

HD-11, 11-B

crawler tractors

service manual

FINAL DRIVES

S/N 6427 thru 14650
17L14651 thru 17L16000
29C14651 thru 29C16000
46Y14651 thru 46Y16000
16C16001 - UP
25L16001 - UP

Form 70682019 English
(SAME AS 0682019-5)

WARNING

STUDY THE OPERATION AND MAINTENANCE
INSTRUCTION MANUAL THROUGH BEFORE
STARTING, OPERATING, MAINTAINING,
FUELING OR SERVICING THIS MACHINE.



The Operation and Maintenance Instruction Manual provides the instructions and procedures for starting, operating, maintaining, fueling, shutdown and servicing that are necessary for properly conducting the procedures for overhaul of the related components outlined in this Service Manual.



This symbol is your safety alert sign. It means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED.



Read and heed all safety instruction carrying the signal words WARNING and DANGER.



Machine mounted safety signs have been color coded yellow with black borders and lettering for warning and red with white borders and lettering for danger points.



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SAFETY RULES

GENERAL

Study the Operation and Maintenance Instruction Manual before starting, operating, maintaining, fueling, or servicing machine.

Read and heed all machine-mounted safety signs before starting, operating, maintaining, fueling or servicing machine.

Machine-mounted safety signs have been color coded yellow with black borders and lettering for warning and red with white borders and lettering for danger points.

Do not allow unauthorized personnel to service or maintain this machine. Do not perform any work on equipment that is not authorized. Follow the Maintenance and Service procedures. Study the Operation and Maintenance Instruction Manual before starting, operating, maintaining, fueling or servicing this machine.

Always wear safety glasses with side shields.

Do not wear rings, wrist watches, jewelry, or loose or hanging apparel, such as ties, torn clothing, scarves, unbuttoned, or unzipped jackets that can catch on moving parts. Wear proper safety equipment as authorized for the job. Examples: hard hats, safety shoes, heavy gloves, ear protectors, safety glasses or goggles, reflector vests, or respirators. Consult your employer for specific safety equipment requirements.

Do not use controls or hoses as handholds when climbing on or off machine. Hoses and controls are movable and do not provide a solid support. Controls may also be inadvertently moved causing accidental machine or equipment movement.

Do not jump on or off machine. Keep two hands and one foot, or two feet and one hand, in contact with steps and grab-rails and handles at all times.

Machine should not be serviced with anyone in the operator's seat unless they are qualified to operate the machine and are assisting in the servicing.

Keep operator's compartment, stepping points, grab-rails and handles clean of foreign objects, oil, grease, mud or snow accumulation to minimize the danger of slipping or stumbling. Clean mud or grease from shoes before attempting to mount or operate the machine.

Never attempt to operate the machine or its tools from any other position than seated in the operator's seat.

Keep operator's compartment clear of loose objects.

If movement of an attachment by means of the machine's hydraulic system is required for service or maintenance, do not raise or lower attachments from any position other than when seated in the operator's seat. Before starting machine or moving attachment or tool, make sure to set brakes, sound horn and call for an all clear. Raise attachment slowly.

Always block with external support any linkage or part on machine that requires work under the raised linkage, parts, or machine per OSHA requirements. Never allow anyone to walk under or be near unblocked raised equipment. Avoid working or walking under raised blocked equipment unless you are assured of your safety.

Never place head, body, limbs, fingers, feet or hands into an exposed portion between uncontrolled or unguarded

scissor points of machine without first providing secure blocking.

Never lubricate, service or adjust a machine with the engine running, except as called for in the Operation and Maintenance Instruction Manuals. Do not wear loose clothing or jewelry near moving parts.

When servicing or maintenance requires access to areas that cannot be reached from the ground, use a ladder or step platform that meets OSHA requirements to reach the service point. If such ladders or platforms are not available, use the machine handholds and steps as provided. Perform all service or maintenance carefully.

Shop or field service platforms and ladders used to maintain or service machinery should be constructed and maintained according to local or national requirements.

Disconnect batteries and TAG all controls according to OSHA requirements to warn that work is in progress. Block the machine and all attachments that must be raised per OSHA requirements.

Never check or fill fuel tanks, storage batteries or use starter fluid near lighted smoking materials or open flame due to the presence of flammable fluid.

Brakes are inoperative when manually released for servicing. Provision must be made to maintain control of the machine by blocking or other means.

Always place the fuel nozzle against the side of the filler opening before starting and during fuel flow. To reduce the chance of a static electricity spark, keep contact until after fuel flow is shut off.

Use only designated towing or pulling attachment points. Use care in making attachment. Be sure pins and locks as provided are secure before pulling. Stay clear of drawbars, cables or chains under load.

To move a disabled machine, use a trailer or low boy truck if available. If towing is necessary, provide warning signals as required by local rules and regulations and follow operation and maintenance instruction manual recommendations. Load and unload on a level area that gives full support to the trailer wheels. Use ramps of adequate strength, low angle and proper height. Keep trailer bed clean of clay, oil and all materials that become slippery. Tie machine down securely to truck or trailer bed and block tracks (or wheels) as required by the carrier.

Never align holes with fingers or hands. Use the proper aligning tool.

Remove sharp edges and burrs from reworked parts.

Use only grounded auxiliary power source for heaters, chargers, pumps and similar equipment to reduce the hazards of electrical shock.

Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

Never place gasoline or diesel fuel in an open pan.

Never use gasoline or solvent or other flammable fluid to clean parts. Use authorized commercial, non-flammable, non-toxic solvents.

When using compressed air for cleaning parts use safety

Safety Rules

GENERAL (Continued)

glasses with side shields or goggles. Limit the pressure to 30 psi according to local or national requirements.

Do not smoke or permit any open flame or spark near when refueling, or handling highly flammable materials.

Do not use an open flame as a light source to look for leaks or for inspection anywhere on the machine.

Be sure all mechanic's tools are in good condition. DO NOT use tools with mushroomed heads. Always wear safety glasses with side shields.

Move carefully when under, in or near machine or implements. Wear required protective equipment, such as hard hat, safety glasses, safety shoes, ear protectors.

When making equipment checks that require running of the engine, have an operator in the operator seat at all times with the mechanic in sight. Place the transmission in neutral and set the brakes and lock. Keep hands and clothing away from moving parts. Shut off engine and disengage the Power Take-Off lever before attempting adjustments or service.

Never use the bucket as a man lift.

The articulation point between frames will not clear a person. Stay clear when engine is running. Support, using device provided when servicing. Return support to carry position and secure before moving machine after servicing. See Operation and Maintenance Instruction Manual.

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

Guard against kinking chains or cables. Do not lift or pull through a kinked chain or cable. Always wear heavy gloves when handling chain or cable.

Be sure cables are anchored and the anchor point is strong enough to handle the expected load. Keep exposed personnel clear of anchor point and cable or chain. DO NOT PULL OR TOW UNLESS OPERATOR'S COMPARTMENTS OF MACHINES INVOLVED ARE PROPERLY GUARDED against accidental cable or chain backlash.

Keep maintenance area CLEAN and DRY. Remove water or oil slicks immediately.

DO NOT pile oily, greasy rags — they are a fire hazard. Store in a closed metal container.

Before starting machine or moving attachment check and adjust and lock operator's seat. Be sure all personnel in the area are clear before starting or moving machine and any of its attachments. Sound horn.

Rust inhibitors are volatile and flammable. Prepare parts in well-ventilated place. Keep open flame away — DO NOT SMOKE. Store container in a cool well-ventilated place secured against unauthorized personnel.

Do not carry loose objects in pockets that might fall unnoticed into open compartments.

Keep clutches and brakes on machine and attachments such as Power Control Units, winches and master clutches adjusted according to Operation and Maintenance Instruction Manuals of the manufacturer at all times. DO NOT ad-

just machine with engine running except as specified.

Wear proper protective equipment such as safety goggles or safety glasses with side shields, hard hat, safety shoes, heavy gloves when metal or other particles are apt to fly or fall.

Wear welder's protective equipment such as dark safety glasses, helmets, protective clothing, gloves and safety shoes when welding. Wear dark safety glasses near welding. DO NOT LOOK AT ARC WITHOUT PROPER EYE PROTECTION.

Know your jacking equipment and its capacity. Be sure the jacking point used on the machine is appropriate for the load to be applied. Be sure the support for the jack at the machine and under the jack is appropriate and stable. Any equipment up on a jack is dangerous. Transfer load to appropriate blocking as a safety measure before proceeding with service or maintenance work according to local or national requirements.

Wire rope develops steel slivers. Use authorized protective equipment such as heavy gloves, safety glasses when handling.

Handle all parts with extreme care. Keep hands and fingers from between parts. Wear authorized protective equipment such as safety glasses, heavy gloves, safety shoes.

Inspect your seat belt at least twice a year for signs of fraying, wear, or other weakness that could lead to failure.

Where it is necessary to use diesel fuel as a lubricant make sure all smoking material and open flames are extinguished or that no sparks are near. Place all parts in a closed container of clear diesel fuel for use as needed.

To minimize dangers of fire and explosion, it is recommended that before any welding is done on a fuel tank, the tank be completely drained of fuel, fuel lines disconnected and the ends closed to protect them, and the tank be steam cleaned. All traces of fuel must be removed before welding is started. Flood the tank with carbon dioxide (CO₂) before and during welding. Caps must be removed and vents and other openings left open during welding.

Dry ice (solid carbon dioxide) is extremely cold and will freeze flesh on contact. Use care to prevent contact with skin, eyes, or other parts of the body to avoid personal injury.

When work is required under or between components, block with an external support capable of holding the components in place according to local or national requirements.

START UP

Do not run the engine of this machine in closed areas without proper ventilation to remove deadly exhaust gases.

Do not place head, body, limbs, feet, fingers, or hands near a rotating fan or belts. Be especially alert around a pusher fan.

STARTING FLUID IS FLAMMABLE. Follow the recommendations as outlined in the Operation and Maintenance Instruction Manual and as marked on the containers. Store containers in cool, well-ventilated place secure from unauthorized personnel. DO NOT PUNCTURE OR BURN CONTAINERS. Follow the recommendation of the manufacturer for storage and disposal.

Safety Rules

ENGINE

Turn radiator cap slowly to relieve pressure before removing. Add coolant only with engine stopped or idling if hot. See Operation and Maintenance Instruction Manual.

Do not run engine when refueling and use care if engine is hot due to the increased possibility of a fire if fuel is spilled.

Never attempt to check or adjust fan belts when engine is running.

Do not adjust engine fuel pump when the machine is in motion.

Never lubricate a machine with the engine running.

Avoid running engine with open unprotected air inlets. If such running is unavoidable for service reasons, place protective screen over all inlet openings before servicing engine.

ELECTRICAL

Be sure to connect the booster cables to the proper terminals (+ to +) and (- to -) at both ends. Avoid shorting clamps. Follow the Operation and Maintenance Instruction Manual procedure.

Always turn the master switch (key switch if so equipped) to the off position when maintaining or servicing machine.

BATTERY GAS IS HIGHLY FLAMMABLE. Leave battery box open to improve ventilation when charging batteries. Never check charge by placing metal objects across the posts. Keep sparks or open flame away from batteries. Do not smoke near battery to guard against the possibility of an accidental explosion.

Check for fuel or battery electrolyte leaks before starting service or maintenance work. Eliminate leaks before proceeding.

Do not charge batteries in a closed area. Provide proper ventilation to guard against an accidental explosion from an accumulation of explosive gases given off in the charging process.

Disconnect batteries before working on electrical system or repair work of any kind.

HYDRAULIC

Fluid escaping under pressure from a very small hole can almost be invisible and can have sufficient force to penetrate the skin. Use a piece of cardboard or wood to search for suspected pressure leaks. **DO NOT USE HANDS.** If injured by escaping fluid, see a doctor at once. Serious infection or reaction can develop if proper medical treatment is not administered immediately.

