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.

N O T I C E

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

GENERAL (Continued)

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

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

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

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

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

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

Never use the bucket as a man lift.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

START UP

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

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

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

Safety Rules

ENGINE

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

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

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

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

Never lubricate a machine with the engine running.

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

ELECTRICAL

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

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

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

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

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

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

HYDRAULIC

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

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

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

ATTACHMENTS

Keep head, body, limbs, feet, hands and fingers away from blade, bucket or ripper when in raised position. Use authorized blocking as a safety measure before proceeding with service or maintenance per OSHA requirements.

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

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

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

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

TIRES (APPLICABLE MACHINES)

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

Stand to one side when changing inflation of tires.

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

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

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

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

Deflate tires before removing objects from the tread.

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

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.

NOTICE

CONSULT FIAT-ALLIS DEALER FOR OTHER SERVICE MANUALS AVAILABLE FOR YOUR UNIT. SEE TECHNICAL PUBLICATIONS INDEX 70658800 FOR ALL AVAILABLE PUBLICATIONS.

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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 operating 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® 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°F (-23°C) Automatic Transmission Fluid Dexron® 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°F (-23°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.

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

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 brakes 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 turbocharger 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.

Engine Clutch and Clutch Brake

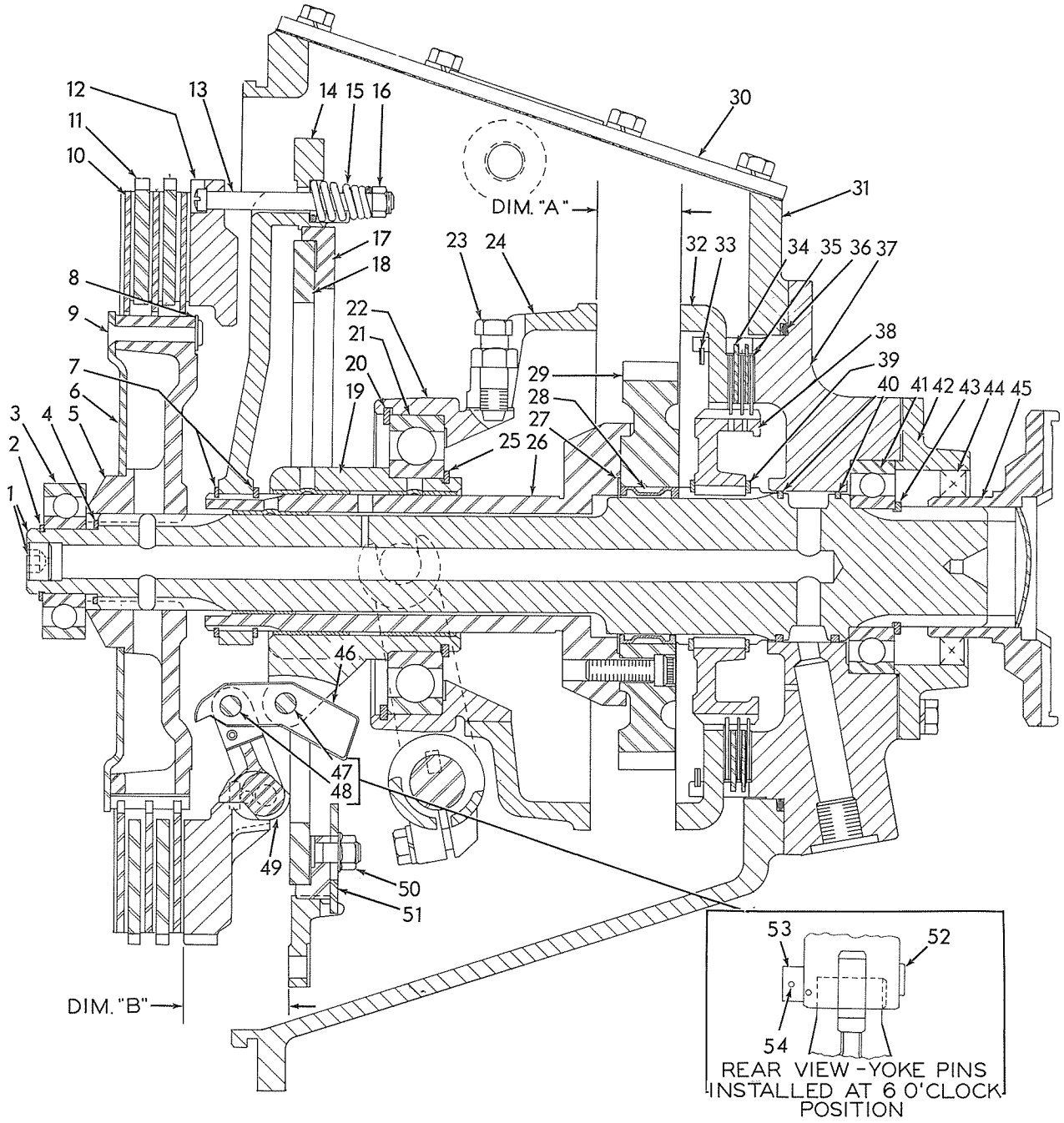

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FIG. 1 ENGINE CLUTCH AND CLUTCH BRAKE

