

# 11-B

(DIRECT DRIVE)  
crawler tractor

## service manual

### ENGINE CLUTCH

S/N 16C16001-UP

Form 70682003 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.

**NOTICE**

Allis-Chalmers Corporation and FIAT S.p.A. entered into a joint venture agreement to combine their manufacture, sale and service of construction machinery products throughout the world after January 1, 1974.

In view of the new enterprise, wherever in this publication reference is made to Allis-Chalmers or your Allis-Chalmers dealer, such reference is intended to identify FIAT-ALLIS Construction Machinery Inc. or your FIAT-ALLIS dealer.

# SAFETY RULES

## GENERAL

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

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

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

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

Always wear safety glasses with side shields.

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

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

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

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

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

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

Keep operator's compartment clear of loose objects.

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

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

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

scissor points of machine without first providing secure blocking.

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

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

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

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

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

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

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

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

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

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

Remove sharp edges and burrs from reworked parts.

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

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

Never place gasoline or diesel fuel in an open pan.

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

When using compressed air for cleaning parts use safety

# Safety Rules

GENERAL (Continued)

just machine with engine running except as specified.

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

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

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

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

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

Inspect your seat belt at least twice a year for signs of fraying, wear, or other weakness that could lead to failure. Where it is necessary to use diesel fuel as a lubricant make sure all smoking material and open flames are extinguished or that no sparks are near. Place all parts in a closed container of clear diesel fuel for use as needed.

To minimize dangers of fire and explosion, it is recommended that before any welding is done on a fuel tank, the tank be completely drained of fuel, fuel lines disconnected and the ends closed to protect them, and the tank be steam cleaned. All traces of fuel must be removed before welding is started. Flood the tank with carbon dioxide (CO<sub>2</sub>) before and during welding. Caps must be removed and vents and other openings left open during welding. Dry ice (solid carbon dioxide) is extremely cold and will freeze flesh on contact. Use care to prevent contact with skin, eyes, or other parts of the body to avoid personal injury.

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

## START UP

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

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

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

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

Do not smoke or permit any open flame or spark near when refueling, or handling highly flammable materials. Do not use an open flame as a light source to look for leaks or for inspection anywhere on the machine. Be sure all mechanic's tools are in good condition. DO NOT use tools with mushroomed heads. Always wear safety glasses with side shields.

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

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

Never use the bucket as a man lift.

The articulation point between frames will not clear a person. Stay clear when engine is running. Support, using device provided when servicing. Return support to carry position and secure before moving machine after servicing. See Operation and Maintenance Instruction Manual. For field service, move machine to level ground if possible and block machine. If work is absolutely necessary on an incline, block machine and its attachments securely. Move the machine to level ground as soon as possible.

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

Be sure cables are anchored and the anchor point is strong enough to handle the expected load. Keep exposed personnel clear of anchor point and cable or chain. DO NOT PULL OR TOW UNLESS OPERATOR'S COMPARTMENT IS GUARDED AGAINST ACCIDENTAL CABLE OR CHAIN BACKLASH.

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

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

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

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

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

Keep clutches and brakes on machine and attachments adjusted according to Operation and Maintenance Instruction Manuals of the manufacturer at all times. DO NOT ad-

# Safety Rules

## ENGINE

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

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

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

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

Never lubricate a machine with the engine running.

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

## ELECTRICAL

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

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

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

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

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

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

## HYDRAULIC

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

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

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

## ATTACHMENTS

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

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

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

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

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

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

## TIRES (APPLICABLE MACHINES)

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

Stand to one side when changing inflation of tires.

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

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

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

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

Deflate tires before removing objects from the tread.

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



## FOREWORD

This manual contains the Fiat-Allis approved procedures for overhaul of engine clutch (including clutch brake) on HD-11 Series B Direct Drive Crawler Tractor.

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

Always furnish Dealer with machine Serial Number when ordering parts.

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

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# TOPIC 1 GENERAL DESCRIPTION

## 1.1 ENGINE CLUTCH

### 1.1.1

The engine clutch is oil type, multiple disc -- it has three bi-metallic friction discs and two steel discs. The clutch is manually controlled through mechanical linkage; it is adjustable to take up normal wear of the clutch discs.

Adjustment is internal.