Shut off engine and be sure all pressure in system has been relieved before removing panels, housings, covers, and caps. See Operation and Maintenance Instruction Manual.

When making pressure checks use the correct gage for expected pressure. See Operation and Maintenance Instruction Manual or Service Manual for Guidance.

ATTACHMENTS

Keep head, body, limbs, feet, hands and fingers away from blade, bucket or ripper when in raised position. Use

authorized blocking as a safety measure before proceeding with service or maintenance per OSHA requirements.

If movement of an attachment by means of the machine's hydraulic system is required for service or maintenance do not raise or lower attachments from any position other than when seated in the operator's seat. Before starting machine or moving attachments or tools, make sure to set brakes, sound horn and call for an all clear. Raise attachment slowly.

Do not use machine to carry loose objects by means other than attachments for carrying such objects.

Never use any gas other than dry nitrogen to charge accumulators. See Operation and Maintenance Instruction Manual.

Keep clutches and brakes on machine and attachments such as power control units, winches and master clutches adjusted according to Operation and Maintenance Instruction Manuals of the manufacturer at all times. **DO NOT** adjust machine with engine running except as specified.

TIRES (APPLICABLE MACHINES)

Be sure tires are properly inflated to the manufacturer's specified pressure. Inspect for damage periodically.

Stand to one side when changing inflation of tires.

Check tires only when the machine is empty and tires are cool to avoid overinflation. Do not use reworked wheel parts. Improper welding, heating or brazing weakens them and can cause failure.

Never cut or weld on the rim of an inflated tire. Inflate a spare tire only enough to keep rim parts in place — a fully inflated tire might fly apart when it is not installed on a machine.

Use care if you must transport (haul) a fully inflated tire.

When servicing tires block the machine in front and back of all wheels. After jacking up, place blocking under machine to protect from falling per OSHA requirements.

Deflate tires before removing objects from the tread.

Never inflate tires with flammable gases. Explosion and personal injury could result.



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FOREWORD

This Service Manual provides information, illustrations, and tool requirements which service personnel should use when performing repair or maintenance operations.

Assure best results and maintain original quality by always using Fiat-Allis parts.

IMPORTANT

Always furnish Dealer with Tractor Serial Number when ordering parts.

Many equipment owners employ Dealer's Service Department for all work other than routine lubrication, adjustments, and minor service. This practice is encouraged, as our Dealers are well informed and equipped to render excellent service.

This manual may not be reprinted or reproduced, either in whole or in part, without written permission of Fiat-Allis.

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TOPIC 1—GENERAL DESCRIPTION

The final drives are double reduction type, each consisting of a drive pinion, intermediate pinion and intermediate gear, sprocket shaft and driving gear, and component parts. The final drives are assembled in a combination "one-piece" steering clutch and final drive housing. Since the final drive housings are an integral part of the steering clutch housing, they are lined bored, thus eliminating misalignment of the bearing bores.

The final drive pinions, final drive intermediate pinions, and track sprocket shafts are mounted on tapered roller bearings which are adjustable by means of shims. The pinion and intermediate shaft bearings are lubricated by oil thrown by the gears. The sprocket shaft bearings rotate in oil.

The sprocket shaft seal assemblies and outboard

bearing seal assemblies are positive type. The final drive pinion shaft and steering clutch seal is lip type.

Each final drive pinion is driven by the bevel gear through the steering clutch; the pinion drives the gear and pinion on the intermediate shaft; the intermediate pinion drives the sprocket shaft gear, which drives the sprocket shaft and in turn drives the track sprocket.

The final drive outboard bearings are double row, self-aligning bearings, which receive lubrication from the final drive housing thru the sprocket splines. They are located in bearing cages which attach to the truck frame; they will absorb thrust in either direction.

TOPIC 2—TROUBLE SHOOTING

Refer to pertinent Topics for detailed information on performing the remedies listed in the "REMEDY" column.

TROUBLE	POSSIBLE CAUSES	REMEDY
Seal Rings Leak	<ol style="list-style-type: none"> 1. Bearings out of adjustment. 2. Seal boot torn. 3. Seal rings worn or damaged. 4. Seal rings not contacting. 	<ol style="list-style-type: none"> 1. Adjust bearings. 2. Replace boot. 3. Replace seal rings. 4. Check spring follower assembly; replace if necessary.
Noise in Final Drive Assembly	<ol style="list-style-type: none"> 1. Bearing failure. 2. Final drive gears and pinion worn or broken. 	<ol style="list-style-type: none"> 1. Replace bearings. 2. Replace gears and pinions.
Excessive Wear on Track Sprockets	<ol style="list-style-type: none"> 1. Sprocket shaft bearings out of adjustment or damaged. 	<ol style="list-style-type: none"> 1. Adjust or replace bearings.

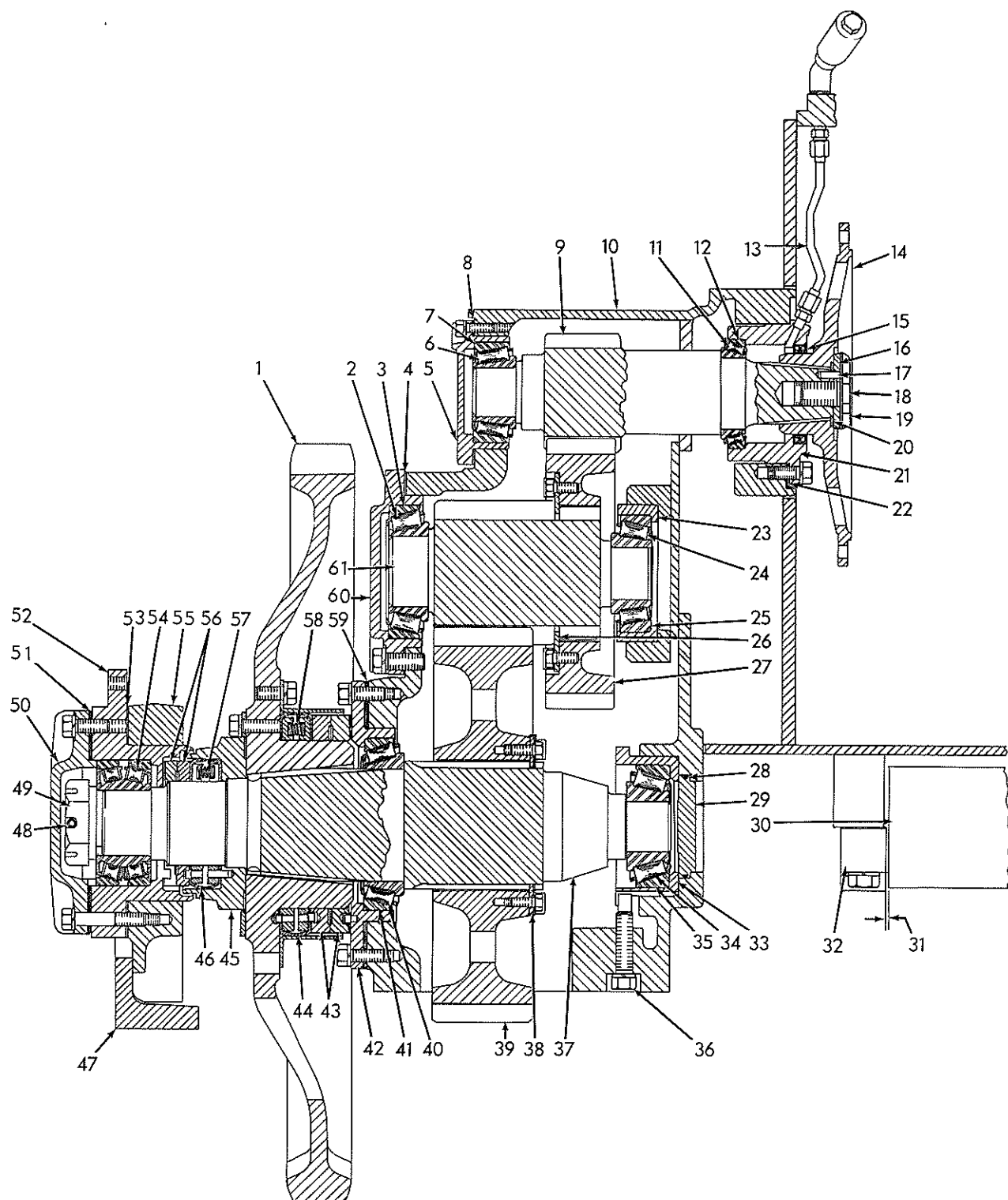


Fig. 1 Final Drive Assembly
(T-70875)

LEGEND FOR FIG. 1

- | | |
|--|---|
| 1. Track sprocket | 32. Truck frame pivot cap |
| 2. Intermediate shaft outer bearing | 33. Inner bearing cage |
| 3. Intermediate shaft outer bearing cup | 34. Sprocket shaft inner bearing |
| 4. Intermediate shaft bearing adjustment shims | 35. Sprocket shaft inner bearing cup |
| 5. Pinion shaft outer bearing cage | 36. Setscrew w/copper washer |
| 6. Pinion shaft outer bearing | 37. Sprocket shaft |
| 7. Pinion shaft outer bearing cup | 38. Sprocket shaft driving gear lock |
| 8. Pinion shaft bearing adjusting shims | 39. Sprocket shaft driving gear |
| 9. Pinion shaft | 40. Sprocket shaft intermediate bearing |
| 10. Steering clutch and final drive housing | 41. Sprocket shaft intermediate bearing cup |
| 11. Pinion shaft inner bearing | 42. Sprocket shaft intermediate bearing cage |
| 12. Pinion shaft inner bearing cup | 43. Inner seal rings |
| *13. Final drive breather tube assembly | 44. Inner seal boot |
| 14. Brake drum hub | 45. Sprocket retaining nut |
| **15. Oil seal (double lip) | 46. Outer seal boot |
| 16. Hub retaining washer | 47. Truck frame |
| 17. Hub retaining washer pin (Early units) | 48. Roll pin |
| 18. Hub retaining capscrew | 49. Outboard bearing retaining nut |
| 19. Hub retaining capscrew lock (Early units) | 50. Outboard bearing cover |
| 20. Pinion shaft oil seal (rubber) | 51. Outboard bearing adjustment shims |
| 21. Pinion shaft inner bearing cage | 52. Outboard bearing cage |
| 22. Gasket | 53. Outboard bearing cage shims |
| 23. Intermediate shaft inner bearing cage | 54. Outboard bearing assembly |
| 24. Intermediate shaft inner bearing | 55. Sprocket shaft outboard bearing cage cap |
| 25. Intermediate shaft inner bearing cup | 56. Outer seal rings |
| 26. Gear lock | 57. Outer seal follower assembly |
| 27. Intermediate shaft pinion gear | 58. Inter seal follower assembly |
| 28. Inner bearing cover O-ring | 59. Intermediate bearing adjustment shims |
| 29. Inner bearing cover | *** 60. Intermediate shaft outer bearing cage |
| 30. Truck frame pivot arm | 61. Intermediate pinion shaft |
| 31. 1/16" + or - 1/64" clearance - use outboard bearing cage shims as required | |

*Models with oil type steering clutches only

**Single lip seal used with dry type steering clutches

***Some models have bearing cage and a separate retainer (with adjustment hole)

TOPIC 3—FINAL DRIVE DISASSEMBLY

NOTE

The disassembly procedure for each final drive is the same.

A. TRACK SPROCKET AND SHAFT REMOVAL

1. Uncouple track by removing track master pin. Move tractor backward until top of track is off of track sprocket and rear truck wheel is positioned on last track link assembly.
2. Drain oil from final drive compartment.
3. Remove truck frame pivot caps, located directly under steering clutch compartment. Remove track sprocket guards or closure plates if so equipped. Remove outboard bearing cover Fig. 2 (6) from outboard bearing cage (7); remove cover and bearing adjustment shims; tie shims to cover to prevent loss. Remove sprocket shaft bearing cap (3). Remove cap-screws attaching equalizing spring seat to truck frame.

