool (2) for lubrication purposes and then is directed through D port back to transmission.

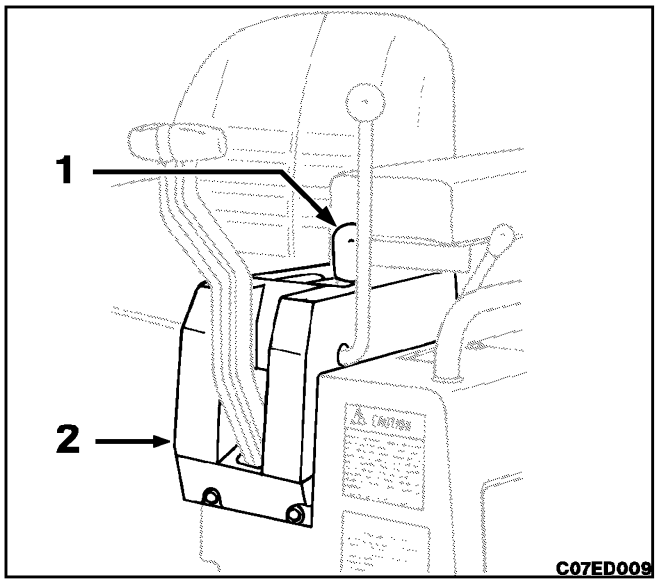
**SPECIFICATIONS**

Spring Criteria:
- Pilot Control Valve Centering Spring:
  - Free Length . . . . . 2.188 in (55.58 mm)
  - Test Length . . . . . 1.39 in (35.31 mm)
  - Working Length . . . . . 1.39 to 1.5 in (35.3 to 38.1 mm)
  - Test Load . . . . . 14.5 lbf (64 N)
  - Number of Working Coils . . . . . 5-¼

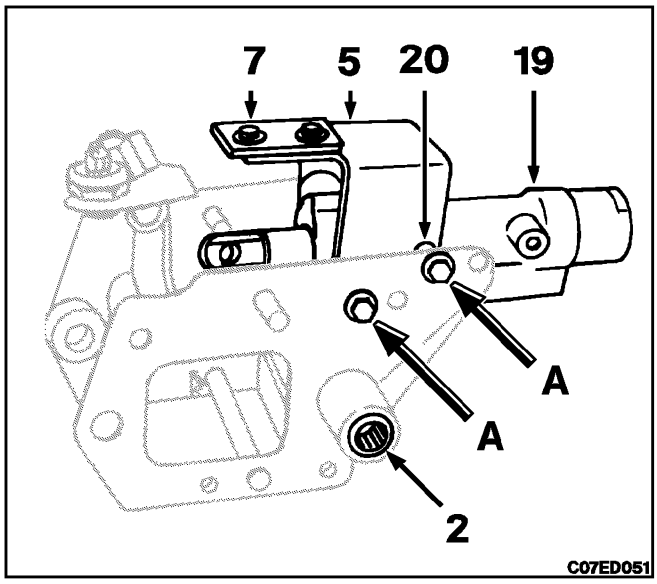
Special Torques:
- Detent Cam . . . . . 6 to 10 lb ft (8 to 13 N•m)

Sealants:
- Detent Cam . . . . . Loctite #568 or Plastic Gasket
- Shifter Knob . . . . . Loctite #242

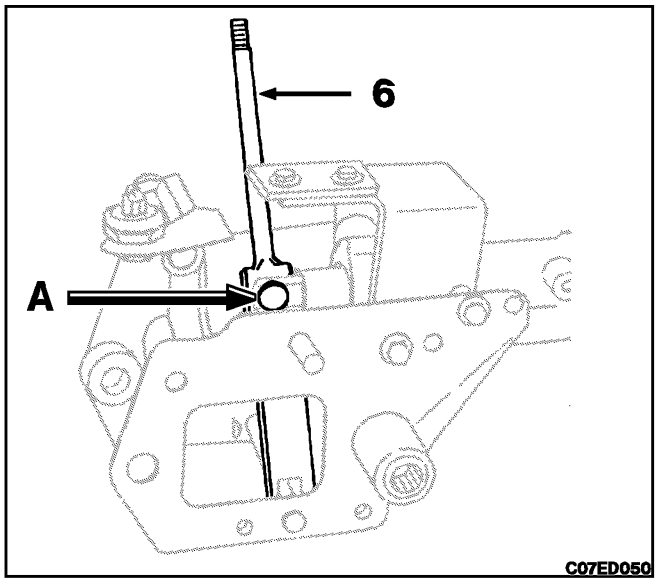
5. Install left control panel (2) and secure with hardware. Torque bolts to 8 lbf ft (10 N•m) ±10%. Apply Loctite #242 to threads of transmission control lever and install shifter knob (1).



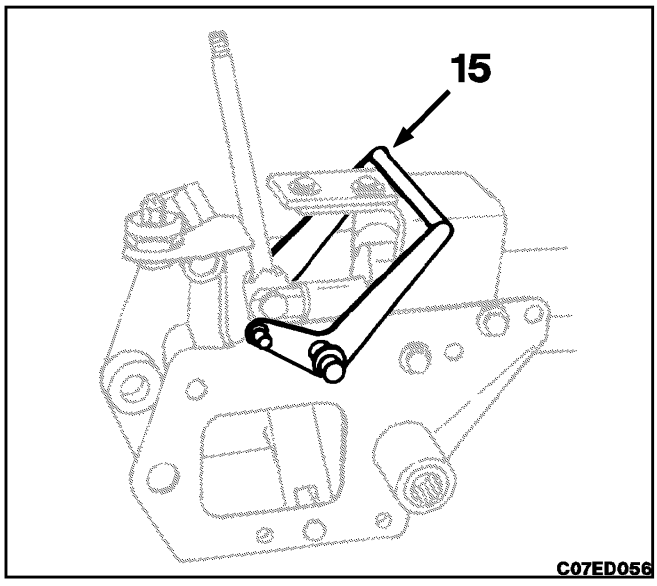
2. If removed, install guide block (7) to transmission lever guide (5) with hardware. Torque bolts to 8 lbf ft (10 N•m) ±10%. Install pilot control valve (19) in lever guide and secure with spacers (20) and hardware (A). Torque bolts to 28 lbf ft (38 N•m) ±10%.




3. Install transmission control lever (6) on mounting shaft and connect to pilot control valve spool with rod end pin, flat washer and new cotter (A).

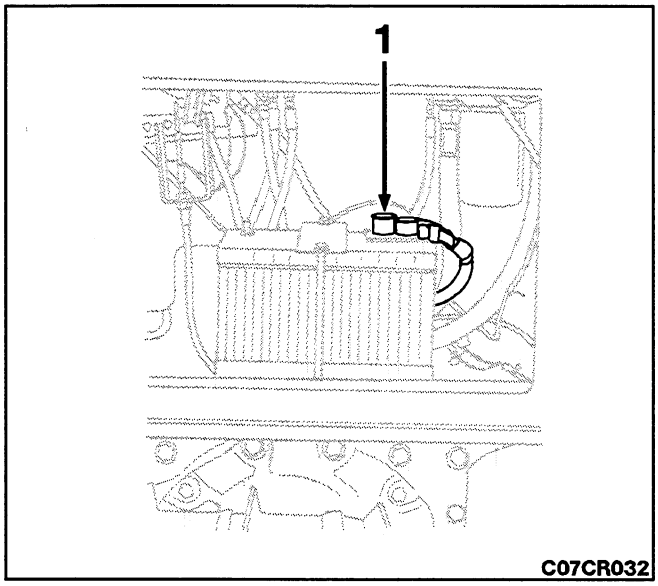



4. Install safety lever bail (15) on mounting shafts.

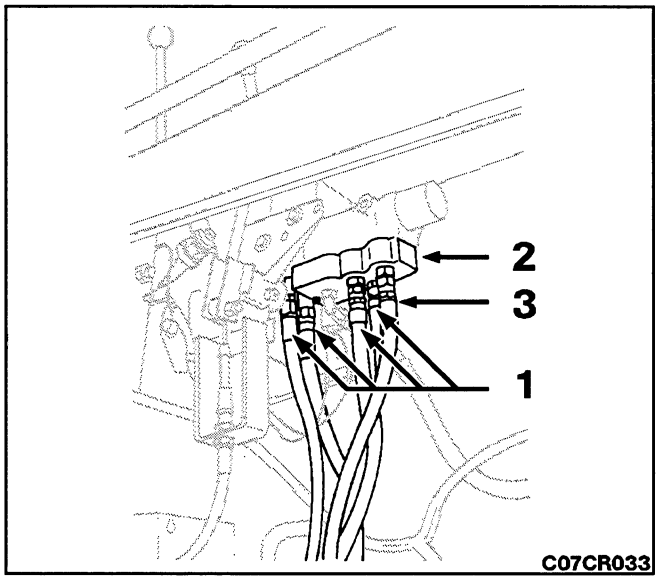


**DESCRIPTION** **PAGE**

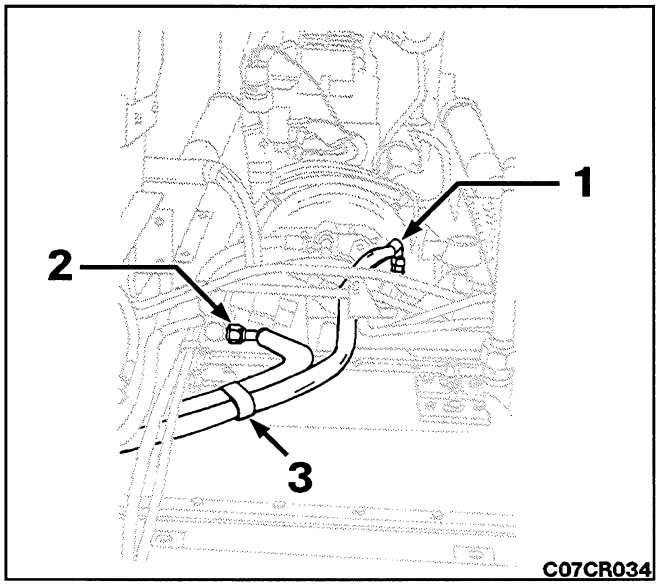
13. From inside battery box, disconnect and remove positive battery cable (1) and position outside of box.



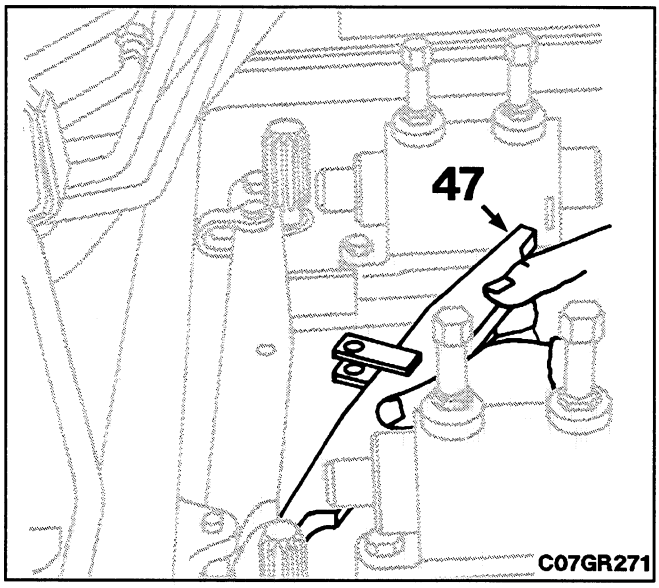

14. Disconnect and cap four hoses (1) at manifold (2). Position disconnected hoses outside of box. Disconnect and cap drain hose (3) at manifold.



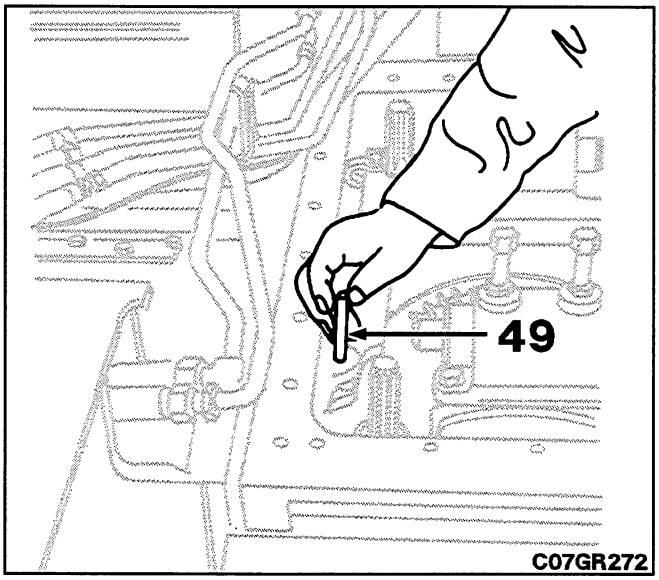

15. Disconnect and cap filter inlet hose (1) from top of pump. Disconnect and cap filter outlet hose (2) from tee at main regulator valve. Unclip (3) hoses from steering fitting cover.



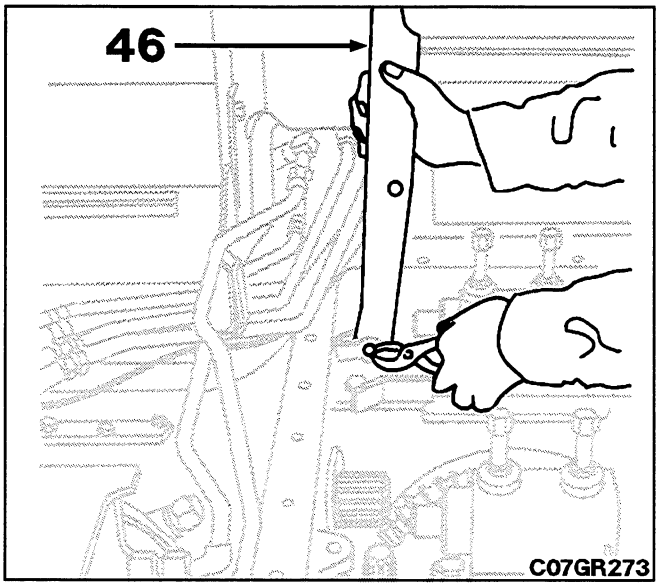
12. Detach brake equalizer bar (47) from brake actuator bar and remove.



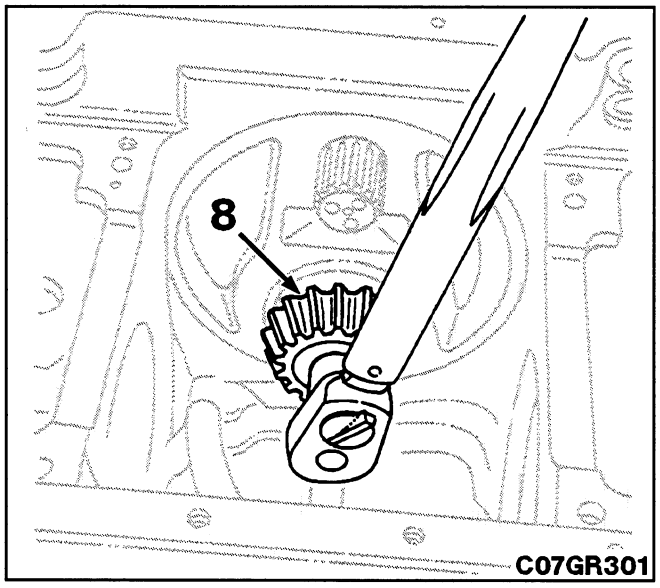

13. Remove pivot pin (49).



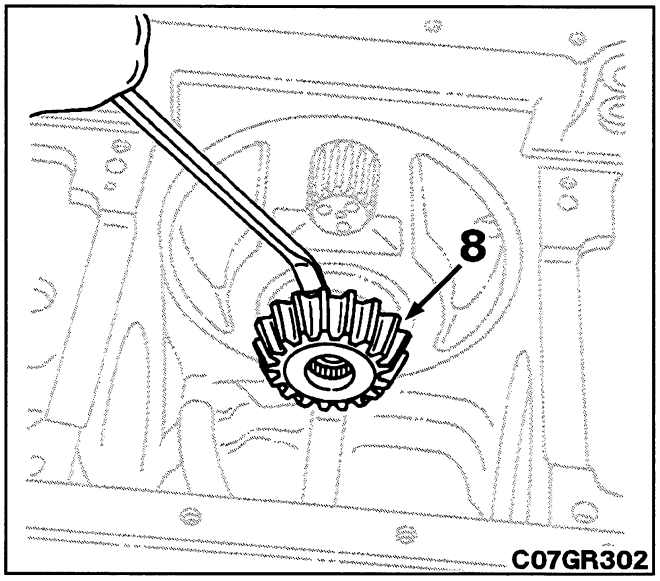

14. Rotate brake actuator bar (46) up and remove cotter pin from clevis pin.



42. Remove pinion gear (8) mounting hardware.



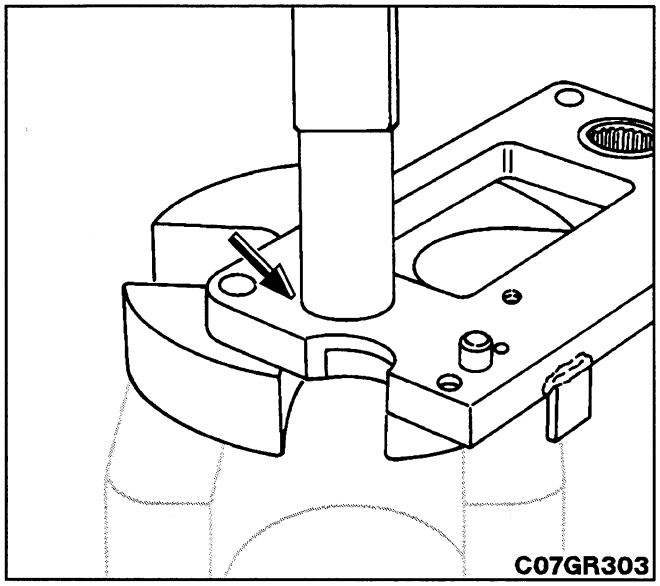

43. Remove pinion gear (8) from transmission output (range) shaft.



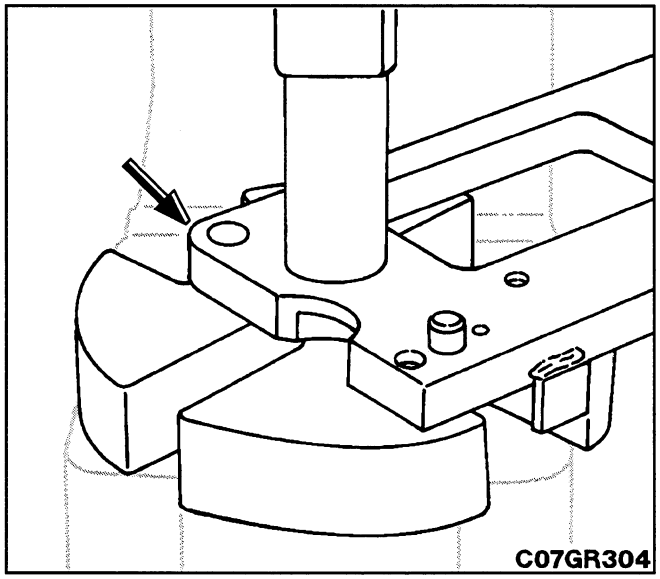
## SERVICE

***NOTE: For removal of mounting plate, refer to DISASSEMBLY under COMPLETE ASSEMBLY and follow steps to mounting plate removal.***

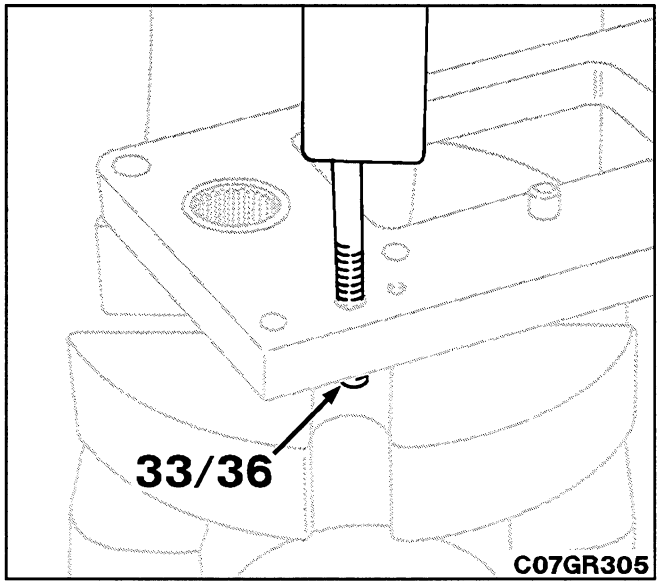
1. Position mounting plate in press with bearing over open area. Apply press and remove bearing.



