FIATALLIS ®

Supplement #3
Form 73151988
FR10B WHEEL LOADER
SERVICE MANUAL

(10-91)

ATTENTION: **Insert this sheet in the front of publication as record or receipt.**
Replace or add pages in the publication according to instructions below.

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This is Supplement No. 3 for the subject manual. This supplement is written to add brake pressure procedure for units prior to S/N 61097.

PAGE 4-4A	**no chnage**
PAGE 4-4B	**added**
PAGE 4-5	**changed**
PAGE 4-6	**no change**

Supplement #2
Form 73151988
FR10B WHEEL LOADER
SERVICE MANUAL

(1-91)

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This is Supplement No. 2 for the subject manual. This supplement is written to clarify and describe modified systems. Follow the instructions carefully to insert this supplement into the manual.

REPLACE OR ADD:

Section 0 in its entirety

Section 1: Table of Contents and pages 1-41, 42 and 47 thru 54

Section 2: Pages 2-115 and 2-116

Section 3: Pages 3-21 and 3-22

Section 4: Pages 4-4A, 4-5, 4-6, 4-9, 4-10

Section 5: Pages 5-2A, 5-2B, 5-33, 5-34

Section 7: Pages 7-3, 7-4, 7-65, 7-66, 7-73, 7-74, 7-77, 7-78

and at the end of all text add - Rear Flysheet

FR10B

wheel loader

service manual set

Form 73151988 English

⚠ 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 instructions 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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FR10B
SERVICE MANUAL
73151988
Supplement #1

8/89

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or
FIATALLIS EUROPE S. p. A. - Magazzino Stampati
Viale Torino, 2 - 10040 Stupinigi (TO) Italy

This is supplement number 1 for the subject manual. This supplement is written to clarify and desc[illegible]modified systems. Follow the instructions carefully to insert [illegible]ement into the manual.

NOTICE
THESE CHANGES ARE
INCLUDED IN THIS COPY

Replace:

Section 0 in its entirety

Section 1 in its entirety

Section 2 page 2-59/2-60

Section 3 page 61

Section 4 in its entirety

Section 5 in its entirety except schematics

Add:

Section 7

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 border and lettering for ***WARNING*** and red with white border and lettering for ***DANGER*** points.

Never attempt to operate the machine or its tools from any position other than seated in the operator's seat. Keep head, body, limbs, hands and feet inside operator's compartment at all times to reduce exposure to hazards outside the operator's compartment.

Do not allow unauthorized personnel to operate service or maintain this machine.

Always check work area for dangerous features. The following are examples of dangerous work areas: slopes, over hangs, timber, demolitions, fire, high walls, drop off, back fills, rough terrain, ditches, ridges, excavations, heavy traffic, crowded parking, crowded maintenance and closed areas. Use extreme care when in areas such as these.

An operator must know the machine's capabilities. When working on slopes or near drop offs be alert to avoid loose or soft conditions that could cause sudden tipping or loss of control.

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

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

Keep operator's compartment, stepping points, grab-rails and handles clear 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.

Be careful of slippery conditions on stepping points, hand rails, and on the ground. Wear safety boots or shoes that have a high slip resistant sole material.

For your personal protection. Do not attempt to climb on or off machine while machine is in motion.

Never leave the machine unattended with the engine running.

Always lock up machine when leaving it unattended. Return keys to authorized security. Heed all shut down procedures of the Operation and Maintenance Instruction Manual. Always set the parking brake when leaving the machine for any reason.

Do not wear rings, wrist watches, jewelry, 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 carry loose objects in pockets that might fall unnoticed into open compartments. Do not use machine to carry loose objects by means other than attachments for carrying such objects.

DO NOT CARRY RIDERS unless the machine is equipped for carrying people to reduce personal exposure to being thrown off.

Do not operate machinery in a condition of extreme fatigue or illness. Be especially careful towards the end of the shift.

Roll Over Protective Structures are required on wheel loaders, dozer tractors, track type loaders, graders and scrapers by local or national requirements. *DO NOT* operate this machine without a Roll Over Protective Structure.

Do not operate a machine without a falling object protective structure (FOPS).

Do not operate this machine without a rear canopy screen when machine is equipped with rear mounted towing winch.

Seat belts are required to be provided with roll over protective structures or roll protection cabs by local or national regulations. Keep the safety belt fastened around you during operation.

Where noise exposure exceeds 90 dBA for 8 hours, wear authorized ear protective equipment per local or national requirements that apply.

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 manufacturers at all times. *DO NOT* adjust machine with engine running except as specified.

Do not operate a machine with brakes out of adjustment. See the Operation and Maintenance Instruction Manual.

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

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.

To prevent entrapment in cabs or mounted enclosures, observe and know the mechanics of alternate exit routes.

On machines equipped with suction radiator fans, be sure to periodically check all engine exhaust parts for leaks as exhaust gases are dangerous to the operator. Keep a vent open to outside air at all times when operating within a closed cab.

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 recommendations of the manufacturer for storage and disposal.

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

OPERATION

Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.

DO NOT START OR OPERATE AN UNSAFE MACHINE. Before working the machine, be sure that any unsafe condition has been satisfactorily remedied. Check brakes, steering and attachment controls before moving. Advise the proper maintenance authority of any malfunctioning part or system. Be sure all protective guards or panels are in place, and all safety devices provided are in place and in good operating condition.

Check instruments at start-up and frequently during operation.

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

Be sure exposed personnel in the area of operation are clear of the machine before moving the machine or its attachments. *WALK COMPLETELY AROUND* the machine before mounting. Sound horn. Obey flag man, safety signals and signs.

Know the principles of cross steering of crawler tractors. Read section in Operation and Maintenance Instruction Manual on cross steering.

Keep engine exhaust system and exhaust manifolds clear of combustible material. Equip machine with screens and guards when working under conditions of flying combustible material.

If engine has a tendency to stall for any reason under load or idle, report this for adjustment to a proper maintenance authority immediately. Do not continue to operate machine until condition has been corrected.

Never use bucket as a man-lift.

Use recommended bucket for machine and material load ability and heaping characteristics of material, terrain, and other pertinent job conditions.

Avoid abrupt starts and stops when transporting a loaded bucket.

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

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 draw bars, cables or chains under load.

When pulling or towing through a cable or chain, do not start suddenly at full throttle. Take up slack carefully. Guard against kinking chains or cables. Inspect carefully for flaws before using. Do not pull through a kinked chain or cable due to the high stresses and possibility of failure of the kinked area. 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 COMPARTMENT OF MACHINES INVOLVED ARE PROPERLY GUARDED AGAINST POTENTIAL CABLE OR CHAIN BACKLASH.*

During operation always carry ripper in full raised position when not in use and lowered to ground when parked.

When counterweights have been provided, do not work machine if they have been removed unless their equivalent weight has been replaced. See the Operation and Maintenance Instruction Manual.

When operating a machine know what clearances will be encountered, overhead doors, wires, pipes, aisles, roadways; also the weight limitations of ground, floor, and ramps.

Know bridge and culvert load limits and do not exceed them. Know machine's height, width, and weight. Use a signal person when clearance is close.

Be sure that the exact location of gas lines, utility lines, sewers, overhead and buried power lines, and other obstructions or hazards are known. Such locations should be precisely marked by the proper authorities to reduce the risk of accidents. Obtain shut-down or relocation of any such facilities before starting work, if necessary.

Be certain to comply with all local, state, and federal regulations regarding working in the vicinity of power lines.

When roading find out what conditions are likely to be met - clearances, congestion, type of surface, etc. Be aware of fog, smoke or dust element that obscure visibility.

When backing, always look to where the machine is to be moved. Be alert to the position of exposed personnel. *DO NOT OPERATE* if exposed personnel enter the immediate work area.

SAFETY RULES

Never travel a machine on a job site, in a congested area, or around people without a signal person to guide the operator.

In darkness, check area of operation carefully before moving in with machine. Use all lights provided. Do not move into area of restricted visibility.

Maintain clear vision of all areas of travel or work. Keep cab windows clean and repaired. Carry blade low for maximum visibility while traveling. Obtain and use fan blast deflectors where tractors are used a pusher tractors in tandem.

Transport a loaded bucket with the bucket as far tipped back and in as low a position as possible for maximum visibility, stability, and safest transport of the machine. Carry it at a proper speed for the load and ground conditions.

Carry the bucket low when traveling with a load.

Maintain a safe distance from other machines. Provide sufficient clearance for ground and visibility conditions. Yield right-of-way to loaded machines.

Avoid going over obstacles such as rough terrain, rocks, logs, curbs, ditches ridges, and railroad tracks whenever possible. When obstructions must be crossed, do so with extreme care at an angle if possible. Reduce speed - down-shift. Ease up to the break over point - pass the balance point slowly on the obstruction and ease down on the other side.

Cross gullies or ditches at an angle with reduced speed after insuring ground conditions will permit a safe traverse.

Be alert to soft ground conditions close to newly constructed walls. The fill material and weight of machine may cause the wall to collapse under the machine.

Operate at speeds slow enough to insure complete control at all times. Travel slowly over rough ground, on slopes or near drop offs, in congested areas or on ice or slippery surfaces.

Be alert to avoid changes in traction conditions that could cause loss of control. *DO NOT* drive on ice or frozen ground conditions when working the machine on steep slopes or near drop offs.

Keep the machine well back from the edge of an excavation.

Be especially careful when traveling up or down slopes. Position the bucket in such a way as to provide a possible anchorage on the ground in case of a slide.

When proceeding across a hill side proceed slowly. Never turn sharply up hill or down hill.

Avoid side hill travel whenever possible. Drive up and down the slope. Should the machine start slipping sideways on a grade, turn it immediately downhill.

In steep down hill operation, do not allow engine to over speed. Select proper gear before starting down grade.

There is no substitute for good judgement when working on slopes.

The grade of slope you should attempt will be limited by such factors as condition of the ground, load being handled, the type of machine, speed of machine and visibility.

NEVER COAST the machine down grades and slopes with the transmission in neutral on power shift machines, or clutch disengaged on manually shifted machines.

To reduce the danger of uncontrolled machine, choose a gear speed before proceeding down grade that will hold machine to proper speeds for conditions.

Operating in virgin rough terrain that includes previously mentioned hazards is called pioneering. Be sure you know how this is done. Danger from falling branches and upturning roots is acute in these areas.

When pushing over trees, the machine must be equipped with proper over head guarding. Never allow a machine to climb up on the root structure particularly while the tree is being felled. Use extreme care when pushing over any tree with dead branches.

Avoid brush piles, logs or rocks. *DO NOT DRIVE THE MACHINE ONTO BRUSH PILES, LOGS, LARGE ROCKS* or other surface irregularities that break traction with the ground especially when on slopes or near drop offs.

Avoid operating equipment too close to an over hang or high wall either above or below the machine. Be on the look out for caving edges, falling objects and slides. Beware of concealment by brush and under growth of these dangers.

Park in a non-operating and non-traffic area or as instructed. Park on firm level ground if possible. Where not possible, position machine at a right angle to the slope, making sure there is no danger of uncontrolled sliding movement. Set the parking brake.

Never park on an incline without carefully blocking the machine to prevent movement.

If parking in traffic lanes cannot be avoided, provide appropriate flags, barriers, flares and warning signals as required. Also provide advance warning signals in the traffic lane of approaching traffic.

Move the machine away from pits, trenches, overhangs and over head power lines before shutting down for the day.

When stopping operation of the machine for any reason, always return the transmission or hydrostatic drive control to neutral and engage the control lock to secure the machine for a safe start up. Set parking brake, if so equipped.

Never lower attachments or tools from any position other than seated in operator's seat. Sound the horn. Make sure the area near the attachment is clear. Lower the attachment slowly. *DO NOT USE* float position to lower hydraulic equipment.

SAFETY RULES

Always before leaving the operator's seat and after making certain all people are clear of the machine, slowly lower the attachments or tools flat to the ground in a positive ground support position. Move any multi purpose tool to positive closed position. Return the controls to hold. Place transmission control in neutral and move engine controls to off position. Engage all control locks, set parking brake, and open and lock the master (key, if so equipped) switch. Consult Operation and Maintenance Instruction Manual.

Always follow the shut down instructions as outlined in the Operation and Maintenance Instruction Manual.

MAINTENANCE

Do not perform any work on equipment that is not authorized. Follow the Maintenance or Service Manual procedures.

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.

Shut off engine and disengage the Power Take Off lever if so equipped before attempting adjustments or service.

Always turn the master switch (key switch if so equipped) to the *OFF* position before cleaning, repairing, or servicing and when parking machine to forestall unintended or unauthorized starting.

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

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

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.

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

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.

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

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

When making equipment checks that require running of the engine, have an operator in the operator's 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.*

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

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

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

If movement of an attachment by means of machine's hydraulic system or winches 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, set brakes, sound horn and call for an all clear. Raise attachments slowly.

Never place head, body, limbs, feet, fingers, or hands into an exposed portion between uncontrolled or unguarded scissor points of machine without first providing secure blocking.

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

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

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

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.

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.

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.

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

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

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

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

SAFETY RULES

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

Never place gasoline or diesel fuel in an open pan.

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.

Do not remove hoses or check valves in the hydraulic system without first removing load and relieving pressure on the supporting cylinders. 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.

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 card board 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.

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

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

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.

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

Block all wheels before bleeding or disconnecting any brake system lines and cylinders.

Never use make shift jacks when adjusting track tension. Follow the Undercarriage Service Manual.

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 of 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.

Always block with external support any linkage or part on machine that requires work under the raised linkage, parts, or machine per local or national 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.

When servicing or maintenance requires access to areas that cannot be reached from the ground, use a ladder or step platform that meets local or national requirements to reach the service point. If such ladders or platforms are not available, use the machine hand holds 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.

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.

In lifting and handling heavy parts, slings must be of adequate strength for the purpose intended and must be in good condition.

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.

When using compressed air for cleaning parts use safety glasses with side shields or goggles. Limit the pressure to 207 kPa (30 psi) according to local or national requirements.

Wear welders protective equipment such as dark safety glasses, helmets, protective clothing, gloves and safety shoes when welding or burning. Wear dark safety glasses near welding. *DO NOT LOOK AT ARC WITHOUT PROPER EYE PROTECTION.*

Replace seat belts every two years on open canopy units and every three years on machines with cabs or at change of ownership.

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.

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

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

Remove sharp edges and burrs from reworked parts.

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

Do not strike hardened steel parts with anything other than a soft iron or non-ferrous hammer.

Do not rush. Walk, do not run.

Know and use the hand signals used on particular jobs and know who has the responsibility for signaling.

SAFETY RULES

Face the access system when climbing up and down.

Apply the parking device and place the transmission in neutral before starting the machine.

Do not bypass the starter safety switch. Repair the starter safety controls if they malfunction.

Fasten seat belt before operating.

Steering should be checked to both right and left. Brakes should be tested against engine power. Clutch and transmission controls should be moved through or to neutral positions to assure disengagement. Operate all controls to insure proper operation. If any malfunctions are found, park machine, shut off engine, report and repair before using machine.

If the power steering or the engine ceases operating, stop the machine motion as quickly as possible. Lower equipment, set parking device and keep machine securely parked until the malfunction is corrected or the machine can be safety towed. Never lift loads in excess of capacity.

Should the machine become stuck or frozen to the ground, back out to avoid roll over.

Know and understand the job site traffic flow patterns.

Keep the machine in the same gear going down hill as used for going up hill.

When roading a machine, know and use the signaling devices required on the machine. Provide an escort for roading where required.

Always use the recommended transport devices when roading the machine.

Do not attempt repairs unless proper training has been provided.

Use extreme caution when removing radiator caps, drain plugs, grease fittings or pressure taps. Park the machine and let it cool down before opening a pressurized compartment.

Release all pressure before working on systems which have an accumulator.

When necessary to tow the machine, do not exceed the recommended towing speed, be sure the towing machine has sufficient braking capacity to stop the towed load. If the towed machine cannot be braked, a tow bar must be used or two towing machines must be used - one in front pulling and one in the rear to retard. Avoid towing over long distances.

Observe proper maintenance and repair of all pivot pins, hydraulic cylinders, hoses, snap rings and main attaching bolts.

Always keep the brakes and steering systems in good operating condition.

Replace all missing, illegible or damaged safety signs. Keep all safety signs clean.

Do not fill the fuel tank to capacity. Allow room for expansion.

Wipe up spilled fuel immediately.

Always tighten the fuel tank cap securely. Should the fuel cap be lost, replace it only with the original manufacturers approved cap. Use of a non-approved cap may result in overpressurization of the tank.

Never drive the machine near open fires.

Use the correct fuel grade for the operating season.

MACHINE THEFT AND VANDALISM

ACTIONS TO DISCOURAGE THEFT AND VANDALISM

Immediately upon receipt of a new machine, record the serial numbers of the machine and of all major components and attachments. Keep this list up-to-date as components are replaced or exchanged on the machine. File these numbers in a safe location for fast retrieval.

Report all model, machine and component serial numbers to the insurance company at the time of purchase. If the numbers are noted on the insurance policy, make certain that the numbers are correct.

Remove keys from unattended machines.

Attach, secure, and lock all anti-vandalism and anti-theft devices on the machine.

Lock doors of cabs when not in use.

Immobilize machine by lowering the blade, bucket, or boom to the ground, removing the battery or removing a critical electrical or starting system component.

Discourage the thief! Inspect the gates and fences of the machinery storage yard or construction site. If possible, keep machines in well-lighted areas. Ask the law enforcement agency having local jurisdiction to make frequent checks around the storage or work sites, especially at night, during weekends or on holidays.

Establish liaison with neighbors and ask them to watch equipment left at job sites and report suspicious activities to the applicable law enforcement agency.

Make frequent inventories of machines to promptly detect losses and vandalism.

ACTIONS TO AID IN RECOVERY OF STOLEN MACHINES

Take photographs of the machine for identification purposes.

In the event of theft, immediately notify the law enforcement agency having jurisdiction. Provide the investigating officer with brand name, type of equipment, and serial numbers of the machine and of major attachments and components. It is helpful to show the investigating officer an Operator's Manual, photographs, and advertising to familiarize him with the appearance of the machine.

Report the theft to the insurance company. Provide the model and all serial numbers.

Report the model and serial numbers of the stolen machine to a dealer handling the respective line of equipment. Request that the dealer forward this same information to the equipment manufacturer.

Ask the dealer to post a description of the stolen machine, including serial numbers, and to inform his sales and service personnel.

FOREWORD

Always furnish serial number if making an inquiry to dealer or factory about this machine.

Many equipment owners employ the Dealer Service Department for all work other than routine lubrication and minor service. This practice is encouraged, as our Dealers are well informed and equipped to render efficient service by factory trained mechanics.

Illustrations show standard and optional items.

IMPORTANT

The information in this manual was current at the time of publication. It is our policy to constantly improve our product and to make available additional items. These changes may affect procedures outlined in this manual. If variances are observed, verify the information through your Dealer.

Fiatallis is not responsible for any liability arising from any damage resulting from defects caused by parts and/or components not approved by Fiatallis for use in maintaining and/or repairing products manufactured or merchandized by Fiatallis.

In any case, no warranty of any kind is made or shall be imposed with respect to products manufactured or merchandized by Fiatallis when failures are caused by the use of parts and/or components not approved by Fiatallis.

1.16 STANDARD PART CLASSIFICATION TO DETERMINE TORQUE DATA

IMPORTANT: When a specific torque is not given the FIAT STANDARD TORQUE CHART should be used after fully indentifying the part.

Part may only be fully identified by the eight-digit code number, as follows:

l / a b c d e / f g

l - Standard part code
Always represented by figure 1. Such a number indicates that the part can be produced in various versions which differ in material and coating.

a-b-c-d-e-Standard part basic number

It always consists in five figures to identify the part in its dimensional characteristics.

f - Material code number
This number represents the material provided for a specific part. Its meaning is indicated in the table below.

g - Coating code number
This number represents the coating provided for a specific part.

1.17 FIAT STANDARD TORQUE CHARTS

When a specific fastener torque is not given, the following charts may be used:

IMPORTANT
- Fasteners with nominal diameter up to 24 mm to be lubricated with engine oil, major diameter fasteners with tallow.

- Torques for cadmium plated fasteners are valid also for not coated parts.

- Nominal torque tolerance is ±5%

- R80, R100, R120 strength classes are to be considered as follows:

10.9 replaces R100
12.9 replaces R120 bolts & screws

10 replaces R80
12 replaces R100 nuts

- Coating abreviation meaning:

CDT = Cadmium plated
FOSF = Phosphatized
ZNT = Zinc plated

Material code (f)	FIAT	Strength class and type of material				
		UNI	DIN	SAE	BSI	BNA
0	R40	4D - 4S - 4A		1	A	42
1	R50	5S - 6S		3	P	56
2	R80	8G		5	T	80
3	R100	100	10K	8	V	100
4	Ottone	Ottone	Messing	Brass	Brass	Laiton
5	Alluminio	Alluminio	Aluminium	Aluminium	Aluminium	Aluminium
6	Rame	Rame	Kupfer	Copper	Copper	Cuivre
7	open to other metallic material					

BOLT AND SCREW TORQUE CHART

Diameter and width of thread mm	Strength class: 10.9				Strength class: 12.9	
	standard ZNT daNm (*/**) lbs ft (°/°°)	self locking ZNT daNm (*/**) lbs ft (°/°°)	standard CDT daNm (*/**) lbs ft(°/°°)	self locking CDT daNm (*/**) lbs ft (°/°°)	standard FOSF daNm (*/**) lbs ft (°/°°)	self locking FOSF daNm (*/**) lbs ft (°/°°)
M6 x 1	1.3 (9.5/6.5) 9.6 (0.37/0.25)	-	-	-	1.4 (12/8) 10 (0.47/0.31)	-
M8 x 1.25	3.2 (12.5/9) 23 (0.5/0.35)	3.5 (12/8) 26 (0.47/0.31)	-	3 (13.5/9.5) 22(0.53/.037)	3.5 (16.5/11) 26 (0.65/0.43)	3.8 (16.5/11) 28 (0.65/0.43)
M10 x 1.25	-	7.9 (18/12.5) 58 (0.70/0.50)	-	6.5 (18/12.5) 48 (0.70/0.50)	-	-
M10 x 1.5	6.5 (16/11) 48 (0.63/0.43)	7 (15.5/10.5) 52 (0.61/0.41)	-	6 (17/11.5) 44 (0.66/0.45)	7 (21/14) 52 (0.82/0.55)	7.8 (21/14.5) 57 (0.82/0.57)
M12 X 1.25	-	13.9 (23/15.5) 102 (0.90/0.61)	-	11.4 (23/15.5) 84 (0.90/0.61)	-	-
M12 X 1.75	11 (19.5/13.5) 81 (0.76/0.53)	12 (18.5/12.5) 88 (0.73/0.50)	-	10.1 (20.5/14) 74 (0.80/0.55)	12 (26/17.5) 88 (1.02/0.68)	13 (26/17.5) 96 (1.02/0.68)
M14 X 1.5	-	22 (26.25/18) 162 (1.04/0.70)	-	18 (26.5/18) 132 (1.04/0.70)	-	-
M14 X 2	18 (23/16) 133 (0.90/0.62)	19 (22/15) 140 (0.86/0.59)	-	16.2 (24/16.5) 119 (0.94/0.65)	19 (30/20) 140 (1.18/0.78)	21 (30/20) 155 (1.18/0.78)
M16 X 1.5	30 (30/20) 221(1.18/0.78)	33 (29/19.5) 243 (1.14/0.76)	25 (31/21) 184 (1.22/0.82)	27 (31/21) 199 (1.22/0.82)	33 (40/26.5) 243 (1.57/1.04)	36 (40/26.5) 265 (1.57/1.04)
M16 X 2	-	-	23 (28.5/19.5) 170 (1.12/0.76)	24.8 (28/19.5) 183 (1.10/0.76)	-	-
M18 X 1.5	45 (34/23) 332 (1.34/0.91)	48 (33.5/22) 354 (1.21/0.86)	36 (35.5/24) 265 (1.39/0.76)	39 (35.5/24) 288 (1.39/0.94)	48 (46/30.5) 354 (1.81/1.20)	52 (46.5/30.5) 383 (1.83/1.20)
M18 X 2.5	-	-	31 (30.5/21) 229 (1.20/0.82)	33.5 (30.5/21) 247 (1.20/0.82)	-	-
M20 X 1.5	60 (38/25.5) 412 (1.50/1.00)	65 (38/25) 479 (1.50/0.98)	50 (39.5/26.5) 369 (1.55/1.04)	-	65 (52.5/34.5) 479 (2.06/1.35)	70 (53/35) 516 (2.08/1.37)
M20 X 2.5	-	-	44 (35/44) 324 (1.37/1.73)	-	-	-
M22 X 1.5	80 (42/28) 590 (1.65/1.10)	90 (42.5/28) 664 (1.67/1.10)	66 (44/29.5) 487 (1.73/1.16)	-	90 (59/38.5) 664 (2.32/1.51)	95 (59.5/39) 700 (2.34/2.32)
M22 X 2.5	-	-	59 (39/26.5) 435 (1.53/1.04)	-	-	-
M24 X 2	100 (44/29.5) 737 (1.73/1.16)	110 (44.5/29.5) 811 (1.75/1.16)	83 (45.5/31) 612 (1.79/1.22)	-	110 (62/40.5) 811 (2.44/1.59)	120 (62/41) 885 (2.44/1.61)
M24 X 3	-	-	74 (41/28) 545 (1.61/1.10)	-	-	-
M27 X 2	100 (54/36) 737 (2.12/1.41)	-	-	-	100 (75/50) 811 (2.95/1.96)	-
M30 X 2	140 (61/40.5) 1032 (2.40/1.60	-	-	-	150 (85/56) 1106 (3.34/2.20)	-
M33 X 2	190 (68/45) 1401 (2.67/1.77	-	-	-	200 (95/63) 1475 (3.74/2.48)	-
M36 X 3	240 (71/47) 1770 (2.80/1.85	-	-	-	250 (97/65) 1844 (3.81/2.55)	-

(*/) Minimum thread length in mm, specified for cast iron with 255 N/mm^2 tensile strength- (/**)Minimum thread length in mm, specificed for steel with 510 N/^{2} tensile strength - (°/)Minimum tread length in inches, specified for cast iron with 37,000 psi tensile strength- (/°°)Minimum tread length in inches, specified for steel with 74,000 psi tensile strength.

NUTS TORQUE CHART - Unit of measure daNm (lbs ft)

Diameter and width of thread mm	Strength class: 10 (RBO)					Strength class 12 (R100)
	standard ZNT	standard CDT	jam type	with polyamide ring		standard FOSF
				standard	jam type	
M6 x 1	1.3 (96)	-	-	-	-	1.4 (10)
M8 x 1.25	3.2 (23)	-	*2.6 (19)	*3.9 (19)	*3.2 (23)	3.5 (26)
M10 x 1.25	-	-	*5.2 (38)	*8.2 (60)	*6.2 (48)	-
M10 x 1.5	6.5 (48)	7.2 (53)	*5 (37)	*7.7 (57)	*6 (44)	7 (52)
M12 X 1.25	-	13 (96)	*8.7 (64)	*14.5 (107)	*10.2 (75)	-
M12 X 1.75	11 (81)	-	*8.1 (60)	*12.9 (95)	*9.6 (71)	12 (88)
M14 X 1.5	-	19.5 (144)	*13 (96)	*21.6 (159)	*15 (110)	-
M14 X 2	18 (133)	-	*12.5 (92)	*20 (147)	*14.6 (107)	19 (140)
M16 X 1.5	30 (221)	23.5 (173)	°13 (96)	°26.8 (198)	°16 (118)	30 (221)
M16 X 2	-	23 (170)	°12.5 (92)	°26.5 (195)	°16 (118)	-
M18 X 1.5	45 (332)	34.5 (254)	°19 (140)	°39 (236)	°23.5 (173)	45 (332)
M18 X 2.5	-	32 (236)	°17.5 (129)	°36.5 (269)	°22 (162)	-
M20 X 1.5	60 (442)	46 (339)	°23.5 (173)	°51.7 (381)	°29 (214)	60 (442)
M20 X 2.5	-	44.5 (328)	°21.5 (158)	°50 (369)	°27 (199)	-
M22 X 1.5	80(590)	62 (457)	°32 (236)	-	-	80 (590)
M22 X 2.5	-	61 (450)	°29.5 (217)	-	-	-
M24 X 2	100 (737)	78 (575)	°37 (273)	°85.8 (633)	°45 (332)	100 (737)
M24 X 3	-	76 (560)	°33 (243)	°84 (619)	°41 (302)	-
M27 X 2	95 (700)	-	-	-	-	95 (700)
M30 X 2	130 (959)	-	-	-	-	130 (959)
M33 X 2	170 (1254)	-	-	-	-	160 (1180)
M36 X 3	220 (1622)	-	-	-	-	220 (1622)

*ZNT (Zinc plated) °CDT(Cadmium plated)

CAPSCREW AND TORQUE VALUES

Capscrew Head Markings	SAE Grade Number	Capscrew Size									
Manufacturer's marks may vary		1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
		Threads per inch									
		20	18	16	14	13	12	11	10	9	8
		28	24	24	20	20	18	18	16	14	14
		Torque Ft-Lb									
	1 or 2	5	11	18	28	39	51	83	105	160	235
		6	13	20	30	41	55	95	115	175	250
	5	8	17	31	49	75	110	150	270	395	590
		10	19	35	55	85	120	170	295	435	660
	6 or 7	10	19	34	55	85	120	167	280	440	660
		12	21	38	61	95	130	187	300	480	730
 	8	12	24	44	70	105	155	210	375	605	910
		14	27	49	78	120	170	240	420	675	990

Notes:

1. Always use the torque values listed above when specific torque values are not available.
2. Do not use above values in place of those specified in other sections of this manual; special attention should be observed.
3. The above is based on use of clean, dry threads.
4. Reduce torque by 10% when engine oil is used as a lubricant.
5. Reduce torque by 20% if new plated capscrews are used.
6. Capscrews threaded into aluminum may require reductions in torque of 30% of more of Grade 5 capscrews torque and must attain two capscrew diameters of thread engagement.

CAUTION:
If replacement capscrews are of a higher grade than originally supplied, adhere to torque specifications for that replacement.

REMOVE THIS PAGE AND INSERT ALL PAGES UNTIL THE NEXT BLACK EDGED PAGE APPEARS UNDER SECTION 1

SECTION 1
ENGINE RELATED COMPONENTS

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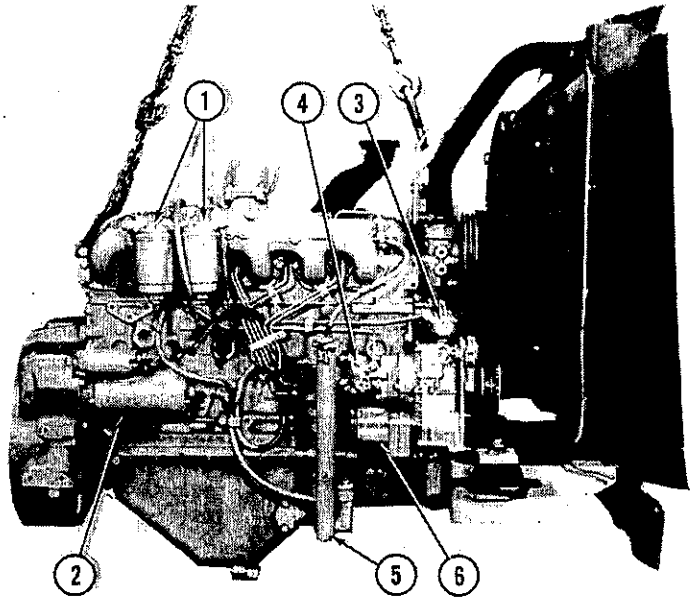
Revised January 1991

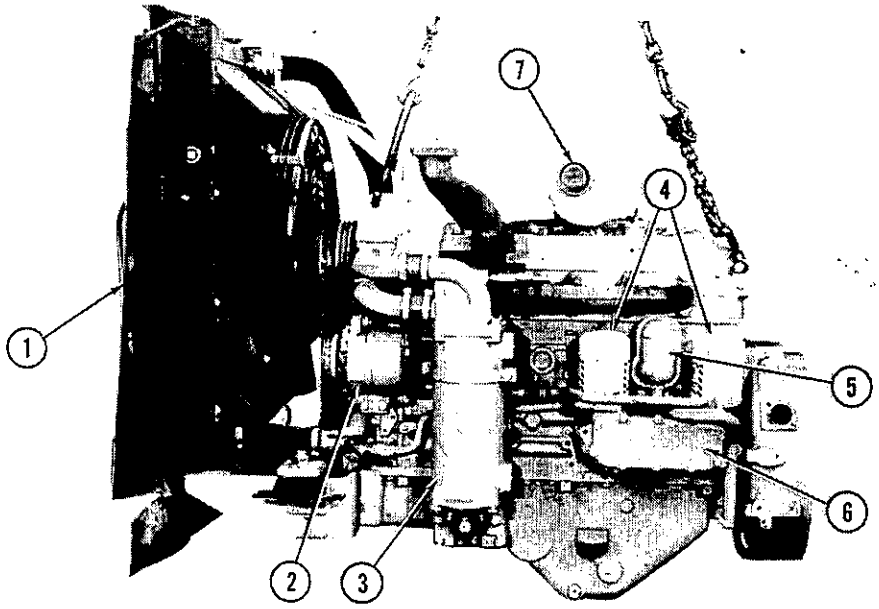
GENERAL DESCRIPTION

The FR10B is powered by a Fiat 8065.05.290 direct injected, four stroke, six cylinder diesel engine. The naturally aspirated engine drives the torque converter as well as the implement, steering and transmission pumps off the rear of the torque converter housing. The brake pump is driven from a pad beneath the fuel pump.



ENGINE LEFT SIDE T-89069

1. *Fuel filters*
2. *Starter*
3. *Fuel transfer pump*
4. *Fuel pump*
5. *Oil filler tube*
6. *Brake pump*



ENGINE RIGHT SIDE T-89068

1. *Radiator*
2. *Alternator*
3. *Transmission oil heat exchanger*
4. *Engine oil filters*
5. *Engine breather*
6. *Engine oil heat exchanger*
7. *Air intake silencer*

Study SAFETY RULES in the front of this manual thoroughly for the protection of machine and safety of personnel.

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Overheating of lubricating oil	Insufficient oil in crankcase		Check dipstick	Fill crankcase to proper level
	Improper lubricant	Operator's manual	Compare oil specifications in the manual with those of oil supplier	Fill crankcase with specified lubricant
	Engine oil cooler clogged	Engine diagnostic kit	Install the low temperature probes on the engine oil heat exchanger inlet and outlet. Run engine Performance test. Check temperature drop across exchanger	Check or replace the oil cooler
Excessive oil consumption	External oil leakage (gaskets, etc)		Visual	Correct all external leaks
	Engine oil seals worn or damaged		Teardown	Replace oil seals
	Lubricating oil too light	Operator's manual	Compare specifications to those of the oil	Fill crankcase with specified lubricant
	Pistons, rings, and/or cylinder sleeves worn	Engine diagnostic kit	Run engine performance test. Observe blue smoke	Replace affected parts
	Oil control rings stuck in piston ring grooves	Engine diagnostic kit	Run engine performance test. Observe blue smoke	Clean ring grooves and replace rings
	Valve guides worn	Engine diagnostic kit	Run engine performance test. Observe blue smoke	Replace valve guides. Check related parts
Excessive oil consumption during first 250 hours of operation and no improvement	Rings not sealed properly	Operator's manual	Compare specifications and break-in procedure	Allow more time for *"break in"*. Make certain specified lube oil is used and engine is operating at proper temperature
	Engine oil viscosity too light	Operator's manual	Compare specifications	Use recommended viscosity
Rapid wear on engine parts	Lubricating oil contaminated		Oil analysis	Fill system with clean engine oil. Replace engine oil filters
	Improper engine lubricating oil	Operator's manual	Compare specifications	Fill system with specified engine lubricating oil

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
LUBRICATING SYSTEM				
No lubricating oil pressure	Insufficient oil in crankcase		Pull dipstick	Fill crankcase to proper level
	Oil pressure gauge inoperative	Second pressure gauge	Install second gauge in place of original. Note if operating pressure is OK	Replace gauge
	Lubricating oil pump screen clogged		Visual with engine sump removed	Remove and clean the screen
	Lubricating oil pump inoperative		Visual with engine sump removed	Repair or replace oil pump
	Oil line loose or broken inside crankcase		Visual with engine sump removed	Repair or replace affected parts
Low lubricating oil pressure with proper oil level in crankcase	Oil pressure gauge inaccurate	Second pressure gauge	Install second gauge in place of original. Note if operating pressure is OK	Replace if necessary
	Oil pressure relief valve or regulator valve stuck in the open position		Observation after teardown of valve	Clean, repair, or replace affected parts
	Oil line in crankcase loose or broken		Visual with engine sump removed	Repair or replace affected parts
	Improper lubricant	Operator's manual	Compare oil specifications with factory specifications	Fill crankcase with specified lubricant
	Main and/or connecting rod bearings worn	Micrometer	Engine teardown and measurement	Replace bearings
	Camshaft bearings worn	Micrometer	Engine teardown and measurement	Replace bearings
	Lubricating oil pump worn		Visual with engine sump and pump removed	Repair or replace oil pump
Excessive lubricating oil pressure	Pressure gauge inaccurate	Pressure gauge	Install second gauge and run engine test	Replace if necessary
	Oil pressure regulating valve improperly adjusted	Pressure gauge	Install second gauge and run engine test	Adjust valve to obtain proper pressure
	Improper lubricant	Operator's manual	Compare oil specifications in the manual with those of oil supplier	Fill crankcase with specified lubricant

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Engine operating temperature too high with ample coolant in system (Continued)	Loose or broken fan drive belts	Belt tension gauge	Compress belt and compare with specification	Adjust or replace fan drive belts
	Lime deposits in water passages of radiator, cylinder heads and/or cylinder block		Visual	Thoroughly clean affected parts
	Water passages in oil cooler restricted	Engine diagnostic kit	Run engine performance test with temperature probes connected to the cooler. Compare results	Remove and clean oil cooler core
	Water pump inoperative		Leaks around front seal or excessive pulley play	Repair or replace water pump
	Engine pulling excessive load		Observe load size	Reduce load
	Engine speed set too high	Engine diagnostic kit	Run engine performance test and compare results	Adjust speed to within specified rpm limits
Engine operating temperature too high due to loss of coolant	External leaks		Visual	Repair affected parts
	Ruptured oil cooler core (oil in coolant)		Pull oil sample and check for coolant in oil	Replace oil cooler core
	Engine cylinder head gaskets leaking		Visual	Replace gaskets and/or retorque head bolts
	Cylinder head cracked		Antifreeze in oil	Replace cylinder head
	Cylinder block cracked		Antifreeze in oil	Replace cylinder block
Engine operating temperature too low	Thermostat stuck in the open position		Pull thermostat and check if open all the time	Replace thermostat
	Operating in extremely cold weather		Observe ambient temperature	Provide necessary cold weather protection

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
AIR INTAKE SYSTEM				
Insufficient air supply to cylinders	Air cleaner clogged	Engine diagnostic kit	Run engine performance test and compare results	Replace air filter element
Insufficient air supply to cylinders (engines with turbocharger)	Foreign material lodged in turbocharger impeller or turbine		Visual	Disassemble and clean
	Excessive dirt buildup in compressor in short period of time		Visual	Thoroughly clean compressor assembly
	Leaks in engine intake and/or exhaust manifold reducing turbocharger efficiency	Pressure gauge, air pump and hose and soap solution	Run test by pressurizing air cleaner. Apply soap solution over joints and check for soap bubbles.	Tighten loose manifold retaining nuts or capscrews. Replace manifold gaskets
	Turbocharger rotating assembly bearing seized		Visual, spin turbocharger by hand	Overhaul turbocharger
Rapid wear on parts	Dirt admitted with intake air	Pressure gauge, air pump and hose and soap solution	Run test by pressurizing air cleaner. Apply soap solution over joints and check for soap bubbles	Inspect air cleaner assembly and related parts thoroughly for cracks or openings which would allow air to enter engine without passing through air cleaner element. Make necessary repairs
	Dirty lubricating oil		Visual	Change engine oil and oil filter elements at recommended intervals
	Improper fuel	Operator's manual	Check the fuel specification with supplier specifications	Use the proper fuel
COOLING SYSTEM				
Engine operating temperature too high with ample coolant in system	Temperature gauge inoperative	Test gauge	Install gauge and compare results after machine warms up	Replace if necessary
	Radiator air passages restricted	Engine diagnostic kit	Run engine performance test and compare results	Clean exterior of radiator
	Thermostat inoperative	Remove thermostat and check operating temperature		If thermostat does not open, replace thermostat

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Starter will not crank engine(Continued)	Starter brush springs weak			Check spring tension and replace if necessary
	Starter commutator dirty or worn			Polish and/or machine commutator and under-cut mica if necessary
	Starter armature shaft bushings worn (armature drags on fields)			Replace worn bushings and related parts
	Starter armature burned out			Replace armature
Starter pinion will not engage with flywheel ring gear	Grease or dirt in starter drive mechanism			Disassemble and clean the drive assembly
	Broken or excessively worn parts			Replace broken or worn parts
FUEL SYSTEM				
Insufficient fuel supply to fuel injection nozzles	No fuel in fuel tank		Observe dipstick reading	Fill fuel tank with specified fuel. Vent fuel system
	Inoperative fuel transfer pump	Vacuum gauge	Install gauge between tank and pump and run engine tests	If vacuum is below specification, repair or replace transfer pump
	Fuel injection nozzle valve binding in valve body	Nozzle tester	Pop nozzles for pressure, pattern and sound	Replace valve assembly in nozzle holder body
	Fuel lines, filter, sediment bowl clogged	Engine diagnostic kit	Visual, run engine performance test and compare results	Clean fuel system components. Replace fuel filter
	Fuel injection pump malfunctioning	Engine diagnostic kit	Run engine performance test and compare results	Repair or replace fuel injection pump
	Fuel injection nozzles improperly adjusted	Nozzle tester	Pop nozzles for pressure, pattern and sound	Adjust fuel injection nozzles
Air in fuel system	Loose fuel line fitting or leak in fuel line on suction side of fuel transfer pump		Visual	Tighten loose fittings or replace damaged fuel lines
	Damaged gasket on fuel filter		Visual	Replace gasket

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Engine emits black smoke from exhaust	Air system clogged	Engine diagnostic kit	Run test and compare results	Check engine air intake system
	Fuel injection pump not properly timed or worn	Timing light	Check engine timing	Retime or repair fuel injection pump
	Improper fuel	Operator's manual	Check fuel specifications with supplier	Drain fuel system and refill with specified fuel
	Lack of good fuel injection spray pattern	Nozzle tester	Check nozzle popping pressure, pattern and sound	Clean and adjust nozzles
Engine emits bluish-white smoke from exhaust	Engine operating temperature too low	Engine diagnostic kit	Run diagnostic test	Check thermostat
	Clogged fuel injection nozzles	Nozzle tester	Check nozzle popping pressure, pattern and sound	Clean and adjust nozzles
	Low compression	Compression tester	Run compression test	If low, make necessary repairs
	Early fuel injection pump timing	Timing light	Time fuel pump to engine	Test and adjust pump timing
Engine detonates or knocks	Fuel pump improperly timed	Timing light	Time fuel pump to engine	Time fuel pump
	Loose bearings		Oil analysis	Replace bearings
	Loose piston		Oil analysis	Inspect piston assembly and replace defective parts
	Loose flywheel			Check tightness of flywheel bolts. Tighten or replace parts as required
	Improperly adjusted valve(s)			Check and adjust valves
	Foreign material in cylinder(s)			Make necessary repairs
STARTING SYSTEM				
Starter will not crank engine	Batteries weak	Hydrometer	Test specific gravity	Check batteries
	Cables or connections loose or corroded		Visual	Clean corrosion from all terminals and tighten all loose connections
	Starter switch inoperative	Volt-Ohm meter	Test starter switch for voltage across contact when in starter position	If no voltage, replace switch
	Starter brushes worn or not contacting properly			Install new brushes or fit brushes to contour of commutator

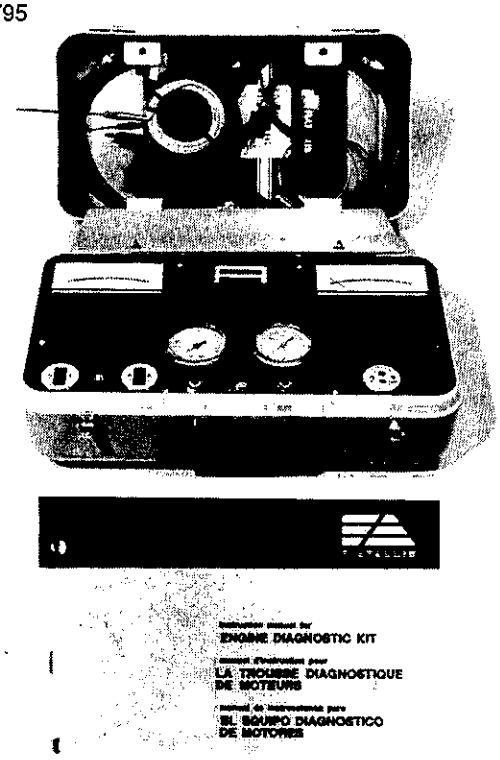
SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Engine shows loss of power(continued)	Fuel injection pump improperly timed	Timing light	Flow time the pump to the engine	Time the fuel injection pump
	Inoperative fuel injection pump or fuel injection nozzles	Engine diagnostic kit	Run engine diagnostic test	Repair or replace defective parts
	Cylinder *"cutting"* out		Locate *"missing"* cylinder as follows: Run engine at low idle speed and cut out each injection nozzle in turn by loosening the fuel injection line nut attaching the line to the fuel pump	A decrease in engine speed indicates the nozzle for that cylinder is functioning properly. If engine speed does not decrease, nozzle is malfunctioning and must be replaced
	Loss of compression	Compression tester	Compression test	May be due to leaking valve or worn piston rings or cylinder sleeves. Repair or replace defective parts
Engine runs unevenly and vibrates excessively	Governor not operating properly		Check pump and throttle linkage	If tight or loose, adjust governor and linkage
	Fuel supply erratic or insufficient	Engine diagnostic kit	Run diagnostic test	If fuel system fault, check fuel system
	Engine operating temperature too low	Engine diagnostic kit	Run diagnostic test	If cooling system fault, check thermostat
	Fuel injection pump malfunctions	Engine diagnostic kit	Run diagnostic test	Check fuel injection pump
	Valves in bad condition			Recondition or replace valve
	Cylinder *"cutting"* out		Locate *"missing"* cylinder as follows: Run engine at low idle speed and cut out each injection nozzle in turn by loosening the fuel injection line nut attaching the line to the fuel pump	A decrease in engine speed indicates the nozzle for that cylinder is functioning properly. If engine speed does not decrease, nozzle is malfunctioning and must be replaced
	Fuel injection nozzle malfunction	Nozzle tester	Check nozzle popping pressure, pattern and sound	Repair or replace nozzle

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Engine Overheats	External leak in cooling system		Visual	Correct all leaks and fill cooling system
	Radiator core clogged	Engine diagnostic kit	Install the low temperature probes at the top and bottom of the radiator. Run engine and check temperature differences	Clean and flush radiator
	Radiator air passages clogged	Flashlight	Visual check	Remove debris from radiator core
	Fan drive belts too loose	Belt tension gauge		Adjust fan drive belts to proper tension
	Thermostat inoperative		Remove thermostat and check opening temperature	Replace thermostat
	Engine oil cooler clogged	Engine diagnostic kit	Install the low temperature probes at the top and bottom of the radiator. Run engine and check temperature differences	Clean or replace the oil cooler core
	Improper engine lubrication	Pressure gauge	Install pressure gauge in instrument panel pressure gauge port	If pressure is low and oil level good, remove the pan and check pump
	Water pump malfunctioning		Check for leaks at pump or pulley drive loose	Repair or replace water pump
	Fuel injection pump improperly timed	Timing light	Flow time the pump to the engine	Time fuel injection pump
Engine shows loss of power	Insufficient air supply to cylinders	Engine diagnostic kit	Run engine diagnostic test	Clean air system
	Insufficient supply of fuel to fuel injection nozzles	Engine diagnostic kit	Run engine diagnostic test	If test shows fuel problem, check fuel system
	Governor not operating properly	Engine diagnostic kit	Run engine diagnostic test	If test shows fuel problem, inspect and adjust governor
	Air in fuel system. Observe fuel sediment bowl for aeration if bowl is on engine or pump			Vent fuel system. Check for leaks on suction side of fuel transfer pump
	Clogged fuel filter	Engine diagnostic kit	Run engine diagnostic test	Change filter element
	Improper valve lash			Adjust valve lash

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Engine hard to start	Batteries weak	Hydrometer	Check specific gravity	Recharge or replace batteries
	Insufficient fuel in tank		Check dipstick	If low, fill with specified fuel
	Incorrect grade of fuel	Operator's manual	Contact fuel supplier for fuel data and compare with machine specifications	Drain fuel system. Fill tank with specified fuel
	Clogged filter or sediment bowl		Inspect sediment bowl	Replace filter or clean sediment bowl
	Fuel injection nozzles not operating properly	Nozzle tester	Pop the nozzles for pattern, pressure and sound	Repair or replace nozzles
	Fuel transfer pump not operating properly	In line pressure gauge	Check pump pressure	Repair or replace fuel transfer pump
	Air in fuel system		Bleed the air from the primary fuel system	Correct leaks in suction side of fuel system. Vent fuel system
	Insufficient air supply to cylinders		Check air restriction indicator for too high restriction	Clean air system
	Fuel injection pump improperly timed	Timing light	Flow time the pump to the engine	Time fuel injection pump
	Valve lash incorrect			Correct valve lash
	Piston rings or cylinder liners worn	Compression test equipment	Compression test	If compression is low teardown and replace defective parts
	Valves warped or pitted			If compression is low recondition or replace valves and/or valve guides
Engine stops frequently	Idling speed too low	Tachometer	Check RPM at low idle	Adjust low idling speed
	Restricted fuel supply	Engine diagnostic kit	Run engine performance test	Check fuel system lines and filters
Engine stops suddenly	Out of fuel		Check dipstick	Fill fuel tank with specified fuel and vent the fuel system
	Restricted fuel supply	Engine diagnostic kit	Run engine performance test	Check fuel system lines and filters
	Broken or loose fuel lines		Visual	Correct or replace defective parts
	Fuel transfer pump or fuel injection pump inoperative	Pressure gauge	Install pressure gauge in transfer pump to filter line and check pressure while engine is running	If low, repair or replace defective parts

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
ENGINE				
Engine will not turn	Batteries weak	Hydometer	Check specific gravity	Recharge or replace batteries
	Starter switch inoperative	Volt-Ohm meter	Check voltage at switch	If bad replace defective switch
	Starter inoperative	Volt-Ohm meter	Check voltage at starter	Replace if voltage is present and starter does not turn over
	Engine locked or seized	Barring mechanism	Rotate the engine by hand. If it does not rotate, remove head and inspect for cause	Due to extended idle, storage periods, or improper preparation of engine for storage, parts may be rusted or corroded and seized Broken piston rings, gears, etc., may also cause locking. Repair or replace defective parts
	Hydro-static lock		Rotate the engine by hand opposite of crankshaft rotation. Check degree of movement. Remove head and inspect where liquid is coming from	Rain water entering uncovered exhaust pipe, leaking head. Repair or replace defective parts
Engine will not start	Slow cranking speed	Hydrometer	Check battery specific gravity	Specific gravity of batteries too low. Charge batteries
			Check starter torque	Starter not delivering maximum torque. Repair or replace defective parts
				Use cold weather start aids if applicable
	Engine controls out of adjustment		Check linkage adjustment	Correct all engine control linkage adjustment
	Insufficient supply of fuel to fuel injection nozzles		Remove fuel nozzle and check fuel volume during cranking	Check fuel system and clean sediment bowl
	Fuel injection nozzles not operating properly	Nozzle tester	Pop the nozzles for pressure, pattern and sound	Repair or replace defective parts
	Fuel injection pump improperly timed	Timing light	Flow time the pump to the engine	Time fuel injection pump

T-85795



1.3.1 ENGINE DIAGNOSTIC KIT

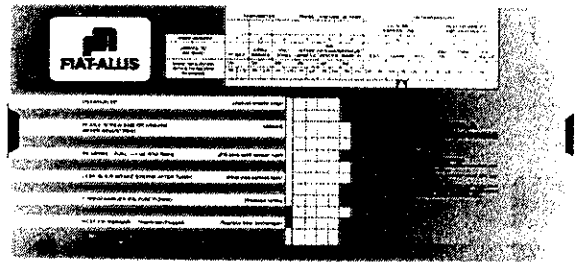
1.3.1.1

When testing an engine, use the Engine Diagnostic Kit, P/N 75300772 and Troubleshooting Guide P/N 75300010. The diagnostic kit allows the engine rpm, engine intake manifold pressure, exhaust manifold pressure and air cleaner restriction to be monitored with relatively easy hook-ups. In addition there are two thermo-couples that can monitor low temperatures that occur in the radiator or heat exchanger.

1.3.1.2

Install the engine sensors as described in Service Manual 73111023. Conduct the engine tests after the engine has come up to operating temperature. Record all results of the test.

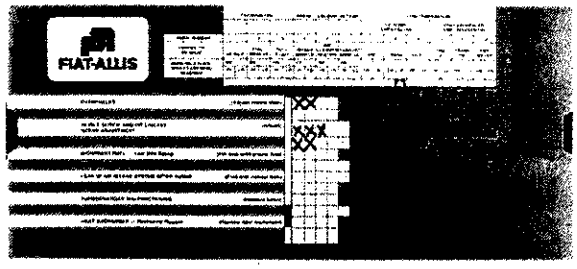
T-85797



1.3.1.3

Use the data in the engine specification section of this manual along with the Troubleshooting Guide to pin point possible problems that occur in the engine's different systems.

T-85798

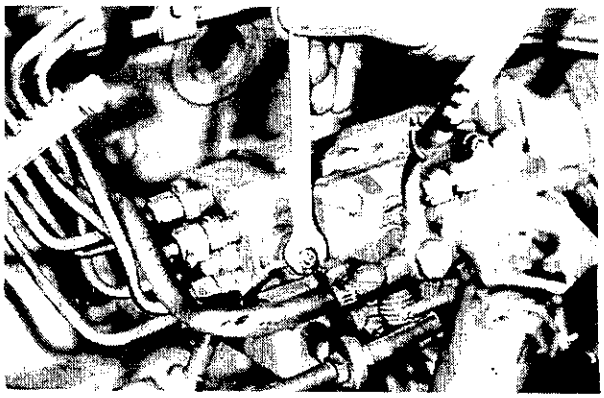


1.3.1.4

Align the white triangle under the different results in the solution area of the guide.

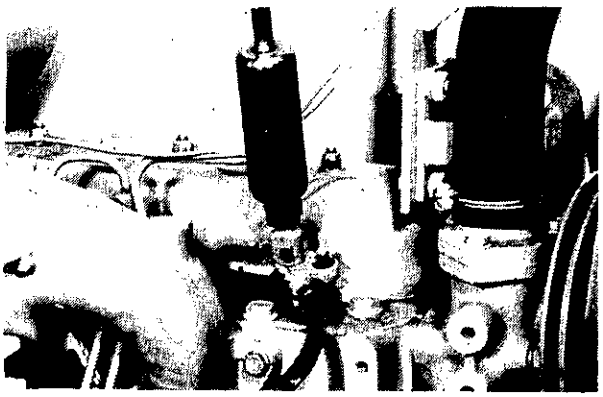
Use a pencil *(NO PEN)* and mark wherever a black line appears in the solution area. After recording all data, note that some boxes have more marks than others. Try to repair those items which have the highest number of pencil marks because that is probably the cause of the problem.

TESTING



Compression testing

Check engine compression pressure after the engine has warmed to operating temperature. Shut the engine off. Install P/N 75292632 and gauge P/N 75294829 in place of an injection nozzle. Disconnect the fuel shut off wire from the fuel pump. Crank the engine with the starter motor and read the compression pressure. Check the engine specifications for acceptable compression pressure.



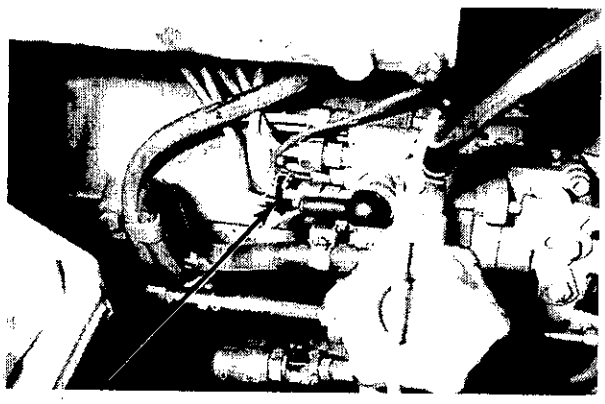
⚠ WARNING

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

Observe all start up and shut down procedures and **"WARNINGS"** listed in the operation and maintenance instruction manual.
This machine and it's attachments are to be operated only by qualified operator seated in the operator's seat.

Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.

Replace seat belts every two years on open canopy units and every three years on machinery with cabs or at change of ownership.

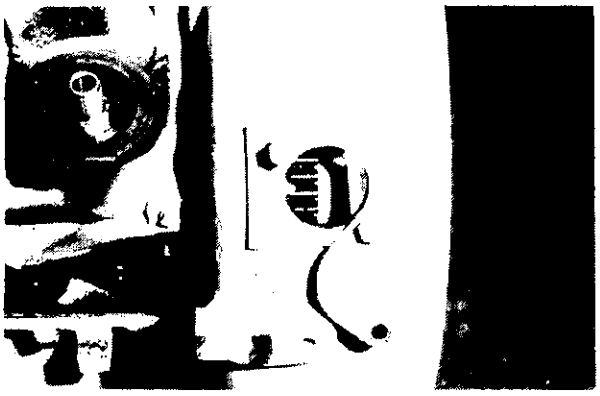


Timing Light

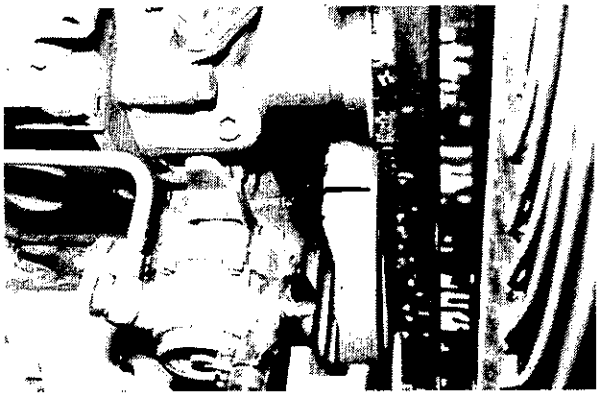
Install the tachometer timing light to number one fuel nozzle line.

TESTING

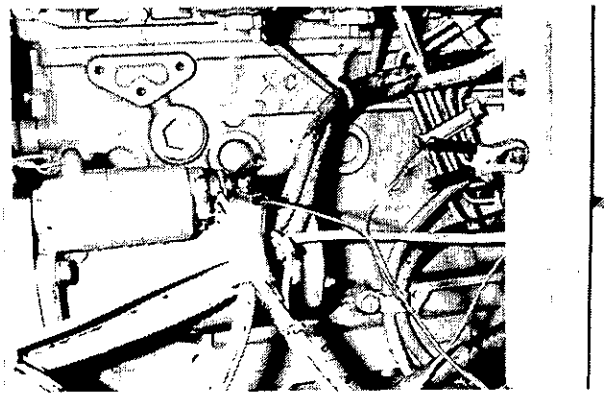
Verify that the engine is on top dead center (PMS) on number one cylinder by removing the valve cover and noting whether number one cylinder's valves are closed. Position the flywheel at the PMS mark on the flywheel.

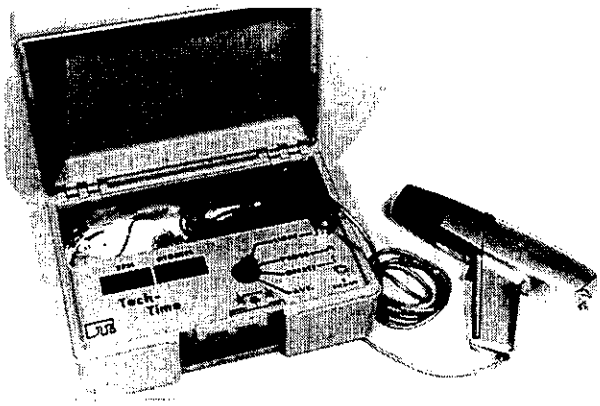


Using a piece of chalk, place a mark on the crankshaft pulley and arrange a timing pointer over the



Operate the loader and note the timing advance for the pump at different engine speeds.





⚠ WARNING

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

Observe all start up and shut down procedures and **"WARNINGS"** listed in the operation and maintenance instruction manual.

This machine and it's attachments are to be operated only by qualified operator seated in the operator's seat.

Before starting machine, check, adjust and lock the operator's seat for maximum comfort and control of the machine.

Replace seat belts every two years on open canopy units and every three years on machin-

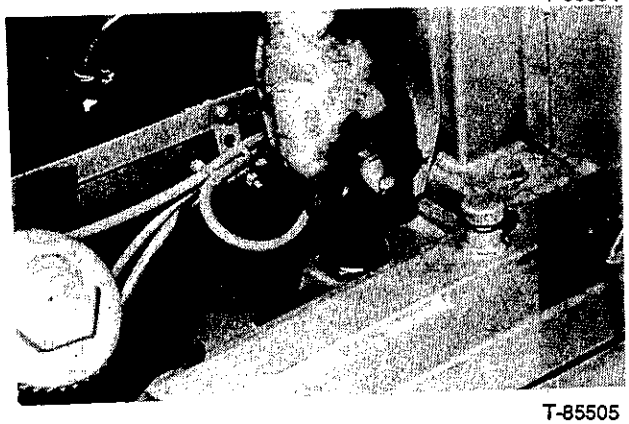
NOTE: RADIATOR IS MOUNTED ON THE ENGINE SUPPORT. THEREFORE RADIATOR CAN BE REMOVED WITH THE ENGINE OR REMOVED SEPARATELY.
PLUG ALL OPENINGS. TAG ELECTRIC WIRES.

1.4.1.1
Disconnect electrical master switch

⚠ WARNING

Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

T-85504

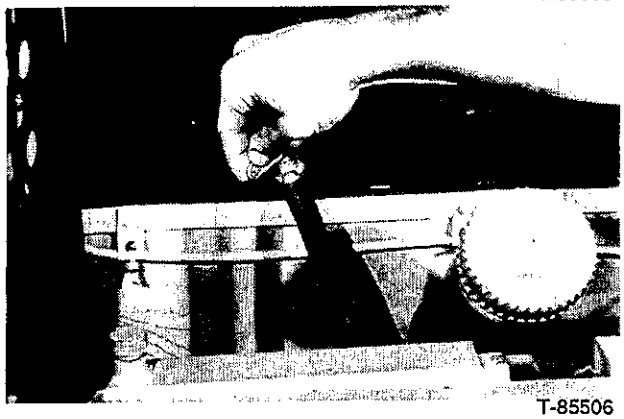


1.4.1.2
Attach a length of hose to radiator drain cock and drain radiator.

⚠ DANGER

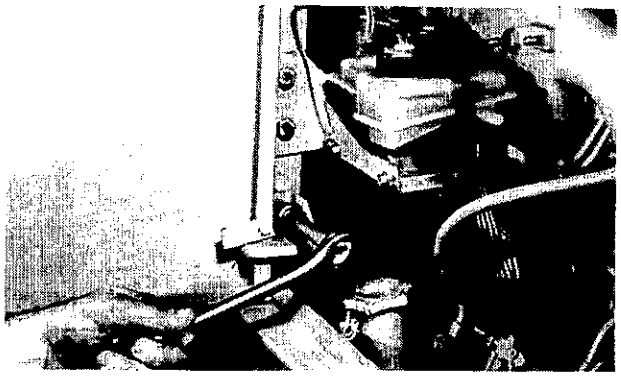
Fluid under pressure - turn cap or cover slowly to relieve pressure before removing.

T-85505



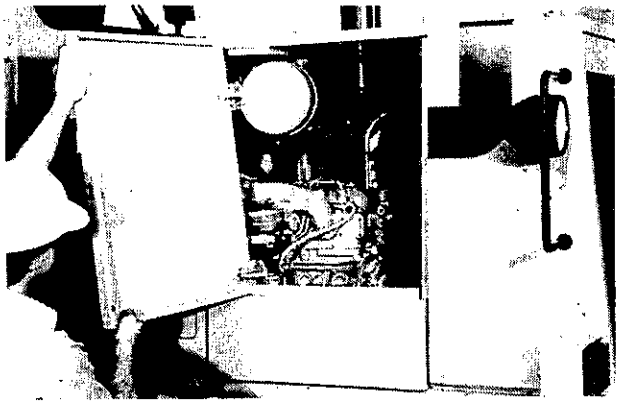
T-85506

1.4.1.3
Remove capscrews attaching side panel hinge to implement oil tank.



T-85500

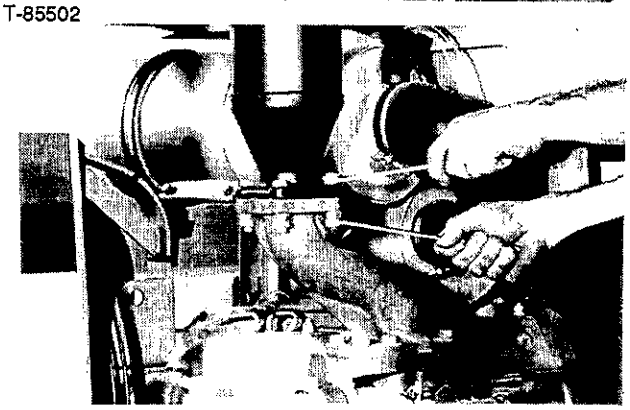
1.4.1.4
Remove door.



T-85501

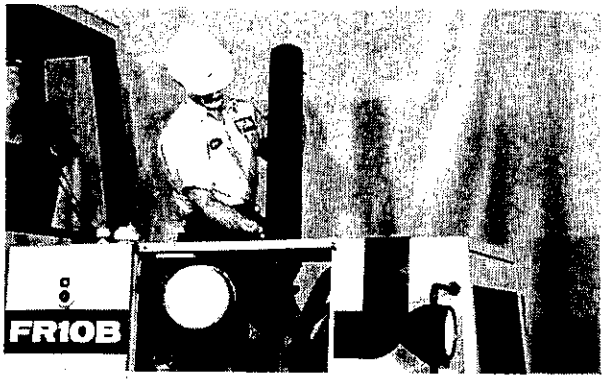
1.4.1.5
Remove lower panel on each side.

T-85502



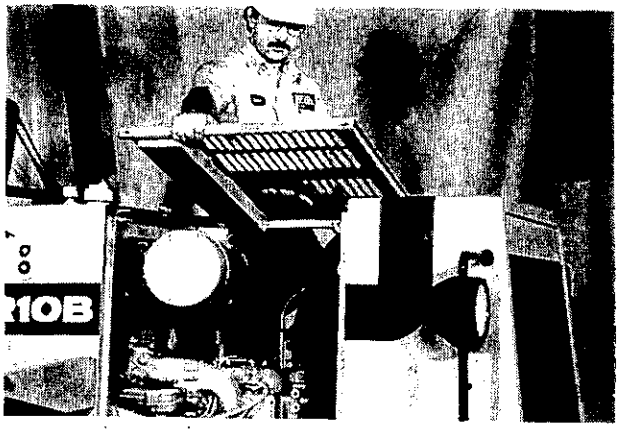
1.4.1.6
Make sure that muffler is cool. Remove capscrews attaching muffler .

T-85503



1.4.1.7
Remove muffler .

T-85495



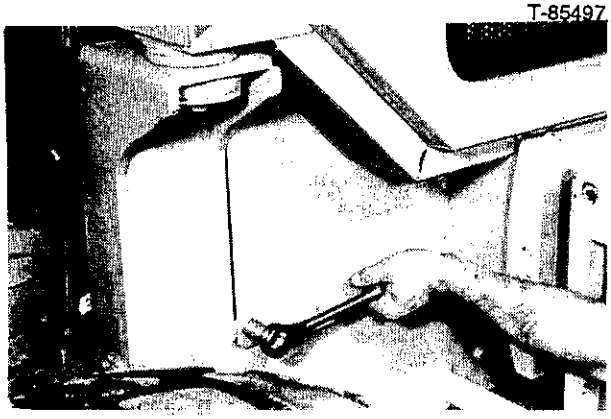
1.4.1.8
Remove capscrew from each corner of hood; remove hood.

1.4.1.9
Remove fenders.

T-85496

1.4.1.10
Remove right and left side access panels.

T-85497

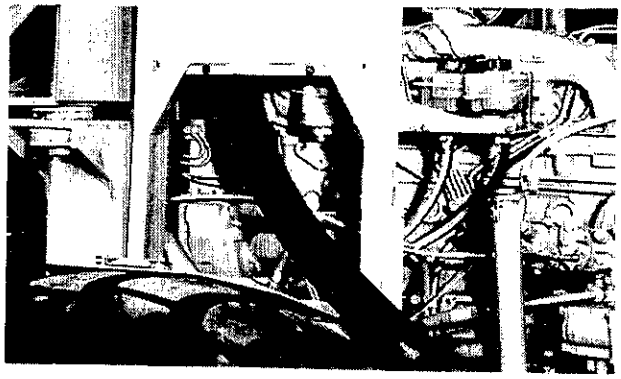


1.4.1.11
Remove cap to drain hydraulic tank. Drain oil into a length of hose and into a pan to keep oil off of tires.

⚠ DANGER

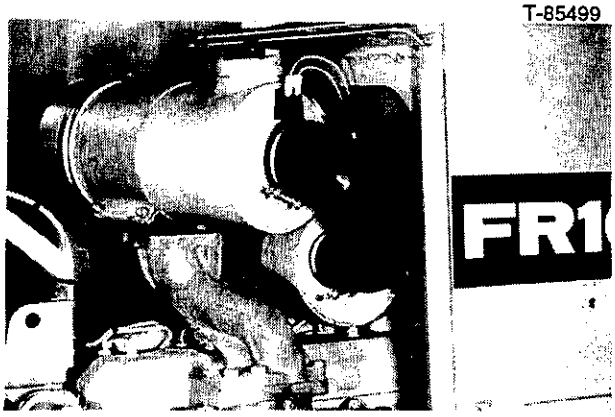
Fluid under pressure - turn cap or cover slowly to relieve pressure before removing.

T-85498

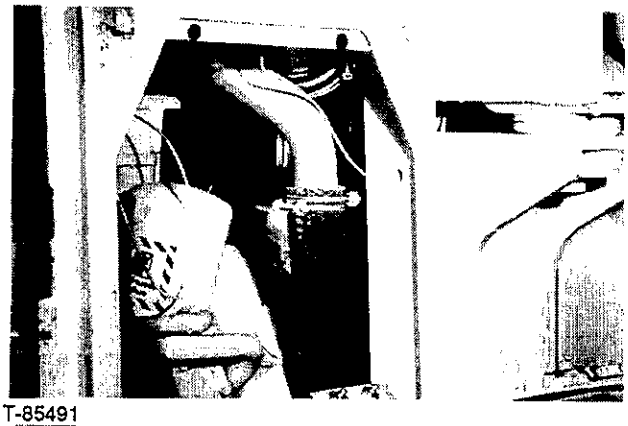


1.4.1.12
Remove air cleaner hose and two senser wires.

T-85499



T-85490



1.4.1.13
Remove two large hydraulic oil hoses from bottom of the tank. Disconnect the larger hose by removing the tube from the tank. There is a filter held in by the tube. The smaller hose can be disconnected from extension on tank. Disconnect wire from sensor in bottom of tank.

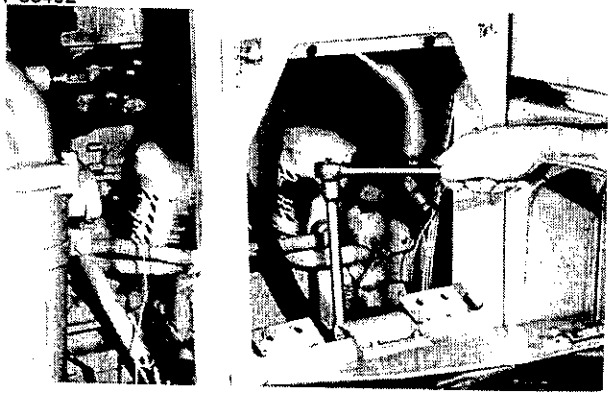
T-85491

1.4.1.14
Remove the filter and seal.

T-85493

1.4.1.15
Disconnect the four grease fittings from the access door flange.

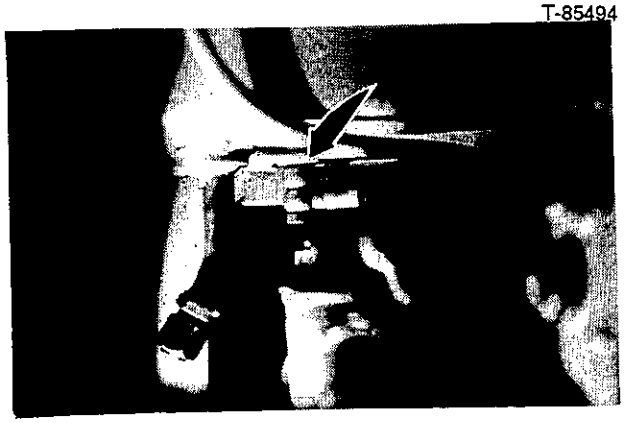
T-85492



1.4.1.16
Remove capscrews holding tank to frame (3 capscrews on each side)

1.4.1.17
Remove two small hydraulic lines from bottom of tank.

T-85494

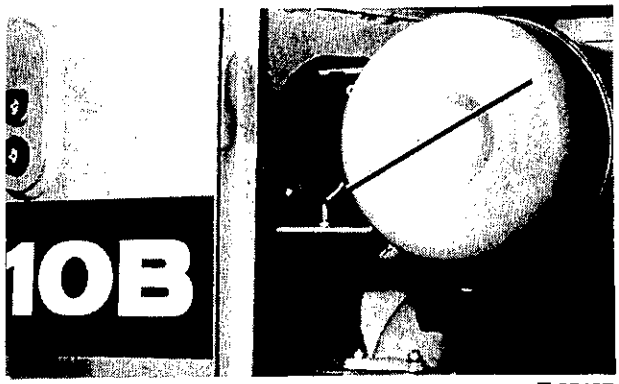


1.4.1.18
Remove brake reservoir support bracket. Lay reservoirs against engine.

T-85485

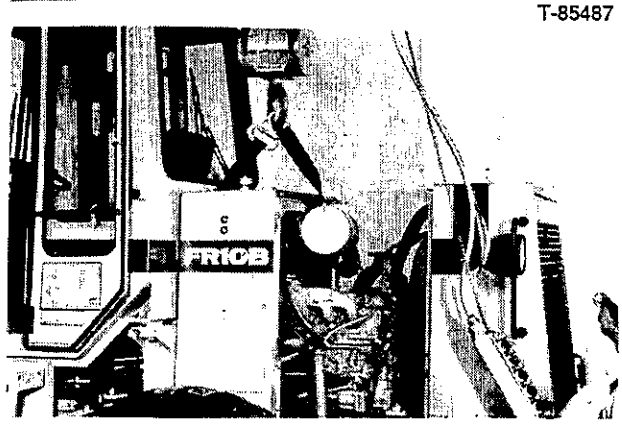
1.4.1.19
Remove fuel tank breather hose.

T-85486



1.4.1.20
Using a suitable hoist and sling, remove implement oil tank from frame.

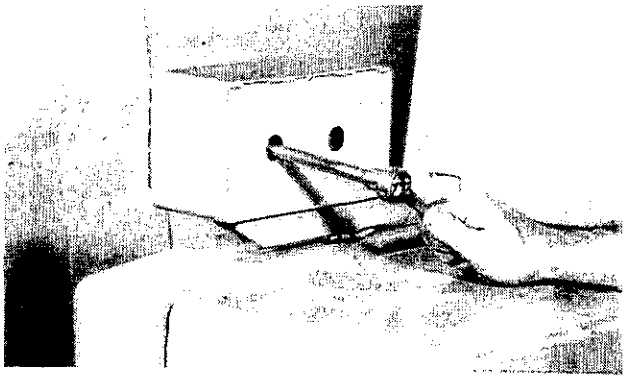
T-85487



⚠ WARNING

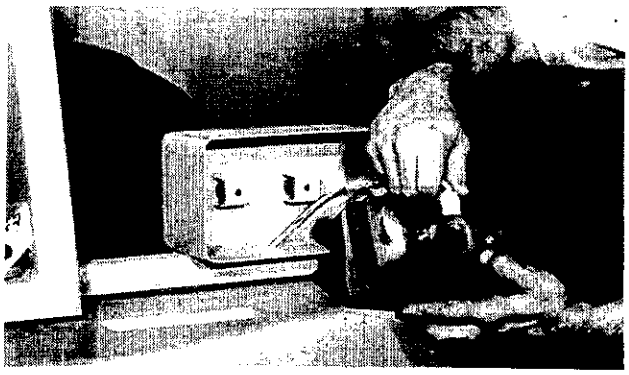
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

T-85488



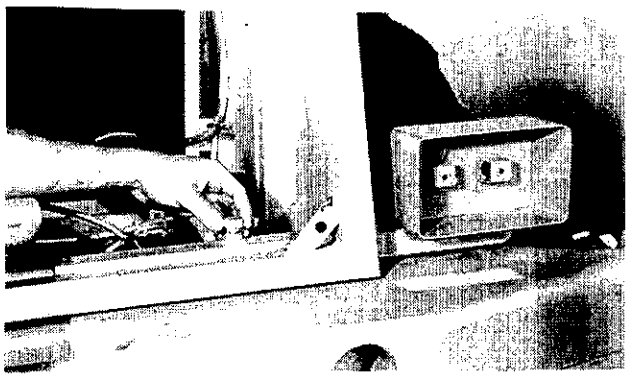
1.4.1.21
Remove nuts from back of stop lights.

T-85489



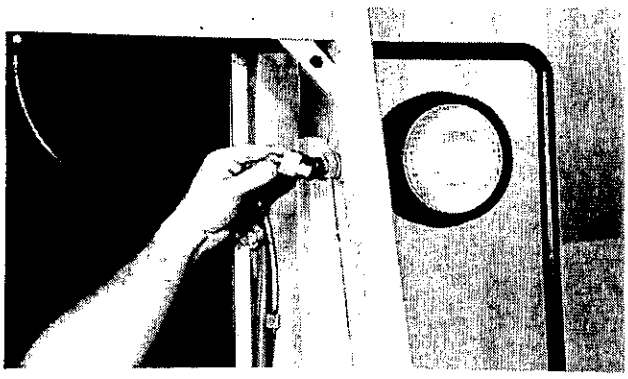
1.4.1.22
Disconnect wire from stop lights.

T-85479



1.4.1.23
Remove stop light housings.

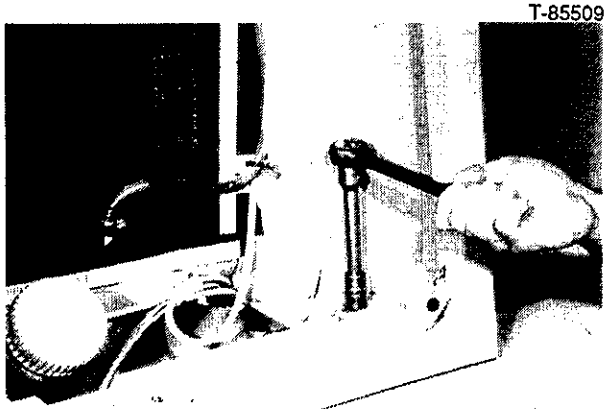
T-85481



1.4.1.24
Disconnect wire from rear flood lights.

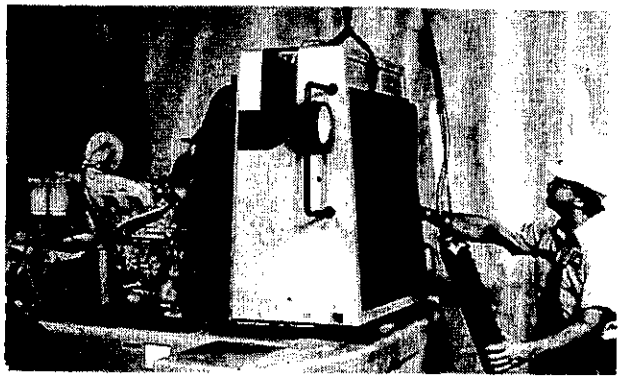
1.4.1.25
Remove capscrews holding radiator guard to frame (2 capscrews each side)

T-85509



1.4.1.26
Using suitable hoist and sling remove radiator guard.

T-85482

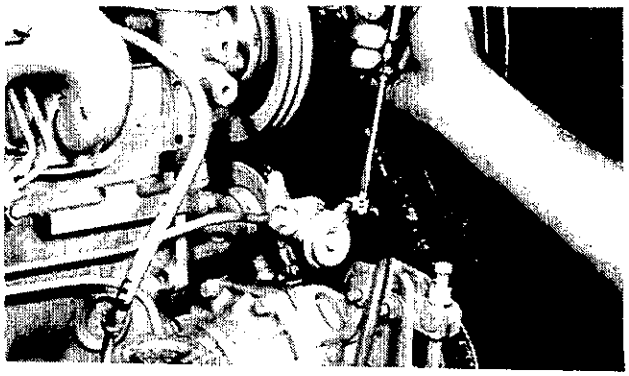


⚠ WARNING

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.

1.4.1.27
Disconnect fuel line to transfer pump.

T-85483

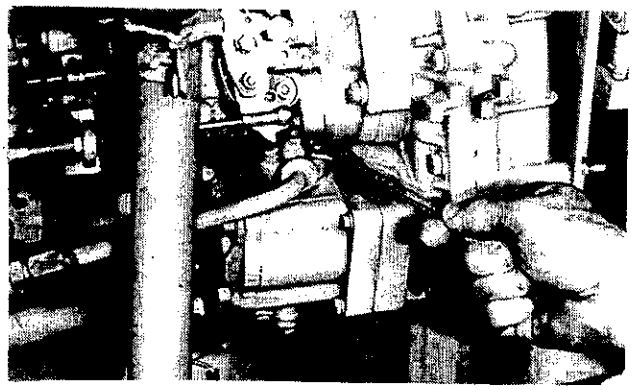


⚠ DANGER

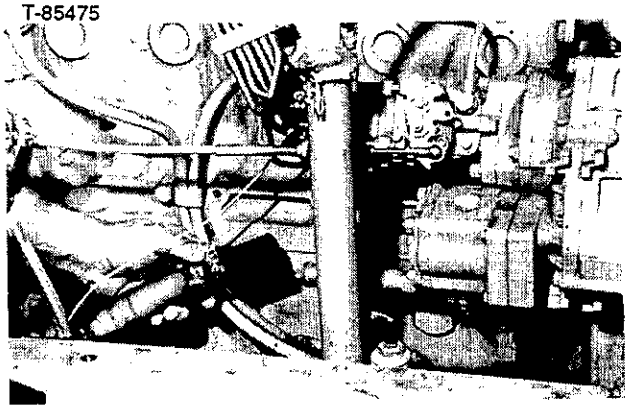
Extinguish all smoking materials, or open flames before checking and filling fuel tanks, changing filters and before opening sediment drain due to the presence of flammable fluid.

1.4.1.28
Disconnect tube attached to top of brake pump.

T-85484

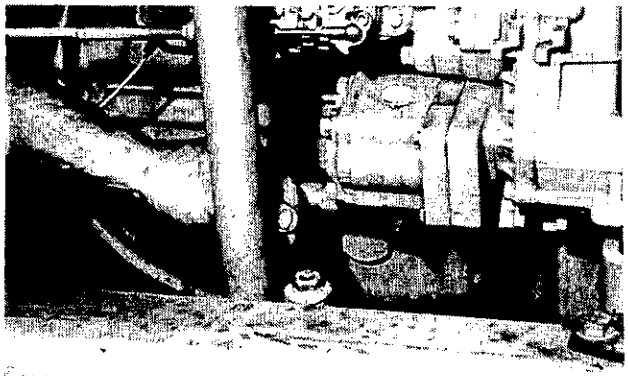


T-85475



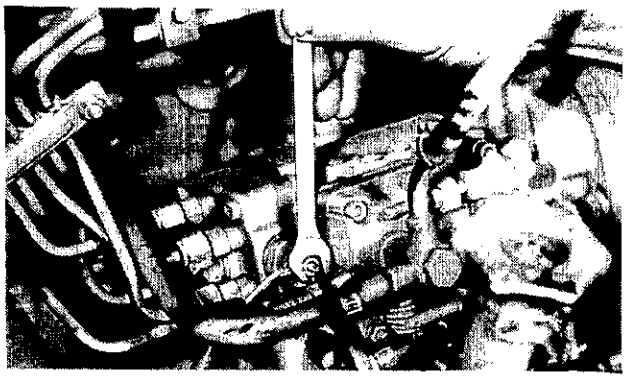
1.4.1.29
Disconnect hose attached to bottom of brake pump.

T-85476



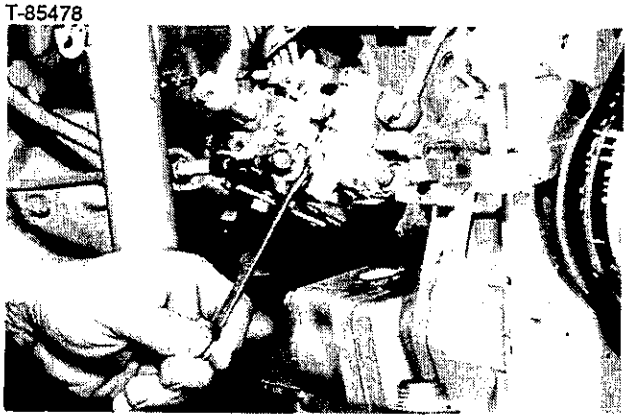
1.4.1.30
Disconnect and tag wire attached to engine oil filler tube.

T-85477



1.4.1.31
Disconnect and tag wire attached to injection pump.

T-85478



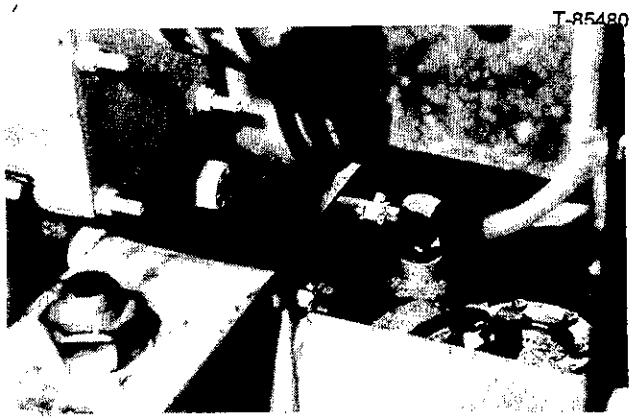
1.4.1.32
Remove throttle cable.

1.4.1.33
Disconnect fuel return line at the tank.

⚠ DANGER

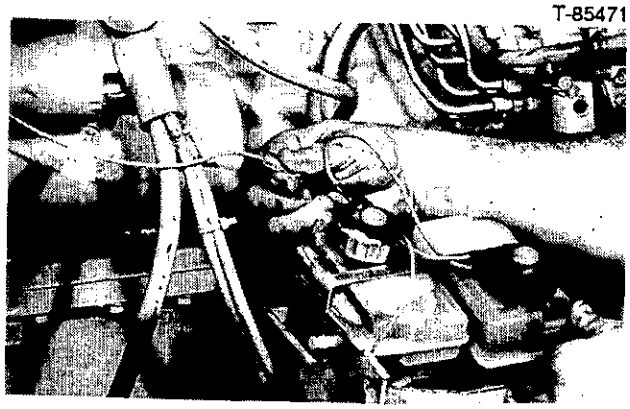
Extinguish all smoking materials, or open flames before checking and filling fuel tanks, changing filters and before opening sediment drain due to the presence of flammable fluid.

T-85480



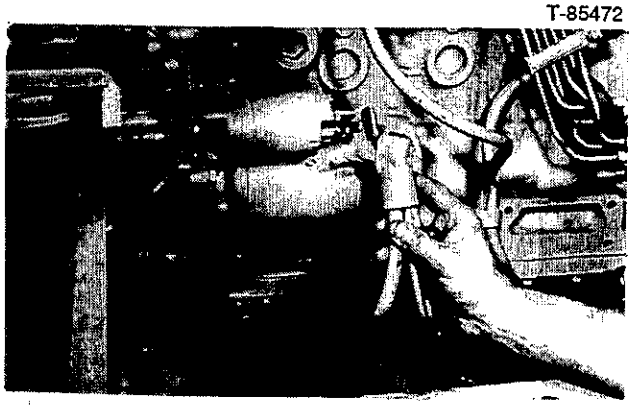
1.4.1.34
Disconnect and tag wire attached to brake reservoir.

T-85471



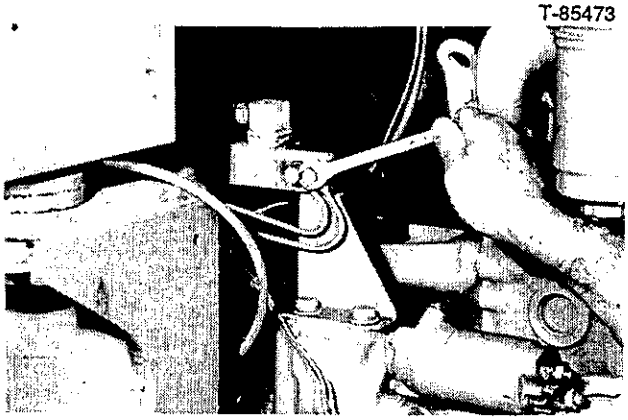
1.4.1.35
Disconnect and tag starter wires.