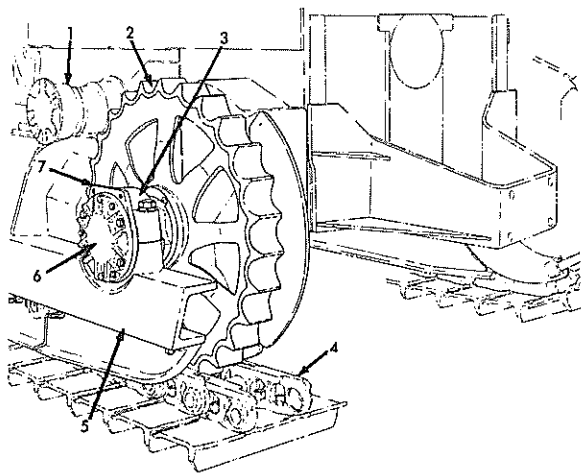


Fig. 2 Track Sprocket Installed
(T-41461)

1. Track support roller
2. Track sprocket
3. Sprocket shaft bearing cap
4. Track assembly
5. Truck frame
6. Outboard bearing cover
7. Outboard bearing cage

4. Use suitable jack or hoist, raise rear of tractor off the truck frame and opposite track off the ground; place suitable cribbing under draw-bar. Raise and block front of tractor high enough so the opposite track is off the ground.

IMPORTANT

It is necessary to raise the opposite track off ground so track can be turned to remove steering clutches and final drive gear locks.

Tilt truck frame outward enough so the equalizing spring will clear track release housing; roll truck frame forward on track far enough to clear track sprocket.

5. Remove roll pin, Fig. 1 (48); remove outboard bearing retaining nut (49).
6. Use puller tools similar to those in Fig. 3; pull sprocket shaft outboard bearing cage and bearing from sprocket shaft. Use care in

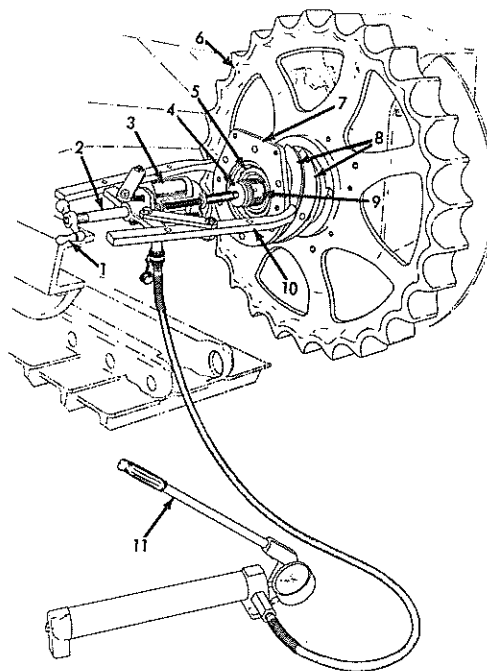


Fig. 3 Removing Sprocket Shaft
Outboard Bearing and Bearing Cage
(T-41330)

- | | |
|---------------------|--------------------------------|
| 1. Adjusting crank | 7. Outboard bearing cage |
| 2. Forcing screw | 8. Outboard bearing cage shims |
| 3. Hydraulic ram | 9. Sprocket shaft |
| 4. Shaft protector | 10. Puller |
| 5. Outboard bearing | 11. Hydraulic pump |
| 6. Track sprocket | |

handling to prevent damage to oil seal ring cemented to bearing cage. Tie bearing cage spacing shims to outboard bearing cage to prevent loss.

7. Remove sprocket retaining nut lock. Place wooden block beneath sprocket to keep sprocket shaft from turning; use suitable wrench (Fig. 4) to loosen sprocket retaining nut. Back off sprocket retaining nut approximately 1/2", but do not remove. Use puller tools similar to those in Fig. 5, pull track sprocket until it is loose on the shaft. It may be necessary to shock rear side of sprocket with heavy hammer to break it loose. Remove puller tools and sprocket retaining nut; use care to prevent damage to outer seal components cemented to sprocket retaining nut. Remove track sprocket; use care to prevent damage to inner seal ring components and threads of sprocket shaft.

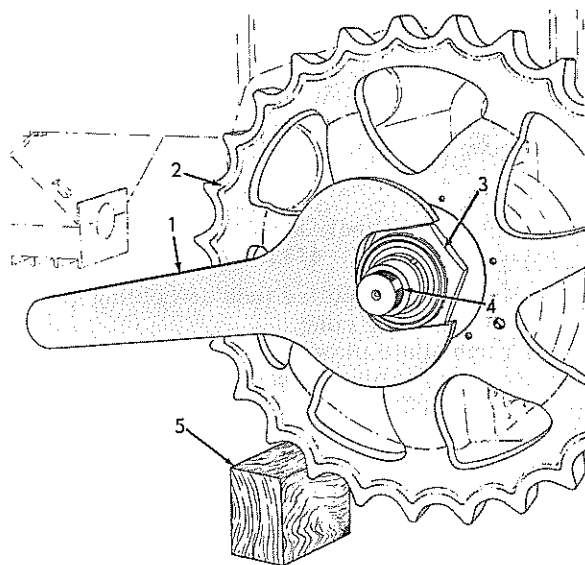


Fig. 4 Loosening Sprocket Retaining Nut
(T-41332)

- | | |
|---------------------------|-------------------|
| 1. Wrench | 4. Sprocket shaft |
| 2. Track sprocket | 5. Wooden block |
| 3. Sprocket retaining nut | |

8. Remove final drive compartment cover from steering clutch and final drive housing. Remove gear locks Fig. 1 (38) from sprocket shaft driving gear (39).

NOTE

To rotate sprocket shaft to correct position for removal of gear locks, rotate opposite track with suitable jack or hoist.

9. Place a wooden block under sprocket shaft driving gear, Fig. 6, to prevent gear from dropping when sprocket shaft is removed.

10. Use pusher screws and remove sprocket shaft intermediate bearing cage assembly Fig. 1 (42); use care to prevent damage to seal ring ce-

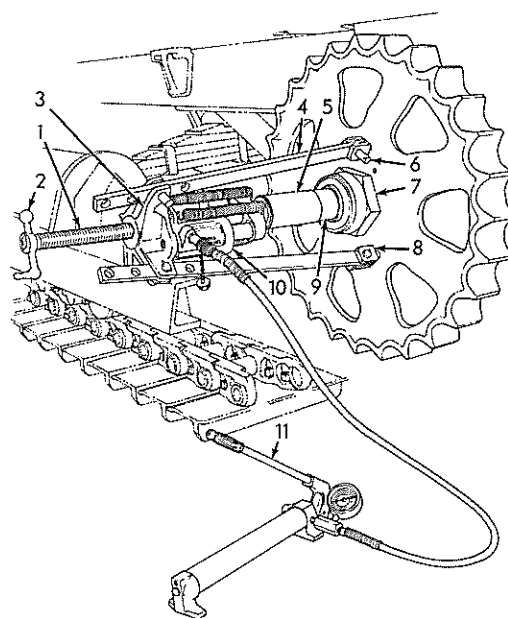


Fig. 5 Pulling Track Sprocket
(T-71886)

- | | |
|---------------------------|---------------------------|
| 1. Forcing screw | 7. Sprocket retaining nut |
| 2. Speed nut | 8. Leg end adapter |
| 3. Puller head | 9. Sprocket shaft |
| 4. Puller leg | 10. Hydraulic ram |
| 5. Sprocket shaft adapter | 11. Hydraulic pump |
| 6. Leg pin | |

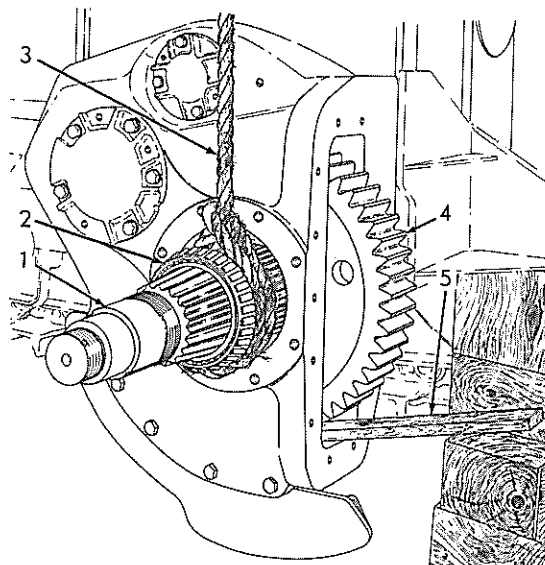


Fig. 6 Removing Sprocket Shaft
(T-41460)

- | | |
|--|------------------|
| 1. Sprocket shaft | 3. Lifting sling |
| 2. Sprocket shaft intermediate bearing | 4. Driving gear |
| | 5. Wooden block |

mented to bearing cage. Tie bearing adjustment shims (59) to cage to prevent loss. Remove sprocket shaft from driving gear, Fig. 6; remove driving gear from steering clutch and final drive housing.

11. If necessary to remove sprocket shaft inner bearing cage and bearing cup, back bearing cage setscrew Fig. 7 (5) out until it clears slot in inner bearing cage. Use tools similar to those in Fig. 7, pull inner bearing cage; use suitable puller tools to remove bearing cup from inner bearing cage. The inner bearing cover Fig. 1 (29) may be removed from housing, if necessary, by driving bearing cover in toward final drive compartment after inner bearing cage has been removed.

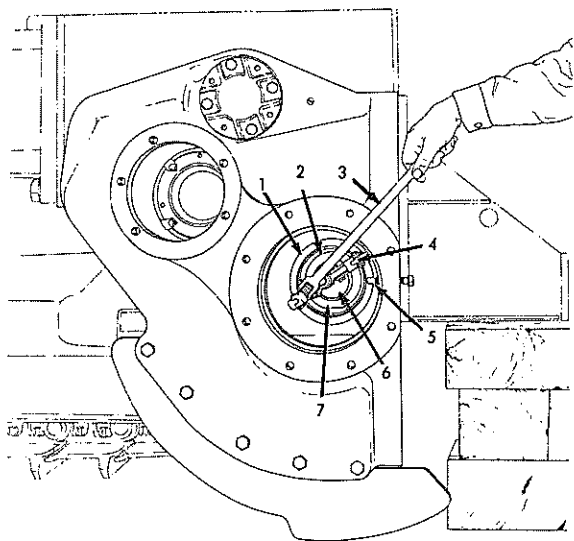


Fig. 7 Removing Sprocket Shaft Inner Bearing Cage (T-41462)

1. Sprocket shaft inner bearing cage
2. Sprocket shaft inner bearing cup
3. Socket wrench (flex handle)
4. Jaw type puller
5. Bearing cage setscrew
6. Step plate
7. Sprocket shaft inner bearing cover

B. INTERMEDIATE SHAFT REMOVAL

1. Remove capscrews and capscrew locks from intermediate gear locks, Fig. 1 (26). Use pusher screws to pull outer bearing cage (60) out approximately 1 inch; move shaft out against bearing cage and remove gear locks.
2. Remove bearing cage (60); use care to prevent intermediate pinion from falling and damaging bearing cage bore. Tie bearing adjustment shims to cage to prevent loss.

NOTE

Some models have intermediate pinion outer

bearing cage and separator retainer, Fig. 1 (60). Pusher screws are not necessary for removal of this cage. Use slide hammer puller as shown in Fig. 8.