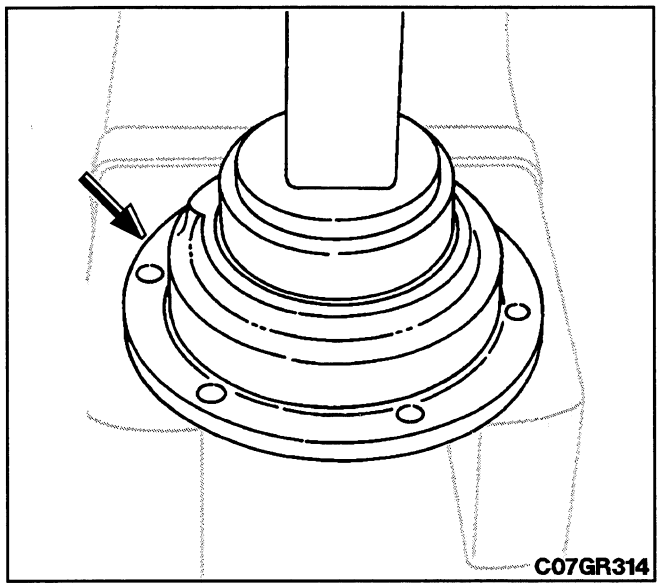

2. Position mounting plate in press with bearing over closed area. Apply press and install bearing flush with both edges of plate.



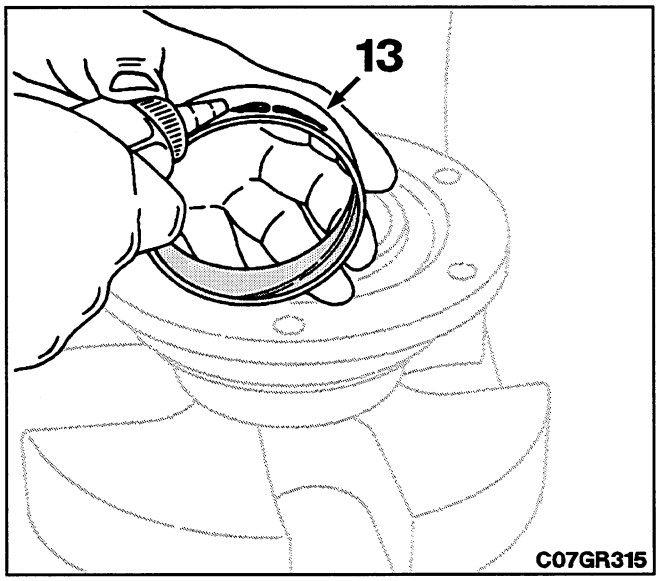

3. Using press and pusher rod, remove dowel pins (33 or 36) from mounting plate.



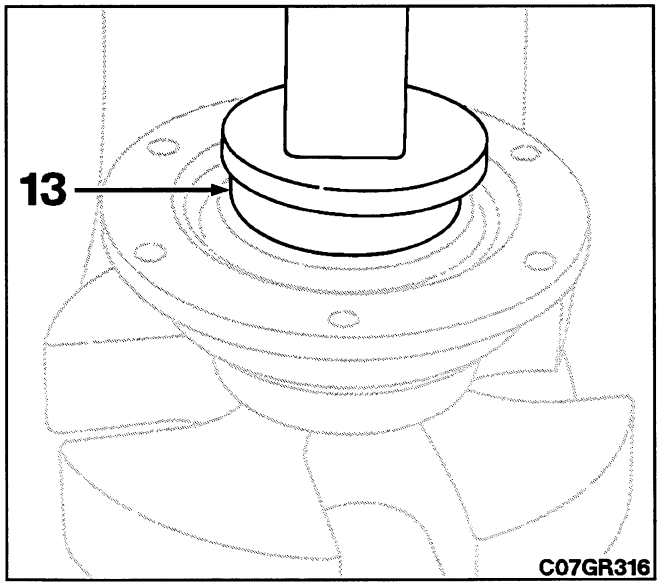
6. Apply press and install bushing 0.03 to 0.08 in (0.76 to 2.03 mm) below edge of carrier.



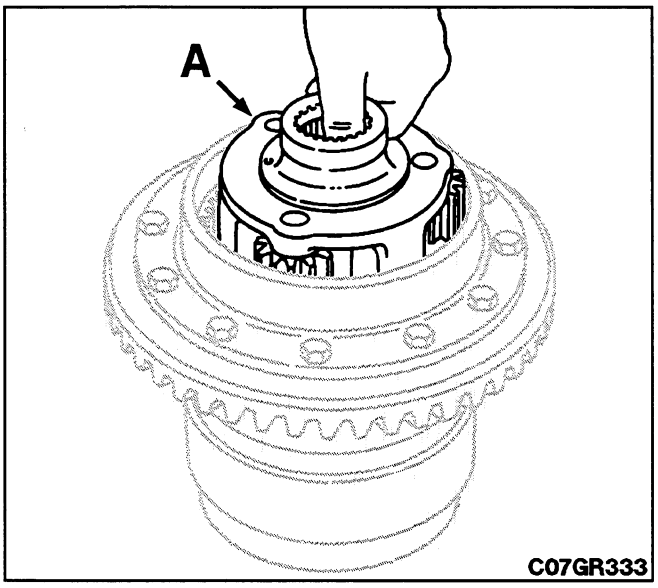

7. Turn carrier over in press. Apply coat of Loctite #609 to outside diameter of bushing (13).



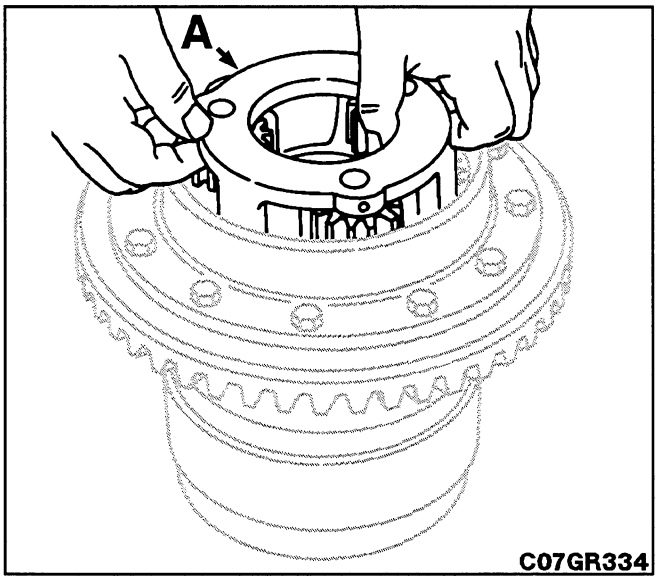

8. Start chamfered edge of bushing (13) into carrier and secure with press.



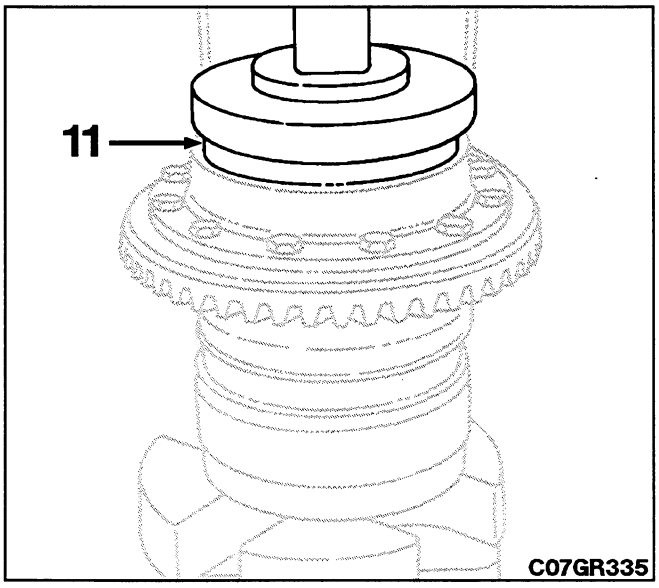
3. Remove assembly from press and position with bevel gear end up. Install one planet carrier assembly (A) with retaining ring end up.



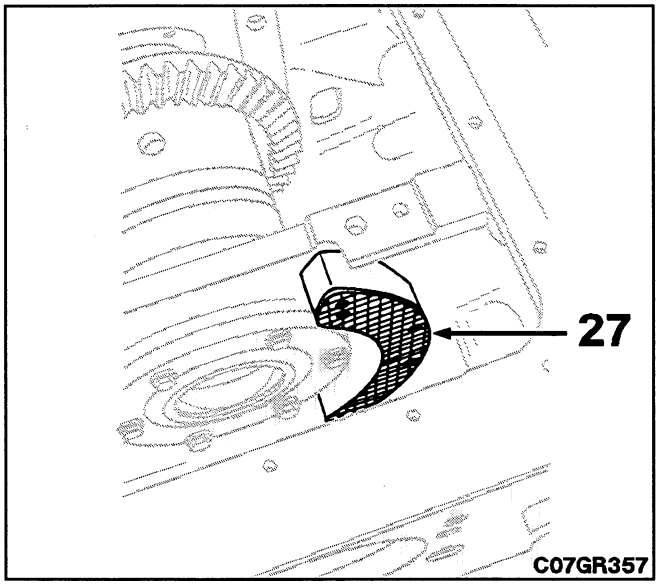

4. Install remaining planet gear carrier assembly (A) with retaining ring end down.



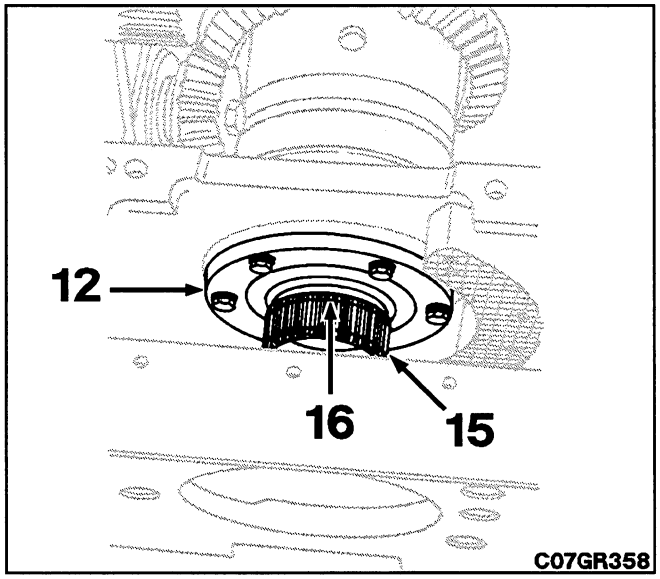

5. Reposition assembly in press, bevel gear end up. Place bearing cup (11) in carrier. Using suitable push plate, apply press and install cup flush with edge of carrier.



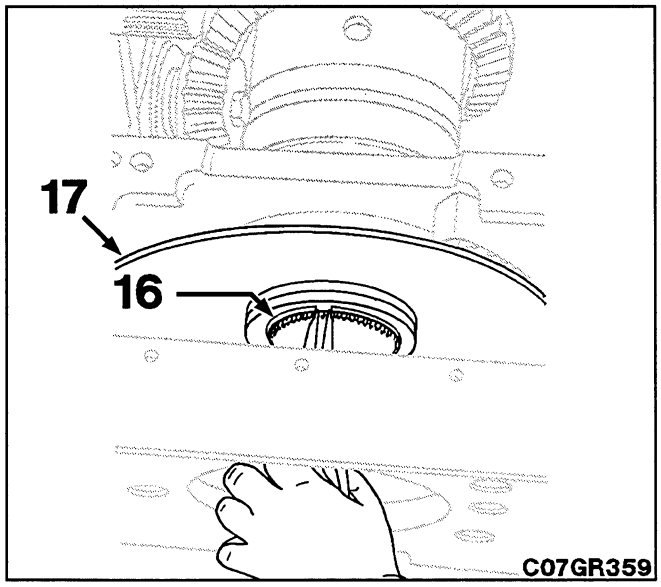
31. Install clutch back up shoe (27) onto dowels in rear main frame.



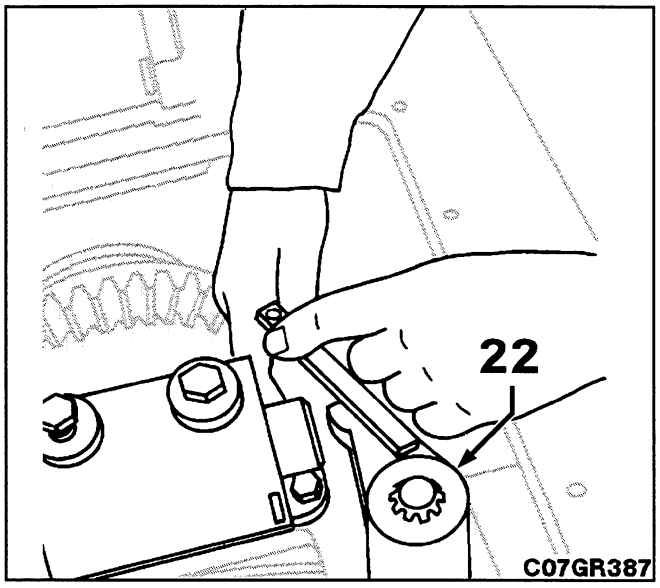

32. Install sun gear (15) with inner retaining ring (16) into bearing carrier (12) meshing with three planet gears.

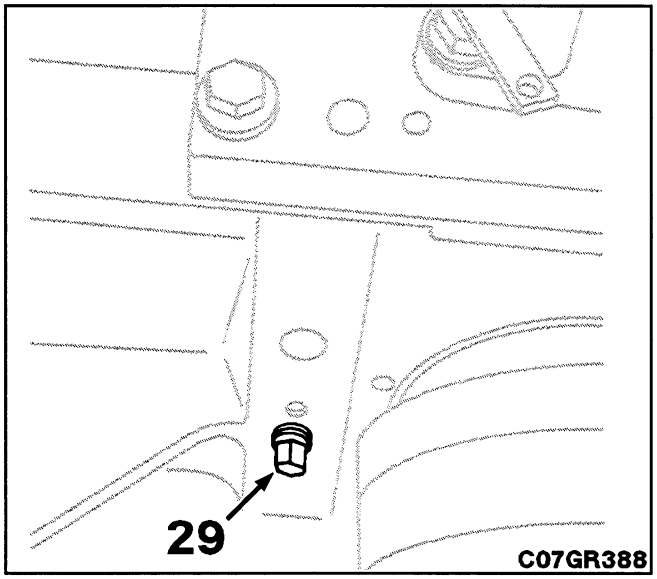


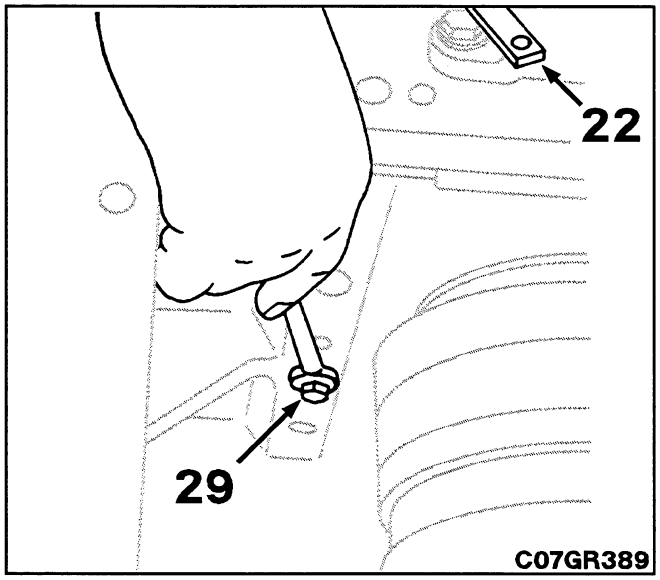

33. Install clutch (drive) disc (17) on sun gear and secure with outer retaining ring (16).



61. From inside rear main frame, turn in adjusting screw (29) until left steering arm (22) bottoms against nose end of steering cylinder.