LEGEND FOR FIG. 1

1. Clutch shaft w/drilled plug
2. Snap ring
3. Pilot bearing
4. Snap ring
5. Center (clutch hub)
6. Cover
7. Snap ring
8. Washer
9. Rivet
10. Clutch friction disc -- bi-metallic
11. Clutch disc -- steel
12. Pressure plate
13. Capscrew
14. Back plate
15. Return spring
16. Lock nut
17. Clutch adjusting ring
18. Adjusting ring plate
19. Throwout bearing sleeve
20. Snap ring
21. Throwout bearing
22. Throwout bearing carrier
23. Setscrew
24. Clutch brake apply plate
25. Snap ring
26. Accessory drive gear sleeve
27. Thrust washer

DIM. "A"-1.54-1.60"(39.1-40.6mm)

28. Bearing
29. Accessory drive gear
30. Access cover
31. Housing
32. Brake pressure plate
33. Retaining ring
34. Brake plate -- steel
35. Brake friction plate -- bi-metallic
36. O-ring
37. Rear cover
38. Clutch brake hub
39. Snap ring
40. Shaft sealing rings
41. Rear bearing
42. Rear bearing retainer
43. Snap ring
44. Rear oil seal
45. Drive shaft front yoke
46. Connecting link
47. Yoke pin
48. Yoke pin
49. Camshaft
50. Nut
51. Adjusting ring lock
52. Head end of yoke pin
53. Collar
54. Roll pin

DIM. "B"-1.91" (48.5mm)

4.2.7
Remove clutch access cover from housing. Remove the twelve capscrews attaching clutch to engine flywheel; bump engine with starter to turn the clutch. Replace first two capscrews removed with 3/8"NC x 5" guide studs.

4.2.8
Attaching lifting chain across access opening in housing and attach suitable hoist to chain -- clutch and housing weight approximately 330 lbs. ft. (149 kg); attach lifting chain to second set of capscrew holes from mounting flange for best balance.

Remove capscrews attaching clutch housing to flywheel housing. Move clutch housing back until clutch discs are clear of the splines in engine flywheel; lift housing up and out of tractor.

NOTE: Two pusher screws can be used if the clutch housing is difficult to move back; the pusher screw holes are on each side of the housing at the center line.

4.3 DISASSEMBLY

4.3.1
Remove front snap ring, Fig. 1 (2); use small puller to remove pilot bearing (3) from shaft.

4.3.2
Slide clutch hub and clutch discs from shaft. Cut off ends of rivets, Fig. 1 (9), and remove washers (8) to slide clutch discs from hub.

4.3.3
Slide drive shaft front yoke off rear of clutch shaft and remove rear bearing retainer, Fig. 1(42).

4.3.4
Remove clutch access cover, Fig. 1(30). Reach through access opening and remove retaining ring (33) from rear cover (37); slide brake pressure plate (32) out of rear cover.

4.3.5
Place alignment marks on clutch housing and rear cover. Remove rear cover attaching capscrews and pull rear cover, shaft, brake hub and brake plates from housing.

4.3.6
Remove rear bearing snap ring, Fig. 1 (43); bump rear end of clutch shaft until it is free of rear bearing. Remove snap ring(39) and slide brake hub from shaft.

4.3.7
Remove remaining clutch parts from housing; lift brake apply plate, Fig. 1 (24), to clear the shifting yoke shaft.

4.3.8
Remove lever from each end of shifting yoke shaft and loosen shifting yoke clamping capscrews. Pull shaft out of housing (either end first); remove shifting yoke as it is free of shaft.

4.3.9
Remove yoke pins, Fig. 1 (47), and front snap ring (7); lift back plate and pressure plate from accessory drive gear sleeve.

4.3.9.1
Remove adjusting ring lock, Fig. 1 (51); unscrew adjusting ring (17) and lift plate (18) from back plate.

4.3.9.2
Remove nuts and springs from capscrews, Fig. 1 (13), to separate the pressure plate and back plate.

4.3.10
Remove rear snap ring, Fig. 1 (7); slide throw out bearing sleeve (19) off accessory drive gear sleeve.

4.3.10.1
Loosen setscrew, Fig. 1 (23), and unscrew clutch brake apply plate (24) from throwout bearing carrier.

4.3.10.2
Remove snap ring, Fig. 1 (20); tap rear side of sleeve (19) to remove throwout bearing from carrier (22).

4.3.10.3
Remove snap ring, Fig. 1 (25); use suitable press to remove throwout bearing (21) from sleeve(19).

4.3.11
If steering pump drive gear must be replaced, remove snap ring, Fig. 2 (35), and drive the gear out toward front of housing. Remove spacer and bearing from the gear and the snap ring and bearing from bore in housing. Remove dozer pump drive gear and bearings in the same manner.