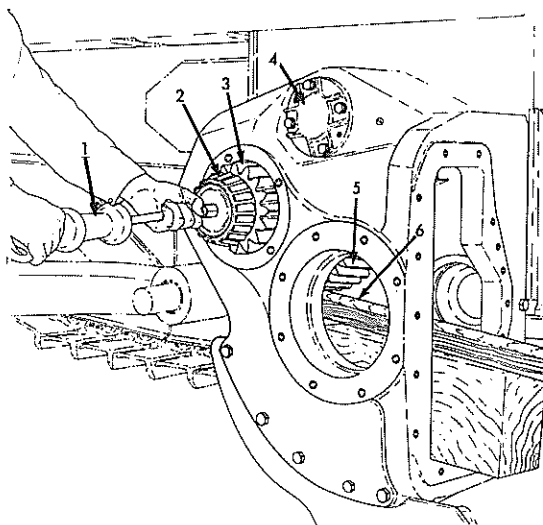


Fig. 8 Removing Final Drive Intermediate Pinion (T-41428)

1. Slide hammer puller (use as holding tool)
2. Outer bearing cone
3. Intermediate pinion
4. Final drive pinion outer bearing cage
5. Intermediate gear
6. Wooden block

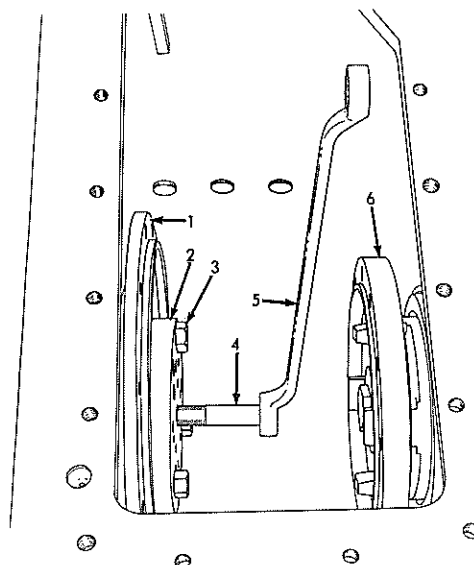


Fig. 9 Pulling Brake Drum Hub (T-41409)

1. Brake drum hub
2. Puller plate
3. Puller screw
4. Forcing screw
5. Wrench
6. Steering clutch driving hub

3. Hold or block intermediate gear Fig. 8 (5); remove intermediate shaft as shown in Fig. 8. Remove intermediate gear (5) from housing.
4. If necessary to remove inner bearing cup, Fig. 1 (25), pull bearing cage (23) from bore. (Bearing cage may be removed using a small pry bar). Use suitable puller tools to remove inner bearing cup from bearing cage.

C. PINION SHAFT REMOVAL

The pinion shaft must be removed through steering clutch compartment. Remove steering clutch; see Technical Publication Index 0658800-8 for the Steering Clutches and Brakes Service Manual applicable to your unit. After steering clutch is removed proceed as follows:

1. Unlock brake drum hub retaining capscrow Fig. 1 (18); loosen capscrow and back it out approximately 1/8". Use tools similar to those shown in Fig. 9, pull brake drum hub until it is loose on shaft. Remove puller tools, retaining capscrow, locking washer, hub retaining washer seal, and brake drum hub from the steering clutch compartment.
2. Models with oil type steering clutches, remove breather tube assembly Fig. 10 (1). All models, use pusher screws to remove bearing cage (2), oil seal (4), and inner bearing cup as an assembly.
3. Use pusher screws to remove outer bearing cage Fig. 1 (5), outer bearing cup (7) and bearing adjustment shims (8) as an assembly. Tie adjustment shims to bearing cage to prevent loss.

4. Remove final drive pinion through steering clutch compartment.

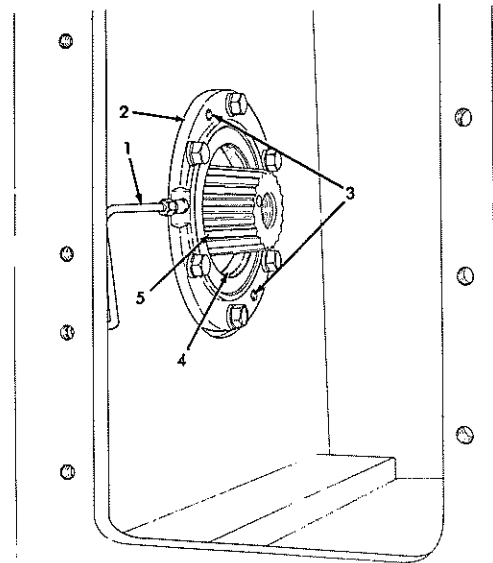


Fig. 10 -- Final Drive Pinion Inner Bearing Cage Installed (T-41454)

1. Final drive breather tube assembly (Models with oil type steering clutches only)
2. Pinion shaft inner bearing cage
3. Tapped holes (for pusher screws)
4. Oil seal
5. Final drive pinion

TOPIC 4—FINAL DRIVE ASSEMBLY

A. CLEANING AND INSPECTION

Clean and inspect all parts; replace worn or damaged parts before assembling final drive. Use press and suitable puller to remove and install shaft bearings. Be certain bearings are properly seated.

NOTE: A .12" oversize bearing cage kit is available to salvage main housings with worn intermediate pinion outer bearing cage bore. This kit is used only on tractors with one piece outer bearing cap, Fig. 12.

If outboard bearing must be replaced, use tools similar to those shown in Fig. 11 and pull bearing from bearing cage.

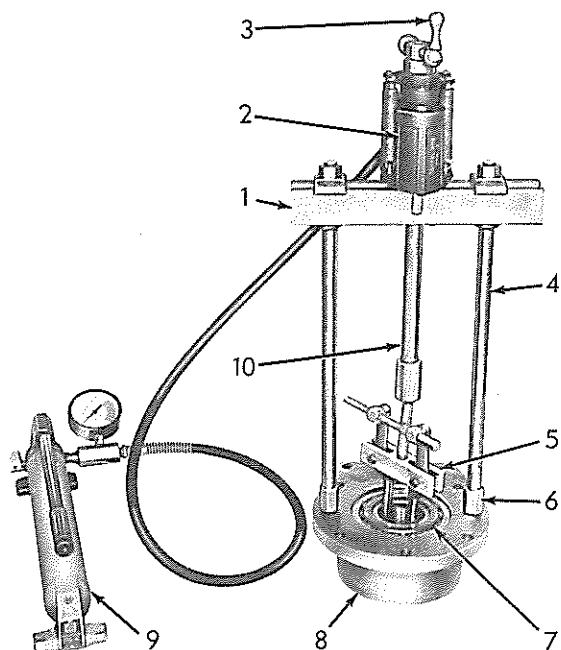


FIG. 11 PULLING OUTBOARD BEARING FROM BEARING CAGE

- | | |
|--------------------|--------------------------|
| 1. Push-puller | 6. Adapter |
| 2. Hydraulic ram | 7. Outboard bearing |
| 3. Adjusting crank | 8. Outboard bearing cage |
| 4. Puller leg | 9. Hydraulic pump |
| 5. Jaw type puller | 10. Forcing screw |

B. INTERMEDIATE PINION AND GEAR INSTALLATION

1. Refer to Fig. 12; assemble bearing cup (12) in cage (13). Align slot in cage with pin (14) in housing; install cage in housing bore.
2. Drive bearing (7) (11) on shaft; lubricate bearings.
3. Place intermediate gear (1) in housing (lock side of gear to outside of housing); install intermediate pinion in housing and lock gear to pinion.

4. Models with one piece outer bearing cage refer to Fig. 12 and proceed as follows:

- a. Drill a 1-5/32" hole in exact center of cage (9) and tap to accept 1" N. P. T. square socket pipe plug. Secure proper plug and install in cage; grind off plug on inside of cage so it is approximately flush with inner surface of cage; also, plug should not protrude excessively from outside of cage. Remove plug.

- b. Press cup (6) in cage (9); use guide studs and install cage (with original bearing adjustment shims) in housing bore. Torque capscrews to 170 to 187 lbs. ft. (If Grade 8 capscrews are used, torque them to 220 -- 240 lbs. ft.).

- c. Refer to Fig. 13; install 5/8" NC capscrew in end of shaft (be sure capscrew bottoms in shaft); assemble tools as shown and measure bearing pre-load. Add or remove shims as necessary to obtain pre-load of 20 -- 40 lbs. in. Remove capscrew and install pipe plug in cage.

5. Models with two piece bearing cage and retainer refer to Fig. 12 and proceed as follows:

- a. Press cup (6) in cage (17); be certain thickest end of cup protrudes .385" minimum out retainer side of cage.

- b. Install assembled cup and cage in housing bore. Install retainer with original bearing adjustment shim pack plus an additional .020" shims, or a shim pack of approximately .150". Torque attaching capscrews to 170 -- 187 lbs. ft. (If Grade 8 capscrews are used torque them to 220 -- 240 lbs. ft.).

- c. Refer to Fig. 13; install 5/8" NC capscrew in shaft (be sure capscrew bottoms in shaft); assemble tools as shown and measure bearing pre-load. Remove shims (gradually) as necessary to obtain pre-load of 20 -- 40 lbs. in. Remove capscrew and install pipe plug in cage.

IMPORTANT: If too few shims are used, bearings will be too tight. Cage must then be removed and bearing cup repositioned in cage as described in step A.

C. PINION (TOP SHAFT) INSTALLATION

1. Refer to Fig. 14; assemble bearing cup (17) in cage (19). Use guide studs; install assembled cup and cage (with original bearing adjustment shims) in outer housing bore.

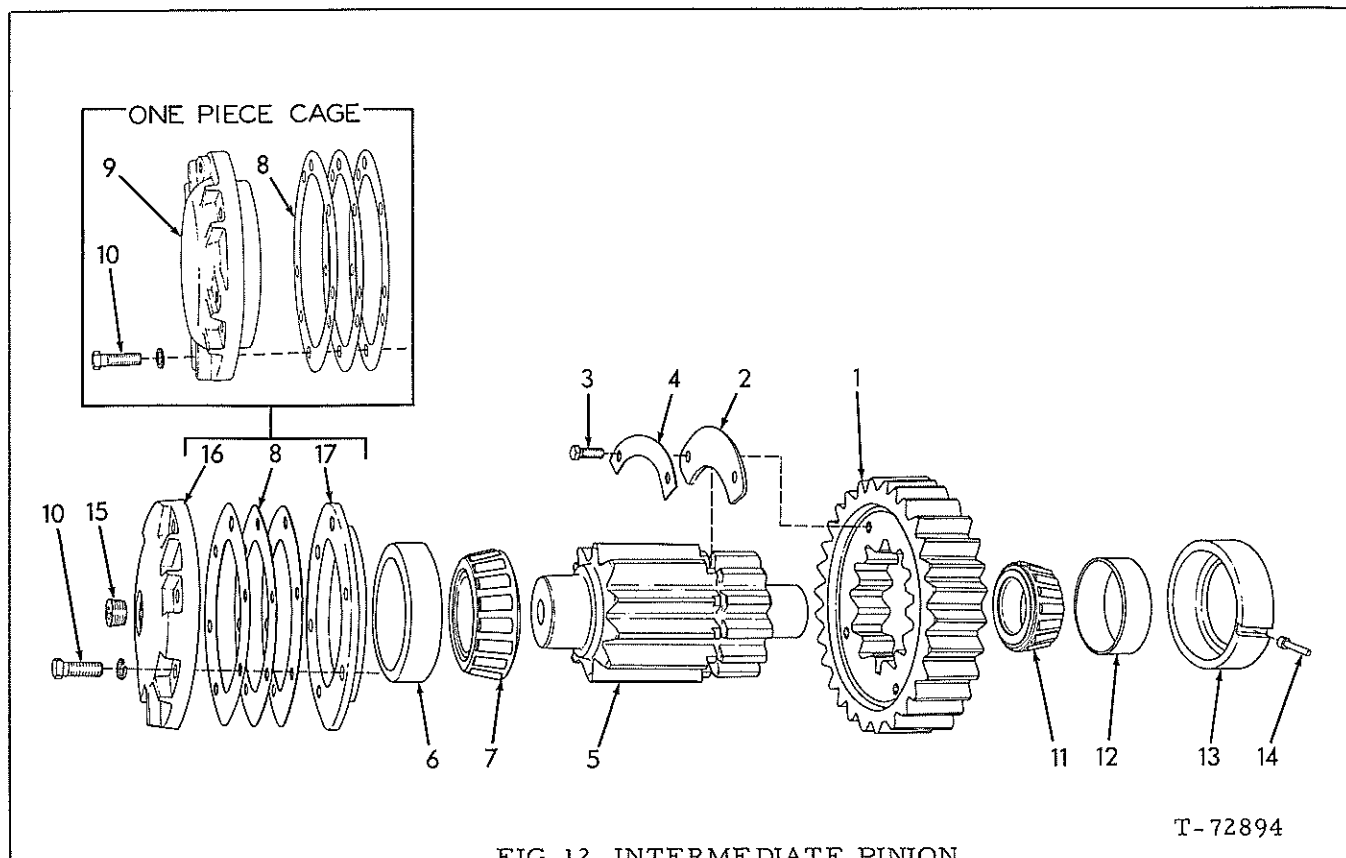


FIG. 12 INTERMEDIATE PINION

- | | | | |
|----------------------|-----------------------------|------------------------|------------------------|
| 1. Intermediate gear | 6. Outer bearing cup | 9. Outer bearing cage | 13. Inner bearing cage |
| 2. Gear lock | 7. Outer bearing cone | 10. Capscrew | 14. Locking pin |
| 3. Capscrew | 8. Bearing adjustment shims | 11. Inner bearing cone | 15. Pipe plug |
| 4. Capscrew lock | | 12. Inner bearing cup | 16. Bearing retainer |
| 5. Pinion | | | 17. Bearing cage |