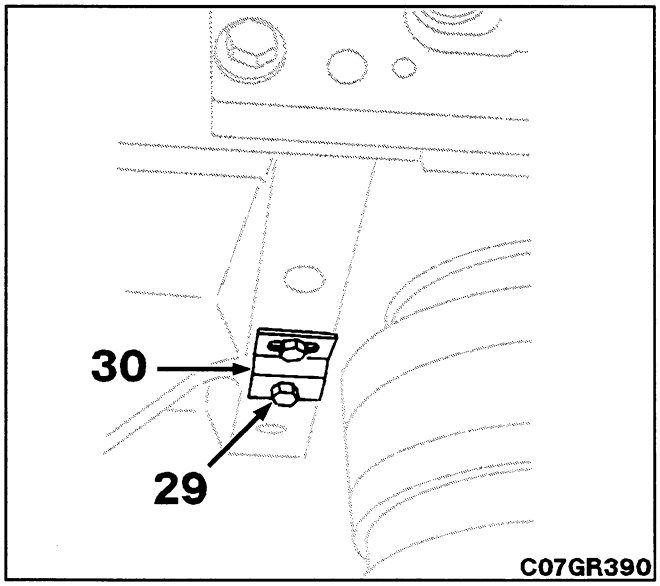



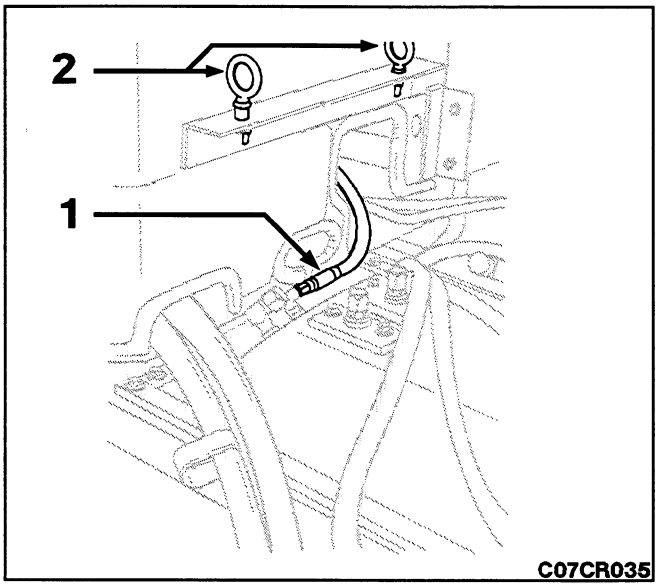

62. Secure adjusting screw (29) in place with lock plate (30) and hardware. Torque bolts to 28 lbf ft (38 N•m) ±10%.

Repeat Steps 59 through 62 for right side of machine.

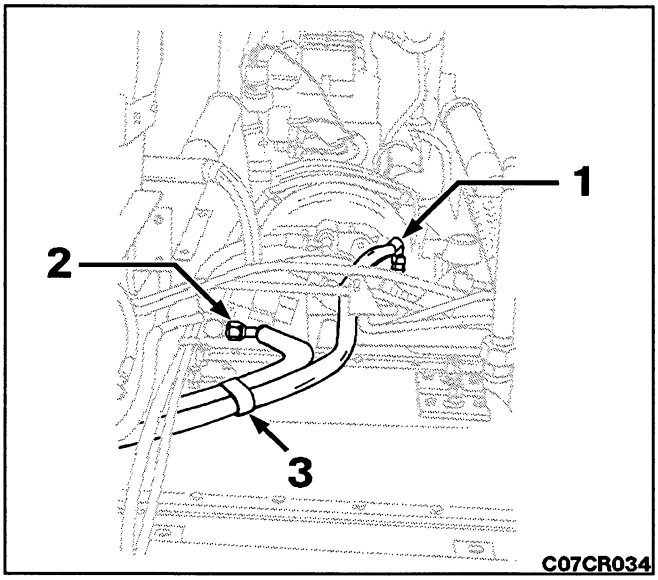
***NOTE: Adjustment tool is reversible by moving adjusting bolt block to other side.***



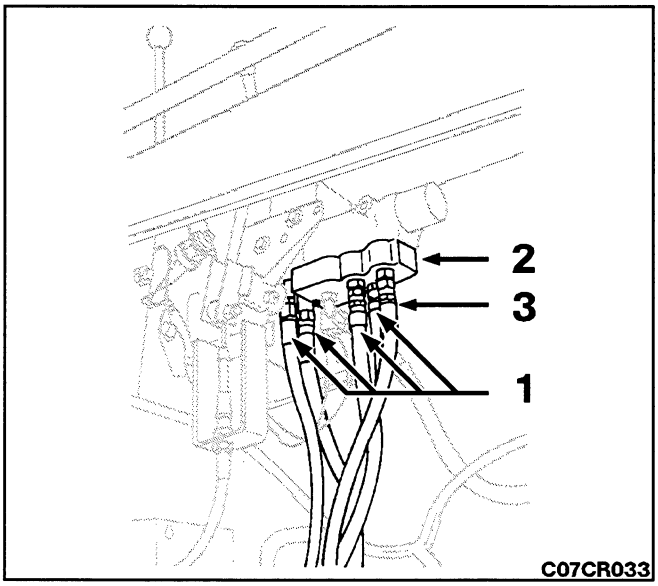
10. Connect pilot valve drain hose (1) to elbow at rear cover. Remove eye bolts (2).




11. Install filter inlet hose (1) to top of pump. Install filter outlet hose (2) to tee at main regulator valve. Reclip (3) hoses at steering fitting seal flange. Torque lock nut to 12 to 15 lbf ft (16 to 20 N•m).

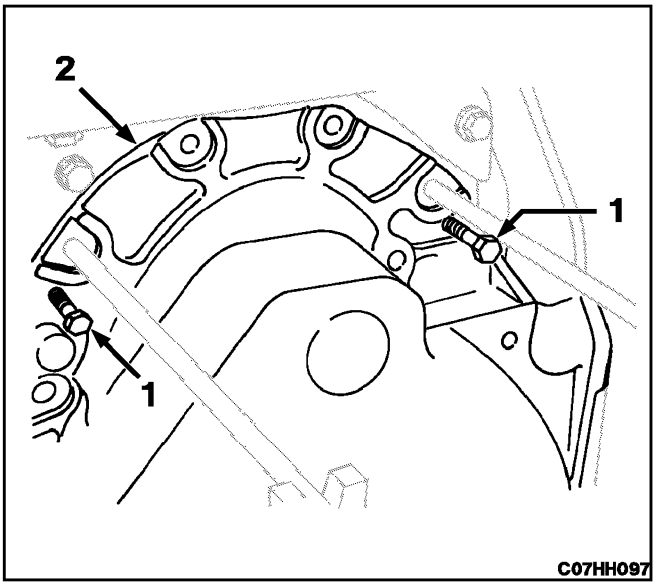



12. Install four hoses (1) to manifold (2). Install drain hose (3) to manifold.

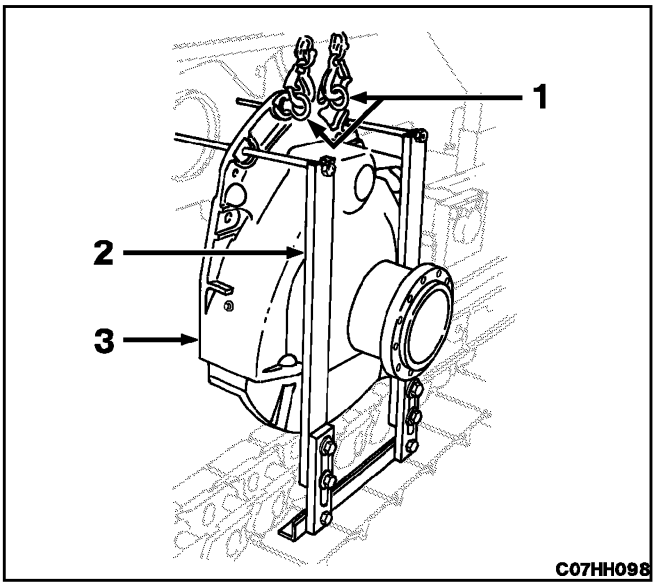


**DESCRIPTION** **PAGE**

13. Remove corks from two puller screw holes. Install two 5/8NCx3 puller bolts (1) and draw final drive (2) away from rear main frame. Slide final drive out to clear side of machine.



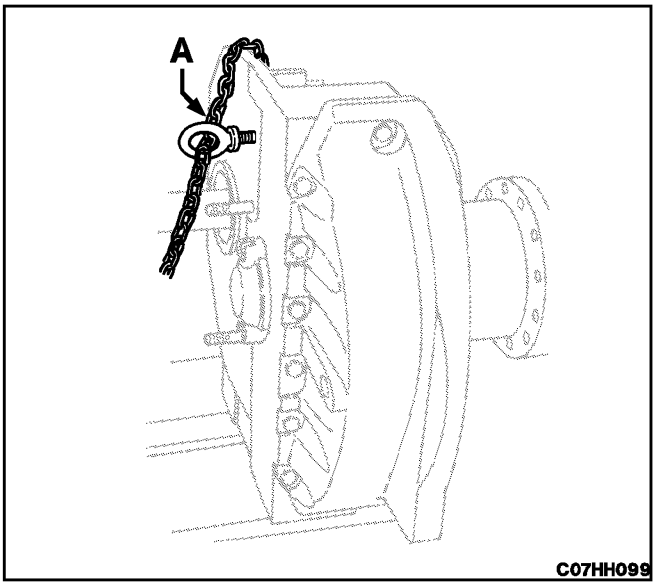

14. Install two eye bolts (1) and nuts in top most holes in final drive housing. Attach hoist and tension. Remove support tool (2) and remove final drive (3).



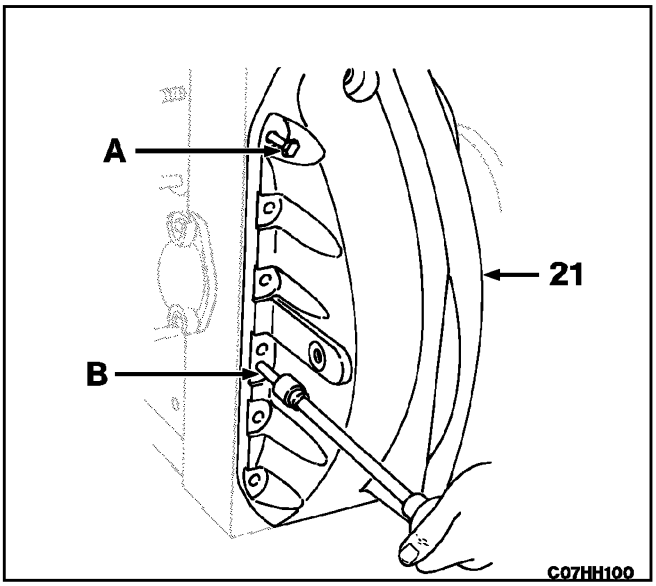
**TD9H**

*NOTE: CALLOUTS FROM EXPLODED VIEW CORRESPOND WITH CALLOUTS IN FOLLOWING STEPS*

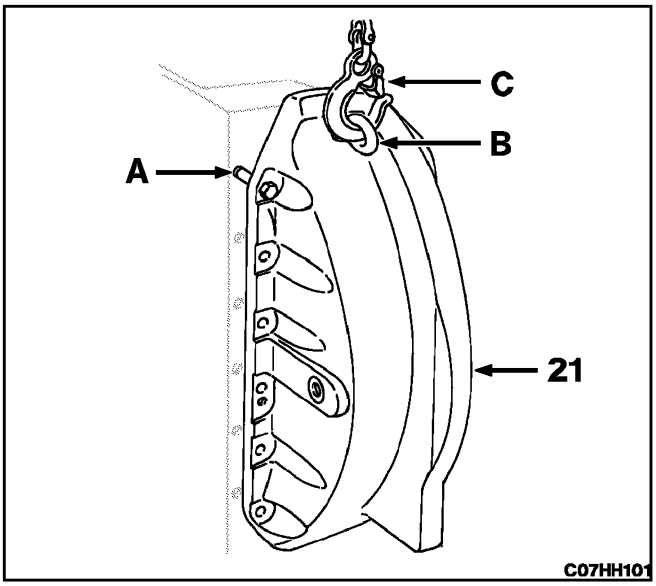
1. Rest final drive on bench with main frame mounting face down. Install safety restraint (1).




2. Replace two top corner bolts of bottom cover with 1/2NCx7 bolts (A). Remove corks from puller screw holes in bottom cover (21). Remove remaining mounting hardware. Install two 1/2NC puller bolts (B). Remove bottom cover by running in puller screws.



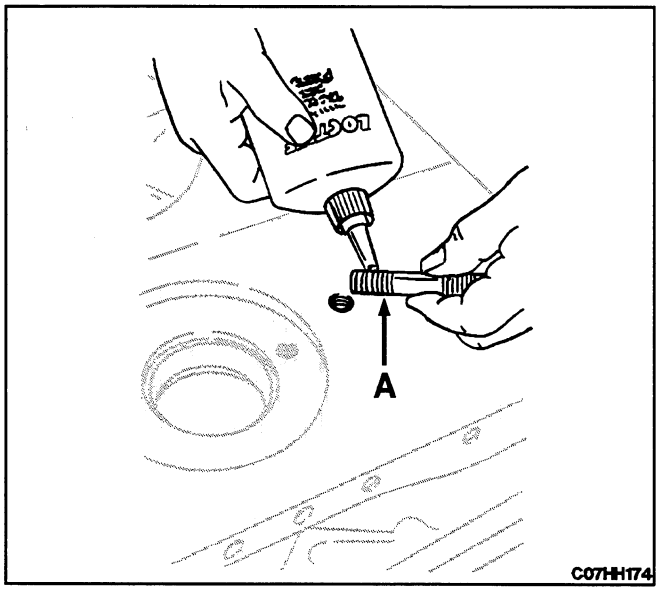

3. Slide bottom cover (21) out on two bolts (A). Install eye bolt and nut (B). Attach hoist (C) to eye bolt and remove bolts then cover.



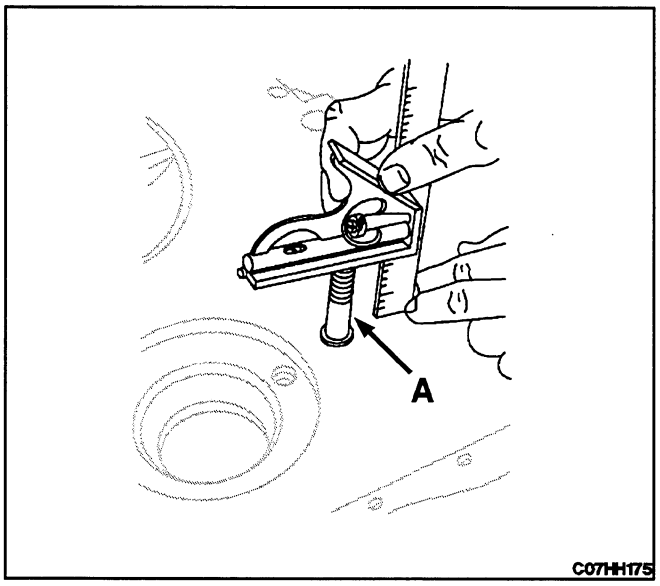
### TD7H OR TD8H

***NOTE: Callouts from exploded view correspond with callouts in following steps***

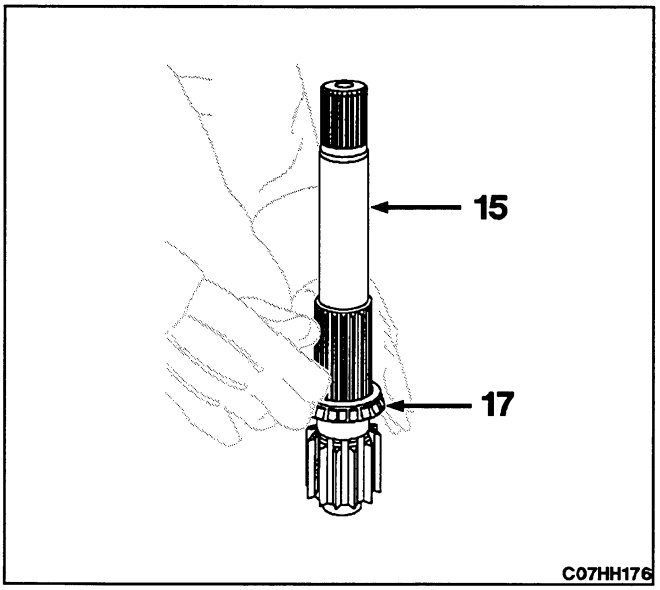
1. Block final drive housing in a horizontal position with rear main frame mating face up. Check height of two mounting studs for 2.56 in (65.024 mm) dimension. If necessary to install new studs (A), use Loctite #568 or Plastic Gasket.



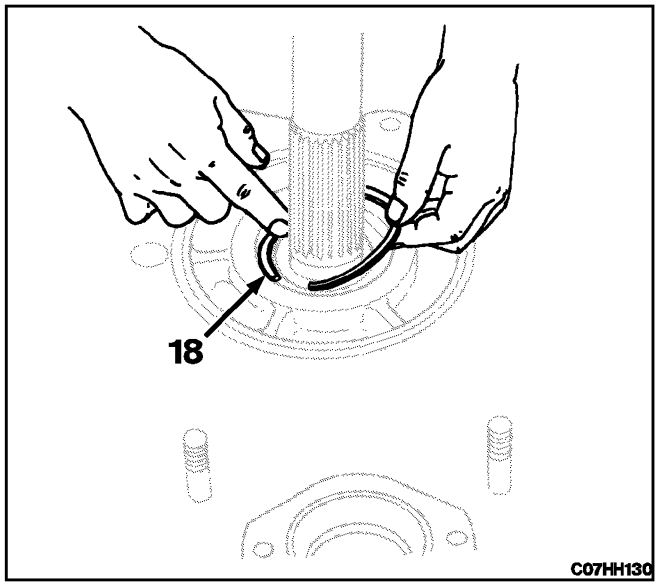

2. Assemble studs (A) to housing and set to 2.56 in (65.024 mm) dimension. If necessary, assemble drive pinion outer bearing cup (16) into housing. Using a driver, tap to seat in housing.