T-85472

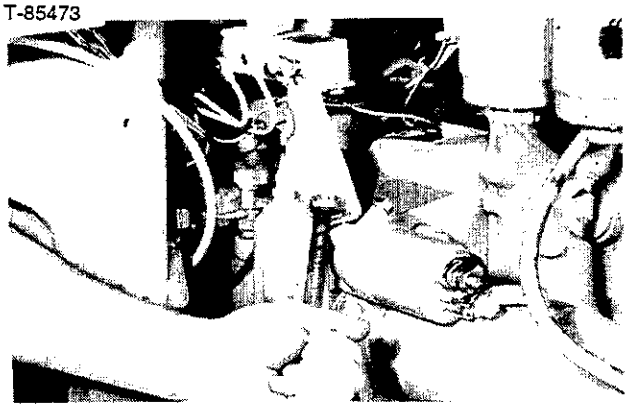


1.4.1.36
Remove clutch disconnect valve tubes.

T-85473

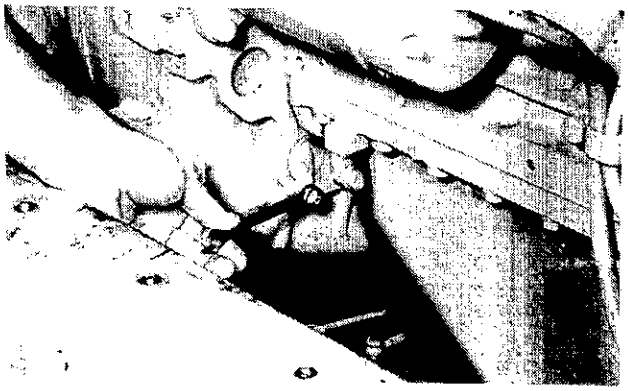


T-85473



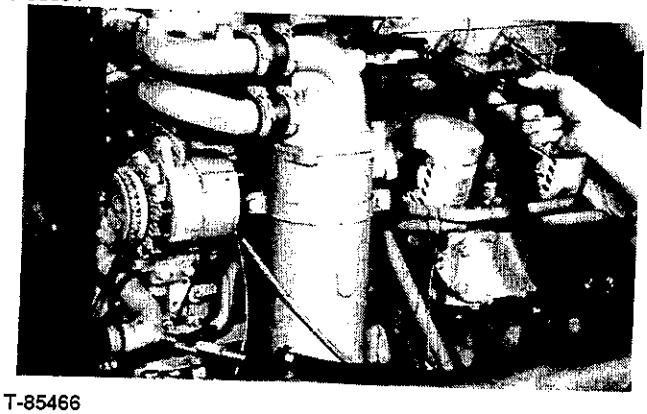
1.4.1.37
Remove clutch disconnect valve bracket capscrews. Push valve and bracket clear of engine.

T-85474



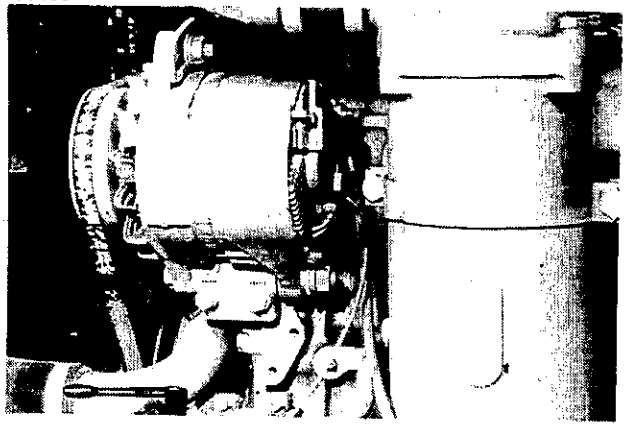
1.4.1.38
Remove flex plate capscrew access cover.

T-85534



1.4.1.39
Shut off valves in cab heater lines. Remove hoses from valves.

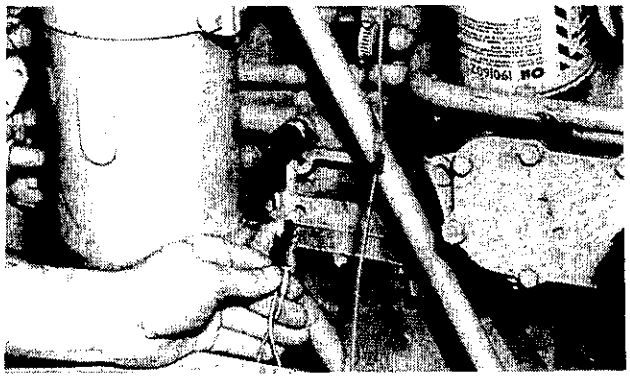
T-85466



1.4.1.40
Disconnect and tag wires from alternator.

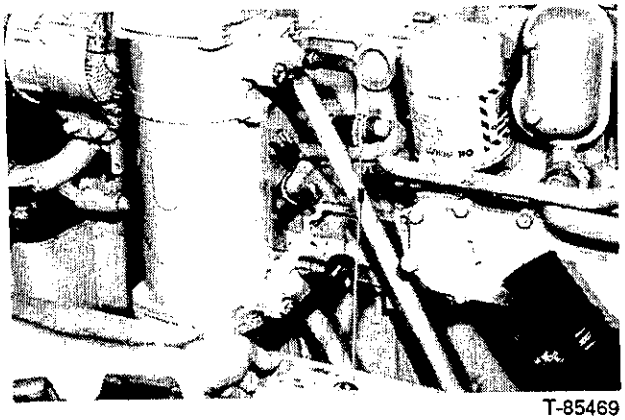
T-85467

1.4.1.41
Disconnect wire from engine lubrication sensor.



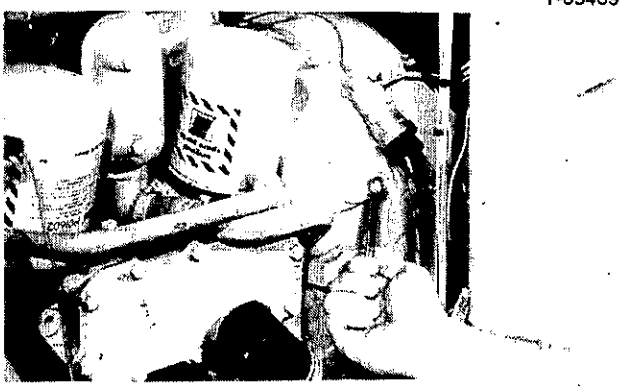
T-85468

1.4.1.42
Disconnect tubes from transmission oil cooler.



T-85469

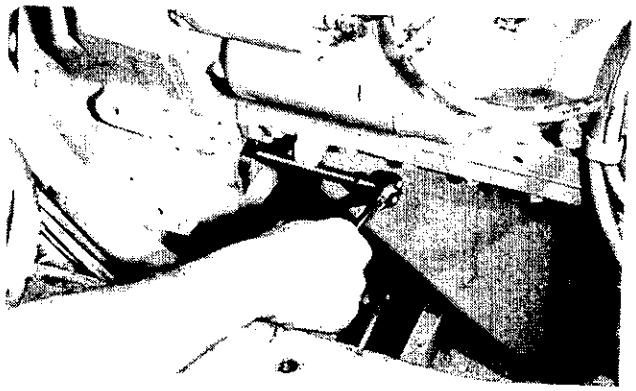
1.4.1.43
Remove flywheel timing mark access cover.



T-85529

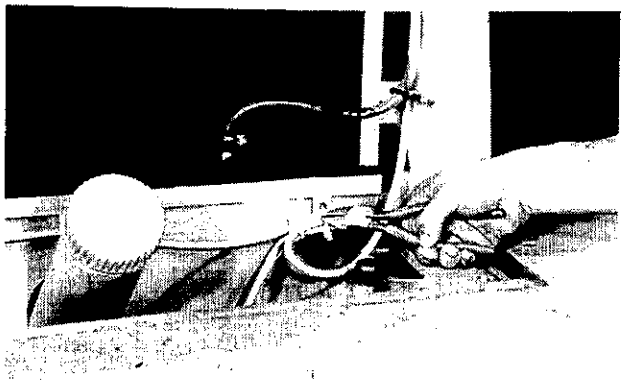
1.4.1.44
Bar engine to gain access to flex plate capscrews. Work through the timing mark access hole or the starter mounting hole.

T-85530



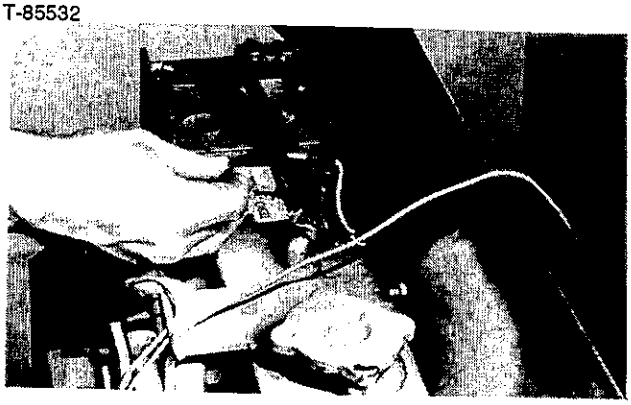
1.4.1.45
Remove flex plate capscrews through access hole under starter.

T-85531



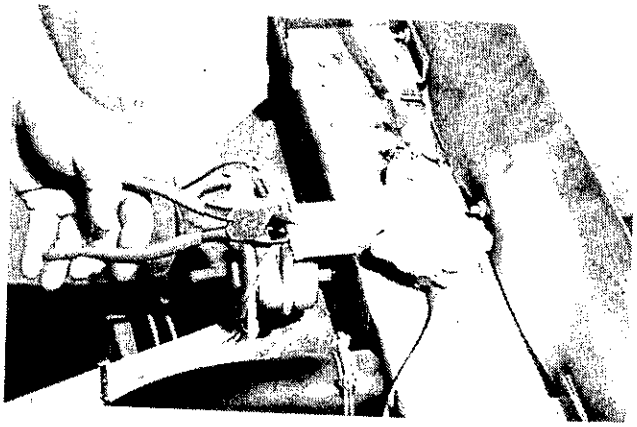
1.4.1.46
Remove ties holding wires to radiator. Tag all wires. Move wires clear of radiator.

T-85532



1.4.1.47
Disconnect and tag wire to radiator level sensor.

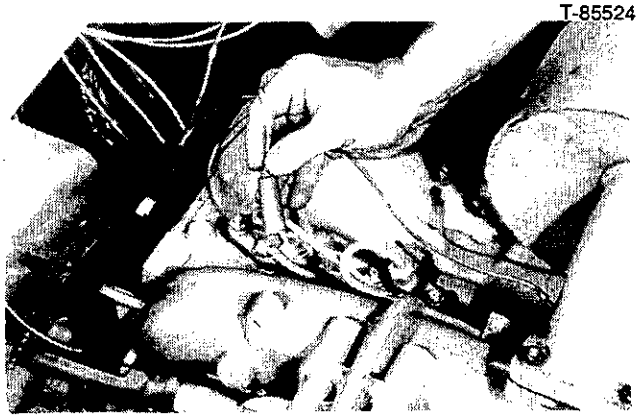
T-85533



1.4.1.48
Remove ties holding wires to top of engine. Tag wires and move them clear of engine.

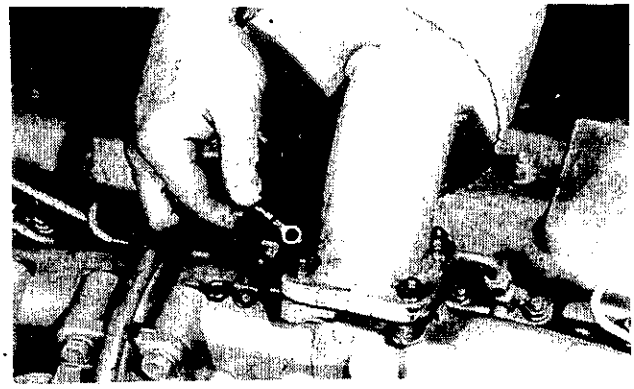
1.4.1.49
Disconnect wire from sensor in top of head.

T-85524



1.4.1.50
Disconnect air cleaner sensor ground wire.

T-85525

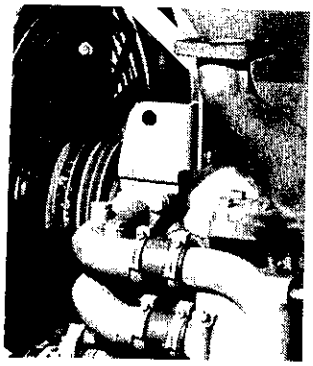


1.4.1.51
Attach suitable hoist and sling to engine lifting eyes. Engine weighs approximately 650 kg (1430 lbs.)

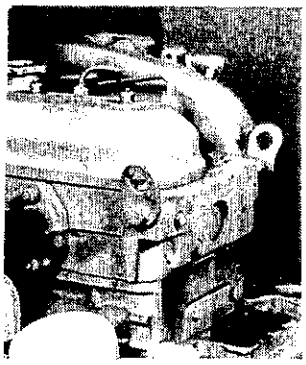
⚠ WARNING

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.

T-85527

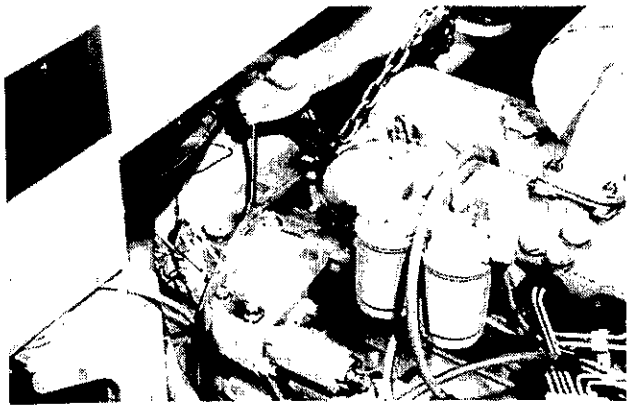


T-85526



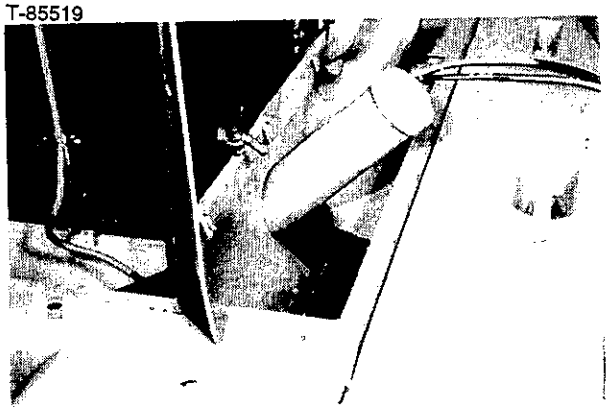
1.4.1.52
Remove capscrews attaching transmission to flywheel housing.

T-85528



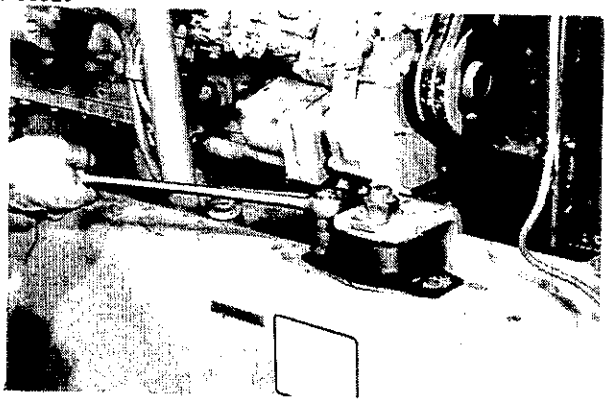
ENGINE REMOVAL

T-85519



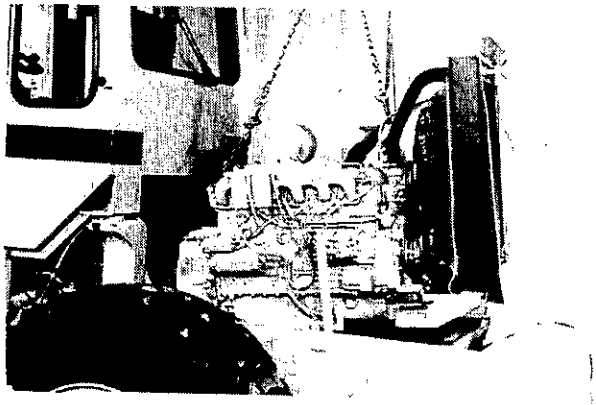
1.4.1.53
Cut seal on bottom of radiator so seal will come off fuel filler tube.

T-85520



1.4.1.54
Remove engine mounting bracket capscrews

T-85511

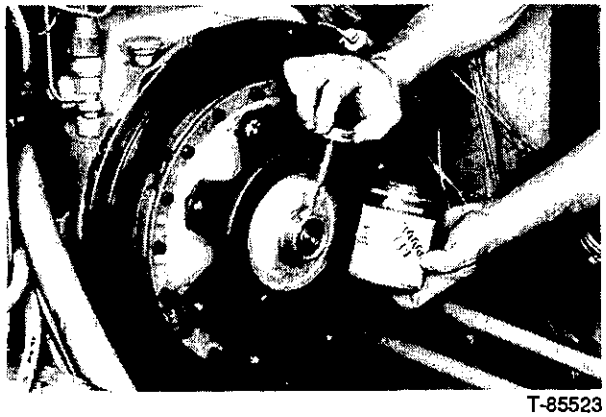


1.4.1.55
Remove engine. It may be necessary to use a pry bar to separate engine from transmission. Check clearances as engine goes up. Be especially careful of flex plate, transmission oil cooler lines and fuel tank filler tube.

1.4.2 INSTALLATION

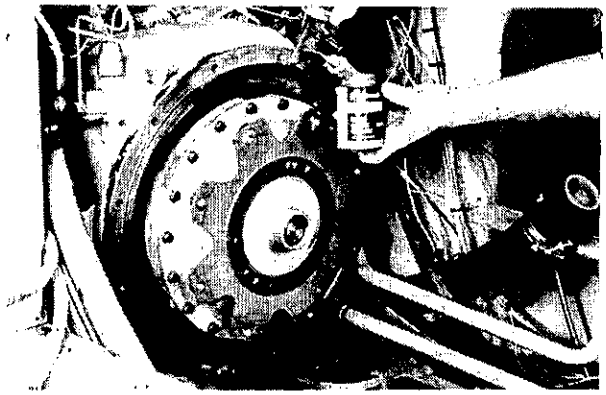
1.4.2.1
Coat flywheel pilot with anti-seize lubricant P/N 75000781.

T-85522



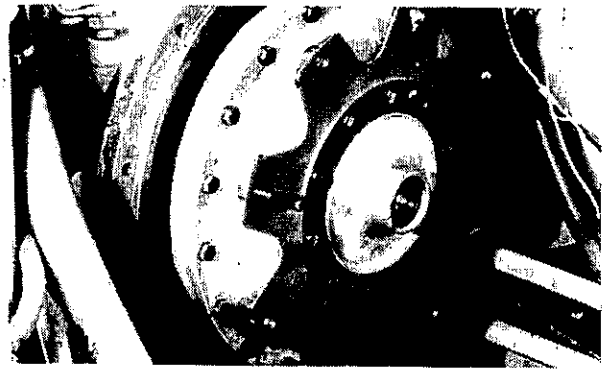
T-85523

1.4.2.2
Coat transmission mounting flange with liquid gasket P.N 70699262.



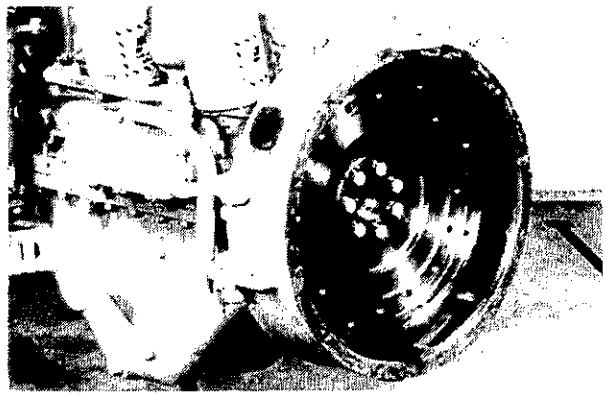
T-85515

1.4.2.3
Install a guide stud in flex plate so plate can be aligned with hole in flywheel and with access hole in flywheel housing.

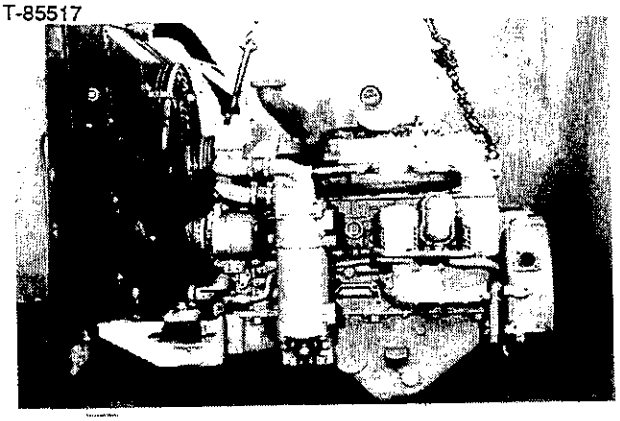


T-85516

1.4.2.4
Turn flywheel so flex plate capscrew hole is in line with access hole in flywheel housing.



T-85517

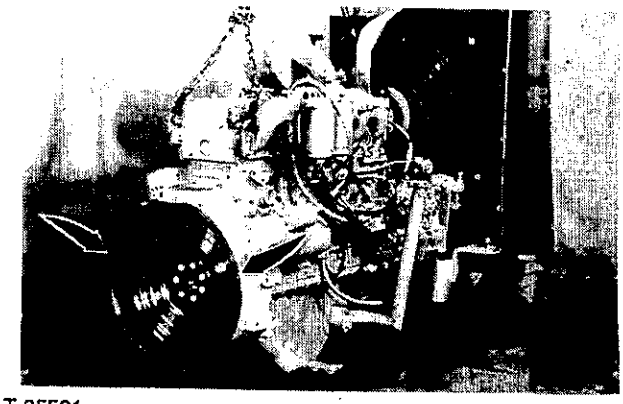


1.4.2.5
Attach suitable hoist and sling to engine lifting eyes. Engine weight approximately 650 kg (1430 lbs)

⚠ WARNING

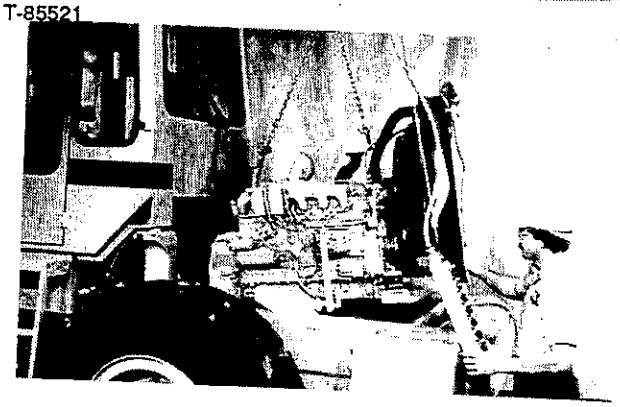
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

T-85518

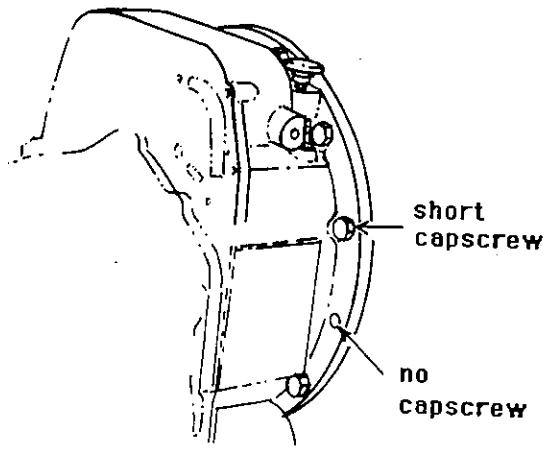


1.4.2.6
Install guide studs in holes indicated to help align engine with transmission assembly.

T-85521



1.4.2.7
Swing engine into position. Check clearances as engine is lowered into frame. Be especially careful of flex plate, transmission oil cooler tubes and fuel tank filler tube. Line up guide stud in flex plate with hole in flywheel.



1.4.2.8
Remove guide studs. Install capscrews attaching transmission to engine. Tighten capscrews to specified torque.

The rest of the installation process is the reverse of removal. Be sure to tighten all capscrews to their specified torque. When finished with installation, fill the reservoirs as stated in the Operation and Maintenance Instruction Manual.

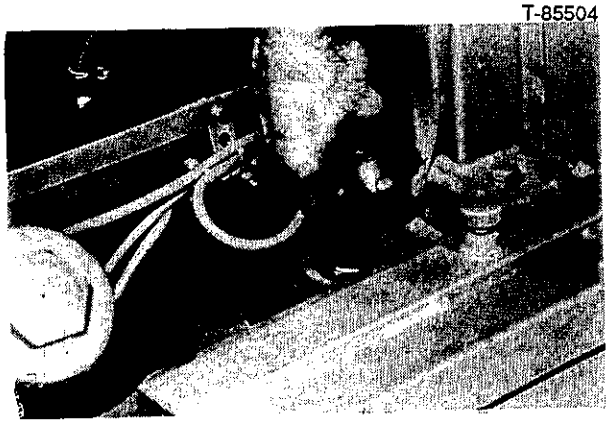
T-85504

1.4.3 FUEL TANK REMOVAL

1.4.3.1.1
Disconnect electrical master switch

⚠ WARNING

Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

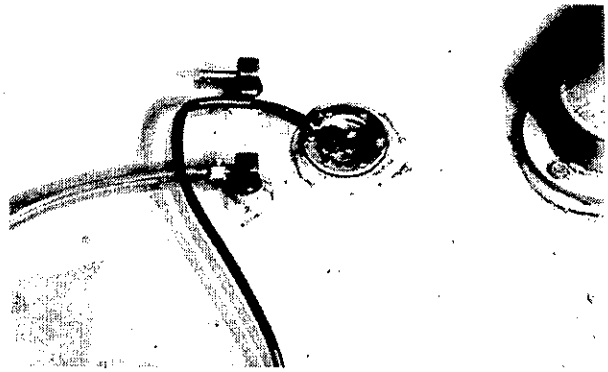


1.4.3.1.2
Drain fuel tank.

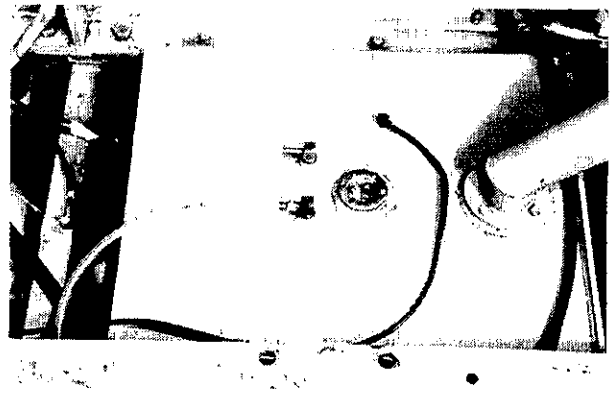
⚠ WARNING

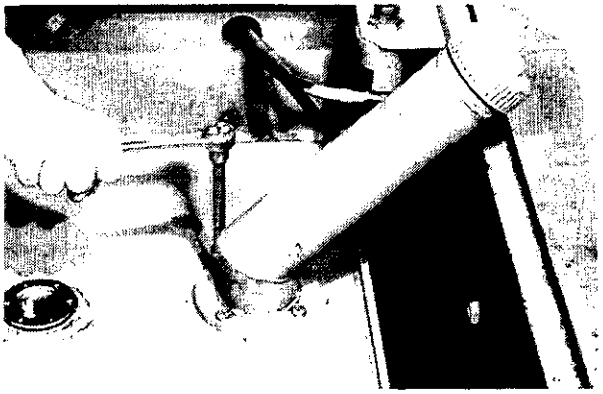
Extinguish all smoking materials or open flames before checking and filling fuel tanks, changing filters and before opening sediment drain, due to the presence of flammable fluid.

1.4.3.1.3
Disconnect and tag the two lines from the fuel tank to the fuel injection pump.

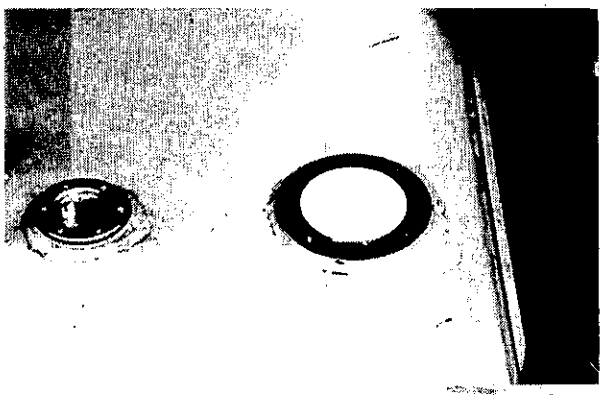


1.4.3.1.4
Disconnect and tag the sensor wire from the top of the fuel tank.

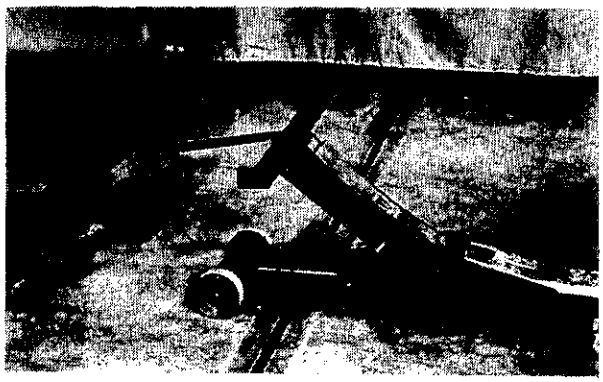




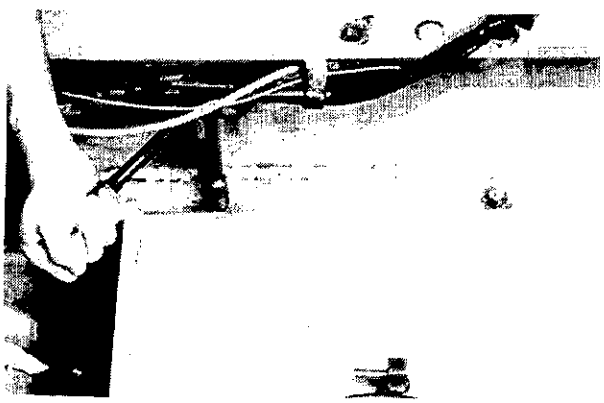
1.4.3.1.5
Remove the four capscrews and lockwashers that attach the fuel tank filler tube and remove the tube.



1.4.3.1.6
Cap filler tube opening.



1.4.3.1.7
Fabricate a support tool similar to the one shown here with a floor jack



1.4.3.1.8
Position the floor jack and support tool under the fuel tank. Remove the six capscrews, lockwashers and washers that attach the fuel tank to the frame.

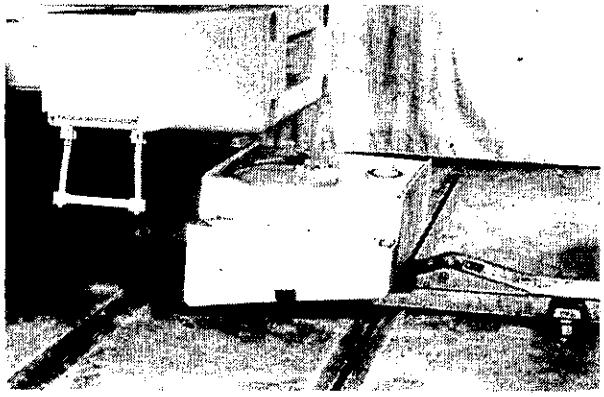
⚠ WARNING

When any supporting machine component must be removed or installed and jacks are used, be sure the support of the jack at the machine and on the ground are appropriate to the load to be applied. Transfer the load to authorized blocking or jack stand immediately. Do not work on or under the machine or its components while supported only on a jack or other lifting device, according to local or national requirements.

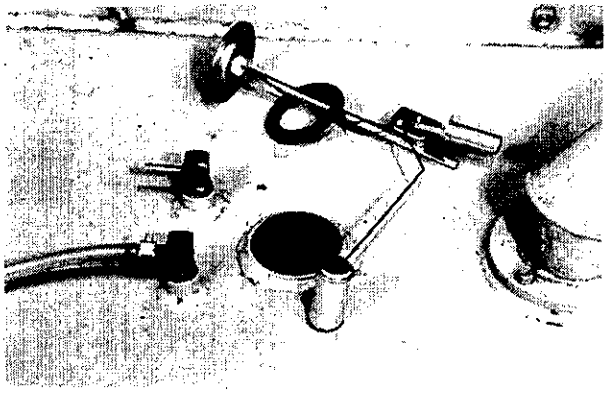
1.4.3.1.9
Lower the fuel tank slowly and remove from under machine. Fuel tank weighs approximately 70 kg (150 lbs).

⚠ WARNING

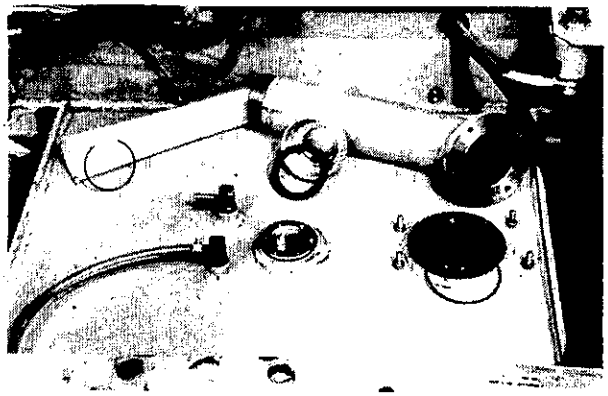
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.



1.4.3.1.10
Remove fuel level gauge.

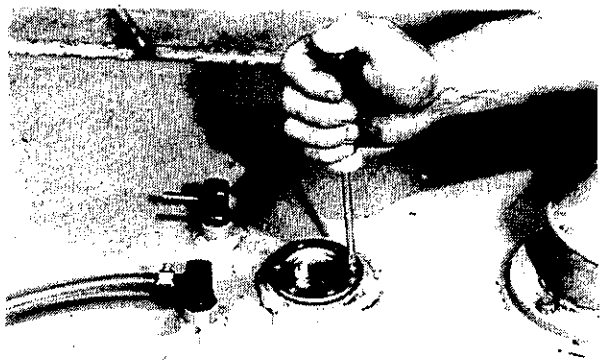


1.4.3.1.11
Remove components of fuel filler tube.

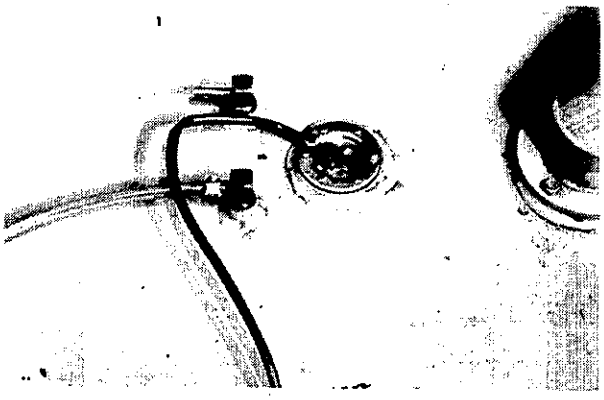


1.4.3.2 INSTALLATION

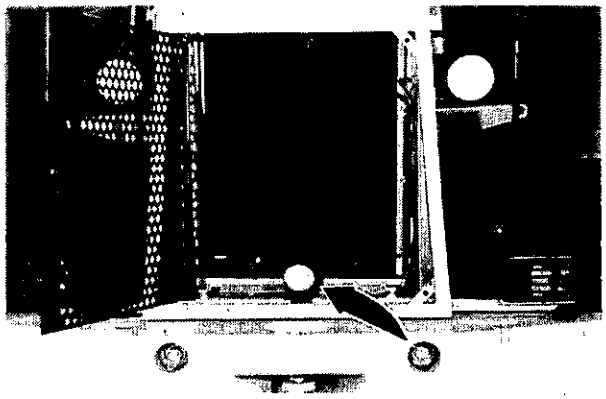
1.4.3.2.1
Install fuel level gauge. The remaining steps for tank installation is the reverse of removal. Tighten all capscrews to specified torque.



FUEL TANK



1.4.2.2.2
Connect fuel level sensor wire to top of tank.



1.4.3.2.3
Connect fuel lines. Fill tank. Check for leaks.

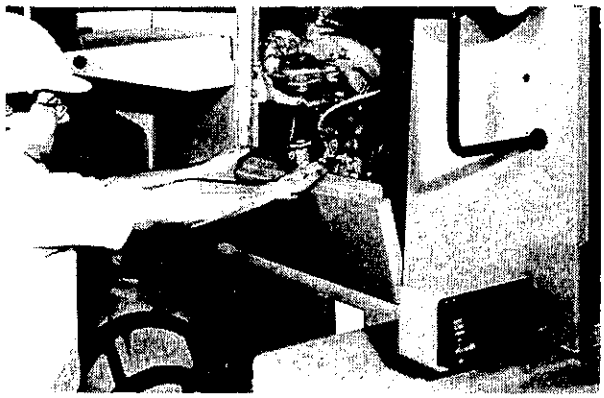
⚠ DANGER

Extinguish all smoking materials or open flames before checking and filling fuel tanks, changing filters and before opening sediment drain, due to the presence of flammable fluid.

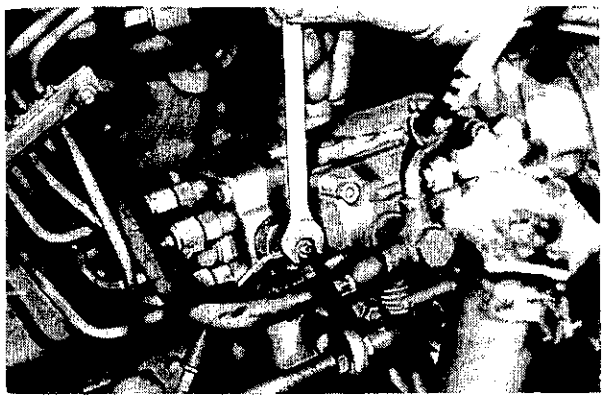
FUEL PUMP
REMOVAL

1.4.4.1 Removal

1.4.4.1.1
Remove engine compartment lower panel

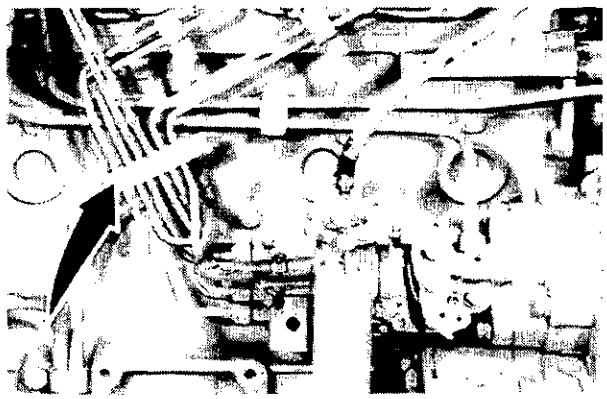


1.4.4.1.2
Disconnect fuel shut off solenoid wire.

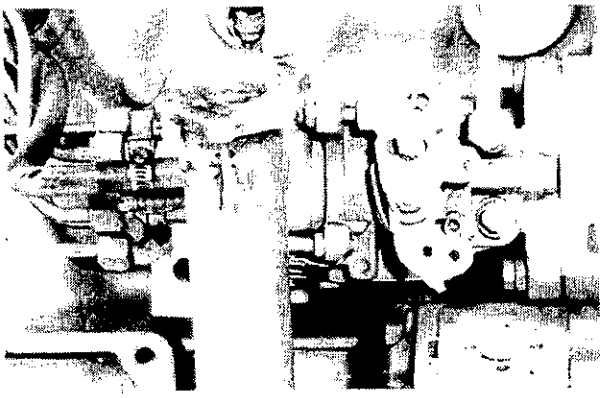


1.4.4.1.3
Disconnect throttle cable

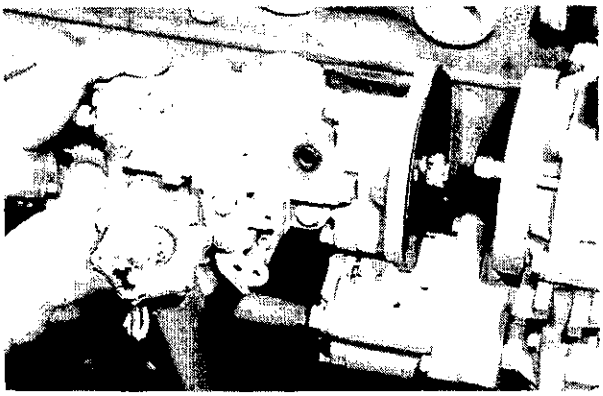
1.4.4.1.4
Disconnect fuel line bracket from side of engine.



FUEL PUMP
REMOVAL



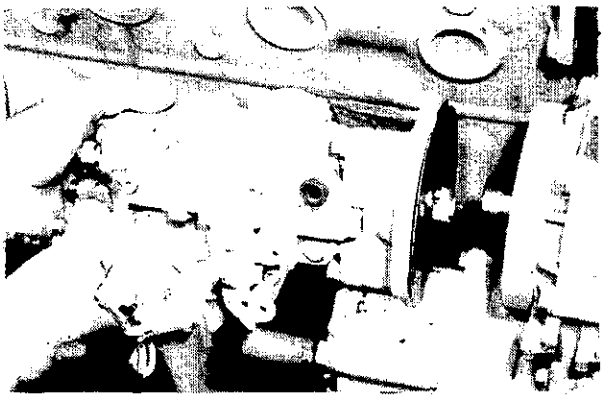
1.4.4.1.5
Disconnect fuel lines from pump. Flex lines clear of pump.



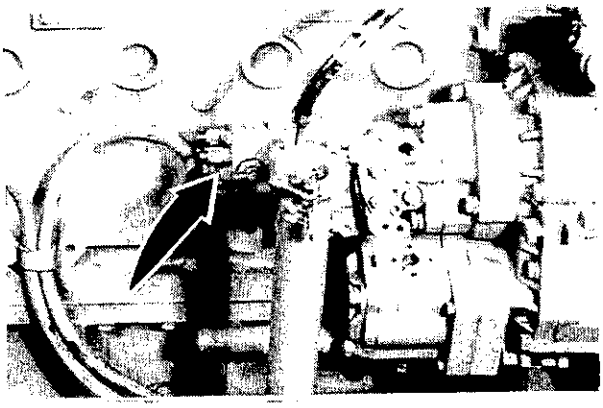
1.4.4.1.6
Remove pump and spacer. Refer to 1.4.3.6 for repair of injection pump.

1.4.4.2 Installation

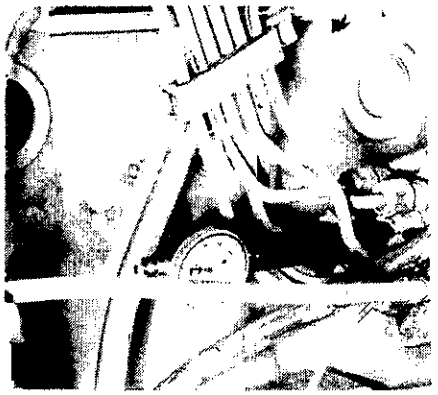
1.4.4.2.1
Align the blind tooth on the drive gear with the coupling and install the pump and spacer.



1.4.4.2.2
Remove delivery plunger plug from end of pump.

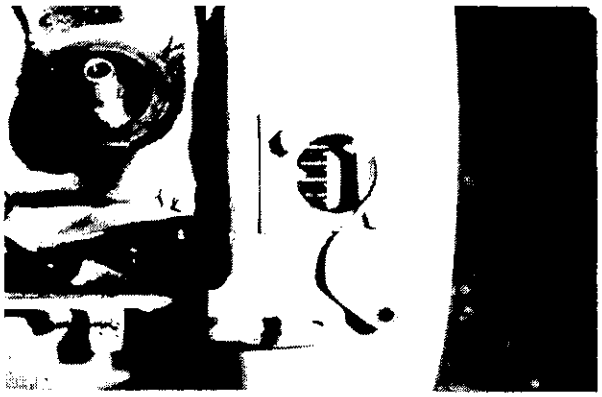


1.4.4.2.3
Mount dial indicator P/N 75290774and holder, P/N 75292197 in delivery plunger plug hole. Insure that the indicator is pre-loaded at least 2 mm (.008 in).

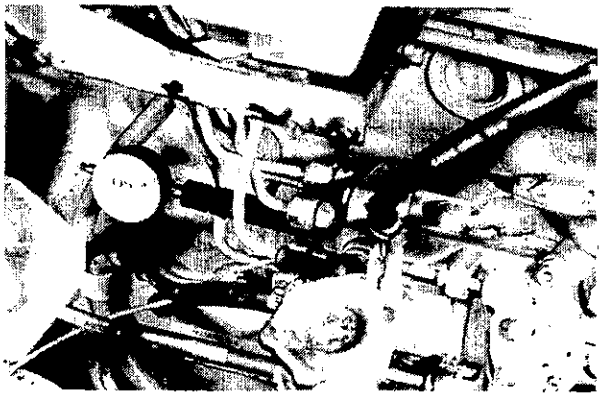


1.4.4.2.4
Rotate engine in the direction of rotation (clockwise) to bring flywheel timing mark (INIEZ) into view and alined with the timing pointer. Now move the flywheel counter-clockwise until the dial indicator stops (i.e. bottom of plunger stroke) or bottom dead center. Zero the dial indicator.

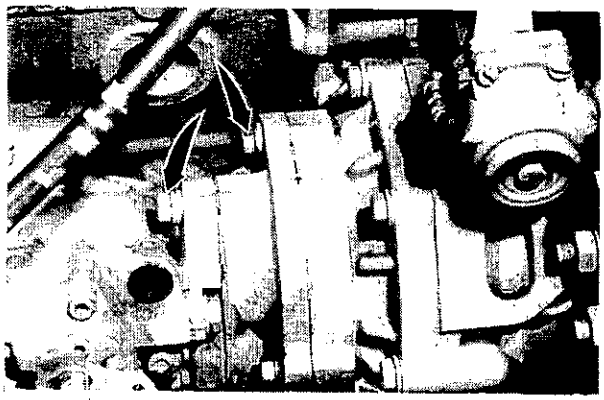
FUEL PUMP
INSTALLATION AND TIMING



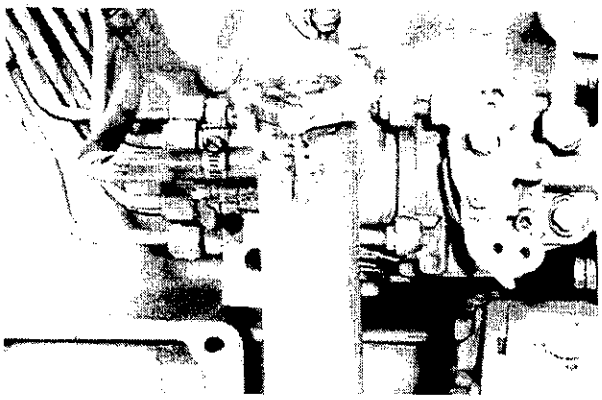
1.4.4.2.5
Rotate the engine counterclockwise another 20° to remove drive gear backlash. Now rotate the engine in the direction of rotation to the injection mark (INIEZ).



1.4.4.2.6
Observe that the dial indicator has moved 1 mm.

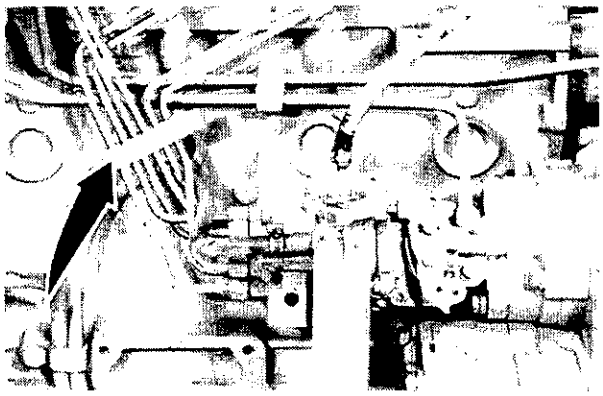


1.4.4.2.7
If the indicator has not moved to 1 mm, loosen the pump capscrews and rotate the pump in the required direction to bring the indicator to 1 mm. Tighten the capscrews to specified torque.



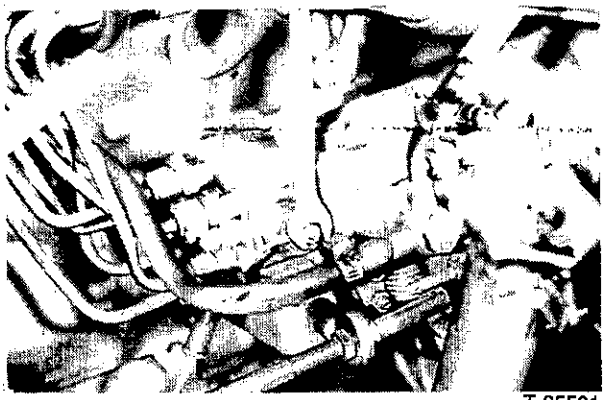
1.4.4.2.8
Attach fuel lines to pump

1.4.4.2.9
Connect fuel line bracket to side of engine.



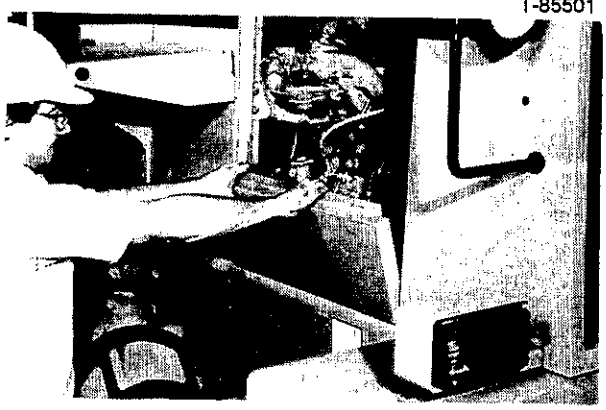
1.4.4.2.10
Attach throttle cable.

1.4.4.2.11
Connect fuel shut off solenoid wire.



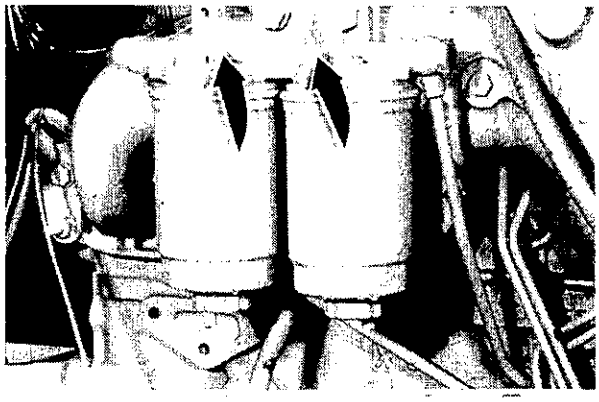
T-85501

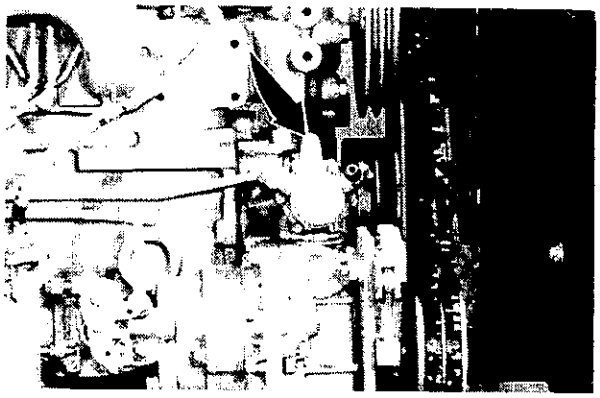
1.4.4.2.12
Install engine compartment lower panel.



FUEL PUMP

1.4.4.2.13
Bleed fuel system by loosening the two bleed screws at the top of the fuel filters. Stroke the transfer pump until all air is purged from the fuel lines. Tighten the bleed screws.





1.4.5.1 REMOVAL

1.4.5.1.1
Disconnect electrical system master switch.

⚠ WARNING

Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

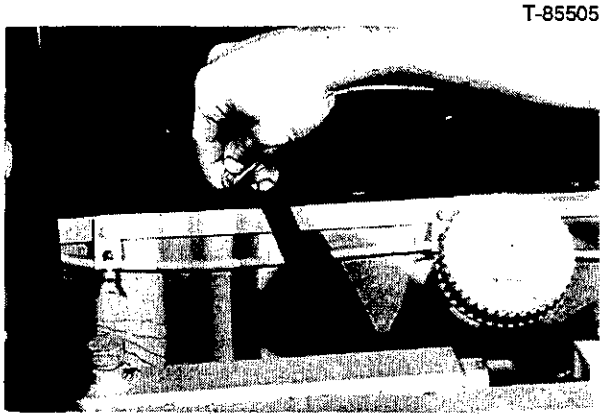
T-85504

1.4.5.1.2
Drain the radiator.

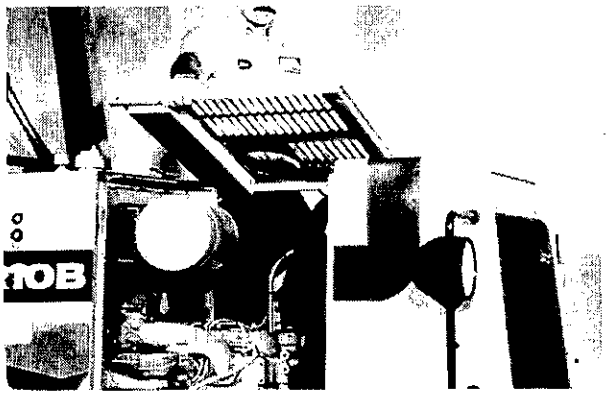
⚠ DANGER

Fluid under pressure - Turn cap or cover slowly to relieve pressure before removing or until pressure has been relieved as coolent may boil over and cause personal injury.

T-85505



1.4.5.1.3
Remove hood, doors and lower side panels.

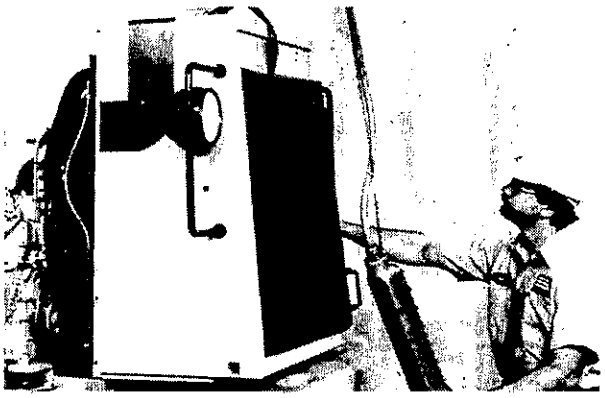


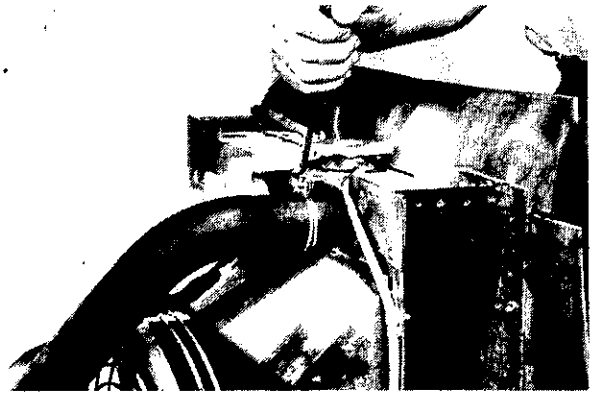
T-85482

1.4.5.1.4
Disconnect rear lights. Remove radiator guard.

⚠ WARNING

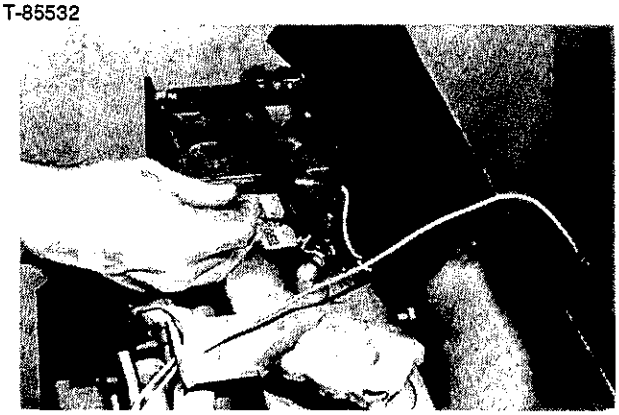
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.





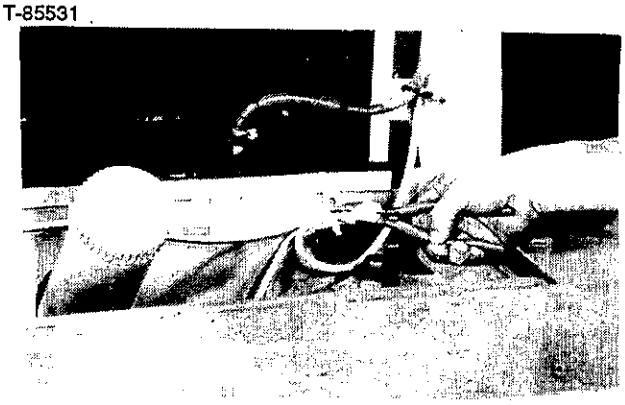
T-85532

1.4.5.1.5
Remove upper hose from radiator.

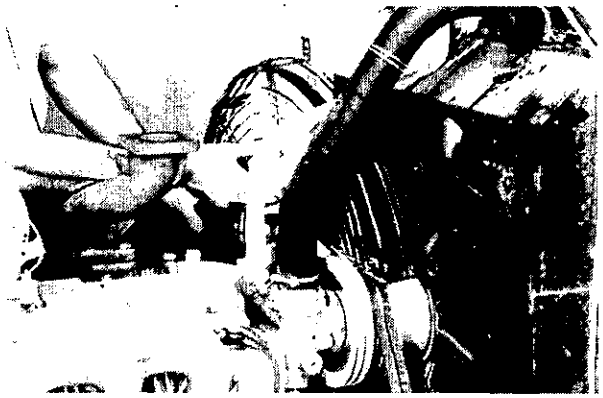


T-85531

1.4.5.1.6
Disconnect wire to radiator level sensor.



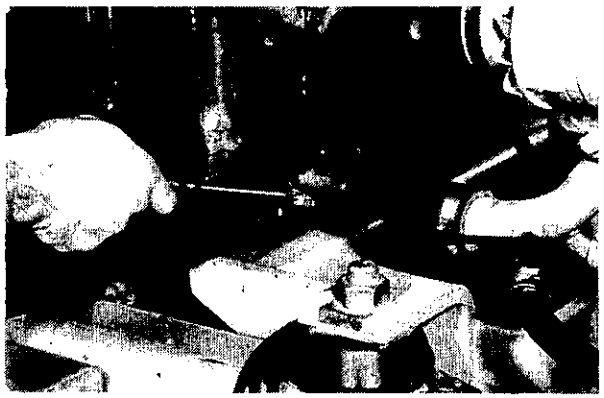
1.4.5.1.7
Remove electrical wires from radiator.



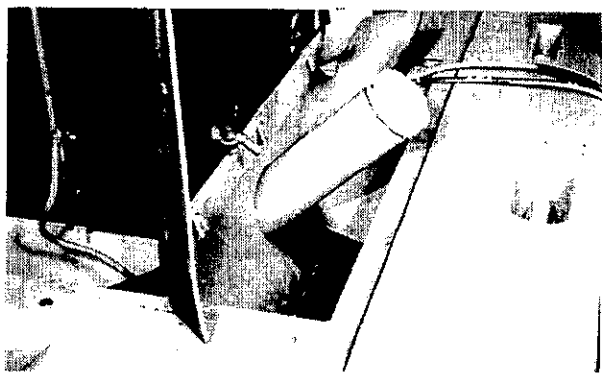
1.4.5.1.8
Remove fan guard.

1.4.5.1.9
Remove capscrew attaching brace to top of radiator.

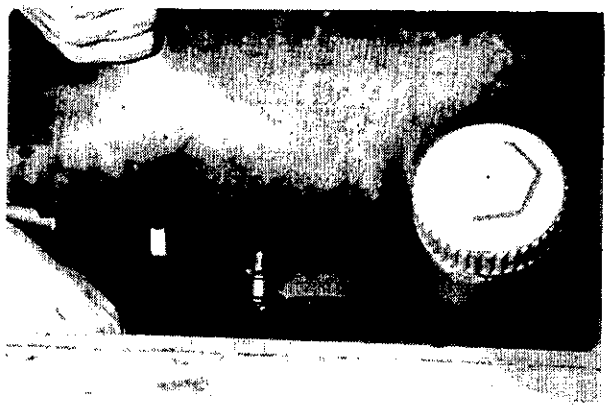
1.4.5.1.10
Remove lower hose from radiator.



1.4.5.1.11
Cut seal on bottom of radiator so seal will come off fuel filler tube.



1.4.5.1.12
Remove two capscrews attaching bottom of radiator.

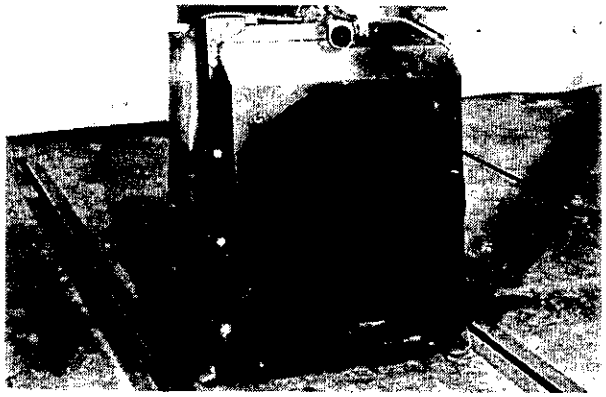


RADIATOR

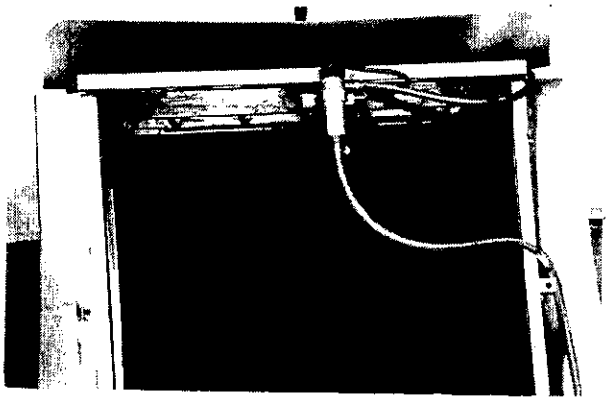
1.4.5.1.13
Using a suitable hoist and sling, remove radiator.

⚠ WARNING

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 i n the vicinity.



1.4.5.1.14
Remove fan shroud from radiator.



1.4.5.1.15
Remove seals and straps. Remove radiator coolant level sensor and tubes.

1.4.5.2.1
Installation of the radiator is the reverse of removal. Tighten all capscrews to their specified torque. Fill the radiator with specified fluid as described in the Operation and Maintenance Instruction Manual.

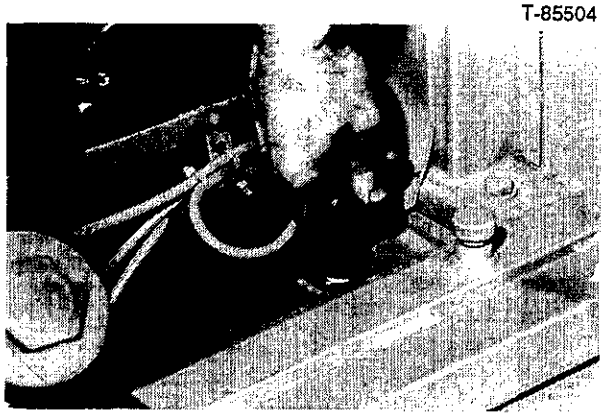
1.4.6.1 STARTER REMOVAL

1.4.6.1.1
Disconnect electrical system master switch.

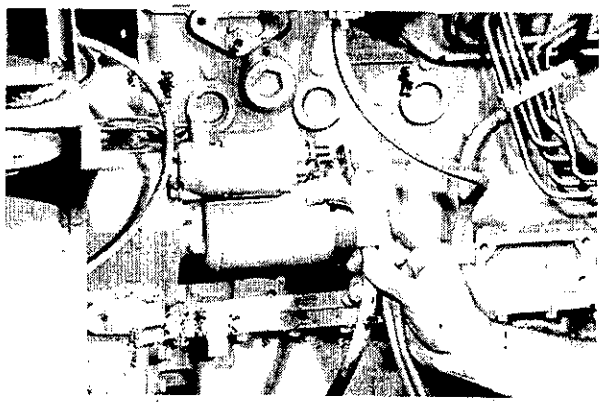
⚠ WARNING

Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

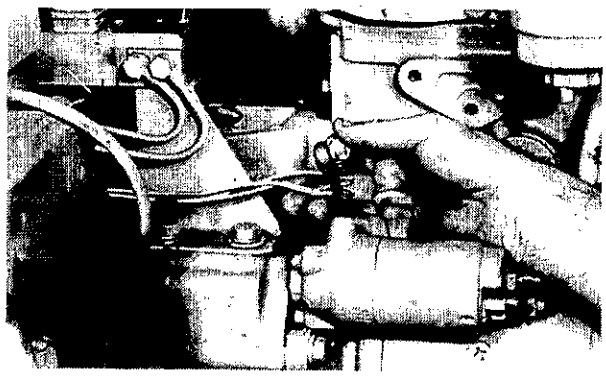
T-85504



1.4.6.1.2
Access to starter is through door by left rear wheel.

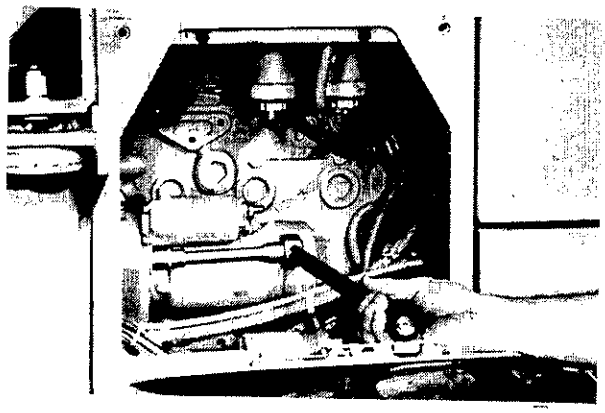


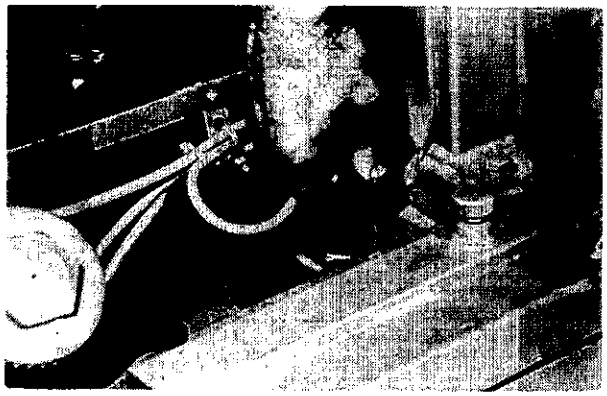
1.4.6.1.3
Tag and disconnect wires.



1.4.6.1.4
Remove attaching capscrews; remove starter. Refer to Manual 73146366 for starter repair.

Installation of the starter is the reverse of removal. Tighten capscrews to specified torque.



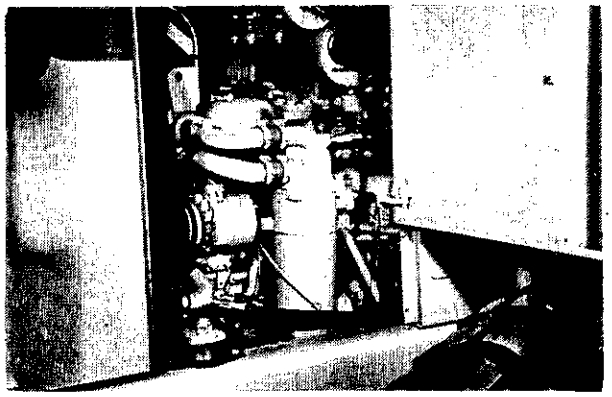


1.4.6.2 ALTERNATOR REMOVAL

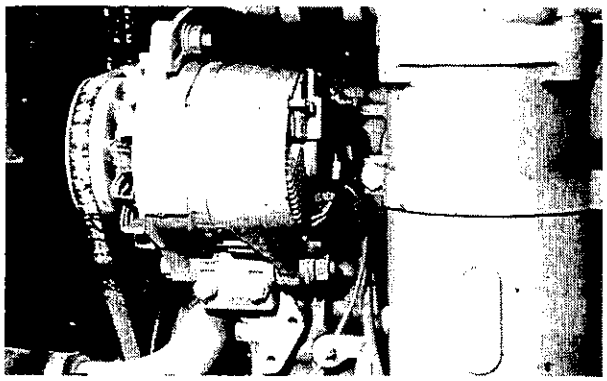
1.4.6.2.1
Disconnect electrical system master switch.

⚠ WARNING

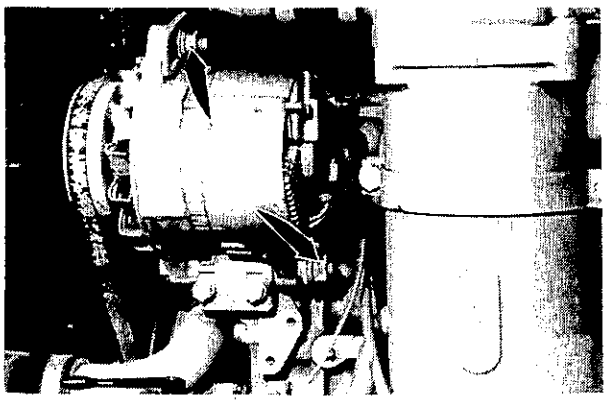
Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.



1.4.6.2.2
Open door to engine compartment. Remove lower panel.



1.4.6.2.3
Tag and disconnect wires from alternator.



1.4.6.2.4
Remove pivot and adjusting capscrews. Remove alternator. Refer to Manual 73146366 for alternator repair.

Installation of the alternator is the reverse of removal. Tighten capscrews to specified torque. Apply the correct tension upon the belt.

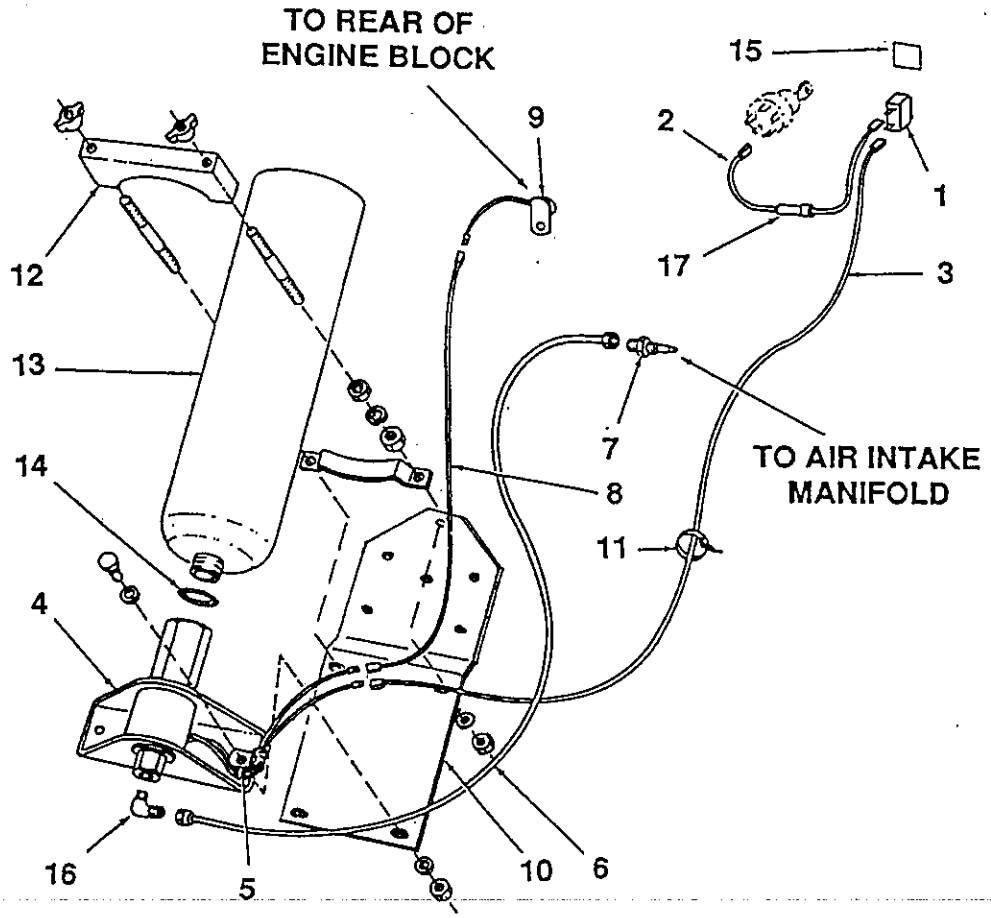
1.4.7 COLD WEATHER STARTING AID
(Special Equipment)

⚠ WARNING

Starting fluid is flammable - Do not puncture or burn containers. Follow precautions printed on containers for storage and disposal.

1.4.7.1
Cold weather starting aid is a system of injecting a measured amount of ether into the engine air intake to help start the engine in cold climates. The system consists of a cylinder of ether, a switch, valve, atomizer and the necessary tubing and wiring.

1.4.7.2
Incorporated in the electrical circuit is a temperature sensing device called a thermoguard. The purpose of the thermoguard is to break the electrical ground connection at a temperature of approximately 27°C (80°F) so the starting aid cannot be used when the engine is warm.



COLD WEATHER STARTING AID

1. Switch
2. Wire
3. Wire
4. Valve
5. Clamp
6. Tube
7. Atomizer (punch mark on hex must be "up")
8. Wire
9. Thermoguard
10. Bracket
11. Tie
12. Clamp
13. Cylinder
14. Gasket
15. Decal
16. Elbow
17. Fuse (15 amp)

1.4.7.3
When troubleshooting the system check for the following:

- empty cylinder
- damaged gasket
- position of atomizer
- condition of electrical circuit
- collapsed tubing

1.4.7.4
Assembly notes:

- Install atomizer with punch mark on hex facing toward air stream. Punch mark indicates location of orifice. Torque atomizer to 2.8 Nm (25 lbs. in) minimum.
- Thermoguard must touch engine.
- Torque capscrews attaching valve to 15 - 18 Nm (11 - 14 lbs. ft).

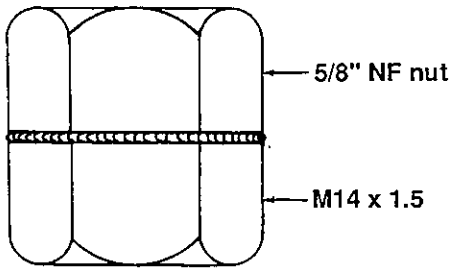
1.5 TOOLS

Tools that can be purchased from Fiatallis

STEP NO.	PART NO.	NAME
1.4.1.51	75292914	Load Rotor (2 ton)
Testing	75300820	Injector Nozzle Tester
	75300823	Injector Nozzle Connector Kit
1.4.4.2.3	75290774	Dial Gauge Holder
	75292197	Fuel Pump Dial Gauge (.01 mm stroke 30 - 60 mm)
1.4.6.	75300811	Belt Tension Gauge

Tools that can be made to assist in removal or rebuild of components.

STEP NO.	NAME
	Injector Puller Adaptor



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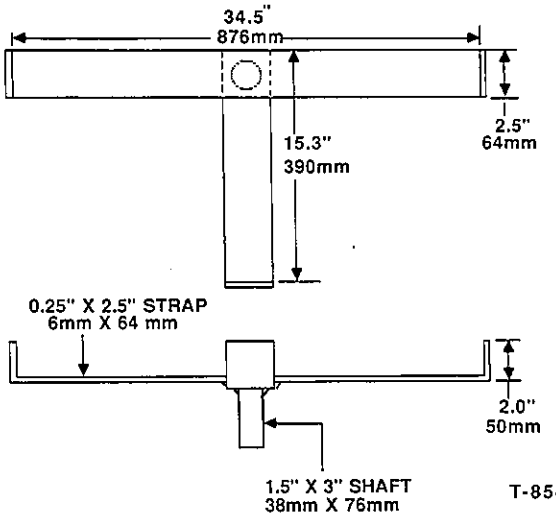
1.4.3.1.7 Fuel Tank support tool



T-85450

1.6.1 GENERAL

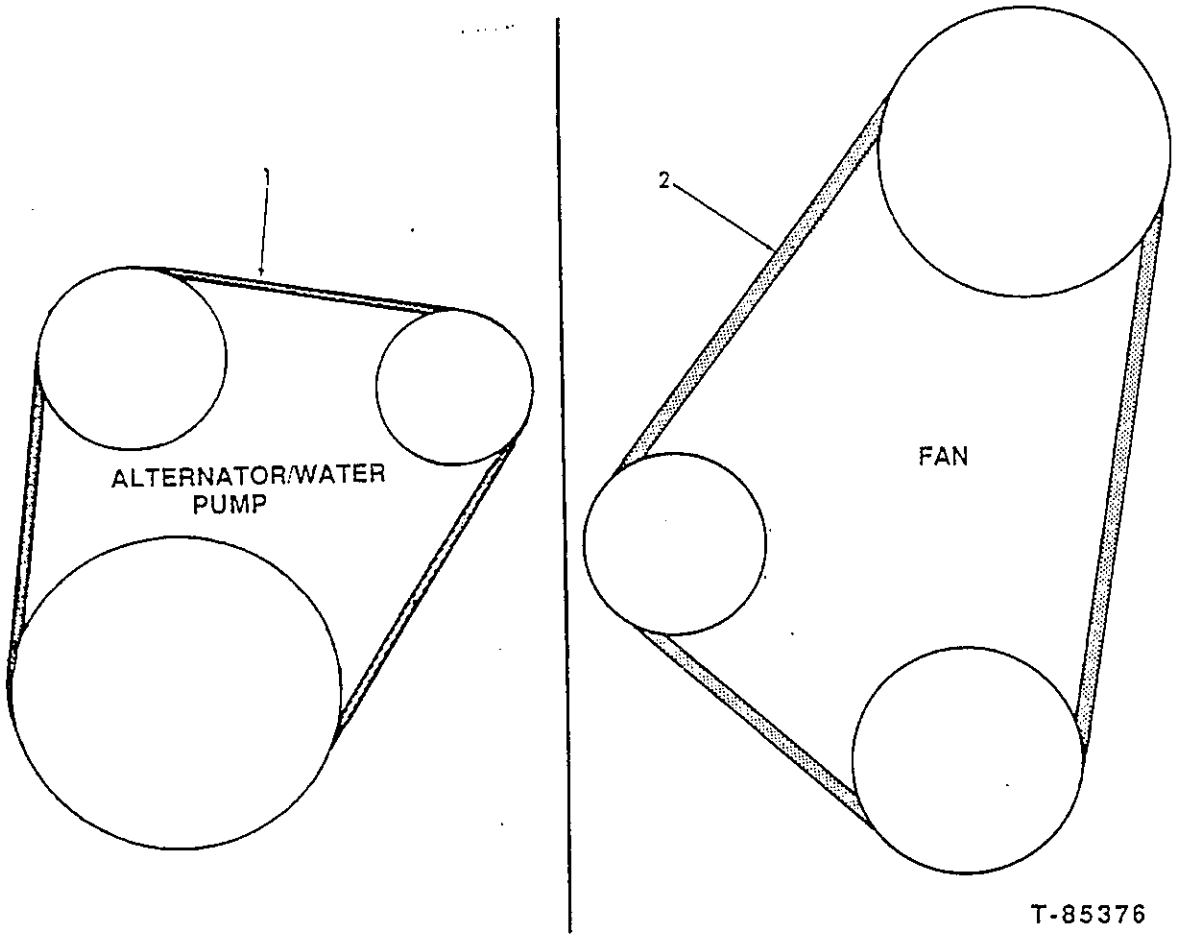
Make	IVECO
Model	8065.05.290
Type	Diesel, 4 cycle, naturally aspirated
Firing Order	1-5-3-6-2-4
Bore	104 mm (4.094")
Stroke	115 mm (4.528")
Displacement	5.9 liter (360 cu. in)
Compression Ratio	17:1
Cylinder Compression Pressure (@250 rpm)	
Normal	25.5 - 27.6 bar (370 - 400 psi)
Min. allowable	22 bar (320 psi)
Max. variation between cylinders	3 bar (43 psi)
Rotation (viewed from fan end)	Clockwise
Weight (dry)	450 kg (1000 lbs)
Number of Main Bearings	7
Valve Clearance (cold)	
Intake	0.25 mm (0.010")
Exhaust	0.35 mm (0.014")
Low Idle	780 - 830 rpm
High Idle	2700 - 2750 rpm
Converter Stall	2530 - 2630 rpm
Full Stall	2000 - 2120 rpm
Exhaust Manifold Temp(at converter stall)	641 - 658°C (1185-1215°F)
Intake Manifold Restriction	
Normal	250 mm H_2O (9.8" H_2O)
Max. allowable	625 mm H_2O (25" H_2O)
Injection Timing (static)	5° BTDC ± 1°

1.6.2 FUEL INJECTION

Injection pump	Bosch VE distributor type
Injection timing (static)	5° BTDC ± 1°
Automatic advance	
Nozzle open pressure	230 - 238 bar (335 - 3450 psi)
Transfer pump pressure	

1.6.3 DRIVE BELT ADJUSTMENT

1. New belt - 10 mm (0.4") deflection with a force of 58 - 78 N (13 - 17 lbs)
   Used belt - 10 mm (0.4") deflection with a force of 43 - 63 N (10 - 14 lbs)
2. New belt - 10 mm (0.4") deflection with a force of 53 - 71 N (12 - 16 lbs)
   Used belt - 10 mm (0.4") deflection with a force of 41 - 55 N (9-12 lbs)



1.6.4 TORQUE VALUES

		Nm	lbs. ft
	Fan hub capscrew	160 - 200	118 - 147
	Fan capscrews	70	51
	Nozzle holder nut	50-70	37-51
	Nozzle hold-down nuts	23	17
1.4.1.6	Muffler capscrews	70	51
1.4.1.16	Hydraulic tank to frame capscrews	70	51
1.4.1.45	Flex plate capscrews	19 - 20	14 - 15
1.4.1.54	Engine mounting bracket to frame capscrew	294	217
1.4.2.8	Transmission to engine capscrews		
	35 mm long	55	40
	40 mm long	65 - 70	48 - 52
1.4.3.1.5	Fuel filler tube capscrews	33	24
1.4.3.1.8	Fuel tank capscrews	70	51
1.4.5.1.4	Radiator guard to frame capscrews	70	51
1.4.5.1.8	Fan guard capscrews	33	24
1.4.5.1.12	Radiator capscrews	123	90
1.4.6.1.4	Starter capscrews	50	36

2.6 SPECIFICATIONS

TORQUES

PARAGRAPH	TORQUE
2.4.2.10	65-70 Nm (47.9-51.6 lbs.ft.)
2.4.2.11	65-70 Nm (47.9-51.6 lbs.ft.)
2.4.2.12	19-20 Nm (14-14.7 lbs.ft.)
2.4.2.13	19-20 Nm (14-14.7 lbs.ft.)
2.4.2.16	294 Nm (217 lbs.ft.)
2.4.2.17	508.4 Nm (375 lbs.ft.)
2.4.2.25	31.2-33.9 Nm (23-25 lbs.ft.)
2.4.2.33	66.4 Nm (49 lbs.ft.)
2.4.2.34	66.4 Nm (49 lbs.ft.)
2.4.2.35	45-50 Nm (33.2-36.9 lbs.ft.)
2.4.2.41	65-70 Nm (47.9-51.6 lbs.ft.)
2.4.2.46	50-61 Nm (37-45 lbs.ft.)
2.4.2.49	142.4 Nm (105 lbs.ft.)
2.4.2.54	32.8 Nm (24 lbs.ft.)
2.4.2.55	70 Nm (51 lbs.ft.)
2.4.2.56	10.3 Nm (8 lbs.ft.)
2.4.2.57	70 Nm (51 lbs.ft.)
2.4.2.58	70 Nm (51 lbs.ft.)
2.4.2.59	32.8 Nm (24 lbs.ft.)
2.4.2.60	70 Nm (51 lbs.ft.)
2.4.11.5	31.2-33.9 Nm (23-25 lbs.ft.)
2.4.11.10	78.6-86.8 Nm (58-64 lbs.ft.)
2.4.11.11	78.6-86.8 Nm (58-64 lbs.ft.)
2.4.11.29	271.2-339.0 Nm (200-250 lbs.ft.)
2.4.11.38	50.2-55.6 Nm (37-41 lbs.ft.)
2.4.11.41	123.4-135.6 Nm (91-100 lbs.ft.)
2.4.11.42	271.2-339.0 Nm (200-250 lbs.ft.)

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SECTION 2

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2.6	**SPECIFICATIONS**	2-115

2.1 GENERAL DESCRIPTION

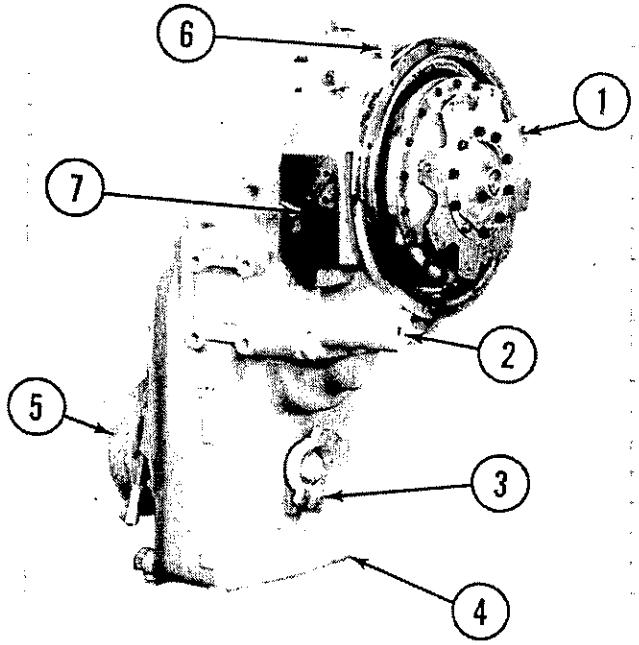

FIG.2-1 TRANSMISSION (3/4 Front View)

1. Flex Plate
2. Suction Screen
3. Output Shaft
4. Transmission
5. Parking Brake
6. Breather
7. Control Valve

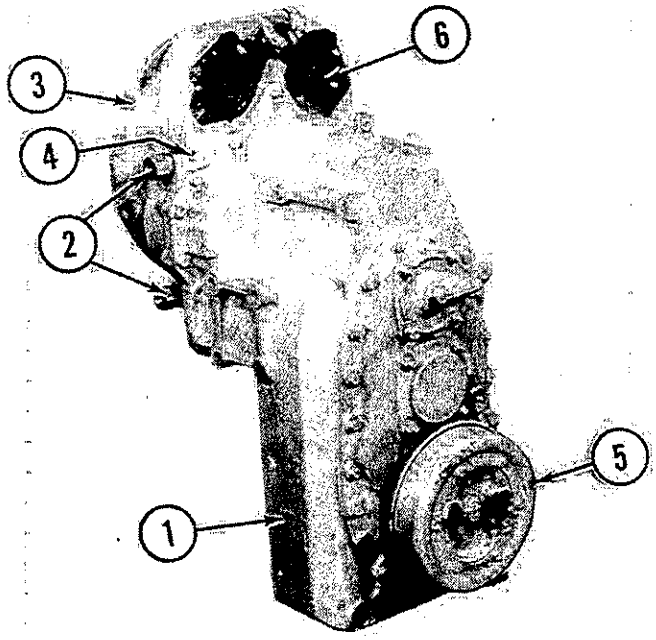

FIG. 2-2 TRANSMISSION (3/4 Rear View)

1. Transmission
2. Oil Cooler Ports
3. Torque Converter
4. Converter Temperature Port
5. Parking Brake
6. Charging Oil Pump

2.1.1 GENERAL

The torque converter and transmission is an integral, 3-speed unit. It is driven directly from the engine through a flex plate coupling. The unit contains 5 clutch packs (forward, reverse, 1st, 2nd and 3rd) and is full power shift.

2.1.2 OPERATION

The torque converter is a single stage, three element (impeller, turbine and reaction member). The impeller acts as a centrifugal pump, picking up the oil flow at its center and discharging the oil from its outer diameter to the turbine. The turbine (output member) discharges the oil from its center to the reaction member (sometimes called a guide wheel or stator). The reaction member changes the direction of the fluid flow, and fluid re-enters the impeller in the direction of the impeller flow; this is the oil flow (vortex flow) that is the means of multiplying torque.

2.1 GENERAL DESCRIPTION

During operation, the "converter" charging pump, draws oil from the transmission sump, through a removable suction screen, directs the oil through the pressure regulating valve to the modulating valve, and the declutch valve, to the remote mounted full-flow filter. The larger oil flow is directed to the converter, through the oil cooler, and to a series of passages to lubricate the transmission clutches, gears and shafts before returning to sump.

The pressure regulating valve maintains pressure in the control valve to actuate the clutches upon demand.