LEGEND FOR FIG. 13

1. Bearing adjustment shims
- * 2. Intermediate pinion outer bearing cage
3. 5/8" capscrew, or other adapter
4. Socket
5. Torque indicating wrench

* Some models have bearing cage and a separate retainer.

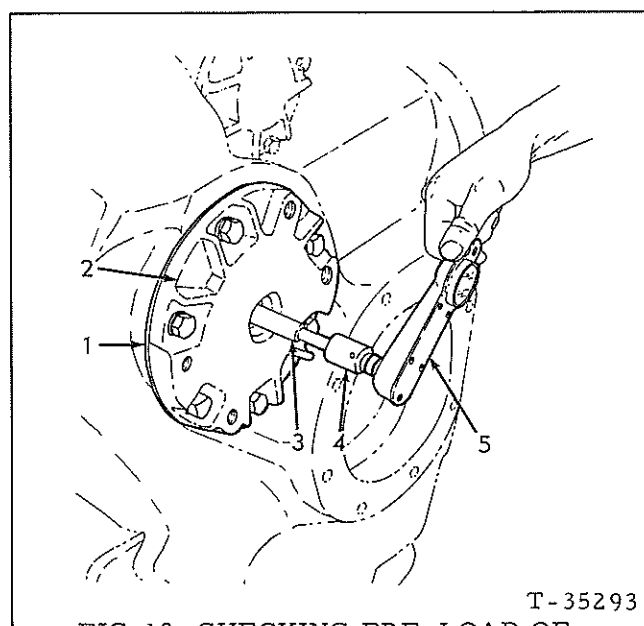


FIG. 13 CHECKING PRE-LOAD OF INTERMEDIATE PINION BEARINGS (HD21 SHOWN, HD11 SIMILAR)

2. With bearing cones (14, 16) assembled on shaft, install pinion shaft in housing.
3. Install seal (9) in cage (10). Models with dry steering clutches use single lip seal; install with sealing lip toward bearing side of cage.
4. Use guide studs and install inner bearing cage (with new gasket) in bore of housing. Models equipped with oil type steering clutches, install breather tube assembly in clutch compartment.

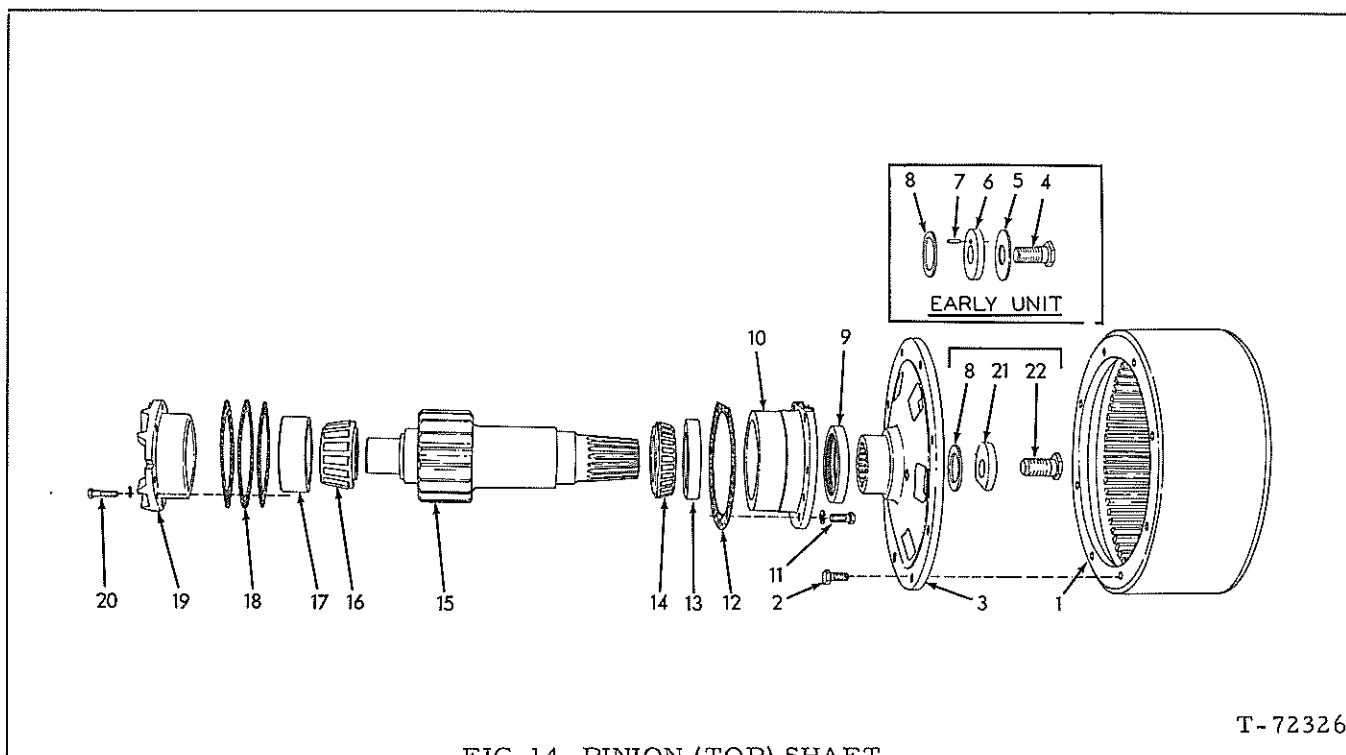


FIG. 14 PINION (TOP) SHAFT

- | | | |
|-----------------------------|----------------------------|------------------------------|
| 1. Brake drum | 8. Sealing washer (rubber) | 15. Pinion |
| 2. Capscrew | 9. Oil seal | 16. Outer bearing cone |
| 3. Brake drum hub | 10. Inner bearing cage | 17. Outer bearing cup |
| 4. Hub retaining capscrew | 11. Capscrew | 18. Bearing adjustment shims |
| 5. Capscrew lock | 12. Gasket | 19. Outer bearing cage |
| 6. Hub retaining washer | 13. Inner bearing cup | 20. Capscrew |
| 7. Hub retaining washer pin | 14. Inner bearing cone | 21. Hub retaining washer |
| | | 22. Hub retaining capscrew |

5. Torque inner bearing cage attaching cap-screws to 35 -- 39 lbs. ft. (43 -- 47 lbs. ft. if Grade 8 capscrews are used). Torque outer bearing cage attaching capscrews to 90 -- 100 lbs. ft. (110 -- 120 lbs. ft. if Grade 8 capscrews are used). Bump bearing cages while torquing to make certain the bearings are fully seated.
6. Refer to Fig. 14a; measure pinion (top shaft) bearing pre-load from inner end of pinion shaft by installing hub retaining capscrew securely into end of shaft and assemble tools as shown. Add or remove shims under outer bearing cage as necessary to obtain a torque reading 8 -- 16 lbs. in. higher (additional) than was measured for intermediate pinion bearing pre-load.
7. Install brake drum hub, Fig. 14 (3); secure to top pinion with retaining washers and capscrew. Torque hub retaining capscrew to 300 lbs. ft. (41.47 kg-m).

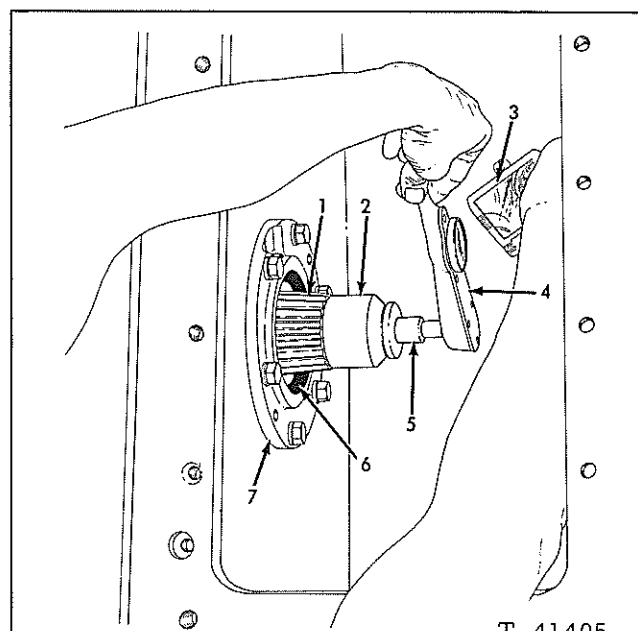


FIG. 14a CHECKING PRE-LOAD OF PINION (TOP SHAFT) BEARING

- | | |
|-----------------------|-----------------------|
| 1. Pinion (top shaft) | 5. Adapters |
| 2. Socket | 6. Oil seal |
| 3. Mirror | 7. Inner bearing cage |
| 4. Torque wrench | |

D. SPROCKET SHAFT BEARING ADJUSTMENT

Sprocket shaft bearing must be adjusted to specified pre-load without gear assembled on shaft.

1. Install new O-ring, Fig. 15 (25) on inner bearing cover (24). Start cover in its bore; install bearing cup (22) in inner bearing cage (23). Use tools similar to those shown in Fig. 16 to install inner bearing cage and inner bearing cover. When installing inner bearing cage, align slot in cage with bearing setscrew, Fig. 15 (27); tighten setscrew after bearing cage is seated in its bore.
2. Lubricate sprocket shaft bearings; install sprocket shaft without driving gear) in housing. Install bearing cup Fig. 15(14) in intermediate bearing cage (12); use guide studs, install bearing cage (with original bearing adjustment shims) in its bore. Remove guide studs; install and torque attaching capscrews to 90 -- 100 lbs. ft. (110 -- 120 lbs.ft. if Grade 8 capscrews are used)
3. Sprocket shaft bearings (inner and intermediate) are properly adjusted when they have 50 -- 100 lbs. in. pre-load or when they are adjusted .002" to .003" tight. A torque wrench and adapter may be used to check bearing preload as shown in Fig. 17. Add or remove shims, Fig. 15 (13), to obtain specified pre-load. When adjusting, bump intermediate bearing cage to be certain bearings are properly seated.
4. After specified pre-load is obtained, remove intermediate bearing cage and sprocket shaft. Keep bearing adjustment shim pack with bearing cage.