NOTE: Spacer, Fig. 2 (32), is used on the steering pump drive gear only.

4.4 INSPECTION

4.4.1
THROWOUT BEARING SLEEVE. Check bushing I. D. of bushing when new is 2.502"–2.504" (63.55–63.60 mm); replace sleeve if I. D. is more than 2.506" (63.65 mm).

4.4.2
ADJUSTING RING PLATE. Check plate for wear at camshaft contact points; plate must be flat within .010" (.25 mm); replace plate if necessary.

4.4.3
CAMSHAFT ASSEMBLIES AND CAMSHAFT BLOCKS. Check camshaft rollers for scoring, wear, and proper operation; check blocks for wear and smoothness. It is recommended that blocks be replaced in sets.

4.4.4
PRESSURE PLATE. Inspect friction surface for excessive wear or scoring; if plate is worn or scored more than .03" (.7 mm) or not flat within .005" (.12 mm) replace pressure plate. Plate may be re-machined a maximum of .06" (1.52 mm) to renew friction surface.

4.4.5
CLUTCH FRICTION DISCS (BI-METALLIC). Thickness of a new disc including friction material is .245" -- .255" (6.22 -- 6.47 mm); depth of friction material grooves is .030" (.76 mm). Replace disc if thickness is less than .215" (5.46 mm) or if not flat within .015" (.38 mm).

4.4.6
CLUTCH DISCS (STEEL). Thickness of a new disc is .247" -- .250" (6.17 -- 6.35 mm). Replace disc if thickness is less than .227" (5.76 mm) or if not flat within .005" (.12 mm).

NOTE: Replace any severely scored or burned disc regardless of thickness.

4.4.7
SPLINED CENTER. Check splines for heavy grooving which might cause friction plates to bind; replace it as necessary.

4.4.8
PRESSURE PLATE RETRACTING SPRINGS. Check springs for free height and proper tension; if free height of any spring is less than 1.5" (38.1 mm), or if tension is not 90--104 lbs. (40 -- 47 kg) at a compressed height of 1.190" (30.2 mm), replace spring.

4.4.9
CLUTCH SHAFT. Check shaft at front and rear bearing locations, seal locations, and shifting sleeve location; if shaft is worn, scored or grooved at any of these locations more than .001" (.02 mm) replace shaft. Be sure drilled oil passages are clean and free of obstructions.

4.4.10
CLUTCH SHAFT BEARINGS. Check front (pilot) and rear bearings for looseness, worn or pitted balls, or other visible damage; replace bearings as necessary.

4.4.11
CLUTCH HOUSING. Check housing for cracks or other visible damage; replace if necessary. Check shifting yoke shaft bores in each side of housing. Do not use housing if I. D. of either bore is larger than 1.006" (25.55 mm).

4.4.12
REAR COVER. Replace if sealing ring contact area in bore cannot be dressed smooth with crocus cloth. Be sure oil passages are clean.

4.4.13
LINKAGE, PIN, LEVERS, BUSHINGS, ETC. Check all such items for excessive wear, cracks, or other damage; replace parts as necessary.