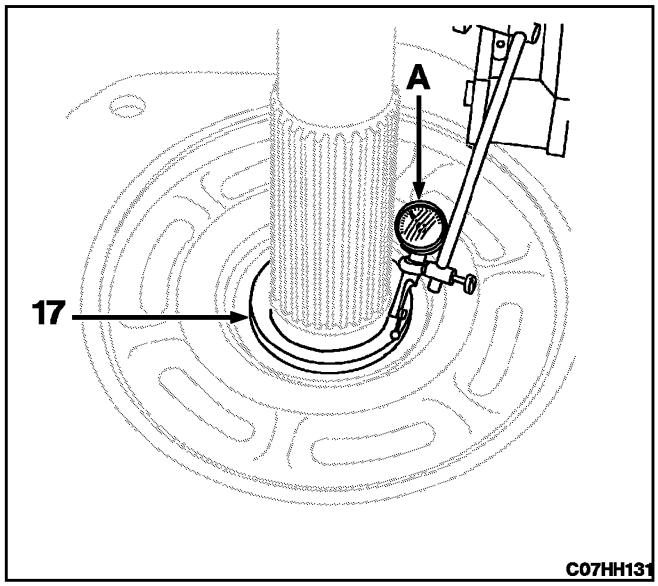

3. Heat drive pinion inner bearing (17) to 275°F (135° C) for 45 minutes and assemble to shaft (15). Tap to seat against shoulder of shaft.



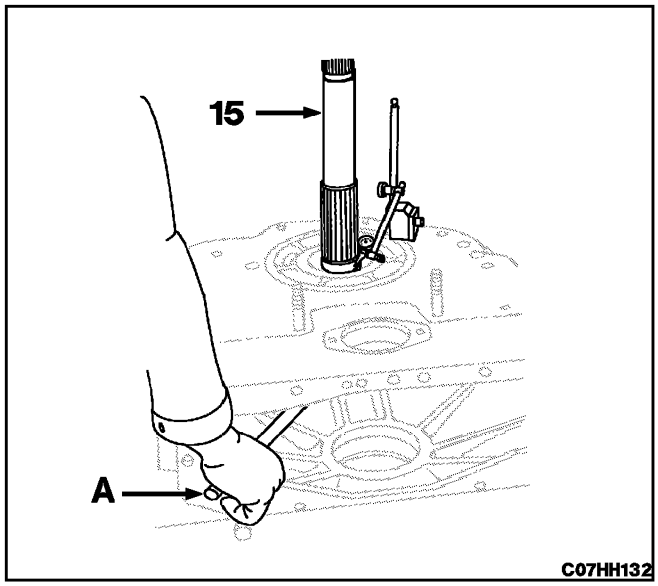
6. Attempt to insert 0.109 in (2.769 mm) retaining ring (18). If possible to insert ring, bump cup back against ring with slide hammer. If shaft rotates freely assembly is complete.




7. Position indicator (A) against bearing cone (17). Set to zero.

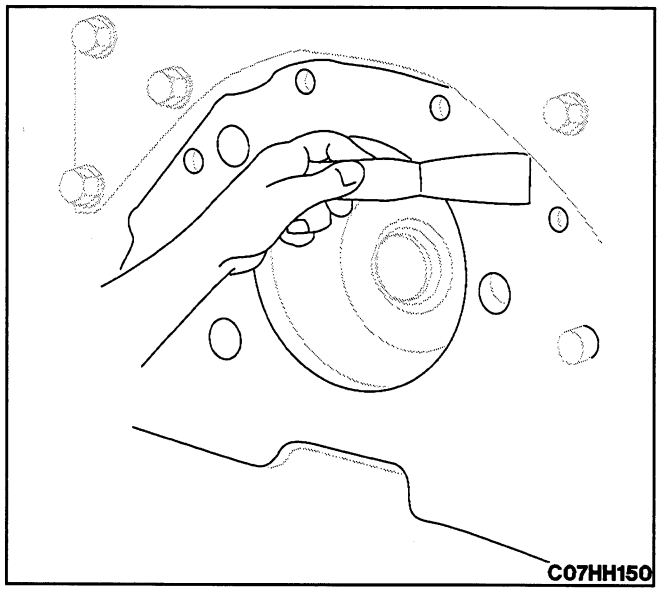



8. Insert pry bar (A) between housing and shaft (15). Pry shaft upward from within housing to determine end play. Observe and record reading. Repeat two or three times and average readings. Required end play is 0.000 to 0.009 in (0.000 to 0.229 mm). If end play should exceed 0.009 in (.229 mm) with 0.109 in (2.769 mm) retaining ring, install 0.117 in (2.972 mm) ring and bump cup back against ring. If 0.109 in (2.769 mm) retaining ring will not fit, or shaft will not rotate freely, install 0.101 in (2.565 mm) retaining ring and bump cup back against retaining ring.

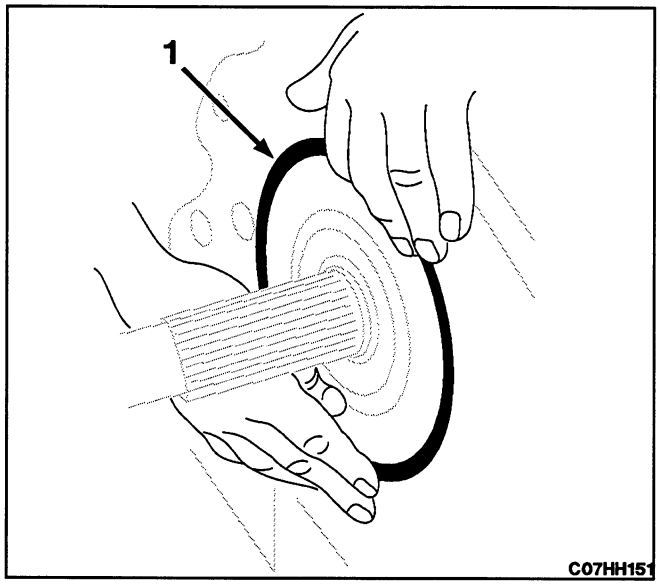


1. Apply Loctite #568 or Plastic Gasket to final drive mounting face of rear main frame. Spread with evenly putty knife.

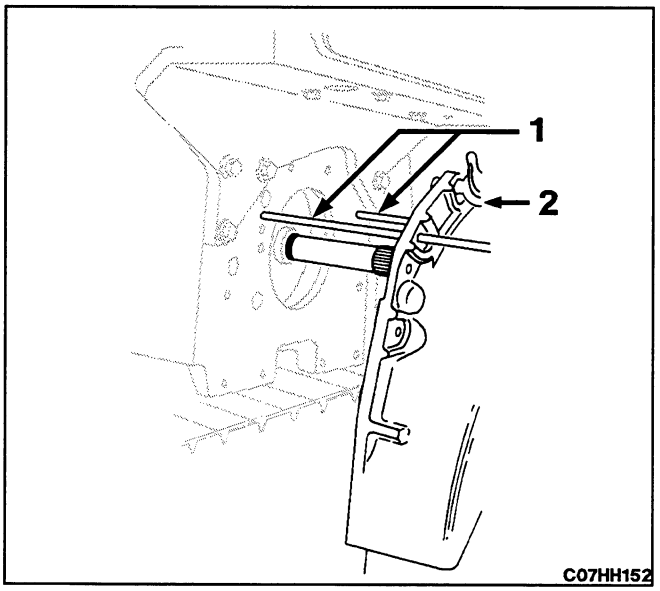
***NOTE:*** ***Loctite must not be closer than 1 in (25.4 mm) from outside diameter of large bore and brake adjustment screw hole.***

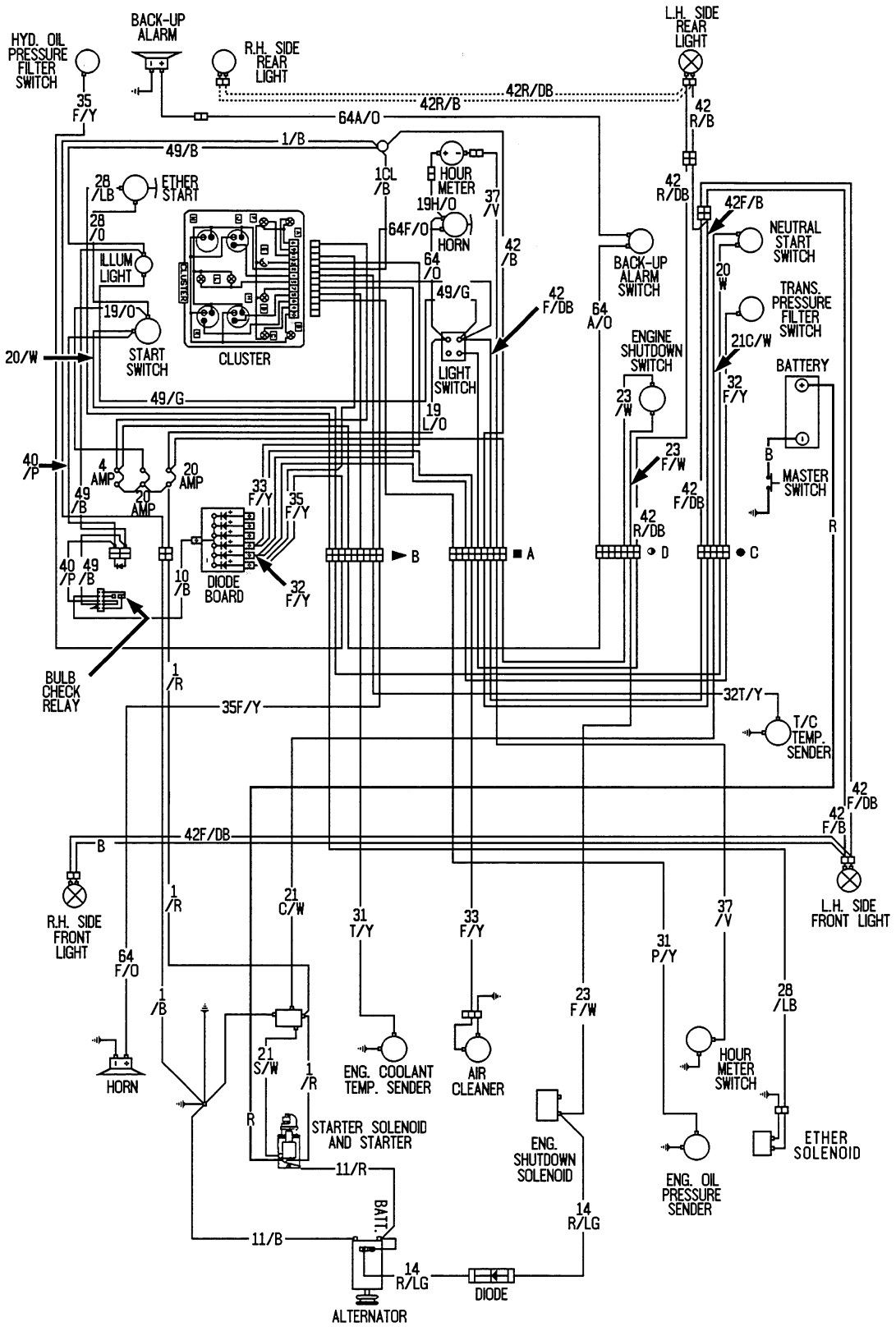



2. Install o-ring (1) to mounting face of final drive.




3. Apply brake pedal lock to prevent brake discs from moving when assembling final drive. Thread support tool rods DR10-817 (1) into rear main frame. Install two ⅝NC eye bolts (2) into top most holes of final drive. Attach two legged chain to eye bolts and lifting strap to sprocket carrier shaft. Adjust strap to maintain pinion shaft perpendicular to rear main frame mounting face.






WIRING DIAGRAM

## TROUBLESHOOTING

If the cranking motor is not performing properly, make the following checks to help determine which part of the circuit is at fault.

### Battery

Check that the battery is at full charge.

***NOTE: Wiring, switches and cranking motor cannot be checked if battery is defective or discharged.***

### Wiring

Inspect wiring for damage. Inspect all connections to the cranking motor, solenoid, magnetic switch, starting and shut down switch and battery, including all ground connections. Clean and tighten all connections as required.

***NOTE: Cranking system cannot operate properly with excessive resistance in circuit.***

### Magnetic Switch, Solenoid and Control Switches

Inspect all switches to determine their condition. From the wiring diagram determine which circuits should be energized with the starting switches closed. Use a voltmeter to detect any open circuits.

### Cranking Motor

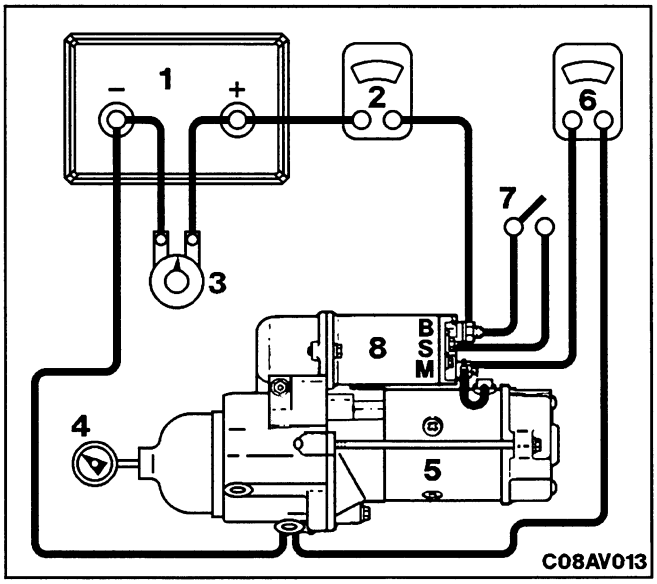
If the battery, wiring and switches are in satisfactory condition, and the engine is known to be functioning properly, remove the cranking motor per REMOVAL and follow the test procedures outlined below.

A cranking motor is designed for intermittent duty only, and should never be operated for more than 30 seconds at a time. After 30 seconds, cranking must be stopped for at least 2 minutes to allow the motor to cool.

The armature should be checked for freedom of rotation by prying the pinion with a screwdriver. Tight bushings, a bent armature shaft or a loose pole shoe screw will cause the armature to not turn freely. If the armature does not turn freely, disassemble the motor and repair cause. If the motor rotates freely, a no-load test should be performed prior to disassembly.

A no-load test may point to specific defects which can be verified with tests when disassembled. A no-load test can also identify open or shorted fields, which are difficult to check when disassembled. Also, the test can be used to indicate normal operation on a repaired motor before installation.

Connect a voltmeter (6) in line from the M terminal of the solenoid (8) and ground terminal. Install a RPM indicator (4) to the end of the nose housing. Connect a fully charged battery (1) in series with an ammeter (2) to the B terminal on the solenoid. Connect an OPEN switch (7) in series between the solenoid B terminal and S terminal. Connect a carbon pile (3) in series between the battery terminals.



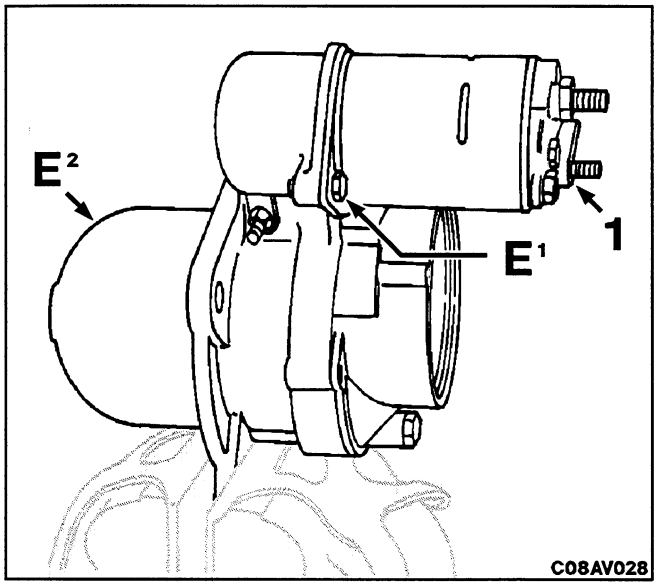

NO-LOAD TEST

1. Battery
2. Ammeter
3. Carbon Pile
4. RPM Indicator
5. Motor
6. Voltmeter
7. Switch
8. Solenoid

| | |
|---|---|
| RPM | 3000 TO 5600 |
| CURRENT | 125 TO 190 AMPS |
| VOLTAGE | 10 |

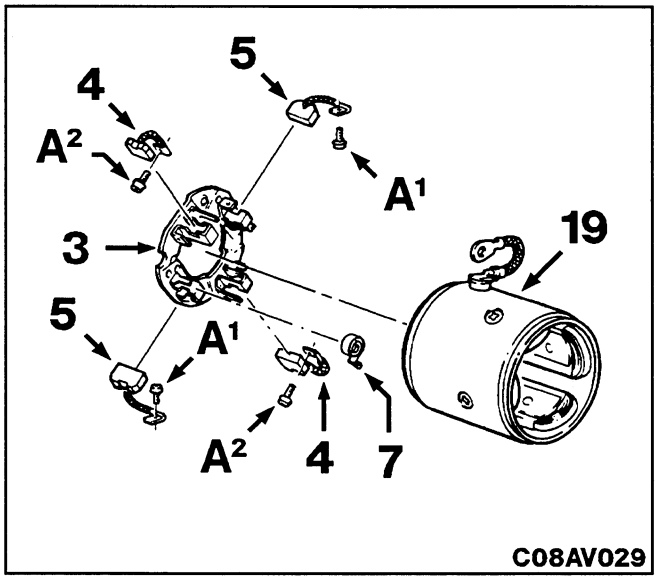
Close the switch and obtain specified voltage by varying the carbon pile. When reached, read and record current draw and the pinion speed. OPEN the switch and disconnect the hook up.