E. SPROCKET SHAFT SEALS ASSEMBLY

NOTE: Use "Neoprene" cement to cement seal assemblies in position. "Neoprene" cement and solvent for thinning can be purchased from Fiat-Allis dealer.

1. INNER SEAL
 - a. Clean seal rings, follower assembly, and seal mating surfaces on intermediate bearing cage and sprocket.

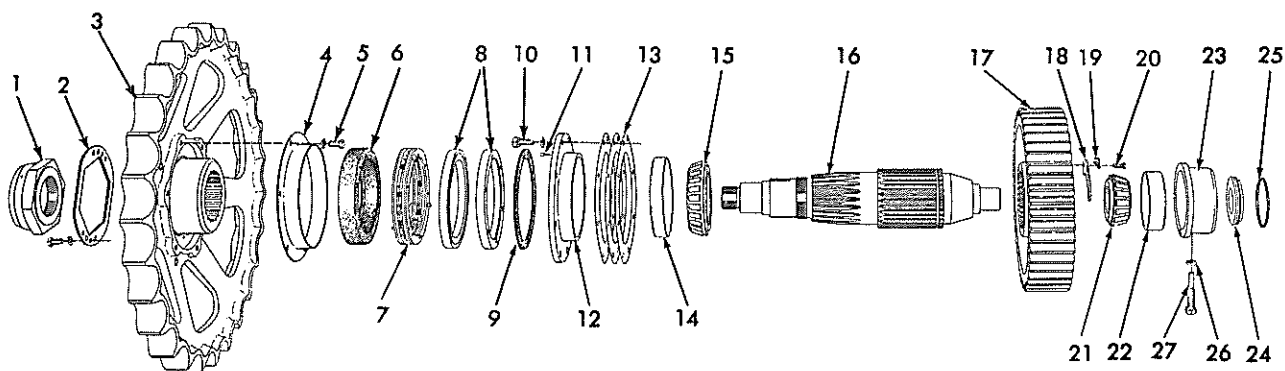


Fig. 15 -- Sprocket Shaft and Driving Gear Details
(T-16297)

- | | | |
|---------------------------------|--|---------------------------------|
| 1. Sprocket retaining nut | 10. Capscrew | 19. Capscrew lock |
| 2. Sprocket retaining nut lock | 11. Pin | 20. Capscrew |
| 3. Sprocket | 12. Intermediate bearing cage | 21. Inner bearing cone assembly |
| 4. Seal guard | 13. Bearing adjustment shims | 22. Inner bearing cup |
| 5. Capscrew | 14. Intermediate bearing cup | 23. Inner bearing cage |
| 6. Inner seal boot | 15. Intermediate bearing cone assembly | 24. Inner bearing cover |
| 7. Inner seal follower assembly | 16. Sprocket shaft | 25. O-ring |
| 8. Inner seal rings | 17. Driving gear | 26. Washer |
| 9. Gasket | 18. Gear lock | 27. Setscrew |

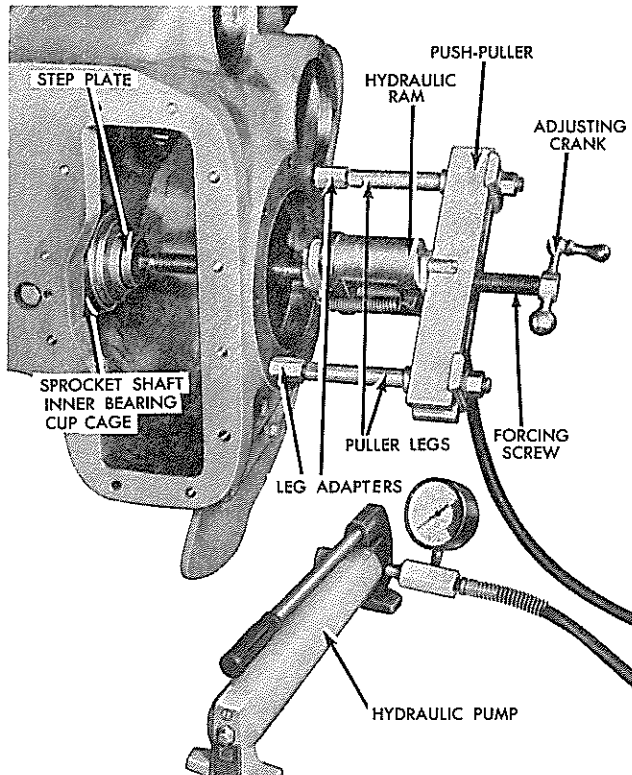


Fig. 16 -- Installing Sprocket Shaft
Inner Bearing Cage
(T-11884)

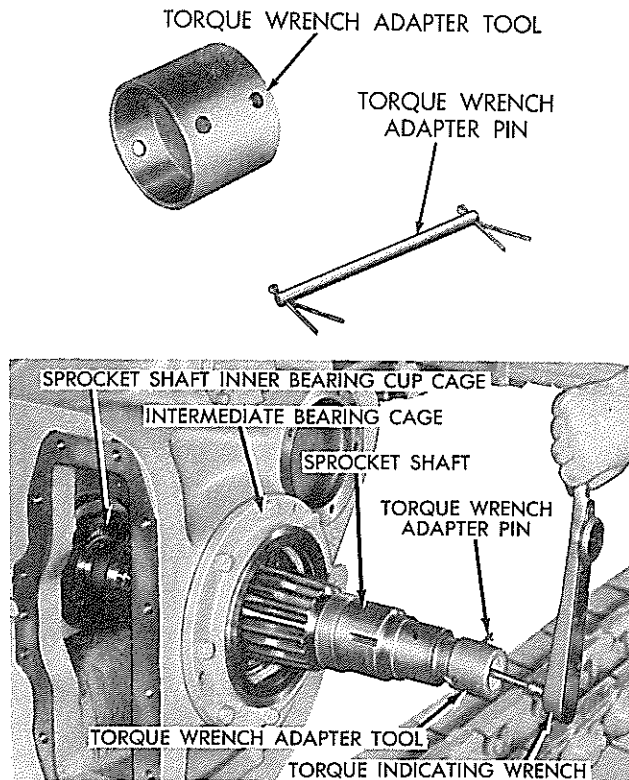


Fig. 17 -- Checking Pre-load of Sprocket Shaft
Bearings
(T-20154 & T-20155)

- b. Cement sealing surface of intermediate bearing cage Fig. 15 (12) and one side of seal ring gasket (9); install gasket on bearing cage. Cement flat side of a seal ring (8) and outer face of seal ring gasket (9); install seal ring on gasket, in position on pins (11).
- c. Protect seal ring with a clean cloth; place weight on seal ring and allow cement to dry and set thoroughly (at least 30 minutes).
- d. Install boot, Fig. 15 (6) on follower assembly (7). Hold each lip of seal boot outward; cement inside of lips and sides of follower assembly. Press boot lips back in place against follower assembly.
- e. Cement one side of seal boot and sealing surface of track sprocket. Immediately place seal boot and follower assembly over hub of track sprocket; insert protruding follower pins into corresponding holes in track sprocket.
- f. Cement flat side of other seal ring, Fig. 15 (8) and lip of seal boot (6); immediately place seal ring against seal boot and follower assembly. Protect seal ring with a clean cloth; place weight on seal ring and allow cement to dry and set thoroughly.

2. OUTER SEAL ASSEMBLY

- a. Clean seal rings, follower assembly, and seal mating surfaces on sprocket retaining nut and outboard bearing cage.
- b. Install boot, Fig. 20 (17) on follower assembly (16). Hold each lip of seal boot outward; cement inside of lips and sides of follower assembly. Press boot lips back in place against follower assembly.
- c. Cement one side of seal boot and machined face in bottom of counterbore in sprocket retaining nut. Immediately place seal boot and follower assembly in sprocket retaining nut; insert ends of follower pins into corresponding holes in sprocket retaining nut.
- d. Cement other side of seal boot and flat side of a seal ring, Fig. 20 (15). Immediately place seal ring on seal boot and follower assembly, inserting ends of follower pins into corresponding holes in outer seal ring.
- e. Protect seal ring with a clean cloth; place weight on seal ring and allow cement to dry and set thoroughly (at least 30 minutes).
- f. Place outboard bearing cage on a clean work bench, cover attaching side down.
- g. Cement one side of seal ring gasket Fig. 20 (14) and machined face in bottom of counterbore in outboard bearing cage (11); immediately place gasket in position on pins in bearing cage. Cement other side of seal ring gasket (14) and flat side of other seal ring (15);

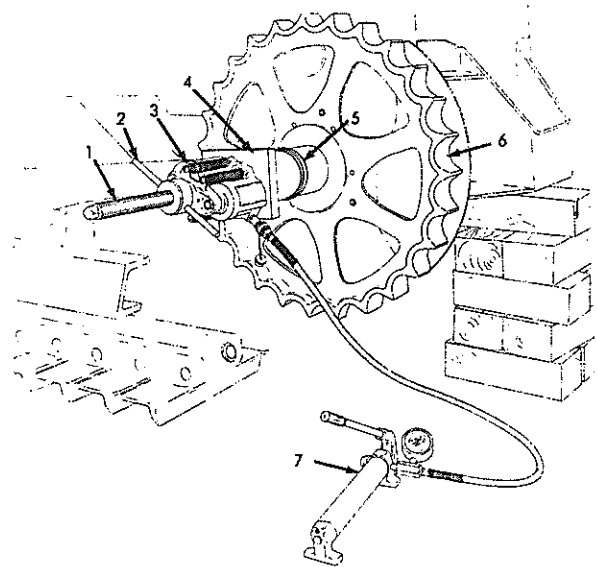


Fig. 18 Installing Track Sprocket on Sprocket Shaft (T-41470)

1. Forcing screw
2. Speed nut
3. Hydraulic ram
4. Spacer tube (sprocket installing)
5. Spacer tube (sprocket installing)
6. Sprocket
7. Hydraulic pump

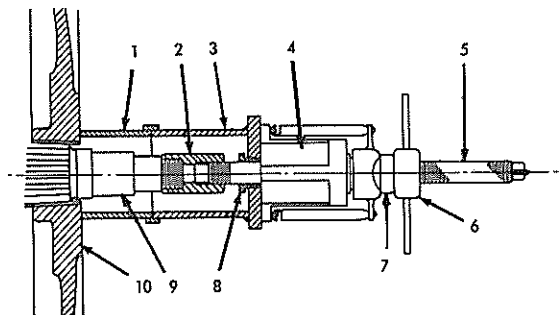


Fig. 19 Sprocket Installation Tools Installed - Sectional View (T-41486)

1. Spacer tube (sprocket installing)
2. Sprocket shaft adapter
3. Spacer tube (sprocket installing)
4. Hydraulic ram
5. Forcing screw
6. Speed nut
7. Plain hole insert
8. Tube bushing
9. Sprocket shaft
10. Track sprocket

immediately place seal ring on gasket, in position on pins. Protect seal ring with a clean cloth; place weight on seal ring and allow cement to dry and set thoroughly.

F. SPROCKET SHAFT AND GEAR INSTALLATION

1. Install sprocket shaft driving gear (with lock side of gear toward inner bearing cup) in housing and block gear in position.
2. Lubricate sprocket shaft bearings and insert sprocket shaft into bore in housing and driving gear; push sprocket shaft in so that inner bearing is in position in inner bearing cup. Install sprocket shaft intermediate bearing cage, with seal assembly attached, using correct amount of bearing adjustment shims as determined previously. Tighten intermediate bearing cage attaching capscrews to a torque of 70 to 90 lbs. ft.
3. Position driving gear on sprocket shaft so gear locks may be installed. Install gear locks, capscrews and capscrew locks. Tighten capscrews and secure with capscrew locks. Install final drive compartment cover gasket (new gasket if necessary) and cover. Tighten cover attaching capscrews securely.

G. TRACK SPROCKET INSTALLATION

NOTE

It is very important that track sprocket be installed tightly on splines of sprocket shaft.