Engine Clutch and Clutch Brake

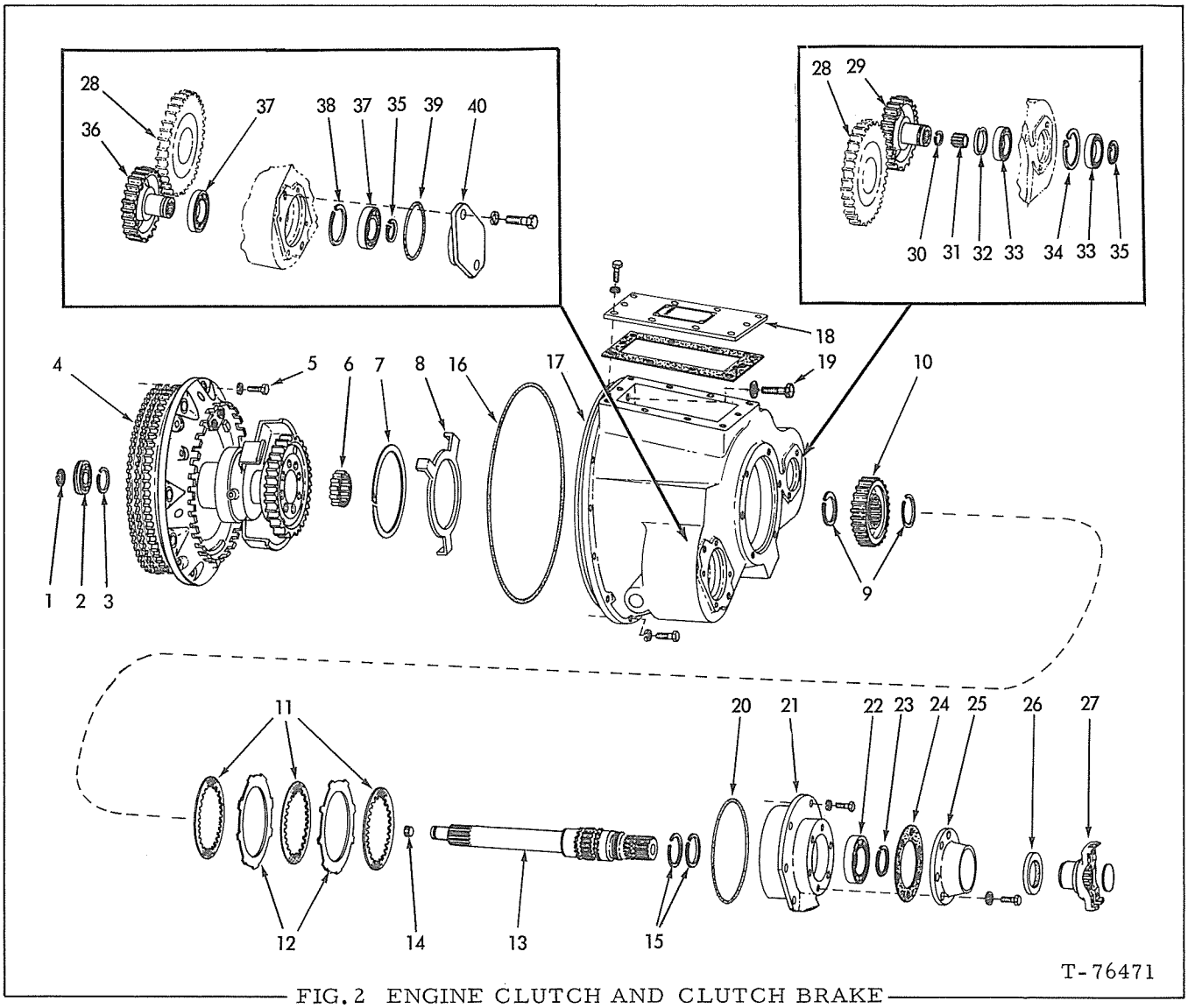

FIG. 2 ENGINE CLUTCH AND CLUTCH BRAKE

1. Snap ring
2. Pilot bearing
3. Snap ring
4. Clutch assembly (see Fig. 4)
5. Capscrew
6. Accessory drive gear bearing
7. Retaining ring
8. Brake pressure plate
9. Snap ring
10. Brake hub
11. Brake friction plates -- bi-metallic
12. Brake plates -- steel
13. Clutch shaft
14. Drilled plug -- .094"(2.38 mm) orfice
15. Shaft sealing rings
16. Housing O-ring
17. Housing
18. Access cover
19. Capscrew with copper washer
20. Rear cover O-ring
21. Rear cover
22. Rear bearing
23. Snap ring
24. Gasket
25. Rear bearing retainer
26. Rear oil seal
27. Drive shaft front yoke
28. Accessory drive gear
29. Steering pump drive gear
30. Snap ring
31. Pump drive coupling
32. Spacer
33. Bearing
34. Snap ring
35. Snap ring
36. Dozer pump drive gear
37. Bearing
38. Snap ring
39. O-ring
40. Cover (Pump mounts here if unit has hydraulic dozer)

4.4.14
BRAKE FRICTION PLATES (BI-METALLIC). Thickness of a new plate including friction material is .098" -- .102" (2.48 -- 2.59 mm); depth of friction material grooves is .010" (.25 mm). Replace plates if thickness is less than .092" (2.33 mm) or if not flat within .002" (.05 mm).

4.4.15
BRAKE PLATES (STEEL). Thickness of a new plate is .081" -- .085" (2.05 -- 2.15 mm). Replace plates if thickness is less than .071" (1.80 mm) or if not flat within .002" (.05mm).

NOTE: Replace any severely scored or burned plate regardless of thickness.

4.4.16
ACCESSORY DRIVE GEAR THRUST WASHER. Thickness of new washer is .030" -- .032" (.76 -- .81 mm). Replace washer if worn or damaged.

4.4.17
ACCESSORY DRIVE GEAR SLEEVE. Check bushings. I.D. of bushing when new is 1.752" -- 1.754" (44.50 -- 44.55 mm); replace sleeve if I.D. of either bushing is more than 1.756" (44.60 mm).