7. Remove solenoid (1) mounting hardware ($E^1$) from gear reduction and drive group ($E^2$). Pivot inside end of solenoid out of engagement with shift lever in gear reduction and drive group and remove solenoid.

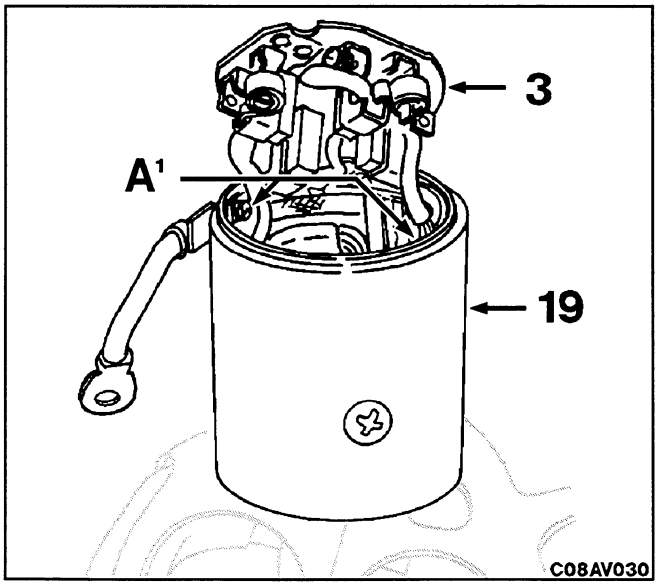



**Frame, Field and Brush Holder Group ($C^1$)**

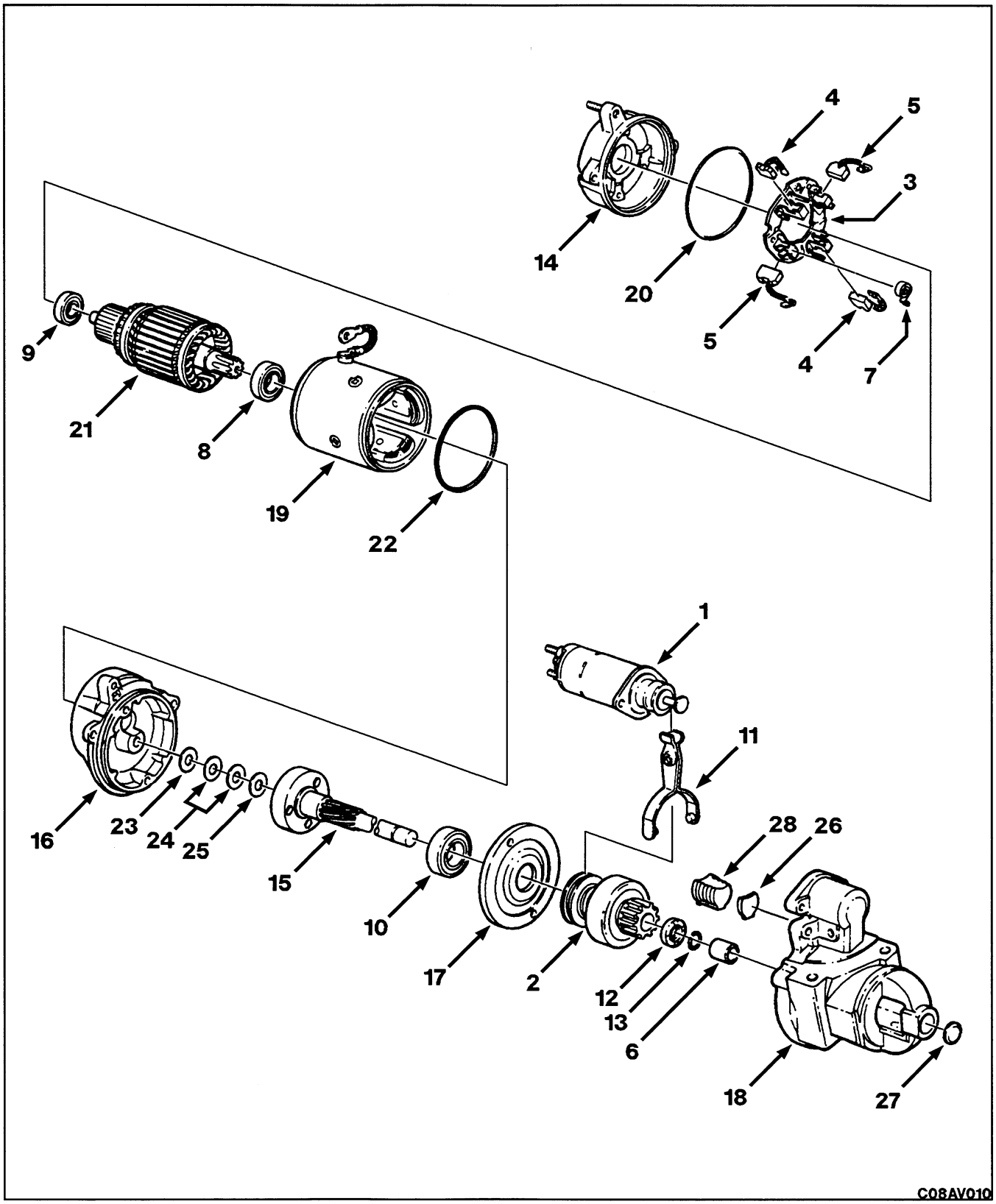
$A^1$. Insulated Brush Screws
$A^2$. Grounded Brush Screws
3. Brush Holder
4. Grounded Brush
5. Insulated Brush
7. Brush Spring
19. Frame and Field Assembly




8. Move brush holder (3) assembly (with brushes and springs) away from frame and field assembly (19). Remove insulated brush screws ($A^1$) and separate holder from frame.



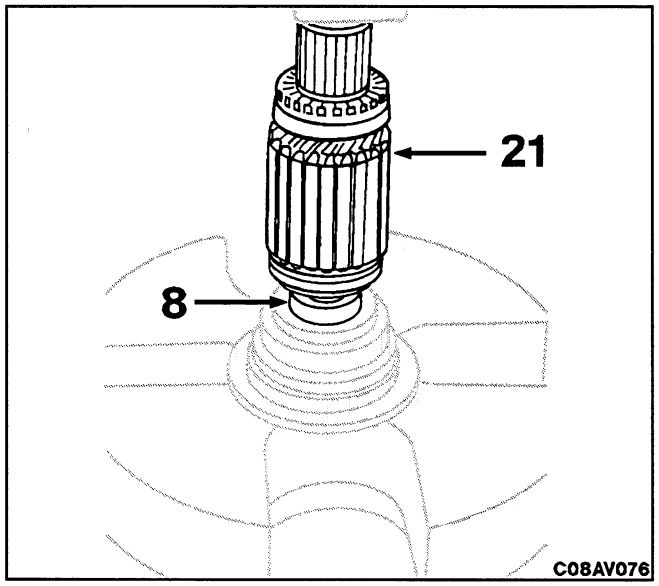
## REASSEMBLY



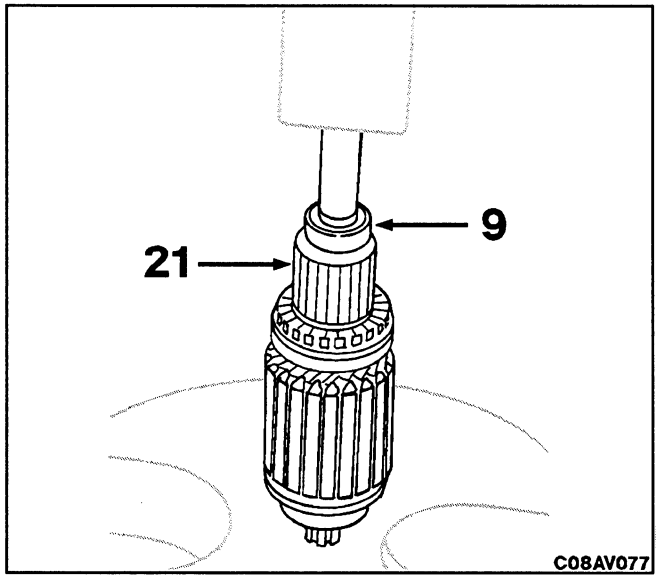

EXPLODED VIEW OF CRANKING MOTOR

### Armature Group (D)

20. Position DE (drive end ) bearing (8) in press. Start armature (21) in bearing and bottom with press.

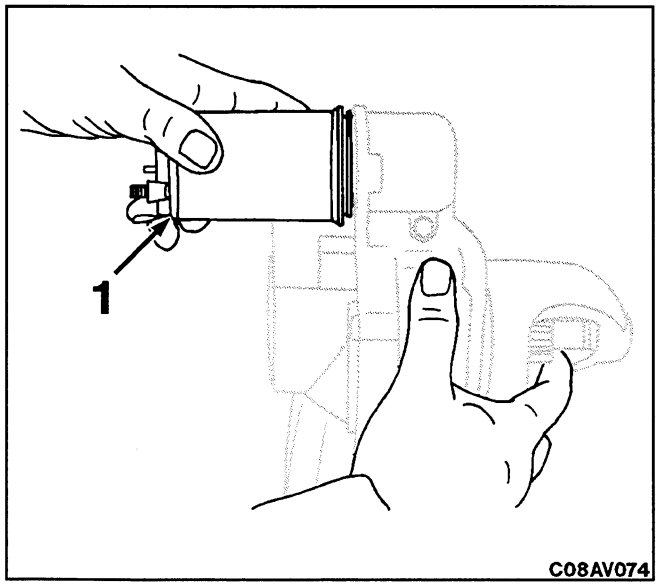



21. Position armature (21) in press with CE (commutator) end up. Start CE bearing (9) on shaft and bottom with press and tube.

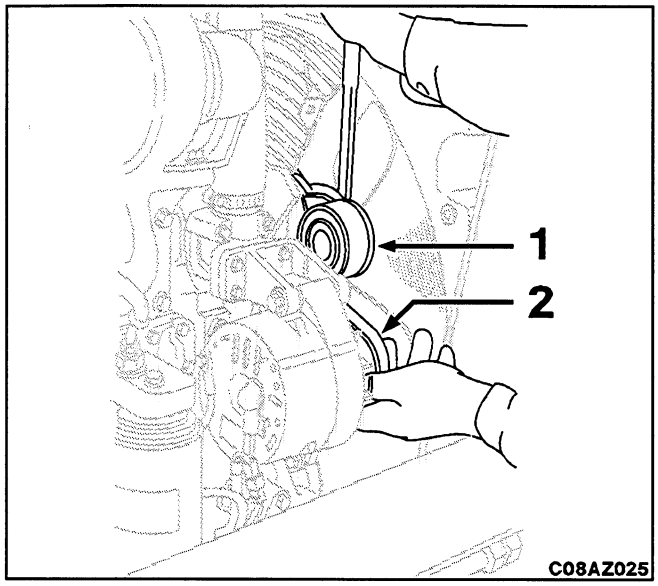



### Complete Assembly

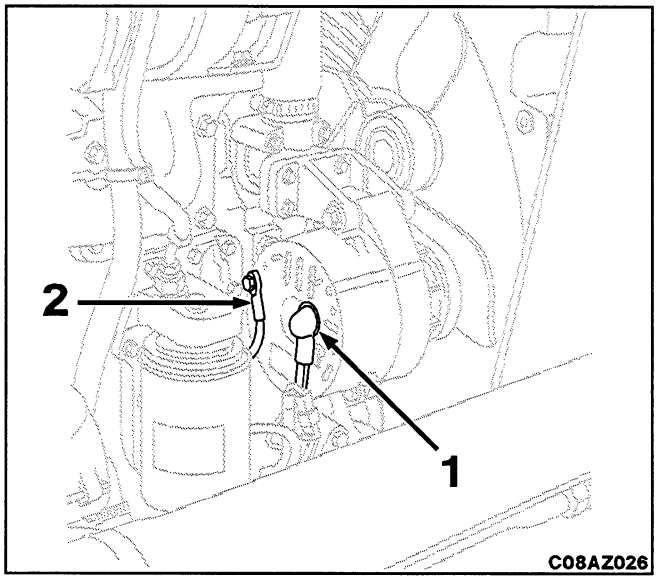
22. Pivot plunger of solenoid (1) into engagement with shift lever in gear reduction and drive group and secure with hardware.



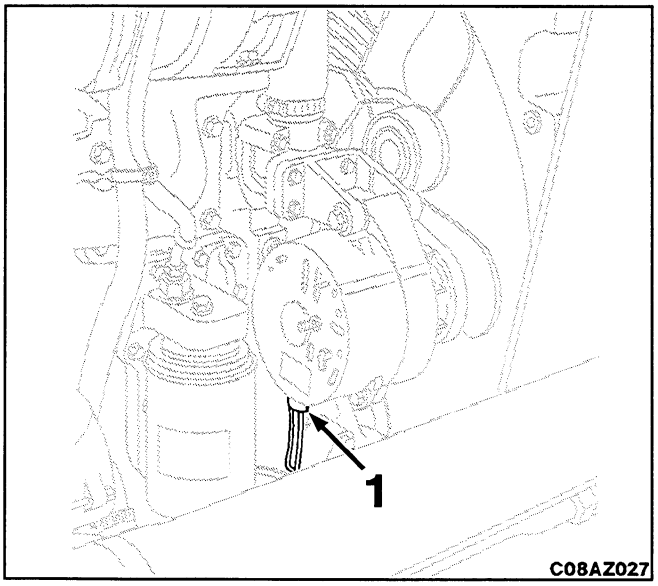
4. Install ½" breaker bar in belt tensioner (1). Lift up on breaker bar and remove belt (2) from alternator pulley.



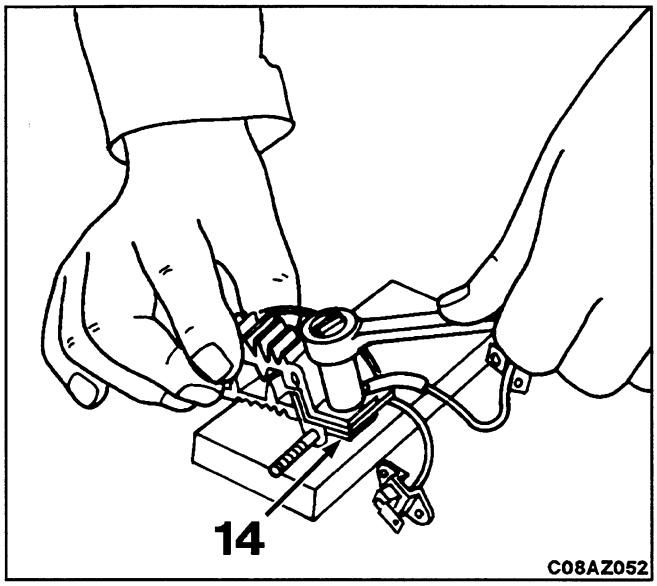

5. Remove output (1) and ground (2) leads from back of alternator.



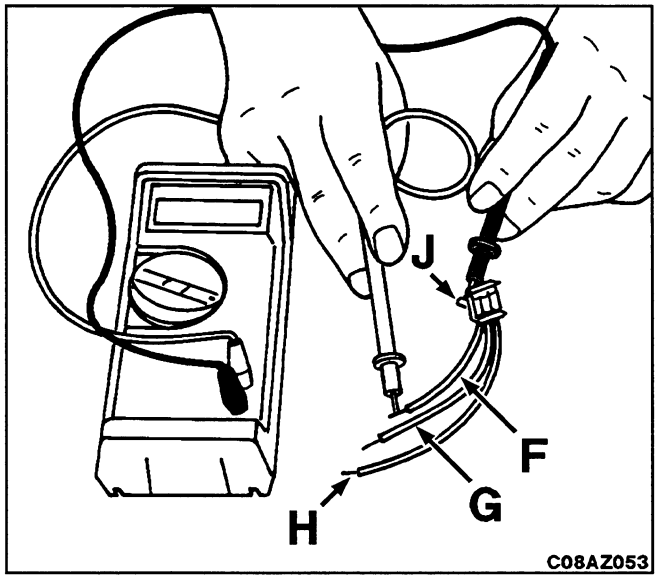

6. Disconnect diode lead (1) at bottom of alternator.



17. Remove hardware securing diode trio (14) to bridge and separate.



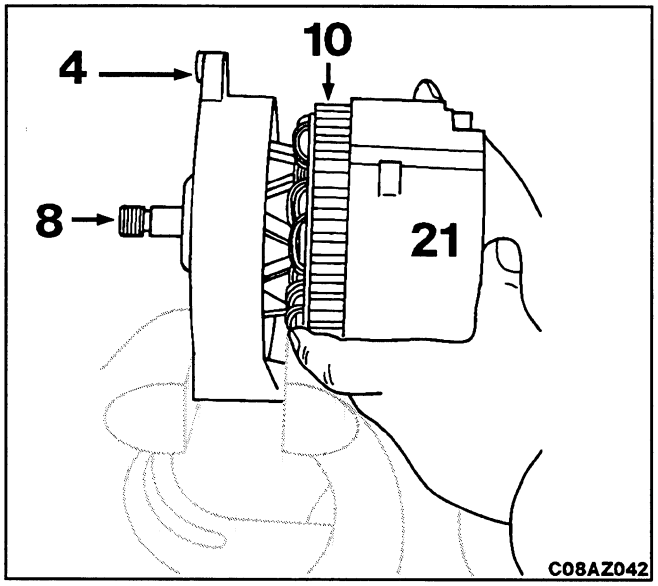

18. Diode tests can be made using an ohmmeter, special diode tester or 12 volt DC test lamp. All internal diodes should check out in a similar manner. Replace diode trio if any one diode tests either open or shorted.