The modulating valve is activated when the forward/reverse lever passes through neutral, or the declutch valve is activated, allowing a smoothe shift by momentarily restricting the forward/reverse clutch oil flow. This prevents shift-shock damage to the power train components.

The declutch valve is activated when the brake pedal is depressed (when valve is in the "on" position) opening the pressure regulating valve, dumping clutch pressure which essentially shifts transmission to neutral (forward or reverse clutches are de-activated).

2.1.3 SERIAL NUMBER LOCATION

The transmission model and serial numbers are located on a plate mounted on the bottom, left corner of the transmission housing below the parking brake assembly, Fig. 2-3.

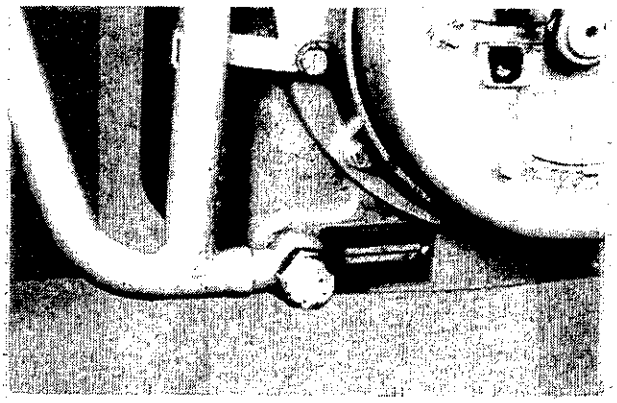

FIG. 2-3 MODEL AND SERIAL NUMBER

2.2 TROUBLESHOOTING

Troubleshooting is an aid to locating the source of difficulty in a malfunctioning unit. It is necessary to consider the torque converter, charging pump, transmission, oil cooler and connecting lines as a complete system when searching for the source of trouble since the proper operation of any unit depends on the condition of the others. By studying the principals of operation, together with data in this manual, it may be possible to correct any malfunction which may occur in the system. Troubleshooting procedure basically consists of two classifications: MECHANICAL and HYDRAULIC.

⚠ WARNING

Warn all people who may be servicing or working around machine before starting engine.

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

Observe all start up and shut down procedures and "WARNINGS" listed in the operation and maintenance instruction manual.

2.2.1 MECHANICAL CHECKS

Prior to checking the hydraulic portion of the system, the following checks should be made.

1. Check to be sure all control lever linkage is properly connected and adjusted at all connecting points.

2. Check shift levers and rods for binding or restrictions in travel that would prevent full engagement. Shift levers by hand at the control valve. If full engagement cannot be obtained, difficulty may be in the control cover and valve assembly.

2.2.2 HYDRAULIC CHECKS

Prior to checking the torque converter and transmission pressures and rate of oil flow, the following preliminary checks should be made.

1. Check oil level in the transmission. This shopuld be done with the oil temperature at 82.2°-83.3°C (180°-200°F). Do NOT check with cold oil. To bring the oil temperature to this specification it is necessary to "stall" out the converter (Refer to "TESTING SYSTEMS" for stall test precedures).

2. Transmission pressure may be checked at various points around the transmission. (Refer to "TESTING SYSTEMS" for pressure checking precedures)..

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Low clutch pressure.	1. Low oil level 2. Clutch pressure regulating valve stuck open 3. Faulty charging pump 4. Broken or worn clutch shaft or piston sealing rings 5. clutch piston bleed valve stuck open			1. Fill to proper level 2. Clean valve spool and housing 3. Replace pump 4. Repair or replace parts as needed 5. Clean bleed valve thoroughly
Low converter outlet pressure	1. Low oil level 2. Suction screen plugged 3. Defective oil pump			1. Fill to proper level 2. Clean suction sreen 3. Repair or replace pump
Overheating	1. Worn oil sealing rings 2. Worn oil pump 3. Low oil level			1. Repair or replace parts as needed 2. Replace pump 3. Fill to proper level
Noisy converter	1. Worn oil pump 2. Worn or damaged bearings			1. Replace pump 2. A complete overhaul is necessary to determine what bearing is faulty
Lack of power	1. Low engine rpm at converter stall 2. Refer to "Overheating" and make same checks			1. Correct engine problem 2. Make corrections as explained in "Overheating"

2.3 TESTING SYSTEMS

2.3.1 TRANSMISSION LINKAGE ADJUSTMENT

The shift linkage will need adjustment anytime it is suspected that the transmission is not fully engaged in one range. Overheating of the converter, slippage or erratic operation are some of the signs of not fully engaging in one range. Inspect linkage for loose or broken parts. Adjust the linkage as follows:

1. Put shift lever(1), Fig. 2-4, in the neutral position, set the parking brake and make certain the transmission control valve plunger is in the neutral position.

2. Loosen the locknuts(2) on rod(3) and adjust to the desired position. After the desired position is obtained, tighten the locknuts on both ends of the rod.

3. Set the shift lever in 1st gear and check the control valve plunger, making certain it is in 1st gear position (there is a neutral position on this spool and must not be confused with the 1st gear position).

4. Loosen the locknuts(4) on the rod(5) and adjust to the desired position. After the desired position is obtained, tighten the locknuts on both ends of the rod.

5. Pass the shift lever through all gears in forward and reverse. Observe both plungers on the control valve making certain their position corresponds to the position on the shift lever.

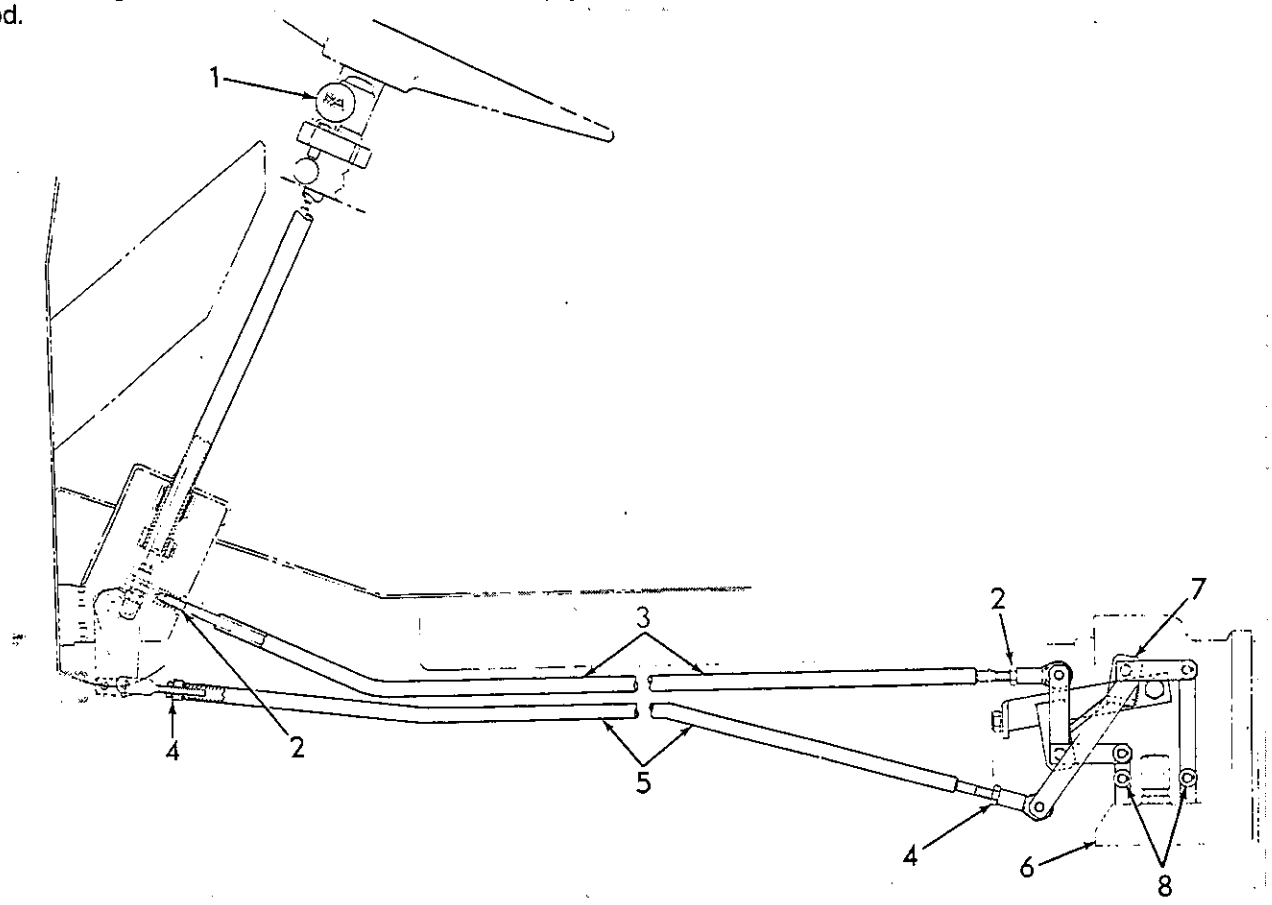

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FIG.2-4 TRANSMISSION SHIFT LINKAGE

1. Control lever
2. Locknut
3. Rod
4. Locknut
5. Rod
6. Control valve
7. Linkage assy.
8. Pins

2.3 TESTING SYSTEMS

2.3.2 PARKING BRAKE ADJUSTMENT

The parking brake assembly is a mechanical brake with internal expanding shoes. The shoeassembly plate is bolted to a boss at the front of the transmission housing. The drum is bolted to the front output flange of the transmission. Adjust the parking brake as follows:

⚠ WARNING

Always turn the master switch to the off position before cleaning, repairing,servicing or parking the machine to prevent injury.

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

1. Block the tires to prevent the loader from moving.

2. Disconnect the rear drive shaft from the parking brake flange.

3. Remove the capscrews (6), Fig. 2-5, and lockwashers attaching the brake drum (5) to the flange (4).

4. Loosen the locknut on the tierod (13), and rotate the adapter (14) until the lever (2) can be adjusted to give a 0.25mm (0.010 in.) clearance between the brake shoes (3) and the brake drum (5).

5. Tighten the locknut on the tierod (13) securing the adapter (14).

6. Install the capscrews (6) and lockwashers attaching the brake drum (5) to the flange (4).

7. Install the rear drive shaft to the parking brake flange..

8. Check the brake holding ability by parking the loader on a reasonable grade or incline.

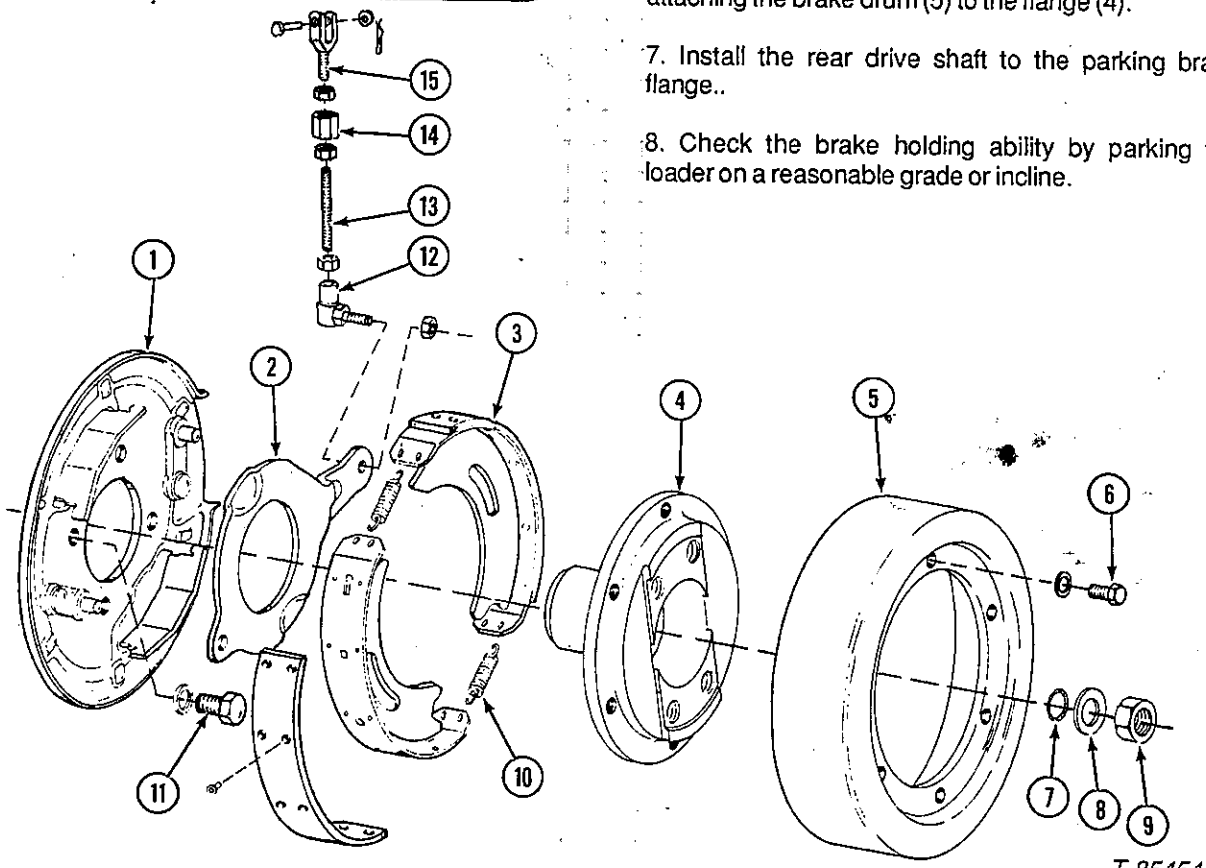

FIG.2-5 PARKING BRAKE

1. Backing plate
2. Lever
3. Brake shoe
4. Flange
5. Drum
6. Capscrew
7. O-ring
8. Washer
9. Nut
10. Return spring
11. Capscrew
12. Ball joint
13. Tie rod
14. Adapter
15. Clevis

2.3 TESTING SYSTEMS

2
.3.3 CONVERTER STALL TEST

A stall test should be conducted when the power package (engine and transmission) is not performing satisfactorily. The purpose of the test is to determine if the transmission is the malfuctioning component. A stall test is conducted with the engine running at full throttle, and the transmission outputs stalled. Conduct the converter stall test as follows:

⚠ WARNING

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

Before moving machine or attachments, be sure exposed people in the area are clear of the machine. Walk completely around machine before mounting. Sound horn.

Observe all start up and shut down procedures and "**WARNINGS**" listed in the operation and maintenance instruction manual.

1. Connect a tachometer of known accuracy to the engine and bring the transmission to normal operating temperature 82.2°-93.3°C (180°-200°F). Do NOT attempt these checks with cold oil.

NOTE: The stall condition should never be maintained for more than 30 seconds at any one time because of the rapid rise in oil temperature.

2. Lower the bucket and block the tires securely. Set the declutch valve in the "off" position. Apply the right brake pedal with the left foot. Shift the selector lever to high forward. Accelerate the engine with the right foot, keeping pressure on the right brake pedal with the left foot.

3. Accelerate the engine half to three-quarters throttle. After reaching a stabilized converter-out temperature of 82.2°C (180°F) minimum, record the engine speed. Do NOT let the converter-out temperature exceed 121°C (250°F).

NOTE: Allow approximately two minutes of neutral operation between stall tests to prevent overheating. During the two minute period, engine speed must be maintained (except for the momentary throttle release when shifting to neutral).

RESULTS: Under stall test conditions, a comparison of actual engine speed with the established normal speed for such conditions will indicate if the engine or transmission is malfunctioning.

NOTE: Environmental conditions, such as ambient temperature, altitude, engine accessory loss variations, etc., affect the power input to the converter. These conditions may cause the stall speed to vary 150rpm from the established normal value. When deviation can be attributed to such causes, the actual speed can be accepted as normal.

2.3.4 FLOW/PRESSURE TEST PROCEDURES

Prior to checking the torque converter and transmission pressures and rate of oil flow, the following preliminary check should be made.

Check the oil level in the transmission. This should be done with the oil temperature at 82.2°-93.3°C (180°-200°C). Do NOT attempt this check with cold oil. To bring the oil temperature to this specification, it is necessary to either work the machine or "stall" out the converter (see paragraph 2.3.3).

⚠ WARNING

Holding stall speeds for excessive lengths of time will overheat the converter.

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

Warn all people who may be servicing or working around machine before starting engine.

Never leave machine unattended with the engine running.

Check both gauges in the instrument panel for temperature and pressure. If main pressure is within specifications (or if after making repairs to obtain specified main pressure and original trouble still exists) check and record all pressures so comparisons can be made.

2.3 TESTING SYSTEMS

Pressure gauge connection points for all the system pressures are indicated in Fig.s 2-7 and 2-8. All pressure check connections can be made at the same time. The pressure gauge connected at each point should have a capacity high enough to check the desired pressure, but not so high that the exact pressure is difficult to obtain.

It is suggested that the test kit shown in Fig.2-6, be used to check the system pressures and flows. The kit contains eight pressure gauges of various capacities, a 50 gph flow meter, and a tachometer. Oil lines and fittings are furnished with the kit.

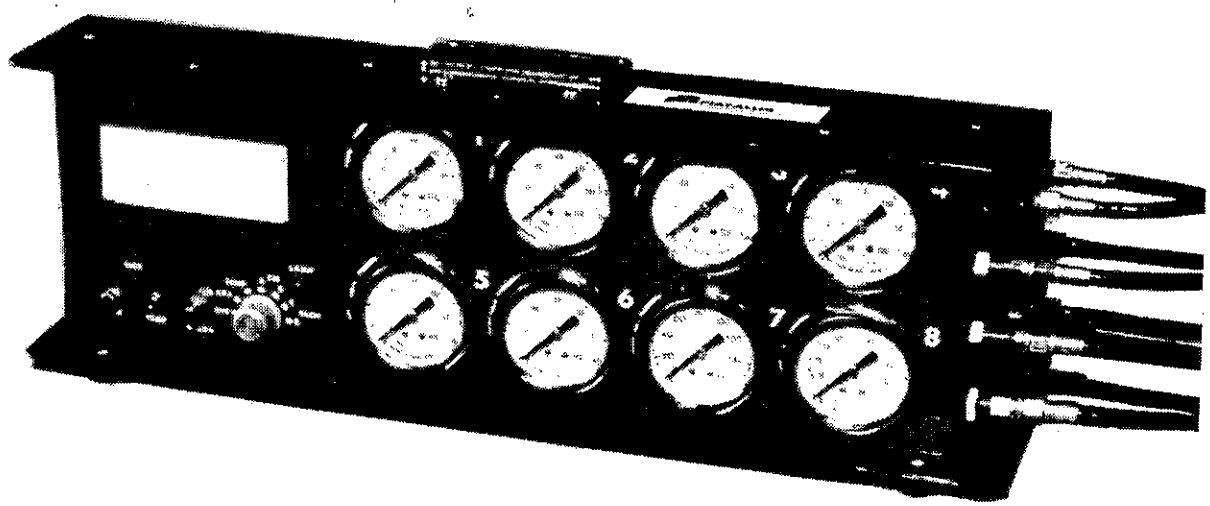

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FIG. 2-6 PRESSURE GAUGES (TG-100C)

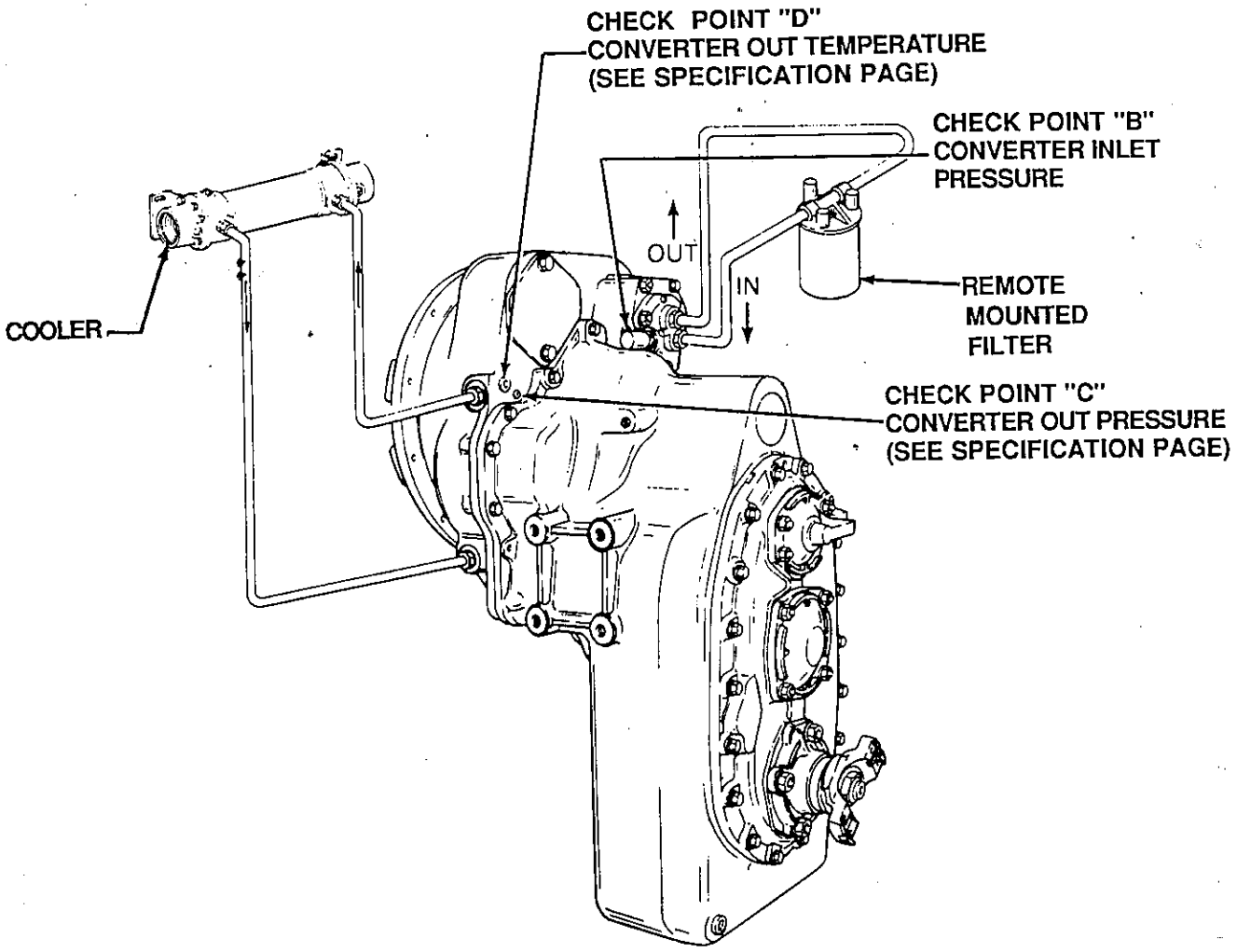

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FIG. 2-7 PRESSURE CHECK POINTS

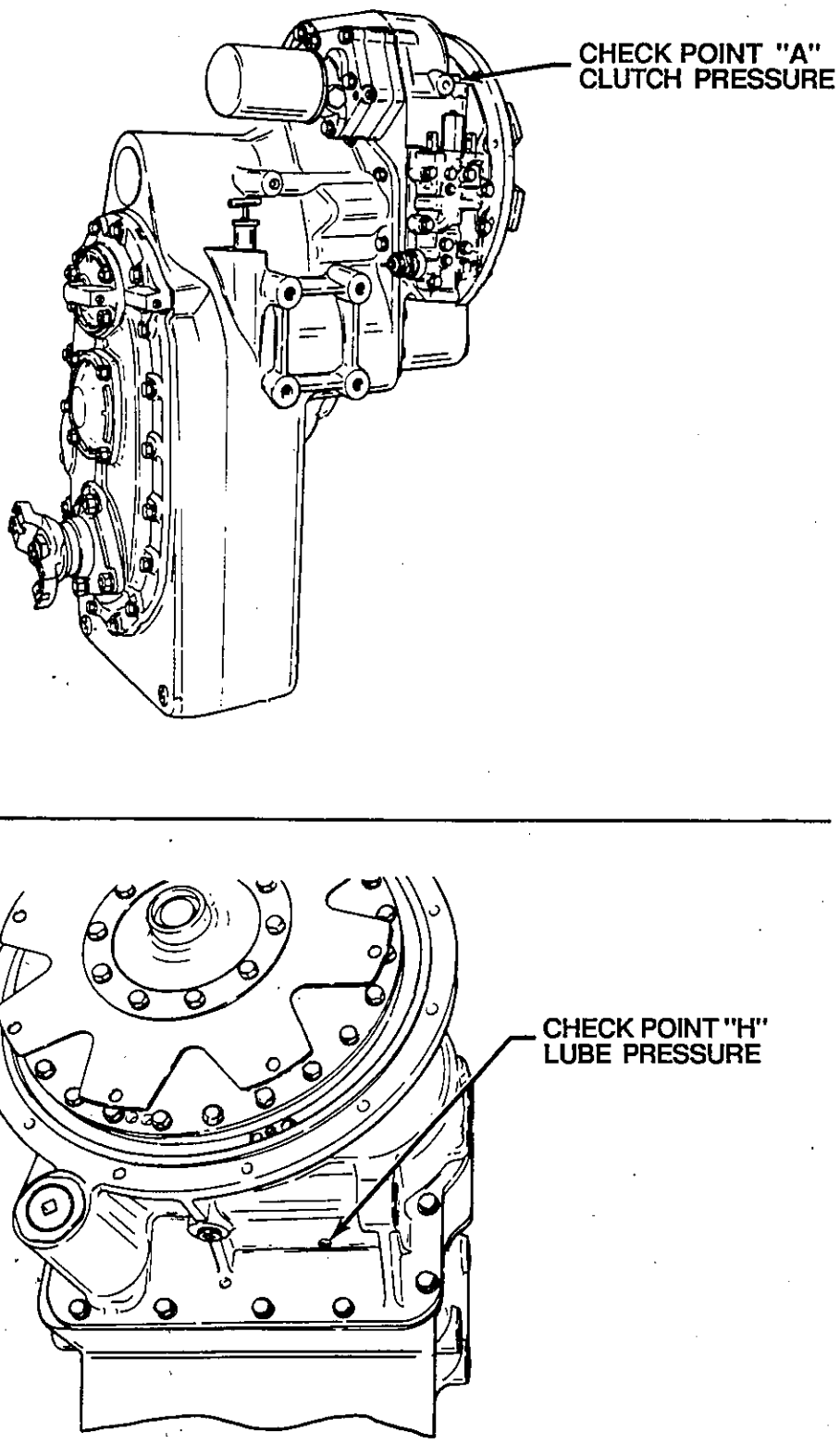

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FIG. 2-8 PRESSURE CHECK POINTS

2.3 TESTING SYSTEMS

Although the same pressure readings will result from individual pressure checks, the sequence of pressure changes when a direction shift is made may give the mechanic a little better understanding of the hydraulic system.

Observe the pressure while the shift is being made and after the shift has been completed. If the specified pressures cannot be obtained, the trouble can be located by checking the individual pressures.

Main pressure check results:

No pressure. Check pump for worn or damaged parts.

Low and erratic pressure. Suction line screen clogged. Remove and clean the screen.

Low pressure in one speed clutch or one direction clutch. Seal leaking in the clutch which has low pressure. Flow check the clutch to ascertain the problem.

Low pressure in both directions and all speeds. Failure in main pressure regulator valve. Remove valve and check pressure regulating springs. If valve meets specifications, low pump output may be the cause. Check pump flow.

Transmission lube pressure check:

Low main pressure. Pressure regulating valve set too low.

Pressure remains at lube when clutch should be engaged. Check shifter valve for clogged oil passages or the spool is stuck in its bore.

Both pressures within specification in one range but low in the other range. Indicates excessive leakage in the clutch with low pressures, (operation will be sluggish in this range). Remove clutch and replace seals. Check flow with transmission shift lever in neutral and engine at high idle. Be sure the transmission main pressure is within specifications.

Transmission pump flow check results:

No flow. Pump worn or damaged. Repair or replace parts as needed.

Low flow. Flow meter needle fluctuates during check. Suction line screen clogged and/or leak in suction line. Remove and clean screen or tighten suction line fittings.

Transmission clutch apply flow check results:

Low flow in both ranges can be caused by low pump flow. If pump flow is within specifications, the cause is a restriction in the control valve selector spool. Check selector spool for full movement into each detent position. Adjust linkage if necessary. Low flow in one range will be caused by a restriction in the affected shifter valve. Remove the valve and check movement of the spool in the bore.

High flow in one clutch. Check affected clutch for leakage and make necessary repairs.

Converter in/out flow check results:

Install flowmeter to converter "in" port. Check flow in 3rd forward and 3rd reverse.

Install flowmeter to converter "out" port. Check flow in 3rd forward and 3rd reverse.

Compare "in" and "out" flows to determine internal converter problems.

Transmission lube flow check results:

Check flow in all three ranges in forward and reverse.

Low flow. Indication of low output by transmission pump or leakage some place in system.

If pump flow and transmission clutch apply flow are within specifications, regulator valve may be stuck. If regulator valve is not at fault, leakage is in the torque converter. Disassemble the converter and inspect for damaged seal rings.

High flow. Torque converter and transmission pressure also high. Failure in pressure regulator valve. Repair or replace parts as needed.

2.4 REPAIR PROCEDURES

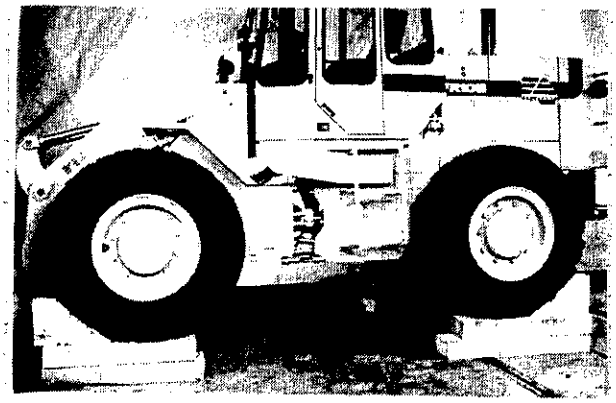
2.4.1 REMOVAL

⚠ WARNING

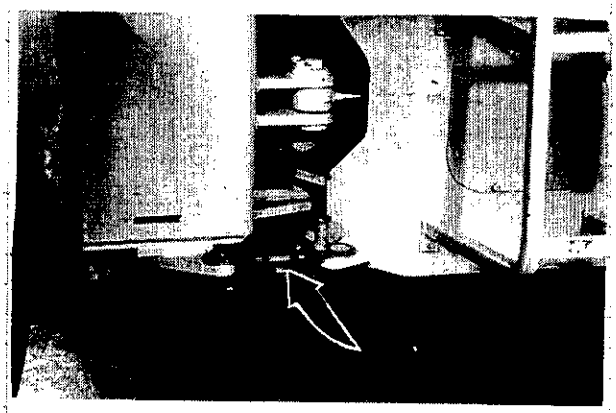
Do not work under or near an unblocked or unsupported linkage, parts or machine.

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.

Always turn the master switch to the off position before cleaning, repairing, servicing or parking the machine to prevent injury.

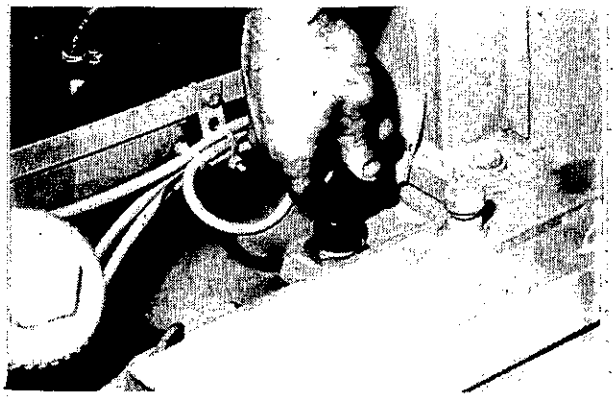


2.4.1.1
Position loader on suitable blocks or jack stands at a height of approximately 457.2 mm (18 inches), and lower bucket to ground or blocks.



2.4.1.2
Install articulation lock bar.

2.4.1.3
Turn electrical master switch to the "OFF" position.



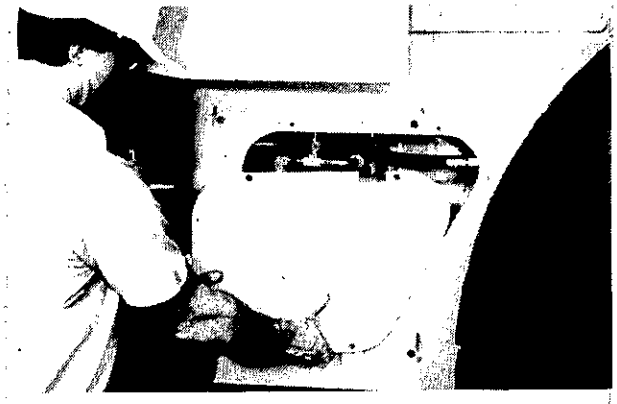
2.4.1.4
Drain transmission fluid.

2.4.1.5
Drain hydraulic tank.

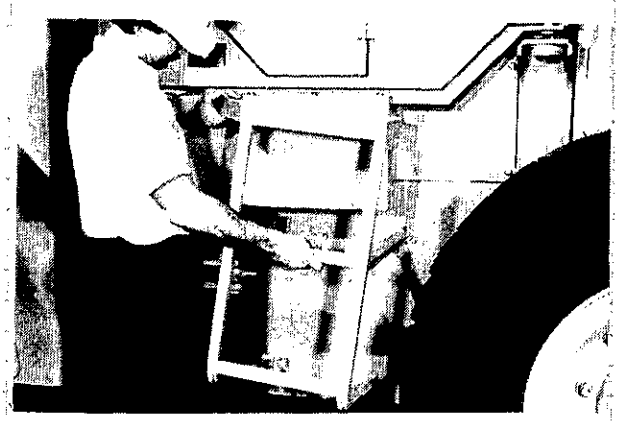
2.4.1.6
Remove fenders.

⚠ WARNING

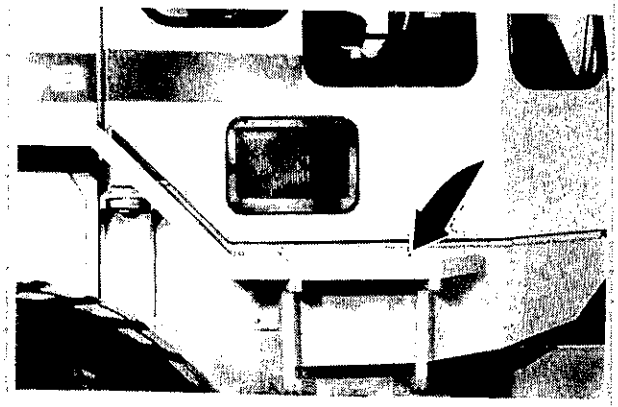
When servicing or maintenance requires access to areas that cannot be reached from the ground, use a ladder or step platform that meets local or national requirements to reach the service point. Perform all service or maintenance carefully.



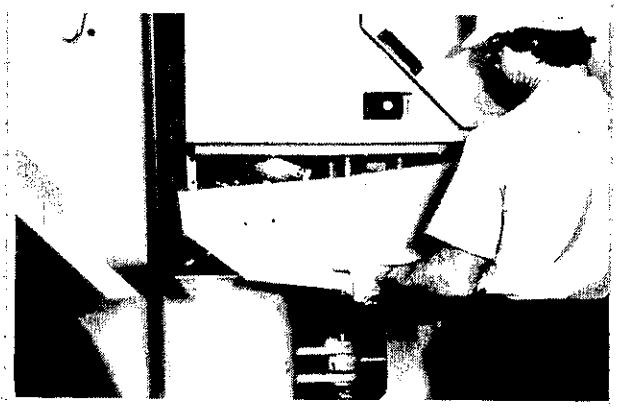
2.4.1.7
Remove side access panels.



2.4.1.8
Remove left side ladder.

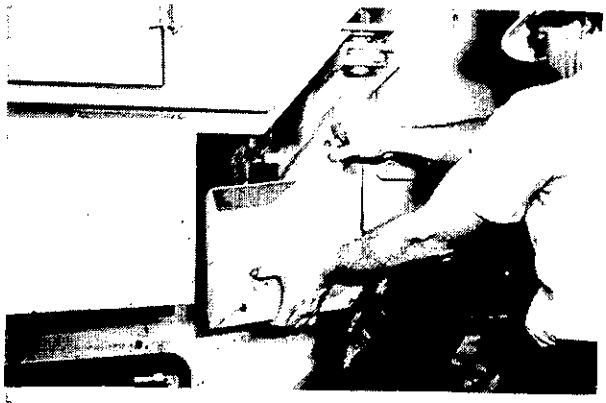


2.4.1.9
Remove right side platform.

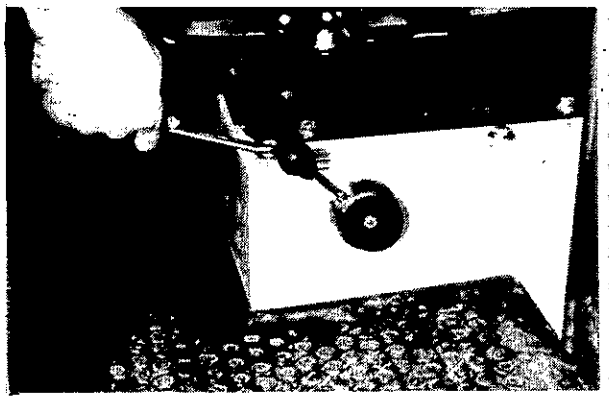


2.4.1.10
Remove skirting around bottom of cab.

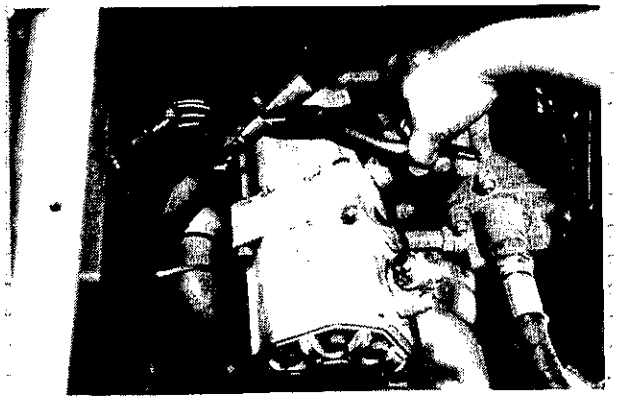
2.4.1.11
Remove cab corner access panel.



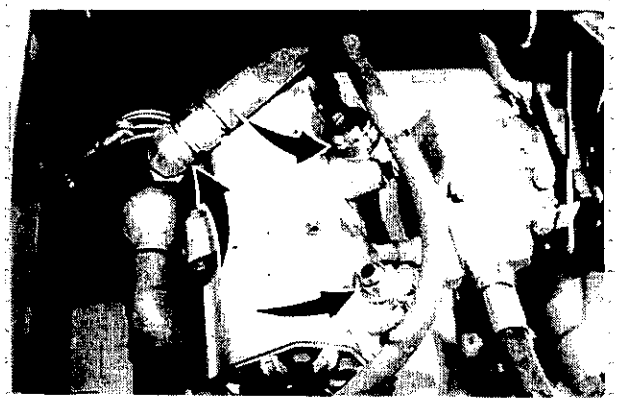
2.4.1.12
Remove seat and suspension assembly.



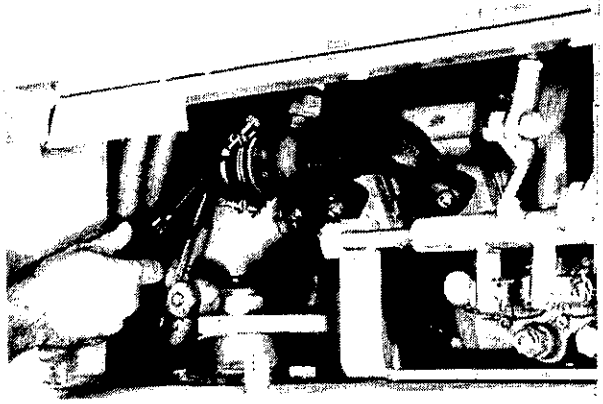
2.4.1.13
Cut and remove two ties from lines from hydraulic tank.



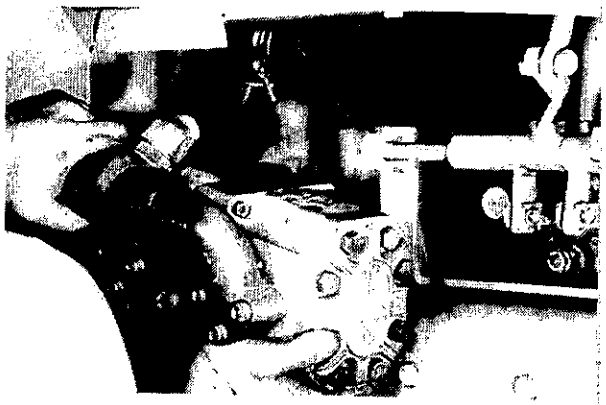
2.4.1.14
Disconnect and tag three lines to implement hydraulic pump.



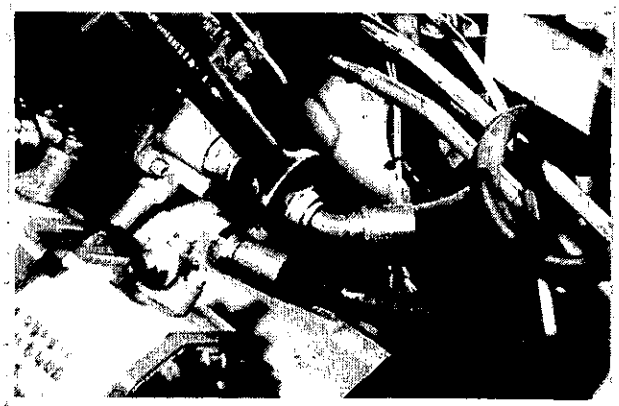
2.4.1.15
Disconnect and tag small line from hydraulic valve.



2.4.1.16
Remove two clamps attaching hose from hydraulic tank to pump.

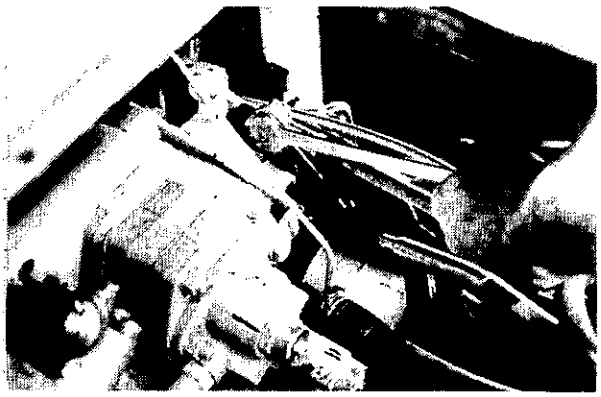


2.4.1.17
Remove capscrews attaching the implement hydraulic pump and remove pump.

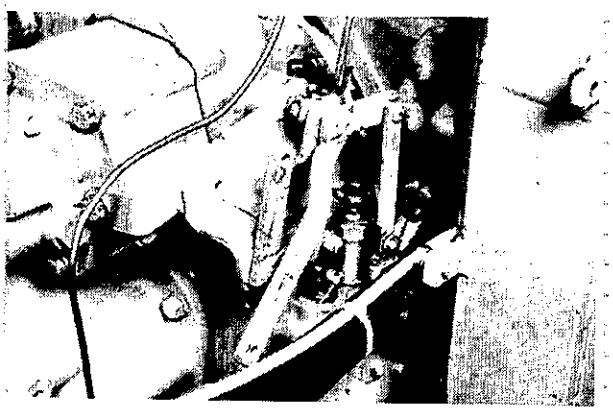


2.4.1.18
Disconnect and tag two lines from transmission filter to transmission charging pump.

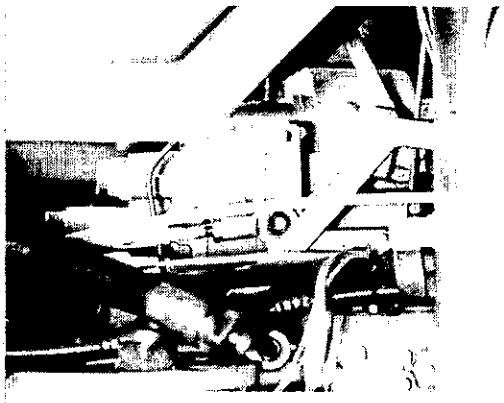
2.4.1.19
Disconnect and tag two rods from transmission shift linkage at the valve.



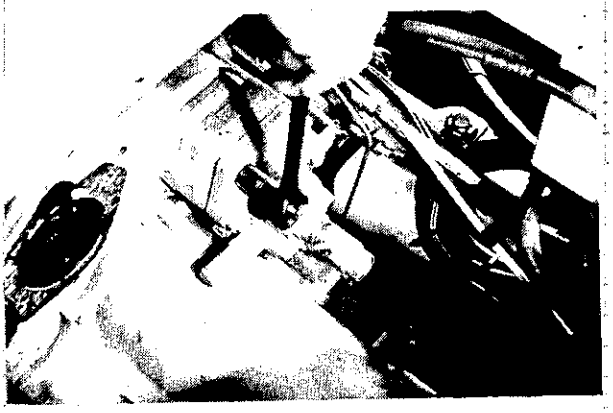
2.4.1.20
Remove pins and cotter pins attaching linkage assembly to valve.

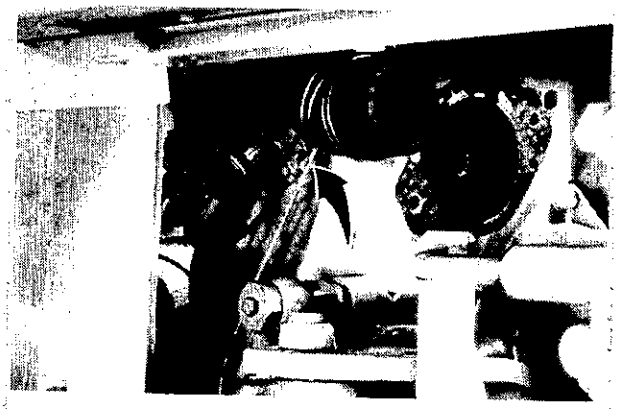


2.4.1.21
Remove capscrews and washers attaching linkage to pump and converter housing.

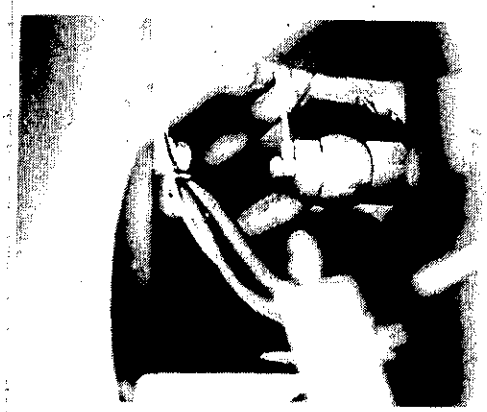


2.4.1.22
Disconnect and remove transmission charging pump.

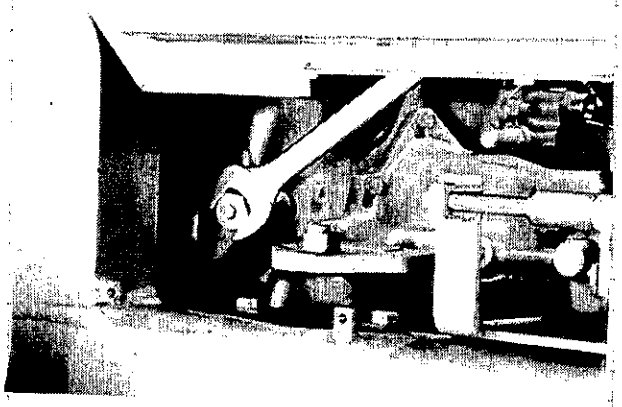




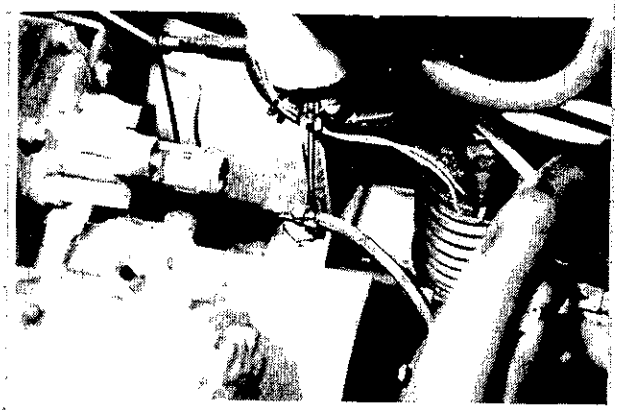
2.4.1.23
Remove capscrew and clip that retains transmission temperature sensor to converter housing.



2.4.1.24
Disconnect sensor tube from fitting on heat exchanger tube and remove sensor.

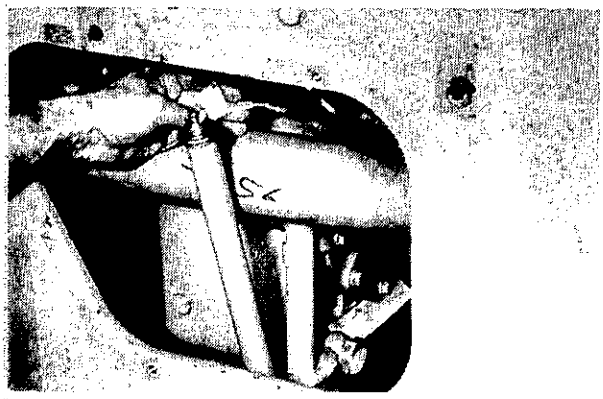


2.4.1.25
Disconnect two heat exchanger tubes from torque converter.

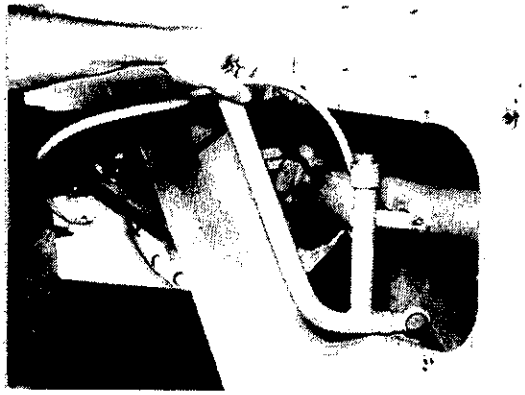


2.4.1.26
Remove hose and clamp from banjo fitting at connector at top of transmission housing. (clutch oil return to sump)

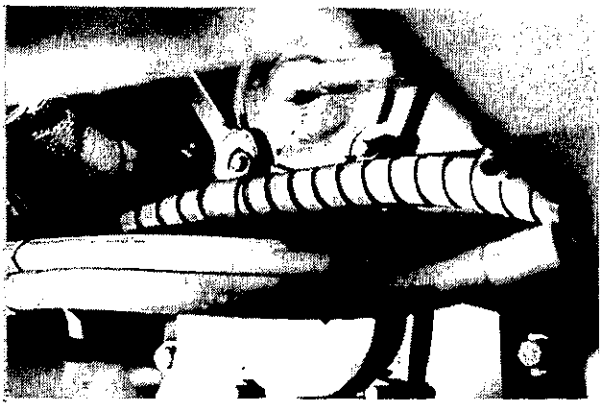
2.4.1.27
Disconnect and tag sensor wire to transmission dipstick tube.



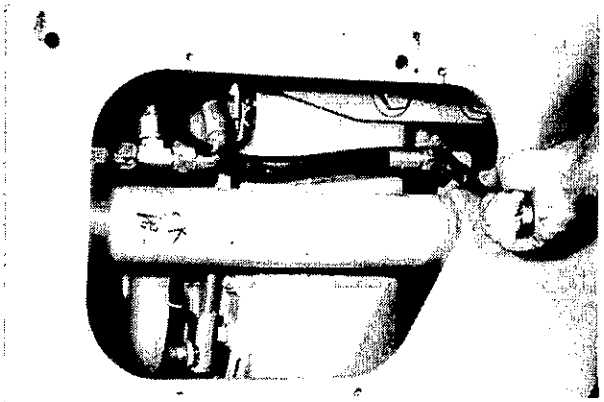
2.4.1.28
Remove capscrews that retain dipstick tube and remove tube.

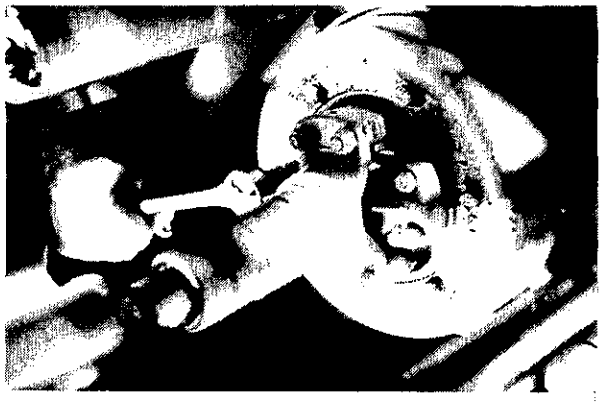


2.4.1.29
Remove capscrew and clip that retains steering cylinder line to transmission housing.



2.4.1.30
Disconnect and tag steering cylinder lines from cylinders.

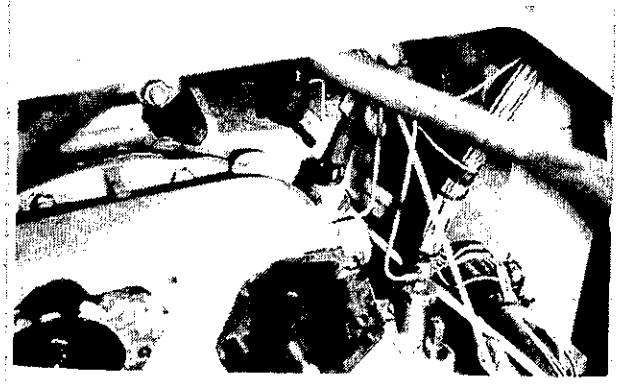




2.4.1.31
Disconnect front drive shaft from parking brake flange.

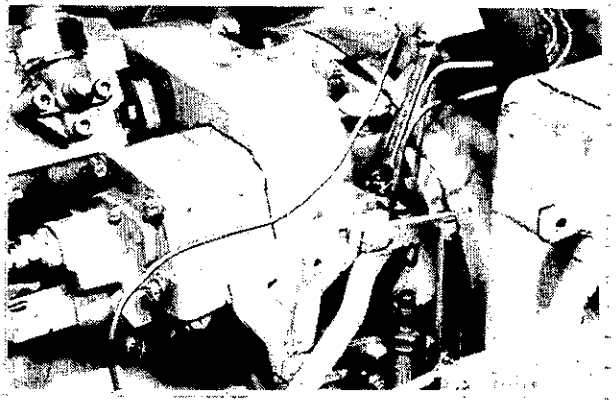
2.4.1.32
Disconnect rear drive shaft from rear output flange and rear axle and remove drive shaft.

2.4.1.33
Disconnect and tag sensor wire at pressure switch from top of converter housing. (clutch pressure check point)

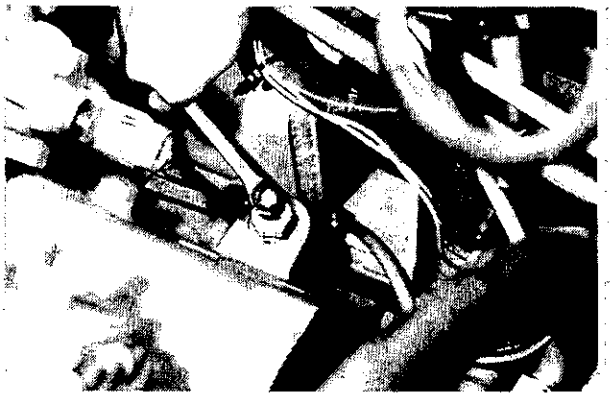


2.4.1.34
Disconnect and remove clutch pressure switch from tube at top of converter housing. (clutch pressure check point)

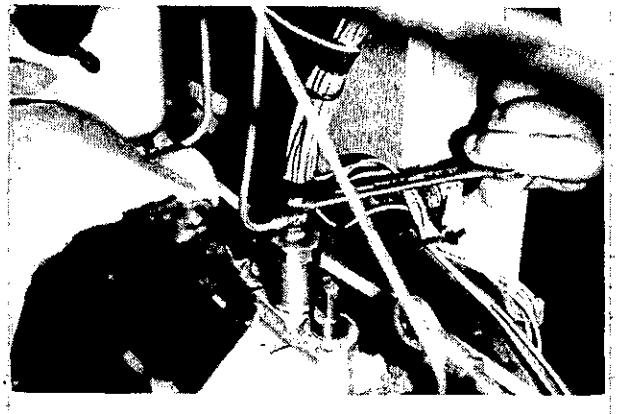
2.4.1.35
Disconnect and remove tube from connector at top of converter housing. (clutch pressure check point)



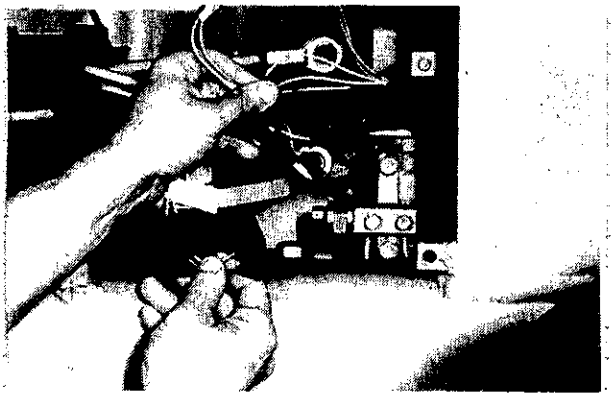
2.4.1.36
Disconnect and remove tube from connector at top of transmission housing. (clutch oil return to sump)

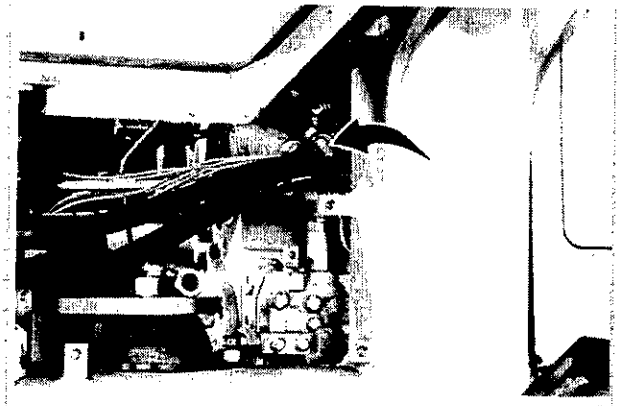


2.4.1.37
Disconnect and remove tube from connector at top left of control valve.

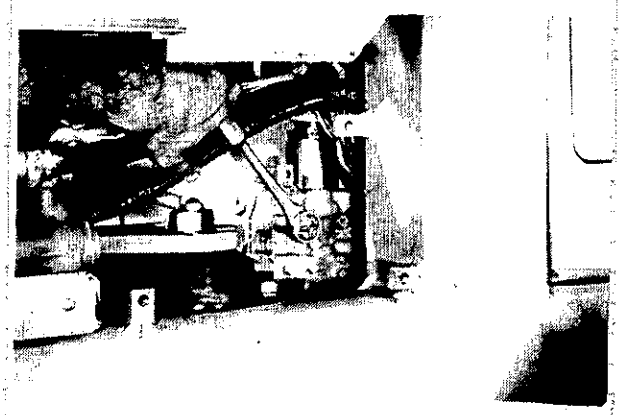


2.4.1.38
Disconnect and tag sensor wires at control valve.

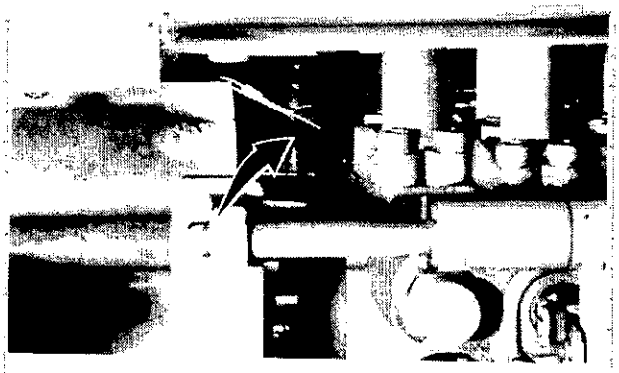




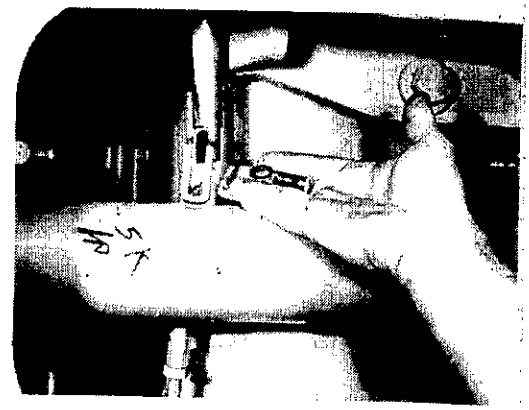
2.4.1.39
Remove capscrew attaching clip to bracket on frame in front of transmission control valve, and move hoses aside to gain access to valve.



2.4.1.40
Remove control valve assembly. **NOTE:** There are two springs and two balls that will drop from the valve assembly.

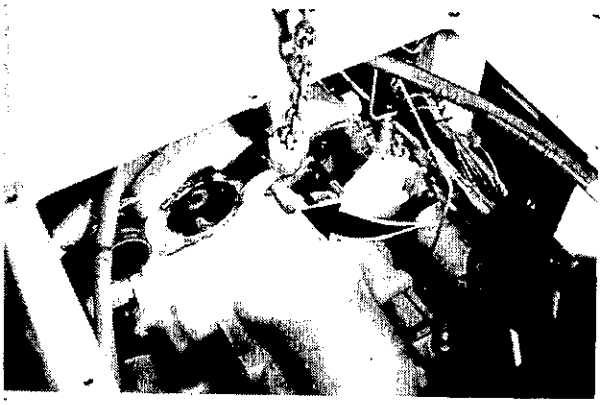


2.4.1.41
Disconnect and tag wire to parking brake sensor.



2.4.1.42
Disconnect parking brake linkage.

2.4.1.43
Install a lifting eye in the tapped hole provided at top of housing.

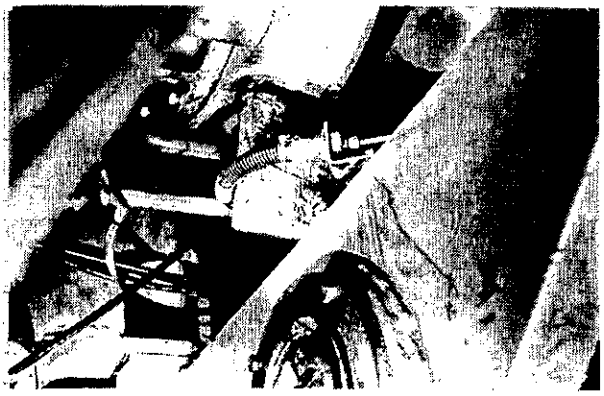


2.4.1.44
Position a hoist and chain through the cab door and attach the chain to the lifting eye. Transmission weighs approximately 304 kgs. (670 lbs.).

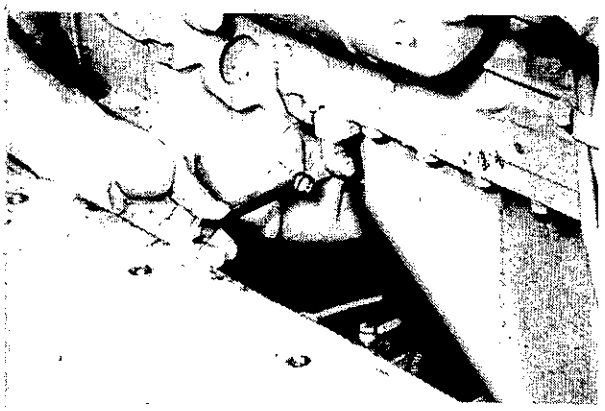
⚠ WARNING

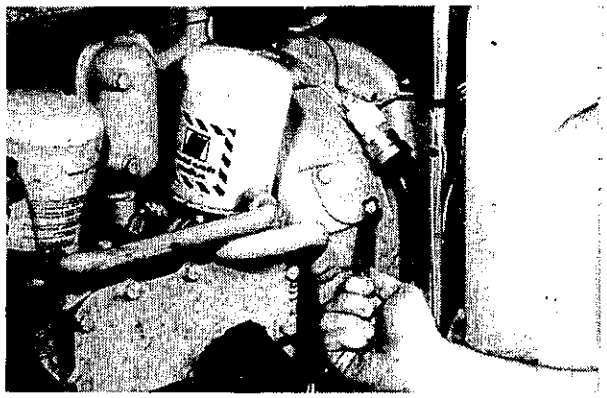
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

2.4.1.45
Place a block between the flywheel housing and the rear axle support bracket to support the engine.

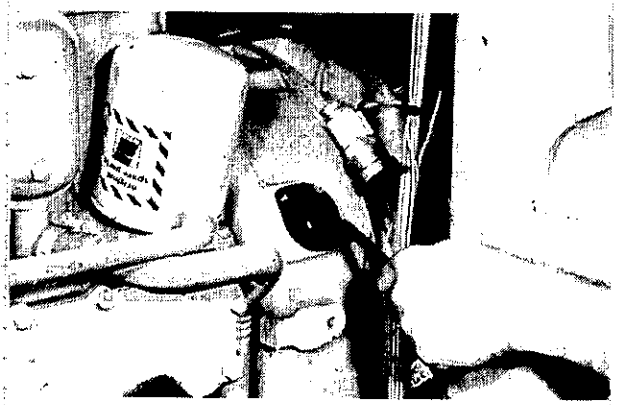


2.4.1.46
Remove flex plate capscrew access cover from left side of flywheel housing.

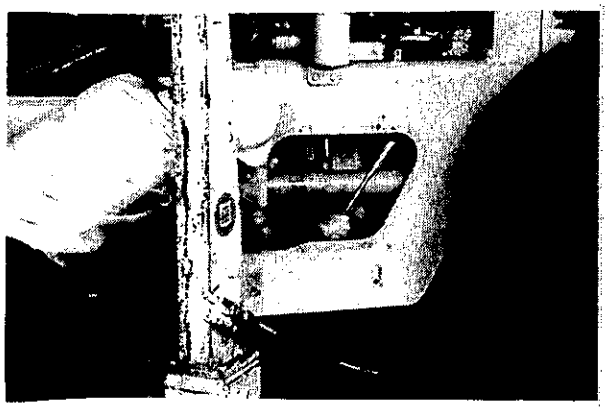




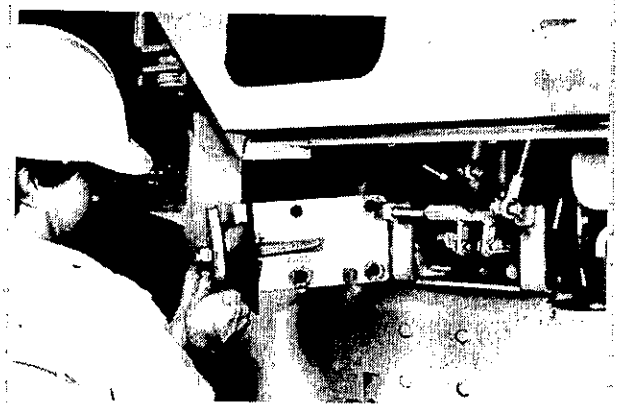
2.4.1.47
Remove flywheel timing mark access cover from right side of flywheel housing.



2.4.1.48
Remove flex plate capscrews by barring the engine to bring holes into alignment with access hole in flywheel housing.

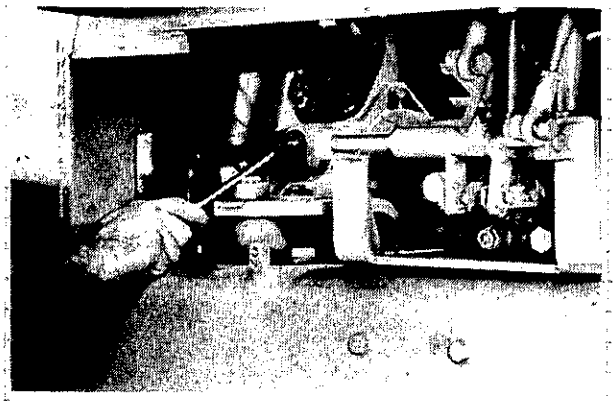


2.4.1.49
Remove the eight capscrews and washers attaching the transmission to right and left mounting brackets.

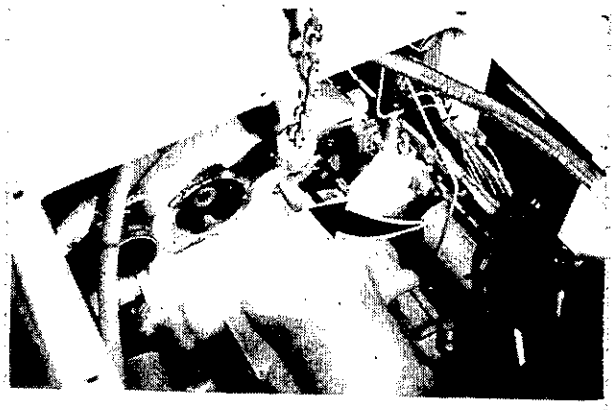


2.4.1.50
Remove the right side mounting bracket.

2.4.1.51
Remove capscrews attaching converter to flywheel.

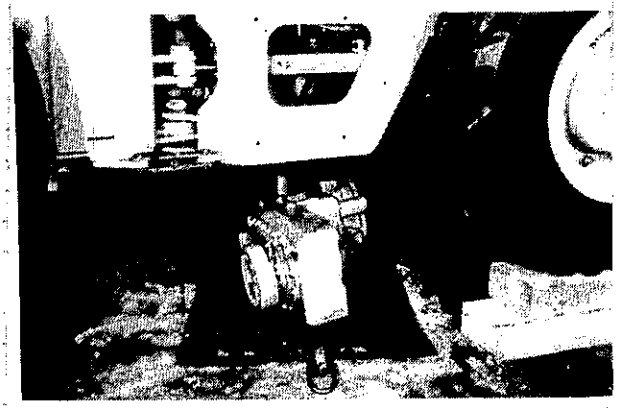


2.4.1.52
Slowly lower the transmission to the ground resting it on a pallet to be dragged from underneath.

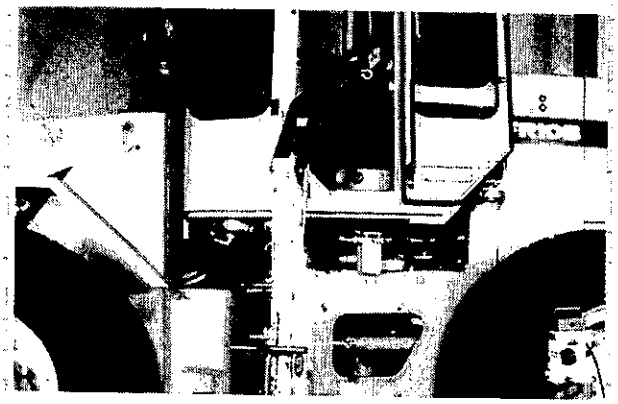


2.4.2 INSTALLATION

2.4.2.1
Attach a lifting eye to the tapped hole provided at the top of the transmission housing.



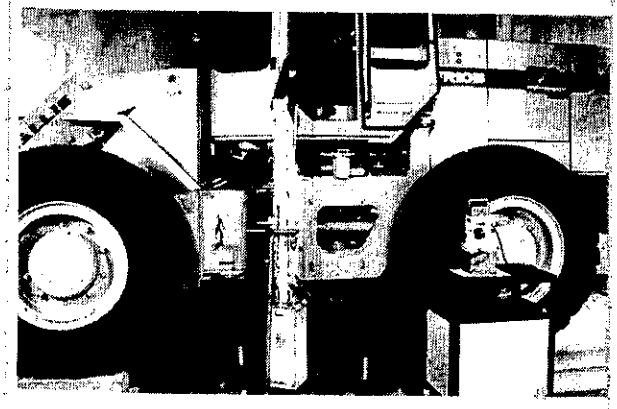
2.4.2.2
Slide the transmission under the loader.



2.4.2.3
Position a hoist through the cab door and lower a chain through to the lifting eye on the transmission. Attach the chain to the lifting eye.

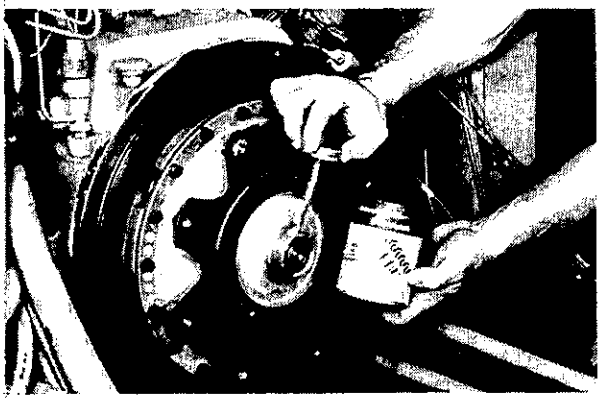
⚠ WARNING

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.

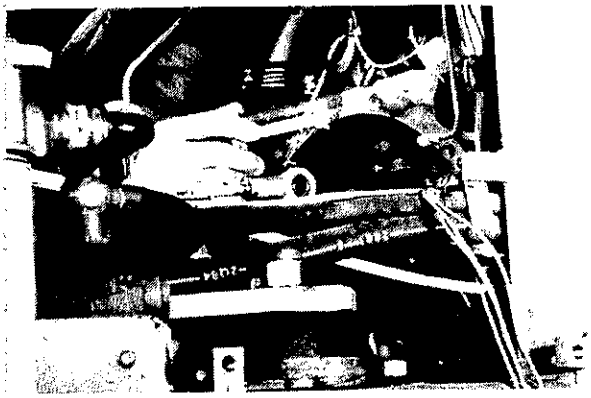


2.4.2.4
Slowly raise the transmission while scooting the bottom of the transmission to position it properly within the loader.

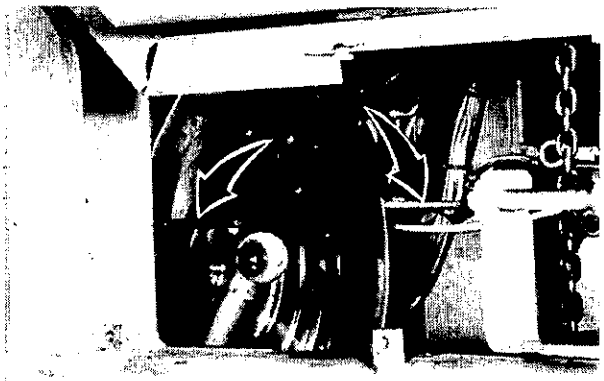
2.4.2.5
Apply a thin coat of Loctite anti-seize lubricant (FA part # 75000781) to the impeller cover as shown.



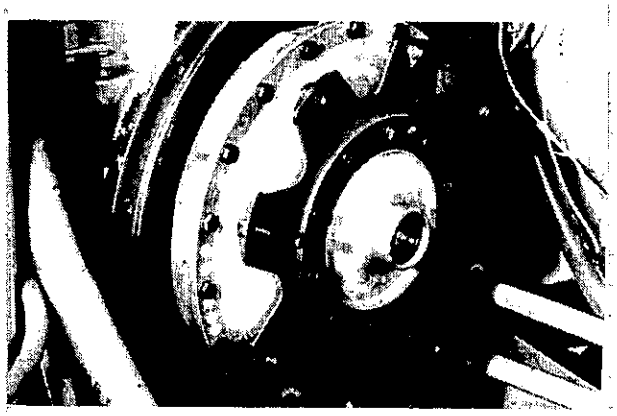
2.4.2.6
Apply a thin coat of liquid gasket (FA part # 70699262) to the mating surfaces of both the engine flywheel housing and torque converter housing.



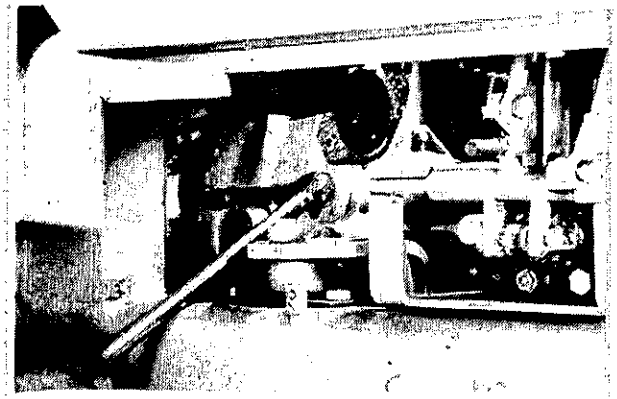
2.4.2.7
Install two guide studs to the engine flywheel housing, only in the two holes shown.



2.4.2.8
Install a guide stud into the flex plate on the transmission.

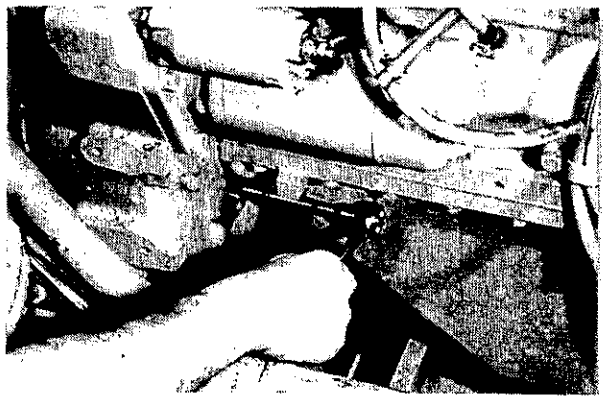


2.4.2.9
Slide transmission over guide studs, taking care not to damage flex plate.



2.4.2.10
Install capscrews attaching converter to engine flywheel.

2.4.2.11
Remove two guide studs and install remaining two capscrews.



2.4.2.12
Install flex plate capscrews by barring engine to bring holes into alignment with access hole in flywheel housing.

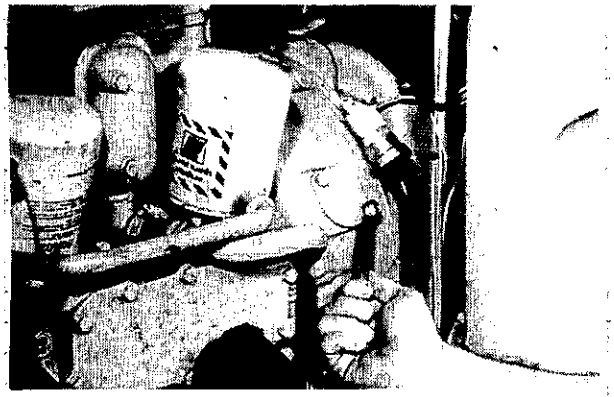
2.4.2.13
Remove guide stud and install remaining flex plate capscrew.

2.4.2.14
Install flex plate capscrew access cover to left side of flywheel housing.

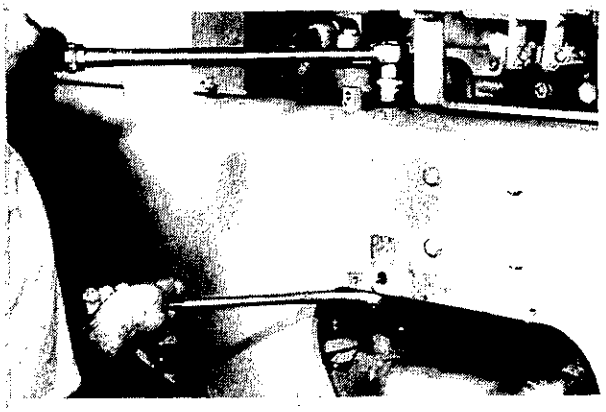
2.4.2.15
Install flywheel timing mark access cover to right side of flywheel housing.

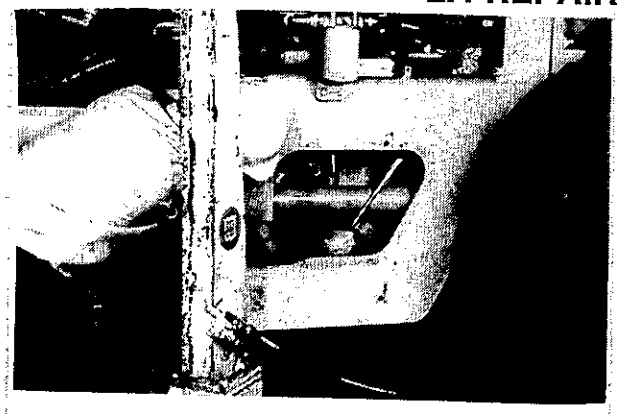
⚠ WARNING

Use proper tools to bring holes into alignment. "DO NOT USE FINGERS OR HANDS".

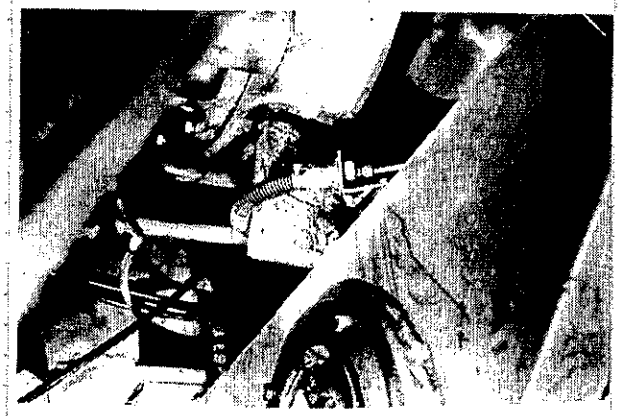


2.4.2.16
Install right side transmission mounting bracket.

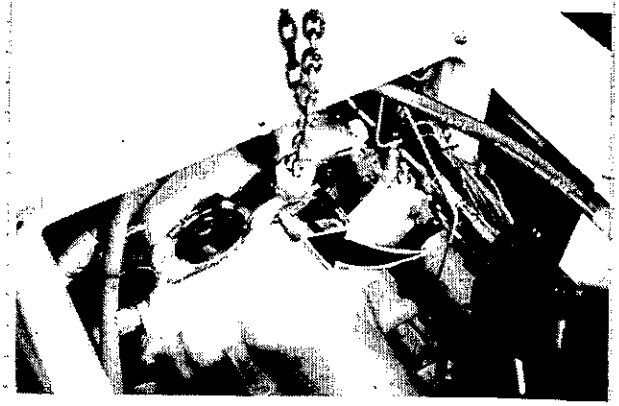




2.4.2.17
Install the eight capscrews and washers attaching the transmission to the mounting brackets. Apply a coat of Loctite (FA part# 75000778) to the threads of each capscrew.



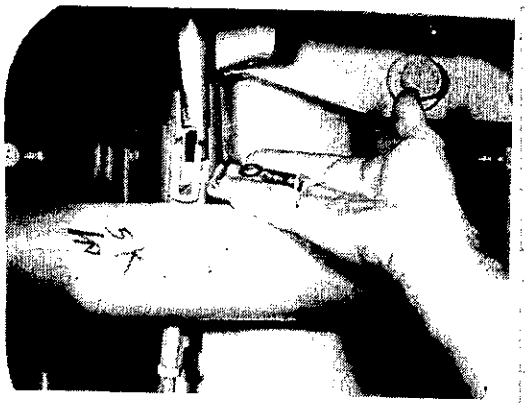
2.4.2.18
Remove the block that was used to support the engine between the flywheel housing and the rear axle support bracket.



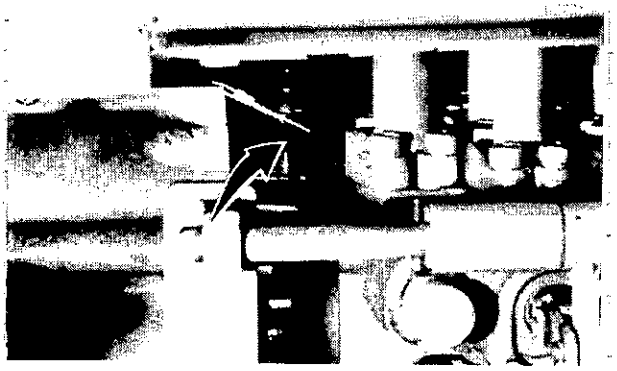
2.4.2.19
Disconnect and remove the hoist and chain from the lifting eye on the transmission.

2.4.2.20
Remove the lifting eye from the top of the transmission housing.

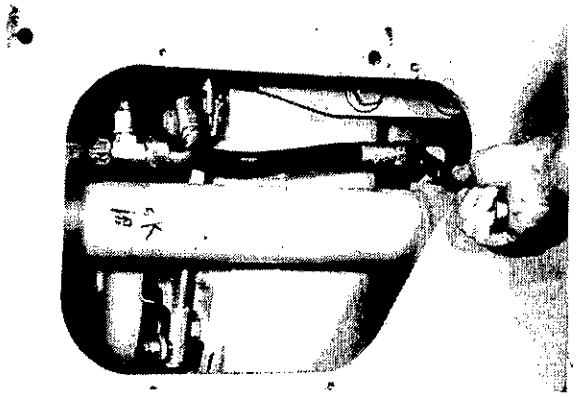
2.4.2.21
Connect the parking brake linkage.



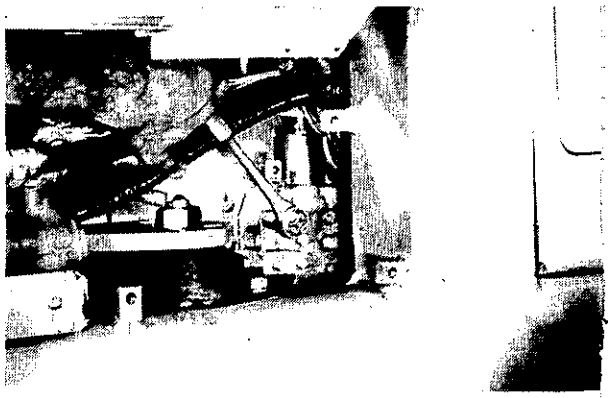
2.4.2.22
Connect the wire to the parking brake sensor switch.



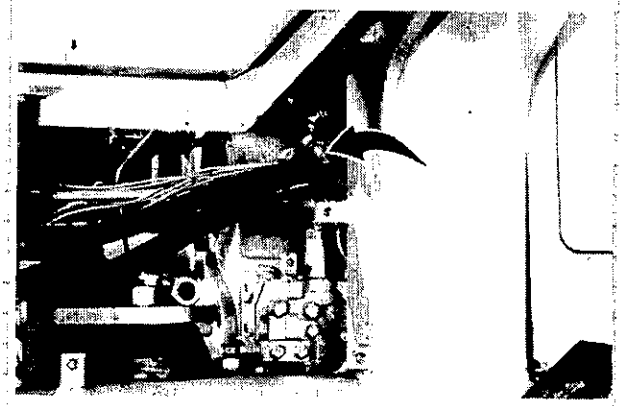
2.4.2.23
Connect steering cylinder lines to cylinders.



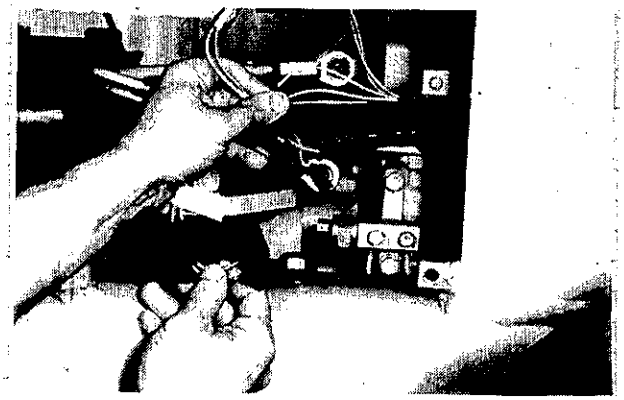
2.4.2.24
Install new gasket for control valve assembly.



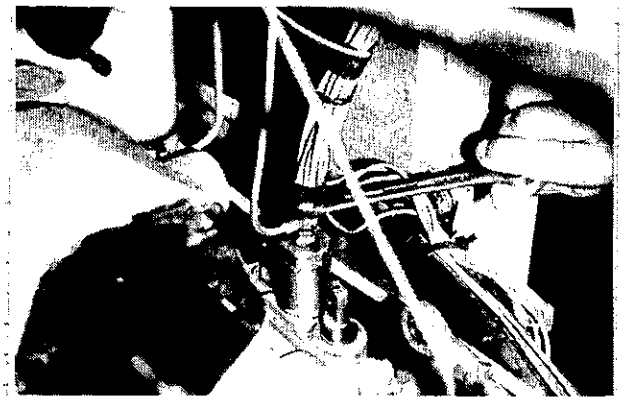
2.4.2.25
Install control valve assembly.Tighten capscrews 31.2-33.9 Nm (23-25 lbs.ft.).



2.4.2.26
Install capscrew attaching clip to bracket on frame in front of control valve.



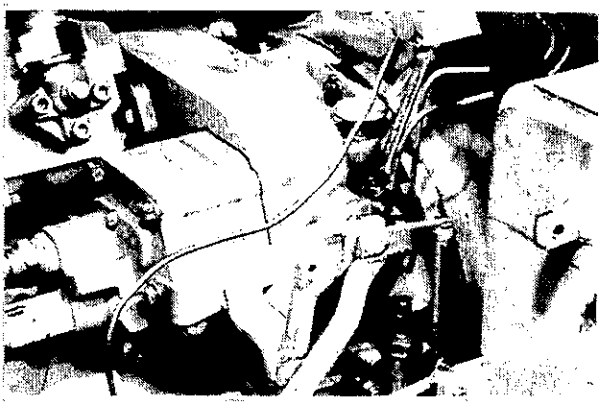
2.4.2.27
Connect wires to two sensor switches on control valve.