Enclosed in the clutch housing and driven directly from the engine flywheel is an accessory drive gear. This gear drives the steering pump and, on tractors with a hydraulic dozer, also drives the dozer pump. Both pumps are driven at .92:1 engine speed.

## 1.2 CLUTCH BRAKE

### 1.2.1

The clutch brake is oil type, multiple plate -- it has three bi-metallic plates and two steel plates.

### 1.2.2

The brake is applied by pushing clutch operat-

ing lever as far forward as possible. Purpose of the brake is to stop rotation of the drive shaft after disengaging the engine clutch -- allowing a fast, smooth shift to be made.

### 1.2.3

The clutch brake is adjustable to take up normal wear of the brake plates and compensate for clutch adjustments; adjustment is internal.

## 1.3 HYDRAULIC SYSTEM

### 1.3.1

The engine clutch is included in the steering and transmission hydraulic system. Lubricating and cooling oil is supplied to the engine clutch from the steering clutch control valve. The oil is split at a restricted tee on the right side of transmission case, Fig. 5--part of the oil going to the transmission. The tee is restricted to assure adequate oil flow to both the transmission and clutch.

Oil in the clutch housing is returned to main housing by centrifugal force created by rotation of the engine flywheel.

# TOPIC 2 HYDRAULIC SYSTEM LUBRICANT SPECIFICATION, CAPACITY, AND SERVICE

## 2.1 LUBRICANT SPECIFICATIONS

### 2.1.1

Oil for use in the hydraulic system must meet one of the following specifications:

#### 2.1.1.1

Transmission fluid "Type C-1 or C-2".

#### 2.1.1.2

Crankcase oil SAE 10W API classification "Service SD" or "MIL-L-2104B" Grade 10W.

#### 2.1.1.3

Automatic transmission fluid Dexron<sup>®</sup> or "Type A-Suffix A".

### CAUTION

API Classification "Service CD" or "Series 3" oil is not recommended.

#### 2.1.1.4

When atmospheric temperature is below  $-10^{\circ}\text{F}$  ( $-23^{\circ}\text{C}$ ) Automatic Transmission Fluid Dexron<sup>®</sup> or "Type A-Suffix A", or lubricating oil meeting Military Specification "MIL-L-10295B OES" must be used.

### CAUTION

Do not use "MIL-L-10295B OES" if atmospheric temperature remains consistently above  $-10^{\circ}\text{F}$  ( $-23^{\circ}\text{C}$ ).

## 2.2 CAPACITY AND SERVICE

### 2.2.1

18.5 gallons (70.0 lit) is required to fill the system after a complete overhaul of the engine clutch.

### 2.2.2

Service consists of changing oil, replacing filter element, cleaning steering suction line filter element, and cleaning transmission suction line screen. Perform service after making major repairs to any part of the system; replace filter element and clean steering suction line filter element again after the first 50 hours of operation. Detailed service instructions and specified service intervals are given in Operator's Manual 0677389-9.

# TOPIC 3 TROUBLE-SHOOTING

## IMPORTANT

Always make certain hydraulic system is filled to proper level with specified lubricant before trouble-shooting.

REMEDY	POSSIBLE CAUSE	TROUBLE
None required	This is to be considered normal.	Transmission and engine clutch lube pressure OK at high idle but low at low idle
<p>Check for loose fittings in pump suction line. If OK, check for clogged suction line screen. Check steering system and/or pump; refer to Service Manual 0682005-4</p>	<p>Air in system (Pressure reading will also be erratic if this is the trouble). Oil leak in steering system or a worn steering pump</p>	<p>Transmission and engine clutch lube oil pressure low at high idle (NOTE: oil pressure will vary from the upper to lower portion of Operating Range on gauge as oil temperature in the system increases)</p>
<p>Check clutch lever pull (4.7); adjust clutch to increase lever pull if necessary</p> <p>Remove clutch and replace defective parts</p>	<p>Clutch out of adjustment</p> <p>Clutch friction discs warped and/or excessively worn</p>	<p>Clutch slipping</p>
<p>Adjust or replace linkage (Re-move clutch housing access cover to check linkage inside the housing)</p> <p>Check clutch lever pull (4.7); adjust clutch to decrease lever pull if necessary</p> <p>Adjust linkage (4.8)</p>	<p>Clutch control linkage binding or broken</p> <p>Clutch out of adjustment</p> <p>Transmission shifting lock linkage binding or out of adjustment</p>	<p>Clutch hard to engage</p>
<p>Adjust brake (4.9). If adjustment does not correct the problem, remove and inspect brake plates (4.1)</p>	<p>Clutch brake out of adjustment or brake plates worn</p>	<p>Gears clash when shifting</p>