4.5 ASSEMBLY

4.5.1
Slide spacer, Fig. 2 (32), on steering pump drive gear (29); press bearing (33) against spacer. Seat snap ring (34) in groove in bore on right rear of housing. Install gear (29) from front side of housing; seat bearing (33) against snap ring bore. Install rear bearing (33) on gear and secure with snap ring (35); hold "bucking" bar against front of gear while installing bearing. Install snap ring (30) and coupling sleeve (31) in I.D. of gear.

4.5.2
Use procedure in 4.5.1 to assemble and install the dozer pump drive gear, Fig. 2 (36), bearings (37), and snap rings (38) (35). Install gear in left bore at rear of housing.

4.5.3
Install new seal in shifting yoke shaft bore on each side of housing -- sealing lip of both seals faces in. Protect seal lips and start shaft through one of the bores -- keyway in right end of shaft faces down; the other three key-ways face up. Install shifting yoke as shaft is pushed through housing -- capscrew side of yoke toward the front. Drive the shaft through bore on opposite side of housing; left end of shaft should extend .25" (6.35 mm) farther from housing than right end. Install woodruff keys in shaft; center shifting yoke over the keys and tighten yoke clamping capscrews.

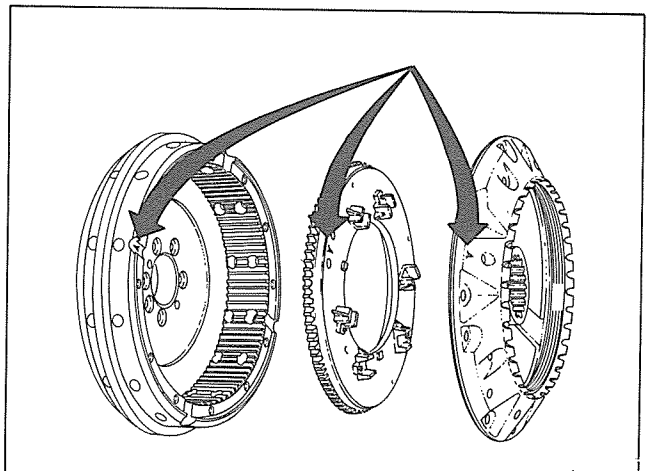

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FIG. 3 FLYWHEEL, PRESSURE PLATE, AND BACK PLATE ALIGNMENT MARKS "A"

4.5.4
Install woodruff key in left end of shifting yoke shaft. Center lever, Fig. 5 (17), over key; install and tighten the lever clamping capscrew.

4.5.5
Install woodruff key in right end of shifting yoke shaft. Center lever, Fig. 5 (18), over key; install and tighten the lever clamping capscrew.

NOTE: If engine clutch is replaced as an assembly, Fig. 2 (4), it can now be installed. Place clutch brake pressure plate, Fig. 1 (32), and retaining ring (33) in rear part of clutch housing with flange side of pressure plate toward the front. Lift clutch assembly over shifting yoke shaft and seat the throwout bearing carrier trunnions in the yoke. Be sure the setscrew, Fig. 1 (23), is located under clutch access opening in housing. Block under the clutch discs to hold clutch level. Continue to 4.5.16 for further assembly instructions.

4.5.6
Use press to install throwout bearing, Fig. 4 (24) on sleeve (22); secure at I.D. with snap ring (25). Tap carrier (26) over throwout bearing; seat carrier on bearing and secure at O.D. with snap ring (23).

4.5.7
Slide throwout bearing sleeve over accessory drive gear sleeve; install rear snap ring, Fig. 4 (9).

4.5.8
Align "A" marks, Fig. 3; attach pressure plate to back plate with capscrews, Fig. 4 (6), springs (11), and nuts (12). Tighten nuts only enough to expose two threads on each capscrew.

4.5.9
Place pressure plate face down on flat surface. Attach blocks, Fig. 4 (8), to pressure plate.

Attach links, Fig. 1 (46), to camshafts (49). The attaching yoke pins (48) must all be installed in the same direction; see inset in Fig. 1 for proper installation. Place camshafts over blocks on pressure plate.

4.5.10
Be sure adjusting ring lock capscrews, Fig. 4 (16), are firmly seated in adjusting ring. Place plate, Fig. 1 (18), over camshaft; screw adjusting ring (17) into back plate until distance between face of pressure plate and face of back plate, Fig. 1 DIM. "B", is 1.91"(48.5mm) (This will be close to the initial clutch adjustment). Place lock plate, Fig. 4 (15), on adjusting ring; start, but do not tighten, the attaching nuts.

4.5.11
Install back plate on accessory drive gear sleeve; install front snap ring, Fig. 4 (9). Connect links, Fig. 1 (46), to throwout bearing sleeve (19). The attaching yoke pins (47) must all be installed in the same direction; see inset in Fig. 1 for proper installation.