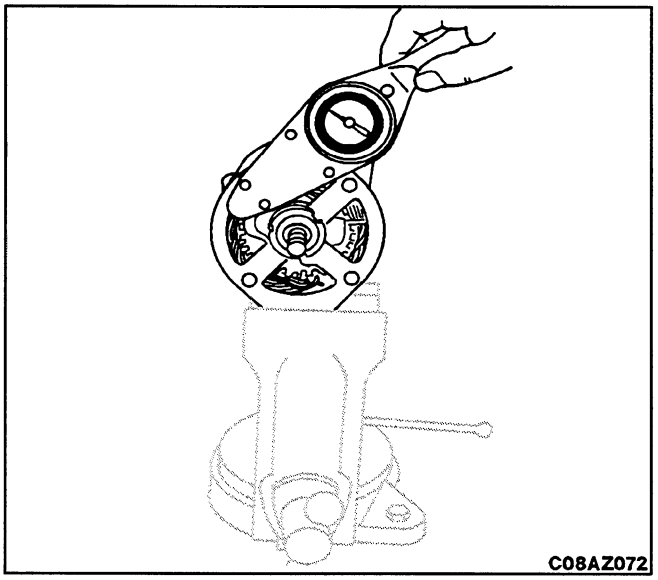

| OHMMETER/LAMP LEAD PLACEMENT | | OHMMETER RANGE READING | | LAMP | |
|---|---|---|---|---|---|
| RED + | BLK - | OHMS | | ON | OFF |
| F,G,H | J | Rx1 | 5 to 20 | X | |
| J | F,G,H | Rx1 | ∞ | | X |

14. Position rear housing (21) with stator (10) over slip ring end of rotor (8) and hand press to front housing (4) and secure with through bolts.

***NOTE: New rear housing contain through bolt holes that are not tapped. A sufficient torque is required to drive thread forming through bolts.***

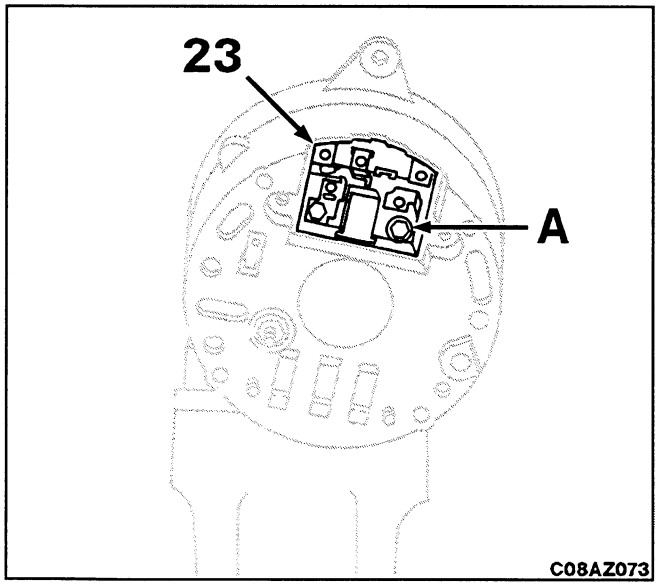



15. Torque bolts to 40 to 50 lbf in (4.5 to 5.6 N•m).



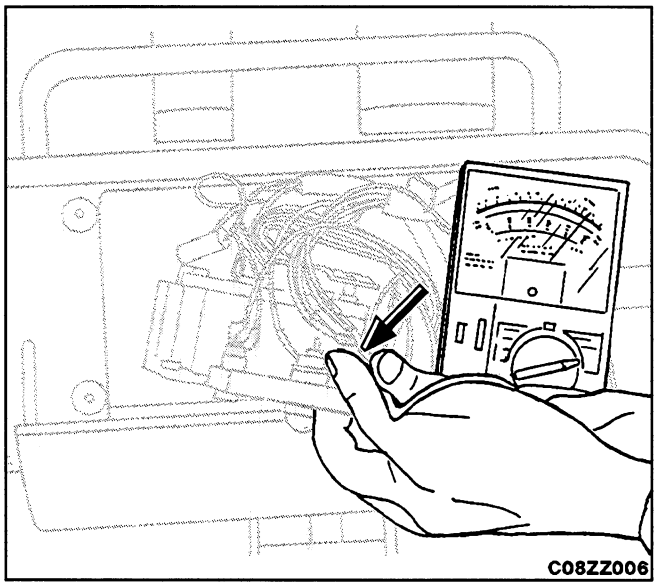

16. Install brush (23) into rear housing, push down and hold in position. Secure with mounting hardware.

***NOTE: Note use of flat washer (A) under right side mounting screw.***



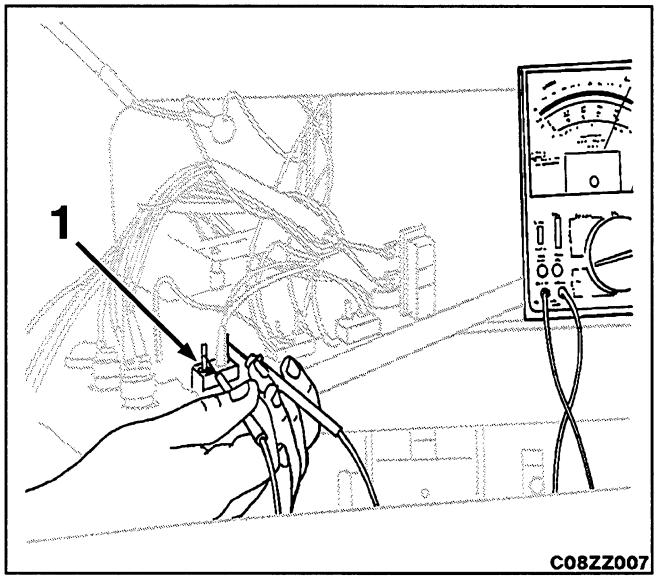
10. With master disconnect switch key in off position, no continuity between terminals. With master disconnect switch key in on position, continuity between terminals. If preceding tests were bad, replace starter switch.

    Apply electrical sealing grease, Grafo 112-X to wire leads and terminals and secure with hardware.




11. Remove leads from outer 20 amp circuit breaker (1). Check for current flow through breaker. If present breaker okay. If not replace breaker.

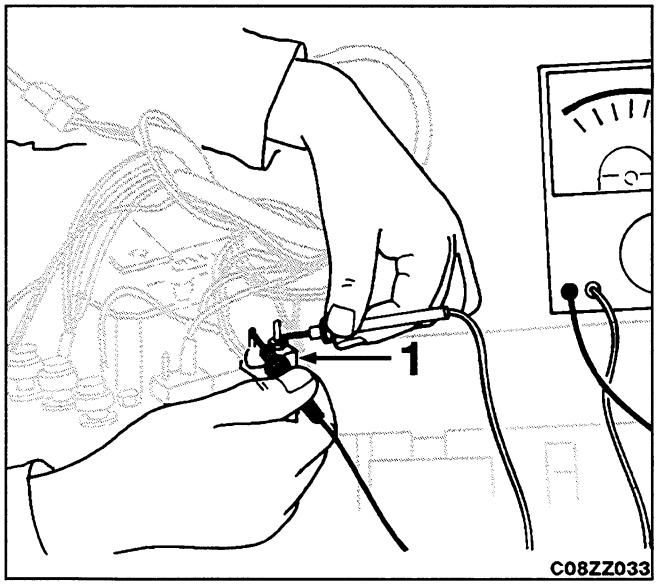
    Apply electrical sealing grease, Grafo 112-X to wire leads and terminals and secure with hardware.



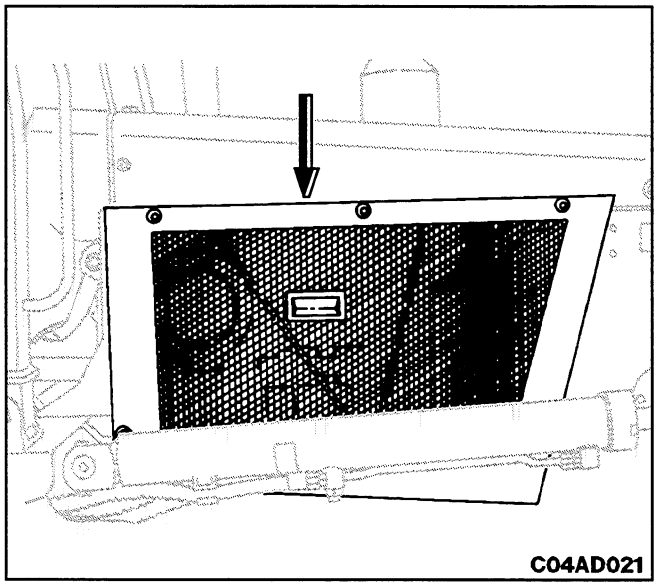

12. Remove leads from center 20 amp circuit breaker (1). Check for current flow through breaker. If present breaker okay. If not replace breaker.

    Apply electrical sealing grease, Grafo 112-X to wire leads and terminals and secure with hardware.

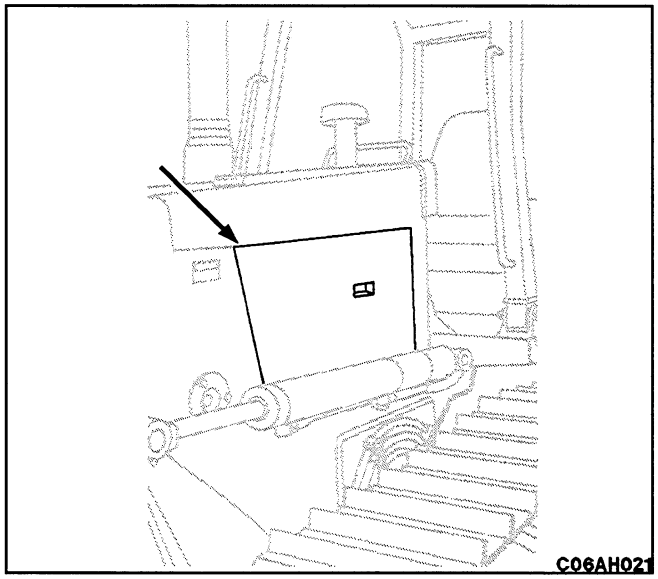
    Install instrument panel back in cowling and secure with acorn nuts.



40. Install right engine side door and secure with hardware. Torque bolts to 28 lbf ft (38 N•m) ±10%.

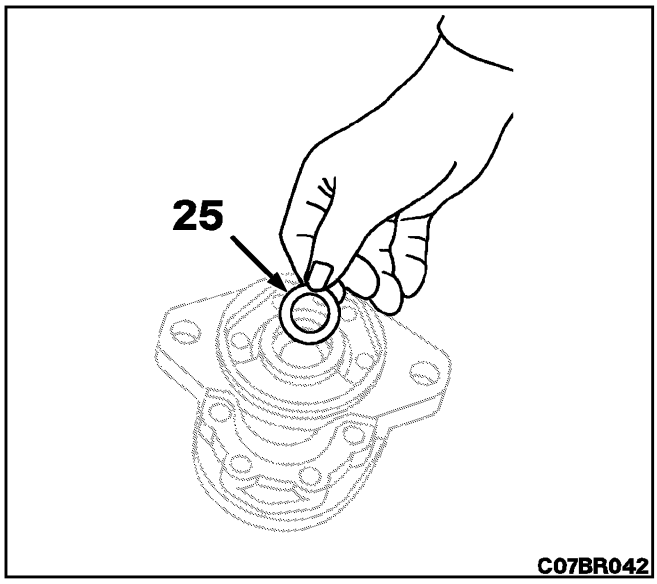



41. Install left engine side door and secure with hardware. Torque bolts to 28 lbf ft (38 N•m) ±10%.

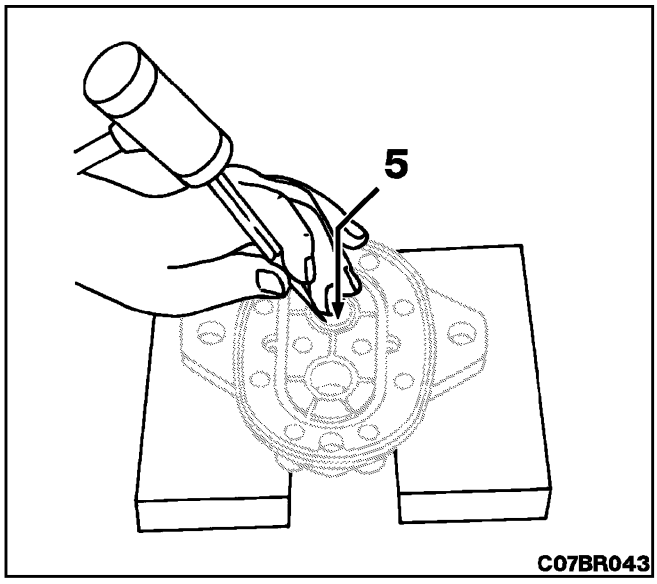


**WARNING !** REFER TO AND READ ALL SAFETY PRECAUTIONS IN SECTION 1.

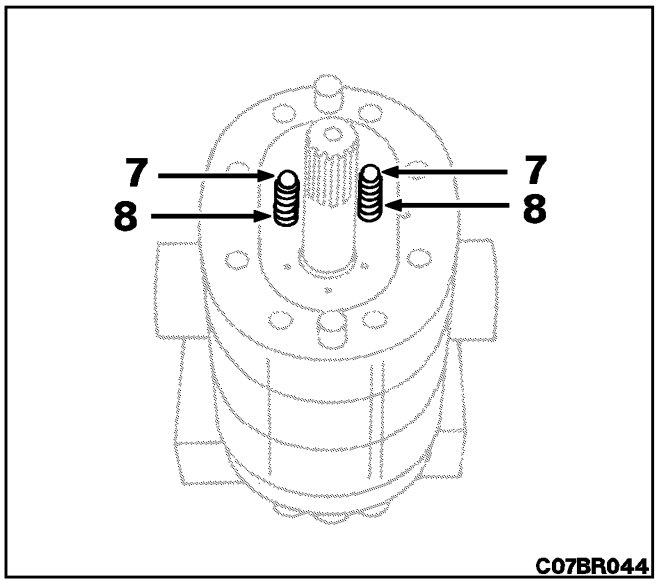
13. Remove seal retainer washer (25) from front plate.



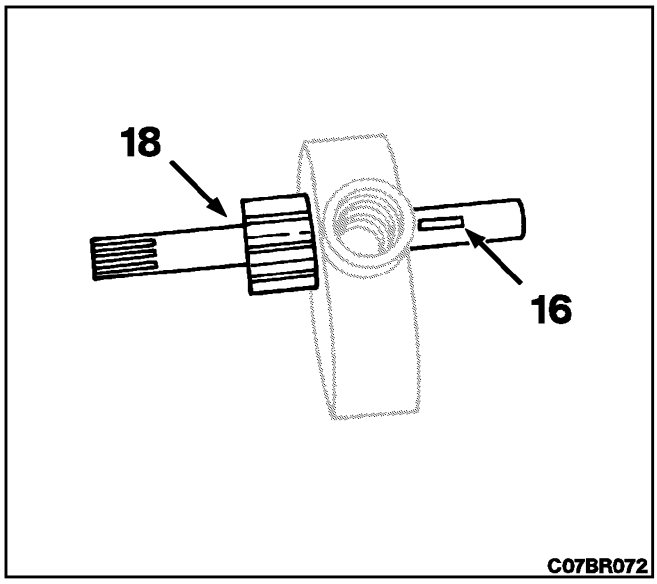

14. Turn front plate over and rest on wooden blocks. Using a punch drift, remove shaft seal (5) from front plate.



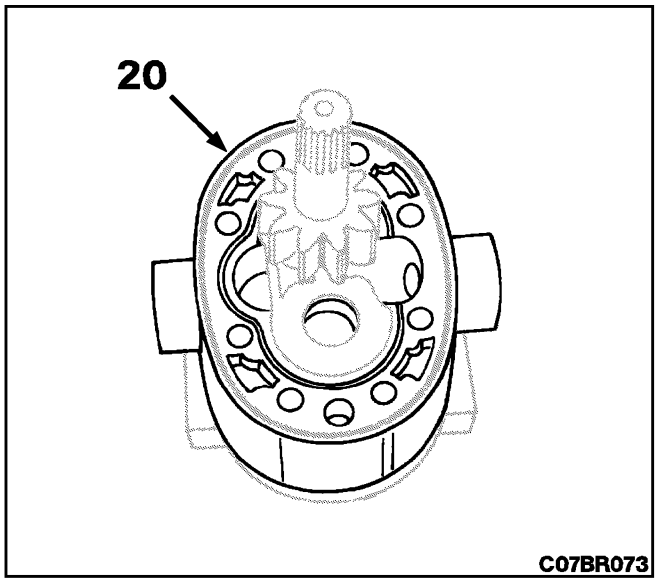

15. Remove check balls (7) and springs (8).



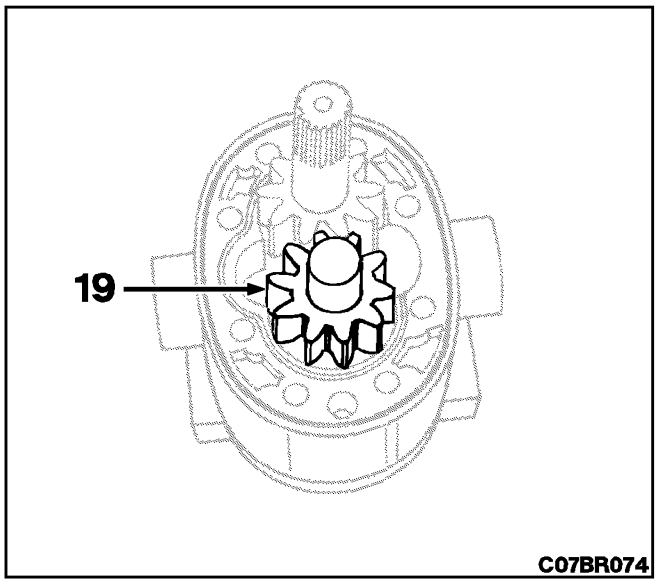
12. Insert drive gear and shaft (18) through center housing. Coat key (16) with amber grease and install in gear and shaft.




13. Aligning match marks, install center housing (20) over dowel pins to rear housing. Make sure key in drive gear and shaft aligns with key slot in rear gear.