# TOPIC 4 ENGINE CLUTCH AND CLUTCH BRAKE

## 4.1 REPLACEMENT OF CLUTCH BRAKE PLATES

### 4.1.1

Remove clutch access cover, Fig. 1 (30). Reach through access opening and remove retaining ring (33) from rear cover (37); slide pressure plate (32) out of rear cover.

### 4.1.2

Disconnect universal joint from front and rear yokes; slide front yoke forward to clear U-joint. Slide front yoke off clutch shaft.

### 4.1.3

Remove rear bearing retainer, Fig. 1 (42), and rear bearing snap ring (43).

### 4.1.4

Place alignment marks on clutch housing and rear cover. Remove rear cover from clutch housing; pull it evenly as possible to prevent binding the brake plates or shaft sealing rings. Slide brake plates from rear cover and/or hub.

NOTE: Brake hub can only be removed from front of shaft -- this requires removal and disassembly of engine clutch.

### 4.1.5

Replace damaged or worn brake plates (see 4.4.14 and 4.4.15 for wear limits). Inspect shaft sealing rings and their bore in rear cover. Rings must turn freely in their grooves but the edges must not be rounded. Replace rear cover if ring indentations in bore cannot be dressed smooth with crocus cloth.

### 4.1.6

Install brake plates alternately on hub; start and finish with a bi-metallic plate. Slide plates forward as far as possible on hub.

### 4.1.7

Remove bearing from rear cover and lubricate I. D. of sealing ring bore. Start rear cover -- with new O-ring, Fig. 1 (36) -- into clutch housing. Align marks placed on housing and rear cover before removal and pull rear cover into housing with attaching capscrews. Align teeth of steel plates with splines in rear cover as the cover is being installed.

### 4.1.8

Reach through clutch access hole and install pressure plate, Fig. 1 (32), against brake plates. Pressure plate must be installed with the two narrow spaced fingers at the top to properly match with brake apply plate. Secure pressure plate with retaining ring (33); be sure ring is fully seated in its groove.

### 4.1.9

Install bearing, Fig. 1 (41), on shaft; seat bearing in rear cover and install snap ring (43). Be sure snap ring is seated in its groove.

### 4.1.10

Inspect rear oil seal, Fig. 1 (44); replace it if damaged. Lip of seal faces toward bearing side of retainer. Attach retainer and gasket to rear cover.

### 4.1.11

Install yoke on clutch shaft; attach universal joint to front and rear yokes.

### 4.1.12

Check brake adjustment before installing access plate; refer to 4.9 for adjustment specification and procedure.

## 4.2 REMOVAL

### 4.2.1

Turn electrical system master switch off; remove floor plates, engine hood, and cowl. Before removing cowl, be certain all electrical wires, hoses, gauge lines, rods and control linkage attached to or through the cowl are disconnected. Cover open end of turbo-charger to prevent entrance of dirt or dust.

### 4.2.2

Remove floor supporting channel; attach spacing shims to channel so they will not be lost.

### 4.2.3

Drain the oil from dozer hydraulic tank or plug the oil outlet in bottom of tank. To plug outlet, remove suction line strainer and magnet from hydraulic tank and place a 4" (101.6 mm) diameter ball in strainer seat; rest strainer assembly on ball to hold it in place.

Disconnect oil lines from dozer pump and steering pump; remove pumps from rear of clutch housing. Disconnect vent line from clutch housing.

### 4.2.4

Break the dozer pump suction line at the joint just below the hydraulic tank; remove the tube and supporting clips on pump side of the joint.

### 4.2.5

Unlock and remove capscrews attaching front and rear yokes to universal joint; slide front yoke forward and remove universal joint.