2.4.2.28
Connect tube from clutch cut-off to connector at top of control valve.

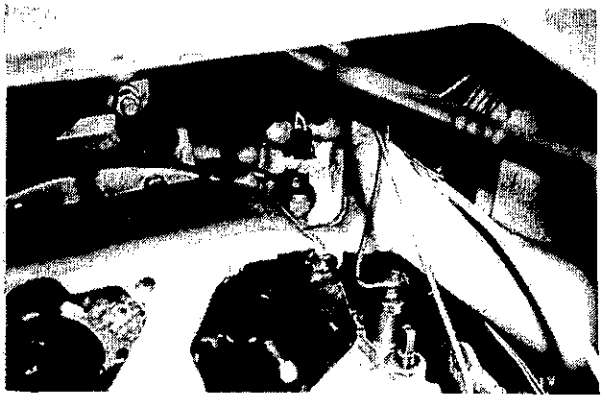
2.4.2.29
Connect tube from clutch cut-off to connector at top of transmission housing. (Clutch oil return to sump)

2.4.2.30
Connect tube from clutch cut-off to connector at top of converter housing. (Clutch pressure check point)

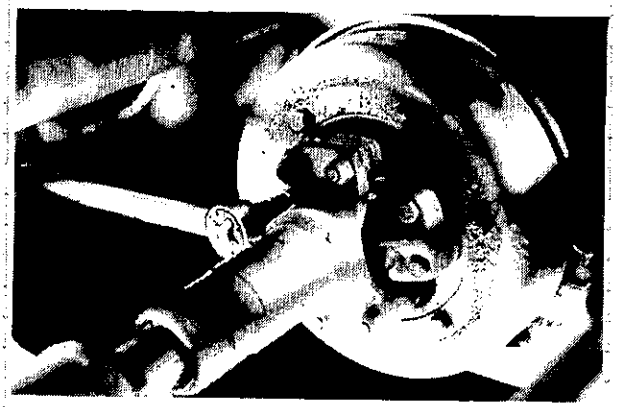


2.4.2.31
Install clutch pressure switch to connector at top of transmission housing. (Clutch pressure check point)

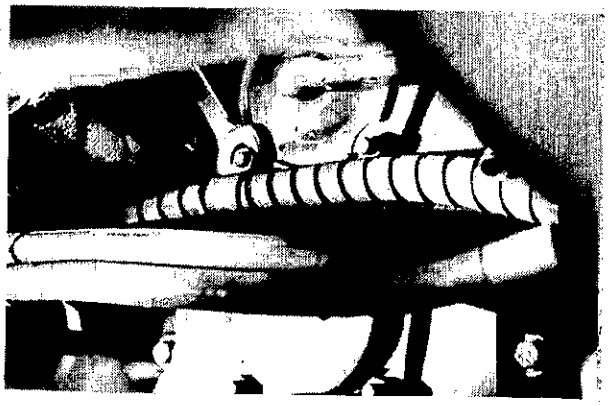
2.4.2.32
Connect wire to clutch pressure switch.



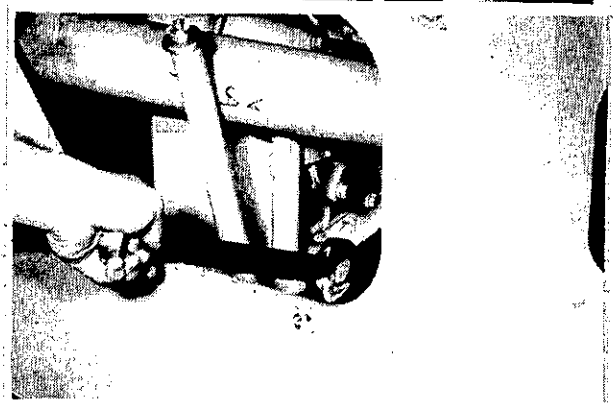
2.4.2.33
Install rear drive shaft to rear output flange and rear axle.



2.4.2.34
Install front drive shaft to parking brake flange.

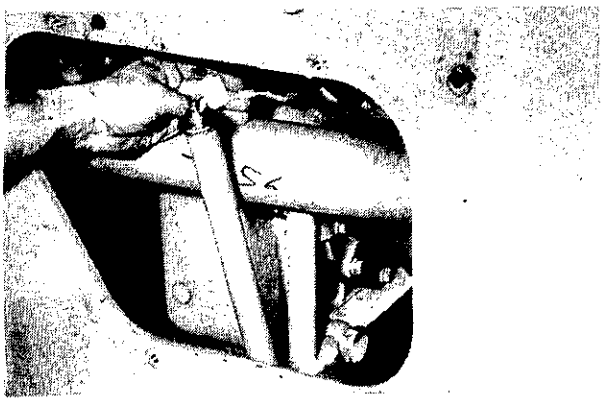


2.4.2.35
Install capscrew and clip that attach steering cylinder line to front of transmission housing.

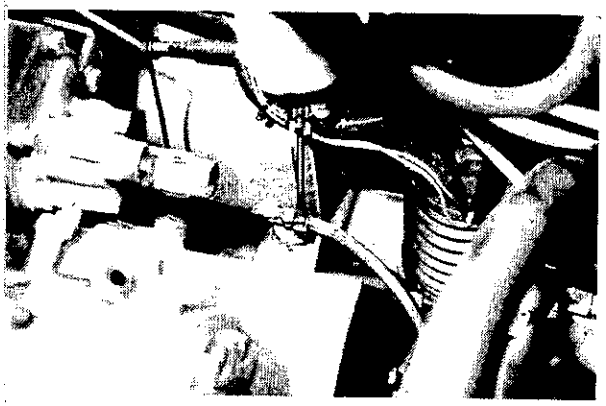


2.4.2.36
Install transmission dipstick tube.

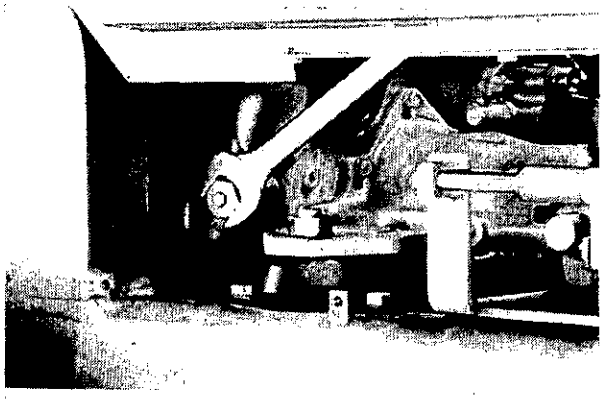
2.4.2.37
Connect wire to sensor switch on dipstick tube.



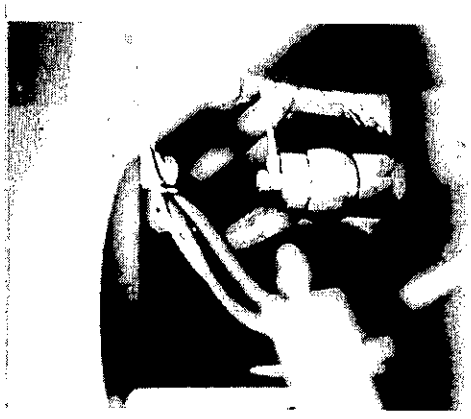
2.4.2.38
Connect hose to banjo fitting at top of transmission housing. (Clutch oil return to sump)

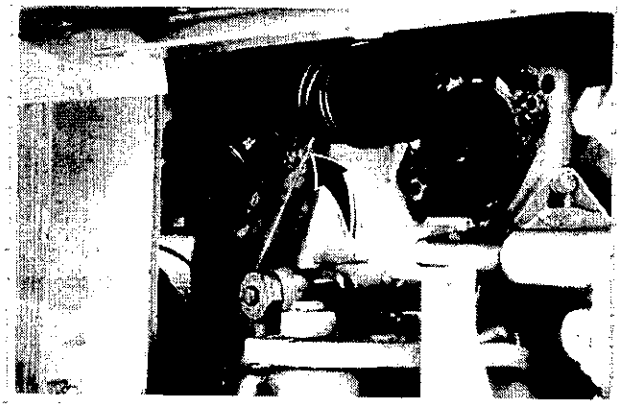


2.4.2.39
Install capscrews and washers attaching heat exchanger tubes to converter housing.

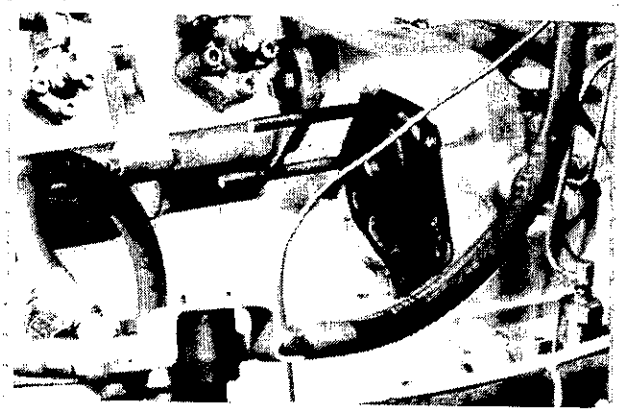


2.4.2.40
Connect sensor tube to fitting on heat exchanger tube.

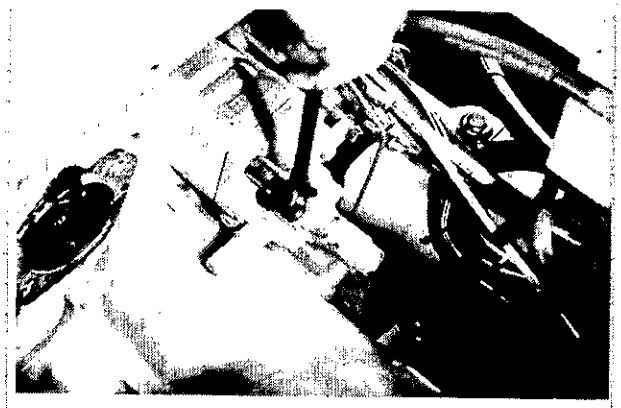




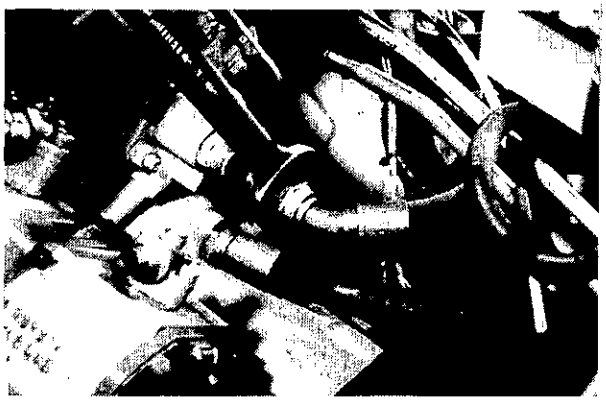
2.4.2.41
Install capscrew and clip that attach transmission temperature sensor switch to converter housing.



2.4.2.42
Install new gasket for transmission charging pump.

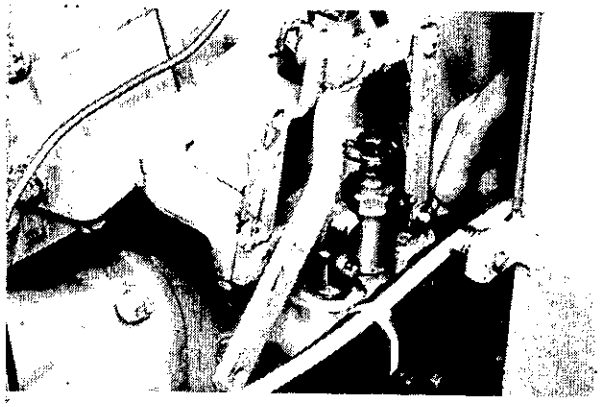


2.4.2.43
Install transmission charging pump.

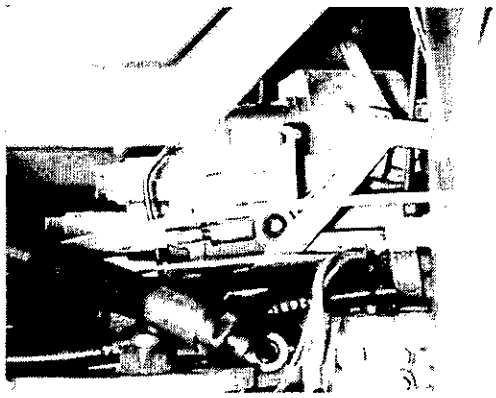


2.4.2.44
Install two lines from filter to transmission charging pump.

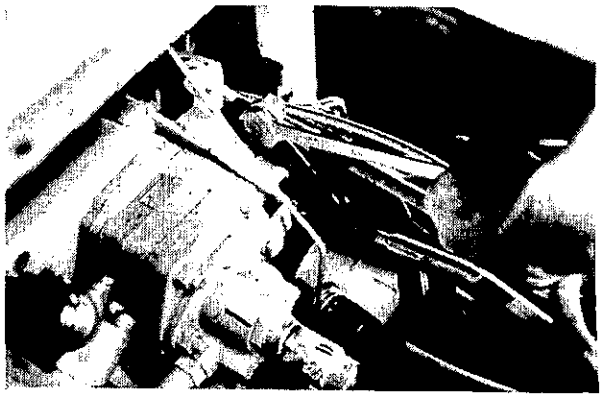
2.4.2.45
Install pins and cotter pins attaching shift linkage to control valve.



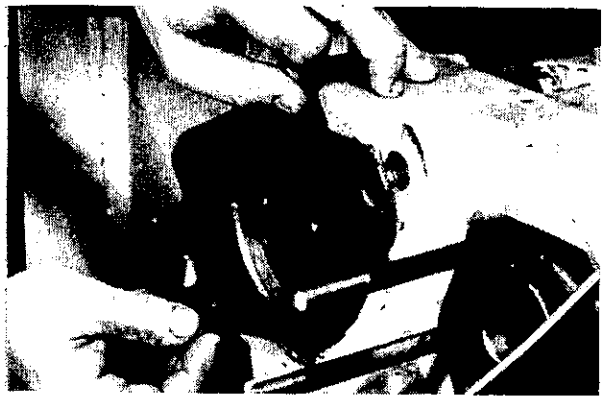
2.4.2.46
Install capscrews and washers attaching shift linkage to transmission housing.

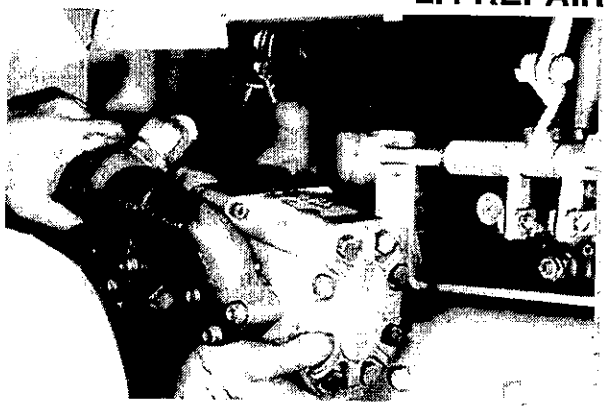


2.4.2.47
Install capscrews and washers attaching control rods to shift linkage.

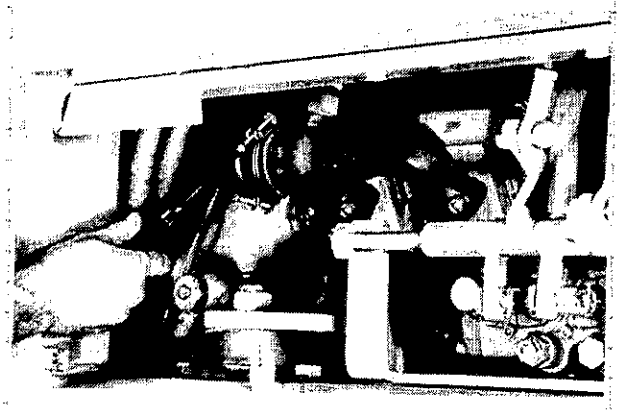


2.4.2.48
Install new gasket for implement hydraulic pump.



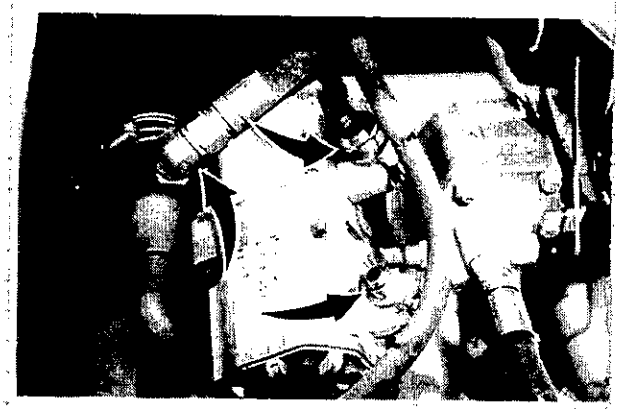


2.4.2.49
Install implement hydraulic pump.



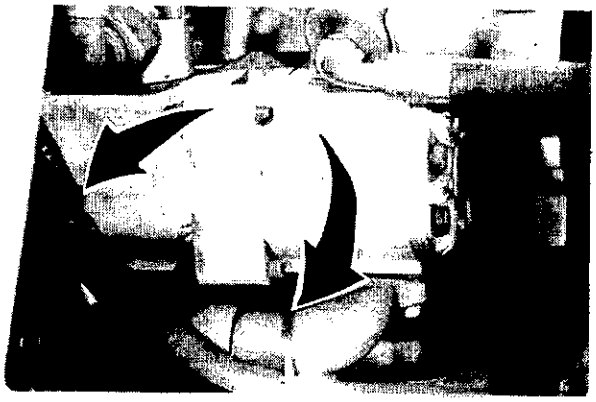
2.4.2.50
Connect large hose from hydraulic tank to pump.

2.4.2.51
Connect small hose from hydraulic tank to control valve.

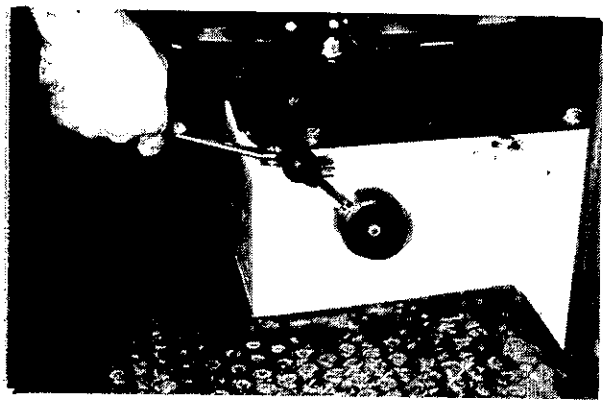


2.4.2.52
Connect three lines to implement hydraulic pump.

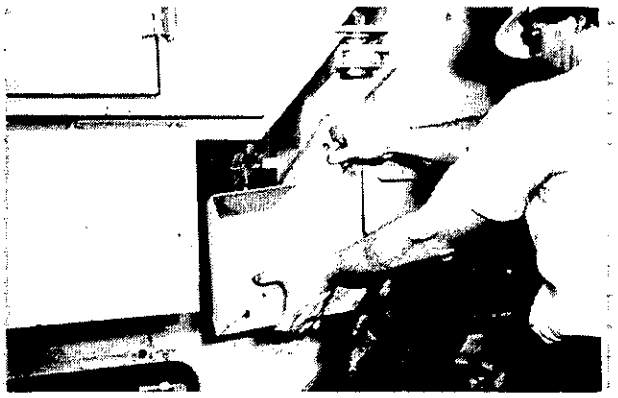
2.4.2.53
Install ties as required to secure small line (from hydraulic tank to control valve), to tube at pump.



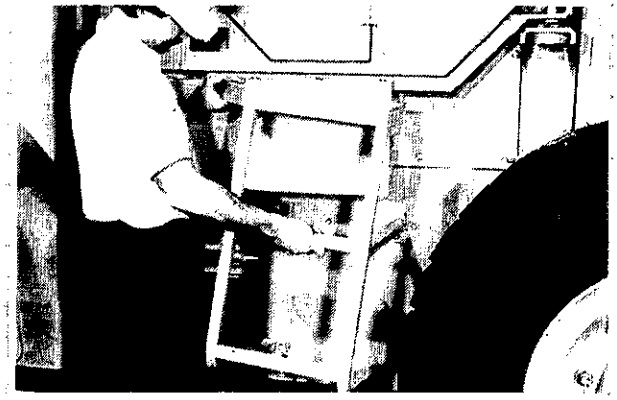
2.4.2.54
Install seat and suspension assembly.



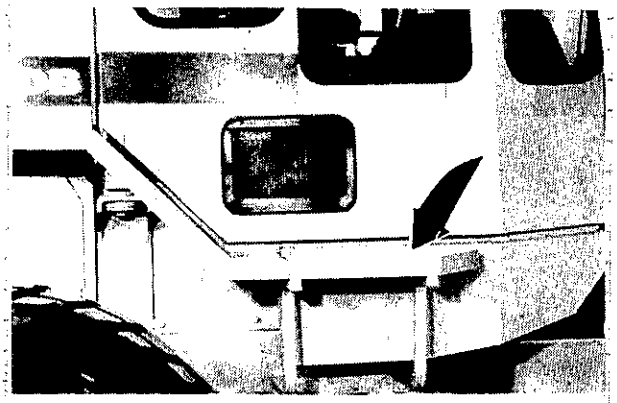
2.4.2.55
Install cab corner access panel.



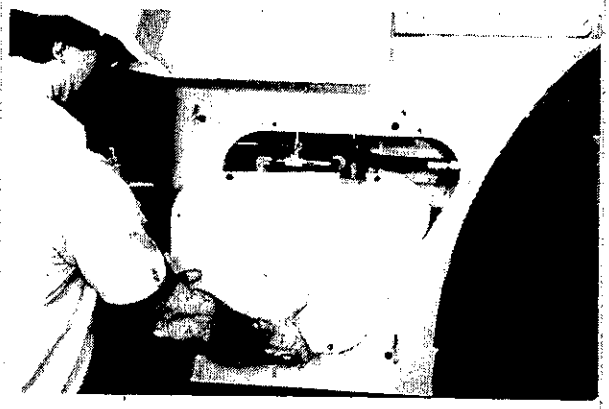
2.4.2.56
Install skirting around bottom of cab.



2.4.2.57
Install left side ladder.



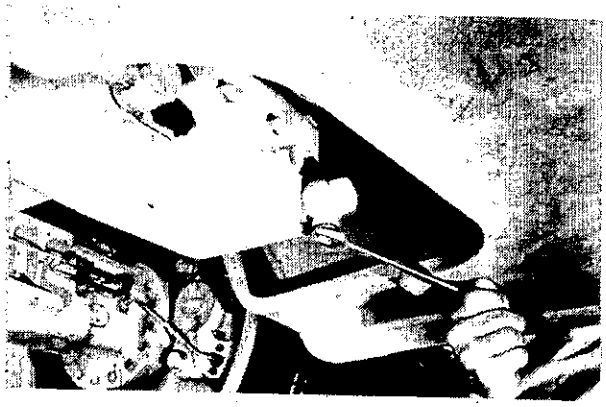
2.4.2.58
Install right side platform.



2.4.2.59
Install side access panels.

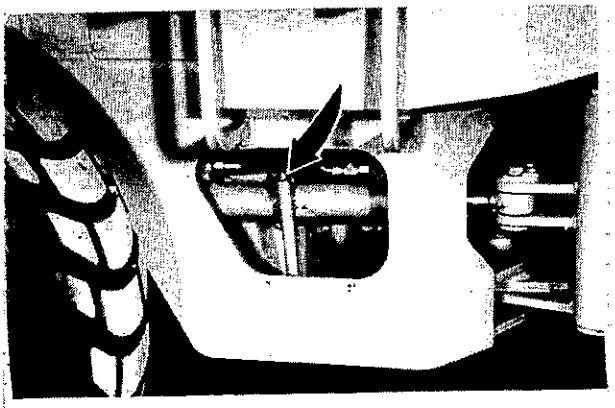
2.4.2.60
Install rear fenders.

2.4.2.61
Install transmission drain plug.

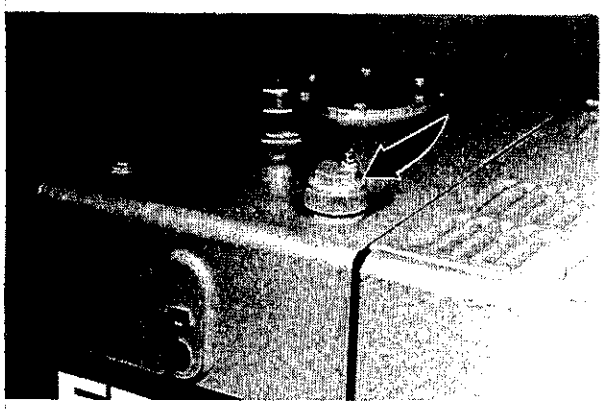


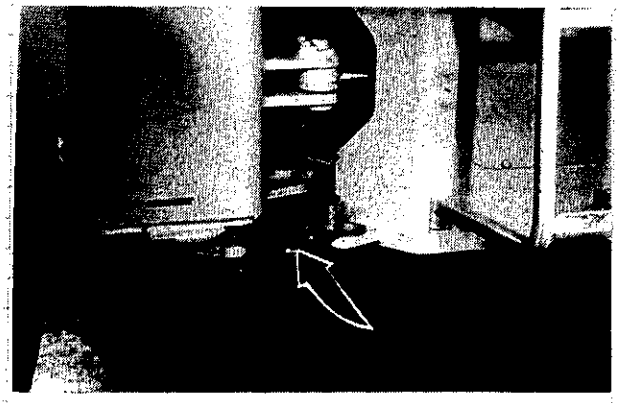
2.4.2.62
Install hydraulic tank drain plug.

2.4.2.63
Fill transmission with fluid to proper level.

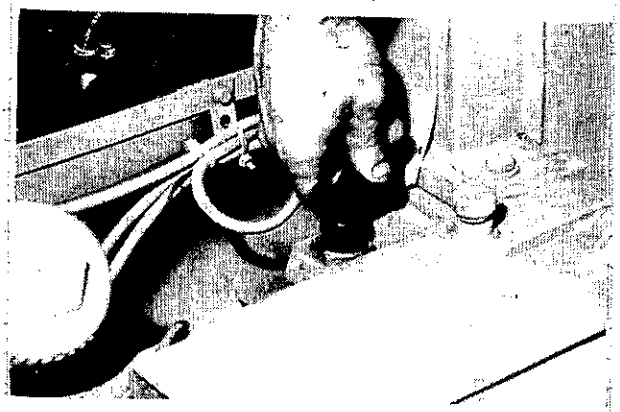


2.4.2.64
Fill hydraulic tank with fluid to proper level.





2.4.2.65
Remove articulation lock bar.

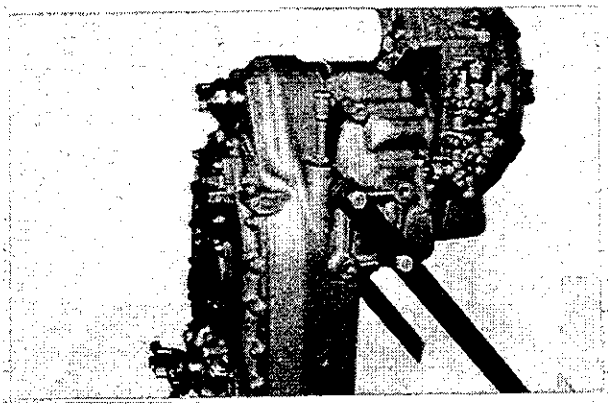


2.4.2.66
Turn electrical master switch to the "ON" position.

2.4.2.67
Remove blocks or jack stands and lower machine to ground.

2.4.3 DISASSEMBLY

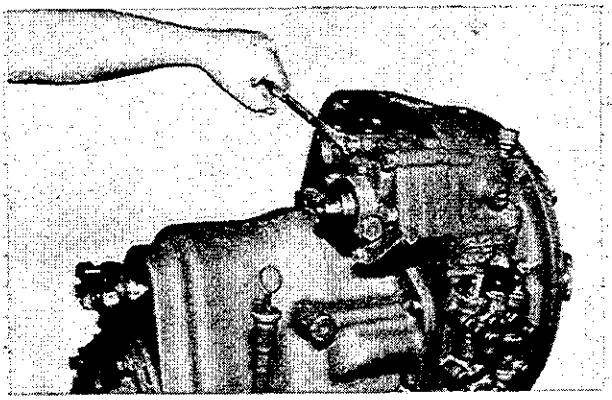
2.4.3.1
Side view of the 18000 series, 3-speed, long drop transmission.



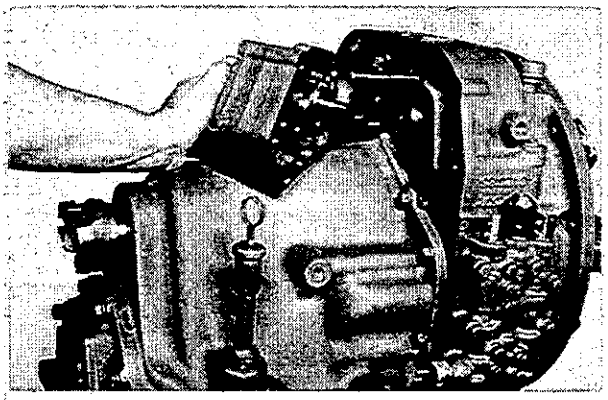
⚠ WARNING

Do not work under or near an unblocked or unsupported linkage, parts or machine.

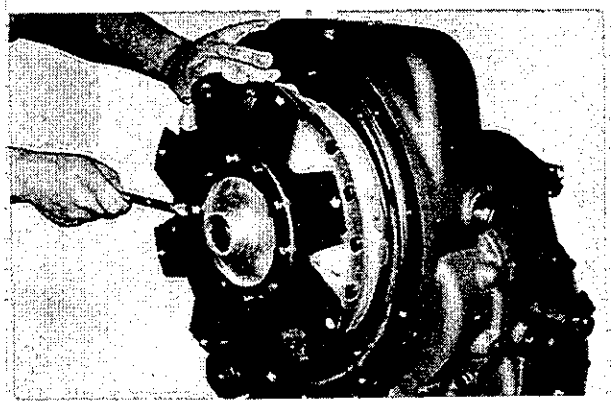
2.4.3.2
Remove pressure regulating valve and charging pump bolts and stud nuts.

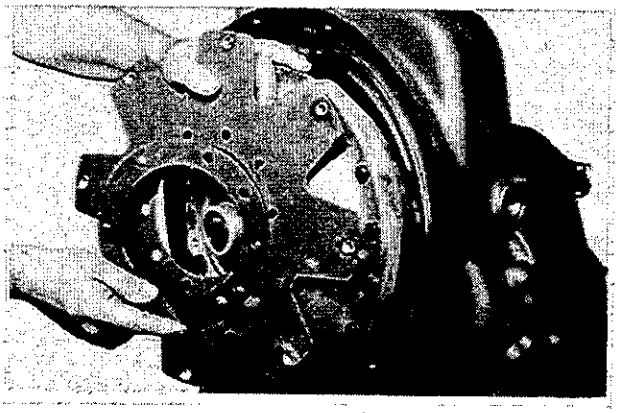


2.4.3.3
Remove valve and pump assembly.

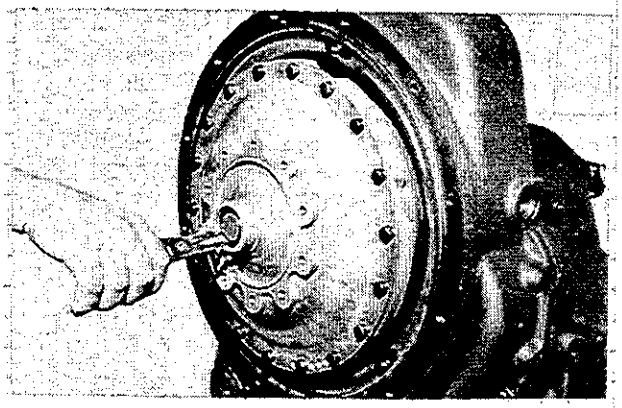


2.4.3.4
Remove drive plate mounting screws and washers.

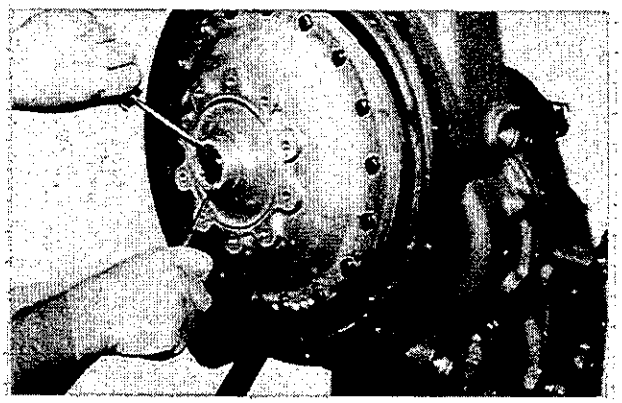




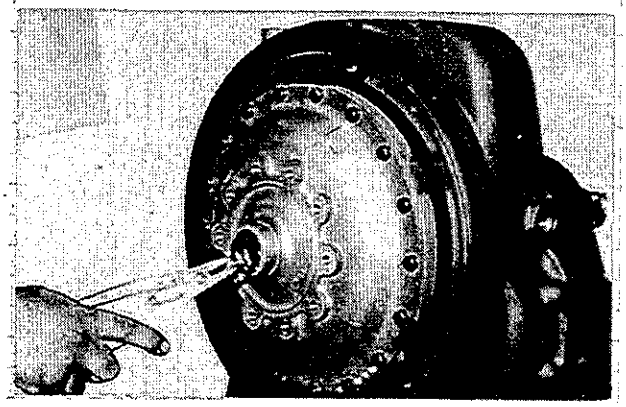
2.4.3.5
Remove drive plate and backing ring.



2.4.3.6
Remove impeller cover bore plug retainer ring.

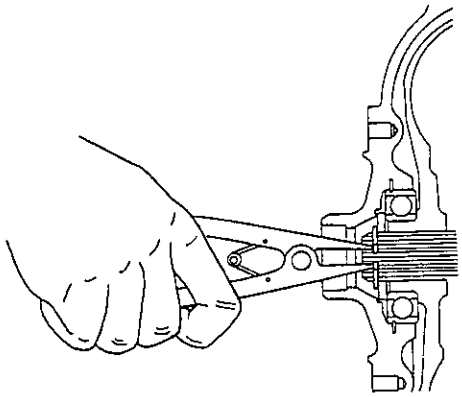


2.4.3.7
Using two small screwdrivers as shown, remove bore plug.

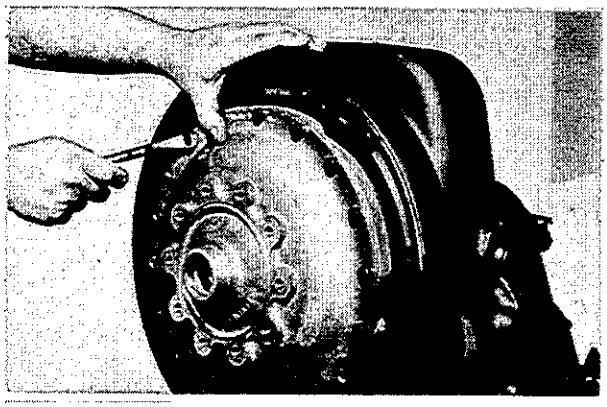


2.4.3.8
Through bore plug hole, remove turbine retaining ring.

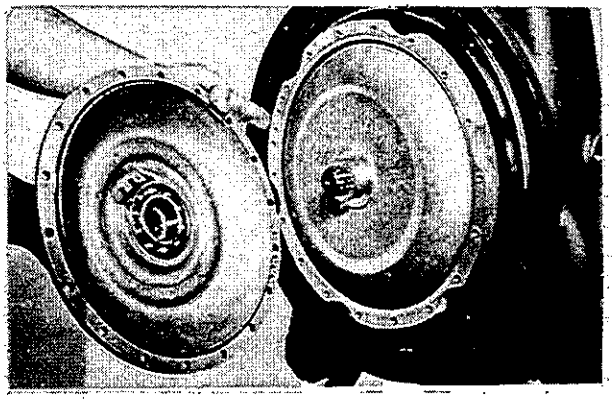
2.4.3.9
Remove turbine retaining ring.



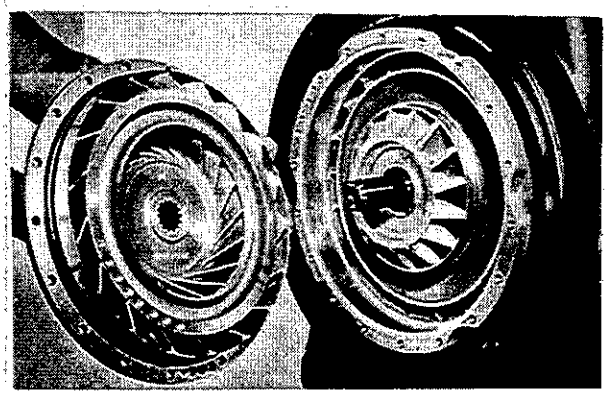
2.4.3.10
Remove impeller cover to impeller bolts.



2.4.3.11
Remove impeller cover.
NOTE: Turbine may remain in impeller cover bearing and will come off with impeller cover as shown as follows.



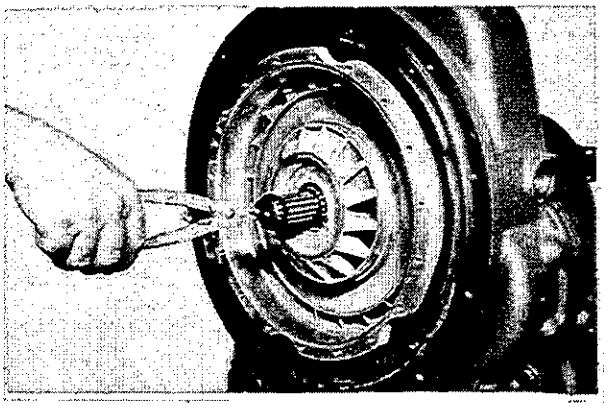
2.4.3.12
Impeller cover and turbine being removed as an assembly.



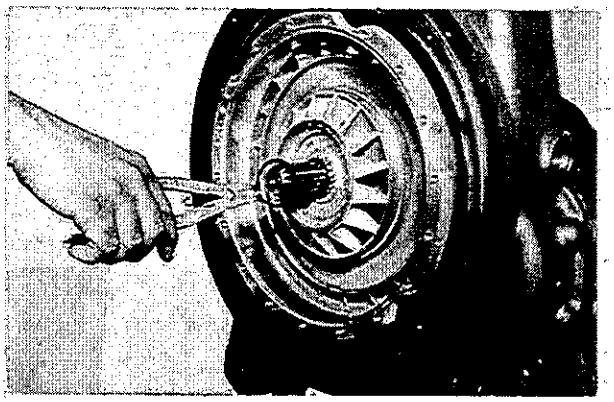
2.4 REPAIR PROCEDURES

2.4.4 REACTION MEMBER & OIL BAFFLE DISASSEMBLY

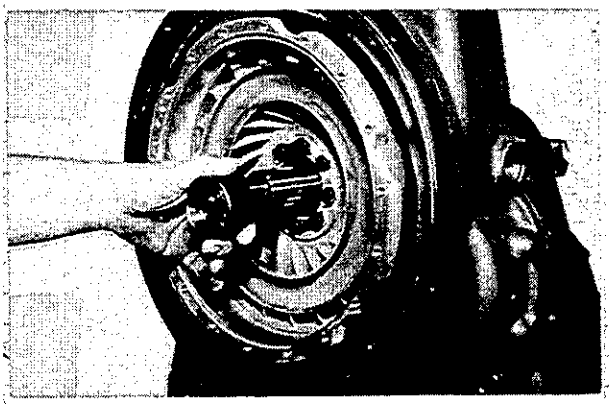
2.4.4.1
Remove turbine locating ring.



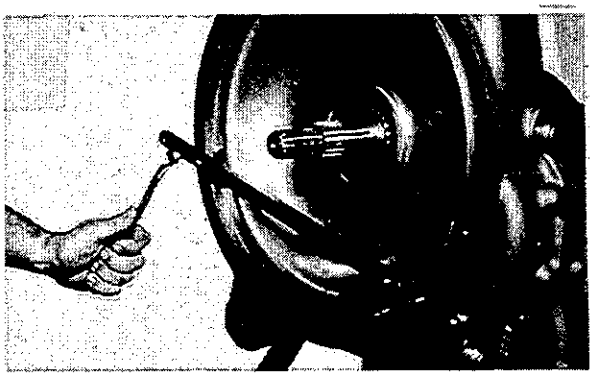
2.4.4.2
Remove reaction member retaining ring.

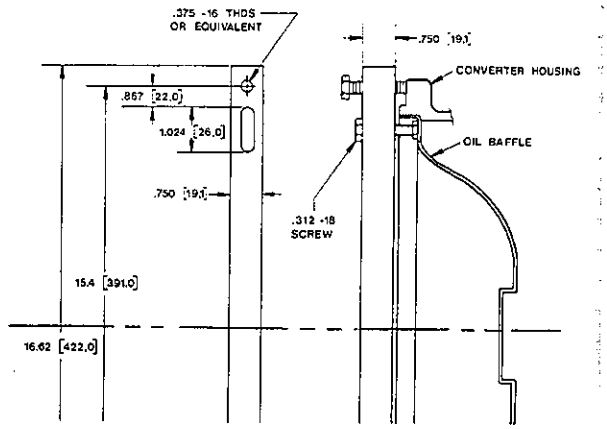


2.4.4.3
Remove reaction member spacer. Remove impeller and hub assembly.

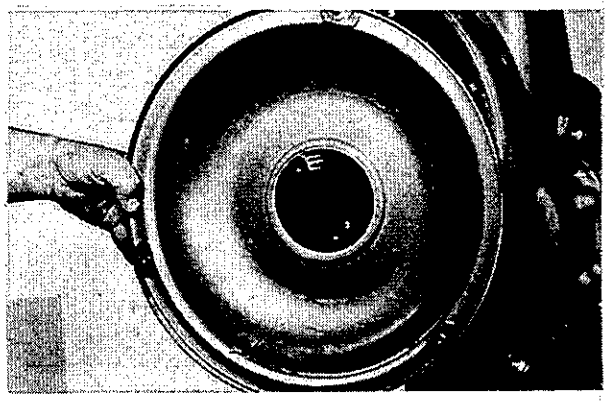


2.4.4.4
Using oil baffle puller holes provided, remove oil baffle.
NOTE: Puller tool can be fabricated from the following diagram.

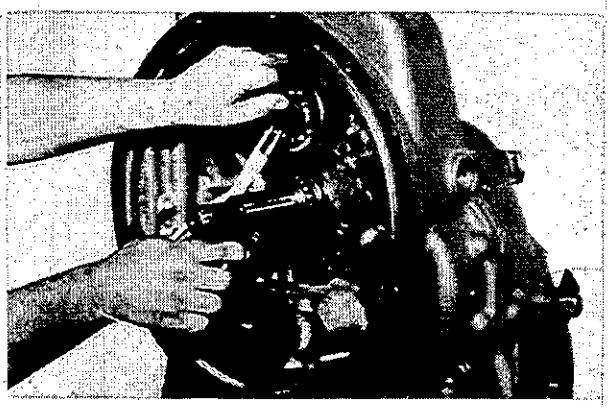




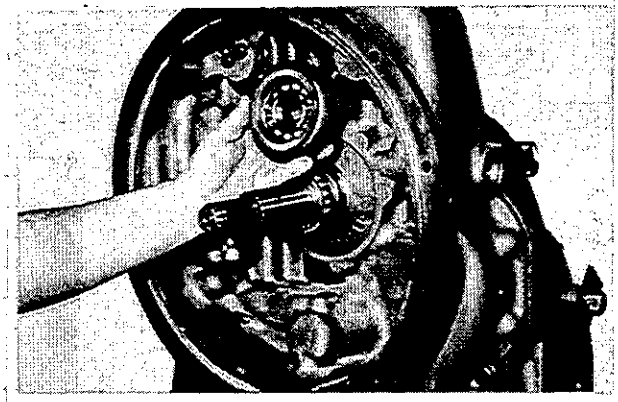
2.4.4.5
Tool for removing oil baffle.



2.4.4.6
Oil baffle removed.

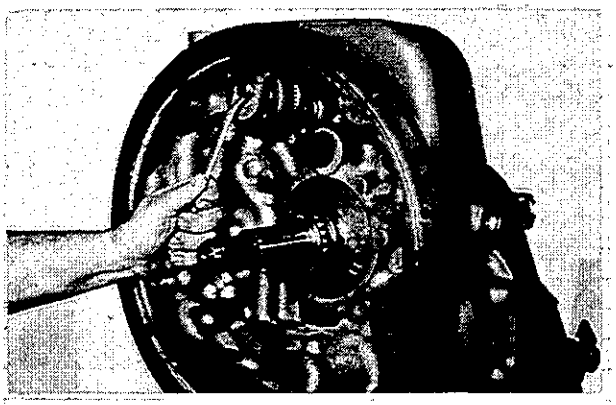


2.4.4.7
Remove pump drive idler gear retaining ring.

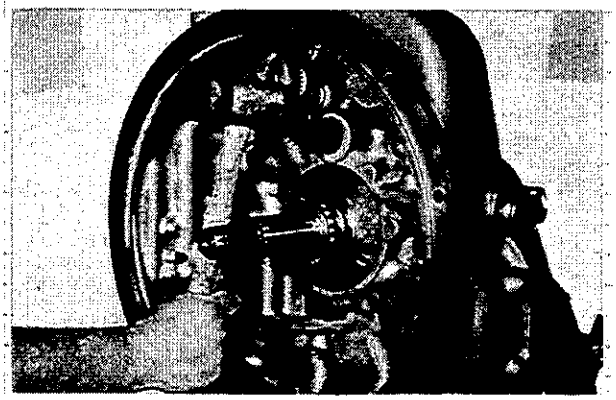


2.4.4.8
Remove idler gear and bearing assembly.

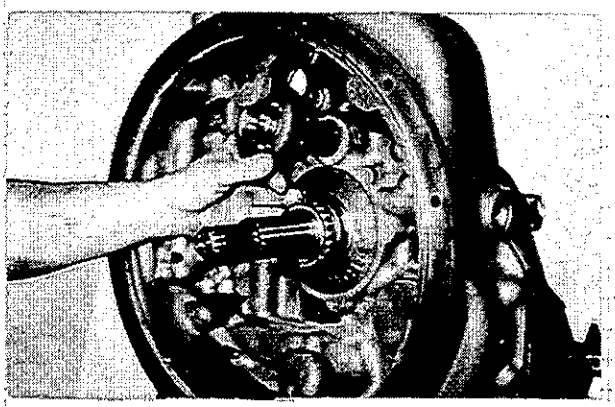
2.4.4.9
Remove pump drive bearing support screw and lockwasher.



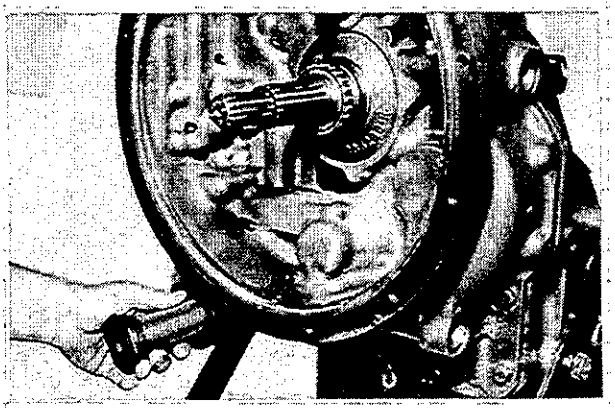
2.4.4.10
Using a soft hammer, tap pump drive gear and bearing support from housing.

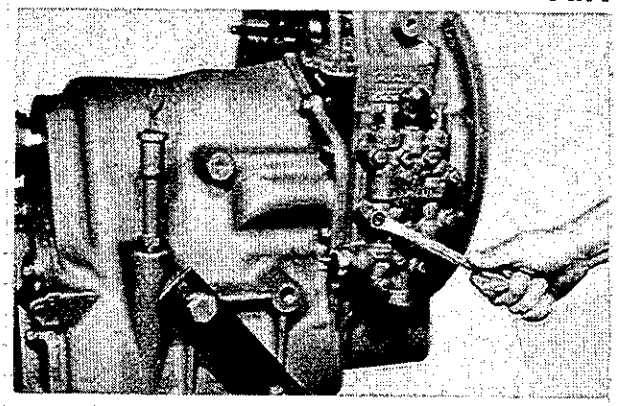


2.4.4.11
Remove gear and bearing assembly from housing.

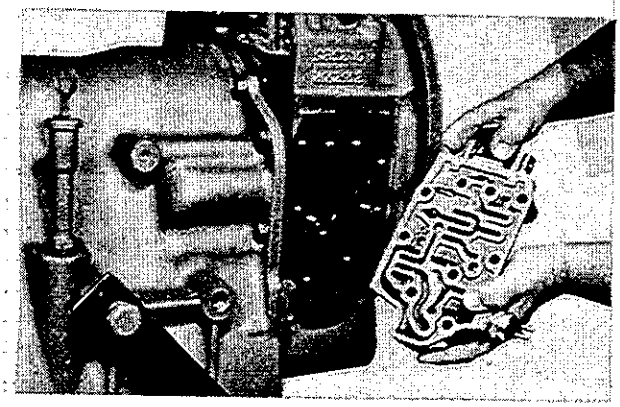


2.4.4.12
Remove sump screen assembly.

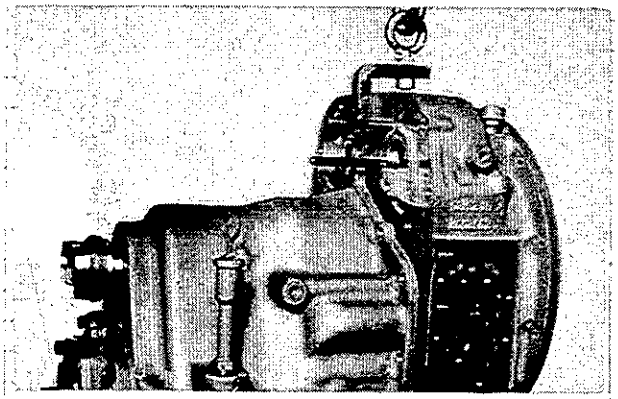




2.4.4.13
Remove control valve bolts and lockwashers.



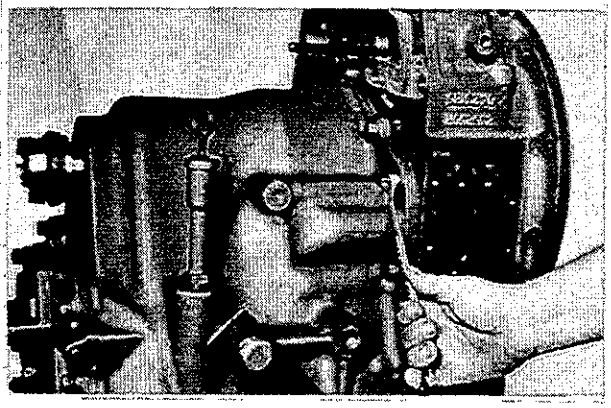
2.4.4.14
Remove control valve assembly. Use caution not to lose detent springs and balls.



2.4.4.15
Support converter housing with a chain hoist.

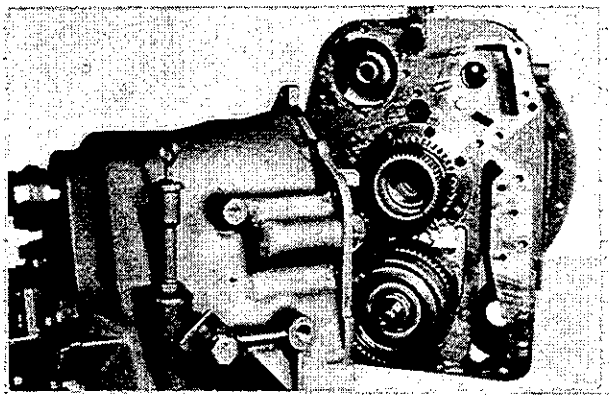
⚠ WARNING

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.

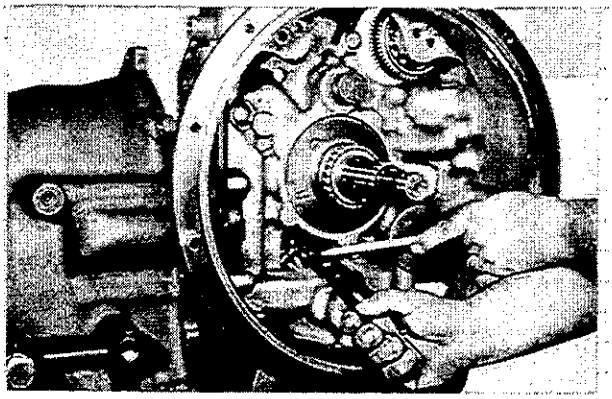


2.4.4.16
Remove all bolts securing transmission to converter housing.

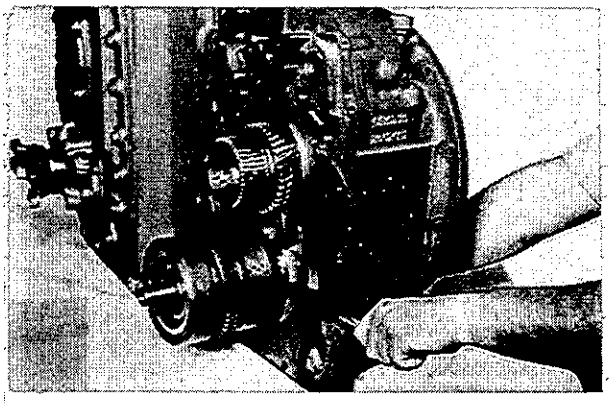
2.4.4.17
Separate converter housing from transmission case assembly.
NOTE: Reverse and 2nd clutch will remain in converter housing.



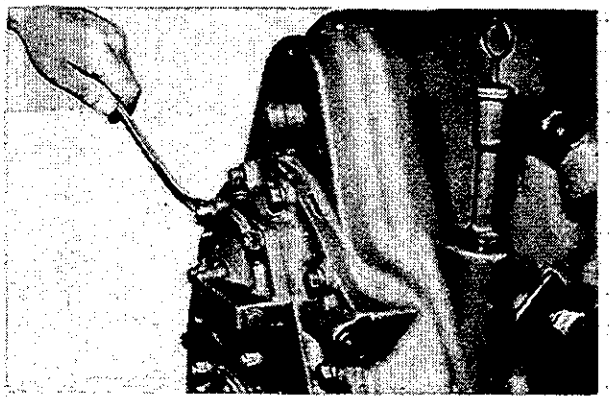
2.4.4.18
Using spreading type snap ring pliers, spread ears on the reverse clutch front bearing retaining ring.

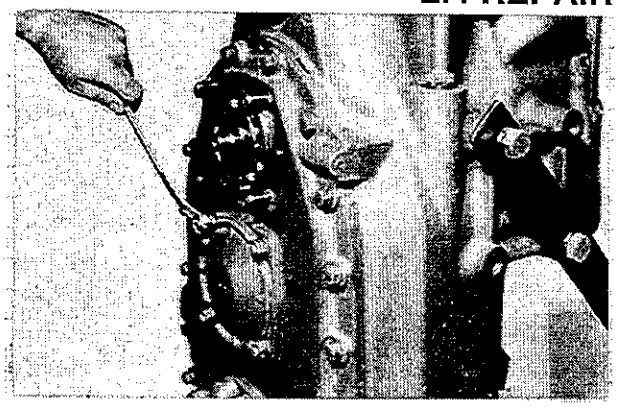


2.4.4.19
Holding snap ring open, pry reverse and 2nd clutch assembly from converter housing.

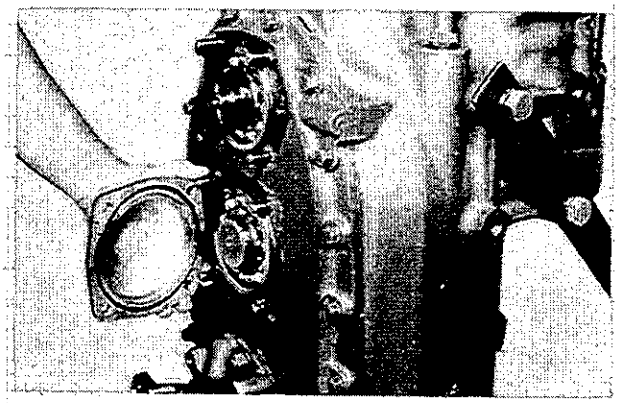


2.4.4.20
Remove low clutch rear bearing cap stud nuts and washers. Remove cap.

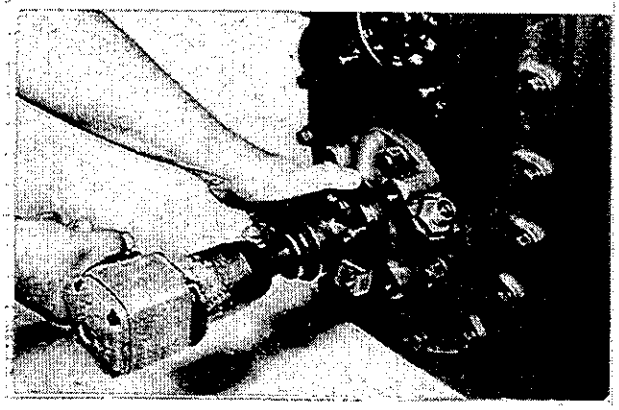




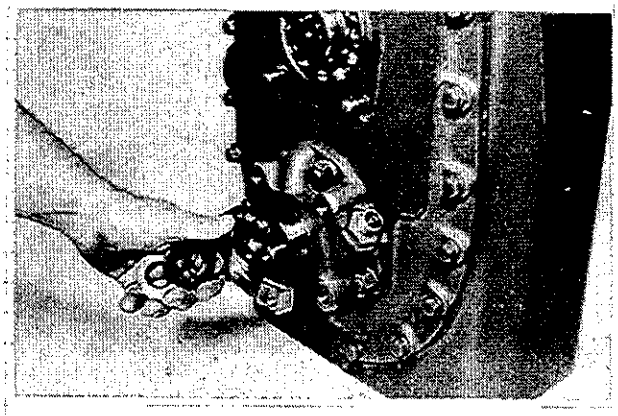
2.4.4.21
Remove idler shaft bearing cap stud nuts and washers.



2.4.4.22
Remove bearing cap.

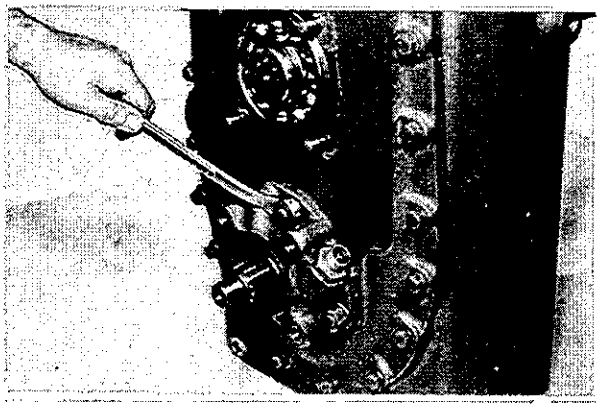


2.4.4.23
Using an impact wrench (if available), if not a flange retainer bar must be used to hold the companion flange from turning, loosen output flange nut.

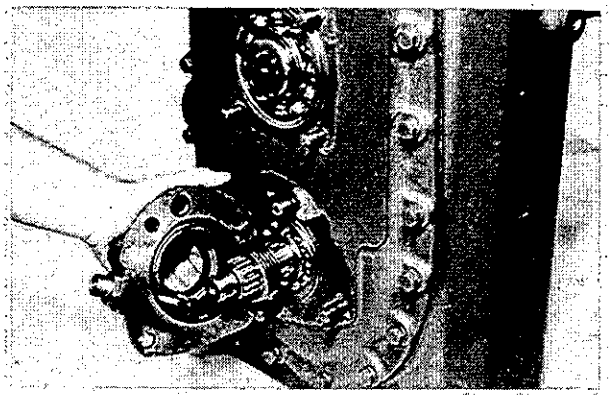


2.4.4.24
Remove flange nut, washer, o-ring and flange. Remove parking brake drum. Remove brake backing plate bolts and washers. Remove backing plate assembly.

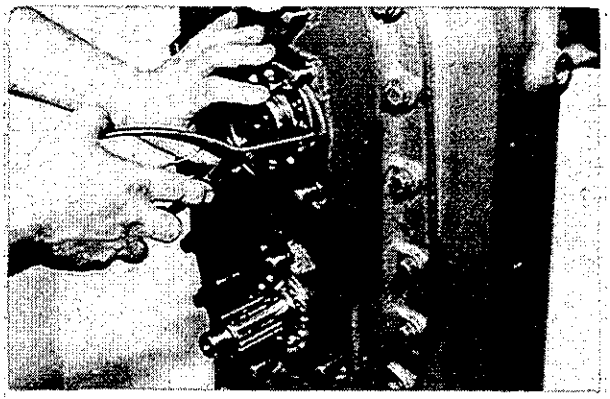
2.4.4.25
Remove output shaft bearing cap stud nuts and washers.



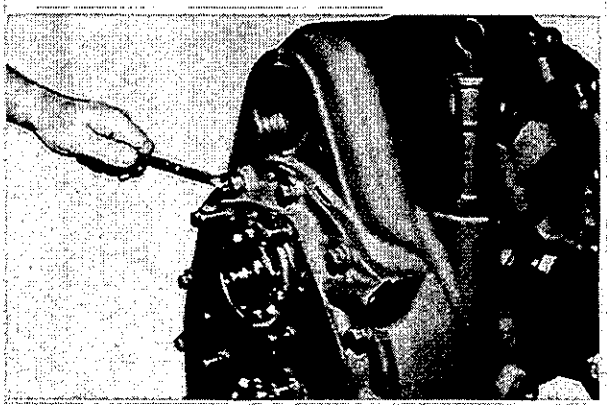
2.4.4.26
Remove output shaft bearing cap. Remove speedometer drive gear from output shaft.



2.4.4.27
Remove low clutch, idler shaft and output shaft rear bearing locating rings.



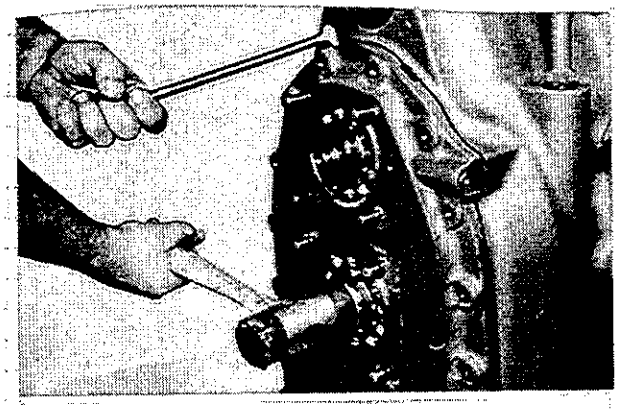
2.4.4.28
Remove rear cover bolts and washers.



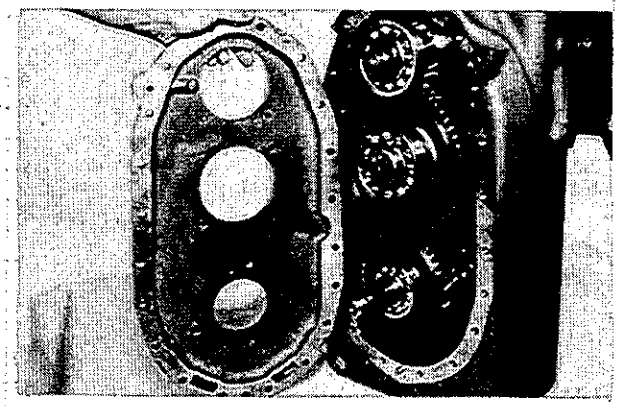
⚠ WARNING

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.

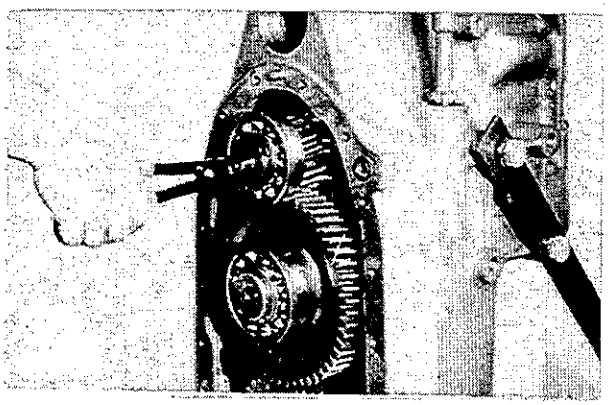
It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.



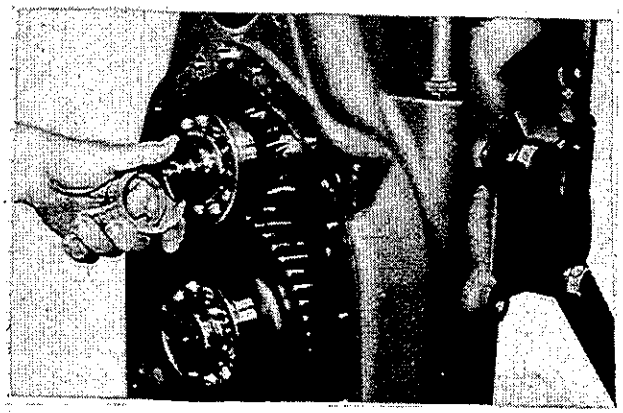
2.4.4.29
Using pry slots provided, pry cover from transmission housing. Using a soft hammer, tap on low clutch, idler and output shafts to prevent cover from binding.



2.4.4.30
Remove rear cover.

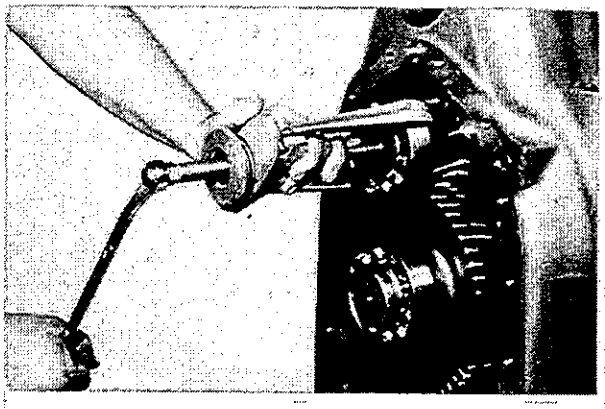


2.4.4.31
Remove low clutch rear bearing retainer ring.

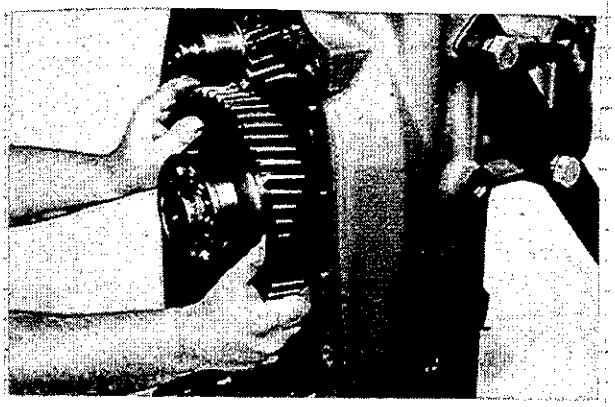


2.4.4.32
Low clutch rear bearing spacer and retaining ring.

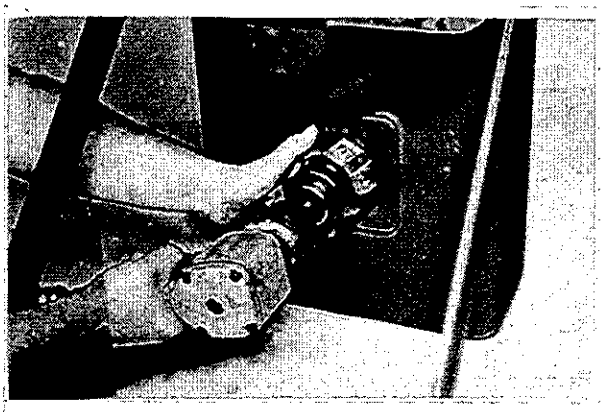
2.4.4.33
Remove low clutch rear bearing.



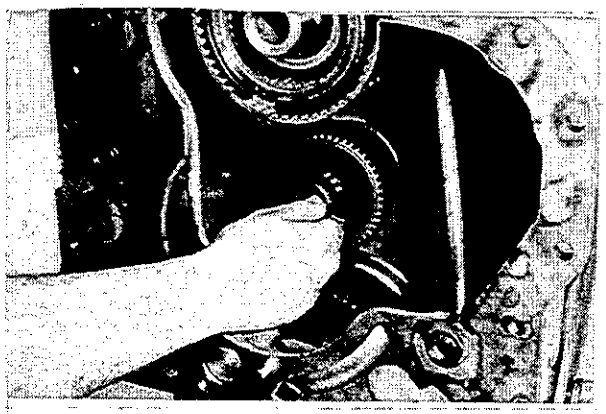
2.4.4.34
Remove idler gear and rear bearing as an assembly.

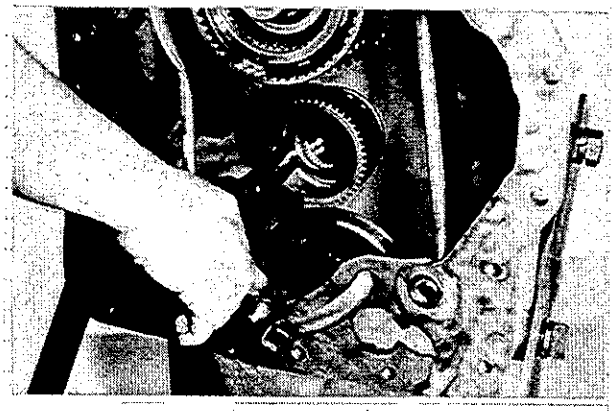


2.4.4.35
Remove output shaft front flange nut, washer, o-ring and flange.

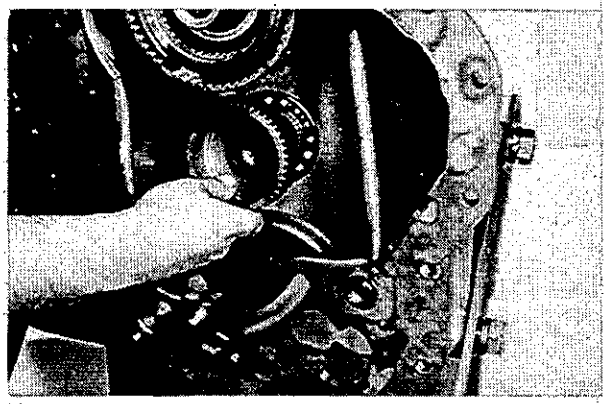


2.4.4.36
Remove reverse and 2nd clutch pilot bearing.

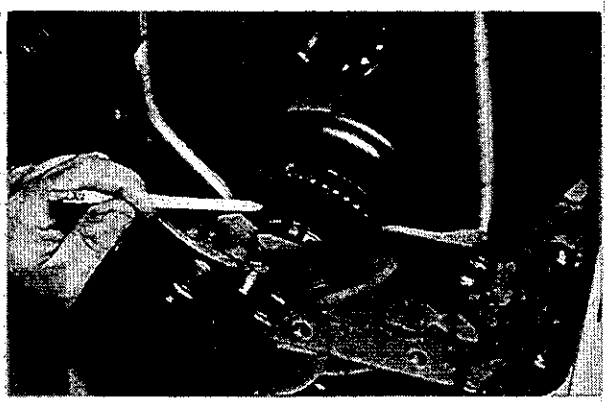




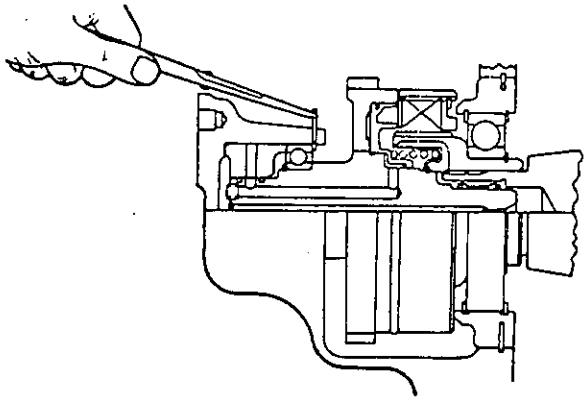
2.4.4.37
Remove 2nd clutch disc hub retainer ring.



2.4.4.38
Remove disc hub.

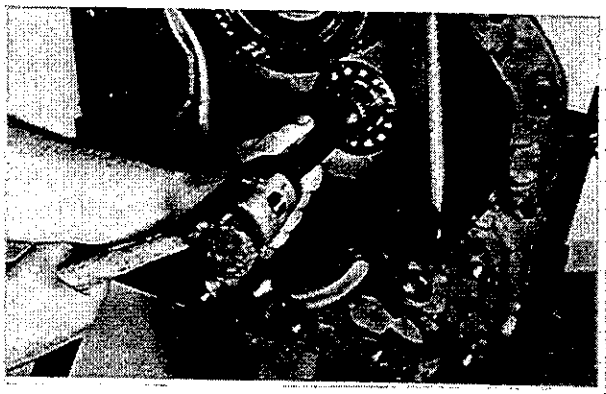


2.4.4.39
Compress ears on 3rd clutch front bearing locating ring. Remove ring from ring groove. It is not necessary to remove ring from clutch, it will come out when clutch is removed.



2.4.4.40
Front bearing locating ring.

2.4.4.41
Tap low clutch assembly from housing. Ifpossible it is recommended someone help in this operation to prevent the low clutch from dropping out of the case.



⚠ WARNING

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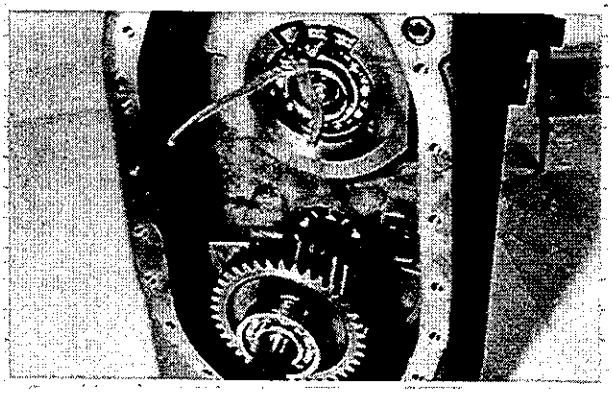
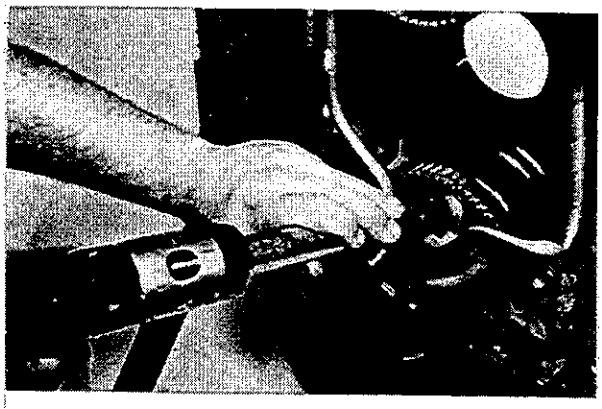
2.4.4.42
Using contracting type snap ring pliers as shown, contact 3rd clutch bearing carrier locating ring. Lock pliers to hold ring contracted.



2.4.4.43
From front of transmission and using a soft bar, tap 3rd speed clutch assembly from housing. If clutch seems difficult to remove, recheck front and rear snap rings being sure they are clear of the ring groove.



⚠ WARNING

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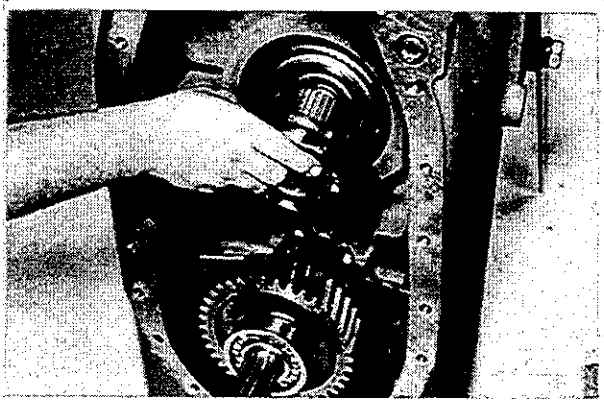
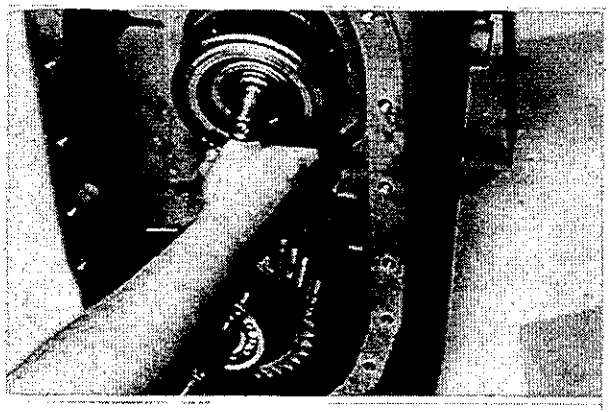
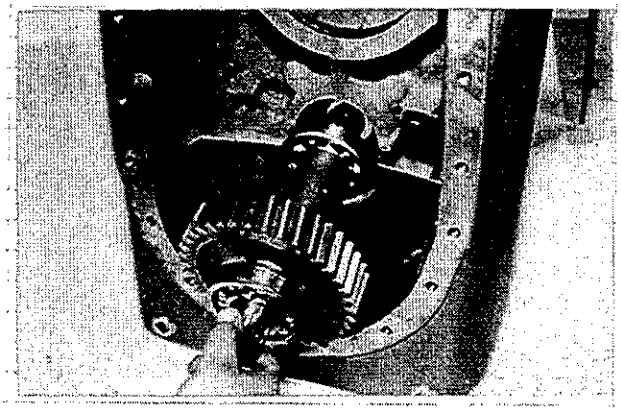
2.4.4.44
Remove bearing carrier, bearing and 3rd speed clutch disc hub.

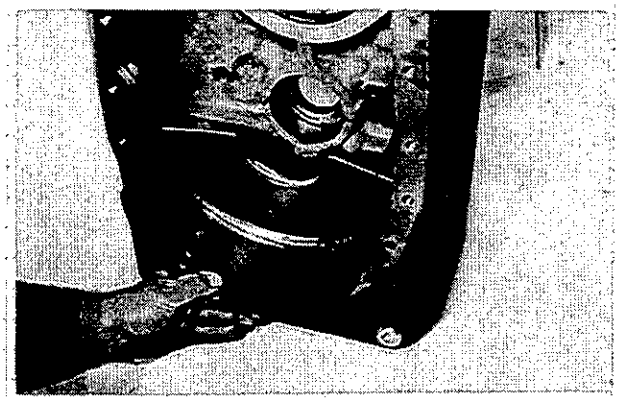




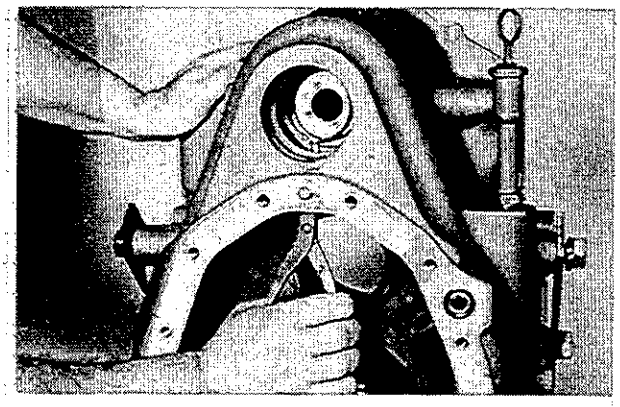
2.4.4.45
Remove 3rd speed clutch assembly.



2.4.4.46
Remove output shaft and bearings as an assembly.

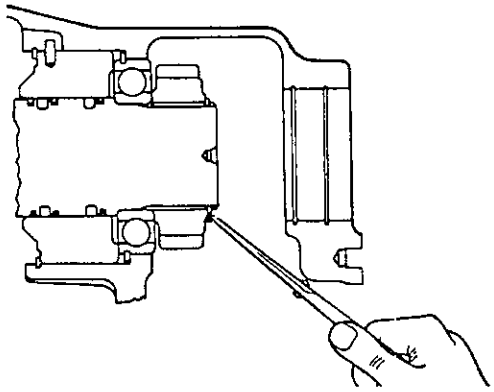


2.4.4.47
Remove oil sump oil baffle.

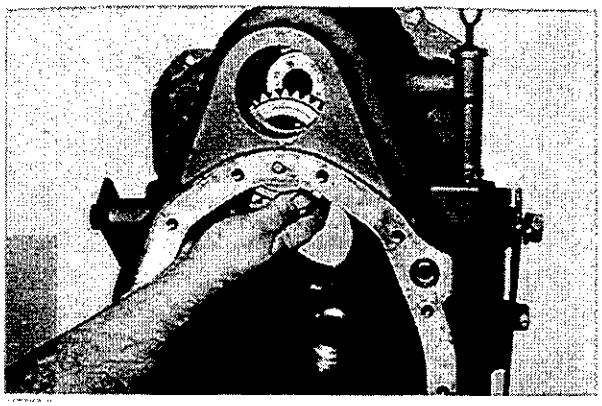


2.4.4.48
Remove forward clutch shaft drive gear retaining ring.

2.4.4.49
Forward clutch drive gear retaining ring.



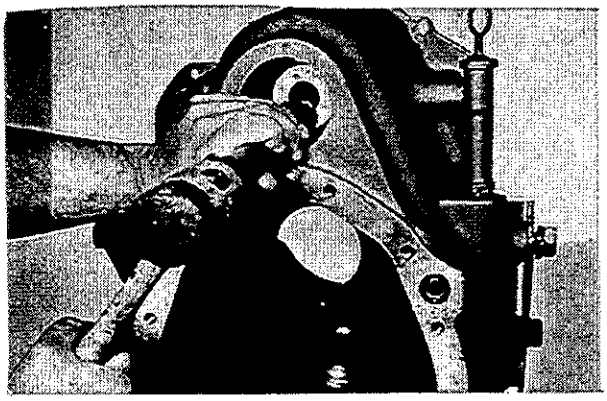
2.4.4.50
Remove forward clutch shaft drive gear.



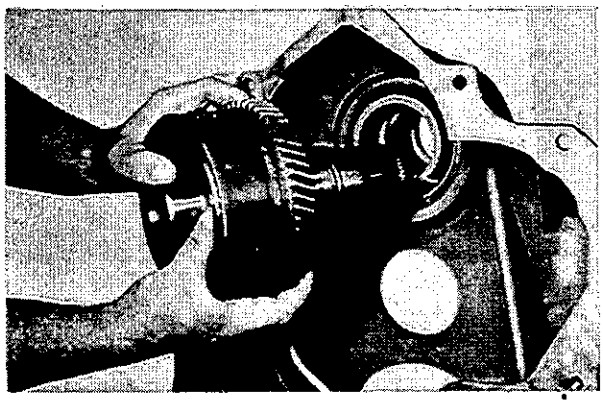
2.4.4.51
Tap forward clutch from rear bearing.

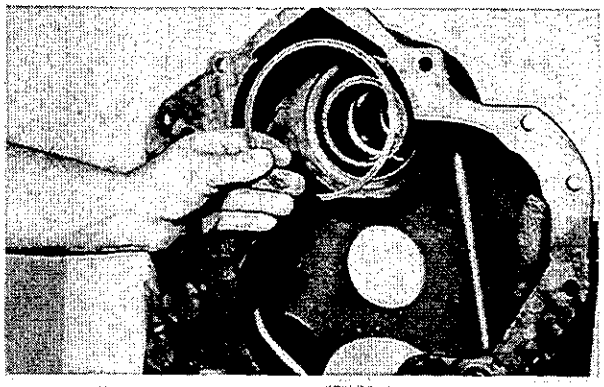
⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

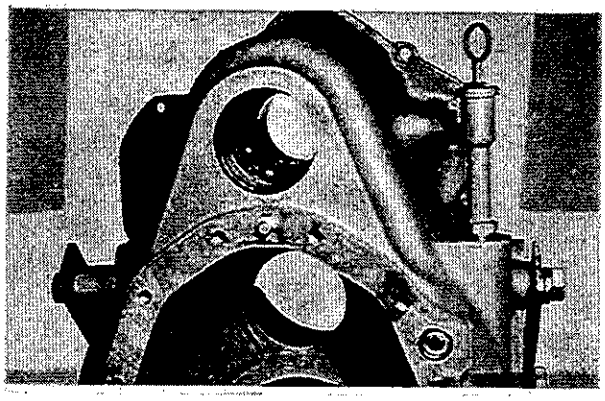


2.4.4.52
Remove forward clutch assembly.





2.4.4.53
Remove forward clutch piston ring sleeve retainer ring.



2.4.4.54
If piston ring sleeve or forward clutch rear bearing is to be replaced, tap bearing from rear of housing.

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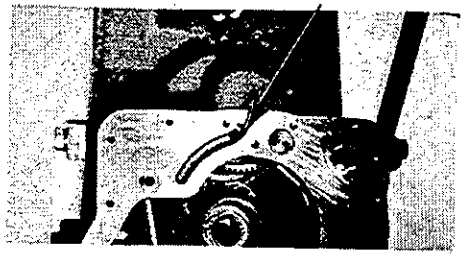
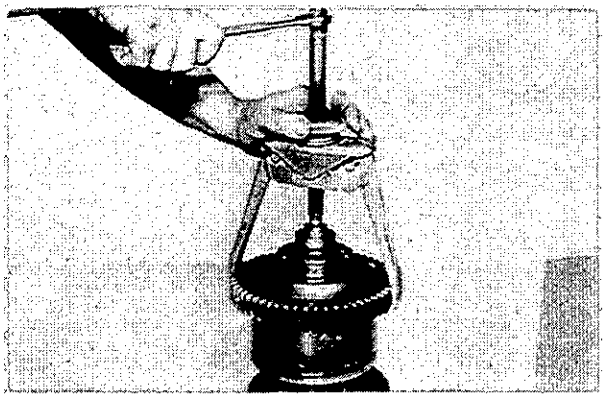


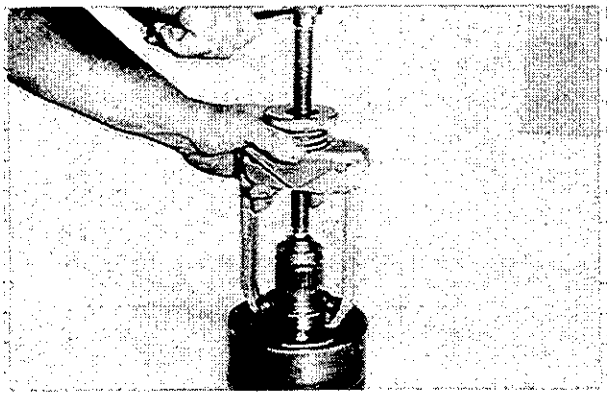
2.4.4.55
If the transmission has lost third range, it is possible that the sleeve has turned in the transmission case. The sleeve serves as the oil collector and must be positioned by the roll pin. If the roll pin should shear or is damaged, this sleeve can be mispositioned and cut off oil flow to the clutch.

2.4.5 3RD AND LOW CLUTCH DISASSEMBLY

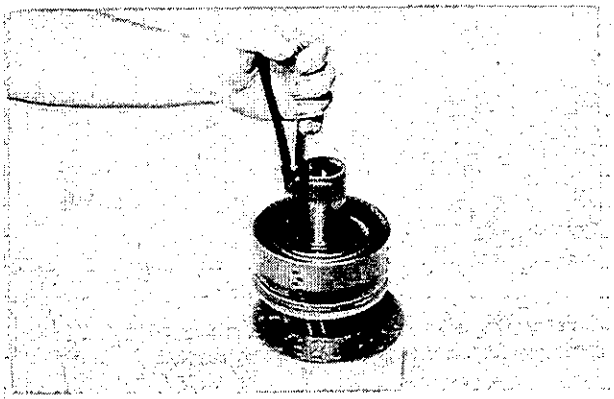
2.4.5.1
Remove low gear and hub, bearing spacer and low clutch front bearing.



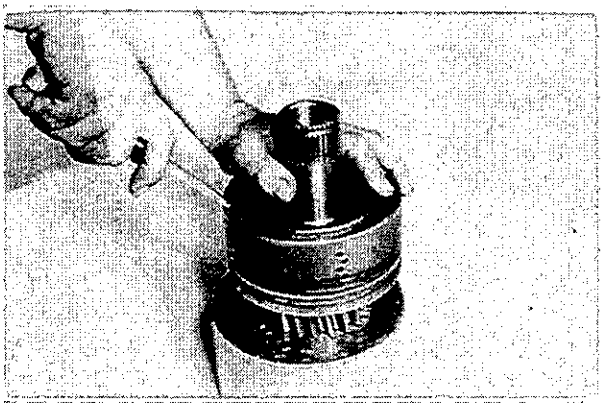
2.4.5.2
Remove low speed gear bearing.