This is accomplished by installing sprockets hydraulically using a specified pressure.

1. Install seal guard Fig. 15 (4) in position on track sprocket. Lubricate mating surfaces of seal rings of inner seal assembly; install track sprocket (with seal rings in place) on sprocket shaft.
2. Refer to Figs. 18 and 19, assemble tools to press track sprocket on sprocket shaft.
3. Connect hydraulic pump hose to hydraulic ram and operate hydraulic pump until a pressure of 35 tons is indicated on pump pressure gauge. After sprocket has been pressed on sprocket shaft to specified pressure, release pressure on pump and remove installing tools.

NOTE

If hydraulic tools shown in Fig. 18 and 19 are not available to install sprocket, use wrench shown in Fig. 4 (with necessary extensions) and tighten sprocket retaining nut to a torque of 3500 lbs. ft. After specified torque is obtained, shock sprocket ONCE with a heavy hammer, then re-torque sprocket retaining nut to specified torque.

4. Coat back face of sprocket retaining nut (face which contacts sprocket) with gasket cement

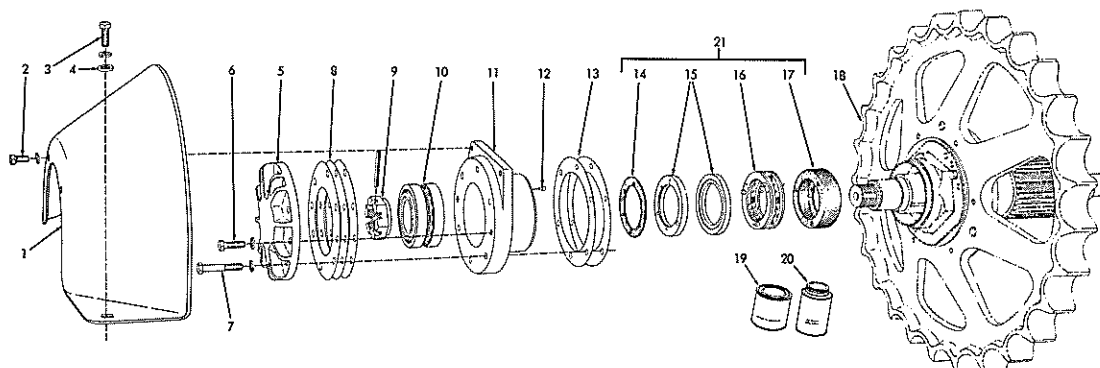


Fig. 20 Sprocket Shaft Outboard Bearing and Seal Details
(T-16298)

- | | |
|--|----------------------------------|
| 1. Sprocket guard (Special Equipment) | 12. Seal ring locating pin |
| 2. Capscrew | 13. Bearing cage spacing shims |
| 3. Capscrew | 14. Seal ring gasket |
| 4. Plain washer | 15. Outer seal rings |
| 5. Outboard bearing cover | 16. Outer seal follower assembly |
| 6. Capscrew | 17. Outer seal boot |
| 7. Capscrew | 18. Sprocket |
| 8. Bearing adjustment shims | 19. Neoprene cement |
| 9. Bearing retaining nut with roll pin | 20. Solvent |
| 10. Outboard bearing assembly | 21. Outer seal assembly |
| 11. Outboard bearing cage | |

or sealing compound. Make certain oil grooves in track sprocket retaining nut are not obstructed with gasket cement or sealing compound, then install nut. Using a wrench on sprocket retaining nut as shown in Fig. 4, tighten nut by striking end of wrench with heavy hammer (sledge hammer) several times to make certain the nut is tight against track sprocket. Install sprocket retaining nut lock and secure with attaching capscrews.

NOTE

It may be necessary to tighten nut until holes in retaining nut lock are aligned with tapped holes in track sprocket.

H. SPROCKET SHAFT OUTBOARD BEARING INSTALLATION

1. Place original amount of bearing cage shims Fig. 20 (13) in position on outboard bearing cage. With outer seal assembly (21) and outboard bearing (10) in place in outboard bearing cage, use outboard bearing installing adapter shown in Fig. 21 to press bearing and bearing cage on shaft far enough to allow 1/4" to 3/8" clearance between outer seal rings. Remove installing tools. Lubricate outboard bearings with clean oil.

IMPORTANT

Do not press outboard bearing and bearing cage on shaft far enough to allow outer seal rings to contact each other, as this will cause a drag between the rings and a false reading will be obtained when adjusting for proper pre-load of outboard bearings.

2. Install sprocket shaft outboard bearing cover, Fig. 20 (5) with original amount of outboard bearing adjustment shims (8); tighten attaching capscrews securely.
3. The outboard bearing is correctly adjusted when it has 8 to 13 lbs. in. pre-load or, is adjusted .001" to .002" tight. Turn outboard bearing cage so extended portion of cage flange is either upward or downward; install outboard bearing cage torque wrench adapter, Fig. 22, on outboard bearing cover. Using a pounds inch torque indicating wrench, rotate outboard bearing cage approximately 30° in either direction and note reading on torque indicating wrench.
4. Add or remove outboard bearing adjusting shims until specified outboard bearing pre-load is obtained.
5. After proper amount of bearing adjustment shims have been determined, remove sprocket shaft outboard bearing cover and bearing adjustment shims.

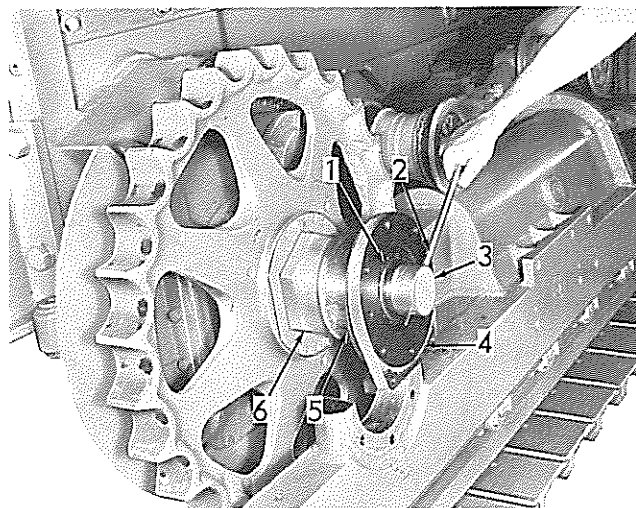


Fig. 21 Installing Sprocket Shaft Outboard Bearing (T-21614)

1. Outboard bearing
2. Bar
3. Outboard bearing installing adapter
4. Outboard bearing cage
5. Outboard bearing cage shims
6. Sprocket retaining nut

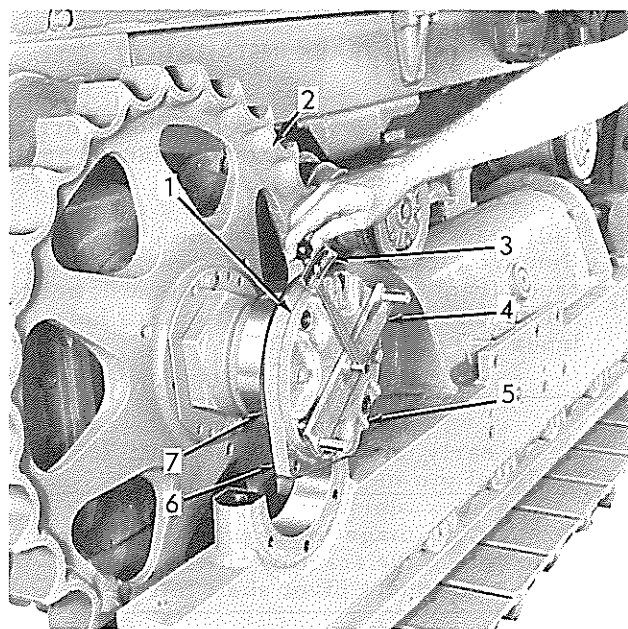
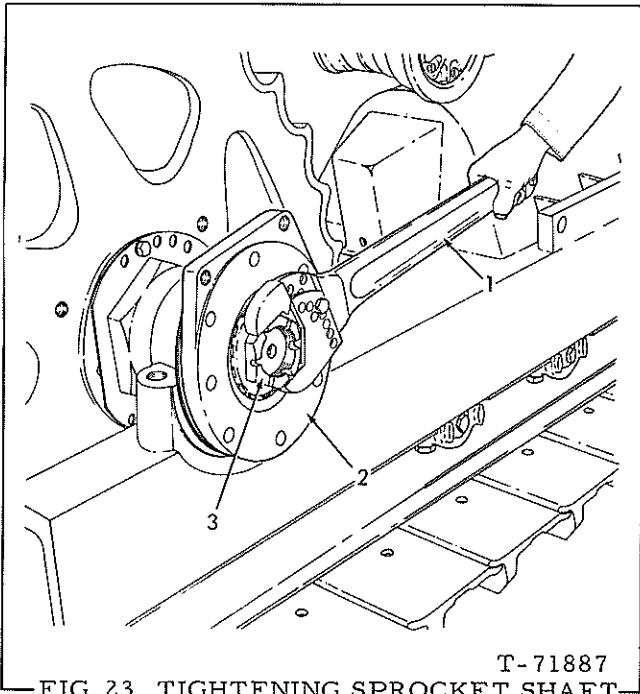


Fig. 22 Checking Outboard Bearing Pre-load (T-21612)

1. Bearing adjustment shims
2. Track sprocket
3. Torque indicating wrench
4. Wrench adapter
5. Outboard bearing cover
6. Outboard bearing cage
7. Outboard bearing cage shims



**FIG. 23 TIGHTENING SPROCKET SHAFT-
OUTBOARD BEARING RETAINING NUT**

1. Wrench
2. Outboard bearing cage
3. Outboard bearing retaining nut

I. TRUCK FRAME AND TRACK INSTALLATION

1. Install steering clutch; see Technical Publications Index 0658800-8 for the Steering Clutches and Brakes Service Manual applicable to your unit.
2. Roll track frame into position under tractor. Remove blocking and lower tractor onto truck frame, making certain that dowel pin for truck frame pivot shaft enters hole in inner end of pivot shaft.

CAUTION

On early units, the pivot shaft dowel pin includes a wick which provides lubrication to the pivot shaft. Damage to the wick while lowering the tractor will result in subsequent pivot shaft failure.

3. Install truck frame pivot shaft caps, making sure caps match position in which they belong. Torque capscrews to 300 -- 330 lbs. ft. (380 -- 420 lbs. ft. if Grade 8 capscrews are used).

4. Lubricate mating surfaces of outer seal rings; install outboard bearing retaining nut. Tighten nut securely using a wrench similar to one shown in Fig. 23 to press bearing and bearing cage to proper position on shaft. Install roll pin to lock retaining nut; drive roll pin flush with flat of retaining nut.
5. Start capscrews that attach sprocket shaft bearing cap (Fig. 2) to truck frame but do not tighten at this time. Install sprocket shaft outboard bearing cover and proper amount of outboard bearing adjustment shims, determined previously. Install and tighten cover attaching capscrews. Torque sprocket shaft bearing cap attaching capscrews to 300 -- 330 lbs. ft. (380 -- 420 lbs. ft. if Grade 8 capscrews are used).
6. Refer to Fig. 1, (31), check clearance between truck frame pivot arm and pivot shaft caps; a specified $1/16''$ + or - $1/64''$ should be obtained at this point. Add or remove bearing cage adjustment shims, Fig. 1 (53) to obtain specified clearance.
7. Attach equalizing beam shock pad bracket to truck frame; torque attaching capscrews to 300 -- 330 lbs. ft. (380 -- 420 lbs. ft. if Grade 8 capscrews are used).
8. Install final drive drain plug and gasket; torque plug to 70 -- 75 lbs. ft. Fill final drive compartment with specified lubricant; install and torque filler plug to 70 -- 75 lbs. ft.

CAUTION

Over-tightening of plugs could extrude gasket from under plug flange and result in leakage.