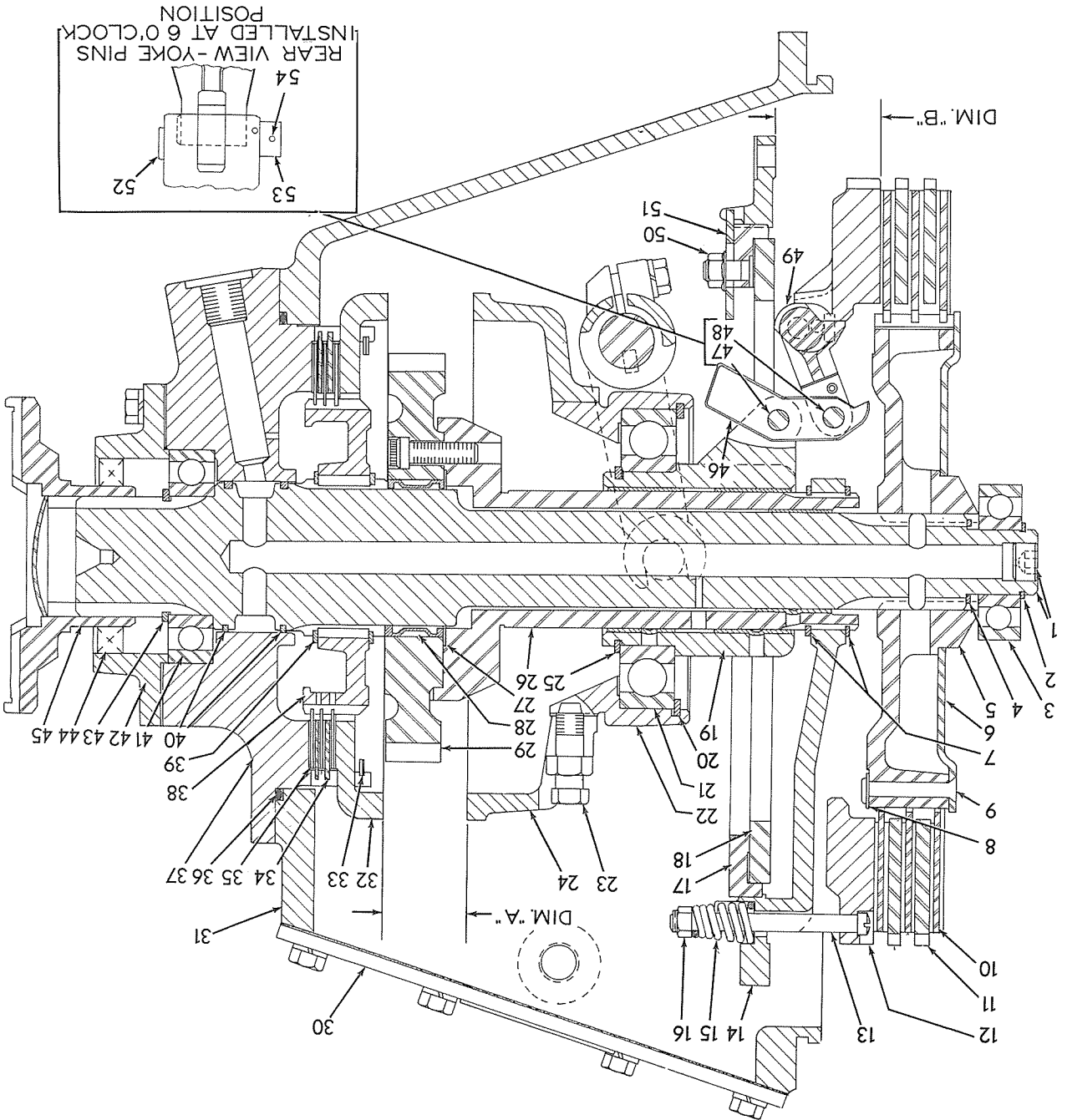
### 4.2.6

Disconnect engine clutch control linkage and transmission shift lock linkage, Fig. 5. Disconnect engine clutch oil supply line (15) and return line (14).

NOTE: Approximately 2 gal. (7.56 lit) of oil will drain from return line when it is disconnected.

FIG. 1 ENGINE CLUTCH AND CLUTCH BRAKE

T-76720



Engine Clutch and Clutch Brake