4.5.12
Screw brake apply plate, Fig. 4 (27), on throwout bearing carrier (26) until front of threads on plate and carrier are flush. Align setscrew hole in plate with slot in carrier; bottom setscrew in slot but do not tighten jam nut until the final adjustment is made (see 4.9).

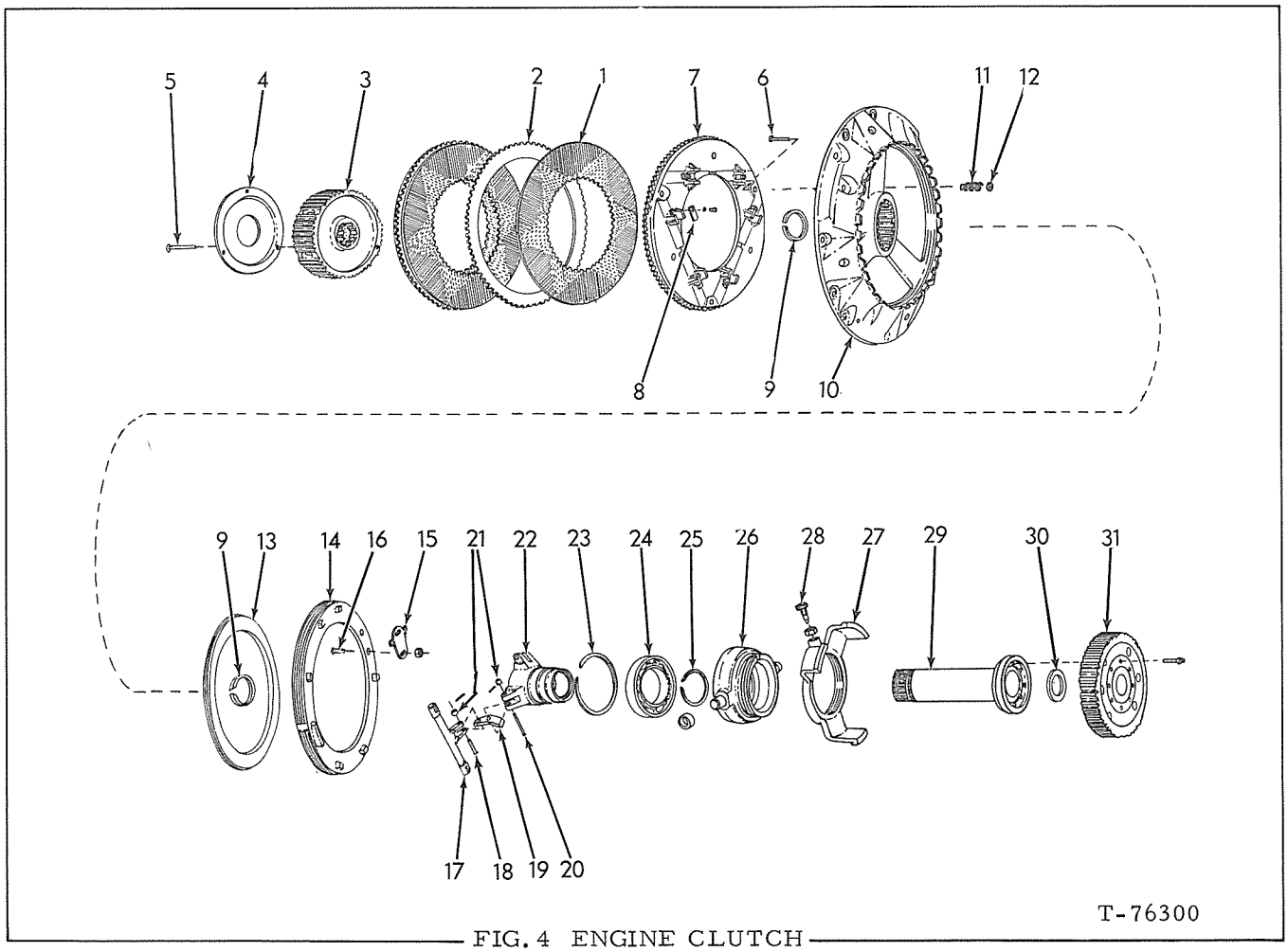

FIG. 4 ENGINE CLUTCH

1. Friction disc -- bi-metallic
2. Disc -- steel
3. Center (clutch hub)
4. Cover
5. Rivet
6. Retracting spring capscrew
7. Pressure plate
8. Camshaft block
9. Snap ring
10. Back plate
11. Retracting spring
12. Lock nut
13. Adjusting ring plate
14. Adjusting ring
15. Adjusting ring lock
16. Capscrew
17. Camshaft
18. Yoke pin -- short
19. Connecting link
20. Yoke pin -- long
21. Collar
22. Throwout bearing sleeve
23. Snap ring
24. Throwout bearing
25. Snap ring
26. Throwout bearing carrier
27. Brake apply plate
28. Setscrew
29. Accessory drive gear sleeve
30. Washer
31. Accessory drive gear