9. Capacity of the final drive housing is 3.25 gal. Use a good quality Regular Gear Oil.

CAUTION

Do not use Extreme Pressure (EP) Gear Oil.

Use oils of following viscosities:

ATMOSPHERIC TEMPERATURE	VISCOSITY
Above 32°F. (0°C)	SAE 90 Gear Oil
32°F. (0°C) and below	SAE 80 Gear Oil

10. Track installation and adjustment instructions are contained in Undercarriage Service Manual; refer to Technical Publications Index 0658800-8 for manual which covers your tractor.

TOPIC 5—FITS AND TOLERANCES

DESCRIPTION

SIZE OF NEW PARTS

A. PINION SHAFT AND COMPONENTS

1. Torque for brake drum hub retaining capscrew 300 lbs. ft.
2. O. D. of brake drum hub at seal location 3.249" - 3.251"
3. Bore diameter in final drive housing for inner bearing cup cage 5.625" - 5.627"
4. Bore diameter in final drive housing for outer bearing cup cage 4.561" - 4.563"
5. Drive pinion inner bearing cup cage
 - a. O.D. for final drive housing bore 5.622" - 5.623"
 - b. I.D. at inner bearing cup location 4.4355" - 4.4365"
 - c. I.D. at oil seal location
 - 1) Models with dry type steering clutches 4.2475" - 4.2505"
 - 2) Models with oil type steering clutches 4.002" - 4.004"
 - d. O.D. of oil seal
 - 1) Models with dry type steering clutches 4.254"
 - 2) Models with oil type steering clutches 4.003" - 4.008"
6. Drive pinion outer bearing cup cage
 - a. O.D. for final drive housing bore 4.562" - 4.563"
 - b. I.D. at outer bearing cup location 4.0605" - 4.0615"
 - c. O.D. of outer bearing cup 4.0625" - 4.0635"
7. Drive pinion shaft
 - a. O.D. at outer bearing location 1.9385" - 1.9390"
 - b. I.D. of outer bearing 1.9375" - 1.938"
 - c. O.D. at inner bearing location 2.8765" - 2.8775"
 - d. I.D. of inner bearing 2.875" - 2.8755"
 - e. Pre-load adjustment on pinion (top shaft) bearings, (torque) . . . 8-16 pounds inch more (additional)
than intermediate shaft bearing adjustment (with gears meshed).

B. INTERMEDIATE SHAFT AND COMPONENTS

1. Bore diameter in final drive housing for outer bearing cup cage. 6.125" - 6.127"
2. O.D. of outer bearing cup cage 6.126" - 6.127"
3. I.D. of outer bearing cup cage 5.373" - 5.374"
4. O.D. of outer bearing cup 5.375" - 5.376"
5. Bore diameter in final drive housing for inner bearing cup cage. 5.500" - 5.502"
6. O.D. of inner bearing cup cage. 5.497" - 5.498"
7. I.D. of inner bearing cup cage 4.748" - 4.749"

DESCRIPTION

SIZE OF NEW PARTS

- 8. O.D. of inner bearing cup 4.750" - 4.751"
- 9 Intermediate pinion shaft
 - a. O.D. at outer bearing location 2.814" - 2.815"
 - b. I.D. of outer bearing 2.8125" - 2.8135"
 - c. O.D. at inner bearing location 2.1260" - 2.1265"
 - d. I.D. of inner bearing 2.1250" - 2.1255"
 - e. Pre-load adjustment on intermediate pinion shaft bearings (torque) 20 to 40 lbs. in.

C. SPROCKET SHAFT AND COMPONENTS

- 1. Bore diameter in final drive housing for intermediate bearing cup cage 7.750" - 7.752"
- 2. O.D. of intermediate bearing cup cage 7.751" - 7.752"
- 3. I.D. of intermediate bearing cup cage 6.998" - 6.999"
- 4. O.D. of intermediate bearing cup 7.000" - 7.001"
- 5. Bore diameter in final drive housing for inner bearing cage 5.625" - 5.627"
- 6. O.D. of inner bearing cage 5.627" - 5.628"
- 7. I.D. of inner bearing cage 4.998" - 4.999"
- 8. O.D. of inner bearing cup 5.000" - 5.001"
- 9 Sprocket Shaft
 - a. O.D. at inner bearing location 2.0015" - 2.0020"
 - b. I.D. of inner bearing 2.0000" - 2.0005"
 - c. O.D. at intermediate bearing location 4.5025" - 4.5035"
 - d. I.D. of intermediate bearing 4.500" - 4.501"
 - e. O.D. at outboard bearing location 2.627" - 2.628"
 - f. Sprocket hydraulic installation pressure 35 tons
(torque required to install sprocket) 3500 - 4000 lbs. ft.
 - g. Pre-load adjustment on sprocket shaft bearings
(inner and intermediate) 50 to 100 lbs. in. or
002" - .003" tight
- 10. Outboard bearing cage
 - a. O.D. of cage at truck frame location 6.246" - 6.248"
 - b. I.D. of cage at outboard bearing location 5.000" - 5.001"
 - c. I.D. of outboard bearing 2.625" - 2.626"
 - d. O.D. of outboard bearing 5.000" - 5.001"
 - e. Pre-load adjustment on outboard bearing 8 to 13 lbs. in. or
.001" to .002" tight

TOPIC 6—SERVICE TOOLS

The purpose of this Topic is to assist service personnel in the selection of proper tools and combinations of tools to perform the various service and maintenance operations described and illustrated in this manual.

The service tools listed below must be ordered directly from the Tool Manufacturer.

TOOL MANUFACTURER

(OTC) Owatonna Tool Company

Owatonna, Minnesota

FIGURE NO.	MFG'S TOOL NO.	DESCRIPTION
3	(OTC) 1003 1/2 (OTC) Y-21	Hydraulic Grip-O-Matic Puller Pump with Y-1 Gauge
4	(OTC) AC-750	Sprocket Retaining Nut Wrench
5	(OTC) Y-50-12 (OTC) Y-50-13 (OTC) Y500-1 (OTC) Y500-2 (OTC) Y537 (OTC) Y500-6 (OTC) Y500-5 (OTC) Y51-A (OTC) Y21-A	Ram Screw Ram Screw Crank Puller Head Puller Leg Sprocket Shaft Adapter Leg Pin Leg End Adapter 50-Ton Hydraulic Ram Hydraulic Pump
7	(OTC) 1002 (OTC) 630-13 2nd 630-14	Grip-O-Matic Puller Step Plates
8	(OTC) 943-U (OTC) 20-M	Slide Hammer Puller Adapter
9	(OTC) AC-752 (OTC) Y15-14	Puller Plate Forcing Screw
11	(OTC) 938 (OTC) 930-B (OTC) 943-E (OTC) 16-M (OTC) Y-21	Push-Puller Leg (2) Pulling Attachment Adapter (2) Pump with Y-1 Gauge
13, 14a	(OTC) DR-100-1	Torque Wrench
16	(OTC) 938 (OTC) 930-E (OTC) AC-304 (OTC) 630-17 (OTC) Y-21 (OTC) Y15-12	Push-Puller Leg (2) Plate Step Plate Pump with Y-1 Gauge Ram Screw
17	(OTC) AC-528 (OTC) DR-100-1	Torque Wrench Adapter Torque Wrench

FIGURE NO.	MFG'S TOOL NO.	DESCRIPTION
18	(OTC) Y50-12	Ram Screw
	(OTC) Y50-15	Speed Nut
	(OTC) Y51-A	50 Ton Hydraulic Ram
	(OTC) Y1100-533-1	Spacer Tube
	(OTC) Y1100-533-2	Spacer Tube
	(OTC) Y519-2	Tube Bushing
	(OTC) Y-21-A	Hydraulic Pump
	(OTC) Y537	Sprocket Shaft Adapter
19	(OTC) Y1100-533-2	Spacer Tube
	(OTC) Y537	Sprocket Shaft Adapter $2\frac{1}{2}$
	(OTC) Y1100-533-1	Spacer Tube
	(OTC) Y51-A	50-Ton Hydraulic Ram
	(OTC) Y50-12	Ram Screw
	(OTC) Y50-15	Speed Nut
	(OTC) Y50-2D	Plain Hole Insert
	(OTC) Y519-2	Tube Bushing
21	(OTC) AC-980	Installing Adapter
22	(OTC) AC-526	Torque Wrench Adapter
	(OTC) DR-100-1	Torque Wrench
23	(OTC) OA-24	Adjustable Wrench

TOPIC 7—CONVERSION TABLES

DECIMAL AND METRIC EQUIVALENTS OF FRACTIONS OF AN INCH

Inches				Inches			
Fractions	Decimals	*Nom. Dec.	Milli-meters	Fractions	Decimals	*Nom. Dec.	Milli-meters
1/64	.015625	.02	.397	33/64	.515625	.52	13.097
1/32	.03125	.03	.794	17/32	.53125	.53	13.494
3/64	.046875	.05	1.191	35/64	.546875	.55	13.891
1/16	.0625	.06	1.588	9/16	.5625	.56	14.288
5/64	.078125	.08	1.984	37/64	.578125	.58	14.684
3/32	.09375	.09	2.381	19/32	.59375	.59	15.081
7/64	.109375	.11	2.778	39/64	.609375	.61	15.478
1/8	.125	.12	3.175	5/8	.625	.62	15.875
9/64	.140625	.14	3.572	41/64	.640625	.64	16.272
5/32	.15625	.16	3.969	21/32	.65625	.66	16.669
11/64	.171875	.17	4.366	43/64	.671875	.67	17.066
3/16	.1875	.19	4.763	11/16	.6875	.69	17.463
13/64	.203125	.20	5.159	45/64	.703125	.70	17.859
7/32	.21875	.22	5.556	23/32	.71875	.72	18.256
15/64	.234375	.23	5.953	47/64	.734375	.73	18.653
1/4	.250	.25	6.350	3/4	.750	.75	19.050
17/64	.265625	.27	6.747	49/64	.765625	.77	19.447
9/32	.28125	.28	7.144	25/32	.78125	.78	19.844
19/64	.296875	.30	7.541	51/64	.796875	.80	20.241
5/16	.3125	.31	7.938	13/16	.8125	.81	20.638
21/64	.328125	.33	8.334	53/64	.828125	.83	21.034
11/32	.34375	.34	8.731	27/32	.84375	.84	21.431
23/64	.359375	.36	9.128	55/64	.859375	.86	21.828
3/8	.375	.38	9.525	7/8	.875	.88	22.225
25/64	.390625	.39	9.922	57/64	.890625	.89	22.622
13/32	.40625	.41	10.319	29/32	.90625	.91	23.019
27/64	.421875	.42	10.716	59/64	.921875	.92	23.416
7/16	.4375	.44	11.113	15/16	.9375	.94	23.813
29/64	.453125	.45	11.509	61/64	.953125	.95	24.209
15/32	.46875	.47	11.906	31/32	.96875	.97	24.606
31/64	.484375	.48	12.303	63/64	.984375	.98	25.003
1/2	.500	.50	12.700	1	1.000	1.00	25.400

VOLUME AND WEIGHT CONVERSION CONSTANTS — U.S. TO METRIC

Pints x .4732 = Liters
 Quarts x .9463 = Liters
 Gallons x 3.7853 = Liters
 Pounds x .4536 = Kilograms
 Cubic Yards x .7645 = Cubic Meters

TORQUE & PRESSURE CONVERSION CONSTANTS —

lb. ft. x 0.1383 = m-kg
 lb. in. x 1.1521 = cm-kg
 psi x 0.0703 = kg/cm²

LENGTH CONVERSION CONSTANTS — U.S. TO METRIC

Inches x 25.400 = Millimeters
 Inches x .0254 = Meters
 Feet x .3048 = Meters
 Statute Miles x 1.60935 = Kilometers

*Nominal decimals are used in place of fractions of an inch, with exception of such items as bolts, screws, washers, tubing, wire, etc.



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