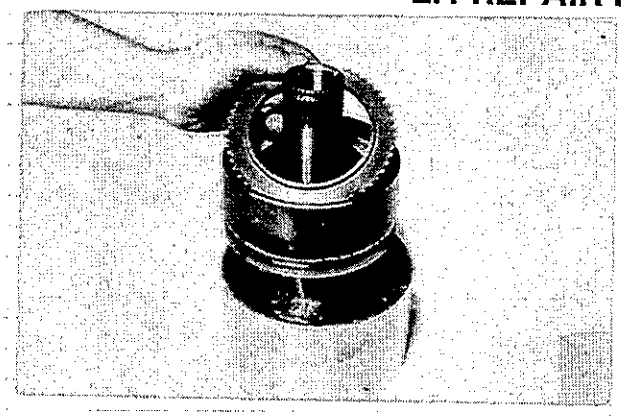


2.4.5.3
Remove low gear bearing locating ring.

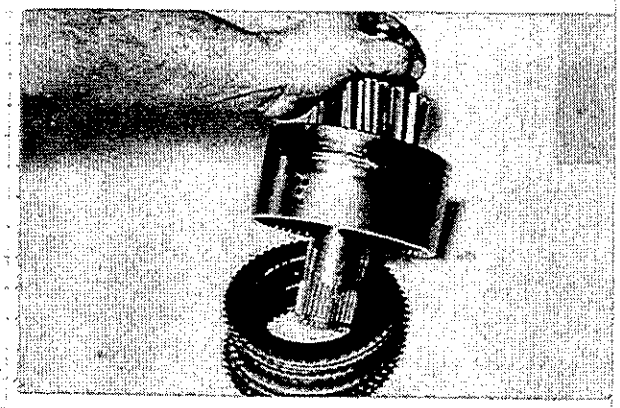


2.4.5.4
Remove end plate retainer ring.

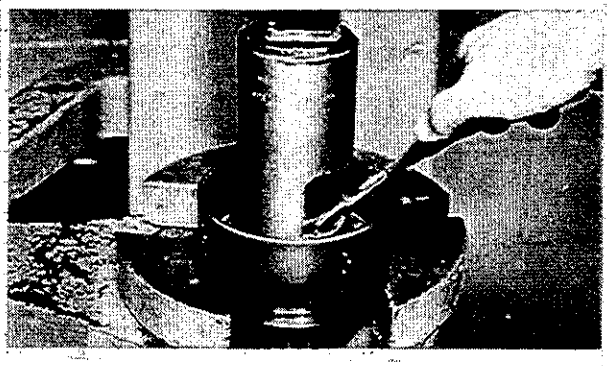




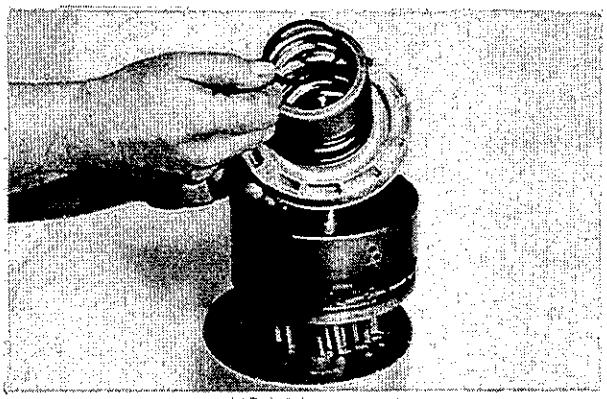
2.4.5.5
Remove end plate.



2.4.5.6
Turn clutch over. Remove inner and outer clutch discs. **Do not mix low clutch friction discs with friction discs in other clutches.**



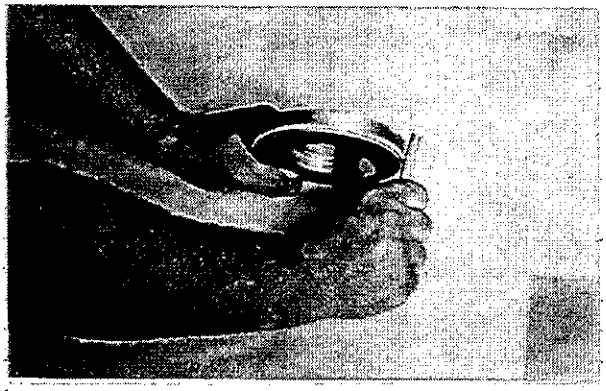
2.4.5.7
Remove clutch piston return spring. A sleeve with a portion removed is recommended for removing the clutch piston return spring, washer, and retainer ring. Sleeve shown is a common pipe, with a 1-1/2" x 1" (39.0mm x 26.0mm) opening. The pipe is 6" x 3-1/4" x 2-3/4" (155.0mm x 85.0mm x 78.0mm). Compress spring retainer washer. Through opening, remove spring retainer snap ring. Release tension on spring retainer.



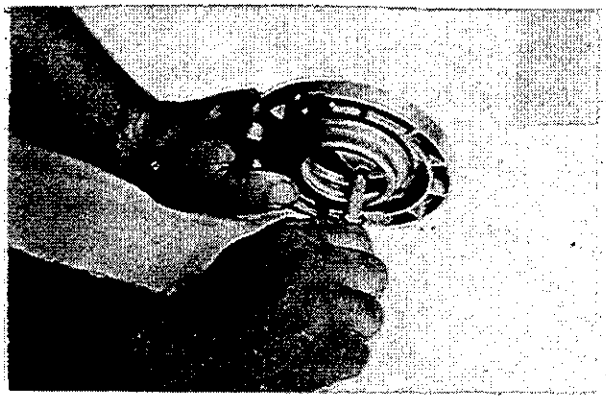
2.4.5.8
Remove spring retainer and spring. Turn clutch over and tap clutch shaft on a block of wood to remove clutch piston.

2.4.6 3RD AND LOW CLUTCH ASSEMBLY

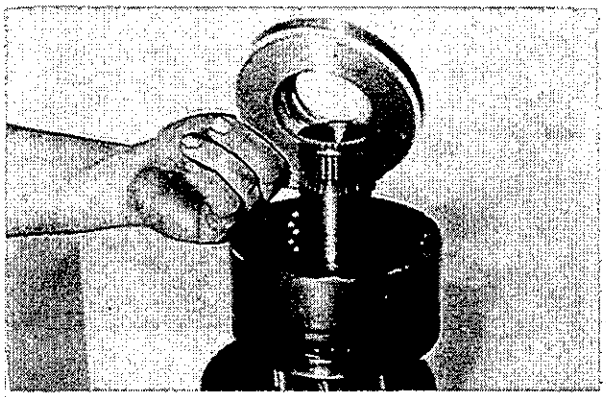
2.4.6.1
Install clutch piston outer seal ring. **NOTE:** Ring must be sized before installing in clutch drum. Sizing is best accomplished by rotating piston while holding a round object against the new seal ring as shown. Rotate piston until seal ring is flush with outer diameter of piston.



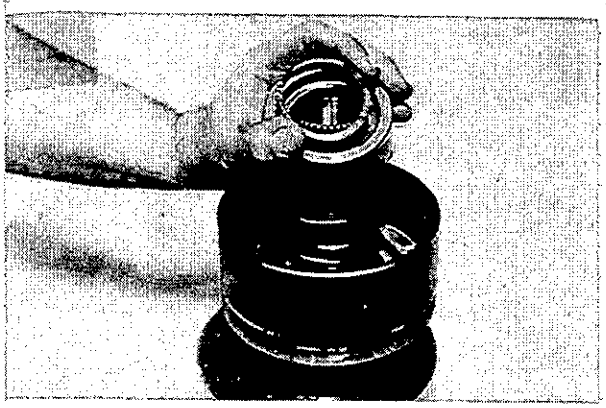
2.4.6.2
Install clutch piston inner seal ring and size as described above.

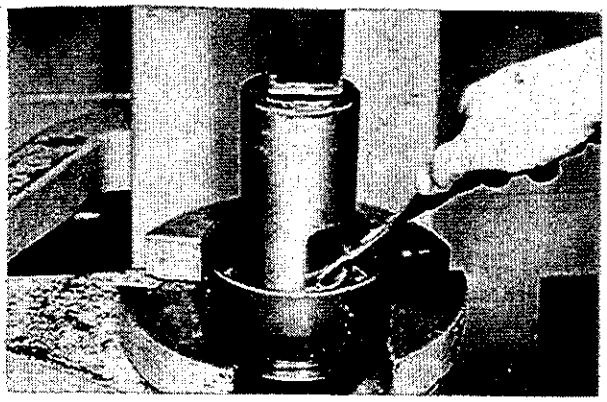


2.4.6.3
Position piston in low clutch drum as shown. Use caution as not to damage inner and outer piston sealing rings.

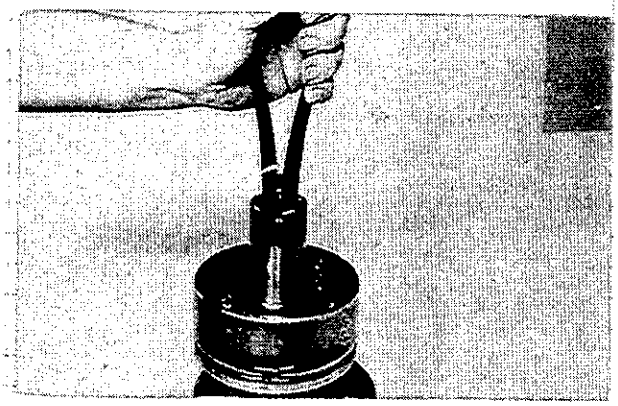


2.4.6.4
Position piston return spring, spring retainer, and snap ring in clutch drum.

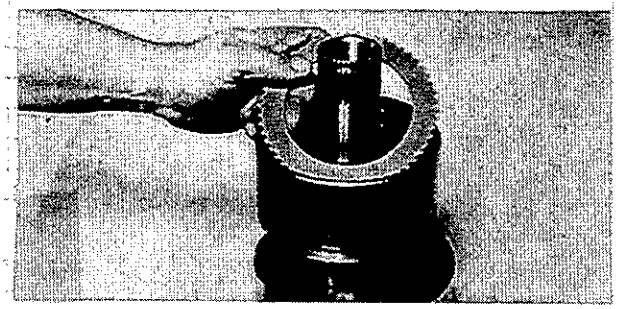




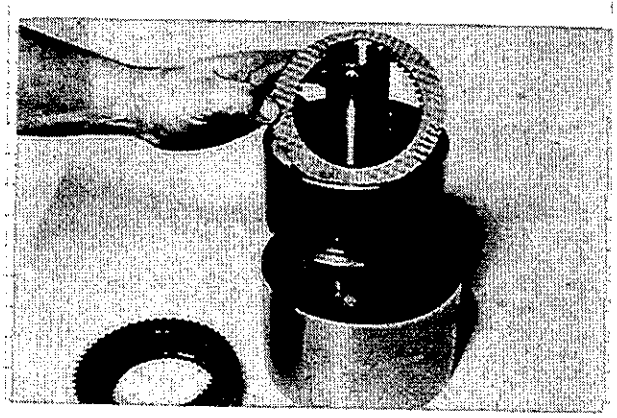
2.4.6.5
Compress spring and retainer. Install retainer snap ring.



2.4.6.6
Install clutch inner bearing locating ring.

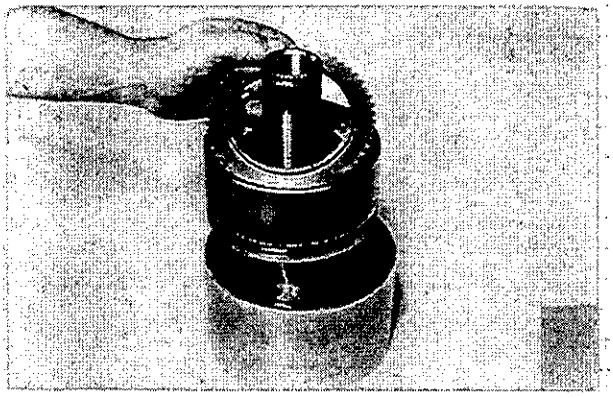


2.4.6.7
Install one steel disc.

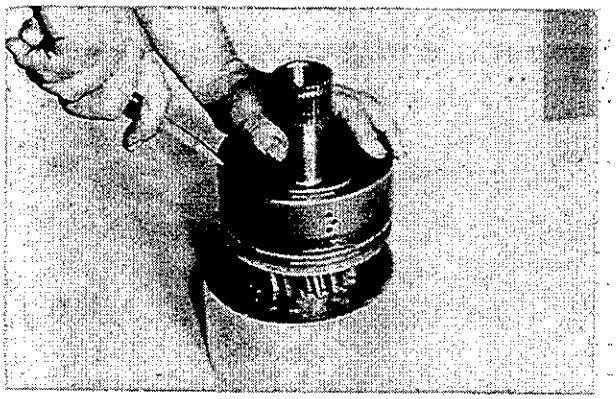


2.4.6.8
Install one friction disc. **NOTE:** The friction discs in the low clutch has a higher co-efficient rating than the friction discs in the other clutches, therefore the discs must not be mixed. The low clutch friction disc has a yellow mark of nonsoluble paint on the outer diameter for permanent identification. Alternate steel and friction discs until the proper amount of discs have been installed. First disc next to the piston is steel; last disc installed is friction.

2.4.6.9
Install clutch disc end plate.



2.4.6.10
Install end plate retainer ring.



2.4.6.11
Install low speed gear inner bearing.

⚠ WARNING

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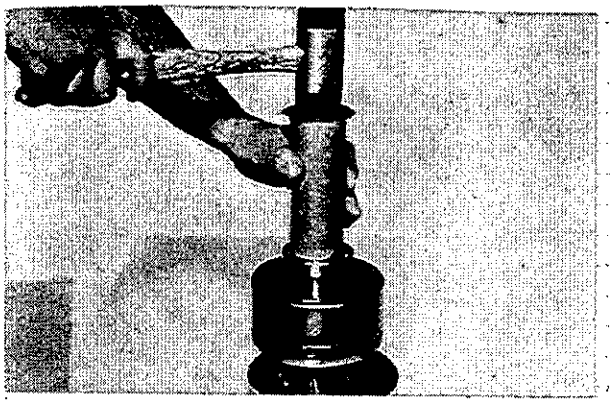
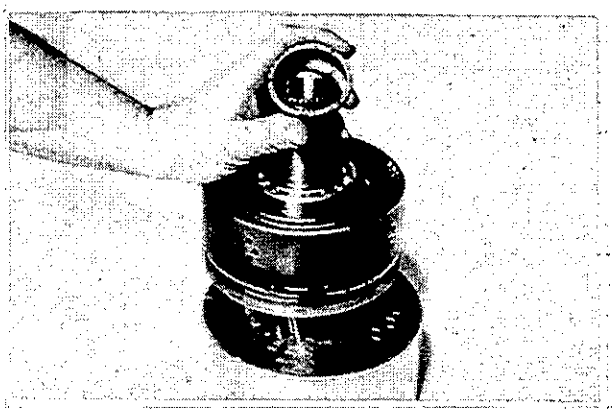
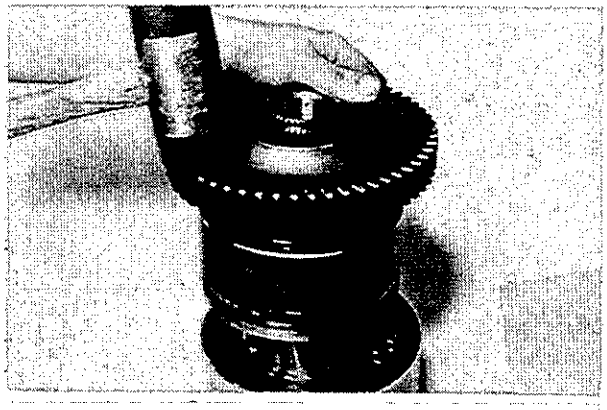


2.4.6.12
Install low speed gear bearing spacer.





2.4.6.13
Install low clutch driven gear and hub into clutch drum. Align splines on clutch hub with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

⚠ WARNING

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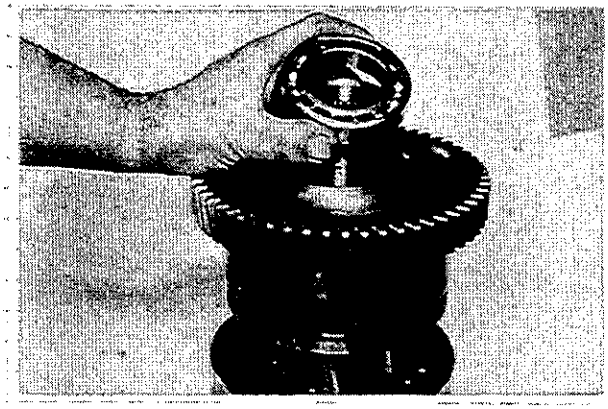
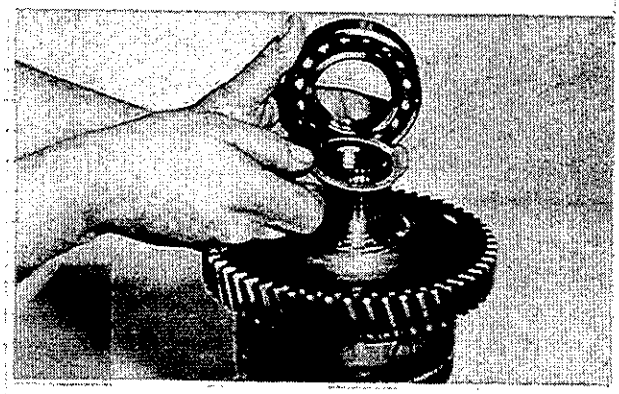
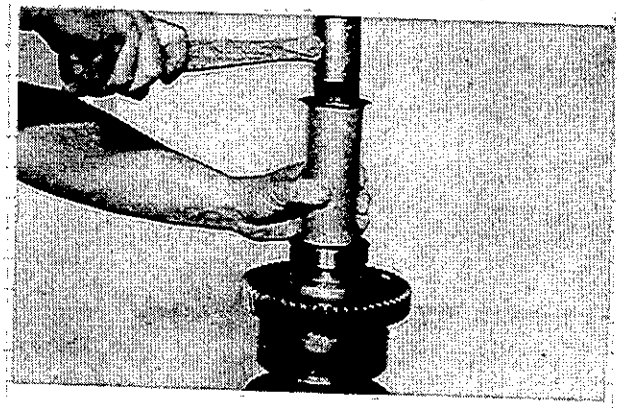


2.4.6.14
Install low speed gear outer bearing.



2.4.6.15
Position low gear front bearing spacer and bearing on clutch shaft.



2.4.6.16
Tap bearing into position.

⚠ WARNING

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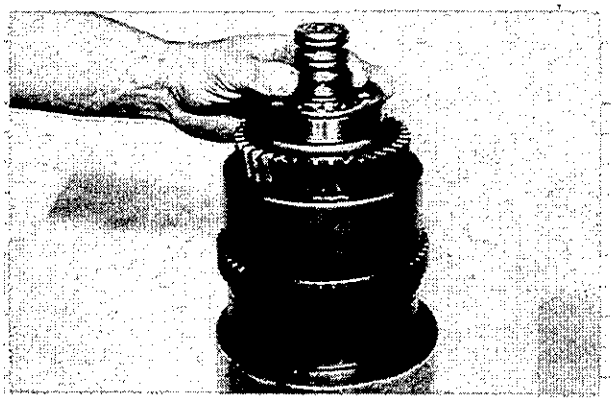
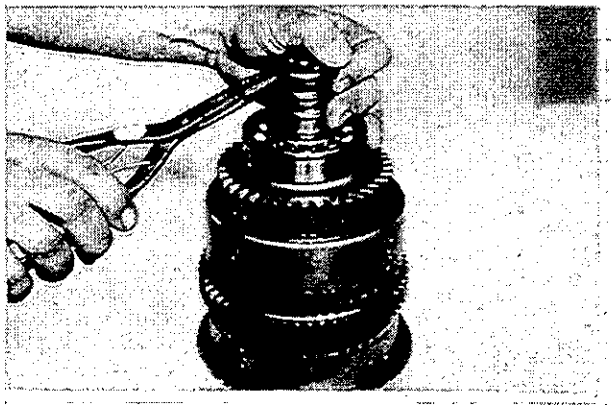
2.4.7 FORWARD, REVERSE AND 2ND CLUTCH DISASSEMBLY

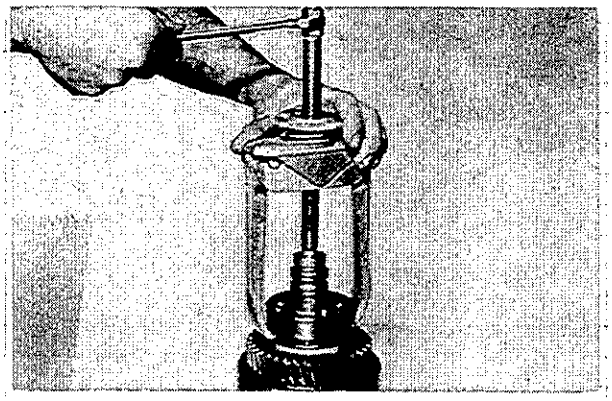
2.4.7.1
Remove clutch shaft piston rings.



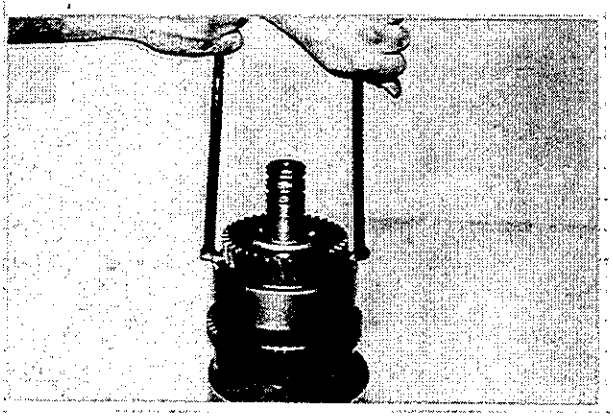
2.4.7.2
Remove front bearing retainer ring.

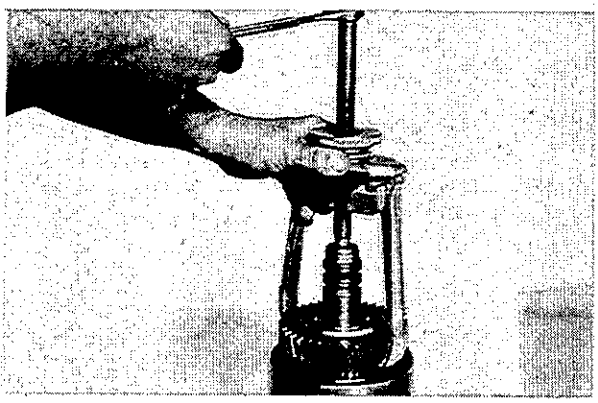


2.4.7.3
Remove front bearing.

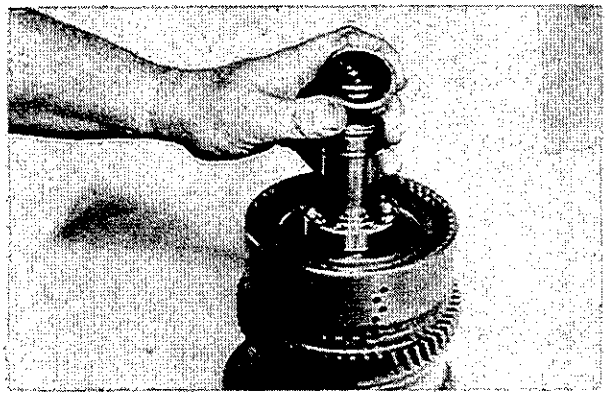


2.4.7.4
Pry reverse gear from clutch assembly far enough to use a gear puller.

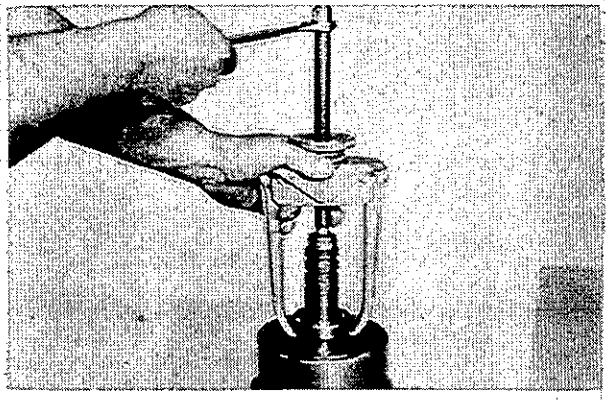




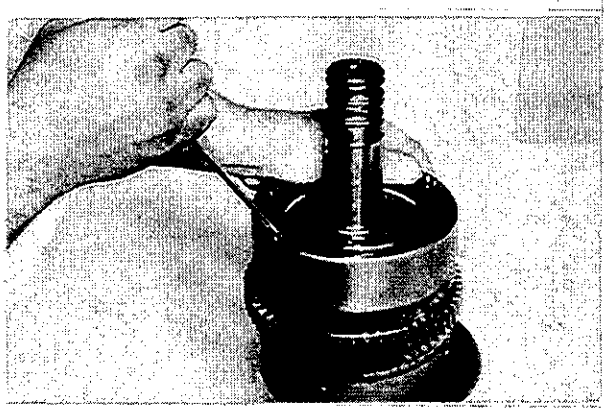
2.4.7.5
Remove gear as shown.



2.4.7.6
Remove bearing spacer.

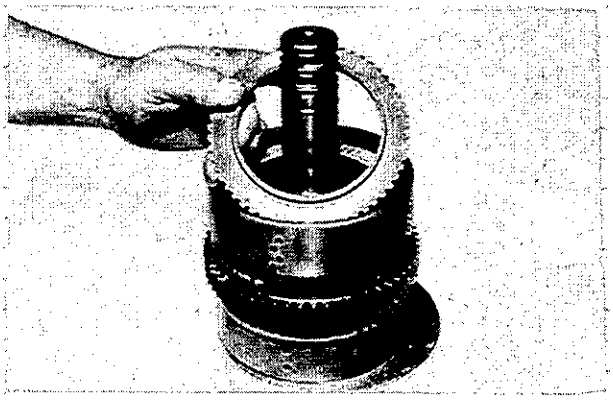


2.4.7.7
Remove inner bearing.

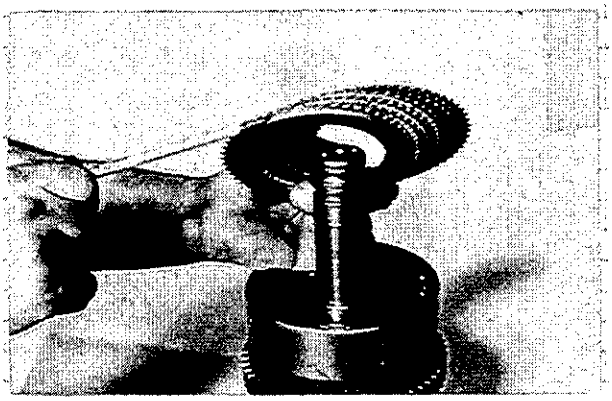


2.4.7.8
Remove end plate retainer ring.

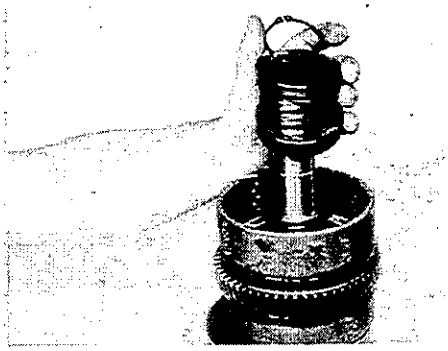
2.4.7.9
Remove end plate.



2.4.7.10
Remove clutch discs.

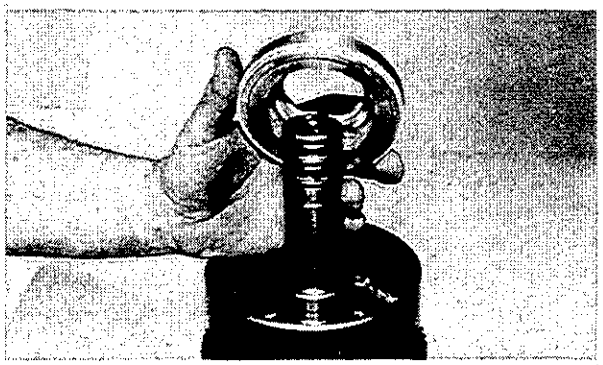


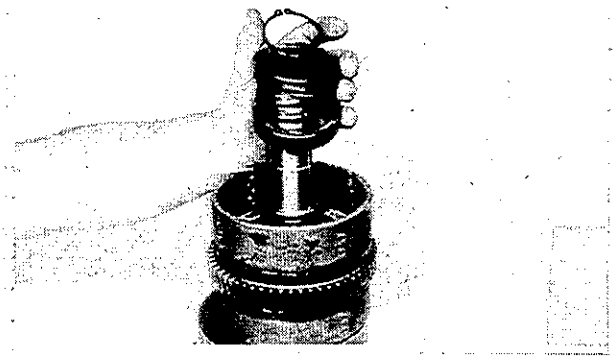
2.4.7.11
Refer to procedure shown in paragraph 2.4.5.7 for removing return spring retainer ring. Remove ring, piston return Belleville spring washers and spacer. Turn clutch over and tap shaft on a block of wood to remove clutch piston. Repeat procedure for forward and 2nd clutch assemblies. **NOTE:** 2nd clutch will not have Belleville washers for piston return.



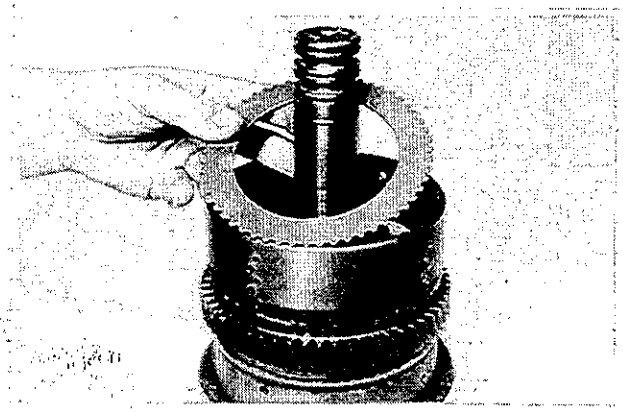
2.4.8 FORWARD, REVERSE AND 2ND CLUTCH ASSEMBLY

2.4.8.1
Install inner and outer clutch piston seal rings. Size rings as previously explained. Position piston in clutch drum.

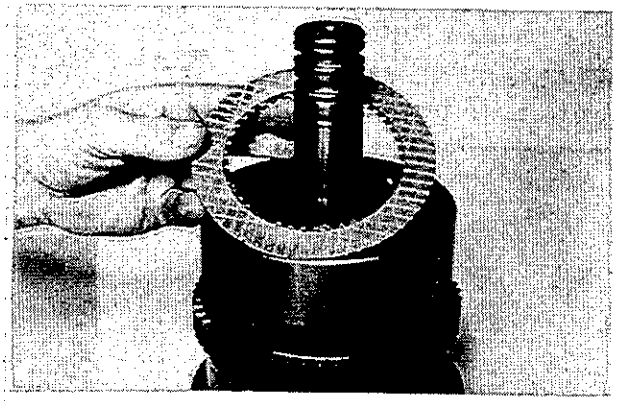




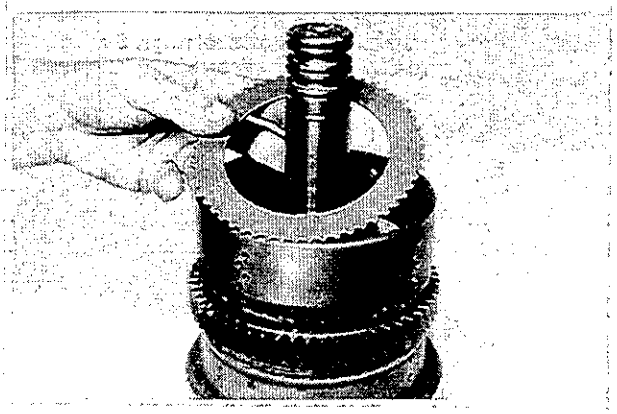
2.4.8.2
Instll piston return spring spacer, Belleville spring washers and retainer ring.



2.4.8.3
Install 1st steel disc.

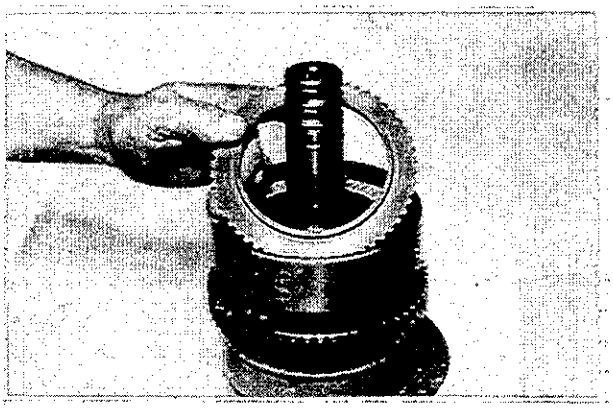


2.4.8.4
Install one friction disc.

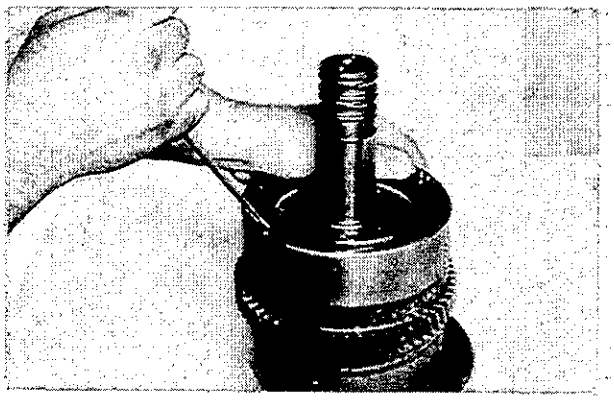


2.4.8.5
Install next steel disc. Alternate friction and steel discs until the proper amount of discs are installed. First disc next to the piston is steel; last disc installed is friction.

2.4.8.6
Install end plate.



2.4.8.7
Install end plate retainer ring.



2.4.8.8
Install inner clutch driven gear bearing.

⚠ WARNING

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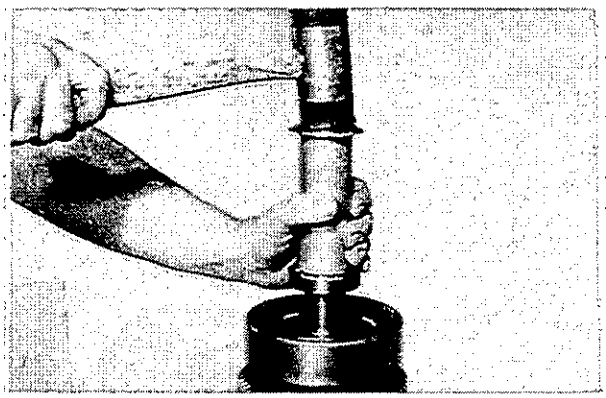
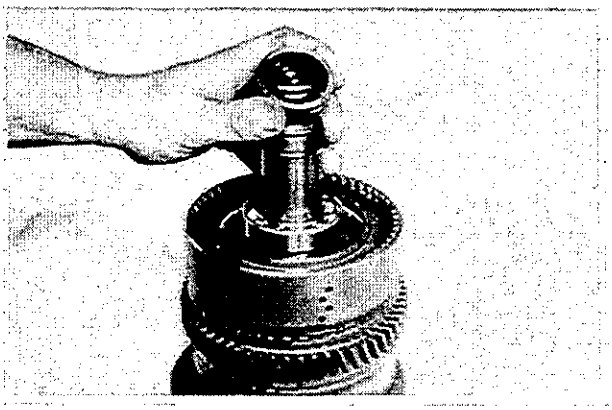
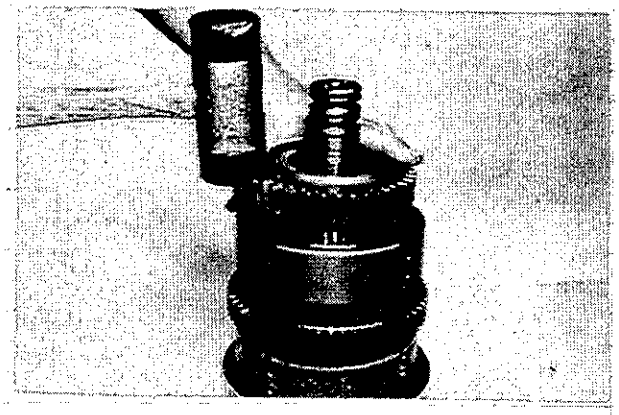


2.4.8.9
Install bearing spacer.





2.4.8.10
Install clutch driven gear into clutch drum. Align splines on clutch gear with internal teeth of friction discs. Tap gear into position. Do not force this operation. Gear splines must be in full position with internal teeth of all friction discs.

⚠ WARNING

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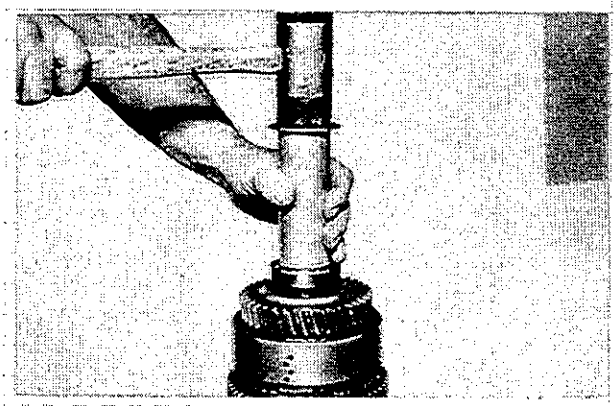
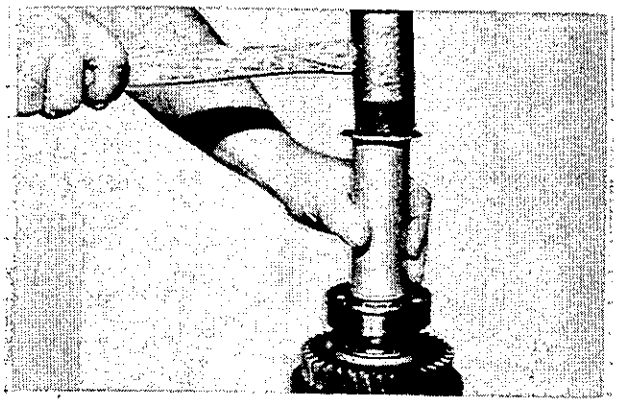
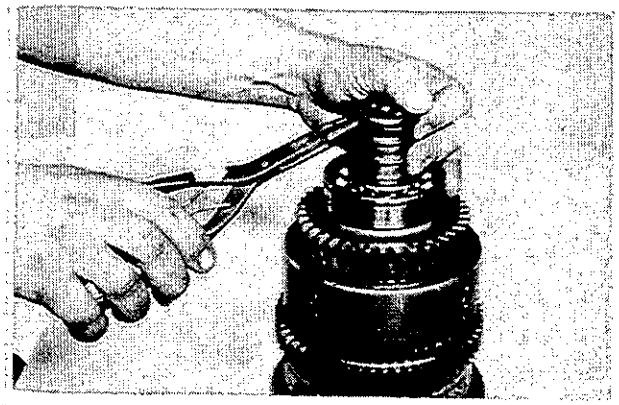


2.4.8.11
Install outer bearing.

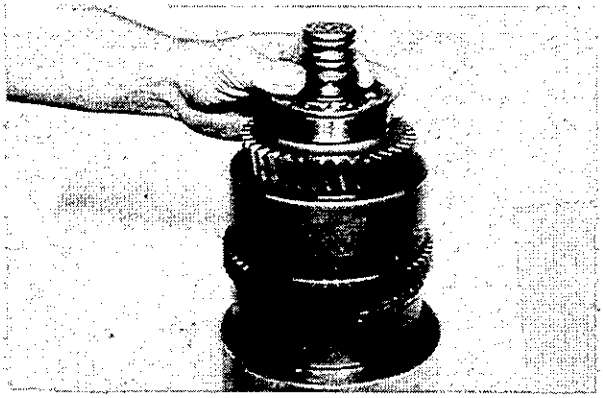


2.4.8.12
Install front bearing. **NOTE:** Snap ring groove in front bearing must be up.

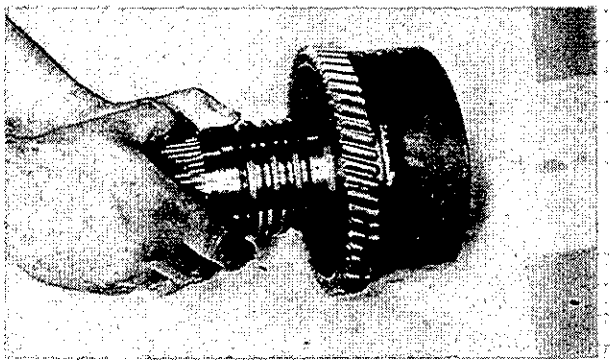


2.4.8.13
Install front bearing retainer ring.

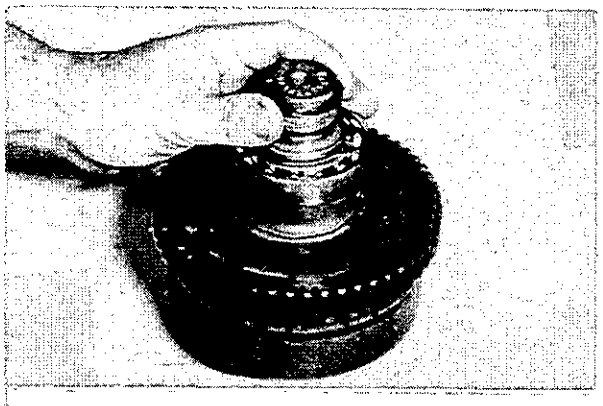
2.4.8.14
Install new clutch shaft piston rings. Grease rings to center on shaft to facilitate reassembly into transmission housing. **NOTE:** 2nd clutch uses a return spring and not Belleville washers for piston return.



2.4.8.15
Forward clutch will disassemble and reassemble the same as the reverse clutch. Install new clutch shaft piston rings. Grease rings to facilitate reassembly.

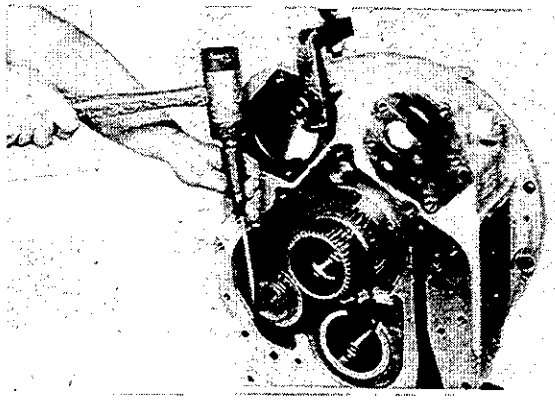


2.4.8.16
The 3rd speed clutch will disassemble and reassemble the same as the low clutch except for the friction discs. See paragraph 2.4.6.8. Install new clutch shaft piston rings.



2.4.9 CONVERTER HOUSING DISASSEMBLY

2.4.9.1
Straighten lockplate tabs from reverse idler capscrews.



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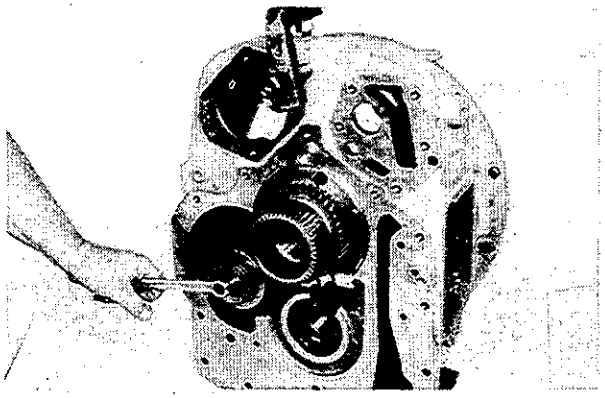
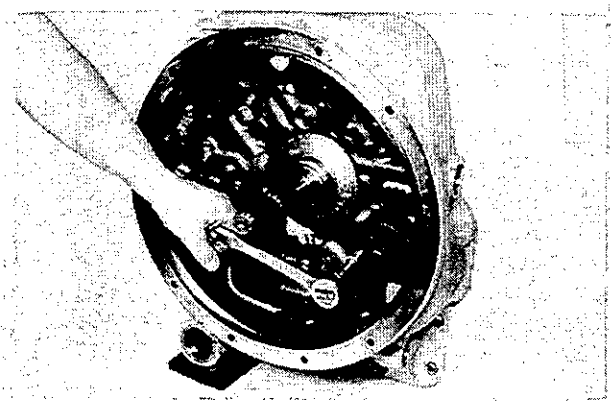
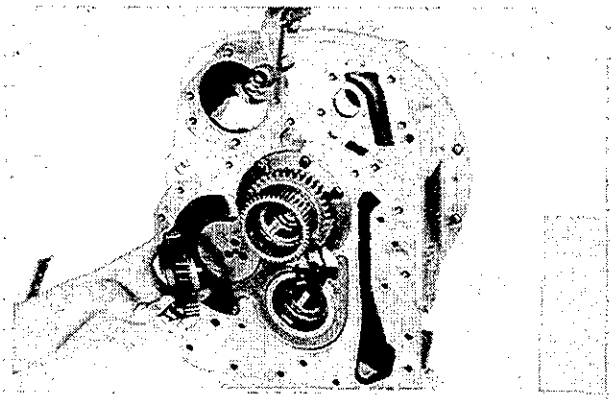


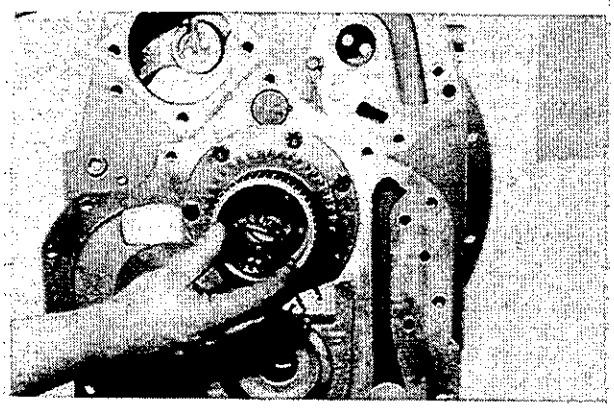
2.4.9.2
Remove reverse idler capscrews.



2.4.9.3
Remove reverse idler shaft front capscrews.

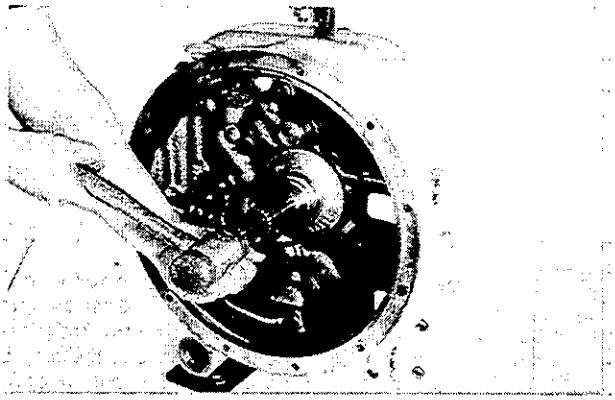


2.4.9.4
Remove reverse idler gear and bearing assembly.



2.4.9.5
Remove forward shaft pilot bearing.

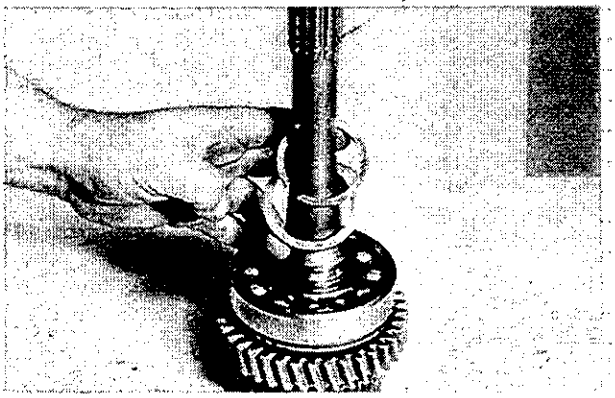
2.4.9.6
Using spreader type snap ring pliers, spread ears on the turbine shaft bearing snap ring. Tap turbine shaft from converter housing.



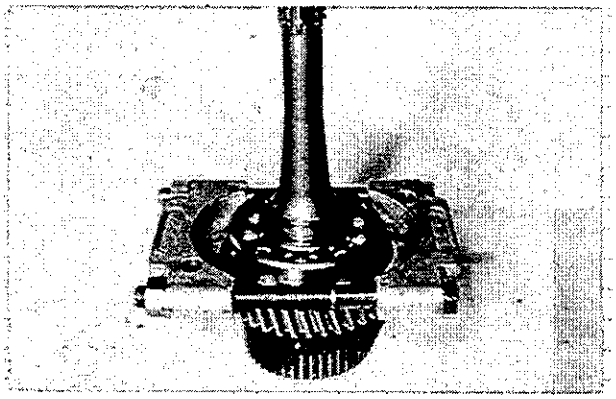
⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

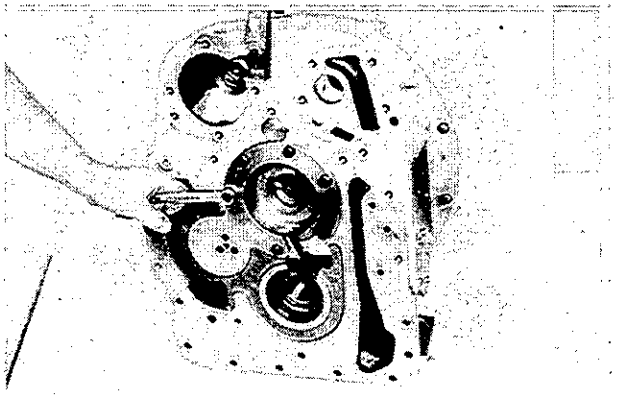
2.4.9.7
Remove oil sealing ring and turbine shaft bearing retainer ring and washer.

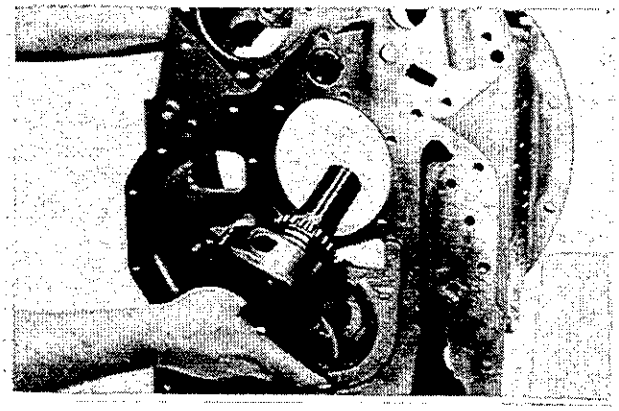


2.4.9.8
Attach puller and remove bearing from turbine shaft.

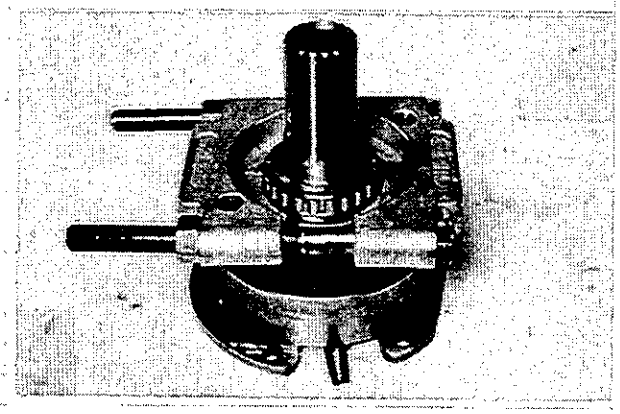


2.4.9.9
Remove reaction member support capscrews.

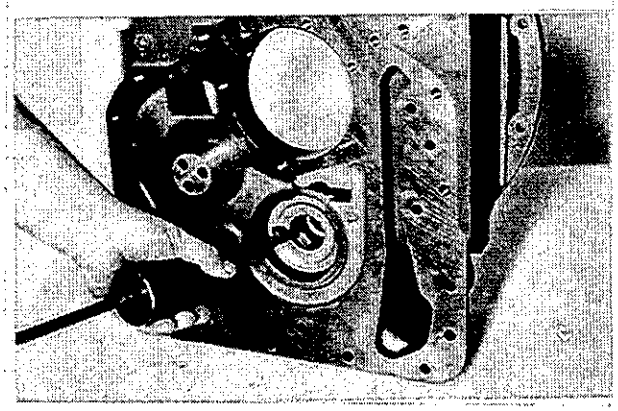




2.4.9.10
Tap reaction member support from housing.



2.4.9.11
Remove bearing from support. Remove support oil sealing ring and sealing ring expander spring.



2.4.9.12
If reverse clutch piston ring sleeve is to be replaced, remove as shown.

2.4 REPAIR PROCEDURES

2.4.10 CLEANING AND INSPECTION

⚠ WARNING

Always wear safety glasses with side shields when removing, overhauling, cleaning or testing machine parts.

Wear safety glasses with side shields or goggles when using compressed air for cleaning to reduce the danger of personal injury from flying particles. Limit pressure to 30 psi (21 Kg/Sq.cm) according to local or national requirements.

Extreme care must be used to avoid fluid contact with skin and inhalation of vapors when using alkali cleaners.

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

2.4.10.1 CLEANING

Clean all parts thoroughly using solvent type cleaning fluid. It is recommended that parts be immersed in cleaning fluid and moved up and down slowly until all old lubricant and foreign material is dissolved and parts are thoroughly cleaned.

2.4.10.2 BEARINGS

Remove bearings from cleaning fluid and strike larger side of cone flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning fluid to flush out particles. Repeat above operation until bearings are thoroughly clean. Dry bearings using moisture-free compressed air. Be carefull to direct air stream across bearing to avoid spinning. Do not spin bearings when drying. Bearings may be rotated slowly by hand to facilitate drying process.

2.4.10.3 HOUSINGS

Clean interior and exterior of housings, bearing caps, etc., thoroughly. Cast parts may be cleaned in hot solution tanks with mild alkali solutions providing these parts do not have ground or polished surfaces. Parts should remain in solution long enough to be thoroughly cleaned and heated. This will aid in the evaporation of the cleaning solution and rinse water. Parts cleaned in solution tanks must be thoroughly rinsed with clean water to remove all traces of alkali. Cast parts may also be cleaned with a steam cleaner. All parts cleaned must be thoroughly dried immediately by using moisture-free compressed air or soft, lintless absorbent wiping rags free of abrasive materials such as metal filings, contaminated oil or lapping compound.

2.4.10.4 INSPECTION

The importance of carefull and thorough inspection of all parts cannot be overstressed. Replacement of all parts showing indications of wear or stress will eliminate costly and avoidable failures at a later date.

2.4.10.5 BEARINGS

Carefully inspect all rollers, cages and cups for wear, chipping or nicks to determine fitness of bearings for further use. Do not replace a bearing cone or cup individually without replacing the mating cup or cone at the same time. After inspection, dip bearings in a clean light oil and wrap them in clean lintless cloth or paper to protect them until installed.

2.4.10.6 OIL SEALS, GASKETS AND RETAINING RINGS

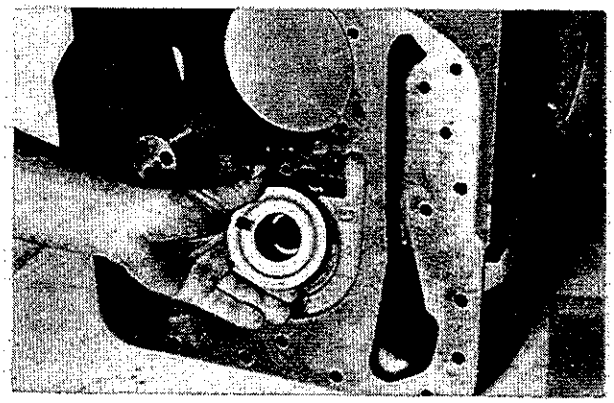
Replacement of spring load oil seals, O-rings, metal sealing rings, gaskets and snap rings is more economical when unit is disassembled than premature overhaul to replace these parts at a future time. Further loss of lubricant through a worn seal may result in failure of other more expensive parts of the assembly. Sealing members should be handled carefully, particularly when being installed. Cutting, scratching, or curling under lip of seal, seriously impairs efficiency. Apply a thin coat of Permatex No. 2 on the outer diameter or the oil seal to assure an oil tight fit into the retainer. When assembling new metal type sealing rings, they should be lubricated with a coat of chassis grease to stabilize rings in their grooves for ease of assembly of mating members. Lubricate all O-rings and seals wtih recommended type Automatic Transmission Fluid before assembly.

2.4.10.7 GEARS AND SHAFTS

If magna-flux process is available, use process to check parts. Examine teeth on all gears carefully for wear, pitting, chipping, nicks, cracks or scores. If gear teeth show spots where case hardening is worn through or cracked, replace with new gear. Small nicks may be removed with suitable hone. Inspect shafts and quills to mqake certain they are not sprung, bent, or splines twisted, and that shafts are true.

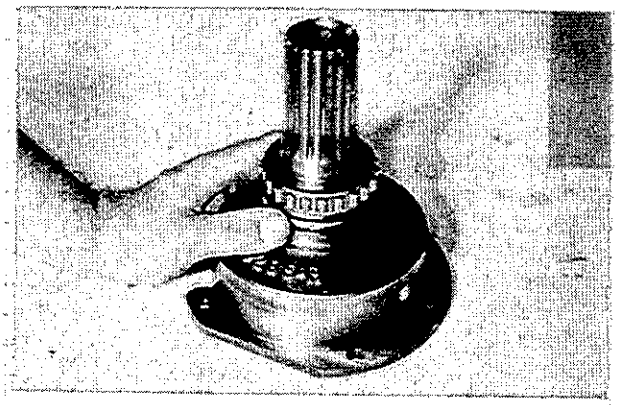
2.4.10.8 HOUSINGS, COVERS, ETC.

Inspect housings, covers and bearing caps to be certain they are thoroughly cleaned and that mating surfaces, bearing bores,etc., are free from nicks or burrs. Check all parts carefully for evidence of cracks or condition which would cause subsequent oil leaks or failures.

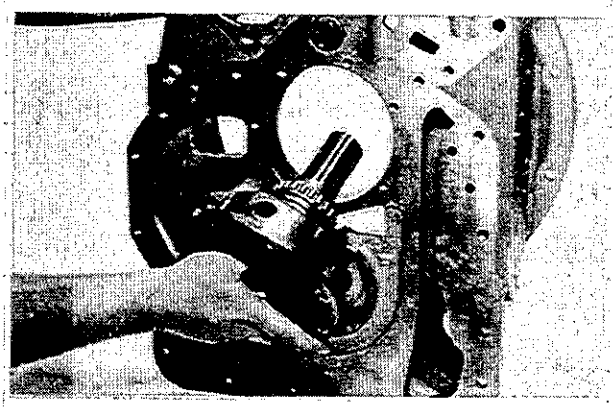


2.4.11 ASSEMBLY

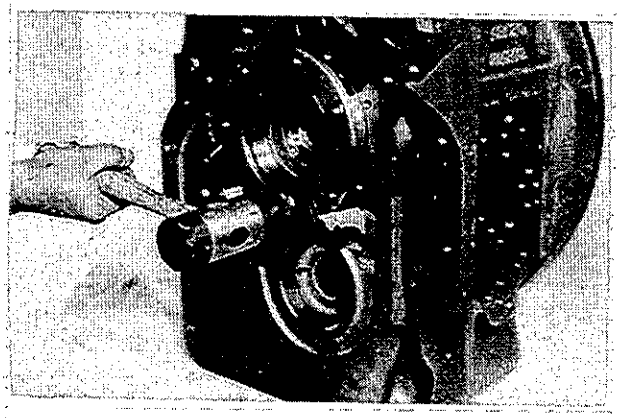
2.4.11.1
Install reverse clutch piston ring sleeve in housing.



2.4.11.2
Install new sealing ring expander spring and oil sealing ring on support. Expander spring gap to be 180° from sealing ring hook joint. Press support bearing into position. **NOTE:** Bearing part number must be up.



2.4.11.3
Position support in converter housing aligning holes of support with housing.

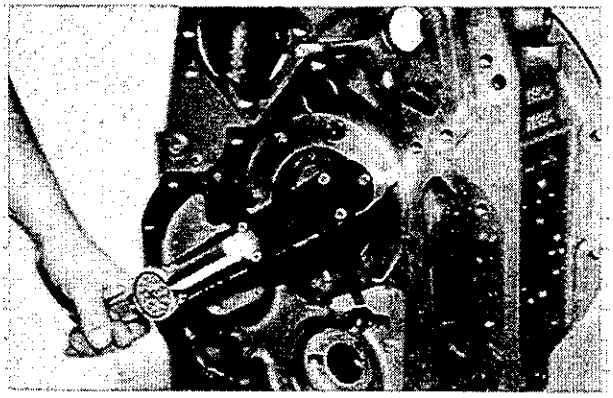


2.4.11.4
Tap support into position.

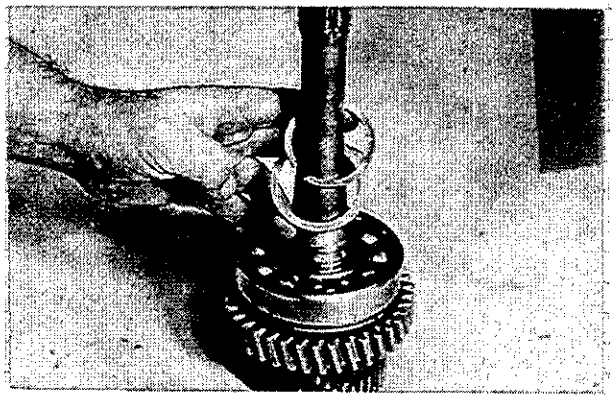
⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

2.4.11.5
Tighten support bolts 31.2 - 33.9 Nm (23 - 25 lbs.ft.)



2.4.11.6
Press turbine shaft bearing into position, Install bearing washer and retainer ring. Install new turbine shaft oil sealing ring.



2.4.11.7
Spread ears on turbine shaft retainer ring located in reaction member support. Tap turbine shaft into position.

⚠ WARNING

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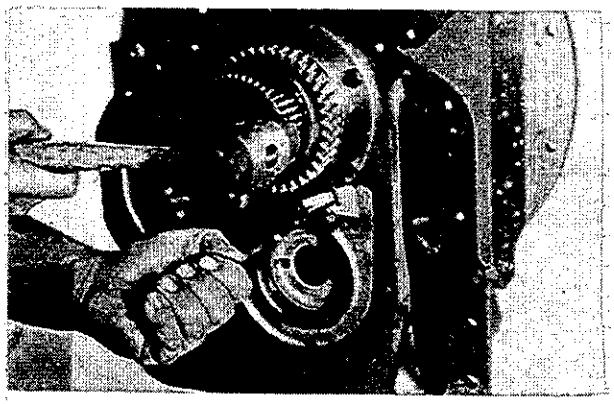
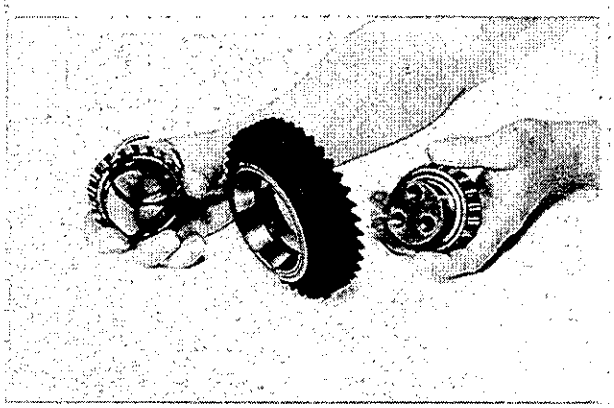
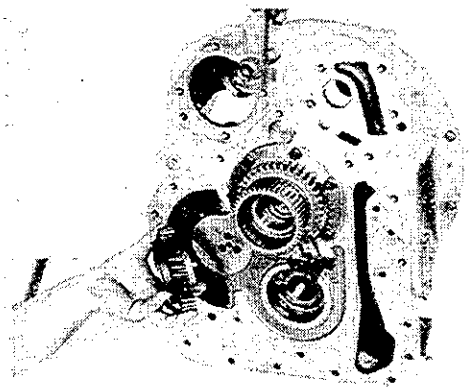
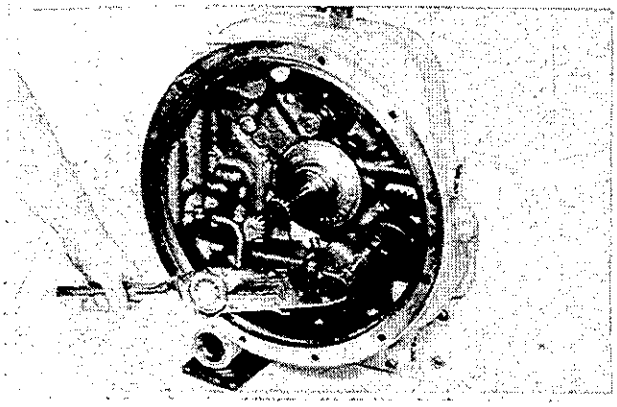


2.4.11.8
Press idler gear bearing on shaft. Install shaft and bearing in idler gear. Position spacer on shaft, press bearing on shaft into gear.

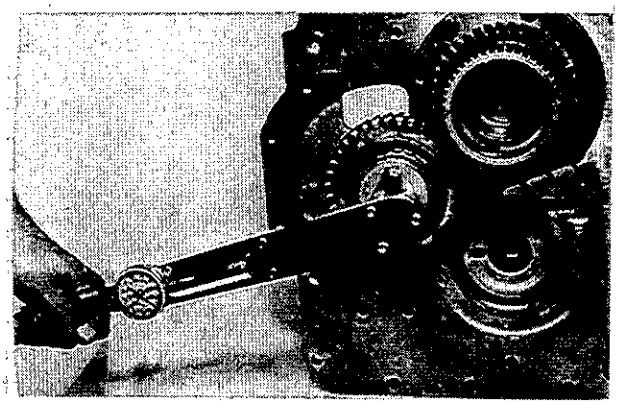




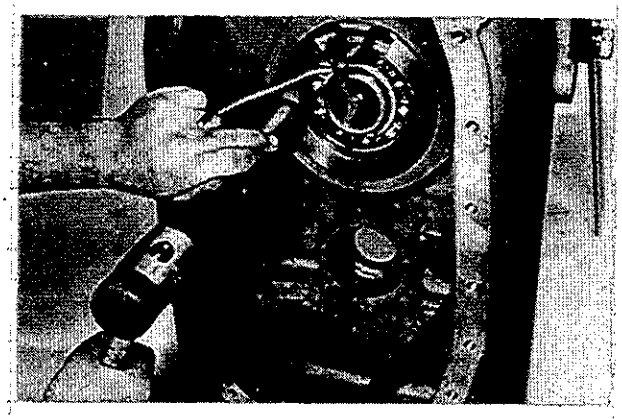
2.4.11.9
Position reverse idler and bearing assembly into converter housing. **NOTE:** Long hub gear out.



2.4.11.10
Install reverse idler shaft capscrews and lockwashers. Tighten capscrews 78.6 - 86.8 Nm (58 - 64 lbs.ft.).



2.4.11.11
Install bearing retainer plate, lock plate and idler gear capscrews. Tighten capscrews 78.6 - 86.8 Nm (58 - 64 lbs.ft.), Bend lockplate tabs over capscrew heads to prevent loosening.

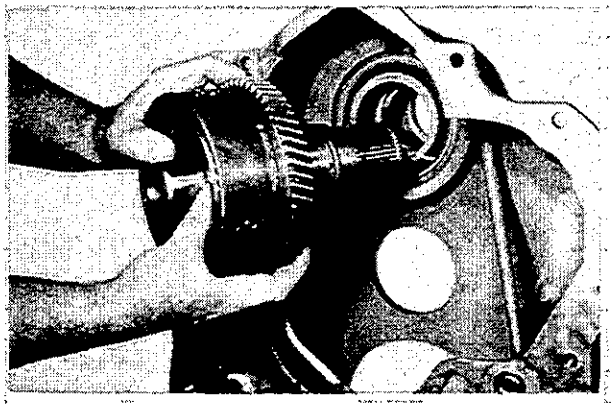


2.4.11.12
Tap forward clutch shaft rear bearing into bearing bore with bearing snap ring toward front of housing. Align roll pin in forward clutch shaft piston ring sleeve with groove in housing. Tap sleeve into position and secure with sleeve retainer ring.

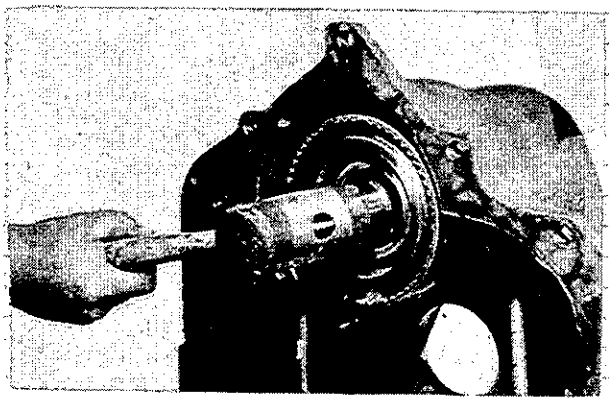
⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

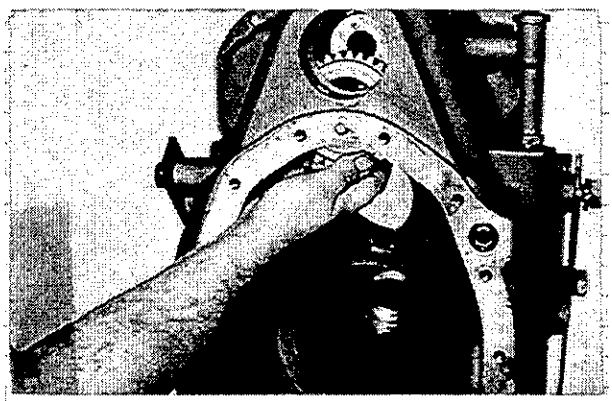
2.4.11.13
Position forward clutch assembly into transmission housing. Use caution as to not damage forward shaft piston rings.



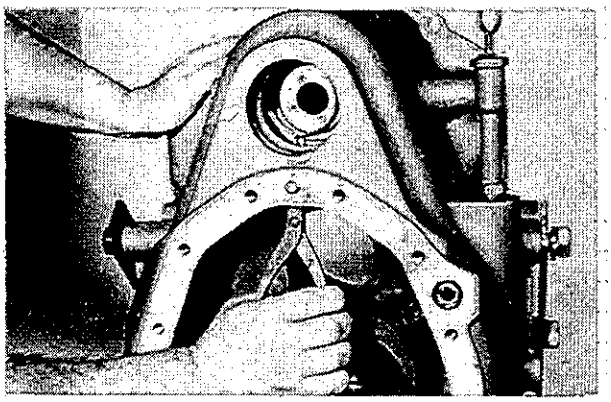
2.4.11.14
Tap clutch assembly into position.

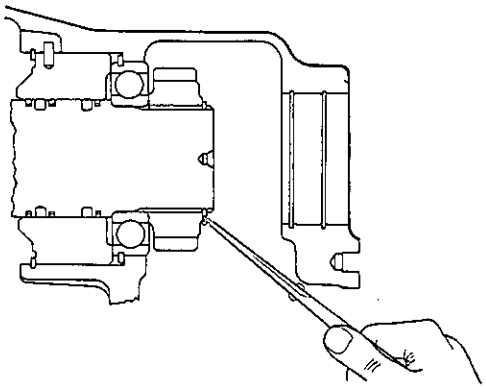


2.4.11.15
Position forward shaft gear on shaft.



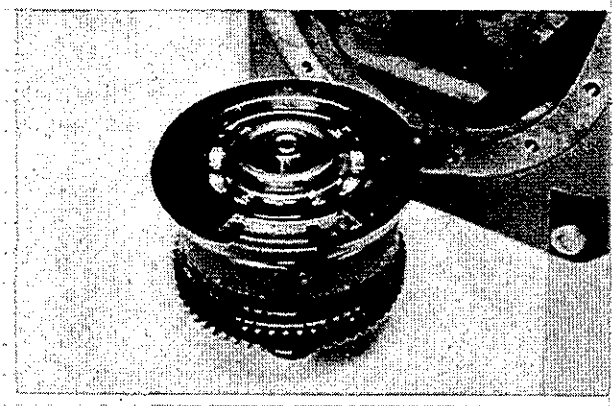
2.4.11.16
Install gear retainer ring.



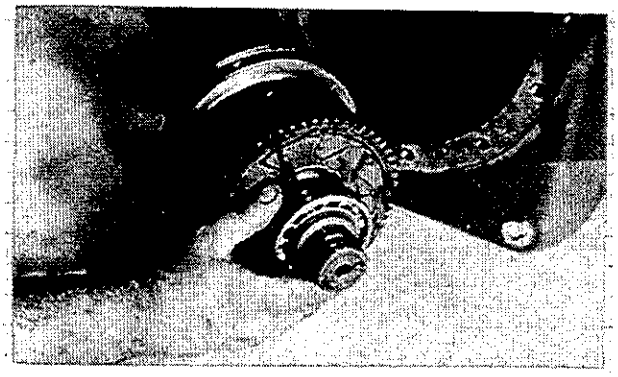


2.4.11.17
Gear retainer ring installed.

2.4.11.18
If 3rd speed clutch rear bearing carrier was disassembled, press bearing into carrier against locating ring. Secure bearing with retaining ring. Pre 3rd speed clutch disc hub into bearing and secure with retainer ring. Position disc hub and bearing carrier on 3rd speed clutch.

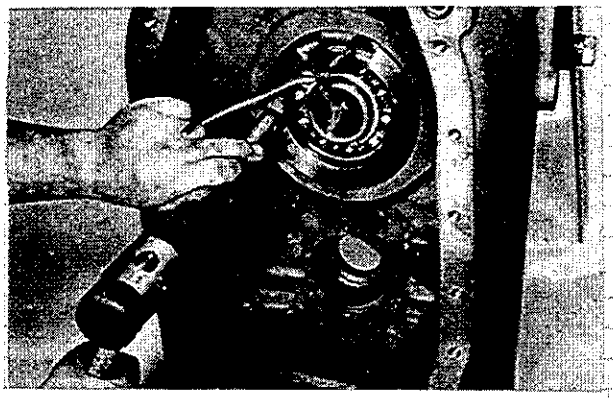


2.4.11.19
Align splines on disc hub with internal teeth of friction discs in clutch. Do not force this operation. Disc hub splines must be in full position with internal teeth of all friction discs.



2.4.11.20
Position the 3rd clutch front bearing locating ring on clutch assembly. Ring will be installed in housing ring groove later.

2.4.11.21
Using contracting type snap ring pliers as shown, lock pliers to hold ring contracted. Tap 3rd speed clutch assembly and bearing carrier into housing until snap ring groove in housing is aligned with snap ring. Remove pliers being sure snap ring is in full position in snap ring groove.



⚠ WARNING

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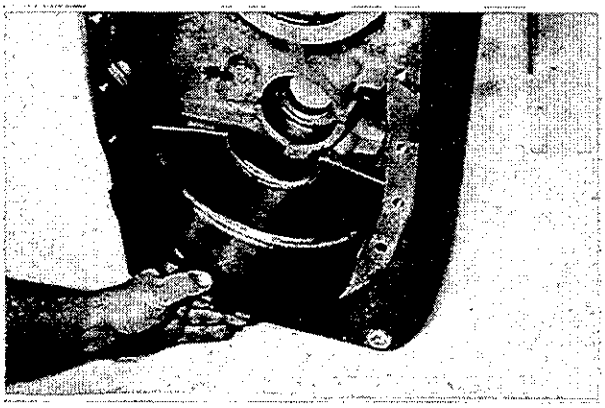
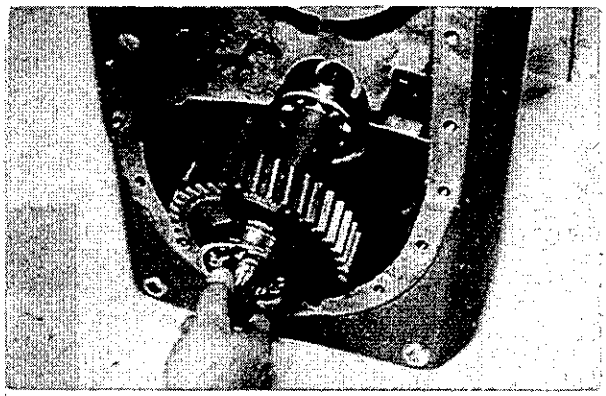
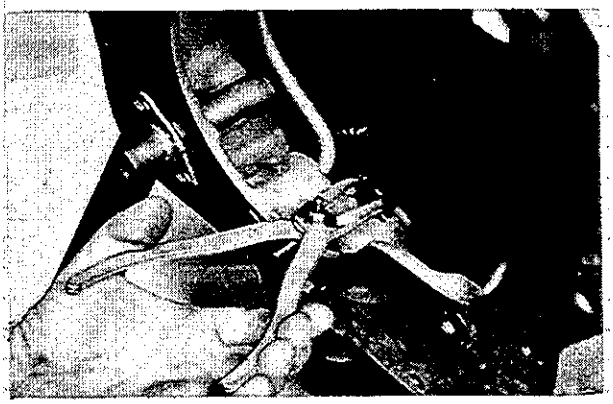
2.4.11.22
Position sump oil baffle in housing.

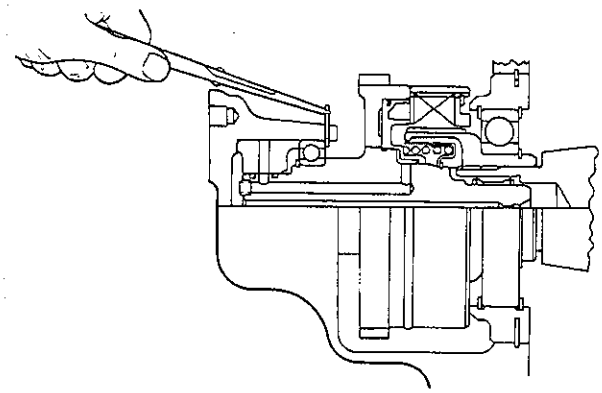


2.4.11.23
Install output shaft and bearing assembly in housing.

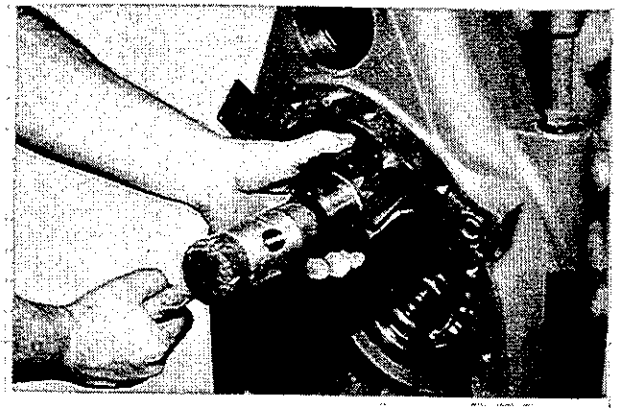


2.4.11.24
From front of housing, install 3rd speed clutch front bearing retainer ring. **NOTE:** Be certain ring is in full position in ring groove.





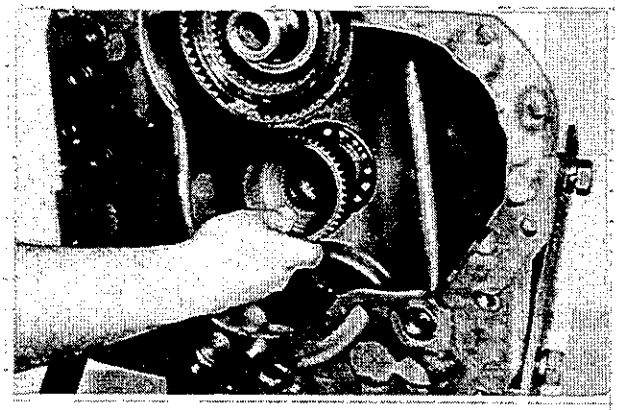
2.4.11.25
Front bearing retaining ring installed.



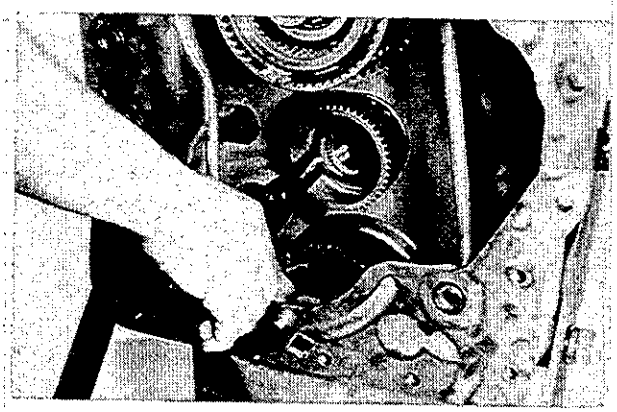
2.4.11.26
From rear of housing, position low speed clutch in bearing bore. Tap clutch into position.

⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

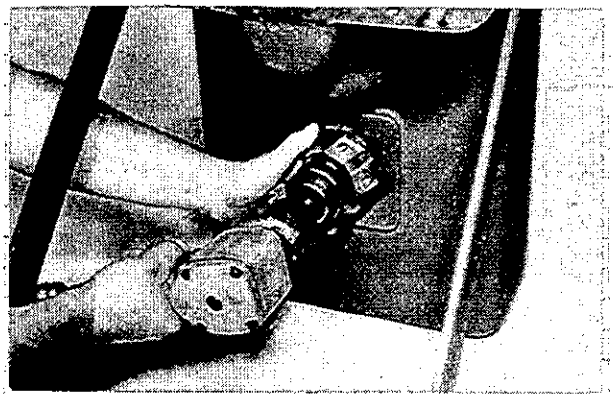


2.4.11.27
From front of housing, install 2nd speed clutch disc hub on low clutch shaft.

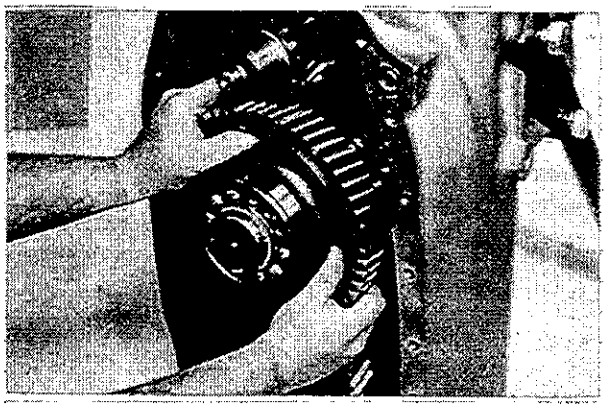


2.4.11.28
Install disc hub retainer ring.

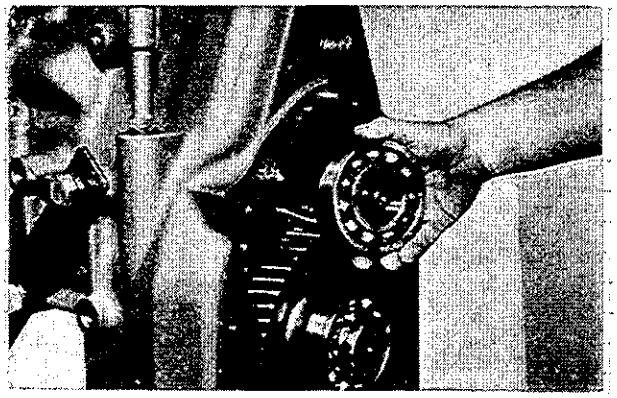
2.4.11.29
Install front output flange, new O-ring, washer and nut. Tighten nut 271.2 - 339.0 Nm (200 - 250 lbs.ft.).



2.4.11.30
Position idler shaft and bearing assembly in end of 3rd speed clutch. **NOTE:** If special low ratio is incorporated, the idler shaft will have two gears on it. (Unit shown is a standard ratio).



2.4.11.31
Position low clutch rear bearing on shaft, with snap ring groove out.



2.4.11.32
Tap bearing into position.

⚠ WARNING

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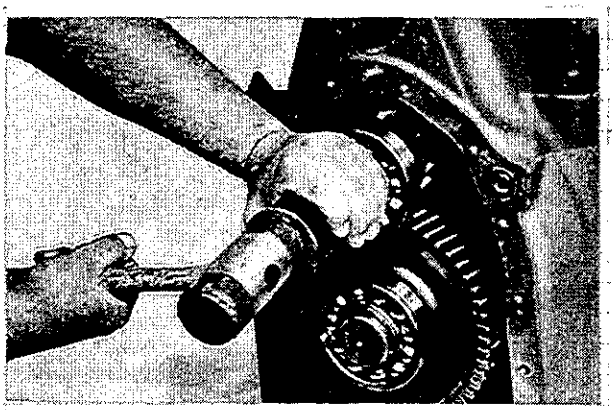
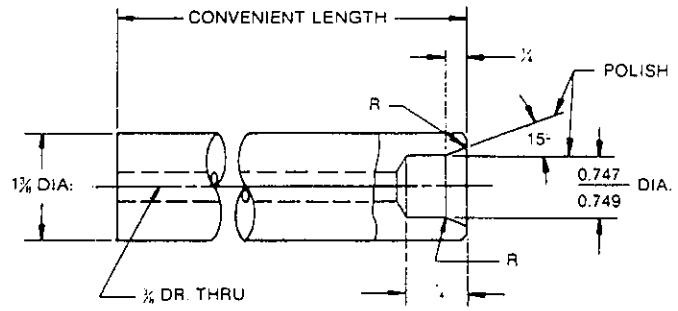
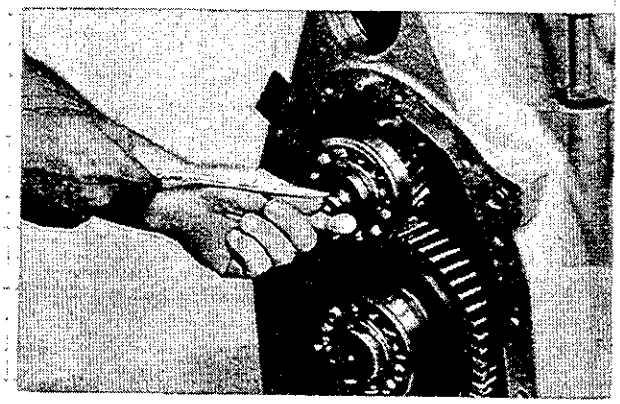
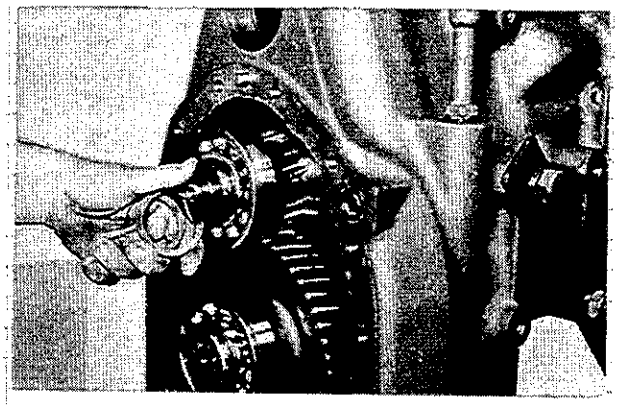




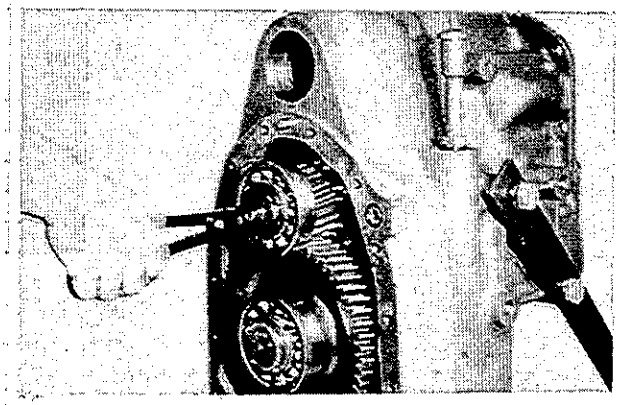
2.4.11.33
Low shaft oil sealing ring sizing tool.



2.4.11.34
Install new oil sealing ring on low clutch shaft. **NOTE:** New ring must be sized before installing low shaft bearing cap. To facilitate sizing, tool can be made from diagram in paragraph 2.4.11.33.

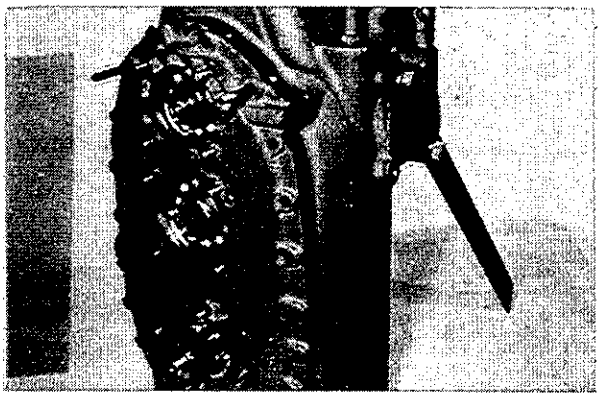


2.4.11.35
Install low shaft rear bearing spacer.



2.4.11.36
Install bearing retainer ring.

2.4.11.37
Position new gasket and O-ring on rear of transmission housing. A thin coat of chassis grease will hold the gasket and O-ring in place. Install rear cover. **NOTE:** Use two aligning studs to facilitate cover to housing assembly. Tap cover into place aligning shaft bearings with bearing bores. Remove studs and install cover bolts and lockwashers.