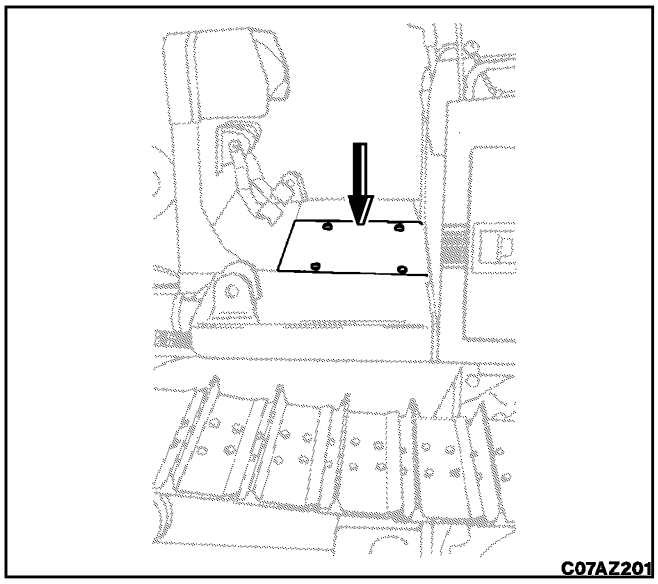

14. Install driven gear and shaft (19).



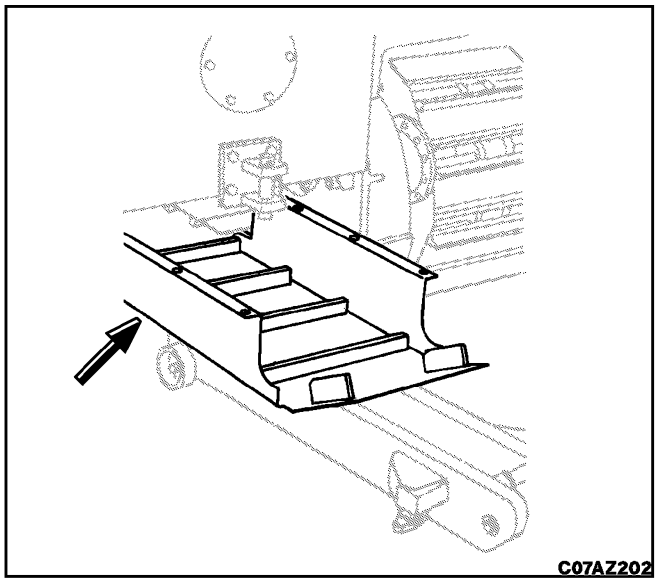
**REMOVAL**

**WARNING! Be sure blade and any rear mounted equipment has been lowered to the ground or on suitable blocking. Turn the master switch to the off position and remove key or remove one of the cables from the master switch to prevent accidental starting.**

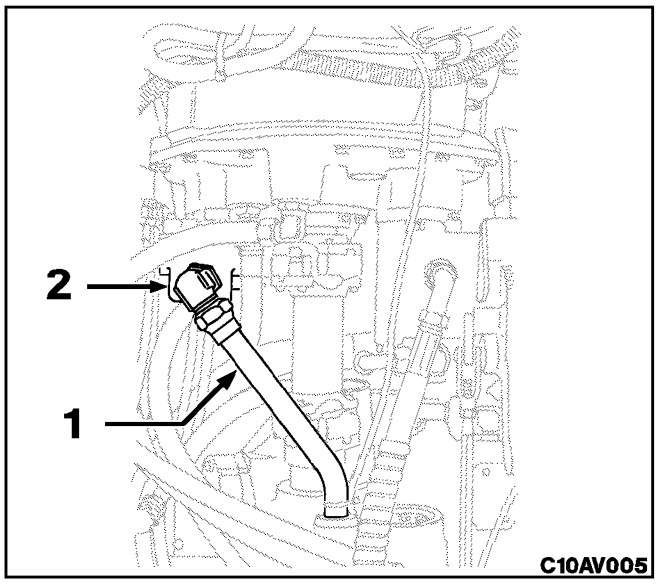
1. Remove operators compartment floor.


C07AZ201

2. Using rolling floor jack, remove transmission guard from under machine.

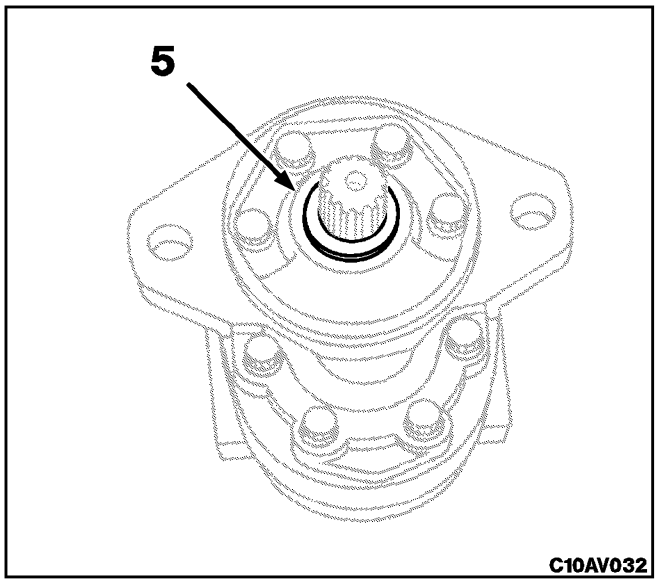

C07AZ202

3. Disconnect and cap lines at top (1) and bottom of pump (2) and allow pump to drain into suitable container. Remove mounting hardware and lift pump out of machine.

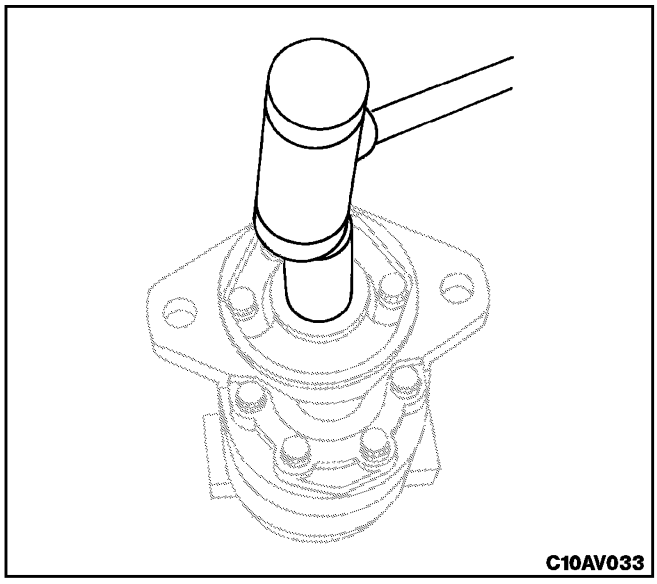


C10AV005

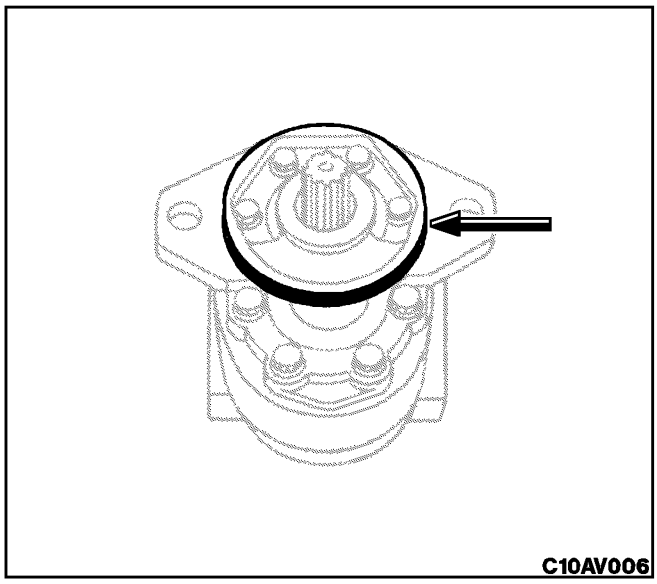
13. Start oil seal (5) over shaft into front plate.



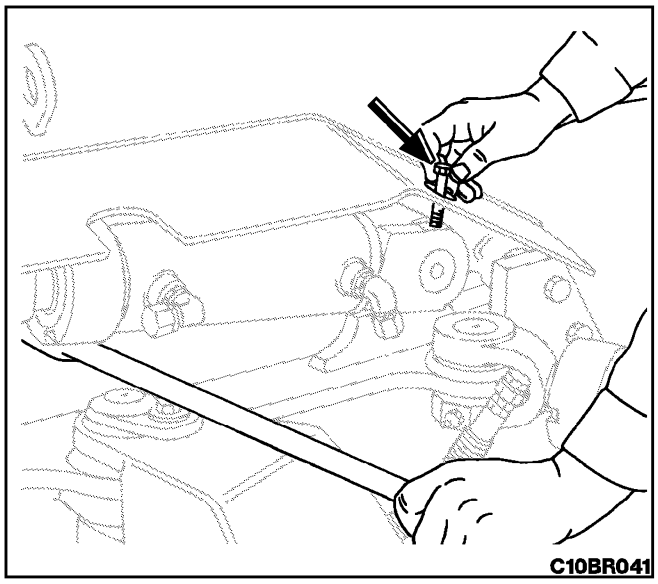

14. Using a deep well socket, bottom seal into front plate.



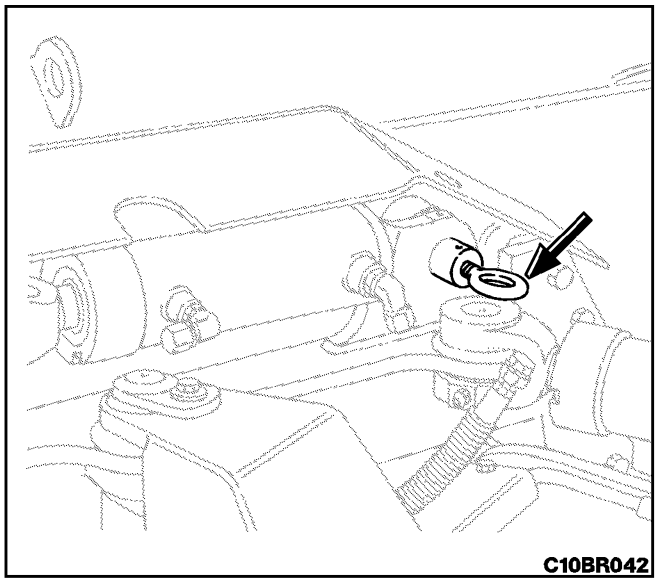

15. Install new mounting o-ring to pump.



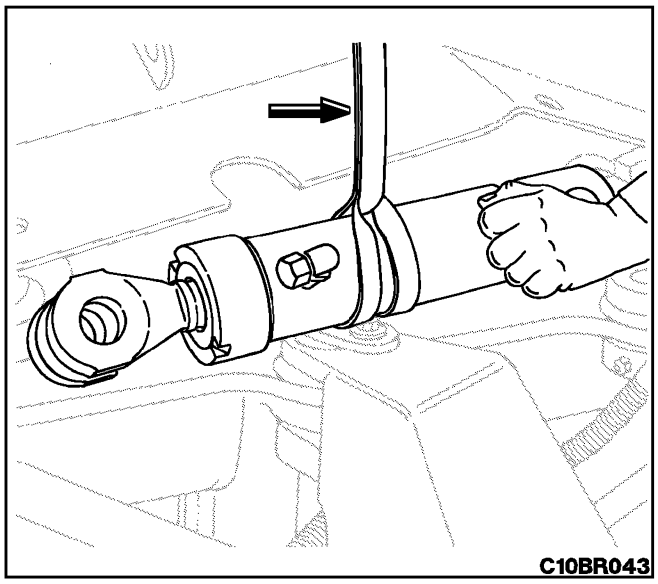
5. Remove piston end anchor bolt. Cylinder may have to be jockeyed around to allow bolt clearance.




6. Using ½NC eye bolt, remove piston end pin.



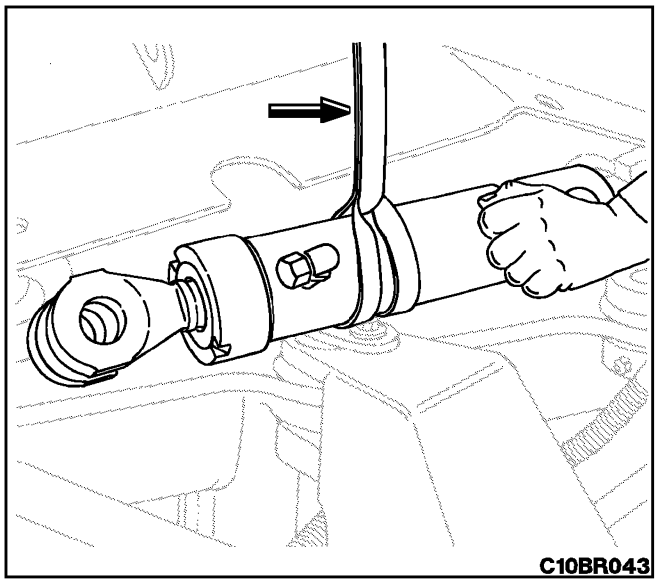

7. Attach hoist and sling to cylinder and remove.



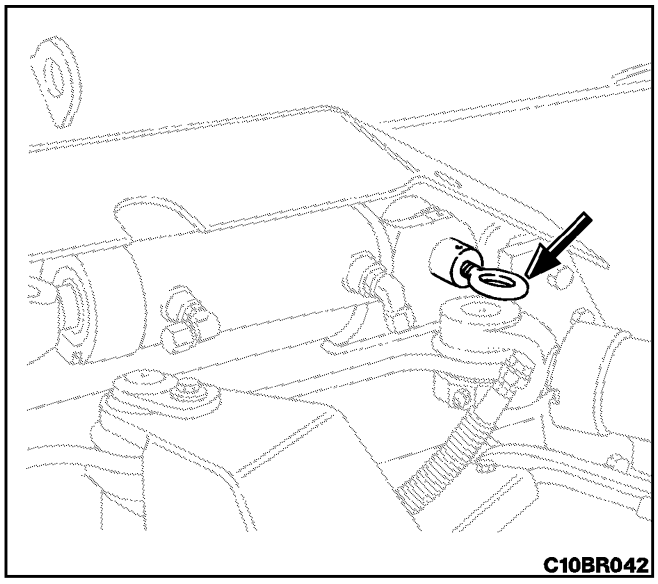
**INSTALLATION**

*NOTE: INSTALLATION OF CYLINDERS ARE SIMILAR WITH TILT CYLINDER SHOWN.*

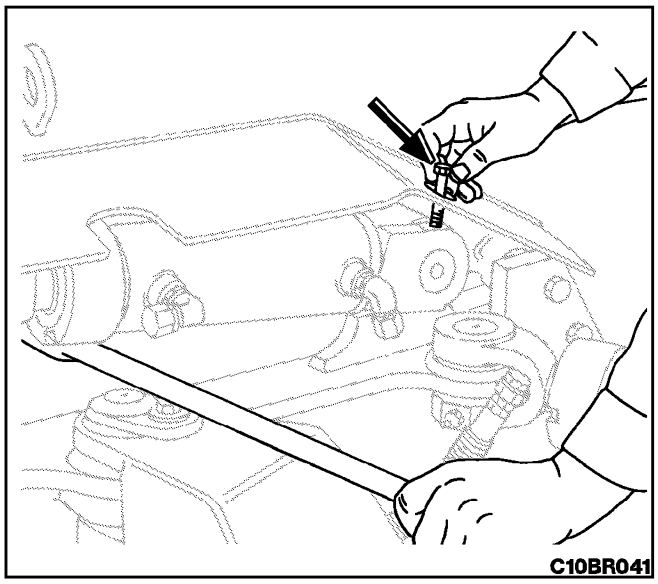
1. Using hoist and sling, position cylinder in place on machine.


C10BR043

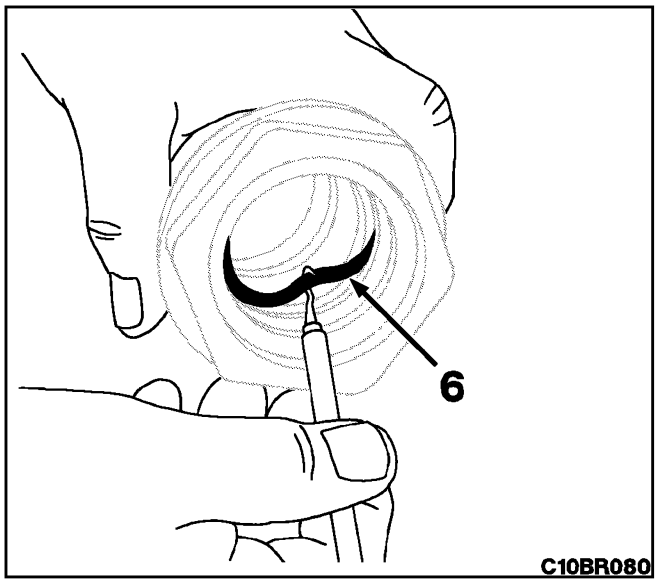
2. Install mounting pin using eye bolt to align anchor bolt mounting holes.


C10BR042

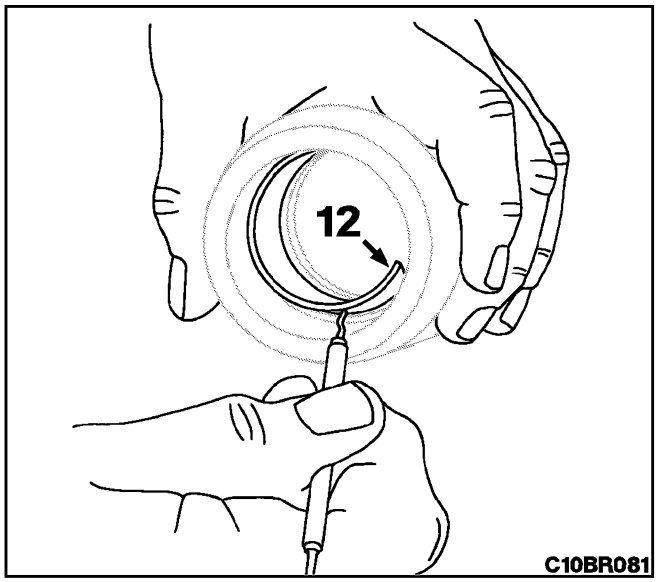
3. Install anchor bolt and secure with nut. Torque bolt to 45 lbf ft (60 N•m) ±10%.