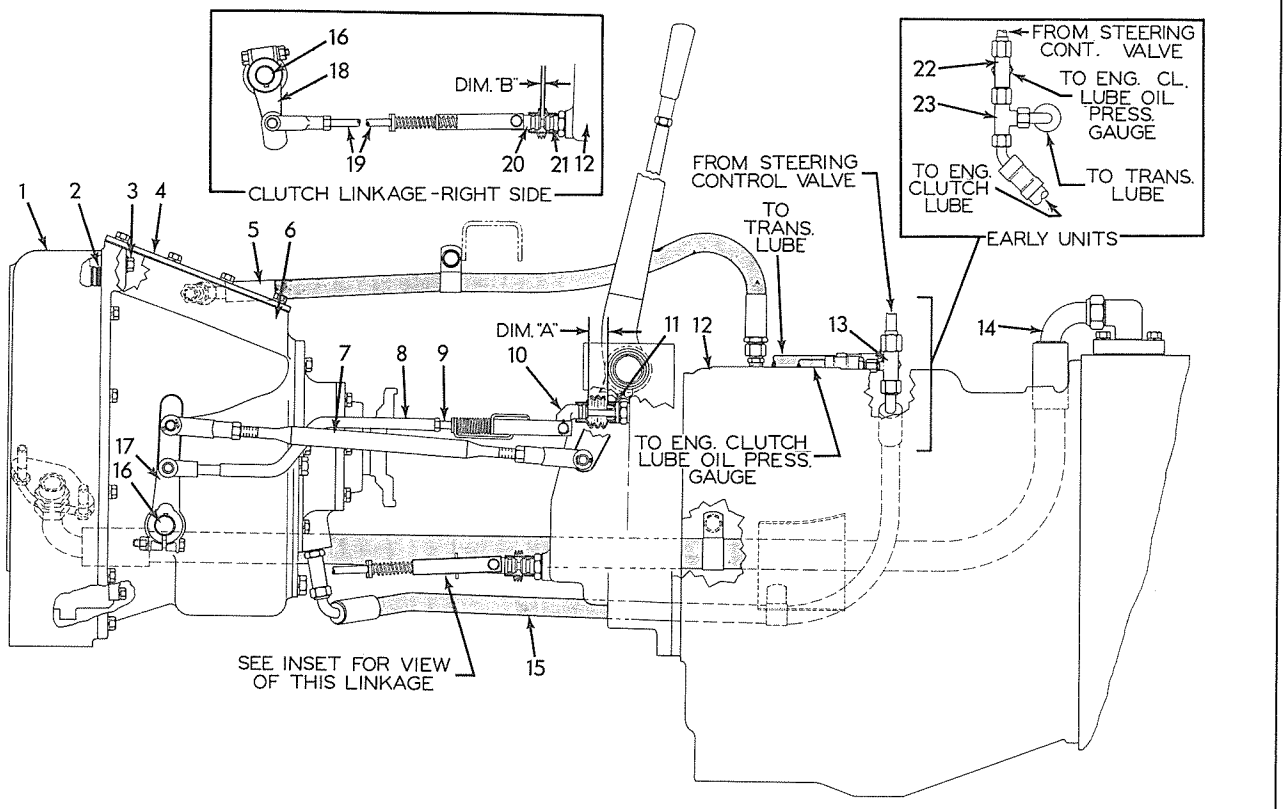

FIG. 5 ENGINE CLUTCH INSTALLED

1. Flywheel housing
2. O-ring
3. Capscrew w/copper washer
4. Clutch access cover
5. Breather
6. Engine clutch housing
7. Clutch control rod
8. High-low shift lock plunger control rod
9. Over-travel
10. High-low shift lock plunger
11. Plunger sleeve
12. Transmission
13. Tee
14. Clutch oil return line
15. Clutch oil supply line
16. Shifting yoke shaft
17. Lever
18. Lever
19. Control rod
20. Speed shift lock plunger
21. Plunger sleeve
22. Tee
23. Tee

DIM. "A" -- 1.25" (31.7 mm) with clutch engaged
DIM. "B" -- .12" (3.04 mm) with clutch engaged

4.5.13
Seat washer, Fig. 4 (30), in counterbore in rear of accessory drive gear sleeve (29). Attach accessory drive gear (31) to sleeve (29); torque attaching capscrews to 43 -- 47 lbs. ft. (5.94 -- 6.50 kg-m).

4.5.14
Place the clutch brake pressure plate, Fig. 1 (32), and retaining ring (33) in rear part of clutch housing with flange side of pressure plate toward the front.

4.5.15
Install the assembled clutch parts in clutch housing. Lift brake apply plate, Fig. 1 (24), over shifting yoke shaft; seat throwout bearing carrier trunnions in the shifting yoke.