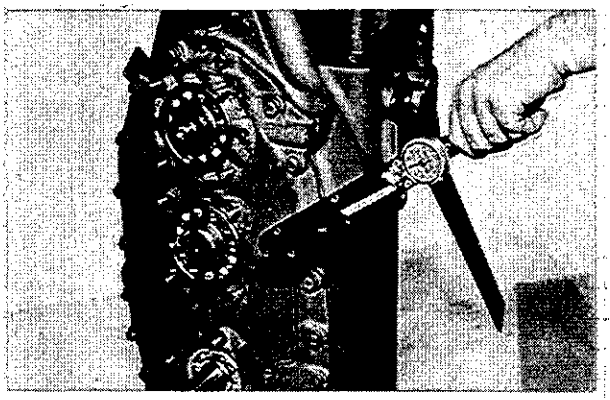


⚠ WARNING

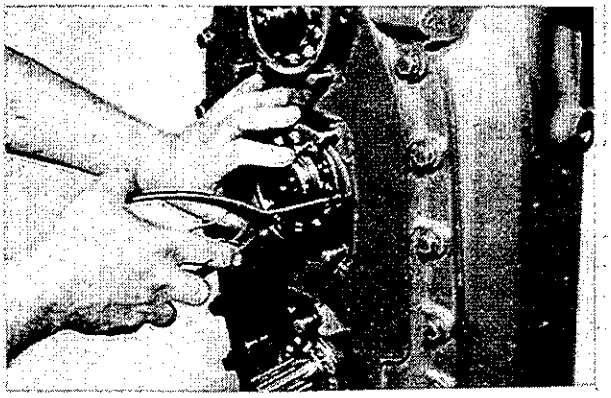
Use proper tools to bring holes into alignment. "DO NOT USE FINGERS OR HANDS".

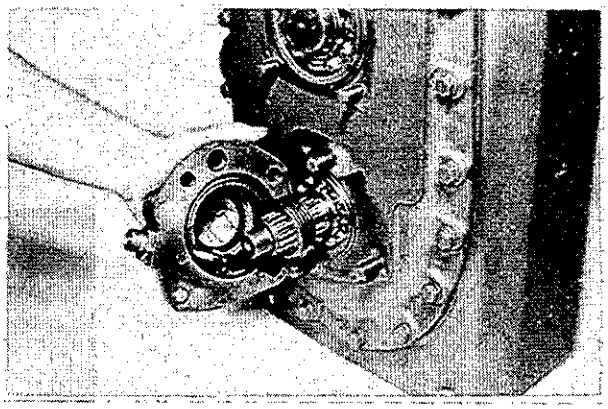
It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

2.4.11.38
Tighten rear cover bolts 50.2 - 55.6 Nm (37 - 41 lbs.ft.).

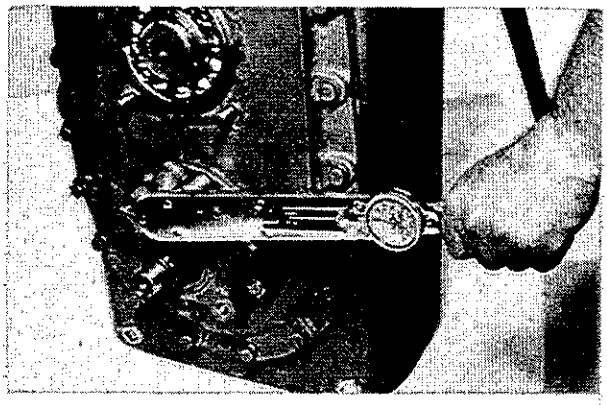


2.4.11.39
Install low, idler and output shaft rear bearing locating rings.

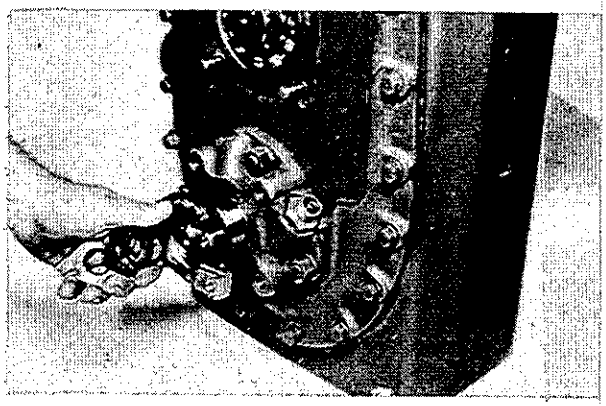




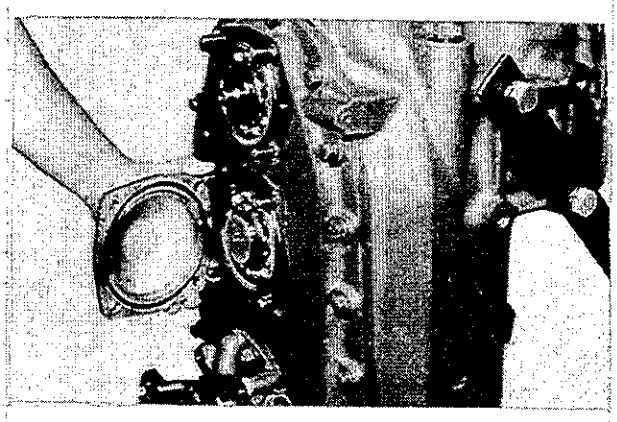
2.4.11.40
Apply a light coat of Perma-tex No.2 to the outer diameter of the output oil seal. Press seal in bearing cap with lip of seal toward bearing side of bearing cap. Position new O-rings on bearing cap. **NOTE:** Some units will have a gasket only between the cap and cover.



2.4.11.41
Install lockwashers and stud nuts. Tighten nuts 123.4 - 135.6 Nm (91 - 100 lbs.ft.).

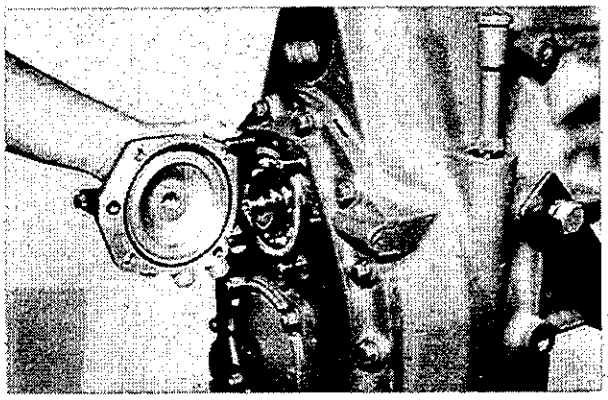


2.4.11.42
Install output flange, O-ring, washer and flange nut. Block flange to prevent it from turning. Tighten flange nut 271.2 - 339.0 Nm (200 - 250 lbs.ft.).

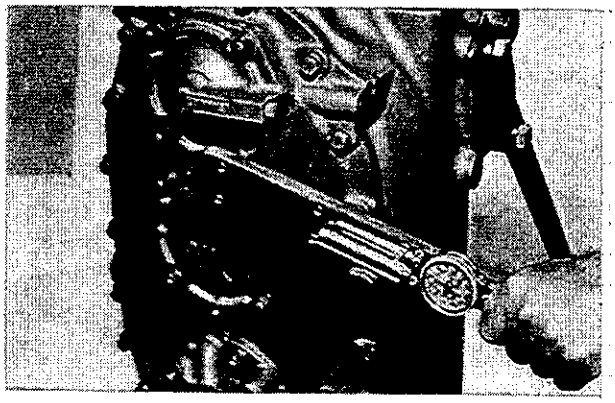


2.4.11.43
Position new O-ring on idler shaft bearing cap. Install cap on studs and secure with lockwashers and nuts.

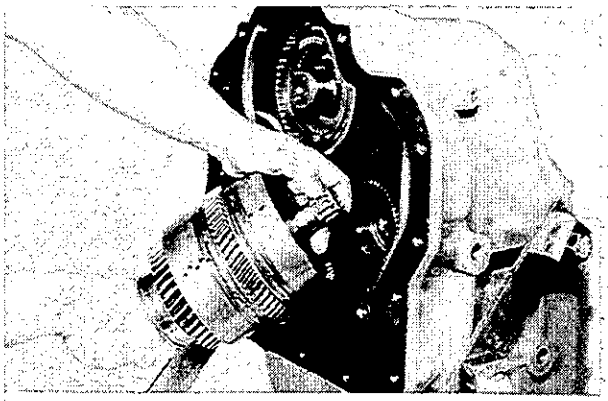
2.4.11.44
Install new bearing cap and low clutch pressure port O-rings on low shaft bearing cap. Position bearing cap on low shaft. Install washers and stud nuts.



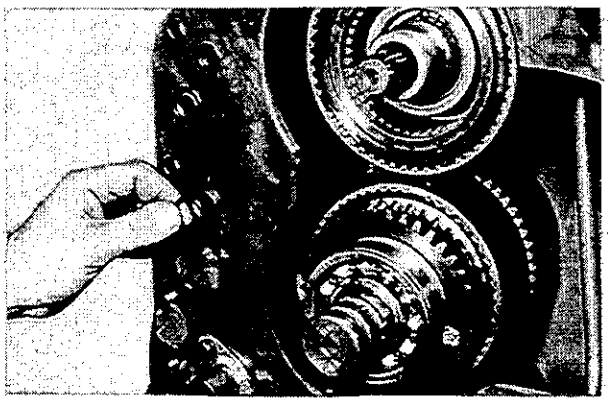
2.4.11.45
Tighten low shaft and idler shaft stud nuts 55.6 - 61.0 Nm (41 - 45 lbs.ft.).

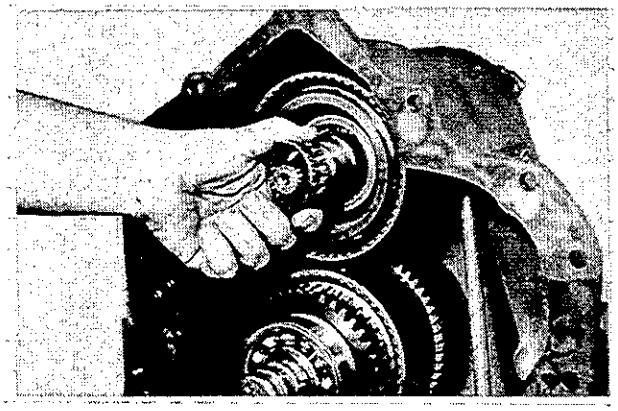


2.4.11.46
Install 2nd speed clutch shaft rear pilot bearing on shaft. Position reverse and 2nd speed clutch on disc hub aligning splines of disc hub with internal teeth of 2nd speed clutch friction discs. Disc hub must be in full position with friction discs. Do not force this operation.

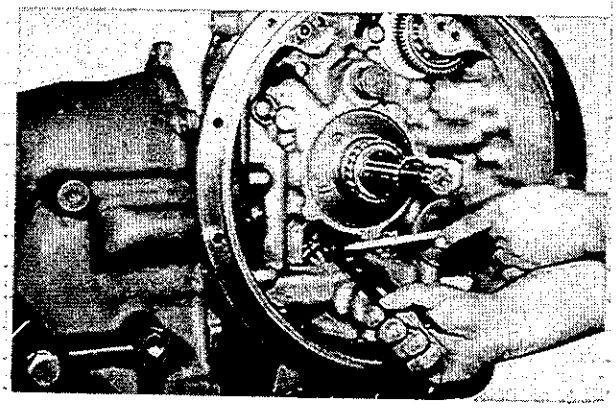


2.4.11.47
Install new O-rings on front of transmission housing. A thin coat of chassis grease will hold O-rings in place.

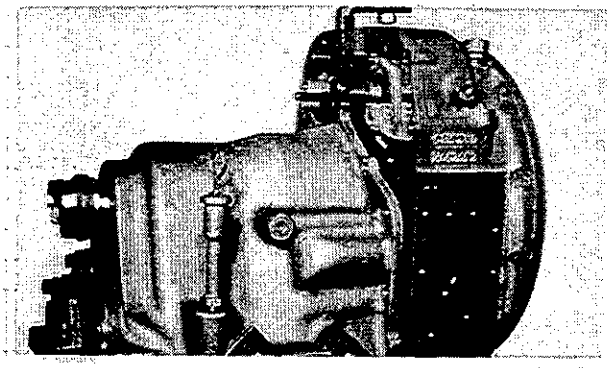




2.4.11.48
Install forward clutch pilot bearing.



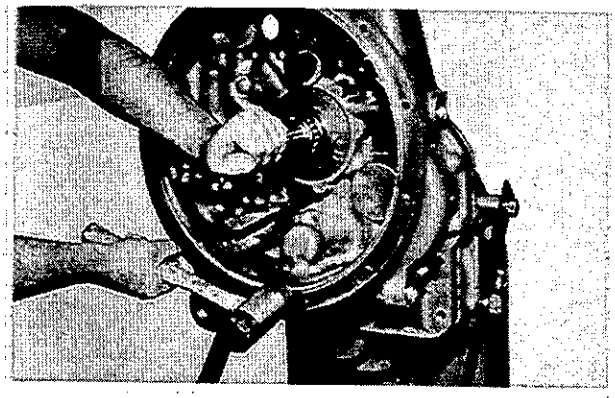
2.4.11.49
Position new gasket on front of transmission housing. A thin coat of chassis grease will hold gasket in place. Spread ears on the reverse clutch front bearing locating ring. Lock pliers open to hold snap ring open.



2.4.11.50
Position converter housing assembly on transmission case. Use caution not to disturb housing O-rings or gasket.

⚠ WARNING

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.



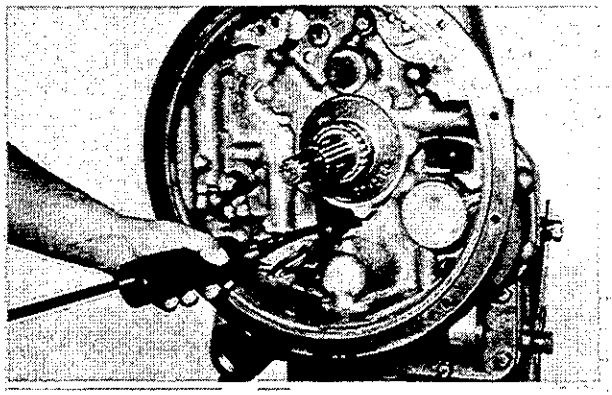
2.4.11.51
Tap converter housing into place. Use caution as not to damage reverse clutch front piston ring. Note aligning stud.

⚠ WARNING

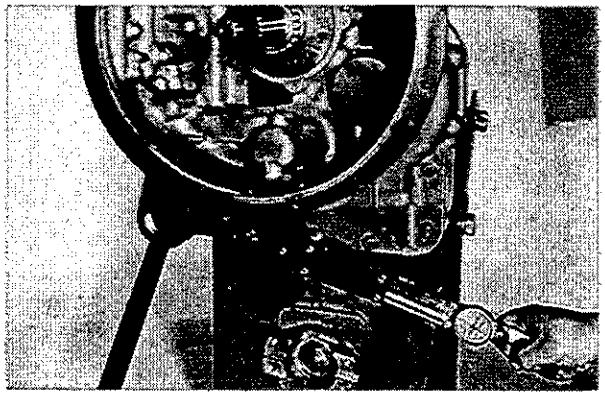
It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

Use proper tools to bring holes into alignment. "DO NOT USE FINGERS OR HANDS".

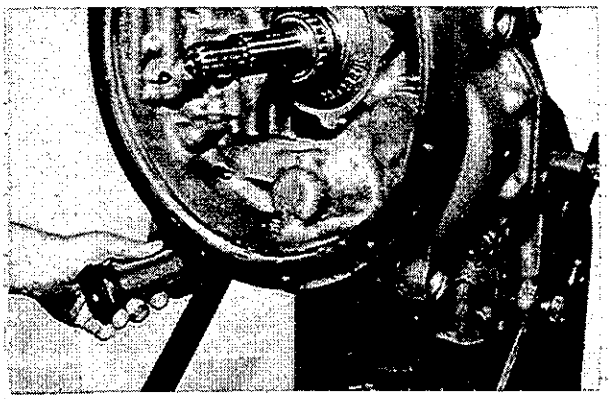
2.4.11.52
Install a capscrew in the front and one in the rear of the converter housing and snug up, but do not tighten. This will hold the converter housing to the transmission housing. Using a hook type slide hammer puller as shown, pull the reverse clutch gear toward the front of the converter housing. This wil move the reverse and 2nd clutch assembly forward to align the snap ring groove in the bearing with the snap ring groove in the housing. Being certain bearing snap ring is in full position in snap ring groove, remove pliers.



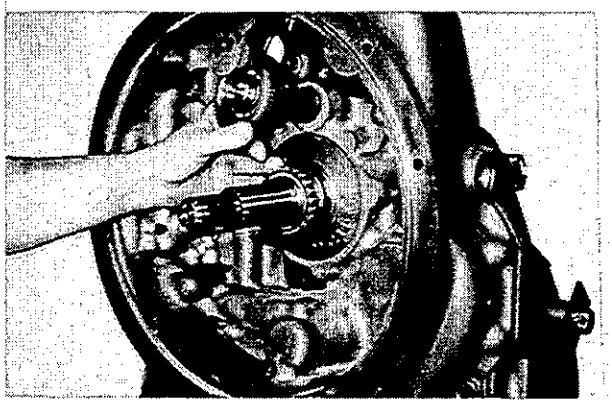
2.4.11.53
Remove converter housing aligning stud. Install converter housing and transmission housing capscrews. Tighten capscrews 50.2 - 55.6 Nm (37 - 41 lbs.ft.).

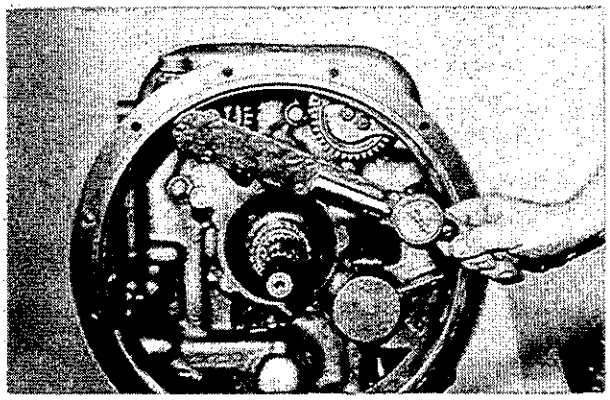


2.4.11.54
Position new gasket on sump screen, install screen assembly and tighten screws 13.6 - 20.3 Nm (10 - 15 lbs.ft.).

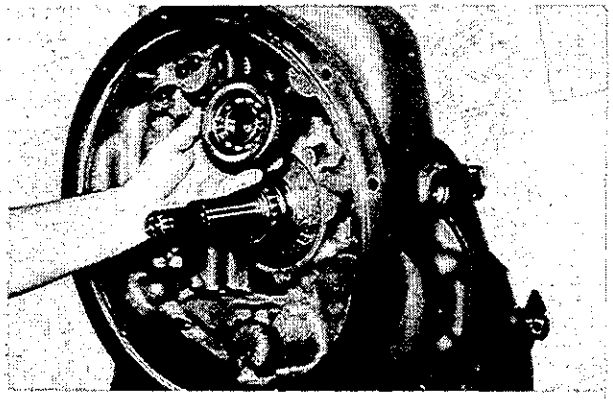


2.4.11.55
Install auxillary and charging pump drive gear. Snug capscrew to hold gears in place.

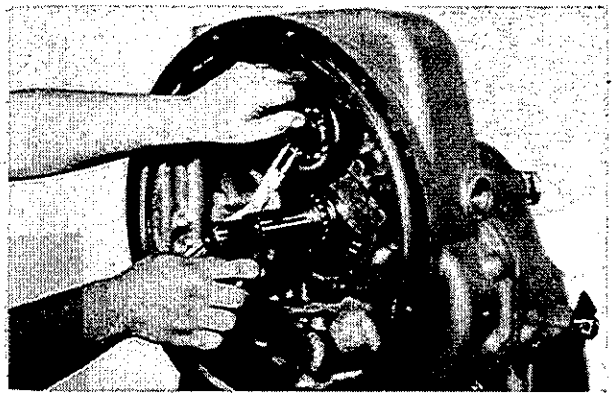




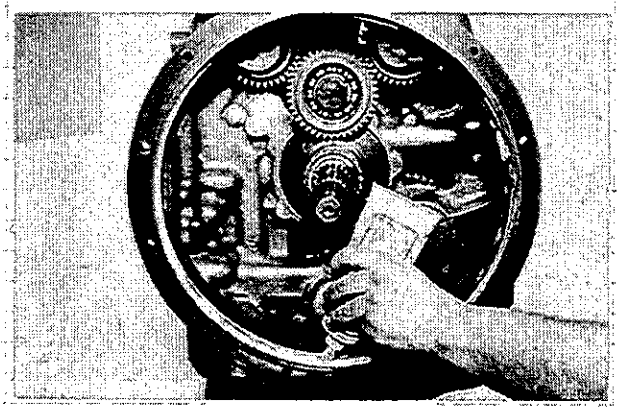
2.4.11.56
Tighten pump drive gear capscrews 31.2 - 33.9 Nm (23 - 25 lbs.ft.).



2.4.11.57
Position pump idler gear and bearing on stub shaft.

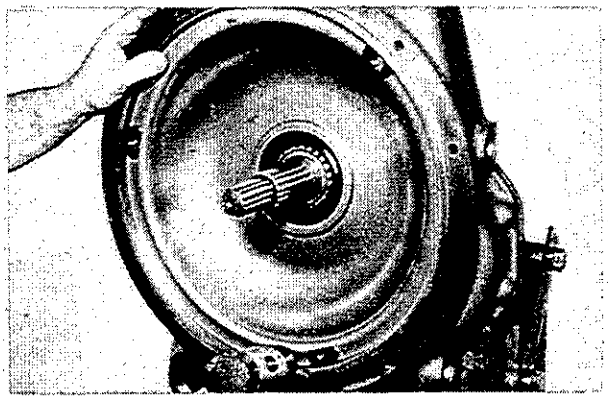


2.4.11.58
Install idler gear bearing locating ring.



2.4.11.59
Apply a light coat of liquid gasket (FA part # 70699262) to oil baffle or counter bore in converter housing. Remove immediately, any excess sealant that could enter the oil circuit.

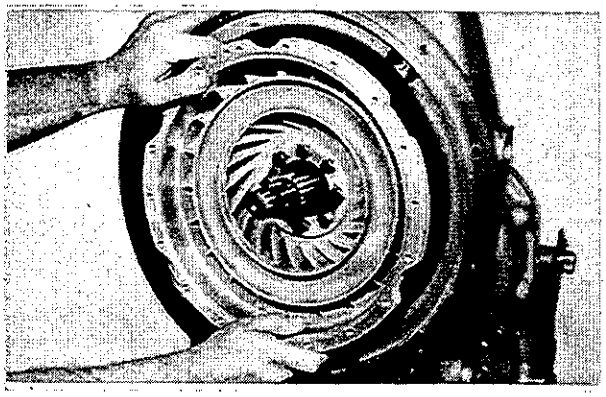
2.4.11.60
Assemble new oil baffle oil seal in baffle. Position oil baffle puller screw holes 15° to 30° either side of vertical center line. Tap baffle into position until baffle shoulders in converter housing.



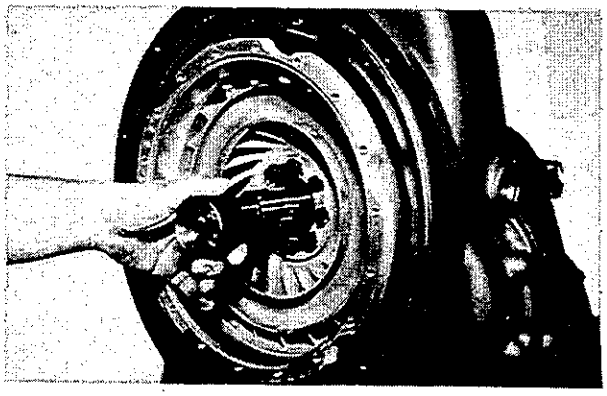
⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

2.4.11.61
Install impeller and hub assembly using caution as not to damage the oil baffle oil seal. **NOTE:** Use extreme caution as not to cut, break or unhook the oil sealing ring on the support.



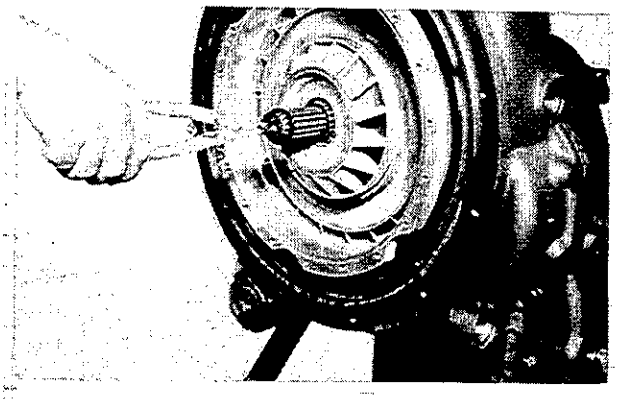
2.4.11.62
Position reaction member to impeller hub gear spacer on the reaction member support. Install retaining ring.



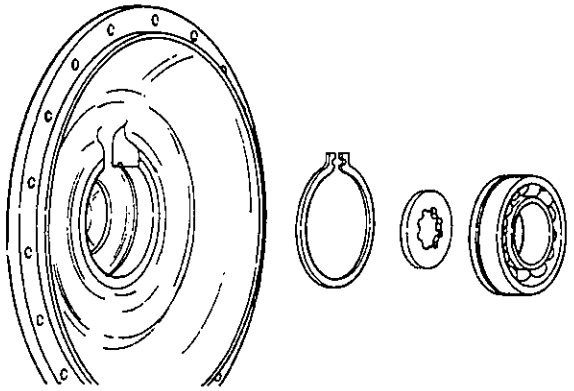
2.4 REPAIR PROCEDURES

2.4.12 CONVERTER ASSEMBLY

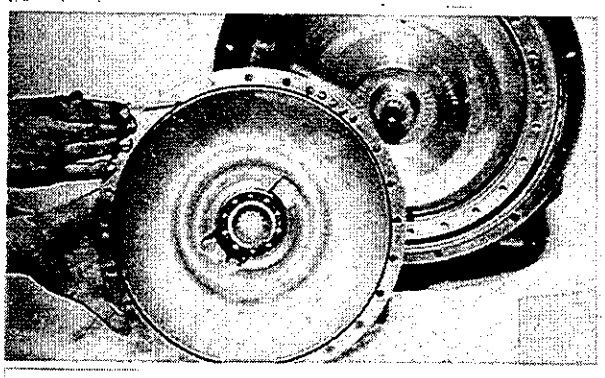
2.4.12.1
Position inner turbine locating ring on shaft. Install turbine on shaft.



2.4.12.2
If the impeller cover bearing retaining washer or bearing was replaced, use the following procedure for reassembly. Heat cover 93° - 121°C (200° - 250°F). Position snap ring in groove. Place bearing retainer washer in cover. While cover is hot, press bearing into position spreading ears on snap ring at the same time. Align snap ring groove in bearing with snap ring. Release snap ring. Check ring to be certain it is in full position in groove.



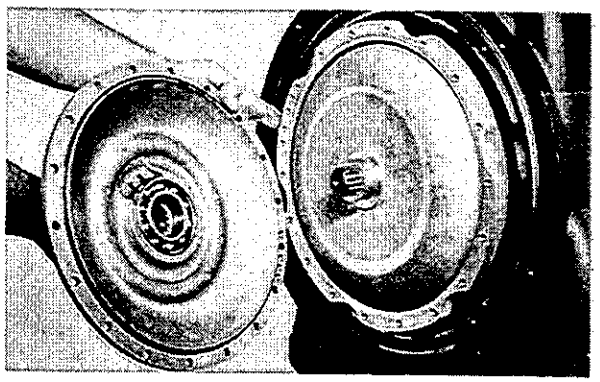
2.4.12.3
Position new O-ring on impeller cover.

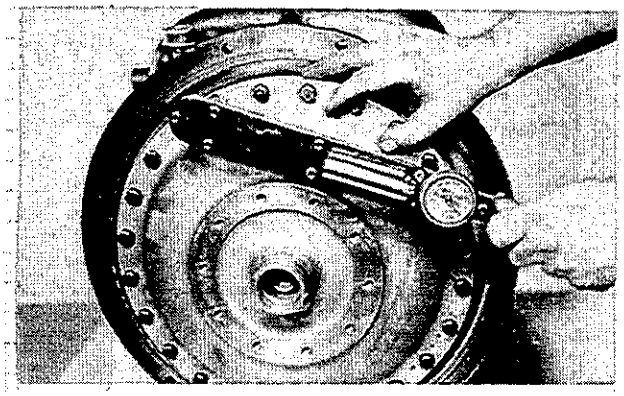


2.4.12.4
Install impeller cover assembly on impeller. Use caution as not to damage O-ring. Bearing retainer plate must be aligned with the turbine shaft.

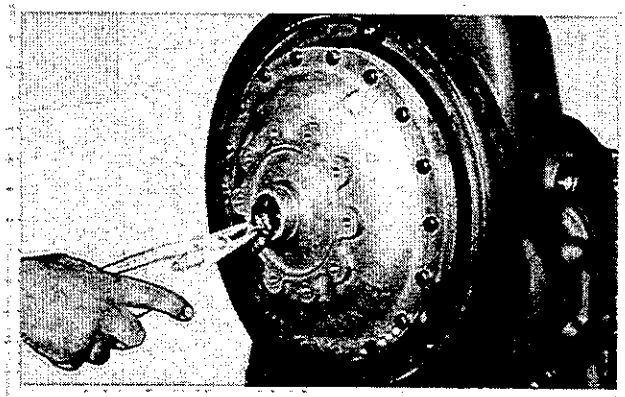
⚠ WARNING

Use proper tools to bring holes into alignment. "DO NOT USE FINGERS OR HANDS".

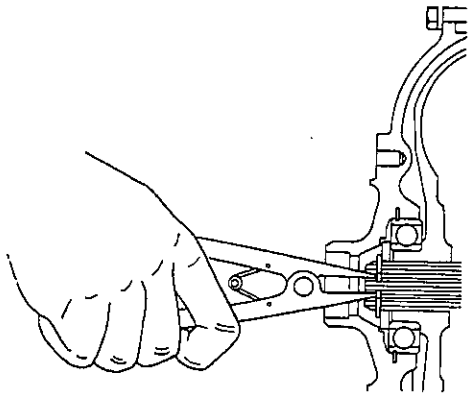




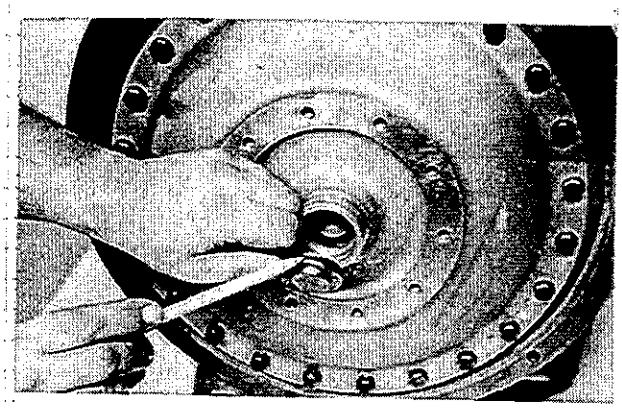
2.4.12.5
Install impeller cover capscrews and washers. Tighten 11" capscrews 16.3 - 21.6 Nm (12 - 16 lbs.ft.). Tighten 12" capscrews 31.2 - 33.9 Nm (23 - 25 lbs.ft.).



2.4.12.6
Install turbine retainer ring.

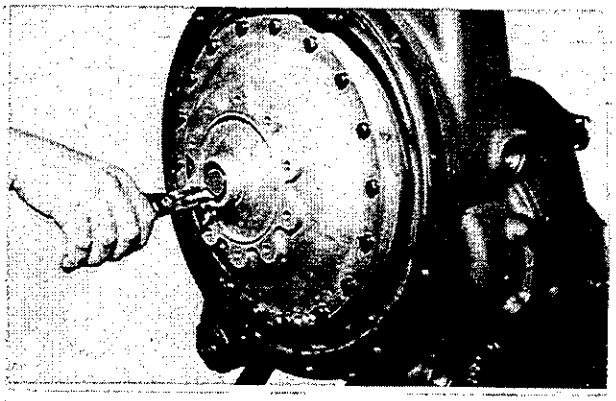


2.4.12.7
Turbine retaining ring installed.

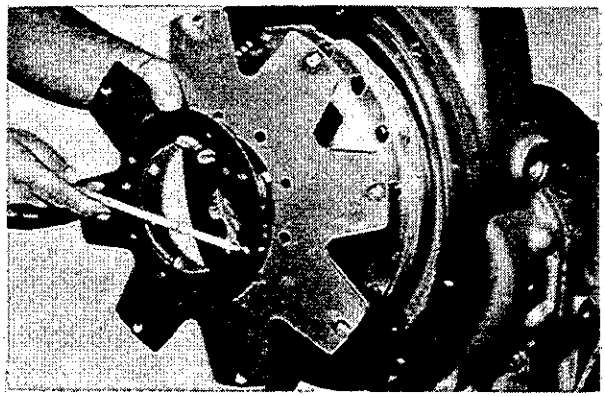


2.4.12.8
Position new O-ring on impeller cover bore plug. Lubricate ring to facilitate assembly. Install plug in cover.

2.4.12.9
Install bore plug retainer ring.



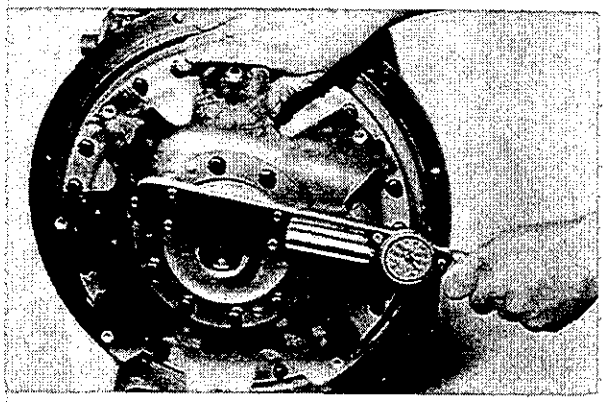
2.4.12.10
Position drive plate and weld nut assembly on impeller cover with weld nuts toward cover. Align intermediate drive plate and backing ring with holes in impeller cover. **NOTE:** Two dimples 180° apart in backing ring must be out (toward engine flywheel). Install capscrews and washers.



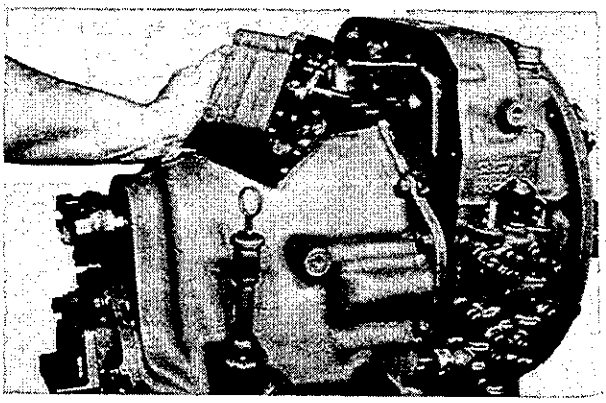
⚠ WARNING

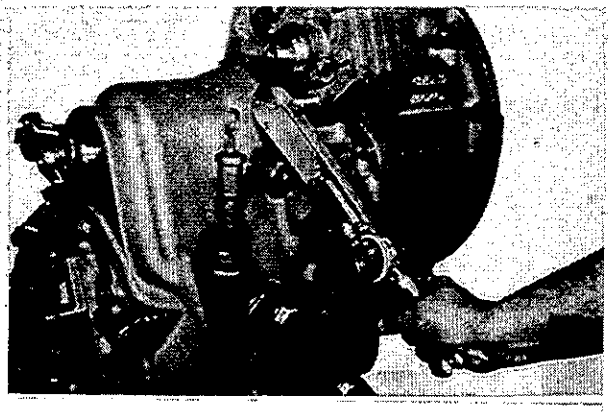
Use proper tools to bring holes into alignment. "DO NOT USE FINGERS OR HANDS".

2.4.12.11
Tighten drive plate capscrews 31.2 - 33.9 Nm (23 - 25 lbs.ft.).

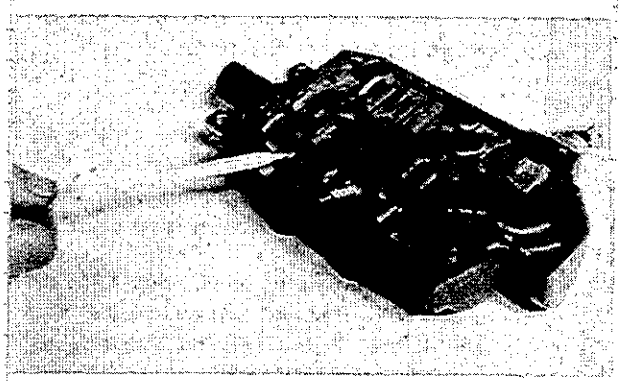


2.4.12.12
Using a new gasket and O-ring, position charging pump assembly on studs. Install washers, nuts and capscrews.

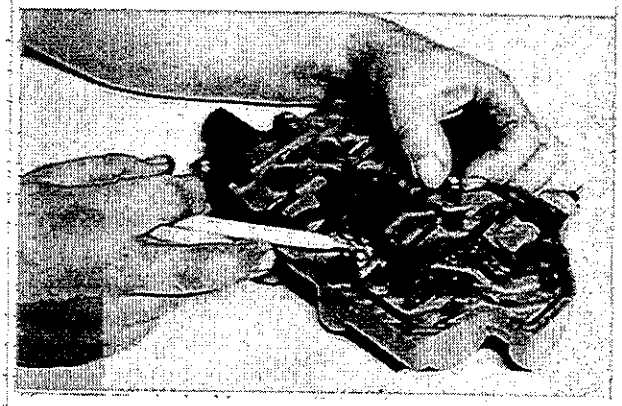




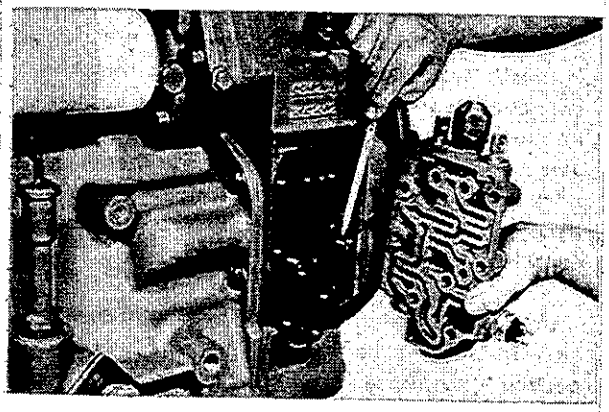
2.4.12.13
Tighten capscrews 50.2 - 55.6 Nm (37 - 41 lbs.ft.). Tighten stud nuts 55.6 - 61.0 Nm (41 - 45 lbs.ft.).



2.4.12.14
If the control cover valve spools are to be inspected or the spool oil seals changed, remove the valve spool stops as shown and pull spools out of oil seals. Always replace oil seals if valve spools are removed for inspection. Sharp edges on valve spool will cut lip of oil seal. When replacing oil seal, pick old seal out of housing using caution as not to damage oil seal bore. Install new seal in control valve. NOTE: When installing speed and direction selector spools through oil seal, use extreme caution as not to cut lip of oil seal.



2.4.12.15
Position detent balls in housing.

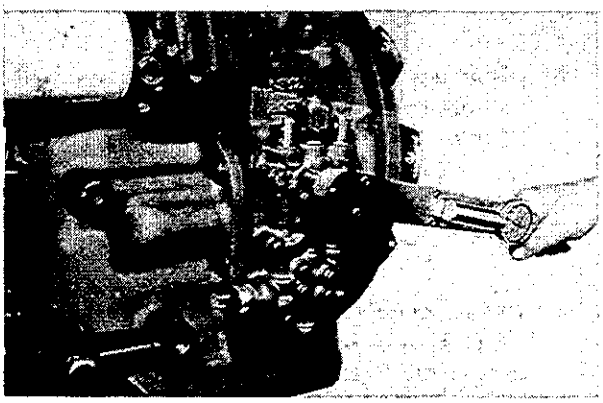


2.4.12.16
Position new gasket and detent springs on converter housing. Install control valve and valve to housing capscrews and washers.

⚠ WARNING

Use proper tools to bring holes into alignment. "DO NOT USE FINGERS OR HANDS".

2.4.12.17
Tighten capscrews, alternately and in small increments, 31.2 - 33.9 Nm (23 - 25 lbs.ft.).



MEMO

2.4.13 REFERENCE DRAWINGS

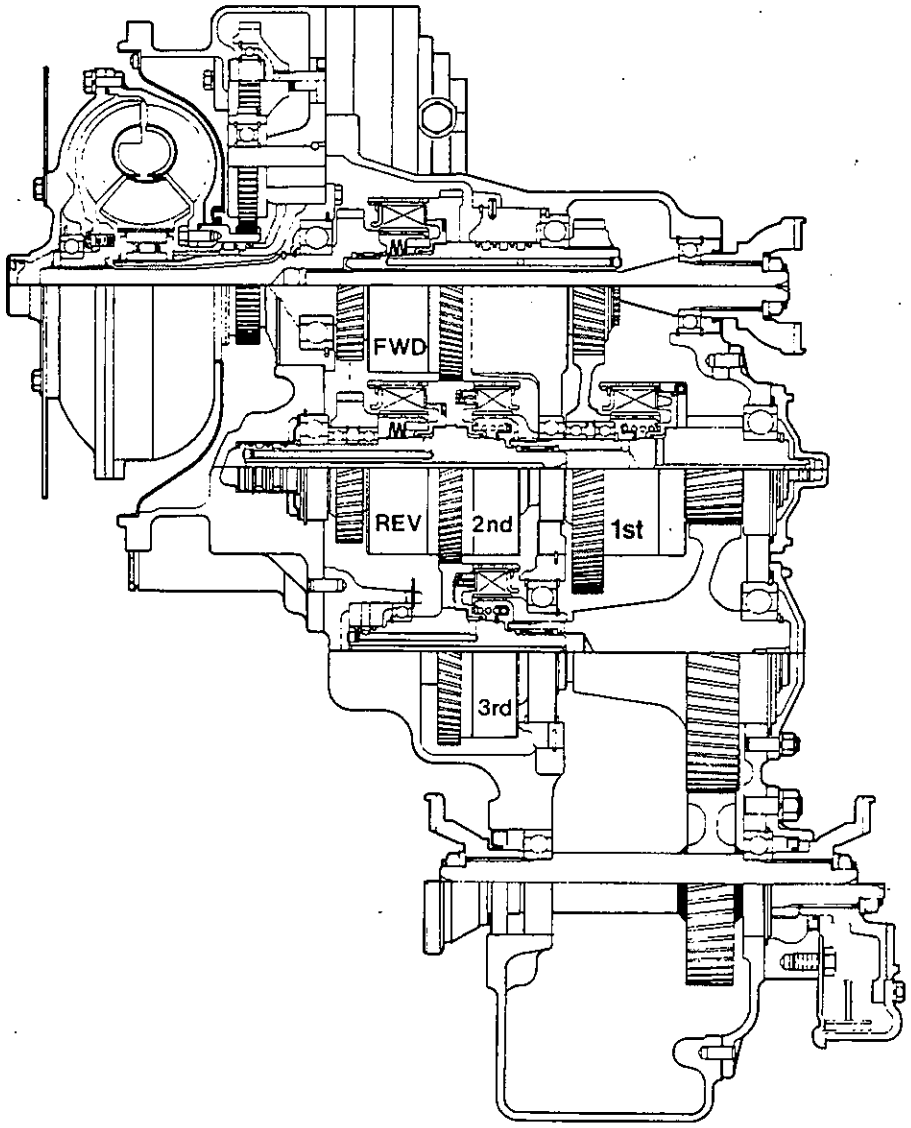


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FIG. 2-9 BASIC DESIGN

2.4.13 REFERENCE DRAWINGS

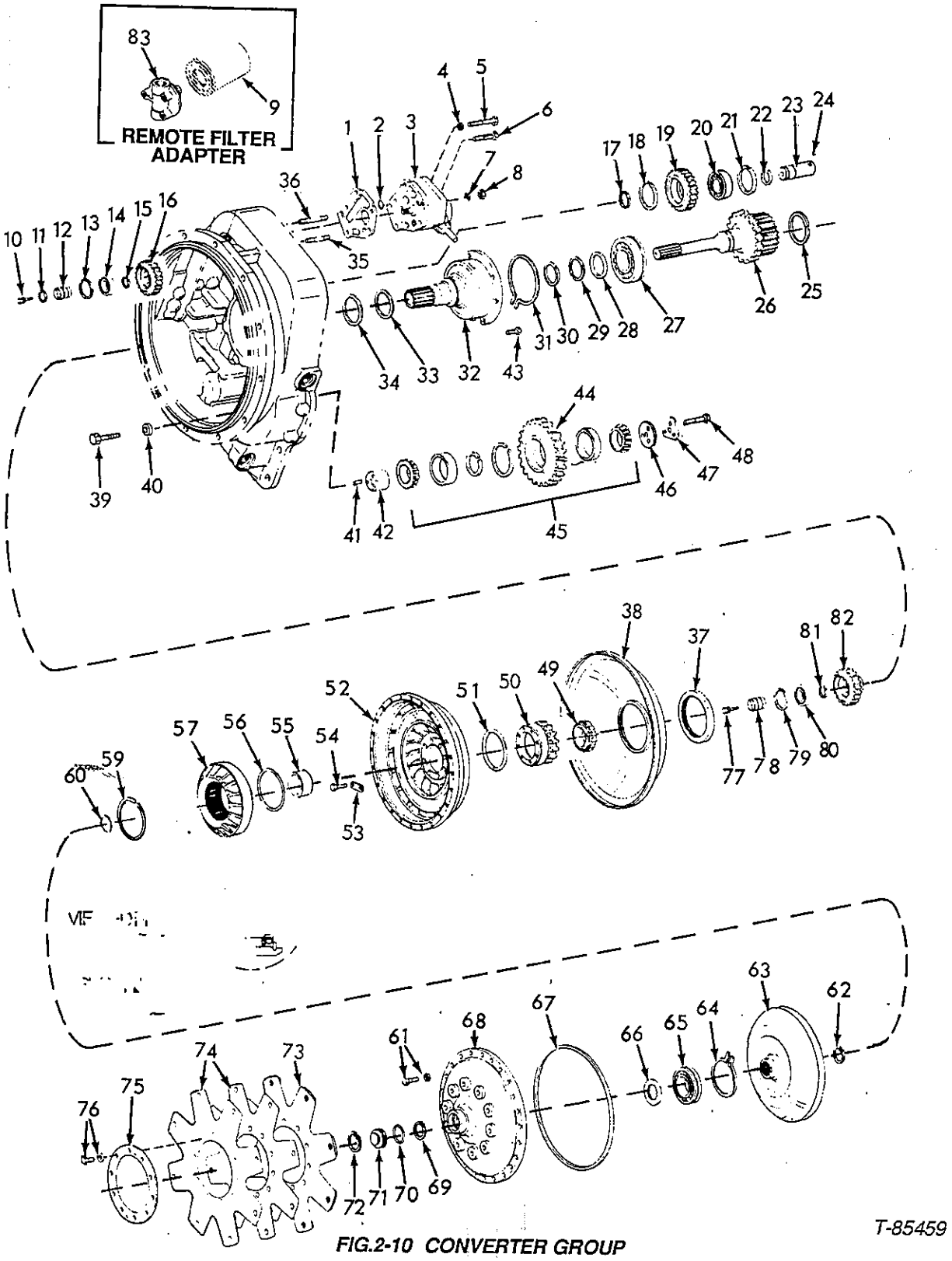

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FIG.2-10 CONVERTER GROUP

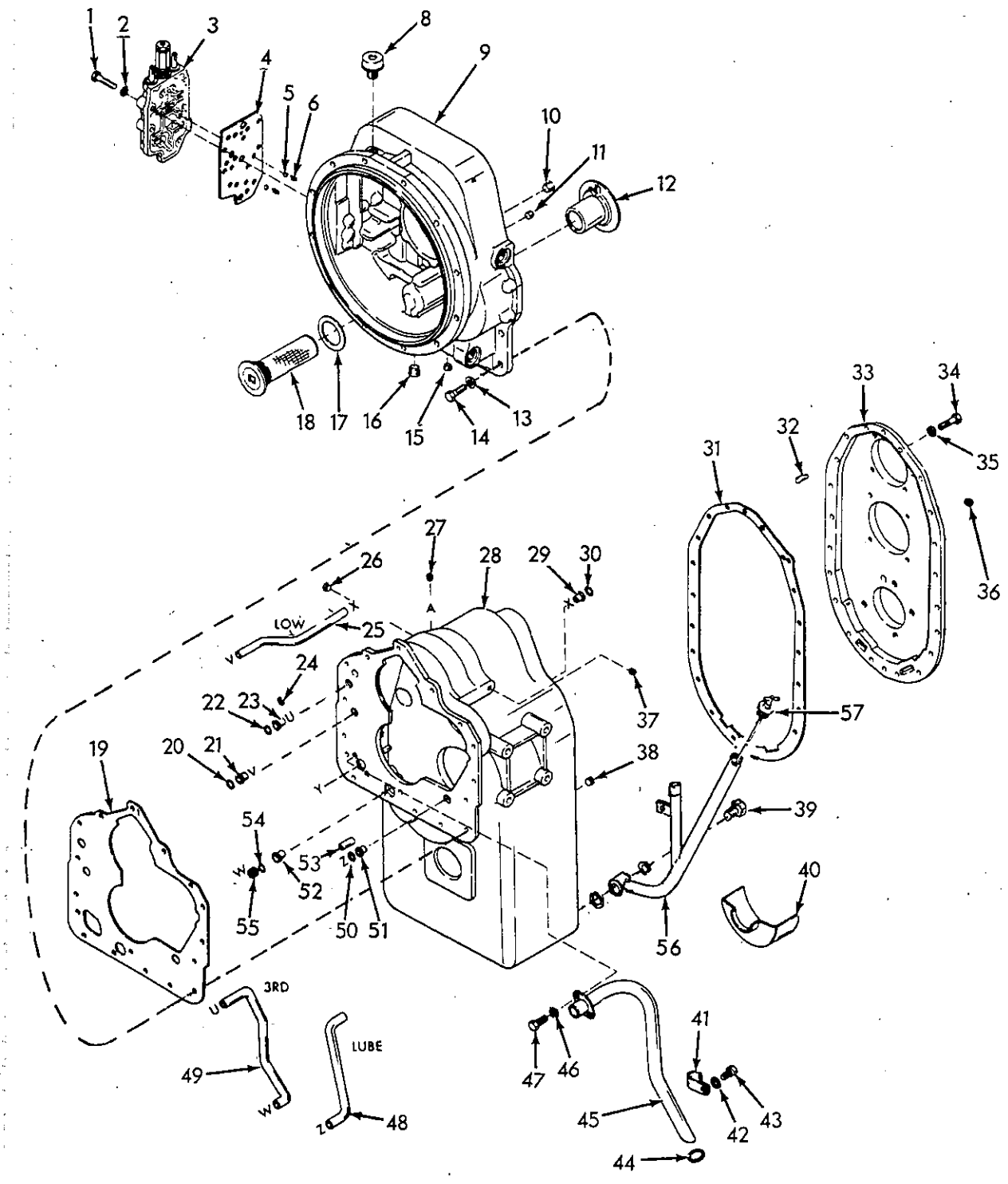
2.4 REPAIR PROCEDURES

2.4.13 REFERENCE DRAWINGS

Legend for Fig. 2-10

1. *Gasket*
2. *O-ring*
3. *Charging pump assembly*
4. *Lockwasher*
5. *Screw*
6. *Screw*
7. *Lockwasher*
8. *Nut*
9. *Filter assembly (Remote mounted)*
10. *Screw & lockwasher*
11. *Bearing locating ring*
12. *Pump drive bearing support*
13. *Bearing retaining ring*
14. *Pump drive gear bearing*
15. *Bearing locating ring*
16. *Pump drive gear*
17. *Locating ring*
18. *Retaining ring*
19. *Pump drive idler gear*
20. *Idler stub shaft bearing*
21. *Retaining ring*
22. *Locating ring*
23. *Idler gear stub shaft*
24. *Stub shaft lock ball*
25. *Baffle ring*
26. *Turbine shaft & disc hub*
27. *Turbine shaft bearing*
28. *Bearing locating washer*
29. *Retaining ring*
30. *Piston ring*
31. *Snap ring*
32. *Reaction member support*
33. *Piston ring expander spring*
34. *Piston ring*
35. *Stud (12")*
36. *Stud (11")*
37. *Oil seal*
38. *Oil baffle assembly*
39. *Screw*
40. *Lockwasher*
41. *Reverse idler shaft pin*
42. *Reverse idler shaft*
43. *Screw*
44. *Reverse idler gear*
45. *Reverse idler gear bearing*
46. *Bearing retaining plate*
47. *Lock plate*
48. *Retaining plate screw*
49. *Impeller hub gear bearing*
50. *Impeller hub gear*
51. *Impeller hub O-ring*
52. *Impeller*
53. *Lock tab*
54. *Screw*
55. *Reaction member spacer*
56. *Snap ring*
57. *Reaction member*
58. *Not used*
59. *Snap ring*
60. *Retainer ring*
61. *Screw & lockwasher*
62. *Retaining ring*
63. *Turbine*
64. *Locating ring*
65. *Turbine hub bearing*
66. *Bearing retaining washer*
67. *O-ring*
68. *Impeller cover*
69. *Retaining ring*
70. *Bore plug O-ring*
71. *Bore plug*
72. *Retaining ring*
73. *Drive plate assembly*
74. *Drive plate*
75. *Drive plate backing ring*
76. *Screw & lockwasher*
77. *Screw & lockwasher*
78. *Auxillary pump drive bearing support*
79. *Retaining ring*
80. *Pump drive gear bearing*
81. *Bearing locating ring*
82. *Auxillary pump drive gear*
83. *Remote oil filter adapter*

2.4.13 REFERENCE DRAWINGS



T-85460

FIG. 2-11 CONVERTER & TRANSMISSION HOUSING GROUP

2.4 REPAIR PROCEDURES

2.4.13 REFERENCE DRAWINGS

Legend for Fig. 2-11

1. *Screw*
2. *Lockwasher*
3. *Control valve assembly*
4. *Gasket*
5. *Detent ball*
6. *Detent spring*
7. *Not applicable*
8. *Breather*
9. *Converter housing*
10. *Plug*
11. *Plug*
12. *Converter housing sleeve*
13. *Lockwasher*
14. *Screw*
15. *Plug*
16. *Plug*
17. *Gasket*
18. *Screen assembly*
19. *Housing to case gasket*
20. *O-ring*
21. *Tube sleeve*
22. *O-ring*
23. *Tube sleeve*
24. *O-ring*
25. *Loe speed clutch pressure tube*
26. *Plug*
27. *Plug*
28. *Transmission case assembly*
29. *Tube sleeve*
30. *Pressure tube O-ring*
31. *Rear cover to case gasket*
32. *Dowel pin*
33. *Rear cover*
34. *Screw*
35. *Lockwasher*
36. *Plug*
37. *Plug*
38. *Plug*
39. *Fitting*
40. *Oil baffle*
41. *Suction tube clip*
42. *Screw*
43. *Lockwasher*
44. *O-ring*
45. *Suction tube*
46. *Lockwasher*
47. *Screw*
48. *Clutch lube tube*
49. *3rd speed tube*
50. *O-ring*
51. *Tube sleeve*
52. *Tube sleeve*
53. *Dowel pin*
54. *O-ring*
55. *3rd speed pressure plug*
56. *Dipstick tube*
57. *Dipstick*

2.4.13 REFERENCE DRAWINGS

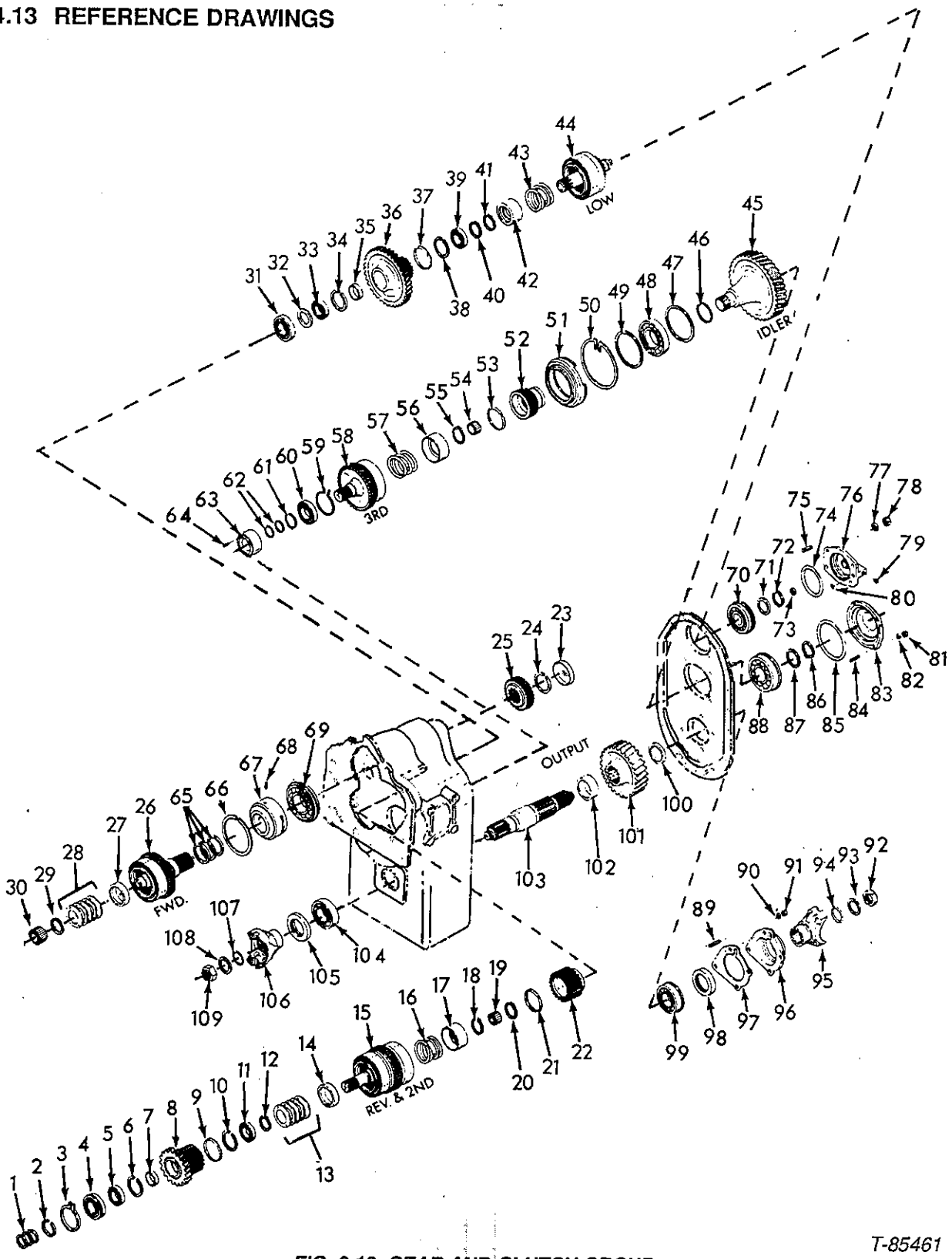


FIG. 2-12 GEAR AND CLUTCH GROUP

2.4 REPAIR PROCEDURES

2.4.13 REFERENCE DRAWINGS

Legend for Fig. 2-12

1. *Ring*
2. *Retaining ring*
3. *Snap ring*
4. *Bearing*
5. *Bearing*
6. *Retaining ring*
7. *Spacer*
8. *Gear & hub assembly*
9. *Baffle ring*
10. *Retaining ring*
11. *Bearing*
12. *Snap ring*
13. *Belleville washers*
14. *Spacer*
15. *Reverse & 2nd clutch*
16. *Spring*
17. *Spring retainer*
18. *Snap ring*
19. *Bearing*
20. *Snap ring*
21. *Baffle ring*
22. *Hub*
23. *Bore plug*
24. *Snap ring*
25. *Gear*
26. *Forward clutch*
27. *Spacer*
28. *Belleville washers*
29. *Snap ring*
30. *Bearing*
31. *Bearing*
32. *Spacer*
33. *Bearing*
34. *Locating ring*
35. *Spacer*
36. *Gear & hub assembly*
37. *Baffle ring*
38. *Locating ring*
39. *Bearing*
40. *Retaining ring*
41. *Snap ring*
42. *Spring retainer*
43. *Spring*
44. *Low speed clutch*
45. *Idler shaft & gear*
46. *Retaining ring*
47. *Locating ring*
48. *Bearing*
49. *Locating ring*
50. *Locating ring*
51. *Bearing carrier*
52. *Hub*
53. *Baffle ring*
54. *Bearing*
55. *Snap ring*
56. *Spring retainer*
57. *Spring*
58. *3rd speed clutch*
59. *Locating ring*
60. *Bearing*
61. *Retaining ring*
62. *Ring*
63. *Race*
64. *Roll pin*
65. *Ring*
66. *Retainer ring*
67. *Sleeve*
68. *Roll pin*
69. *Bearing*
70. *Bearing*
71. *Washer*
72. *Retaining ring*
73. *Ring*
74. *O-ring*
75. *Bearing cap stud*
76. *Bearing cap*
77. *Lockwasher*
78. *Nut*
79. *Plug*
80. *O-ring*
81. *Nut*
82. *Lockwasher*
83. *Bearing cap*
84. *Bearing cap stud*
85. *O-ring*
86. *Retaining ring*
87. *Washer*
88. *Bearing*
89. *Bearing cap stud*
90. *Lockwasher*
91. *Nut*
92. *Flange nut*
93. *Washer*
94. *O-ring*
95. *Output flange*
96. *Bearing cap*
97. *Gasket*
98. *Oil seal*
99. *Bearing*
100. *Spacer*
101. *Output gear*
102. *Spacer*
103. *Output shaft*
104. *Bearing*
105. *Oil seal*
106. *Output flange*
107. *O-ring*
108. *Washer*
109. *Flange nut*

2.4.13 REFERENCE DRAWINGS

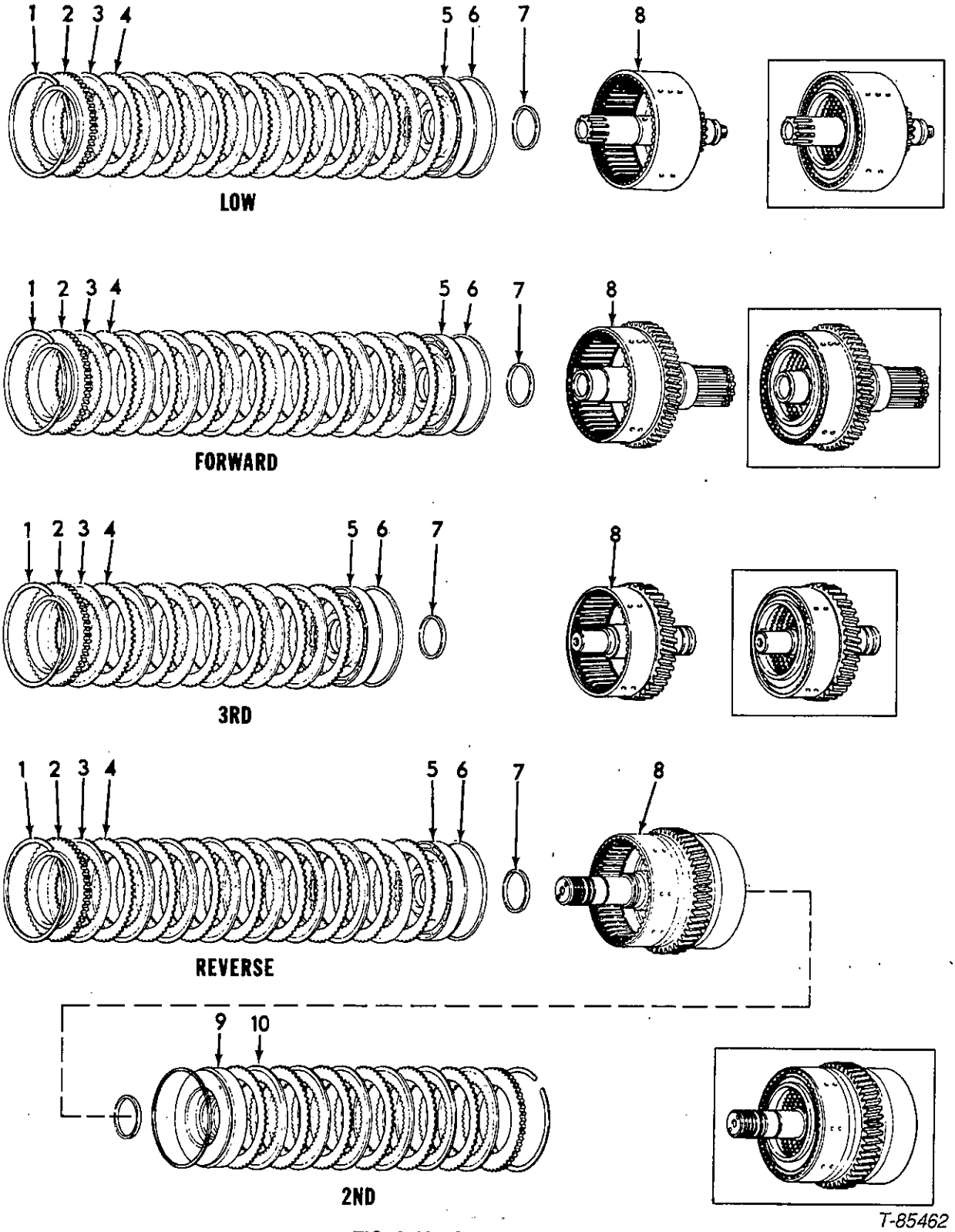


FIG. 2-13 CLUTCH PACKS

2.4.13 REFERENCE DRAWINGS

Legend for Fig. 2-13

1. *Snap ring*
2. *Backing plate*
3. *Disc (inner)*
4. *Disc (outer)*
5. *Piston*
6. *Seal*
7. *Seal*
8. *Shaft & drum assembly*
9. *Piston*
10. *Disc (inner)*

2.4.13 REFERENCE DRAWINGS

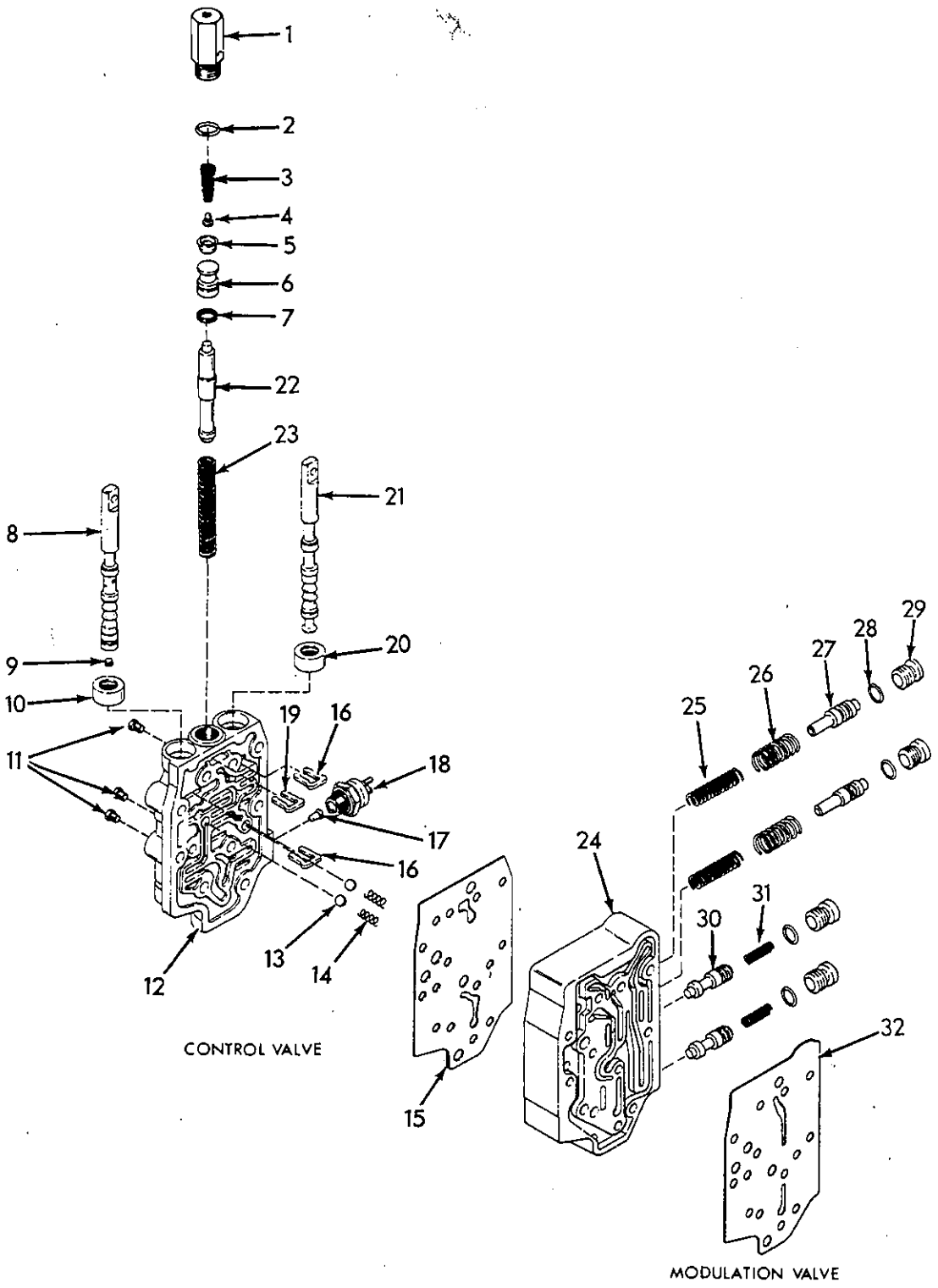


FIG. 2-14 CONTROL VALVE ASSEMBLY

2.4.13 REFERENCE DRAWINGS

Legend for Fig. 2-14

1. *Actuator assembly*
2. *O-ring*
3. *Spring*
4. *Retainer pin*
5. *Piston seal*
6. *Piston*
7. *Glyd ring*
8. *Speed selector spool*
9. *Plug*
10. *Oil seal*
11. *Plug*
12. *Housing*
13. *Detent ball*
14. *Spring*
15. *Gasket*
16. *Spool stop*
17. *Switch actuating pin*
18. *Neutral switch*
19. *Spool stop*
20. *Oil seal*
21. *Forward & reverse spool*
22. *Declutch spool*
23. *Spring*
24. *Modulator housing*
25. *Accumulator spring (inner)*
26. *Accumulator spring (outer)*
27. *Accumulator valve*
28. *O-ring*
29. *Plug*
30. *Regulator spring*
31. *Regulator spool*
32. *Gasket*

2.4.13 REFERENCE DRAWINGS

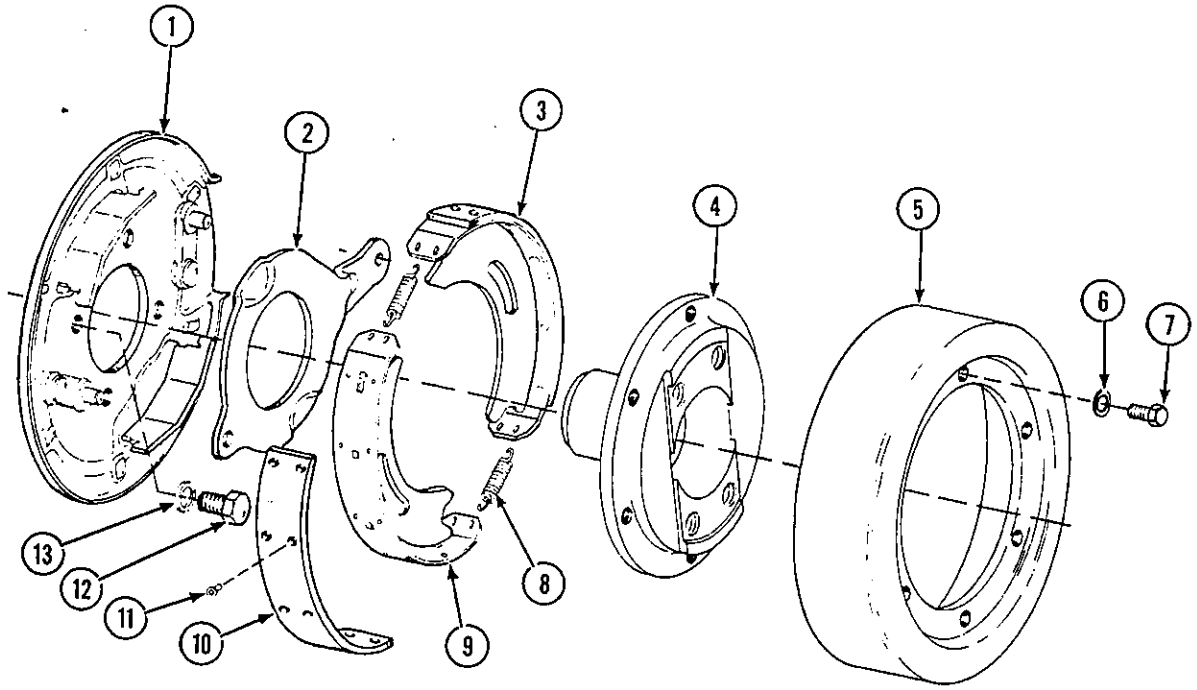


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FIG. 2-15 PARKING BRAKE GROUP

1. *Backing plate*
2. *Actuating lever*
3. *Shoe & lining*
4. *Flange*
5. *Brake drum*
6. *Lockwasher*
7. *Screw*
8. *Return spring*
9. *Brake shoe*
10. *Lining*
11. *Rivet*
12. *Screw*
13. *Lockwasher*

2.5 TOOL SECTION

Service tools required to perform the repair operations in this manual are listed below. Order tools from your *FIATALLIS*® dealer unless otherwise noted.

All other tools are concidered to be standard tools which can be ordered from local tool suppliers.

DESCRIPTION	PART NO.
Transmission mounting stand	_____
Snap ring pliers	_____
Impact wrench	_____
Gear and bearing puller	_____
Press	_____
Pry bar	_____
Mallot & drift	_____
Hoist	_____
Torque wrench	_____
4 to 1 Torque multiplier	_____
Slide hammer	_____
Liquid gasket	70699262
Bolt hole alignment tool	_____
Gauges & flow meter (TG-100C)	75294308
Loctite® anti-seize lubricant	75000781
Guide stud (flex plate to flywheel)	75297151
Guide stud (converter to flywheel housing)	75297152
Converter baffle puller tool	75296845
Sleeve for removal/installation of clutch piston return spring	75297498

MEMO

TORQUES (continued)

2.4.11.45	55.6-61.0 Nm (41-45 lbs.ft.)
2.4.11.53	50.2-55.6 Nm (37-41 lbs.ft.)
2.4.11.54	13.6-20.3 Nm (10-15 lbs.ft.)
2.4.11.56	31.2-33.9 Nm (23-25 lbs.ft.)
2.4.12.5	16.3-21.6 Nm (12-16 lbs.ft.)
2.4.12.5	31.2-33.9 Nm (23-25 lbs.ft.)
2.4.12.11	31.2-33.9 Nm (23-25 lbs.ft.)
2.4.12.13	50.2-55.6 Nm (37-41 lbs.ft.)
2.4.12.17	55.6-61.0 Nm (41-45 lbs.ft.)
2.4.12.17	31.2-33.9 Nm (23-25 lbs.ft.)

CAPACITIES

PARAGRAPH	DESCRIPTION	CAPACITY
2.4.2.63	Transmission Fluid	19 Liters (20.08 qts.)
2.4.2.64	Hydraulic Oil	60 Liters (63.42 qts.)

SPECIFICATIONS

PARAGRAPH	DESCRIPTION	SPECIFICATION
2.4.2.63	Transmission Fluid	*MIL-L-2104 C
2.4.2.64	Hydraulic Oil	*MIL-L-2104 C

* C3 transmission oil meeting MIL-L-2104 C specifications.

	PSI	BAR
Main press @ high idle - neutral	184-224	12.7-15.4
Lube press @ high idle - neutral	16-25	1.1-1.7

2.6 SPECIFICATIONS

2.6 SPECIFICATIONS

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SECTION 3

AXLE

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3.3	Testing	5
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3.6.2	Differential Specifications	62
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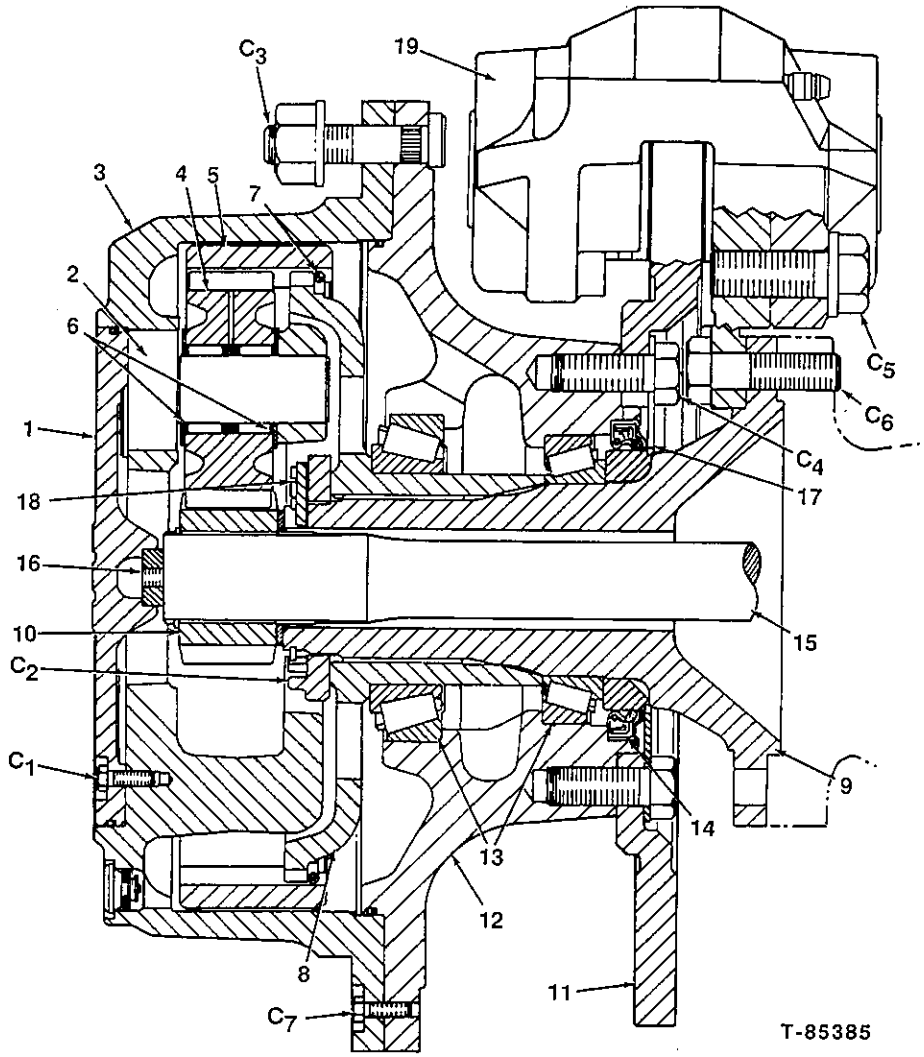
GENERAL DESCRIPTION

The axle is of the planetary design and can be divided into three distinct sections; which are: wheel end, differential and axle shafts.

The planetary wheel end consists of the sun gear, splined to the axle shaft, three planet gears and the ring gear, which is held stationary to the hub spindle. Power is transferred by means of the axle shaft to the sun gear. The rotation of the sun gear causes the planet gears to rotate against the stationary ring gear. The planetary gears riding upon cageless needle bearings are fixed to the wheel end by pins. The net result is that the wheel end turns at a reduced speed but with more tractive power. A brake disc, located on the planetary wheel end, rotates any time the wheel end rotates.



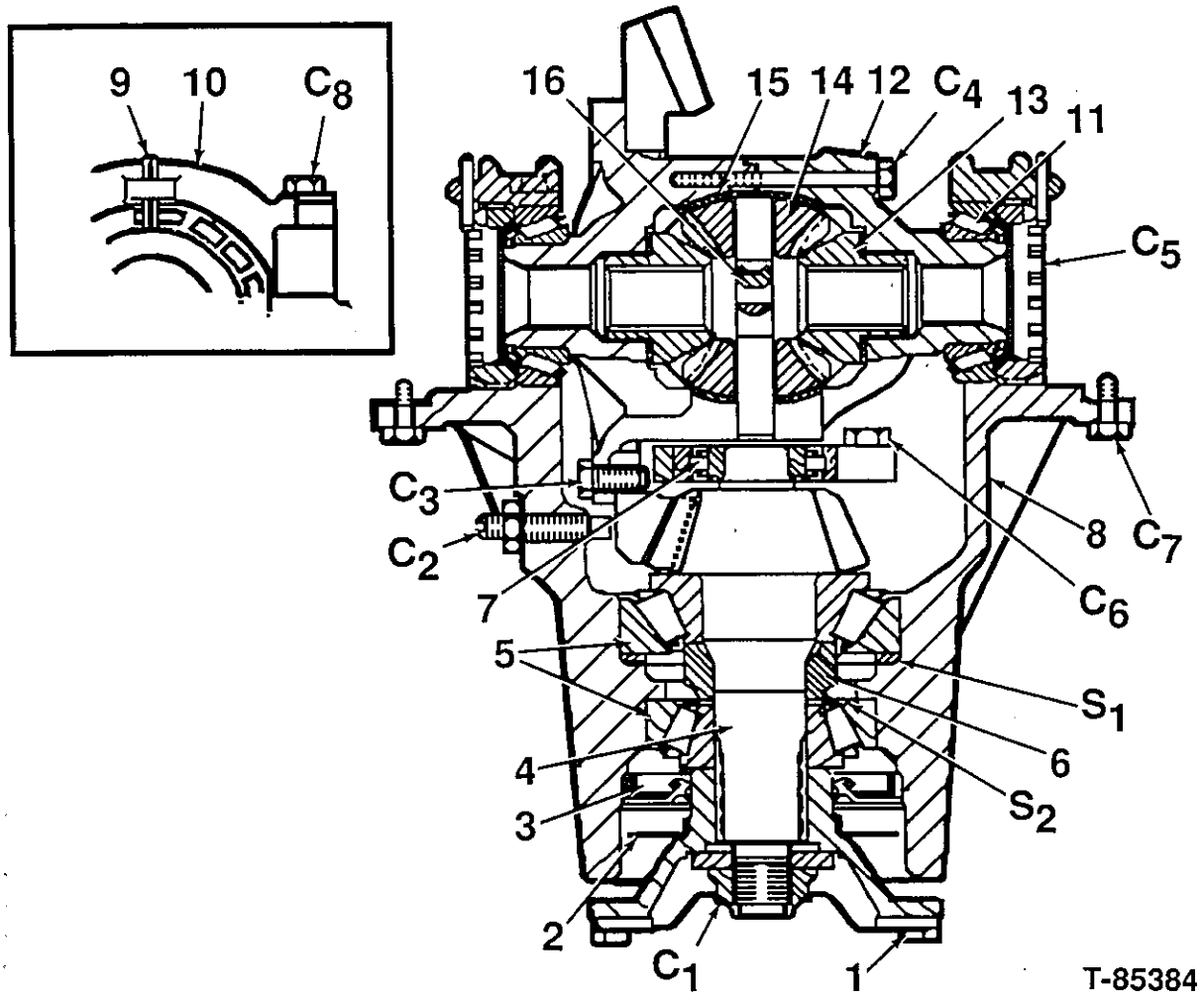
WHEEL END

C_1	*Planet gear cover screws*	3.	*Planetary Case*	12.	*Wheel flange*
C_2	*Hub lock nut*	4.	*Planet gear*	13.	*Tapered roller bearings*
C_3	*Tire rim stud*	5.	*Ring gear*	14.	*Seals*
C_4	*Brake disc mounting screw*	6.	*Thrust washers*	15.	*Axle shaft*
C_5	*Caliper mounting screw*	7.	*Retaining ring*	16.	*Thrust button*
C_6	*Spindle to axle housing screw*	8.	*Ring gear hub*	17.	*Seal shield*
C_7	*Planetary to flange screw*	9.	*Spindle hub*	18.	*Hub nut lock*
1.	*Planet carrier cover*	10.	*Sun gear*	19.	*Brake caliper*
2.	*Planet gear pin*	11.	*Brake disc*		

GENERAL DESCRIPTION

The differential of this axle consists of a drive member, pinion, and the driven member, ring gear. The ring gear is attached to the differential case which has four pinion gears within it. The pinion gears allow one wheel to drive faster than the other. An example of such an instance is turning directions. The outer wheel must turn faster than the inner wheel. The differential pinions will transmit some torque to the non-slipping wheel in slippery roading conditions.

The pinion gear receives its power from the transmission and transfers that power through its meshed ring gear to the attached differential case. If the machine has equal traction on both wheel ends, then both axle shafts, splined to the differential case's side gears, turn at ring gear speed. On the other hand, if unequal traction is encountered, one wheel will rotate faster than the other because the differential pinions within the case will rotate and cause unequal rotating speeds on the drive gears and hence to the axle shafts.



DIFFERENTIAL

C_1	*Flange to pinion nut*	S_2	*Bearing pre-load shims*	9.	*Bearing adjuster lock pin*
C_2	*Ring gear drift screw*	1.	*Flange*	10.	*Bearing cap*
C_3	*Ring gear mount screw*	2.	*Cover*	11.	*Bearing*
C_4	*Differential case screw*	3.	*Seal*	12.	*Differential case*
C_5	*Bearing adjustment nut*	4.	*Pinion*	13.	*Side gear*
C_6	*Bearing retainer screw*	5.	*Bearings*	14.	*Pinion gear*
C_7	*Housing to axle case screw*	6.	*Spacer*	15.	*Thrust washer*
C_8	*Bearing cap screw*	7.	*Pinion shank bearing*	16.	*Spider*
S_1	*Pinion depth shims*	8.	*Differential housing*		

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	TOOLS REQUIRED	TEST	SOLUTION
Noise	Incorrect lubricant or level too low	Operator's manual	Compare oil with specifications	Check level, fill with correct lubricant
	Improperly adjusted wheel bearings		Examination	Adjust bearings
	Damage to planetary gears		Examination	Replace gears
	Pinion to ring gear backlash is too low	Micrometer	Check backlash	Adjust backlash to specifications
	Poor pattern between pinion and ring gear		Examination	Correct pattern
Lubricant Loss	Lubricant leaks at planetary cover		Examination	Tighten capscrews or reseal cover and capscrews
	Lubricant level too high		If oil blows from breather, check oil level	Fill differential to proper level
	Excessive foaming of lubricant		Examination	Drain and fill with correct lubricant
	Breather plugged		Examination	Clean breather
	Damaged seals		Examination	Replace
	Worn yoke		If oil leaks from yoke may be seals or yoke	Replace seal or yoke
Overheating	Incorrect lubricant or level incorrect		Examination	Check level, fill with correct lubricant
	Excessive gear wear		Examination	Replace gears
	Pinion gear assembly adjusted too tight in the differential		Examination	Correct to proper adjustment

AXLE

TESTING

AXLE REMOVAL

NOTE : THE ILLUSTRATIONS IN THIS SECTION SHOW THE REAR AXLE. THE FRONT AXLE IS SIMILAR AND UNLESS OTHERWISE NOTED , THE PROCEDURES APPLY TO BOTH. THE MAIN DIFFERENCE BETWEEN THE TWO IS THE WAY THEY ARE MOUNTED. THE FRONT AXLE IS RIGID AND BOLTS DIRECTLY TO THE FRAME. THE REAR AXLE OSCILLATES AND IS ATTACHED TO THE FRAME BY TWO SUPPORTS.

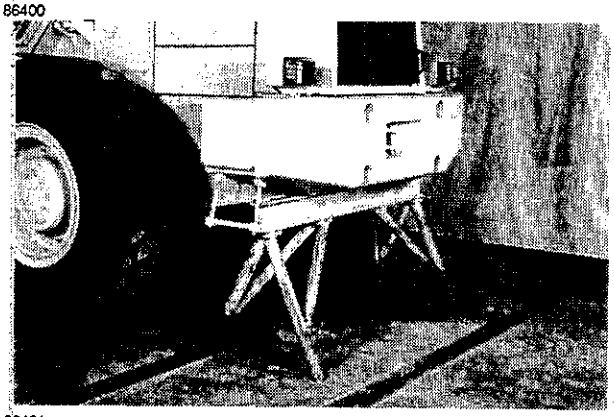
86399

3.4.1.1
Using suitable hoist and sling, raise appropriate end of machine. Weight is approximately 5000 kg (11000 lbs.)

⚠ WARNING

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.

86400



3.4.1.2
Position a jack stand under machine that will support the load.

⚠ WARNING

When any supporting machine component must be removed or installed and jacks are used, be sure the support of the jack at the machine and on the ground are appropriate to the load to be applied. Transfer the load to authorized blocking or jack stand immediately. Do not work on or under the machine or its components while supported only on a jack or other lifting device, according to local or national requirements.

86401

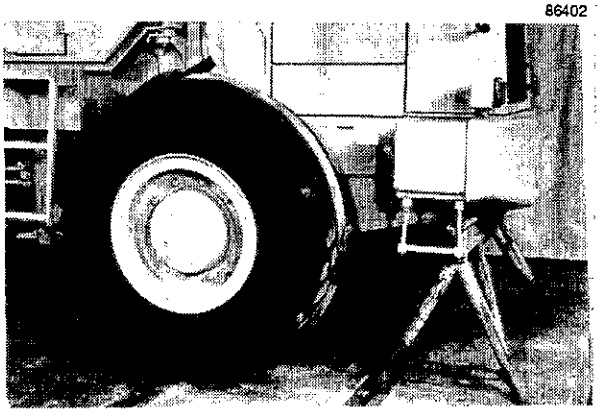
3.4.1.3
Remove fenders.

3.4.1.4
Position a suitable hoist and sling to lift wheel and tire assembly. Standard tire and wheel assembly weighs approximately 225 kg(500 lbs.).