C10BR041

16. Remove and discard o-ring (6) from gland.



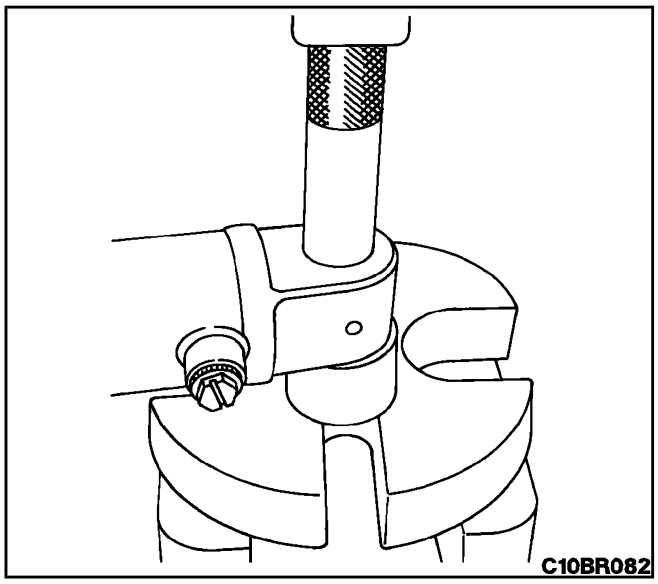

17. Remove and discard wear ring (12) from gland.




**BUSHINGS**

**Cylinder Barrel**

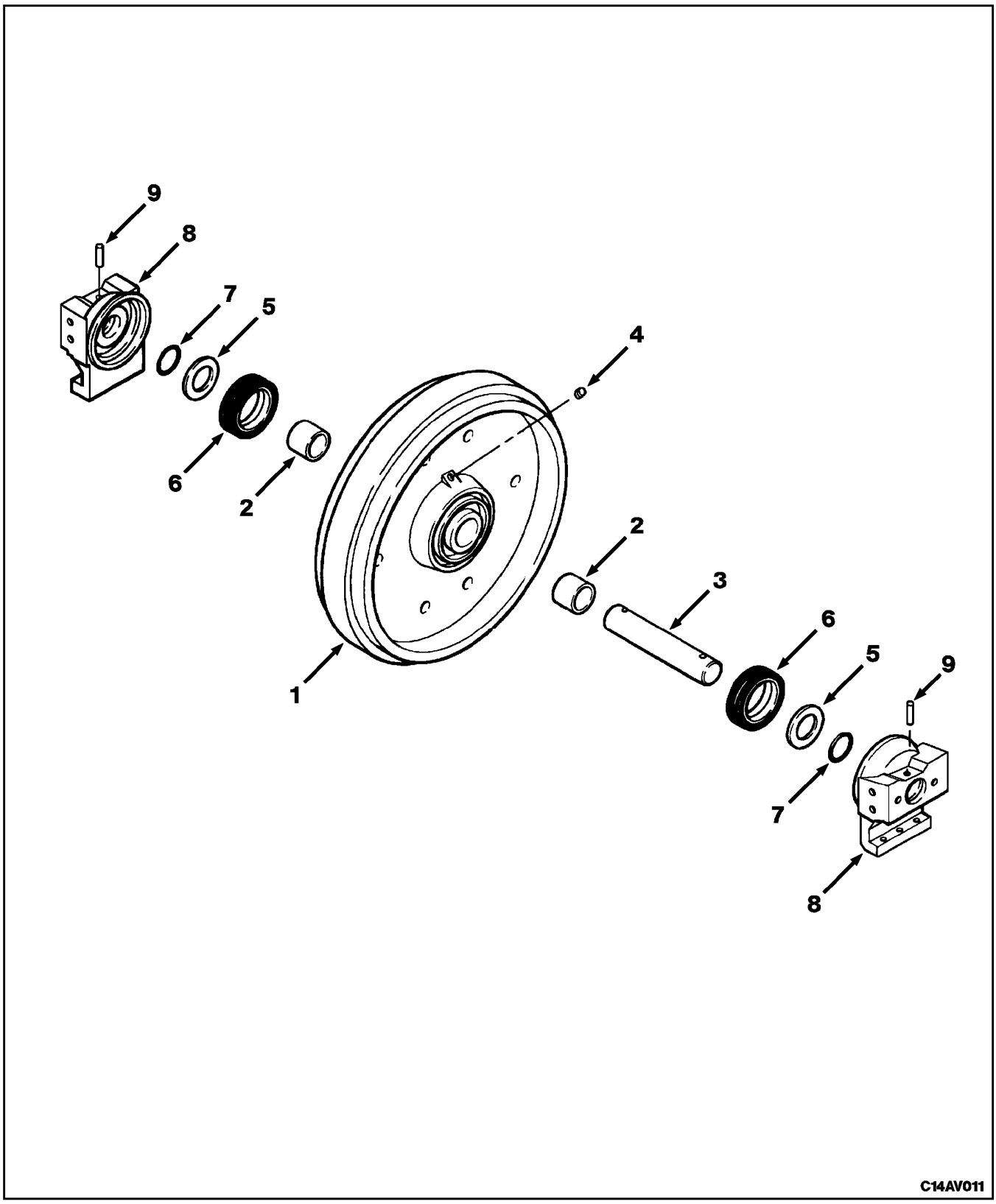
1. Position barrel in press and remove both bushings at same time.



**DESCRIPTION** **PAGE**

**WARNING !** REFER TO AND READ ALL SAFETY PRECAUTIONS IN SECTION 1.

**WARNING !** REFER TO AND READ ALL SAFETY PRECAUTIONS IN SECTION 1.




EXPLODED VIEW OF FRONT IDLER

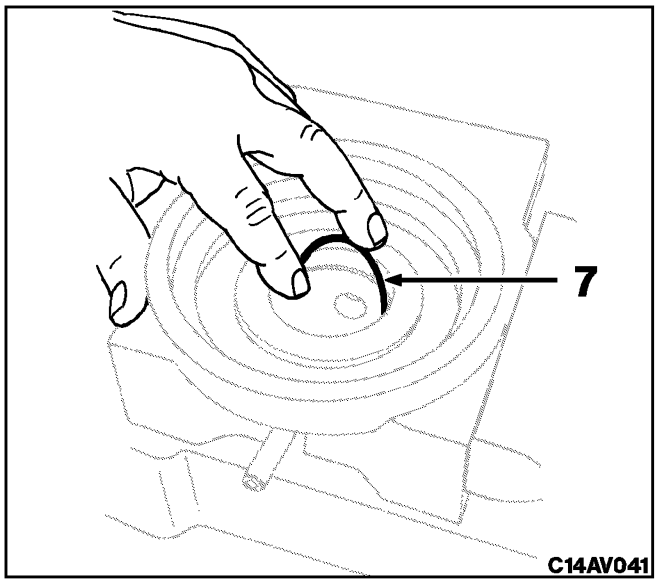
LEGEND FOR EXPLODED AND CROSS SECTION VIEWS

1. Front Idler
2. Bushing
3. Idler Shaft
4. Port Plug
5. Thrust Washer
6. Seal Kit
7. O-Ring
8. Mounting Support
9. Roll Pin

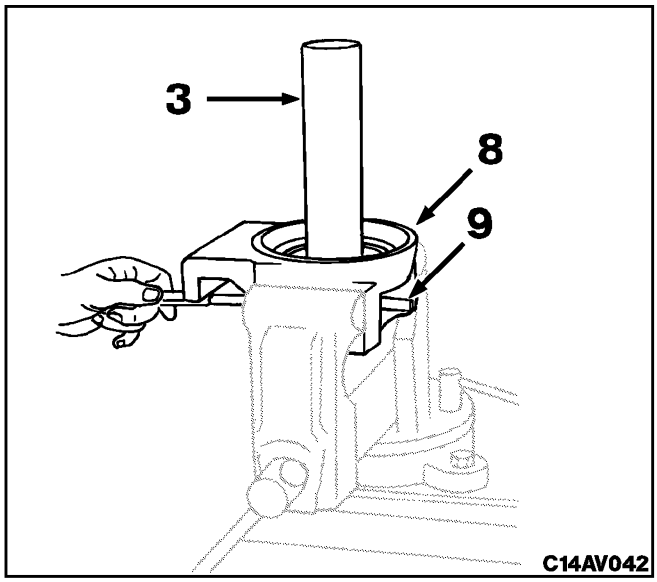
**REASSEMBLY**

*NOTE: CALLOUTS FROM EXPLODED AND CROSS SECTION VIEWS CORRESPOND WITH CALL-OUTS IN FOLLOWING STEPS.*

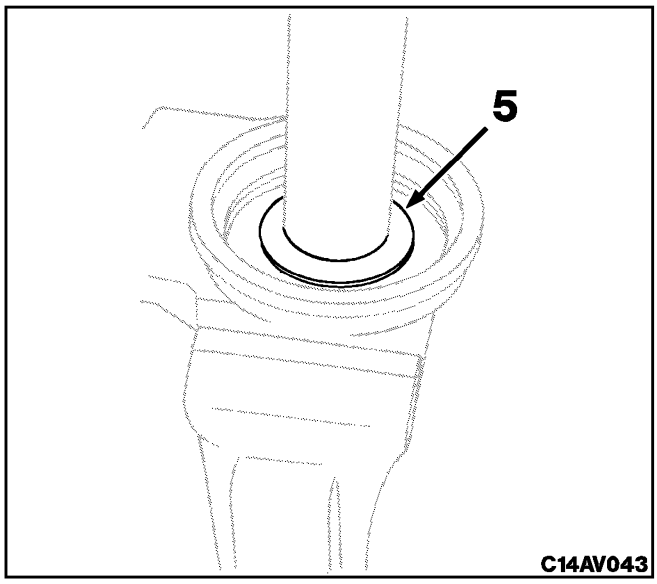
1. Install new o-ring (7) into mounting support and coat with amber grease. Apply a thin coat of "Never Seez" to shaft bore.



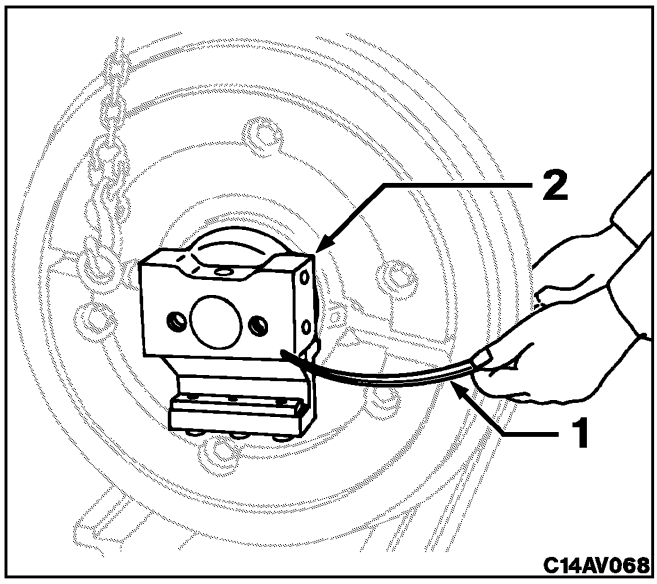

2. Install shaft (3) into mounting support (8) aligning pin hole with dowel. Secure shaft to support with roll pin (9).



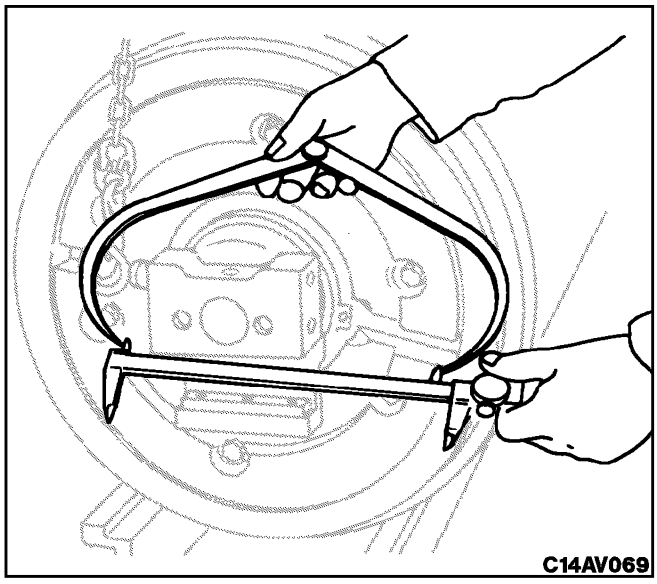

3. Coat thrust washer (5) with a light film of clean oil and install on shaft up against support.



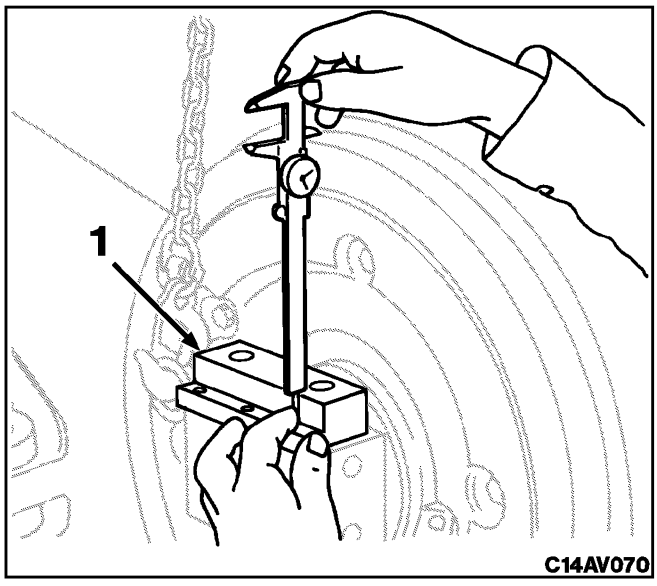
9. Using large outside calipers (1) from undercarriage tool kit, measure distance between outside of mounting blocks (2) at front and rear.




10. Read, average and record measurements.

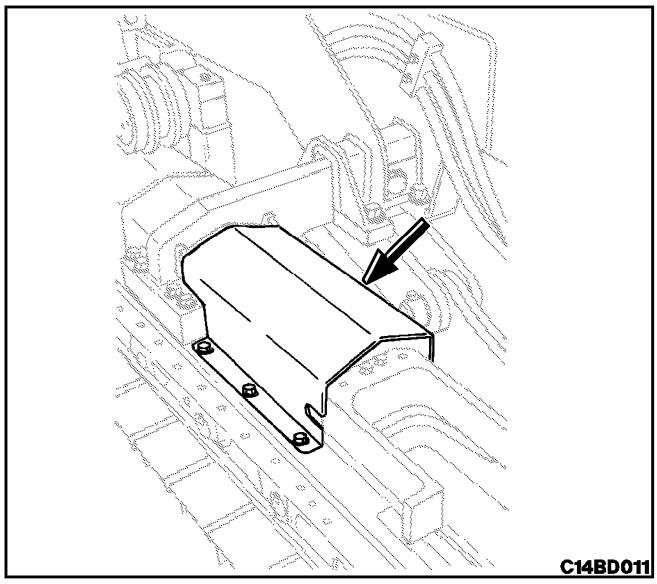



11. Measure distance of stepped area of thrust plate (1) at three places. Read, average and record measurements.

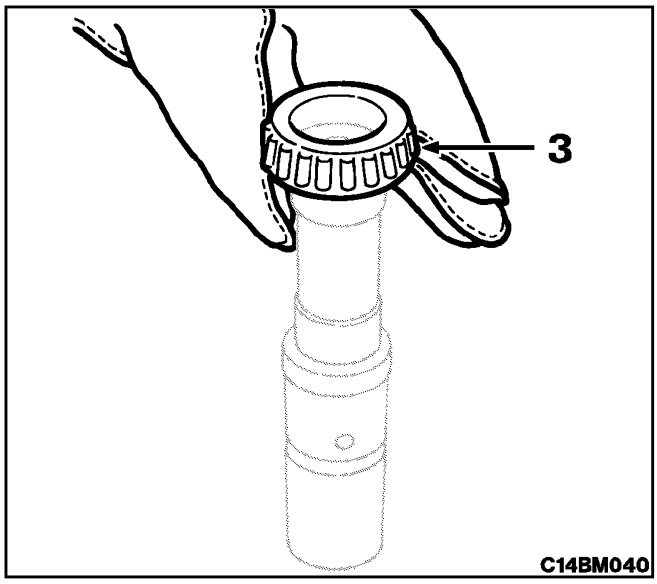


15. Install track frame cover and secure with hardware. Torque bolts to 70 lbf ft (92 N•m) ±10%.

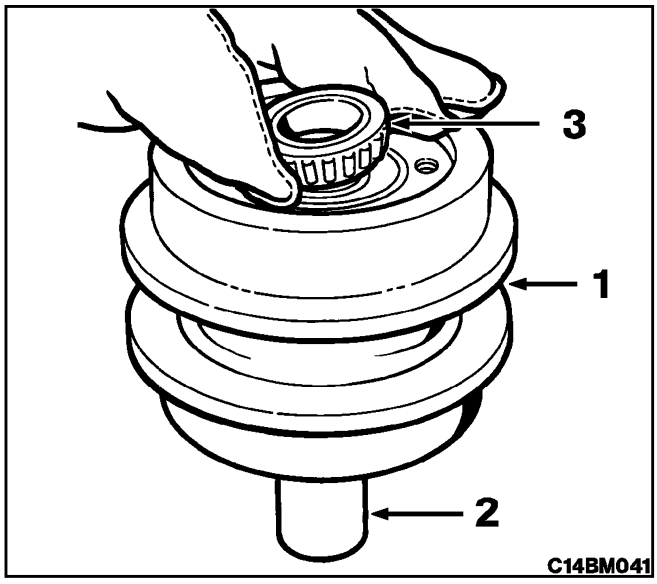
16. Install front idler, refer to FRONT IDLER.



2. Heat bearing cone (3) to 275°F (135°C) for 45 minutes. Install on shaft and bottom. To insure cone is seated, keep pressure against cone until it cools.




3. Install idler body (1) over shaft (2). Heat bearing cone (3) to 275°F (135°C) for 45 minutes. Install on shaft and bottom. To insure cone is seated, keep pressure against cone until it cools.




4. Install bearing spacer (11) on shaft.