⚠ WARNING

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.

86402



3.4.1.5
Place a wood block between axle housing and frame on both sides to keep axle from oscillating when wheel assembly is removed.

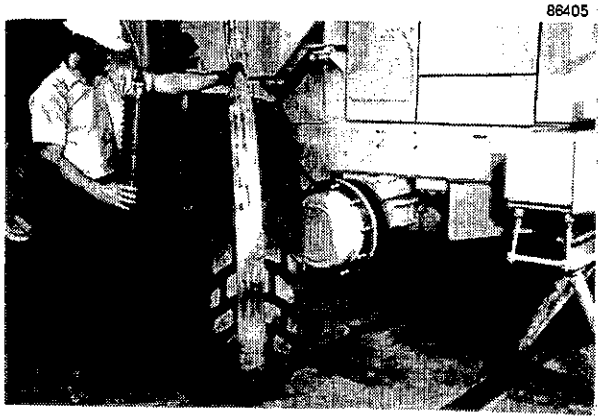
86404

3.4.1.6
Remove wheel nuts.

86403

3.4.1.7
Remove wheel and tire assembly. Repeat wheel removal procedure to remove wheel from opposite side.

86405



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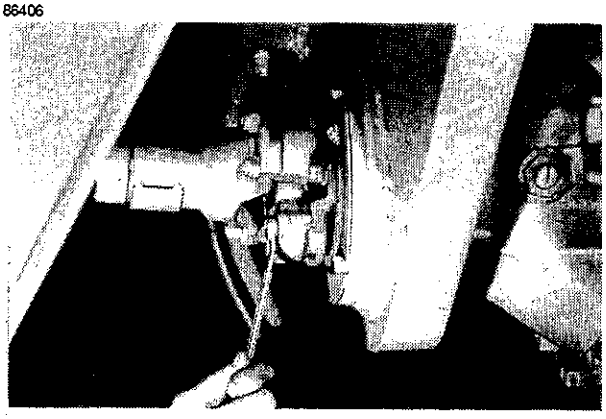
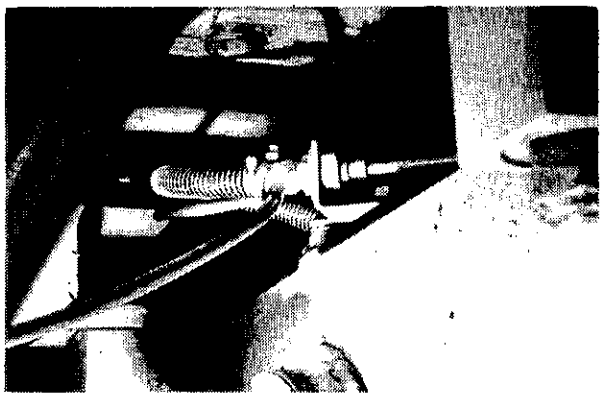


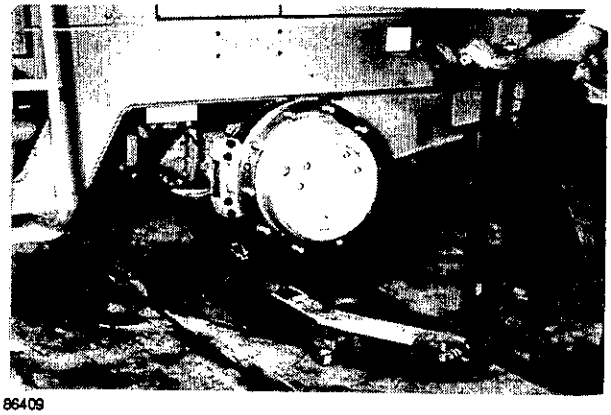
3.4.1.8
Disconnect U-joint spider from differential yoke.

86407



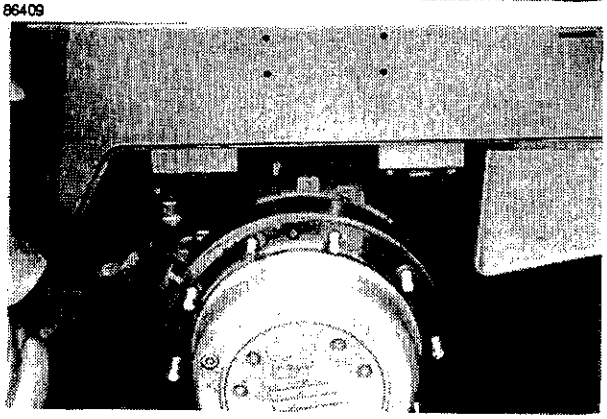
3.4.1.9
Disconnect hose from hydraulic brake tubes. Brake fluid will drain out of lines. On rear axle disconnect lube hose from each support.

86408



3.4.1.10
Position floor jack under center of axle assembly.

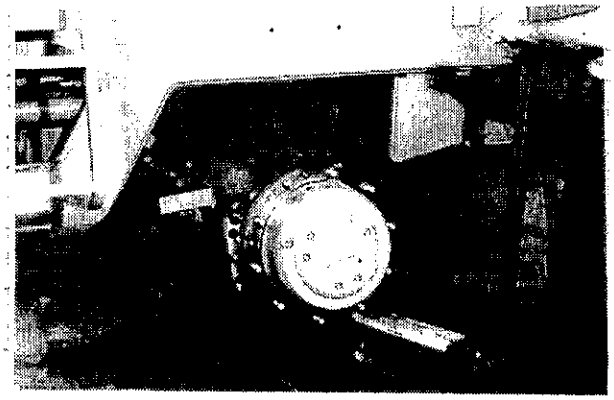
86409



3.4.1.11
Remove capscrews and nuts attaching axle housing axle supports to frame.

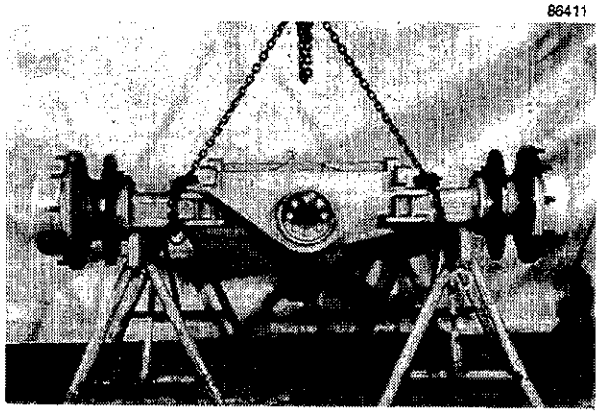
3.4.1.12
Lower axle assembly with floor jack and roll out from under machine. NOTE: The rear axle front support (on differential housing) is not bolted to the assembly. Therefore handle axle assembly in such a manner that support will not fall. Also be careful that the supports do not swing on the pivots.

86410



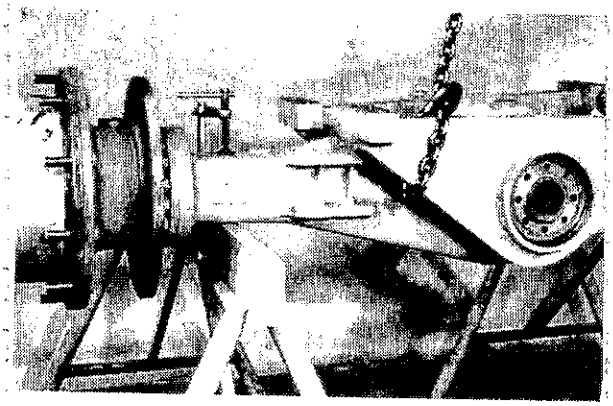
3.4.1.13
Place axle assembly on stands for ease in disassembly.

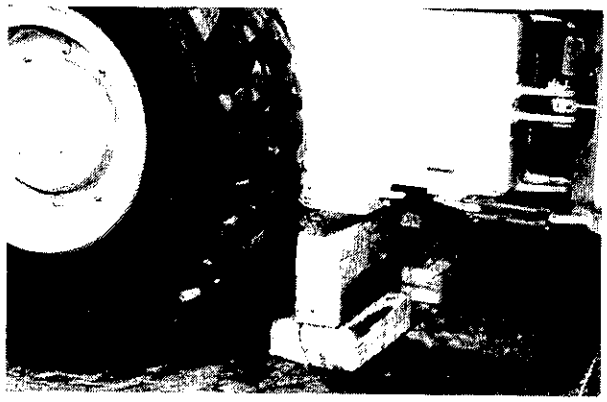
86411



3.4.1.14
Install C-clamps on both ends of the axle housing to keep axle from rotating on stand.

86412





FRONT AXLE REMOVAL

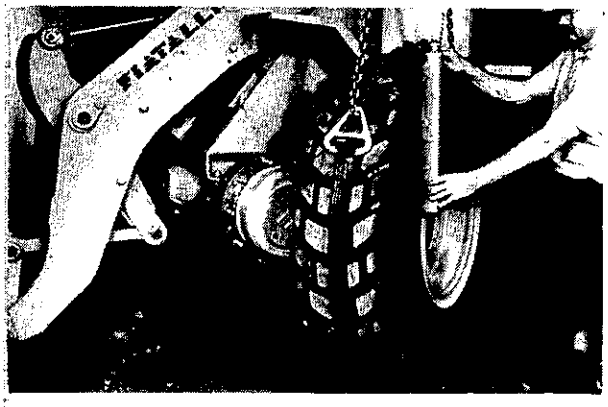
3.4.1.15

Raise the front end of the loader while keeping the bucket upon the ground. Block the front frame behind the axle.

⚠ WARNING

When any supporting machine component must be removed or installed and jacks are used, be sure the support of the jack at the machine and on the ground are appropriate to the load to be applied. Transfer the load to authorized blocking or jack stand immediately. Do not work on or under the machine or its components while supported only on a jack or other lifting device, according to local or national requirements.

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.

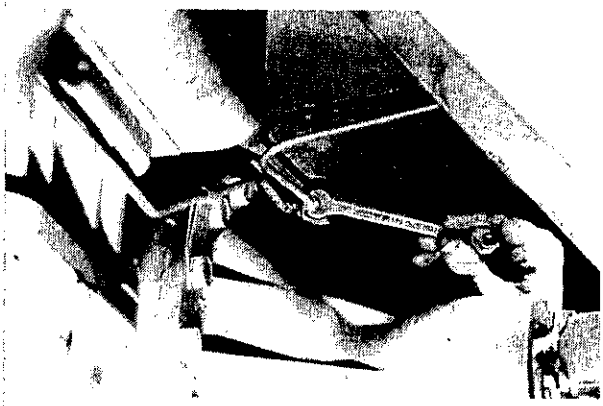


3.4.1.16

Remove the tire.

⚠ WARNING

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.



3.4.1.17

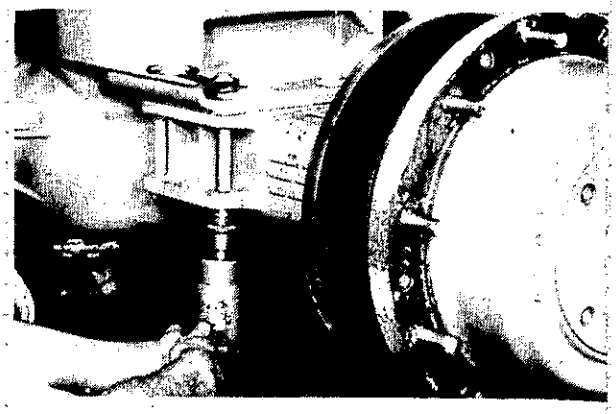
Remove the front brake line at the junction above the differential housing.

3.4.1.18
Remove the drive shaft.

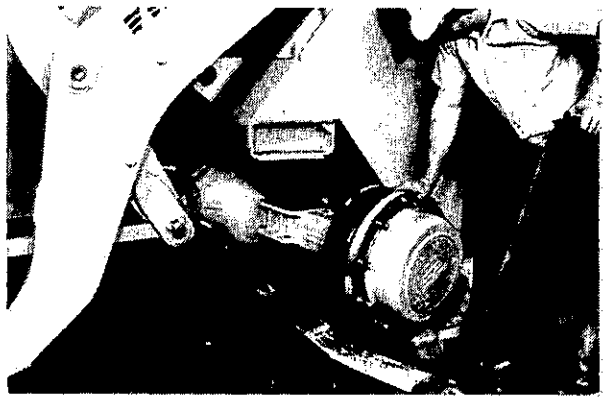
3.4.1.19
Place a suitable jack under the differential area of front axle. Remove axle support bolts.

⚠ WARNING

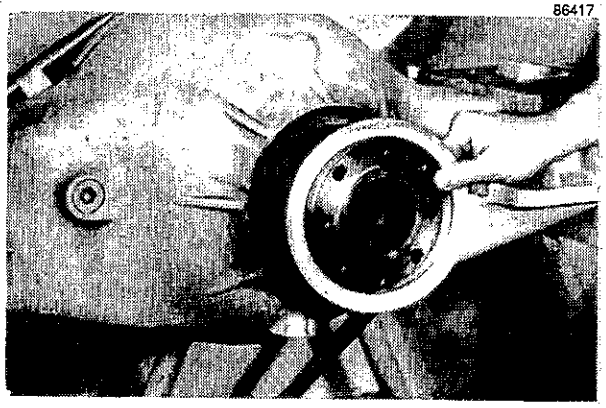
When any supporting machine component must be removed or installed and jacks are used, be sure the support of the jack at the machine and on the ground are appropriate to the load to be applied. Transfer the load to authorized blocking or jack stand immediately. Do not work on or under the machine or its components while supported only on a jack or other lifting device, according to local or national requirements.



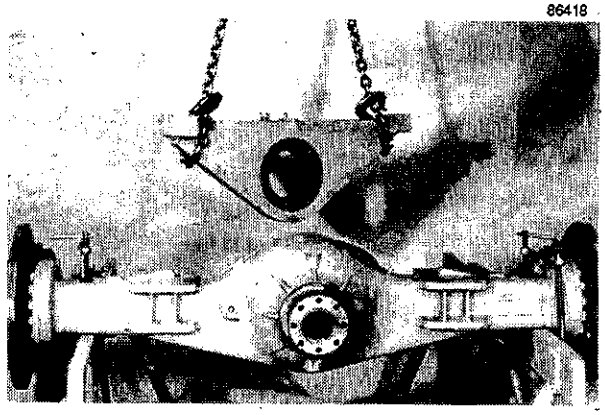
3.4.1.20
Lower axle to the ground.



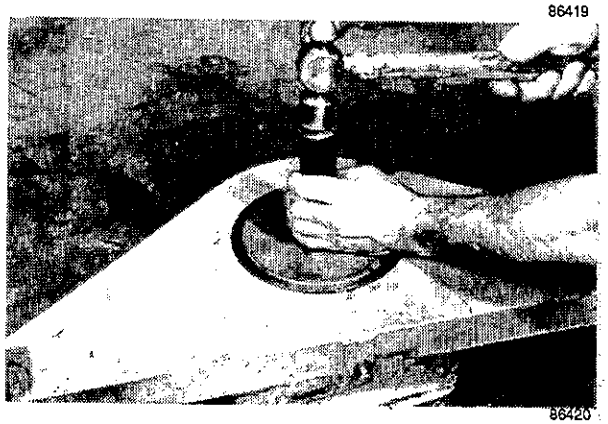
3.4.2.5
Remove inner spacer.


86417

3.4.2.6
Remove other oscillating member from axle housing.

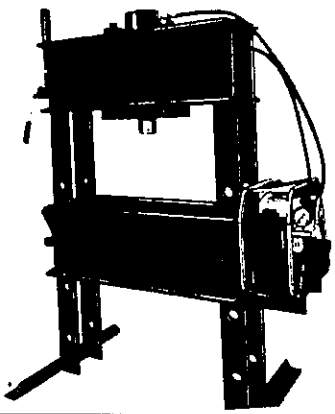

86418

3.4.2.7
Remove the two seals from the support.


86419

86420

3.4.2.8
Install the support in a shop press.



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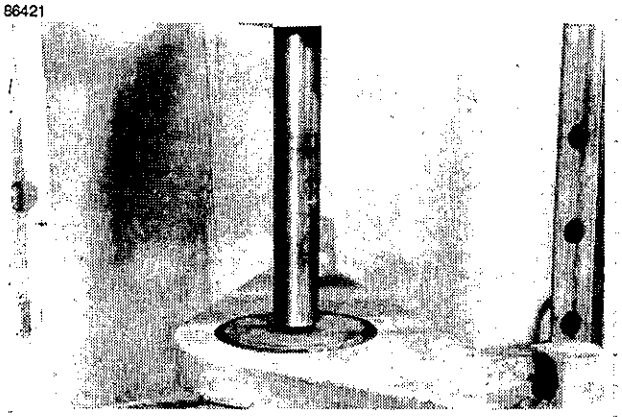


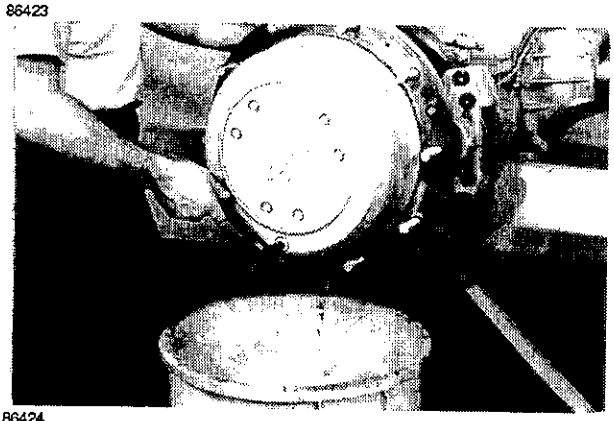
3.4.2.9
Press the bushing from the support using the shop press and a plate 174 mm (6.875") in diameter.

86422

Wheel Ends

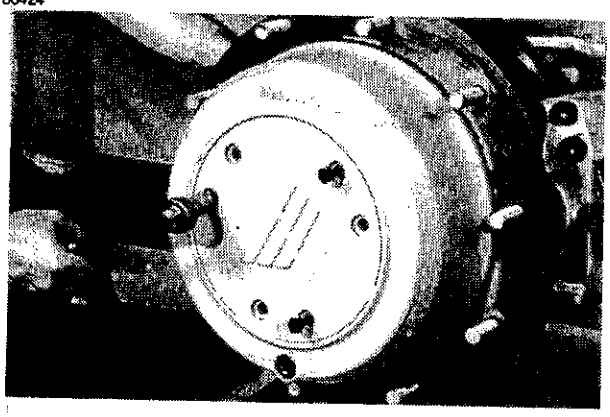
3.4.2.10
Drain oil from differential housing.

86423



3.4.2.11
Drain oil from wheel ends.

86424

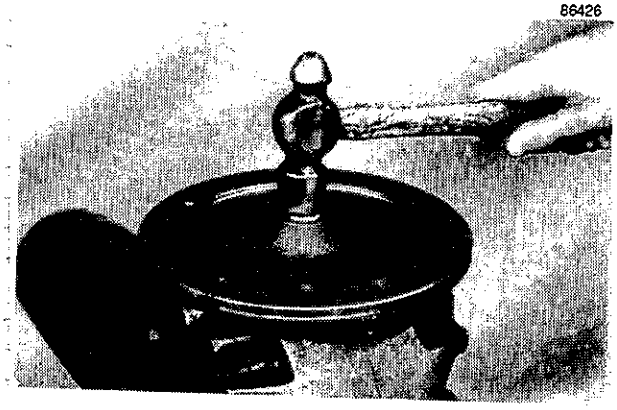


3.4.2.12
Remove wheel end cover. Three holes in cover are tapped for pusher screws.

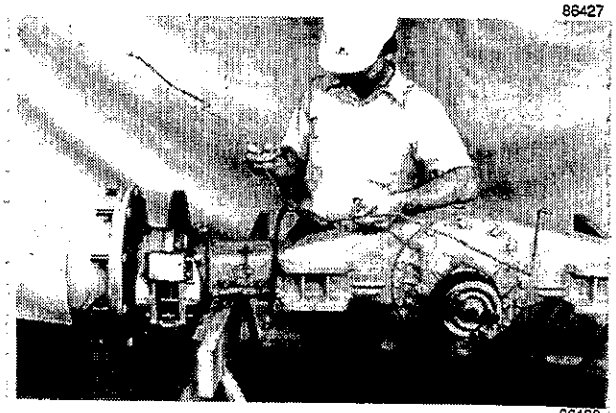
3.4.2.13
Remove cover O-ring.


86425

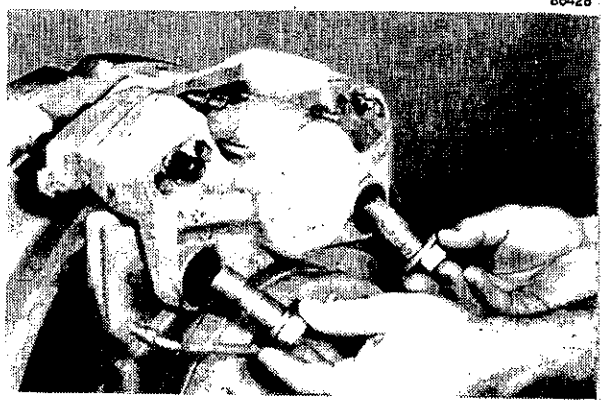
3.4.2.14
Remove axle thrust button.


86426

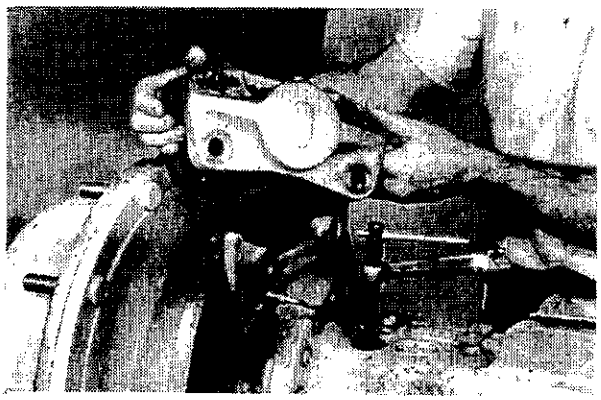
3.4.2.15
Disconnect hydraulic brake line.


86427

3.4.2.16
Remove brake caliper capscrews. Note location of each capscrew as they are different .

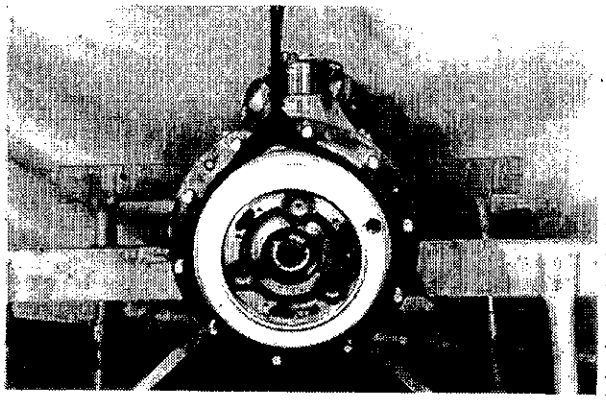

86428

86429



3.4.2.17
Remove brake caliper.

86430

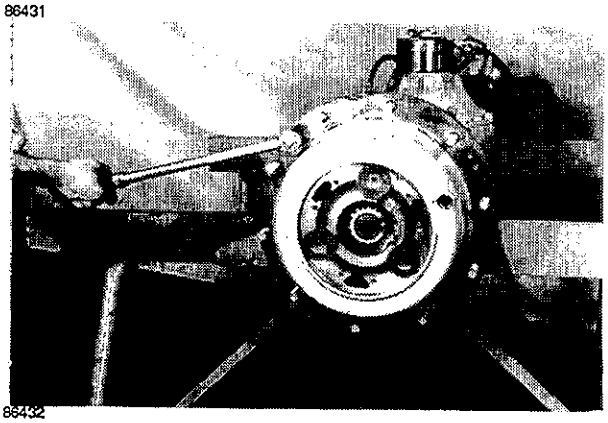


3.4.2.18
Attach a suitable hoist and sling to planet gear support housing.

⚠ WARNING

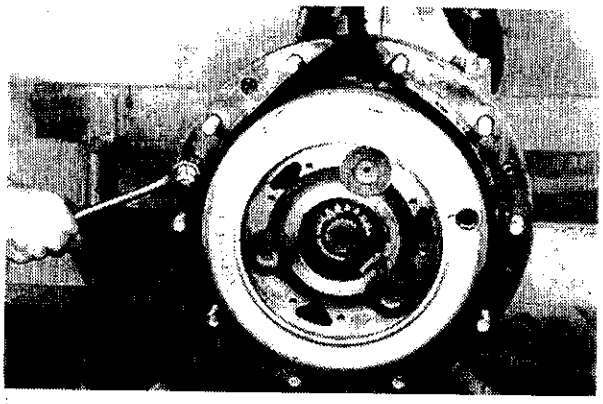
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

86431



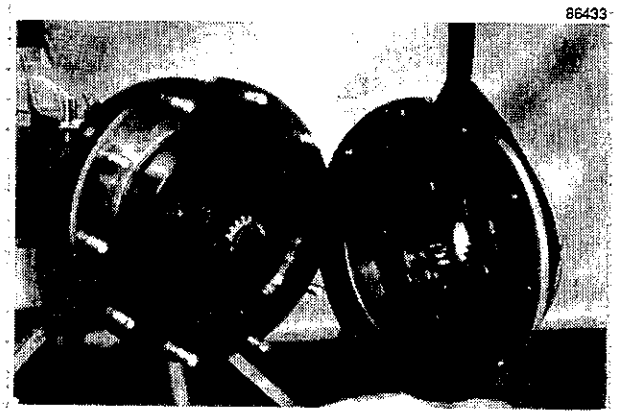
3.4.2.19
Remove attaching capscrews.

86432

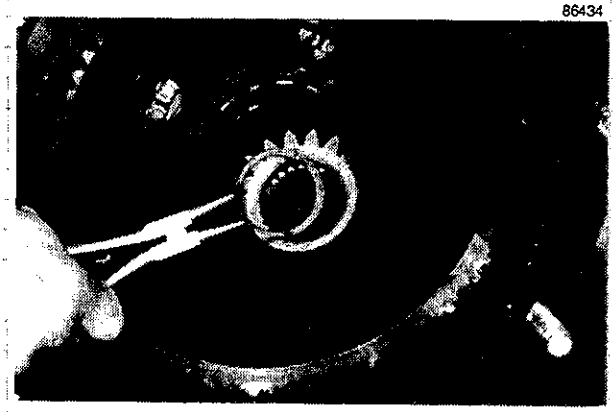


3.4.2.20
Use pusher screws to separate housing from hub.

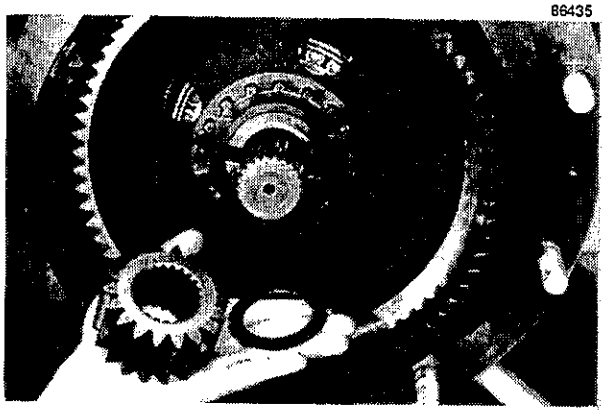
3.4.2.21
Planet gear support housing removed.


86433

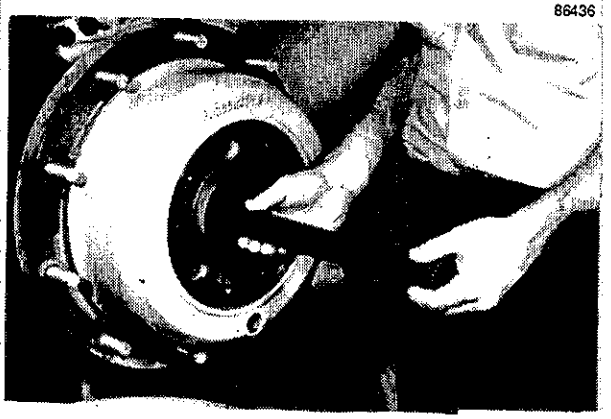
3.4.2.22
Remove snap ring holding gear on axle shaft.


86434

3.4.2.23
Slide off gear and thrust washer.

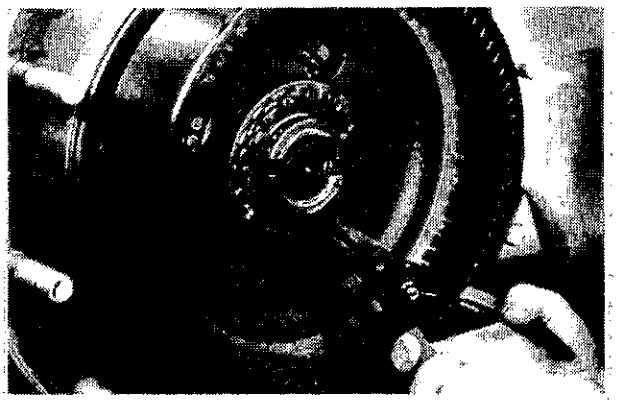

86435

3.4.2.24
Remove axle shaft.


86436

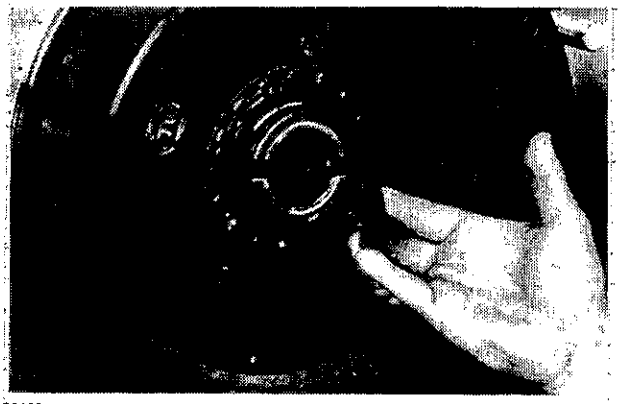
AXLE DISASSEMBLY

86437



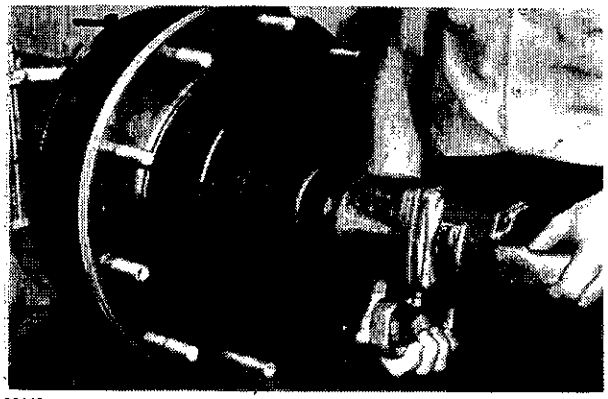
3.4.2.25
Remove snap ring holding hub nut locks.

86438



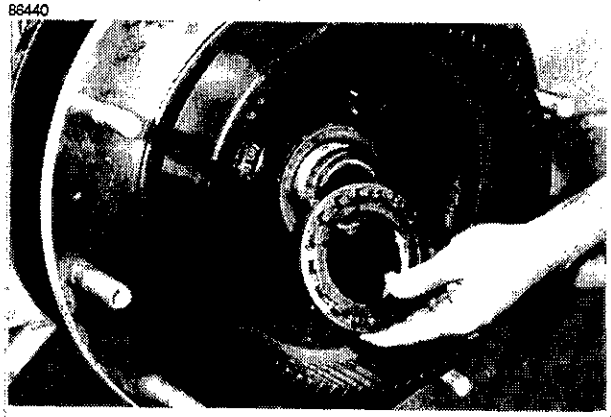
3.4.2.26
Remove nut locks.

86439



3.4.2.27
Loosen hub nut. Use tool # 75292224 and a 1" drive impact wrench.

86440



3.4.2.28
Remove nut.

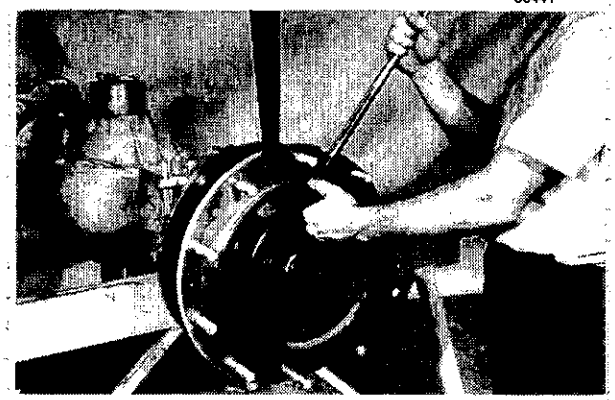
AXLE DISASSEMBLY

3.4.2.29
Support hub flange with a hoist and sling. Remove hub and ring gear assembly.

⚠ WARNING

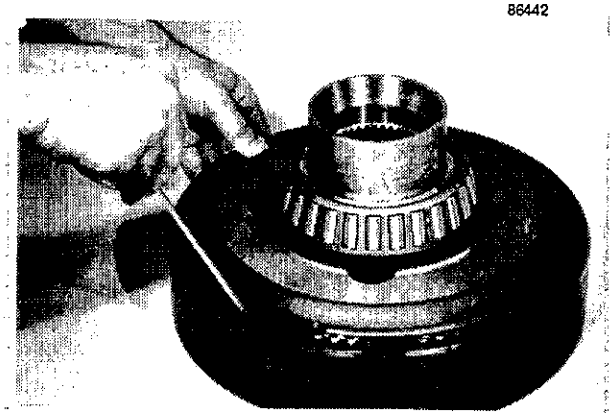
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

86441



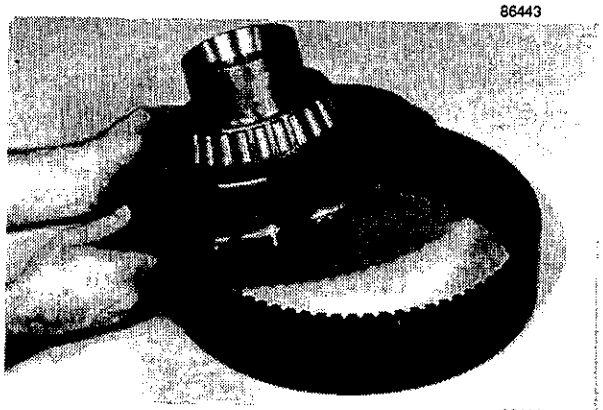
3.4.2.30
Using a screwdriver, remove snap ring from ring gear.

86442



3.4.2.31
Remove hub.

86443



3.4.2.32
Drive off bearing with hammer and cold roll bar.

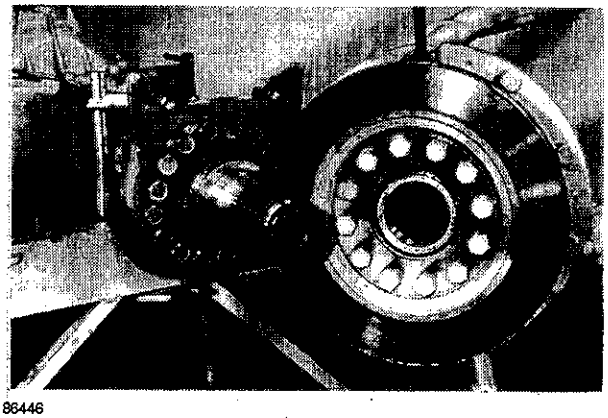
⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

86444

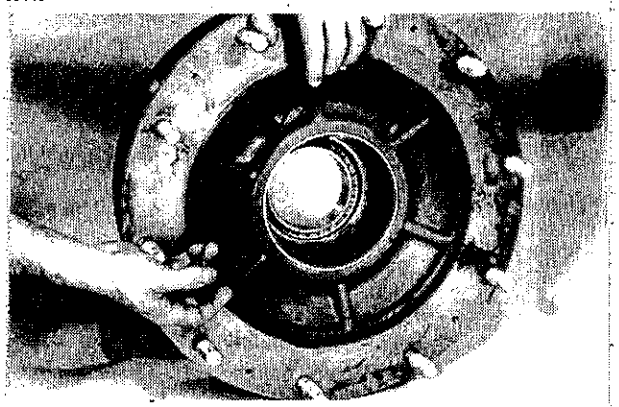
AXLE DISASSEMBLY

86445



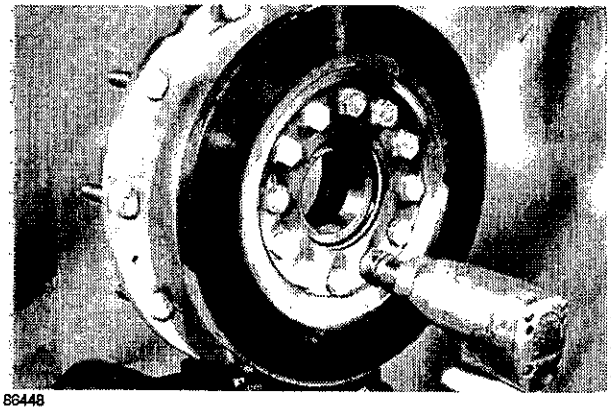
3.4.2.33
Remove hub flange.

86446



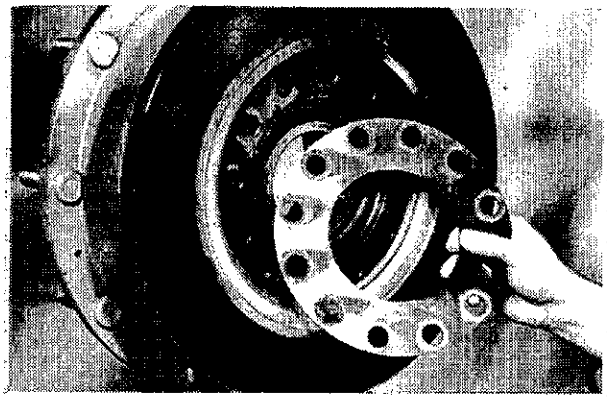
3.4.2.34
Remove O-ring.

86447



3.4.2.35
Remove capscrews from brake disc hub.

86448

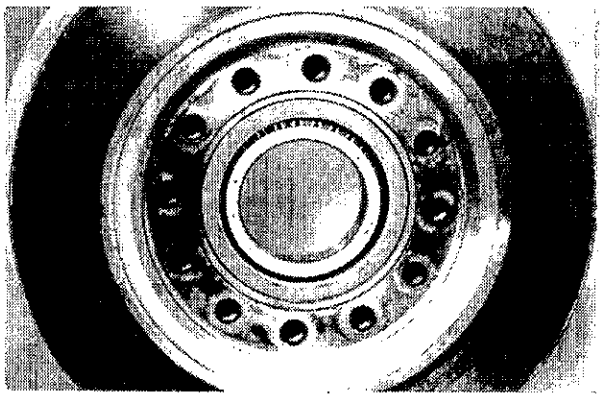


3.4.2.36
Remove seal shield

AXLE DISASSEMBLY

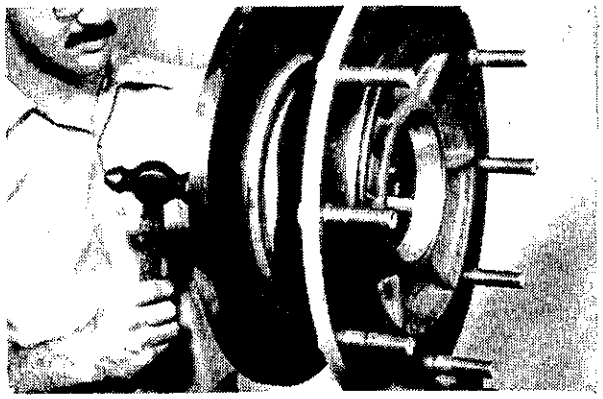
3.4.2.37
Remove seal and small bearing.

86449



3.4.2.38
Remove large bearing race and small bearing race.

96450

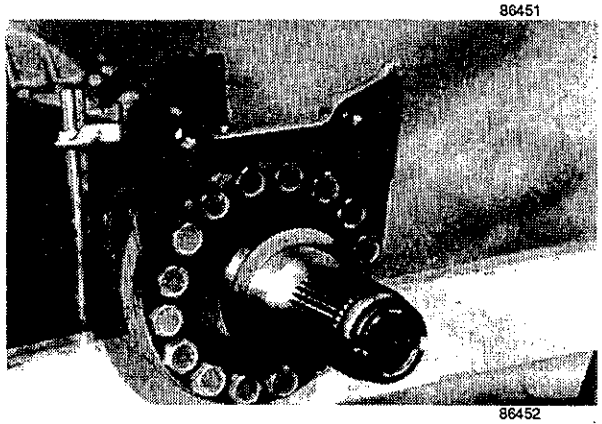


⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

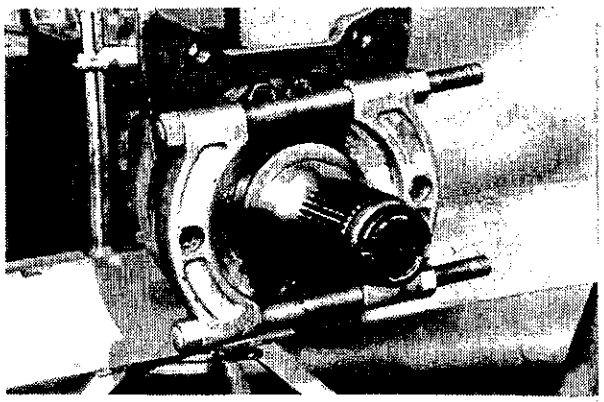
3.4.2.39
If housing end shaft is damaged, remove attaching capscrews and replace it. Use gasket sealer on flange when reassembling.

86451



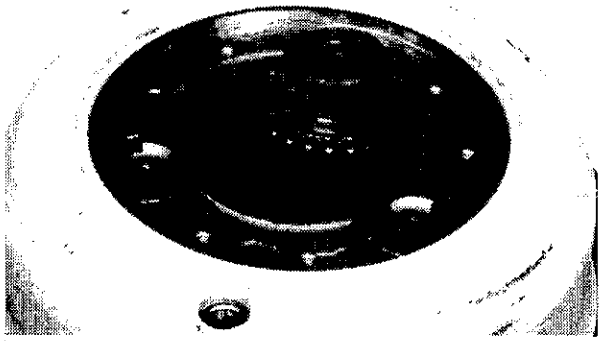
3.4.2.40
If bearing spacer is damaged, it can be removed with a split bearing puller.

86452



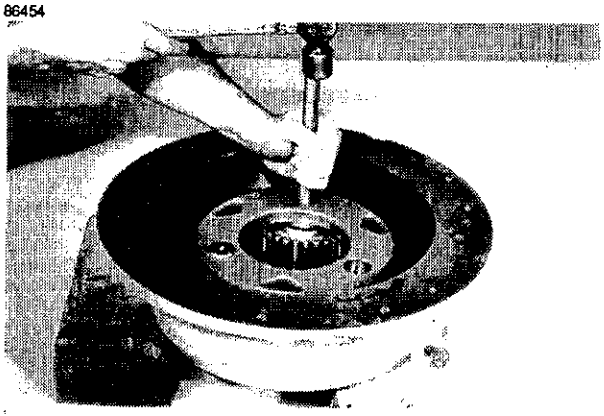
AXLE DISASSEMBLY

86453



3.4.2.41
Mark planet pins, gears,and bores so all parts can be reassembled in their original position.

86454

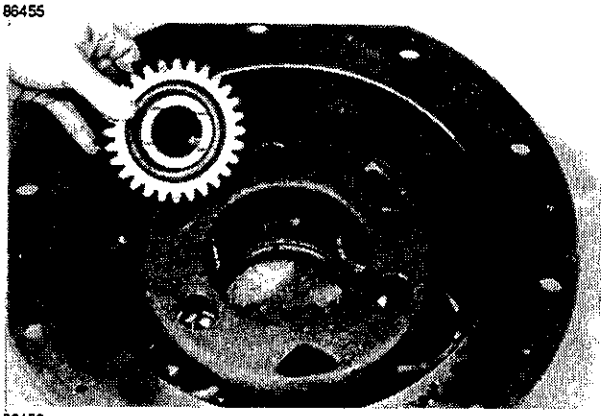


3.4.2.42
Position planet gear carrier on wood blocks.Use a brass drift to drive out planet pins.Note: Bearing rollers will fall out as pin is removed.Place a shop cloth under bore to catch rollers.

⚠ WARNING

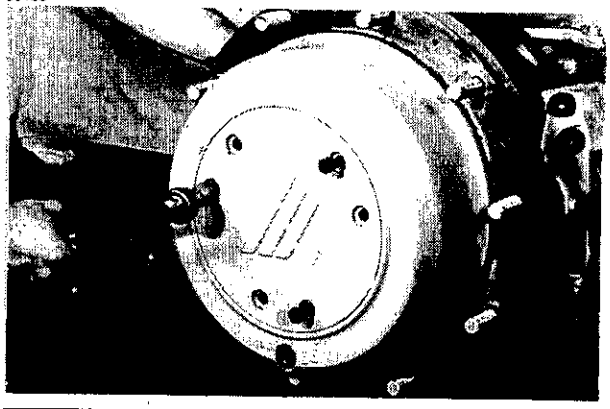
It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

86455



3.4.2.43
Remove gears. No gear can be removed unless all of them are loose.

86456



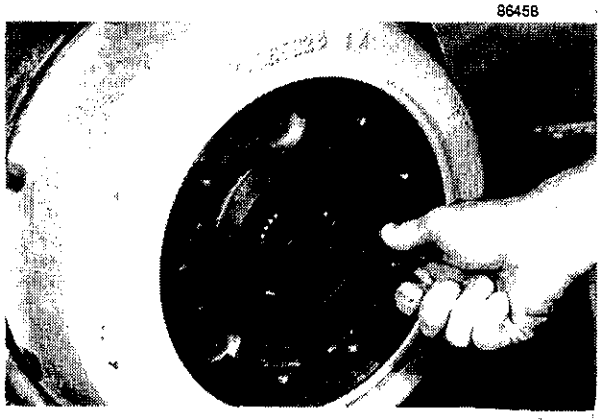
Differential

NOTE: To remove differential, both axle shafts must be pulled out to disengage them from differential side gears.

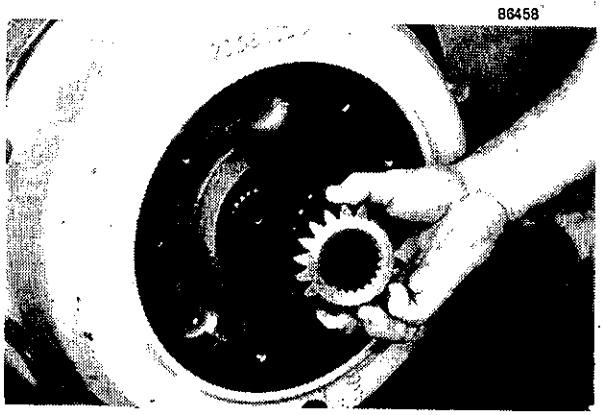
3.4.2.44
Remove wheel end cover. Three bolt holes are tapped for pusher screws.

AXLE DISASSEMBLY

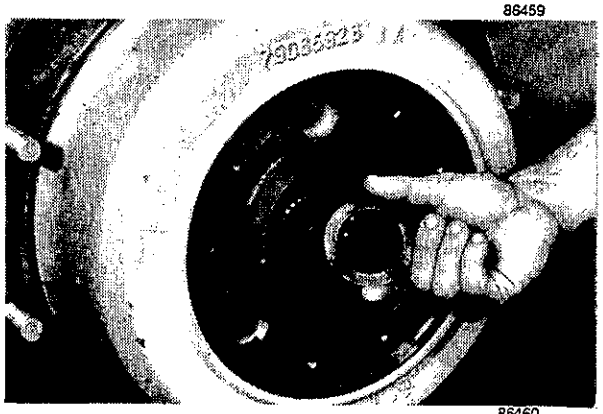
3.4.2.45
Remove snap ring


86458

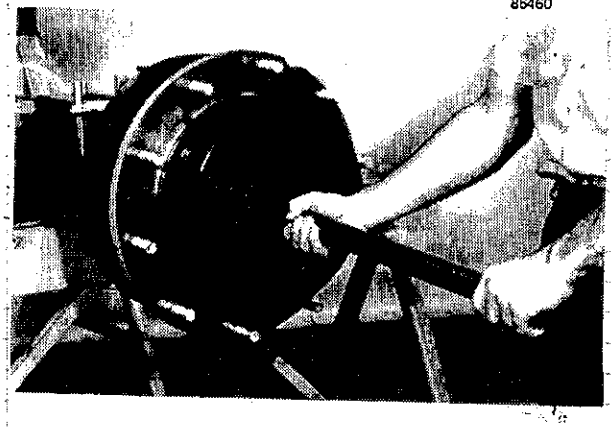
3.4.2.46
Remove gear .


86459

3.4.2.47
Remove thrust washer.

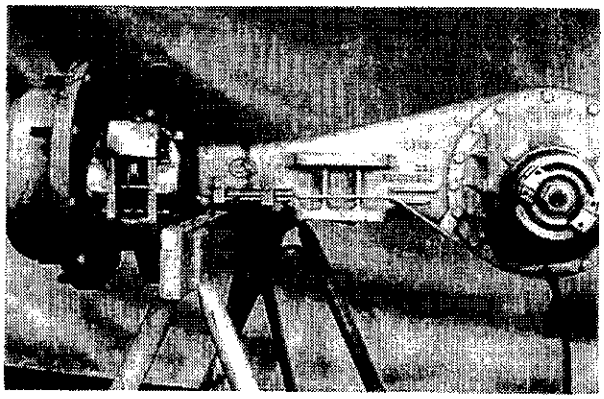

86460

3.4.2.48
Pull axle shaft free of differential side gear.



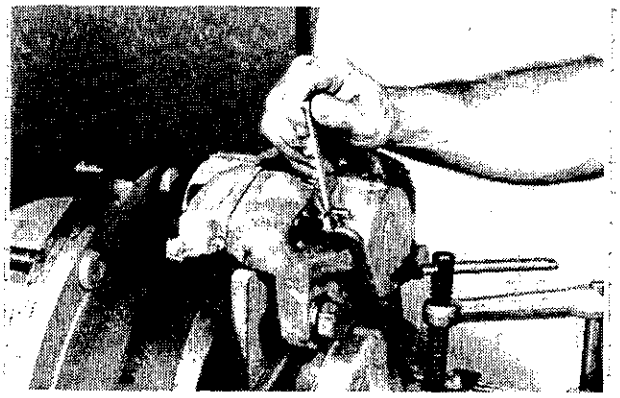
AXLE DISASSEMBLY

86461



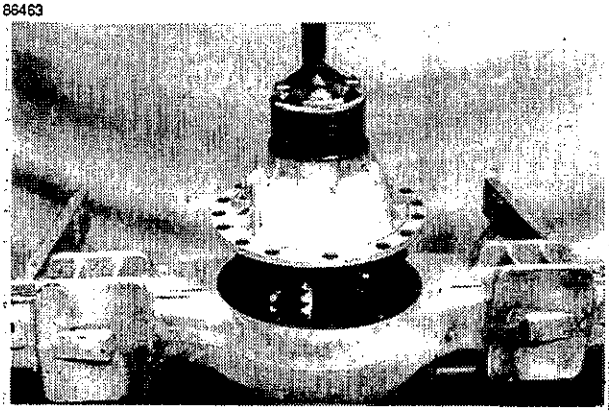
3.4.2.49
Loosen brake line connections and clamping capscrews.

86452



3.4.2.50
Remove brake line.

86463

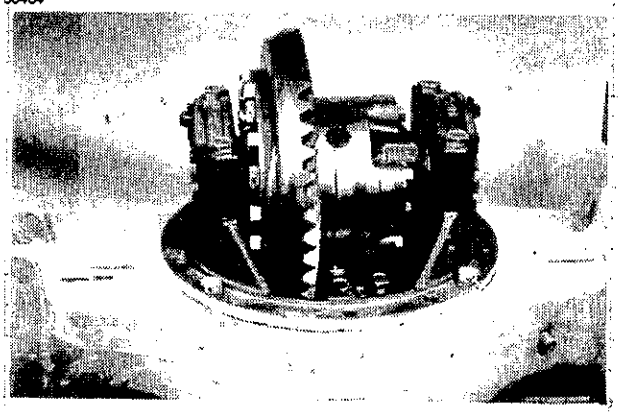


3.4.2.51
Remove differential from axle housing.

⚠ WARNING

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.

86464

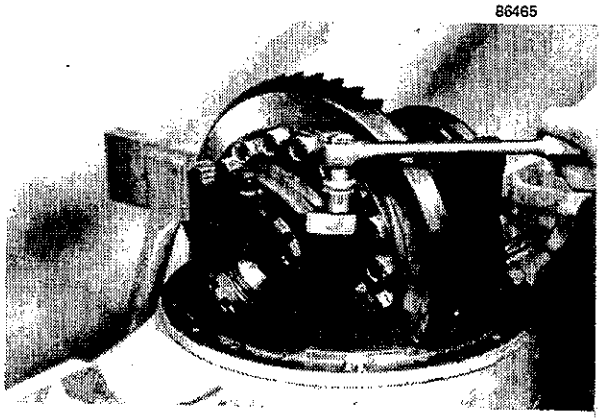


3.4.2.52
Bolt differential upside down on axle housing to hold it for disassembly.

AXLE DISASSEMBLY

3.4.2.53
Remove differential carrier bearing cap capscrews.

86465

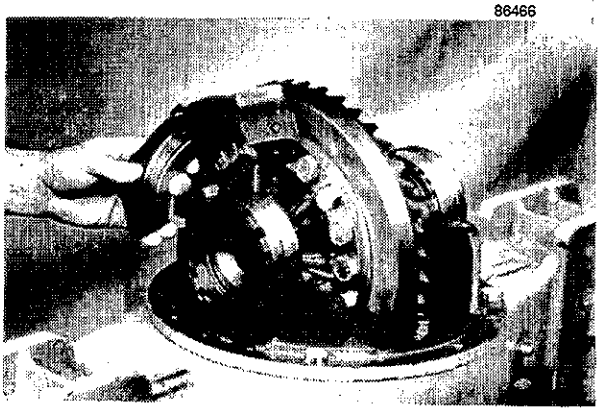


3.4.2.54
Remove differential bearing caps. One cap is marked with a punch so caps can be reassembled in their original position.

⚠ WARNING

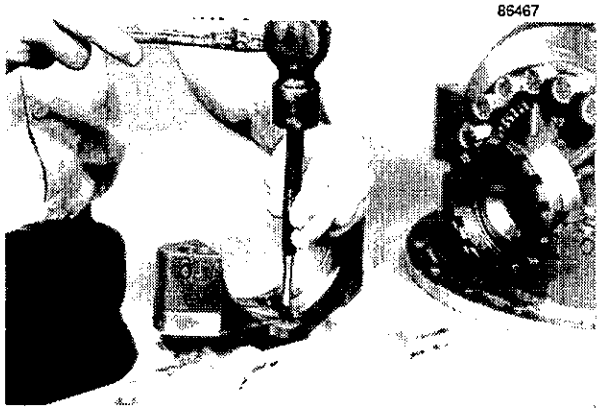
It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

86466



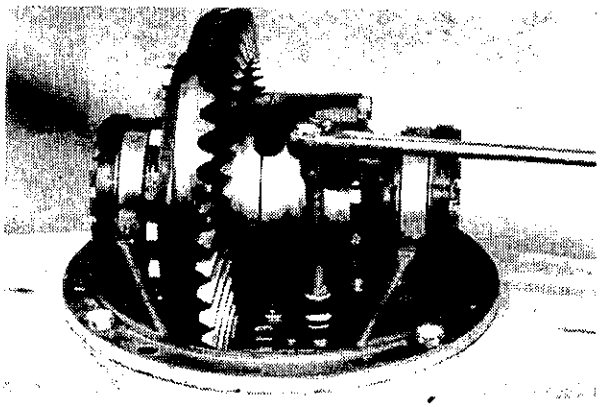
3.4.2.55
Drive spring pin flush with inner surface of cap.

86467



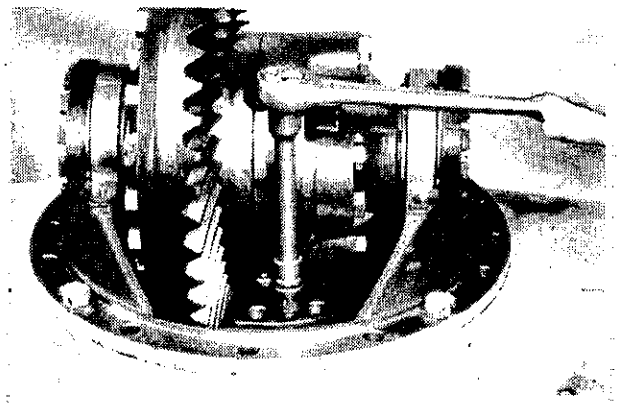
3.4.2.56
Remove bevel pinion shank bearing support capscrews

86468



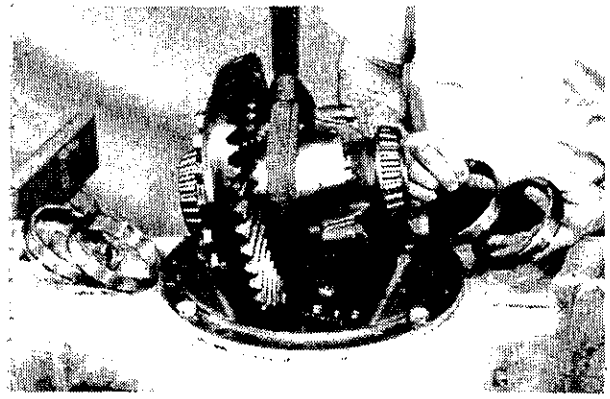
AXLE DISASSEMBLY

86469



3.4.2.57
Using pusher screws, loosen pinion bearing support.

86470

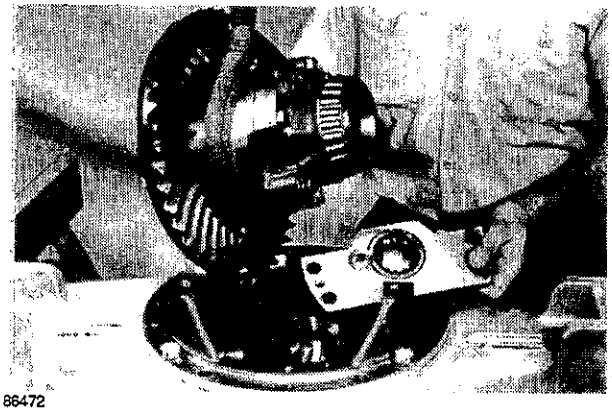


3.4.2.58
Lift differential case assembly.Remove ring nuts and bearing races. Mark pieces so they can be reassembled in their original position.

⚠ WARNING

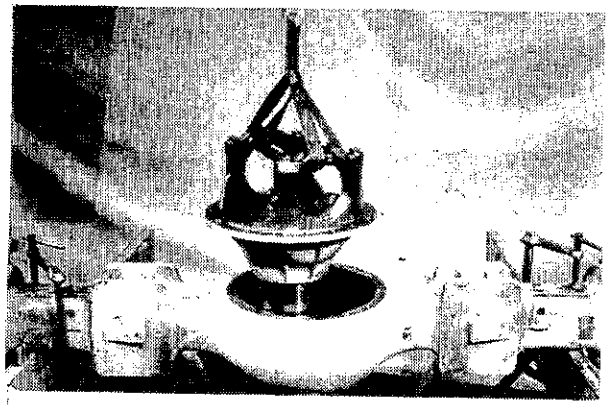
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

86471



3.4.2.59
Remove differential case assembly and pinion bearing support.

86472



3.4.2.60
Using a suitable hoist and sling, lift carrier out of axle housing and position on bench.

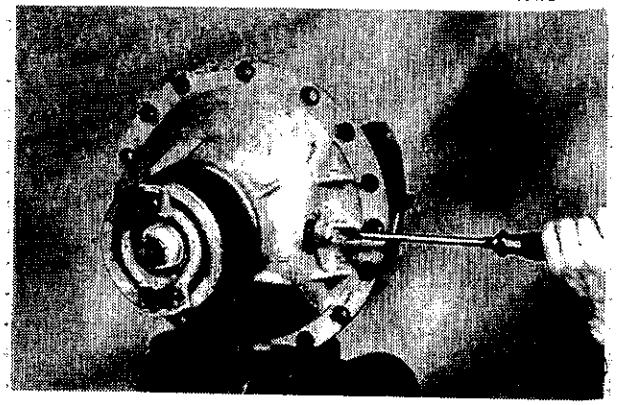
⚠ WARNING

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.

AXLE DISASSEMBLY

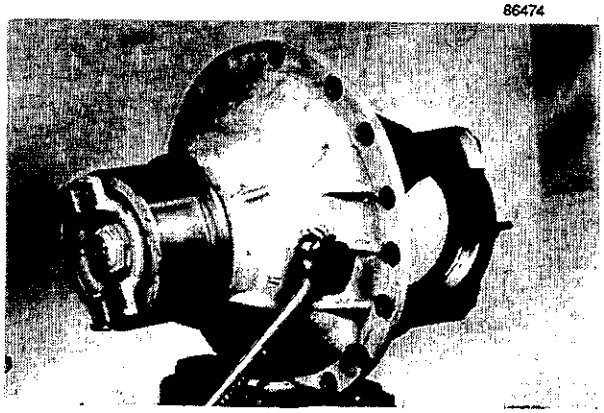
3.4.2.61
Remove bevel gear deflection screw.

86473



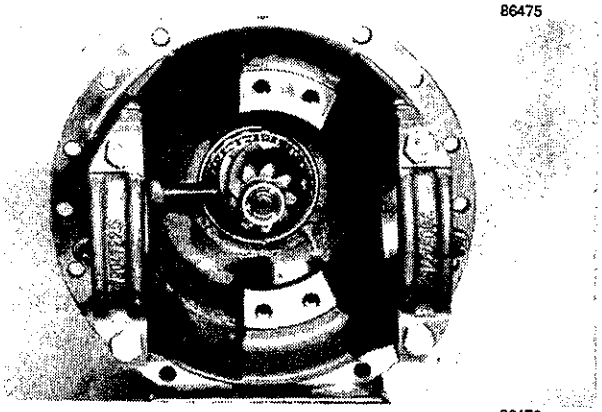
3.4.2.62
Make a lock screw according to specificication in Section 3.5. Install a capscrew to engage and lock pinion. Capscrew must have approximately 100mm(4") of thread. Taper end of capscrew so threads are not damaged when contacting pinion teeth.

86474



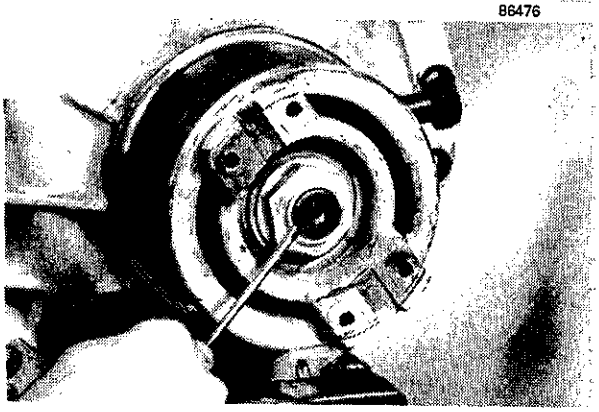
3.4.2.63
Make sure capscrew securely engages pinion teeth.

86475



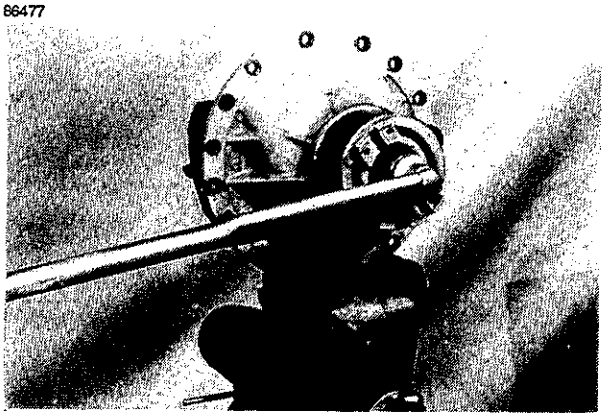
3.4.2.64
Pry out stake indentations on pinion nut.

86476



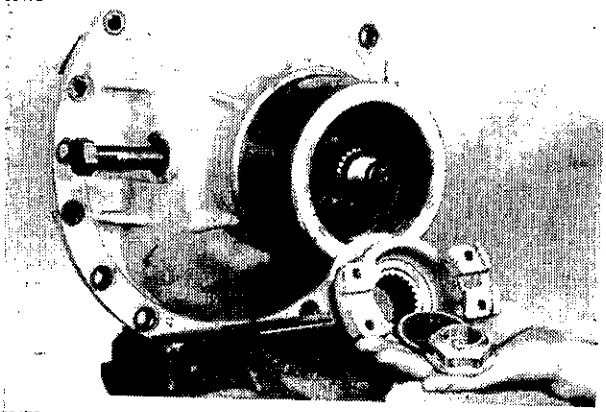
AXLE DISASSEMBLY

86477



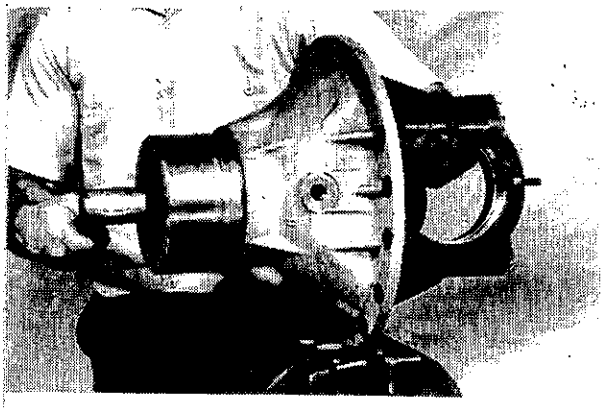
3.4.2.65
Remove pinion nut and washer.

86478



3.4.2.66
Remove yoke and seal guard. Remove pinion holding screw.

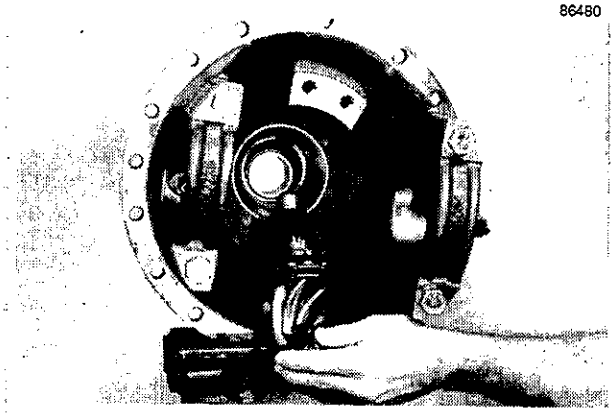
86479



3.4.2.67
Tap end of pinion with a brass hammer to loosen it.

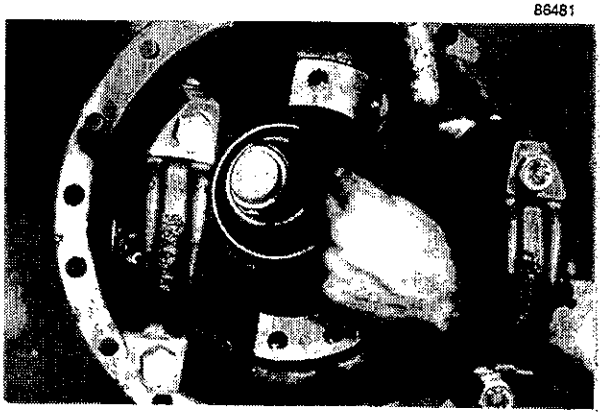
3.4.2.68
Remove pinion, inner bearing, spacer and shims.

86480



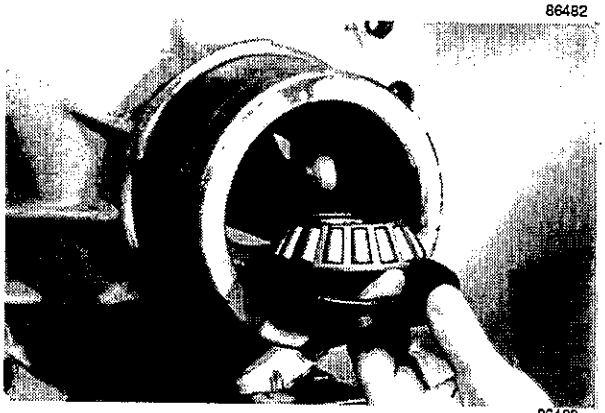
3.4.2.69
Remove seal.

86481



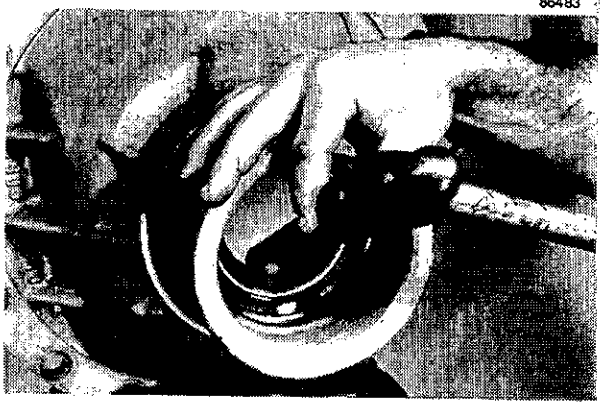
3.4.2.70
Remove outer bearing.

86482



3.4.2.71
Remove inner bearing race and shim.

86483



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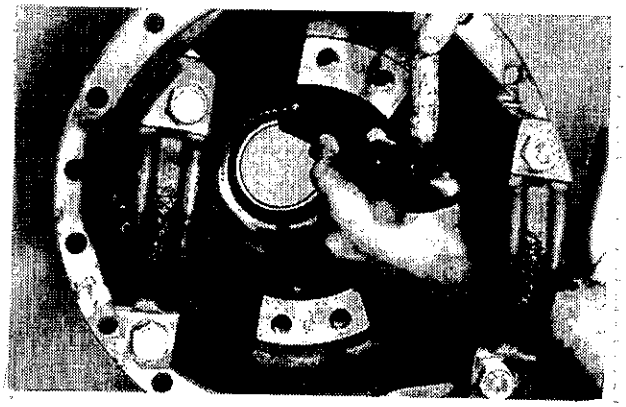
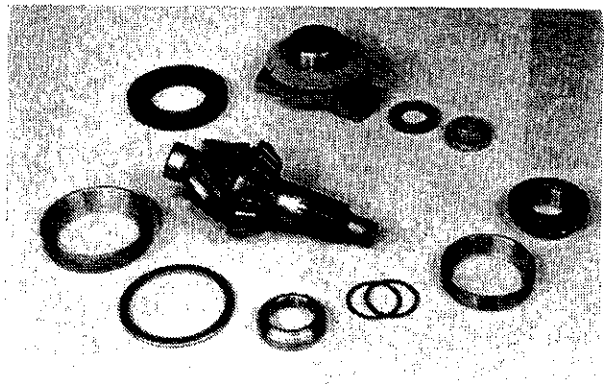


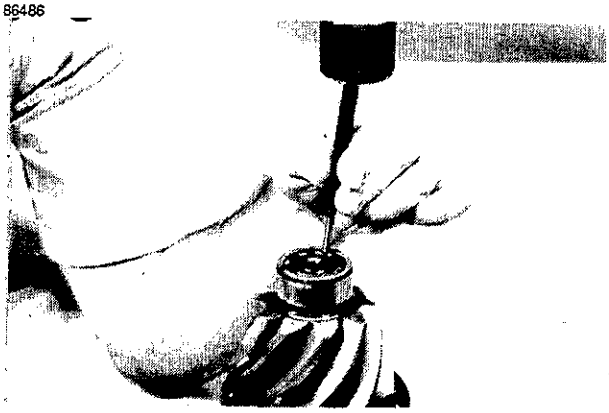
3.4.2.72
Remove outer bearing race.

86485



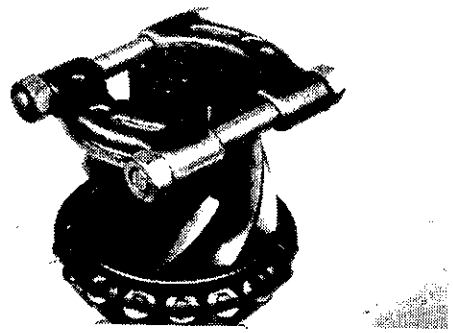
3.4.2.73
Pinion shaft disassembled.

86486



3.4.2.74
Remove stake indentations at pinion shank bearing race.

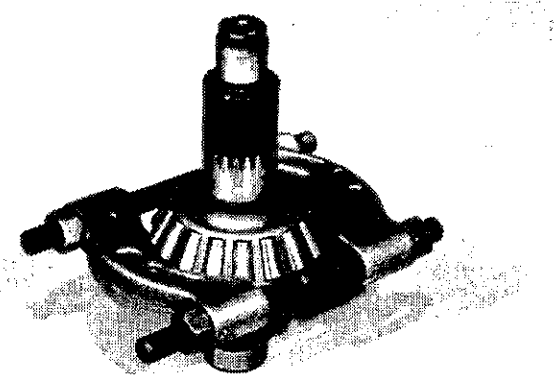
86487



3.4.2.75
Use a split bearing puller to remove pinion shank bearing race.

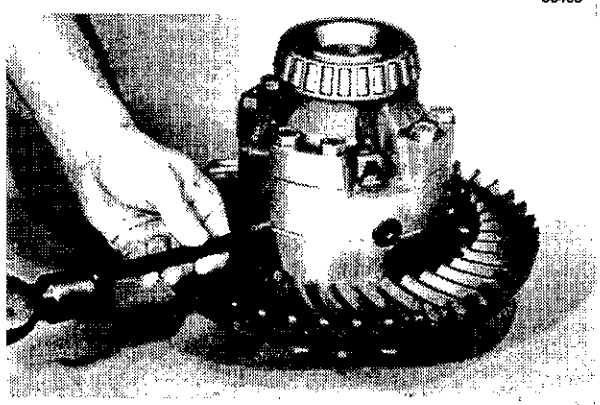
3.4.2.76
Use a split bearing puller to remove inner bearing.

86488



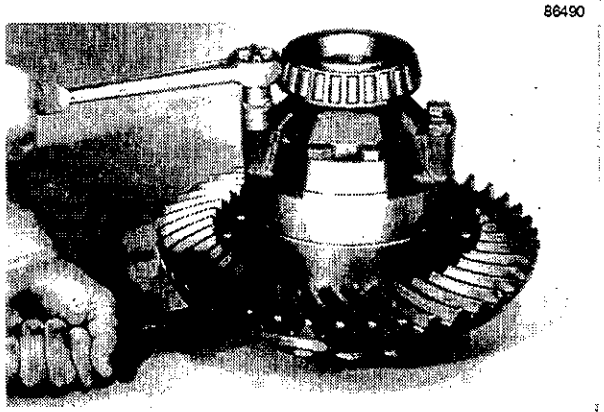
3.4.2.77
Mark case halves so they can be reassembled in their original position.

86489



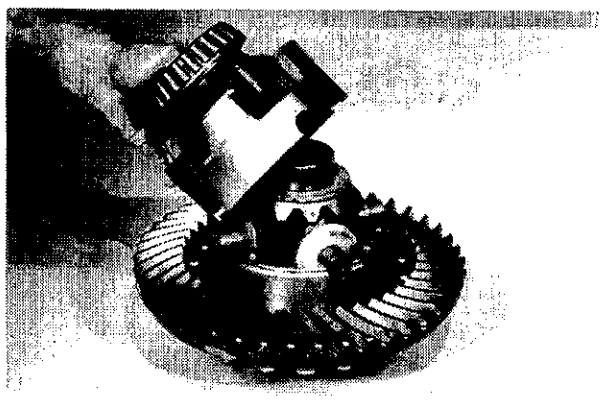
3.4.2.78
Remove capscrews.

86490



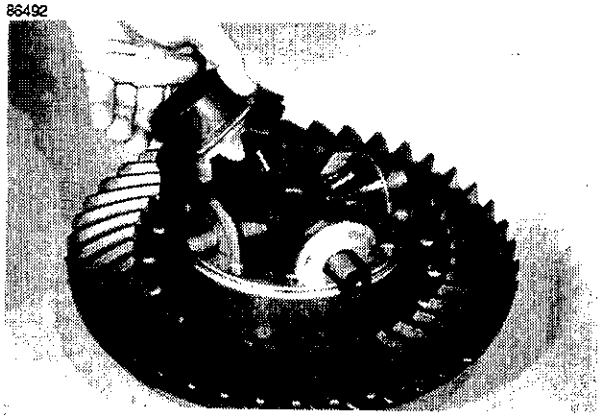
3.4.2.79
Separate the case halves.

86491



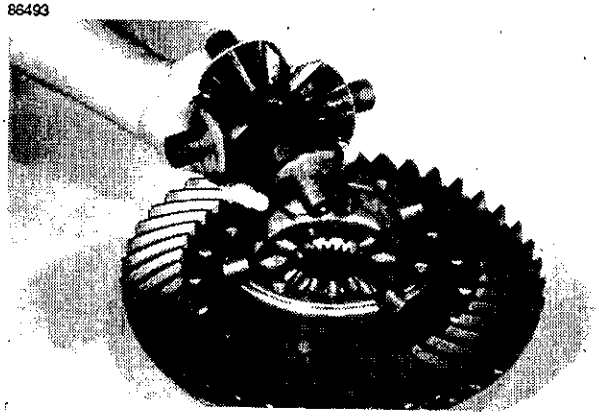
AXLE DISASSEMBLY

86492



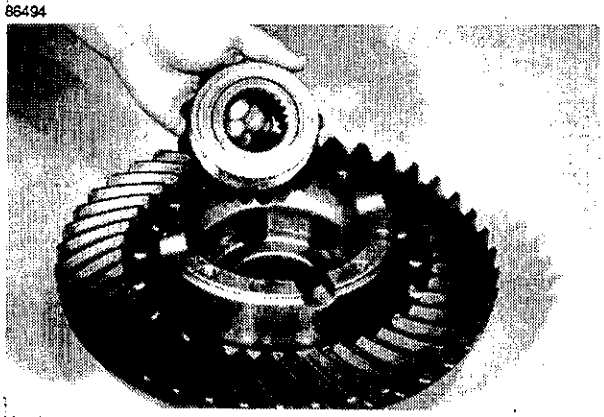
3.4.2.80
Remove side gear.

86493



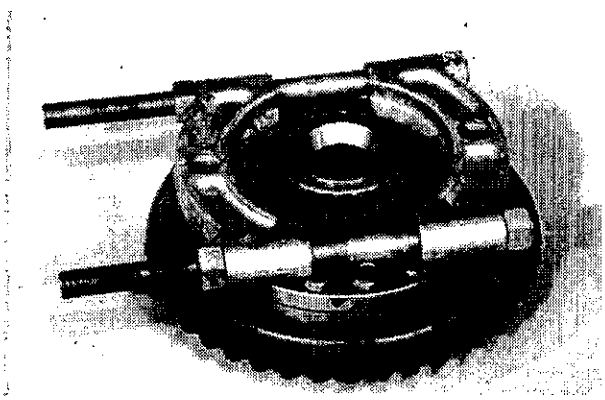
3.4.2.81
Remove pinion gears, thrust washers, and cross shaft.

86494



3.4.2.82
Remove other side gear.

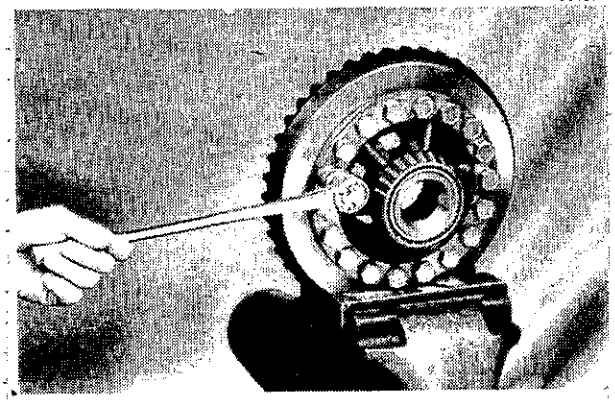
86495



3.4.2.83
Remove bearings from case halves with a split bearing puller.

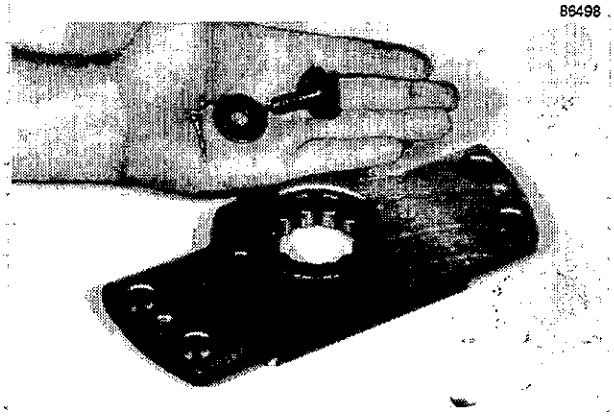
3.4.2.84
Secure bevel gear in vise that has soft jaws. Remove capscrews holding gear to case.

86497



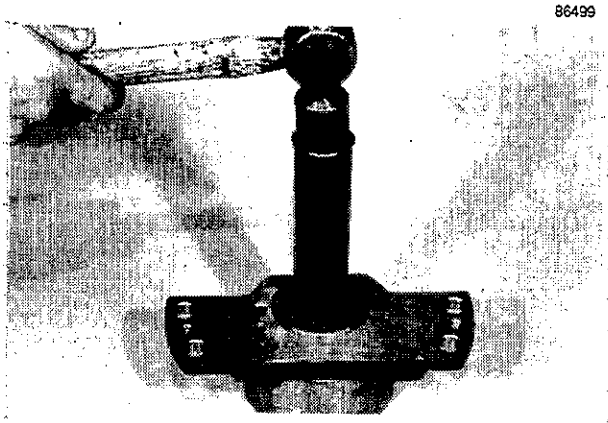
3.4.2.86
Remove cotter pin. Remove washer and pin.

86498

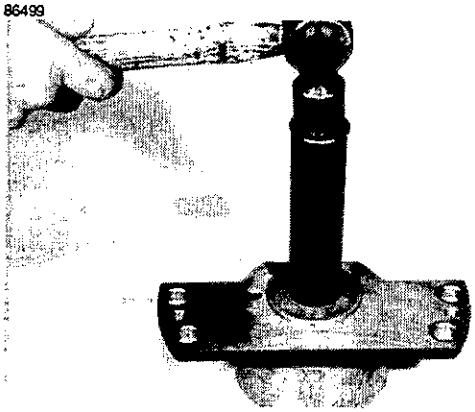


3.4.2.87
Remove bearing.

86499



86499

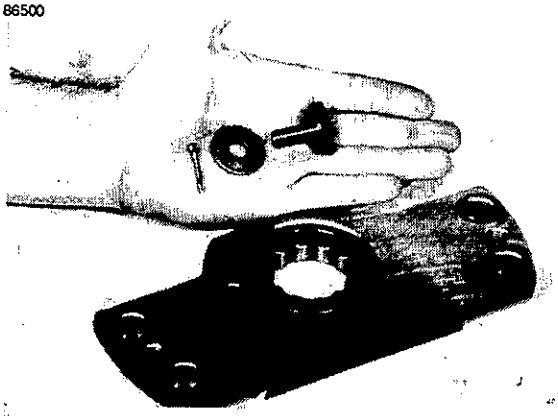


3.4.3.1
Install bearing.

⚠ WARNING

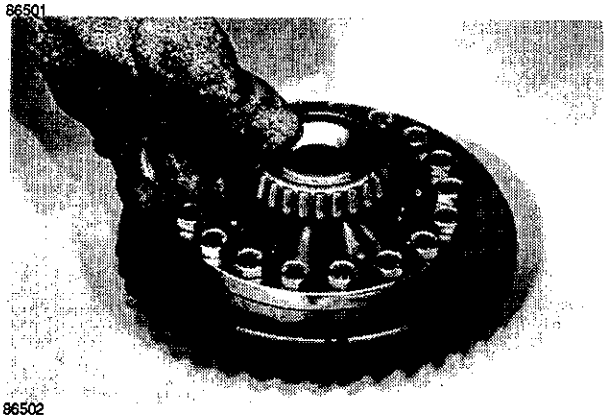
It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

86500



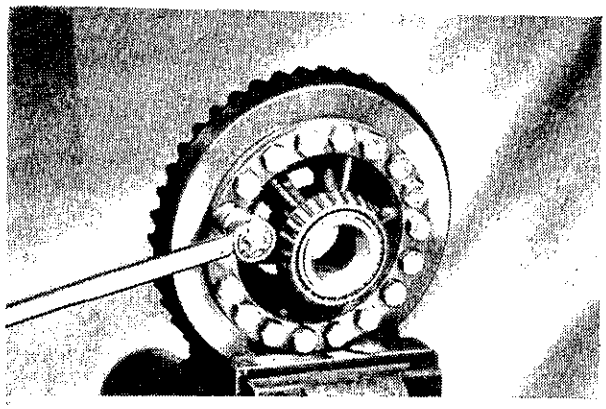
3.4.3.2
Install retaining washer and pin. Install cotter pin.

86501



3.4.3.3
Heat differential bearings to 121°C (250°F) and install on case.

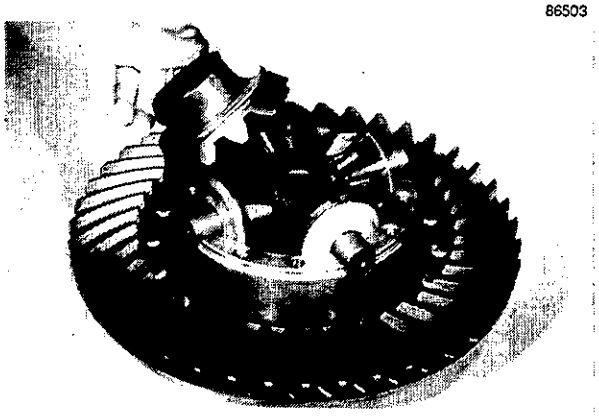
86502



3.4.3.4
Install bevel gear on case. Tighten capscrews to specified torque.

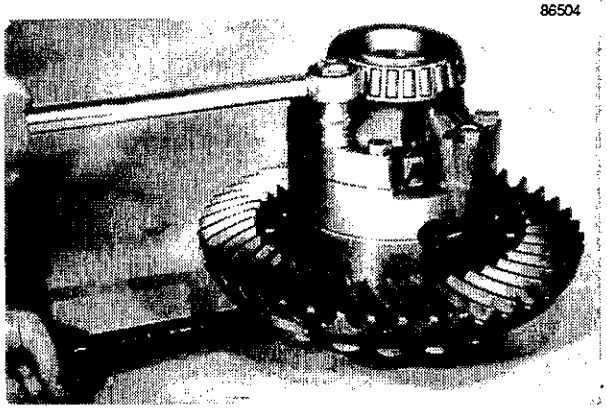
3.4.3.5
Install pinion gears, side gears and cross shaft, and thrust washers.

86503



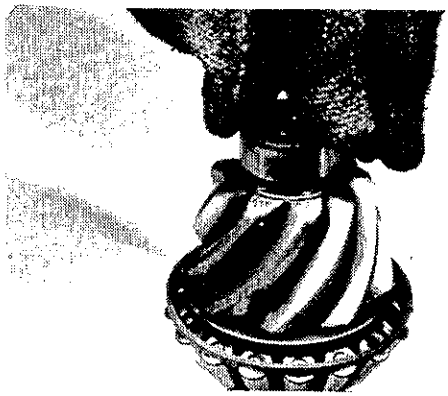
3.4.3.6
Match up marks and install case half. Tighten capscrews to specified torque.

86504



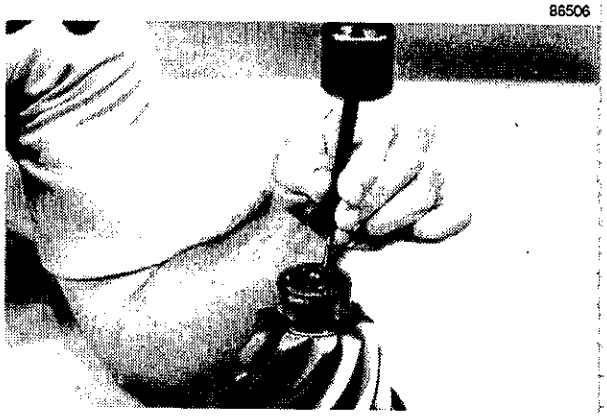
3.4.3.7
Heat pinion shank bearing race to 121°C (250°F); install on pinion.

86505

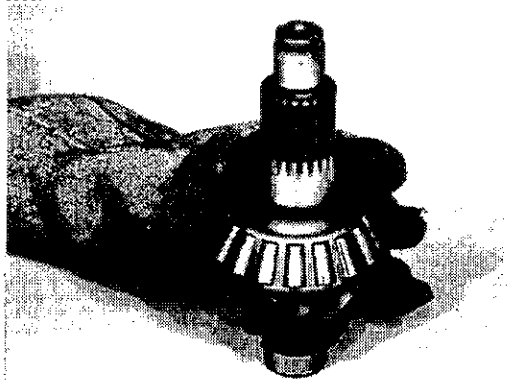


3.4.3.8
Stake bearing race in three places.

86506

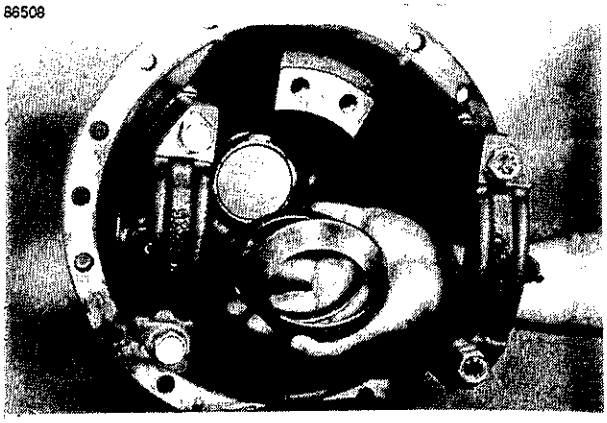


86507



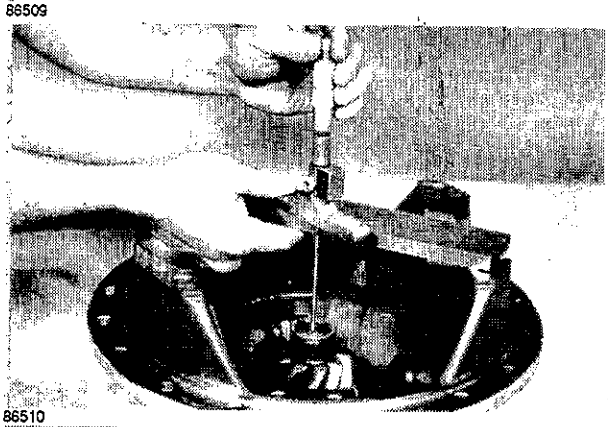
3.4.3.9
Heat inner bearing to 121°C (250°F); install on pinion.

86508



3.4.3.10
Install inner bearing race (without shim).

86509



3.4.3.11
Set pinion in carrier so inner bearing is seated on race.Measure from carrier leg to end of pinion. Subtract thickness of bar. Record measurement.

Example: 94.03 mm (3.702")

86510

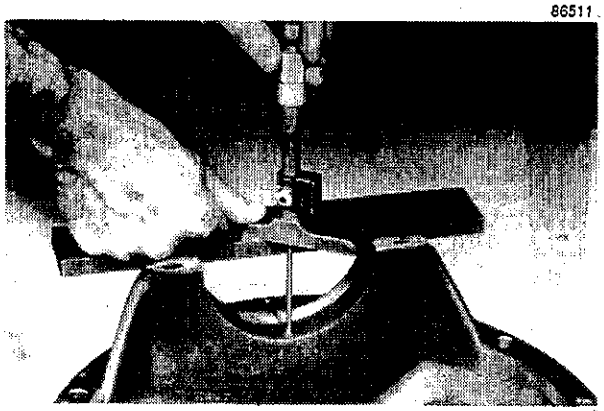
3.4.3.12
Measure O. D. of differential carrier bearing race. Divide measurement by 2 ; add result to measurement in step above.

Example: 125.00 mm/2 = 62.5 mm
94.03 + 62.5 = 156.53 mm

3.4.3.13
Measure from carrier leg to bottom of carrier race bore. Subtract thickness of bar. Micrometer stem must be pointed or have a ball end in order to measure accurately. Subtract figure from total in step above.

Example: 62.52 mm 156.53 - 62.52 = 94.01 mm

86511



86512

3.4.3.14
The nominal value is 90 mm. Subtract that from total in step above.

Example: 94.01 - 90.00 = 4.01 mm

86513

86514

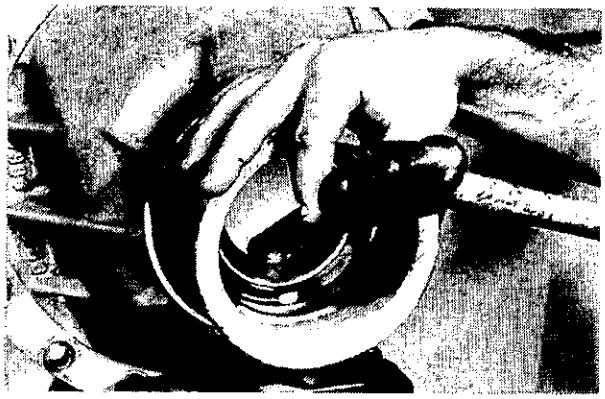
3.4.3.15
A correction factor expressed in tenths of a millimeter is etched on end of pinion. Add or subtract that figure from total in step above.

Example: xxx +4 means add 0.4 mm. 4.01 + 0.4 = 4.41 mm

3.4.3.16
The sum of all computations above is the thickness of shim required to position pinion. Round figure to the nearest 0.1 mm.

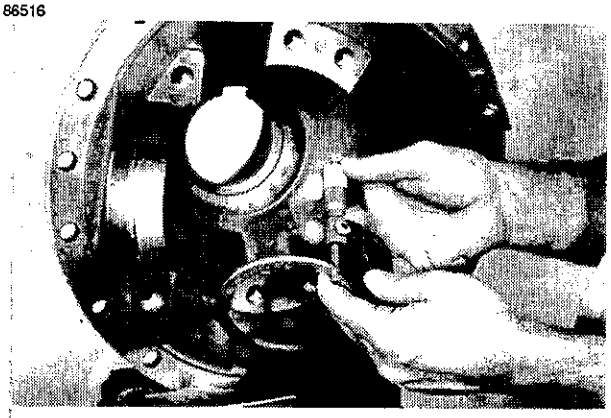
Example: 4.41 rounded = 4.4 mm.

86515



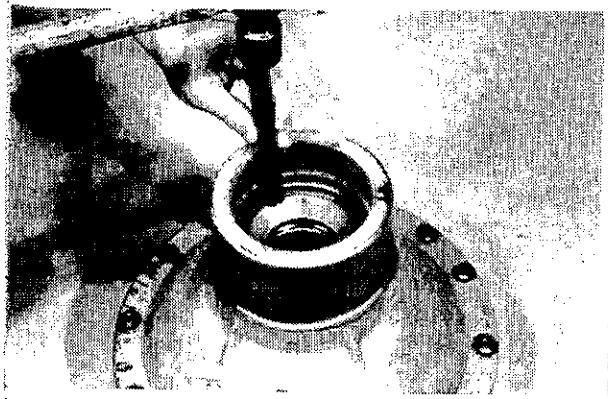
3.4.3.17
Remove inner bearing race.

86516



3.4.3.18
Install pinion positioning shim determined in previous steps and reinstall inner bearing race.

86517



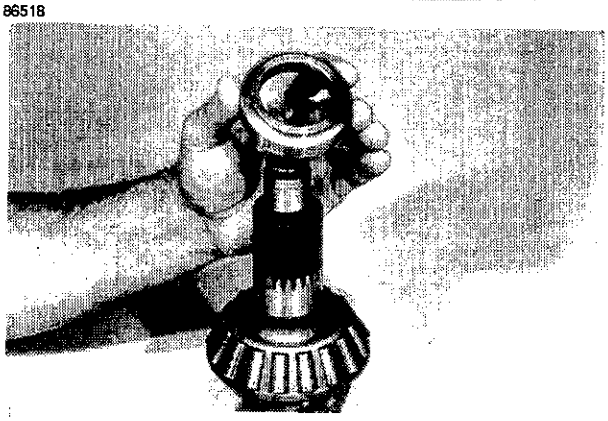
PINION BEARING PRELOAD

3.4.3.19
Install outer bearing race.

⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

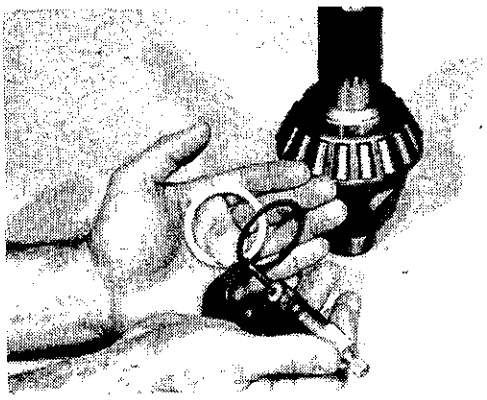
86518



3.4.3.20
Install spacer on pinion.

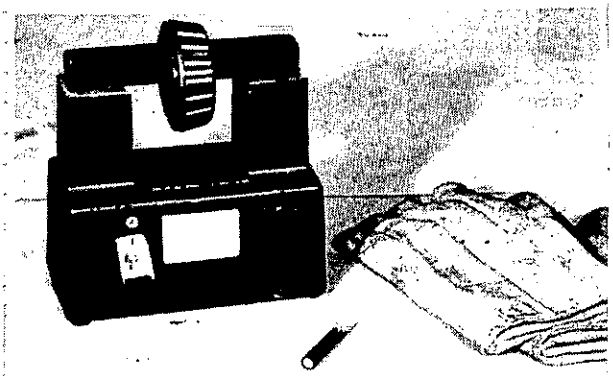
3.4.3.21
Install preload adjusting shims. Start with a pack the same thickness as the original pack.

86519



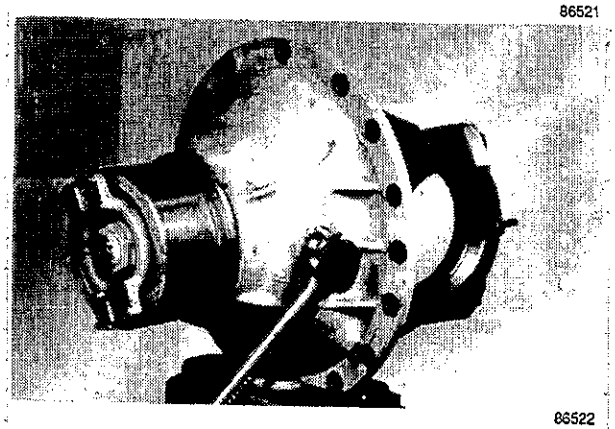
3.4.3.22
Set pinion assembly in carrier. Block in position. Heat outer bearing to 121°C (250°F) and install on pinion.

86520



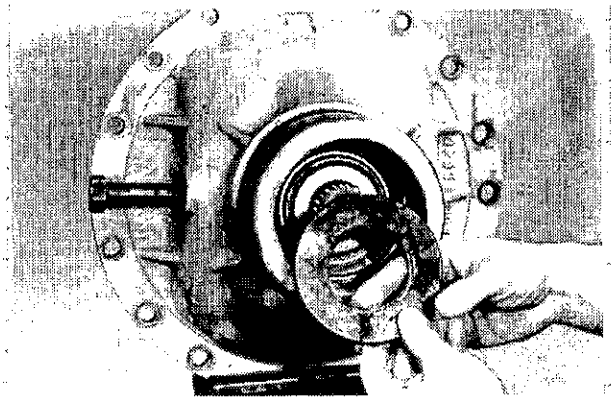
3.4.3.23
Install capscrew in drift screw hole to lock pinion.

86521



3.4.3.24
Lubricate lip of seal.

86522



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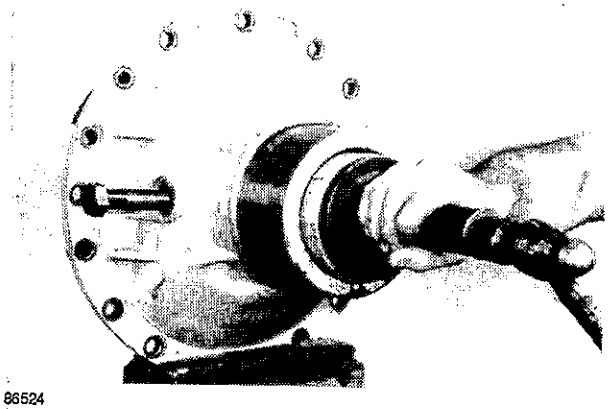
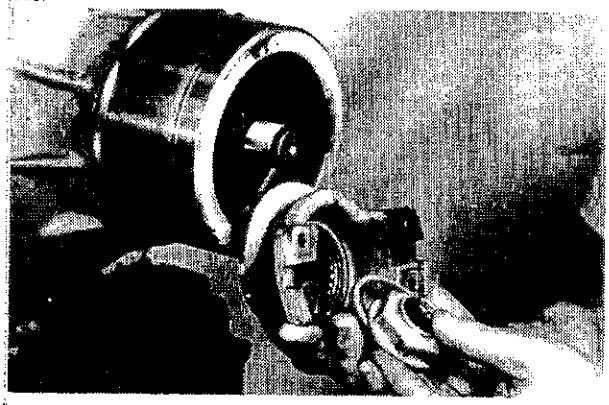


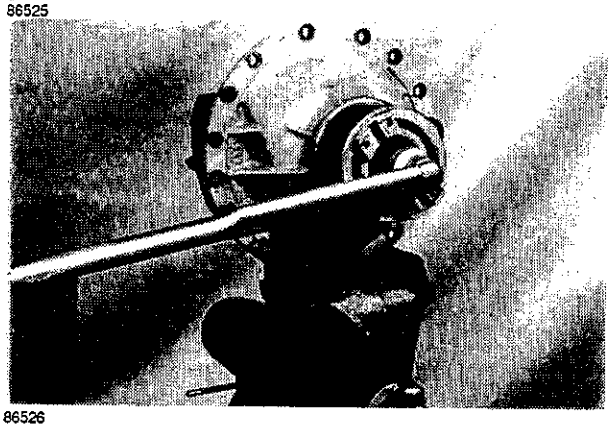
3.4.3.25
Install seal.

86524



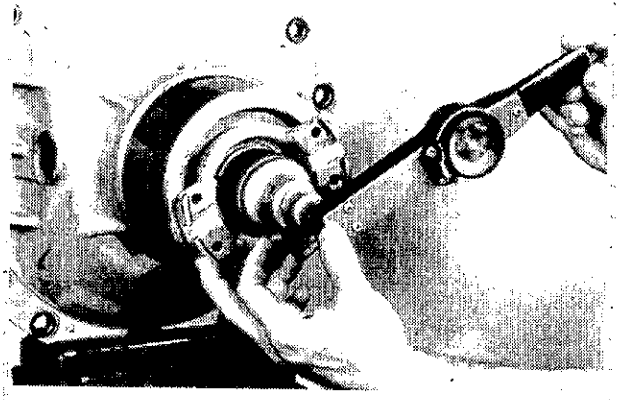
3.4.3.26
Install yoke.

86525



3.4.3.27
Install washer and nut. Tighten nut to specified torque.

86526

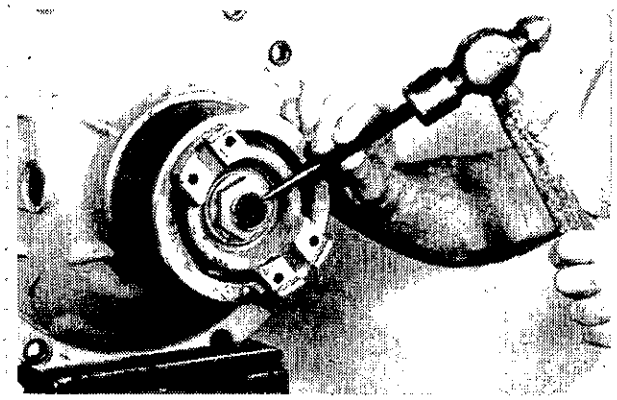


3.4.3.28
Check rolling torque on pinion bearings. If not within specifications add or remove shims until specified torque is obtained.

3.4.3.29
Stake nut in two places.

⚠ WARNING

It is unsafe to strike hardened steel parts with anything other than a soft iron or non-ferrous hammer. When installing or removing such parts wear safety glasses with side shields and heavy gloves, etc., to reduce the possibility of injury.

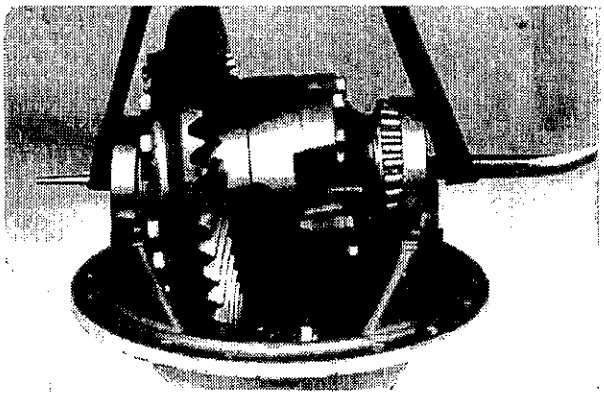


ASSEMBLE DIFFERENTIAL CASE TO CARRIER

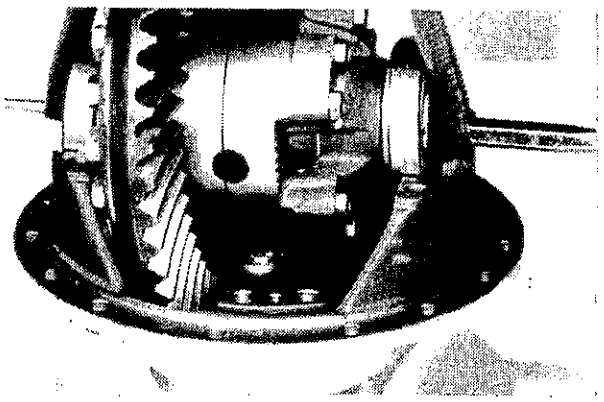
3.4.3.30
Using a suitable hoist and sling, place differential case on carrier.

⚠ WARNING

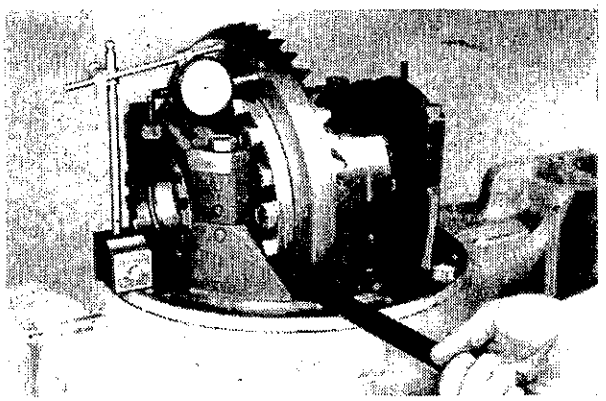
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.



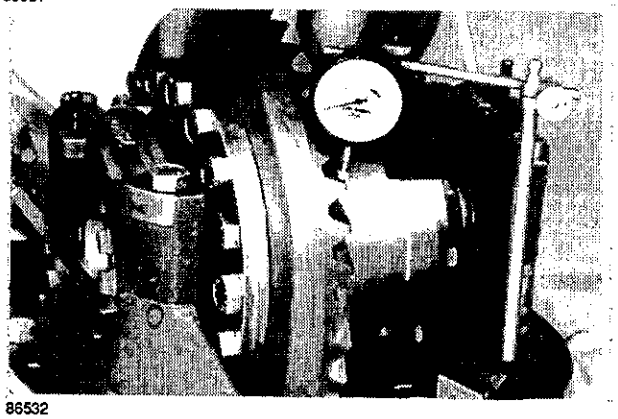
3.4.3.31
Install pinion shank bearing support while lowering case. Tighten capscrews to specified torque. Install bearing caps and tighten the capscrews until the capscrews are snug. Install the spanner nuts being sure the nuts are not cross threaded.



3.4.3.32
Place a dial indicator on the back side of the ring gear. Tighten the two spanner nuts evenly as the ring gear is shifted to the right and left by using a pry bar. Acquire zero end play on the differential bearings.

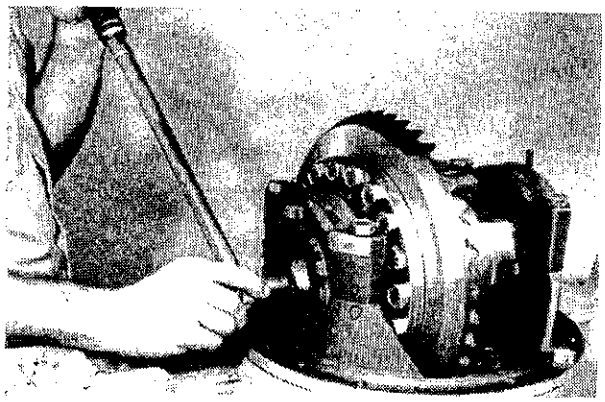


86531



3.4.3.33
Check ring gear backlash by placing the dial indicator perpendicular to the outer face of one ring gear tooth about 5 mm (.25 in) from the tooth's outer edge. To adjust backlash, loosen one spanner nut and tighten the opposite nut the same amount to change the backlash measurement. Repeat the measurement in three places.

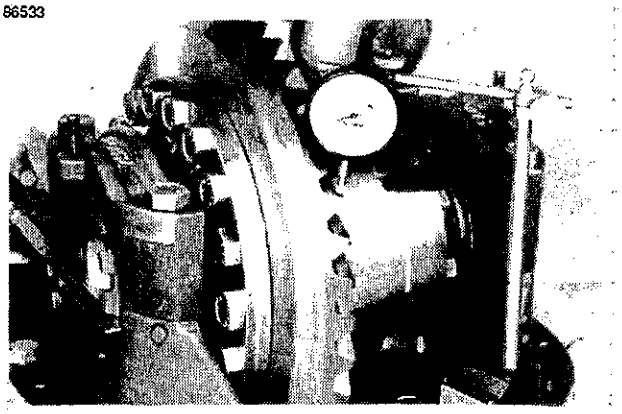
86532



3.4.3.34
Tighten both spanner nuts to the specified torque using the tool shown. Tighten one nut a small amount and then the other nut a like amount. Do not tighten one nut only as the backlash will be altered.

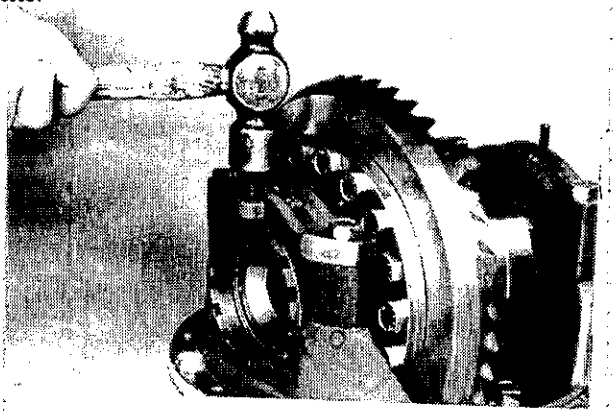
Tool dimensions are. 1/4" bar stock 5 " long with a 3/4" nut welded in center.

86533



3.4.3.35
Check backlash once again to make sure backlash was not altered during spanner nut tightening.

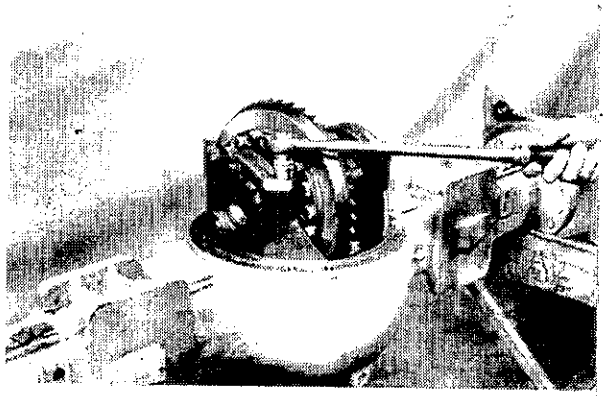
86534



3.4.3.36
Install roll pins through the bearing cap to lock the spanner nuts.

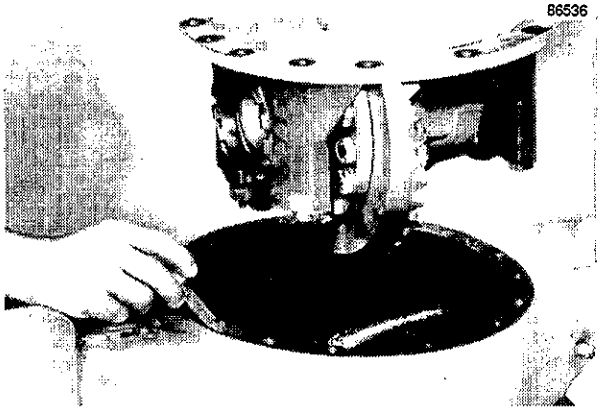
3.4.3.37
Tighten bearing cap capscrews to specified torque.

86535



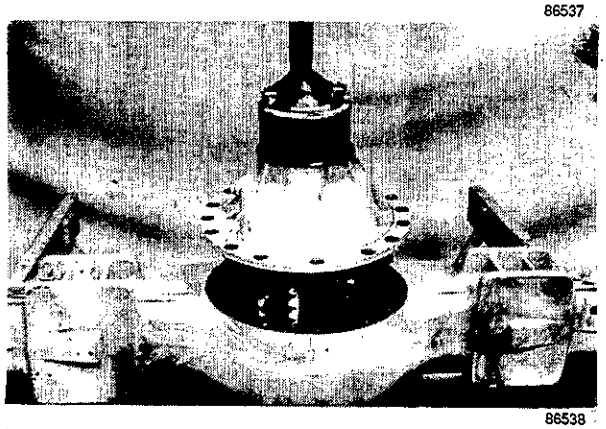
3.4.3.38
Coat axle housing with gasket material 70699262.

86536



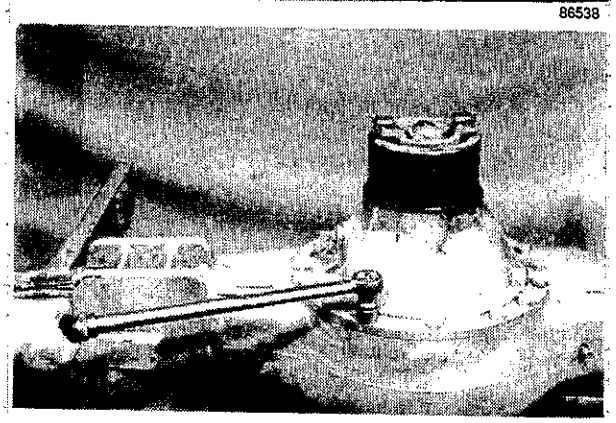
3.4.3.39
Install differential into axle housing.

86537

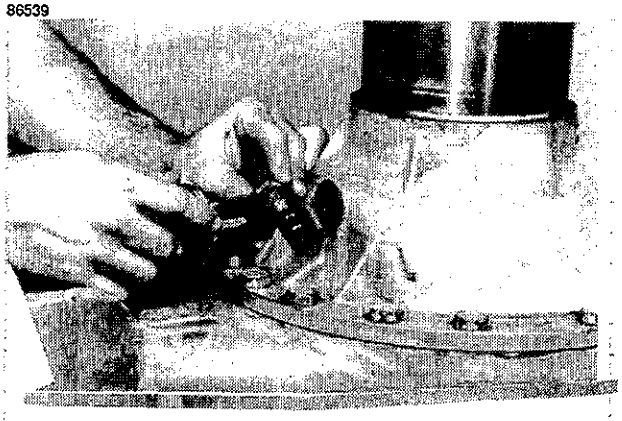


3.4.3.40
Tighten capscrews to specified torque.

86538

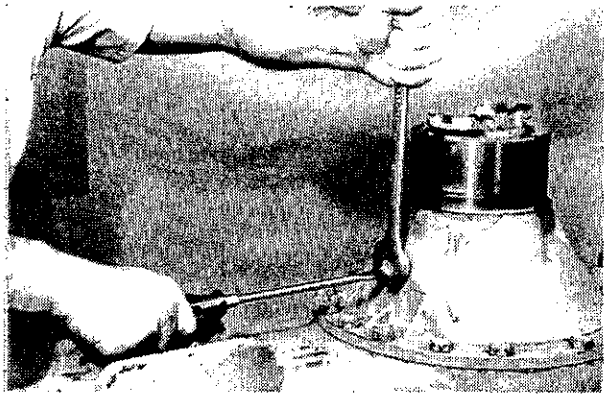


86539



3.4.3.41
Install bevel gear deflection screw.

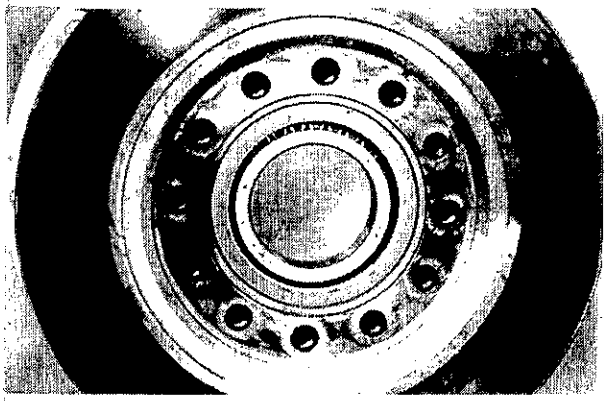
86540



3.4.3.42
Screw in till deflection screw touches bevel gear, then back off 1/4 turn holding screw while tightening lock nut.

3.4.3.43
Install bearing races in wheel hub flange. Lubricate beariong rollers with specified oil.

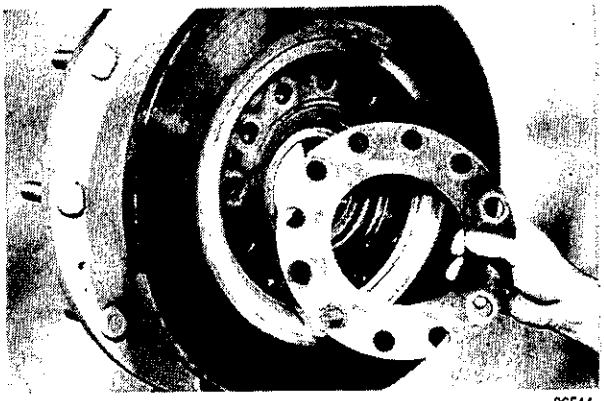
86542



3.4.3.44
Install bearing cone; install seal. Pack lips of seal with grease.

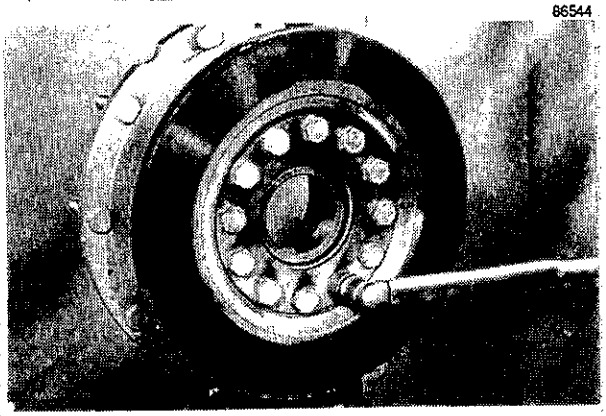
3.4.3.45
Install brake disc and seal shield.

86543



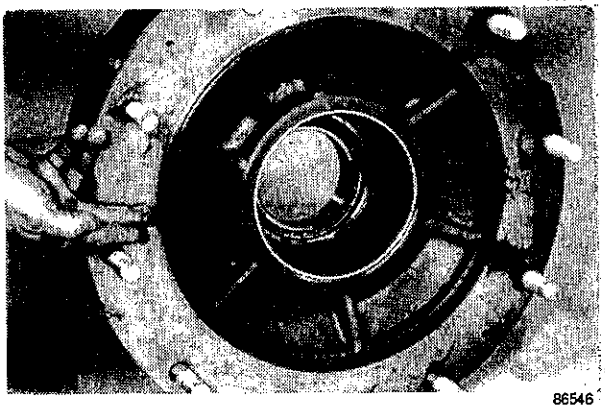
3.4.3.46
Install capscrews and tighten them to specified torque.

86544



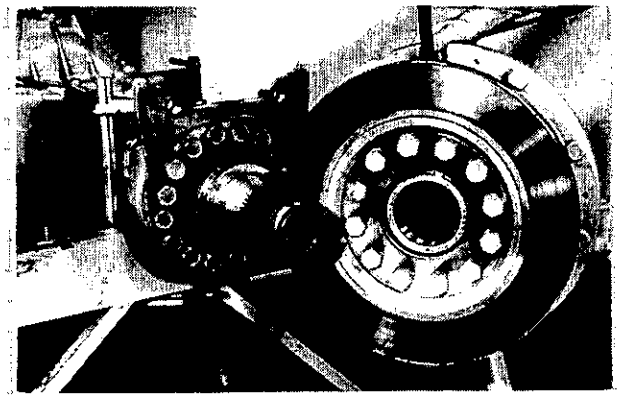
3.4.3.47
Install O-ring.

86545



3.4.3.48
Using a suitable hoist and sling, install wheel hub flange. Flange must be supported until ring gear hub is installed.

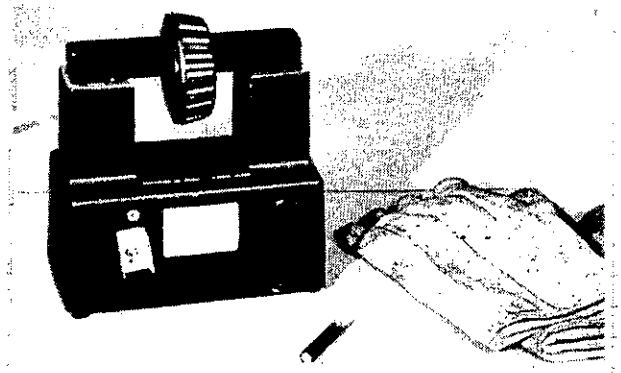
86546



⚠ WARNING

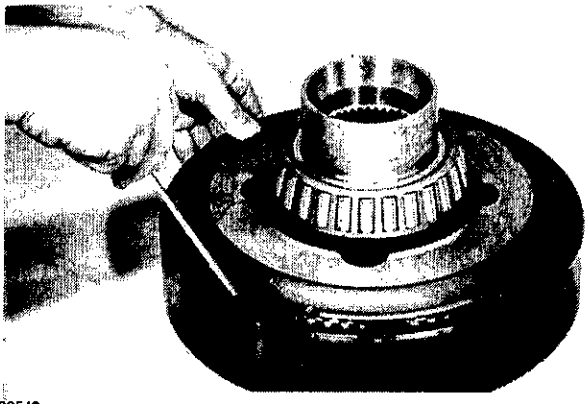
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.

86547



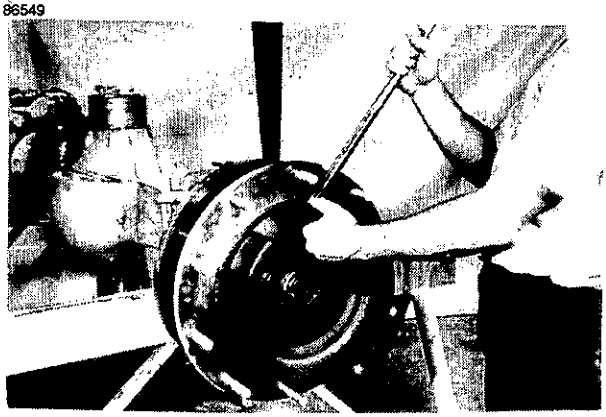
3.4.3.49
Heat bearing to 121 °C (250°F) and install.

86548

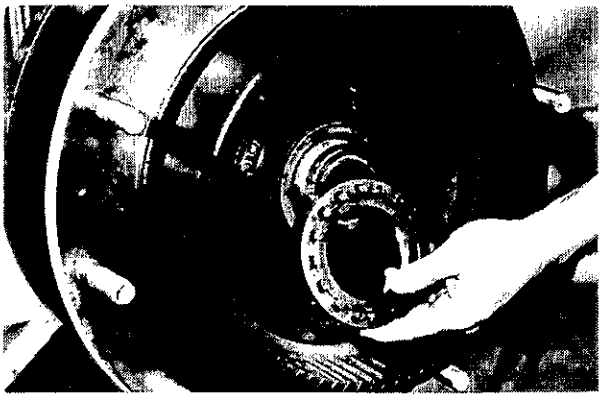


3.4.3.50
Assemble ring gear and hub; install snap ring.

86549



3.4.3.51
Install ring gear hub.



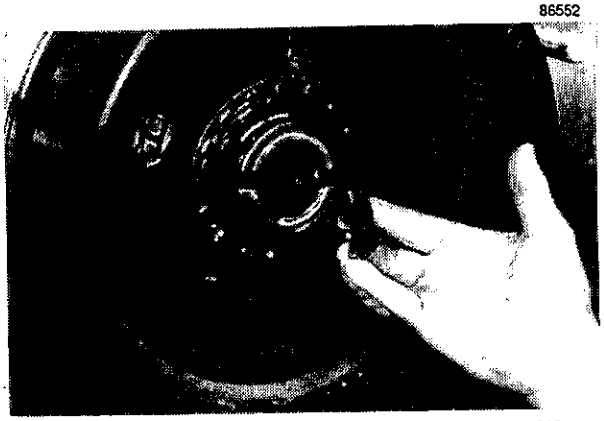
3.4.3.52
Install ring gear hub retaining nut.

3.4.3.53
Tighten nut to low limit of specified torque. Use tool P/N 75292224. Rotate flange as nut is tightened. Try to install locks. If locks will not fit tighten nut as needed to install locks. Do not exceed the high limit of torque specification.

86551

3.4.3.54
Install locks and snap ring.

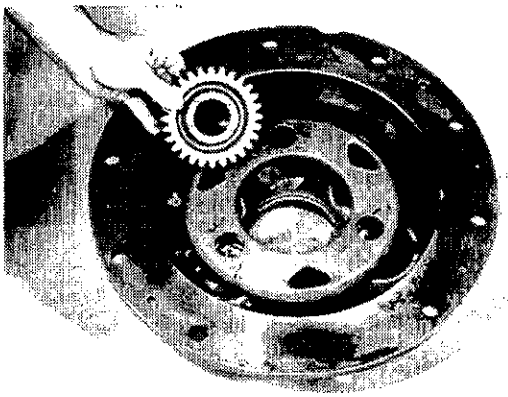
86552



Planet carrier

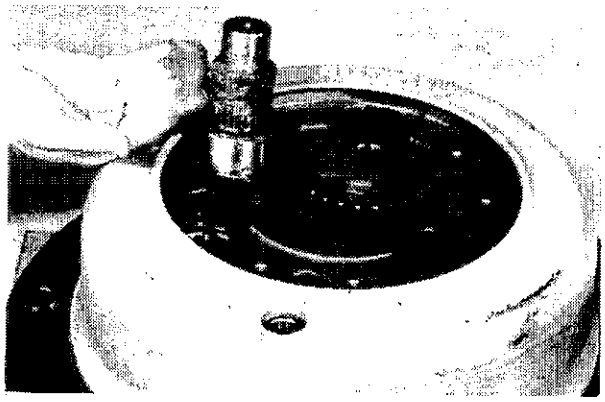
3.4.3.55
Place all three gears inside carrier.

86553



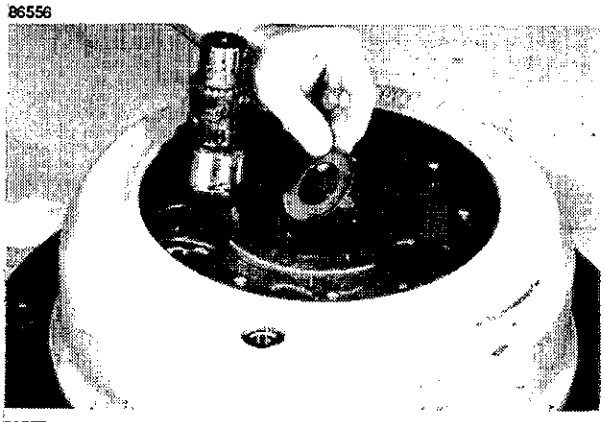
3.4.3.56
Place planet gear carrier on two blocks.

86555



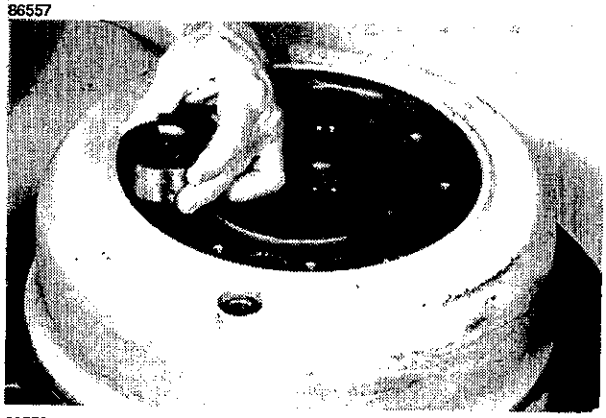
3.4.3.57
Grease rollers and place on shaft.

86556



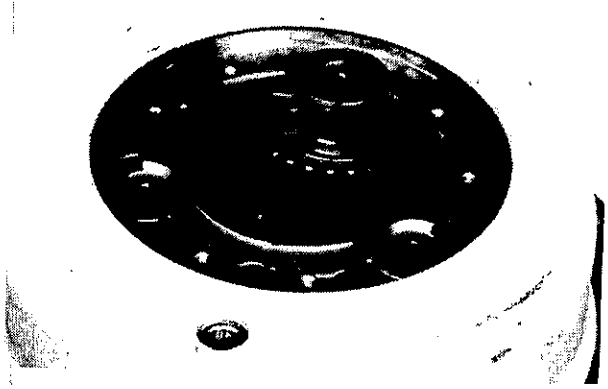
3.4.3.58
Place thrust washers on either side of the planet gears and lign holes.

86557



3.4.3.59
Place greased shaft and rollers through housing, washers and gear with a slight rotating motion.

86558



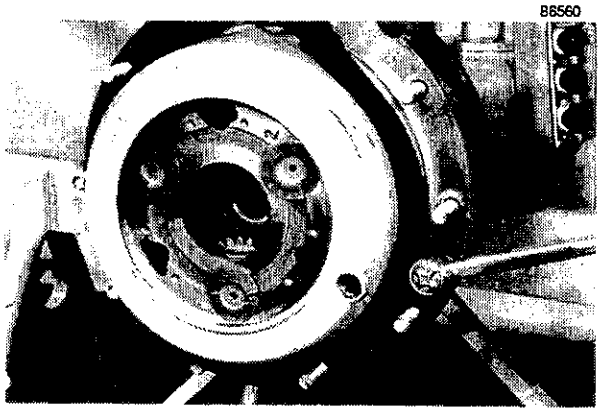
3.4.3.60
Turn pins so they can be aligned with locking plate.

3.4.3.61
Using a suitable hoist and sling, install planet gear carrier. Notch cast in flange must line up with notch in wheel hub flange. Planet gear teeth must be lined up with teeth in ring gear.

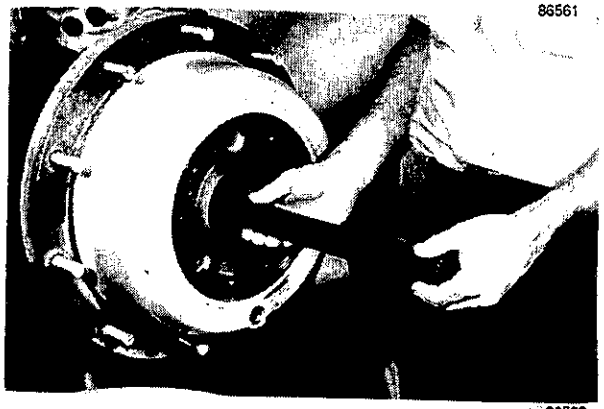
WARNING

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.

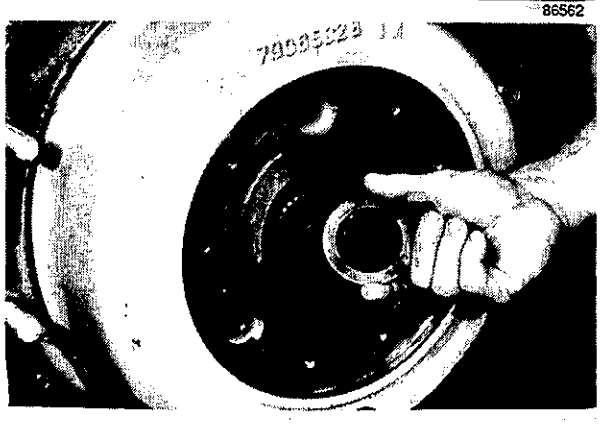
3.4.3.62
Install retaining capscrews. Tighten to specified torque.



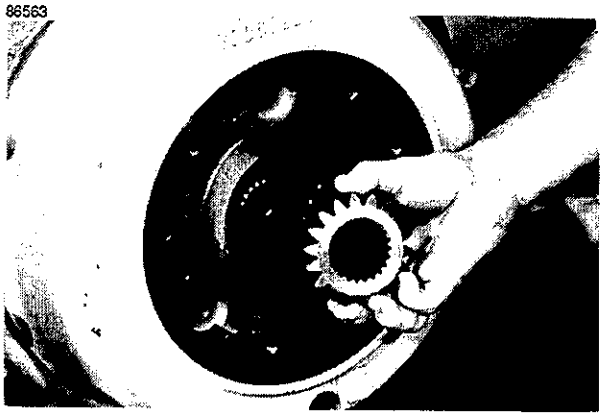
3.4.3.63
Install axle shaft.



3.4.3.64
Install thrust washer.

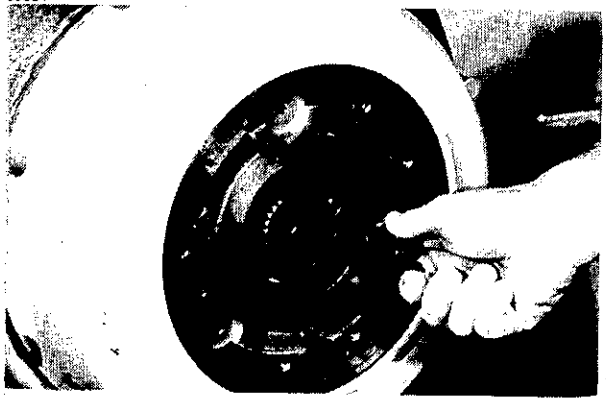


86563



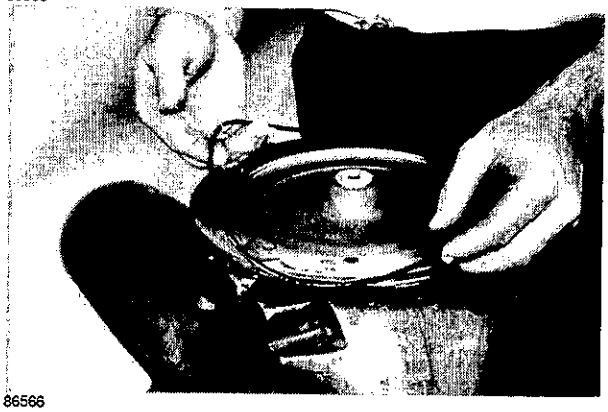
3.4.3.65
Install sun gear on axle shaft.

86564



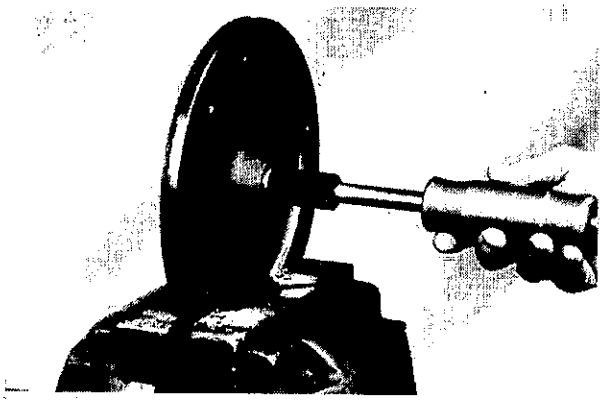
3.4.3.66
Install snap ring.

86565



3.4.3.67
Grease and Install O-ring .

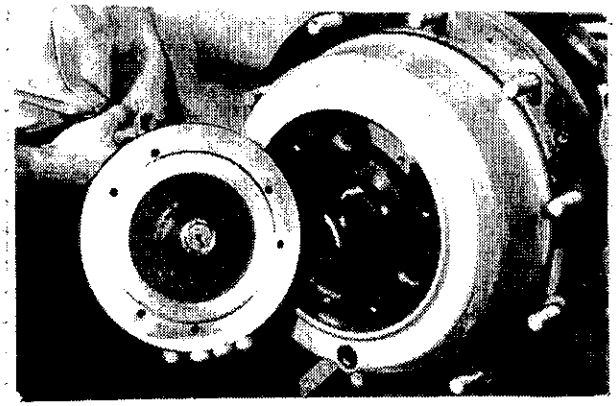
86566



3.4.3.68
Install new thrust button.

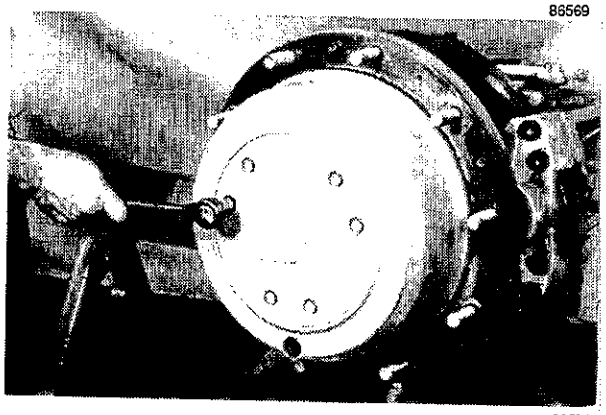
3.4.3.69
Make sure planet pins are positioned correctly.

86567



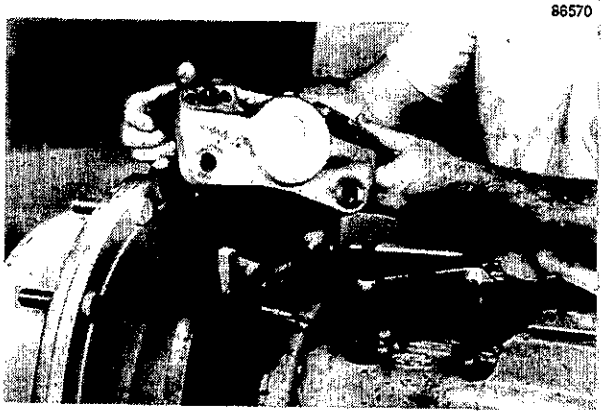
3.4.3.71
Coat capscrews with liquid gasket #70699262.
Tighten capscrews to specified torque.

86569

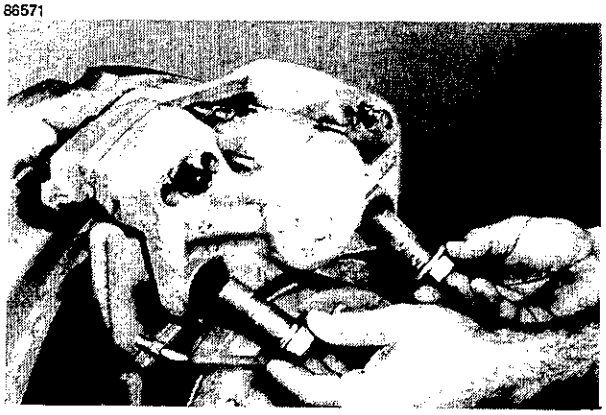


3.4.3.72
Install brake caliper assembly.

86570

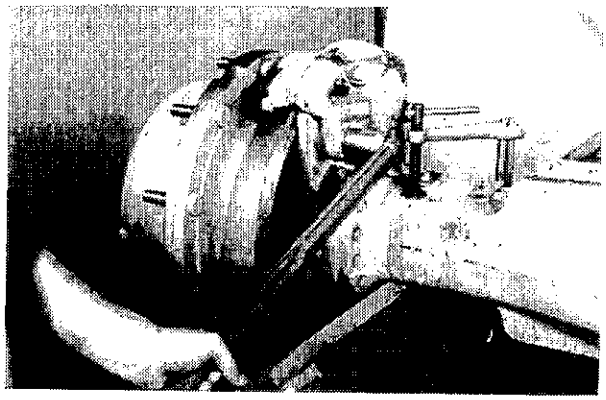


86571



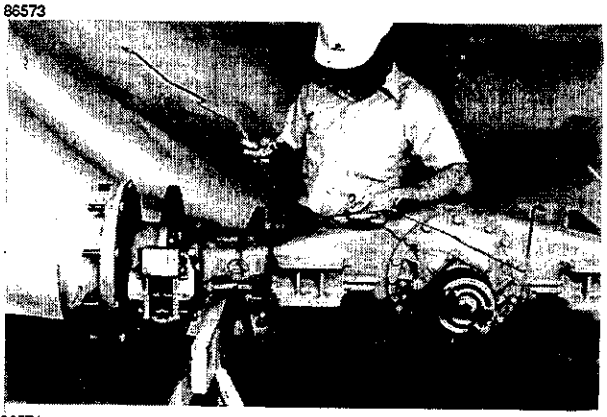
3.4.3.73
Coat capscrews with thread lock# 75000776(Loctite 262) . Shoulder capscrew goes into the larger hole (Top on front axle, bottom on rear axle).

86572



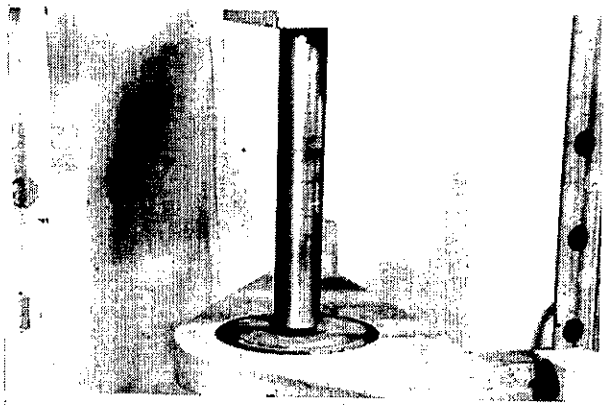
3.4.3.74
Tighten capscrews to specified torque.

86573



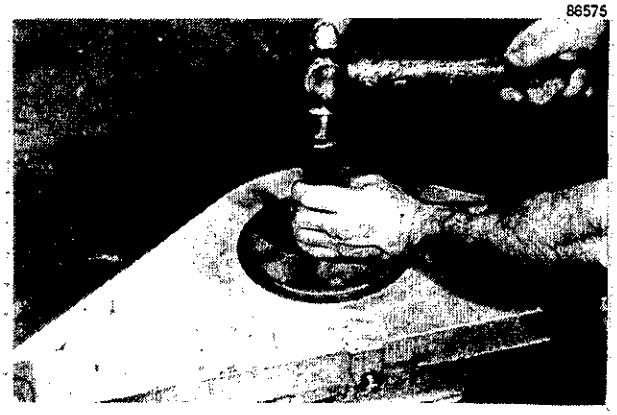
3.4.3.75
Install brake line to axle assembly.

86574



3.4.3.76
Install bushing in axle support using a shop press and a plate 174 mm (6.875") in diameter.

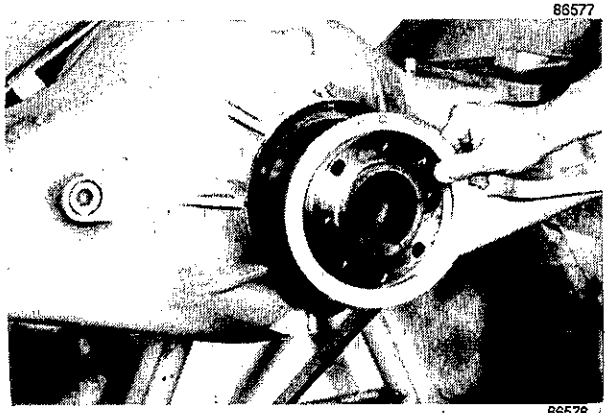
3.4.3.77
Install seals.


86575

AXLE SUPPORTS

3.4.3.78
Grease lips of seals in front support; install support.

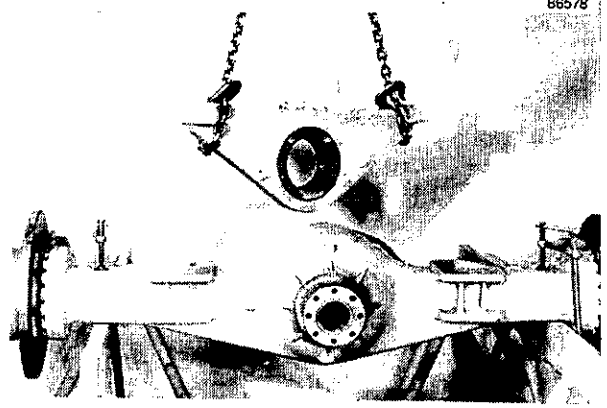
3.4.3.79
Install thrust ring.


86577

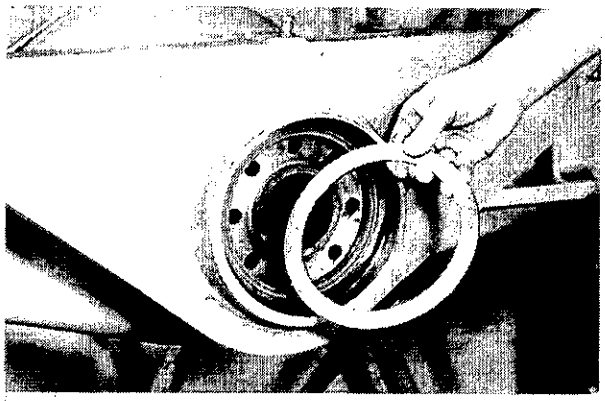
3.4.3.80
Grease lips of seal. Using a suitable hoist and sling, install support. Keep hoist attached while performing the measuring steps.

⚠ WARNING

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.

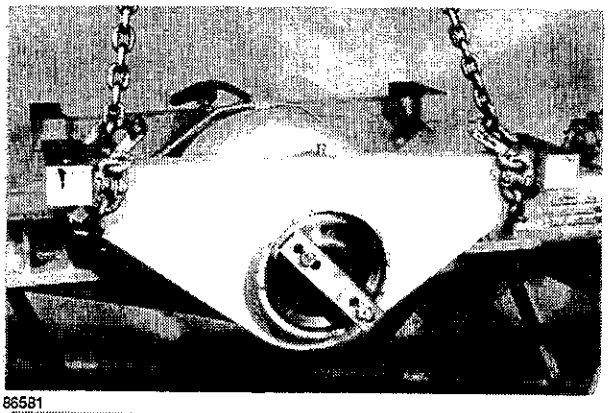

86578

86579



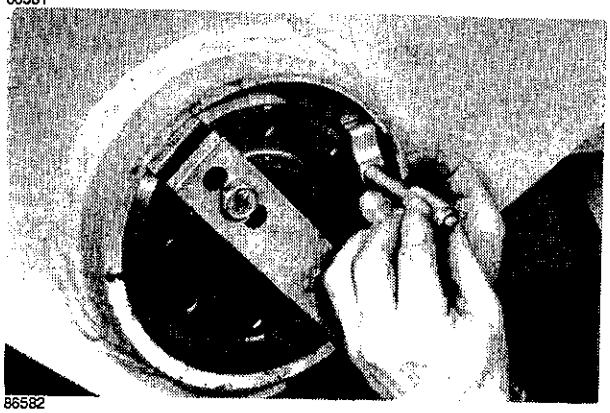
3.4.3.81
Install outer thrust ring.

86580



3.4.3.82
Temporarily clamp support to axle.

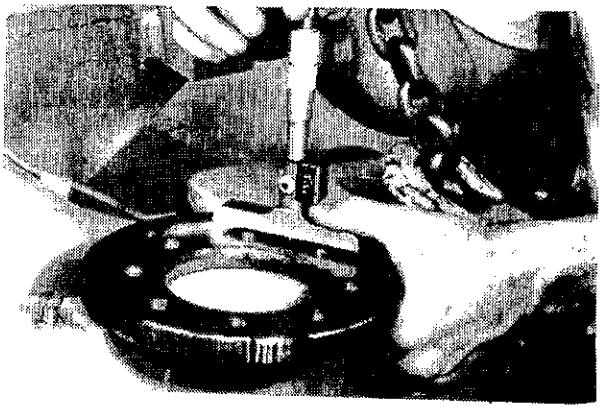
86581



3.4.3.83
Measure from bolt circle face to thrust ring. Dimension A.

Example: 2.4 mm (0.095")

86582



3.4.3.84
Measure depth of counterbore in retaining cover flange. Dimension B.

Example: 5.1 mm (0.201")

3.4.3.85
Subtract A from B. Round off the number to the next higher 1/2 mm.

Example: 5.1 - 2.4 = 2.7 mm
(0.201 - 0.095 = 0.106")

3.4.3.86
Make up a shim pack equal to rounded off figure.

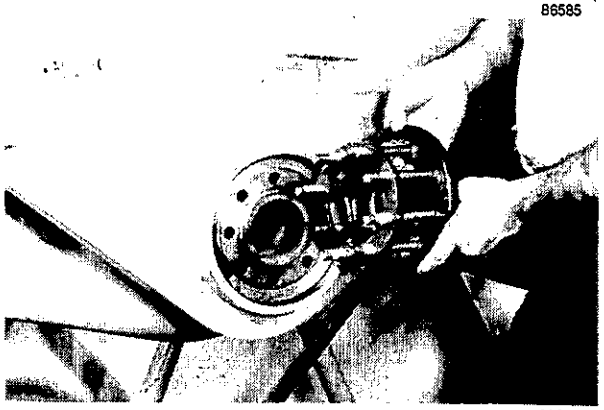
Example: 2.7 mm rounded off = 3.0 mm

(0.106" rounded off = 0.118"

86584

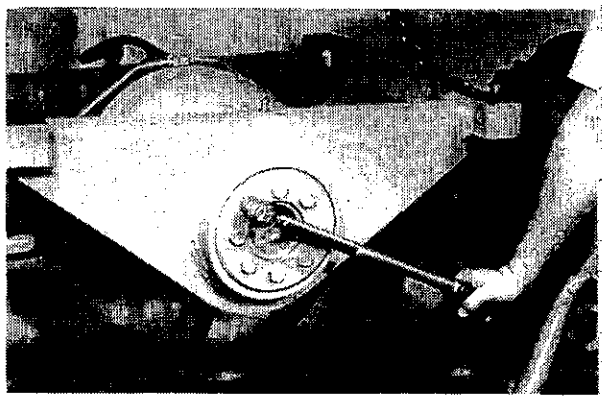
3.4.3.87
Install shims and retaining cover.

86585



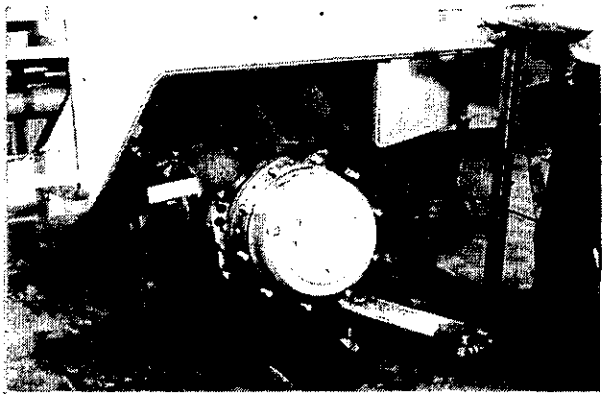
3.4.3.88
Install capscrews. Tighten to specified torque.

86586



AXLE INSTALLATION

86587

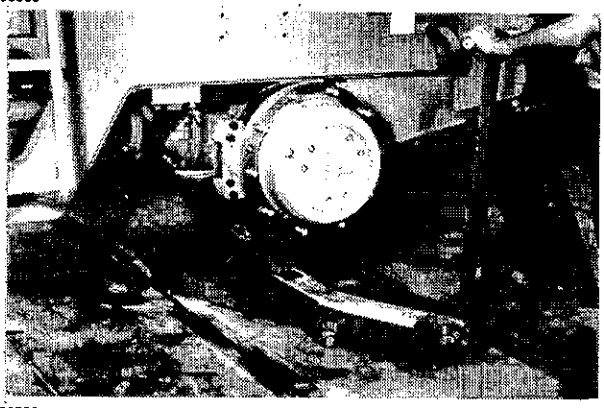


3.4.4.1
Position axle assembly on a floor jack. Roll assembly in position under machine.

⚠ WARNING

When any supporting machine component must be removed or installed and jacks are used, be sure the support of the jack at the machine and on the ground are appropriate to the load to be applied. Transfer the load to authorized blocking or jack stand immediately. Do not work on or under the machine or its components while supported only on a jack or other lifting device, according to local or national requirements.

86588



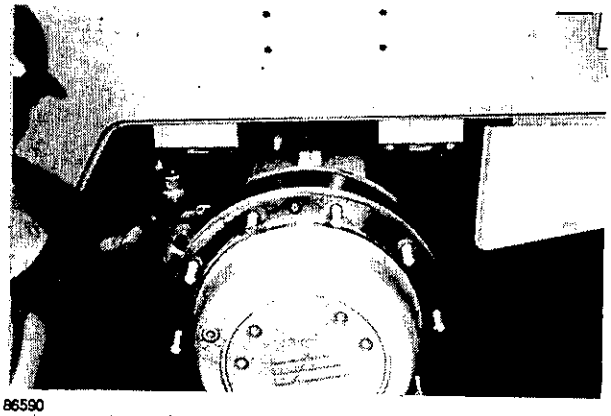
3.4.4.2
Raise axle until it contacts frame. Use a bar to line up bolt holes and to guide dowel pins into their holes.

⚠ WARNING

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.

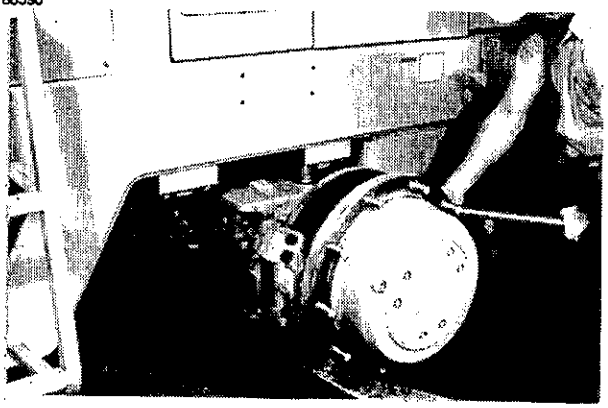
Use proper tools to bring holes into alignment. "DO NOT USE FINGERS OR HANDS".

86589



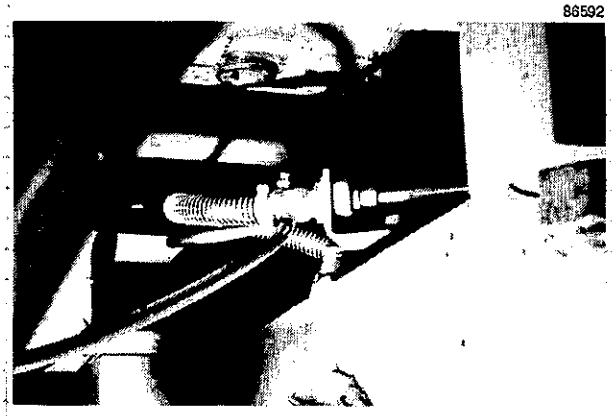
3.4.4.3
Install capscrews and nuts.

86590

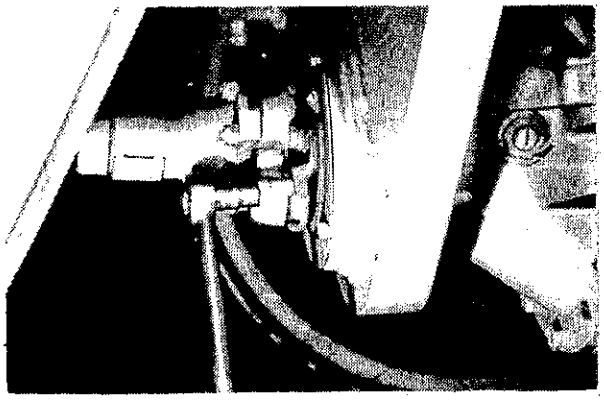


3.4.4.4
Tighten capscrews to specified torque.

3.4.4.5
Connect grease lines to supports. Connect brake line.


86592

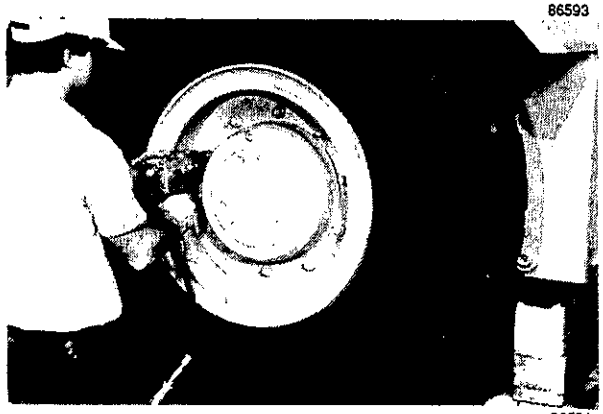
3.4.4.6
Connect U-joint. Coat capscrews with thread lock #75000776 (Loctite 262). Tighten capscrews to specified torque.


86593

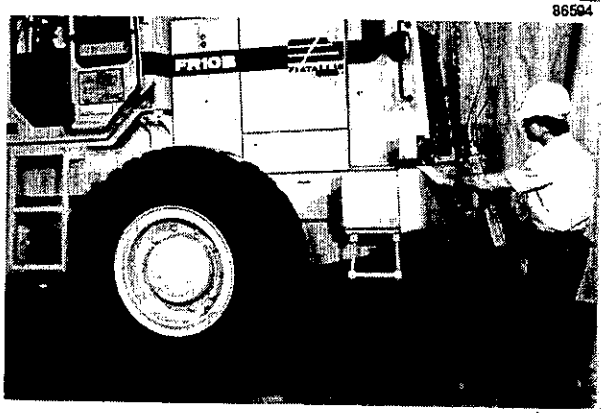
3.4.4.7
Using a suitable hoist and sling, install wheel assembly. Standard tire and wheel weighs approximately 225 kg(500 lbs.)Tighten nuts to near final torque.

⚠ WARNING

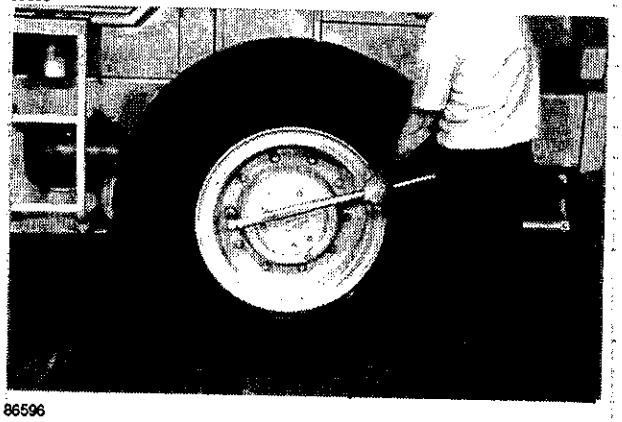
Lift and handle all heavy parts with a lifting device of proper capacity. Be sure parts are supported by proper slings and hooks. Use lifting eyes if provided. Watch out for people in the vicinity.


86593

3.4.4.8
Raise rear of machine and remove stand. Lower machine to ground.

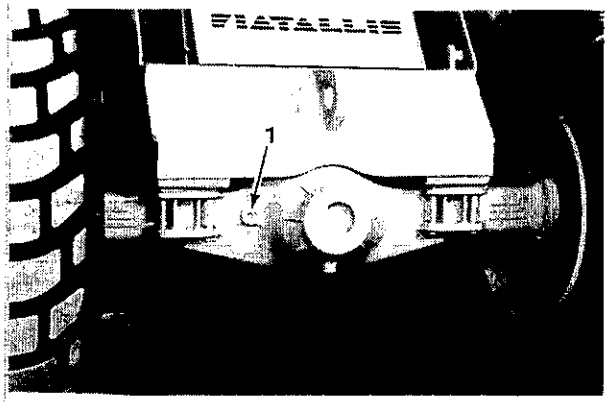

86594

86595



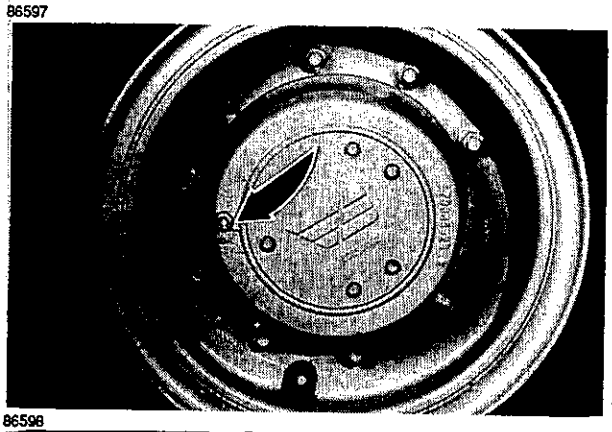
3.4.4.9
Tighten wheel nuts to specified torque.

86596



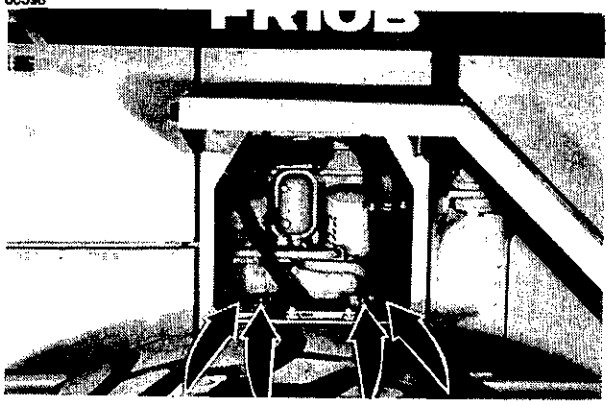
3.4.4.10
Fill axle housing with lubricant specified in the Operations and Maintenance Instruction Manual.

86597



3.4.4.11
Fill wheel ends with lubricant specified in the Operations and Maintenance Instruction Manual.

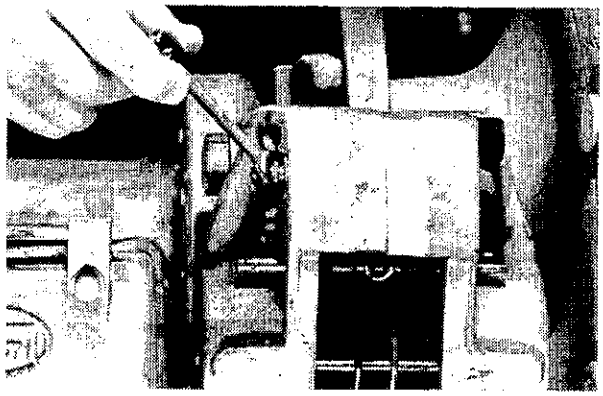
86598



3.4.4.12
Grease both supports.

3.4.4.13
Bleed brakes. See brake section.

86599



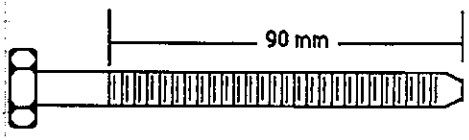
3.5 TOOLS THAT CAN BE PURCHASED FROM FIATALLIS

Step #	Part #	Name
3.4.2.27	75292224	Ring gear hub nut spanner
3.4.3.53	75292224	Ring gear hub nut spanner
3.4.3.28	75300024	Torque wrench, 3/8" drive, 150 in. lbs.
3.4.3.4	75300379	Torque wrench, 1/2" drive, 250 ft. lbs.
3.4.3.6	75300379	Torque wrench, 1/2" drive, 250 ft. lbs.
3.4.3.31	75300379	Torque wrench, 1/2" drive, 250 ft. lbs.
3.4.3.37	75300379	Torque wrench, 1/2" drive, 250 ft. lbs.
3.4.3.40	75300379	Torque wrench, 1/2" drive, 250 ft. lbs.
3.4.3.62	75300379	Torque wrench, 1/2" drive, 250 ft. lbs.
3.4.3.71	75300379	Torque wrench, 1/2" drive, 250 ft. lbs.
3.4.3.88	75300379	Torque wrench, 1/2" drive, 250 ft. lbs.
3.4.4.6	75300379	Torque wrench, 1/2" drive, 250 ft. lbs.
3.4.2.39	75300810	Torque wrench, 3/4" drive, 600 ft. lbs.
3.4.3.27	75300810	Torque wrench, 3/4" drive, 600 ft. lbs.
3.4.3.46	75300810	Torque wrench, 3/4" drive, 600 ft. lbs.
3.4.3.53	75300810	Torque wrench, 3/4" drive, 600 ft. lbs.
3.4.3.74	75300810	Torque wrench, 3/4" drive, 600 ft. lbs.
3.4.4.4	75300810	Torque wrench, 3/4" drive, 600 ft. lbs.
3.4.4.9	75300810	Torque wrench, 3/4" drive, 600 ft. lbs.
3.4.2.9	75300850	Master bearing and seal driver set
3.4.3.76	75300850	Master bearing and seal driver set
3.4.3.77	75300850	Master bearing and seal driver set
3.4.2.40	75300882	Ram set, 17 1/2 ton, shop use
3.4.2.75	75300882	Ram set, 17 1/2 ton, shop use
3.4.2.76	75300882	Ram set, 17 1/2 ton, shop use
3.4.2.83	75300882	Ram set, 17 1/2 ton, shop use
3.4.3.3	75300932	Bearing heater, 110 volt
3.4.3.7	75300932	Bearing heater, 110 volt
3.4.3.9	75300932	Bearing heater, 110 volt
3.4.3.22	75300932	Bearing heater, 110 volt
3.4.3.49	75300932	Bearing heater, 110 volt

Tools that can be made to assist in rebuild of the components

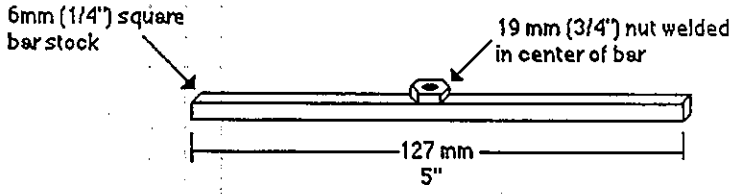
3.4.2.62
3.4.3.23

Pinion holding screw (20 x 1.5 x 110 mm). Can use capscrew 15990131. Cut additional threads and taper end.



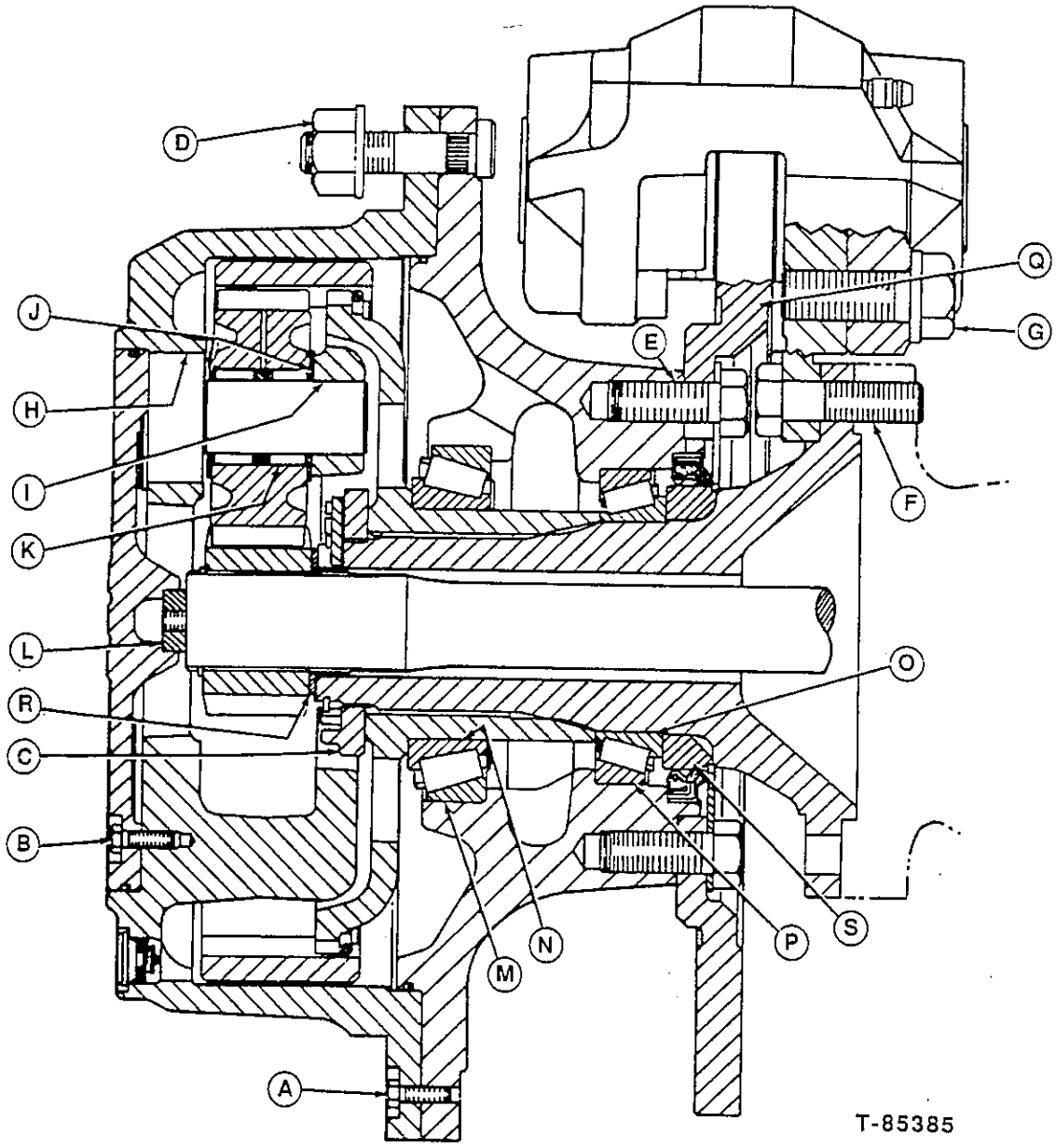
3.4.3.34

Spanner nut tool



MEMO

3.6.1 PLANETARY WHEEL END



3.6.1 PLANETARY WHEEL END

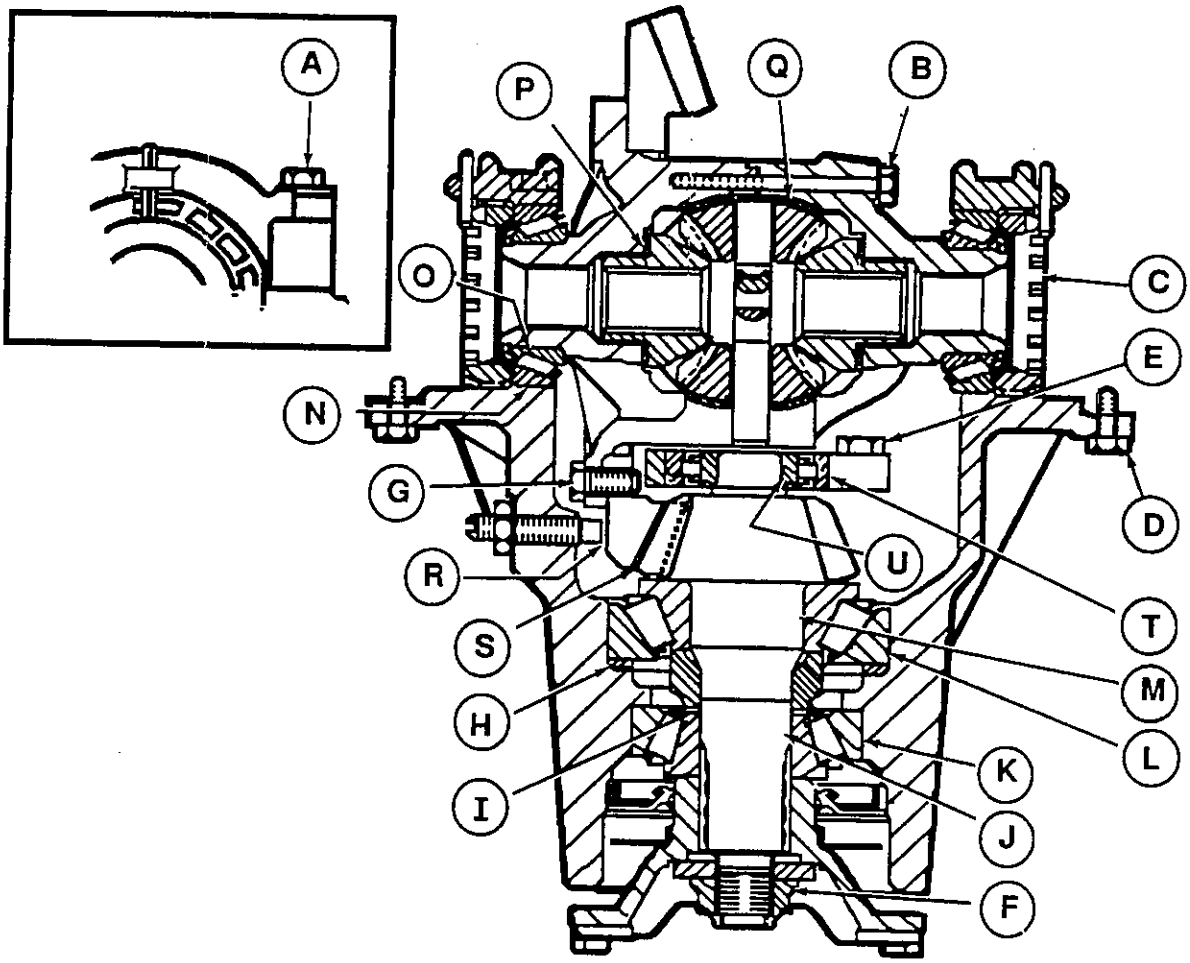
ITEM	STEP #	NAME	TORQUE N·M	TORQUE FT·LBS
A	3.4.3.62	Planet carrier capscrews	33	24
B	3.4.3.71	Wheel end cover capscrews	33	24
C	3.4.3.53	Ring gear hub nut	700 - 1000	515 - 735
D	3.4.4.9	Wheel nuts	580 - 620	430 - 455
E	3.4.3.46	Brake disc capscrews	600	440
F	3.4.2. 39	End shaft capscrews	430	315
G	3.4.3.74	Brake caliper capscrews	530 - 570	390 - 420

ITEM	NAME	DIMENSIONS mm	DIMENSIONS in.
H	Planet pin O. D. (large end)	62.98 - 63.0	2.479 - 2.480
	Carrier bore	63.0 - 63.03	2.480 -2.481
I	Planet pin O. D. (small end)	34.99 - 35.0	1.3775 - 1.378
	Carrier bore	35.0 - 35.025	1.378 - 1.379
J	Thrust washer thickness	1.47 - 1.53	0.058 - 0.060
K	Planet gear bore	45.01 - 45.025	1.772 - 1.7726
L	Thrust button thickness	10.45 - 10.55	0.411 - 0.415
M	Bearing cup O. D.	170.0 - 170.025	6.693 - 6.694
	Wheel hub flange bore	169.91 - 169.95	6.689 - 6.691
N	Bearing cone I. D.	110.0 - 110.025	4.331 - 4.3317
	Wheel hub O. D.	110.013 - 110.035	4.3312 - 4.3321
O	End shaft O. D.	99.97 - 99.99	3.9358 - 3.9366
	Bearing cone I. D.	100.0 - 100.025	3.937 - 3.938
P	Wheel hub flange bore	149.91 - 149.95	5.902 - 5.9035
	Bearing cup O. D.	150.0 - 150.025	5.9055 - 5.9065
Q	Brake disc thickness	21.8 - 22.2	0.858 - 0.874
	Minimum thickness	20.0	0.787
R	Sun gear thrust washer	2.95 - 3.05	0.116 - 0.120

Tire Air Pressure

	PSI	BAR
15.5 x 25	55	3.8
17.5 x 25	35	2.5

3.6.2 DIFFERENTIAL



T-85384

3.6.2 DIFFERENTIAL

ITEM	STEP #	NAME	TORQUE N·M	TORQUE FT·LBS
A	3.4.3.37	Bearing cap capscrews	315 - 345	235 - 250
B	3.4.3.6	Differential case capscrews	123	90
C	3.4.3.34	Spanner nut	64 - 76	47 - 56
D	3.4.3.40	Mounting capscrews	196	145
E	3.4.3.31	Pinion shank bearing support	295	215
F	3.4.3.27	Pinion nut	570 - 630	420 - 465
G	3.4.3.4	Bevel gear capscrews	295	215

			DIMENSIONS	
ITEM	STEP #	NAME	mm	in.
H	3.4.3.16	Pinion depth shims available	3.5. to 4.5 in 0.1 increments	0.138 - 0.178 in 0.004 increments
	3.4.3.14	Nominal distance from end of pinion to center of differential gears	90.0	3.543
I	3.4.3.21	Pinion bearing adjusting shims available	0.5, 1.0 to 1.5 in 0.025 increments	0.020, 0.039 to 0.059 in 0.001 increments
	3.43.28	Pinion bearing rotating torques	2.0 - 4.0 Nm	18 - 35 in lbs
J		Pinion O. D.	45.00 - 45.02	1.7717 -1.7724
		Bearing cone I . D.	45.00 - 45.01	1.7717 -1.7720
K		Bearing cup O. D.	95.00 - 95.025	3.740 - 3.741
		Housing bore	94.93 - 94.96	3.737 - 3.739
L		Housing bore	114.92 - 114.96	4.524 - 4.526
		Bearing cup O. D.	115.0 - 115.025	4.5275 - 4.5285
M		Pinion O. D.	55.01 - 55.03	2.1657 - 2.1665
		Bearing Cone I. D.	55.0 - 55.01	2.1653 - 2.1657
N		Housing bore	124.99 - 125.03	4.9208 - 4.9224
		Bearing cup O. D.	125.0 - 125.025	4.9212 - 4.9222
O		Bearing cone I. D.	80.0 - 80.01	3.1496 - 3.1501
		Case O. D.	80.03 - 80.06	3.151 - 3.152
P		Thrust washer thickness	1.97 - 2.03	0.077 - 0.080
Q		Thrust washer thickness	1.47 - 1.53	0.058 - 0.060
R	3.4.3.42	Deflection screw clearance	0.15 - 0.20	0.006 - 0.008
S	3.4.3.33	Bevel gear backlash	0.20 - 0.28	0.008 - 0.011
T		Support bore	71.96 - 71.99	2.833 - 2.834
		Bearing O. D.	72.0 - 72.025	2.8346 - 2.8356
U		Bearing I. D.	30.0 - 30.01	1.1811 - 1.1816
		Pinion O. D.	30.015 - 30.03	1.1817 - 1.1823

3.6.3 AXLE MOUNTING