NOTE: Be sure the setscrew, Fig. 1 (23), is located under clutch access opening in housing. Block under the back plate to hold clutch parts level.

4.5.16
Install brake hub, Fig. 2 (10), on shaft with a snap ring (9) on each side. Install hub with open side toward the rear.

4.5.17
Install sealing rings, Fig. 2 (15), in shaft; interlock ends of rings. Rings must turn freely in grooves; dress grooves and /or sealing rings with a small file to remove small burrs which may bind the rings.

4.5.18
Install bearing, Fig. 1 (28), in I. D. of accessory drive gear. Install clutch shaft from rear; push it forward as far as possible.

IMPORTANT: The clutch brake pressure plate, Fig. 1 (32) and retaining ring (33) must be inside the clutch housing before the clutch shaft is installed.

4.5.19
Install brake plate alternately on hub; start and finish with a bi-metallic plate. Slide plates forward as far as possible on hub.

4.5.20
Lubricate I. D. of sealing ring bore in rear cover. 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.

4.5.21
Reach through clutch access hole in housing and install pressure plate, Fig. 1 (32), against brake plates; secure with retaining ring (33). Be sure ring is fully seated in its groove. Pressure plate must be installed with the two narrow spaced fingers at the top to properly match with the brake apply plate.

4.5.22
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.

NOTE: Hold bucking bar against front of shaft while installing rear bearing.

4.5.23
Install new seal, Fig. 2 (26), in rear bearing retainer (25) -- sealing lip directed in. Install retainer and new gasket on rear cover.

4.5.24
Install cover, Fig. 4 (4), and rivets (5) on front (open) side of clutch hub, Fig. 1; offset in cover toward hub. Place clutch hub on blocks so the weight rests on rivet heads. Install discs alternately on clutch hub; start and finish with a bi-metallic disc. Install washers Fig. 1 (8), on rivets and flatten rivets over washers.

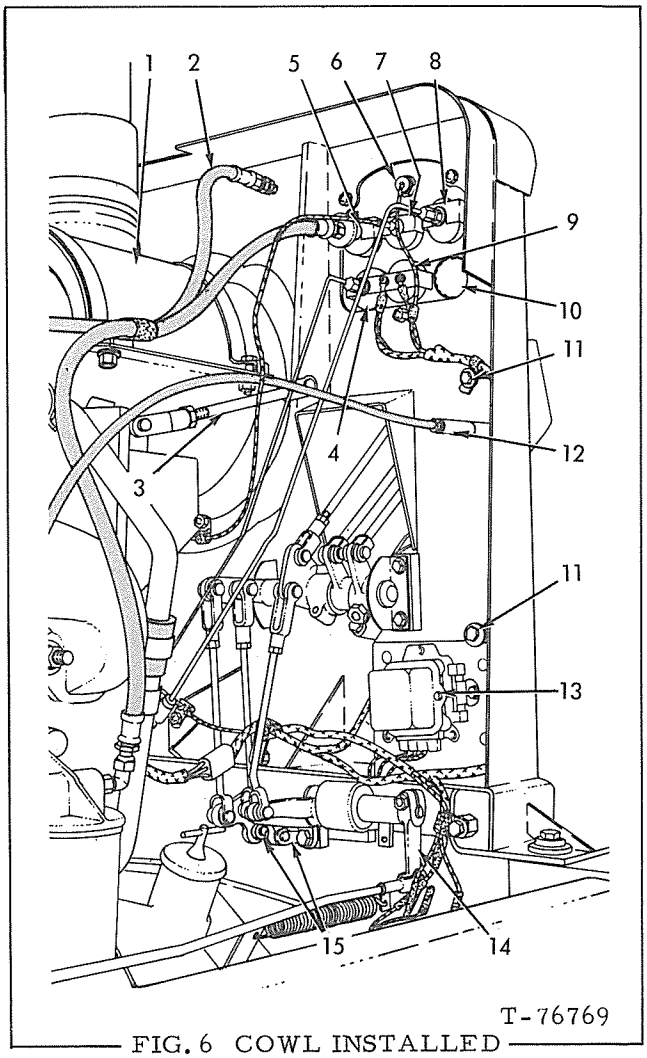

FIG. 6 COWL INSTALLED

1. Air cleaner
2. Air cleaner restriction indicator line
3. Cowl bracing rod
4. Engine clutch lube oil gauge
5. Fuel pressure gauge
6. Instrument light
7. Engine temperature gauge
8. Engine oil pressure gauge
9. Ammeter
10. Plug
11. Supporting clips
12. Engine shut-off
13. Voltage regulator
14. Engine control linkage lever
15. Steering control lower rods

4.5.25
Install snap ring, Fig. 1 (4), in I. D. of clutch hub; slide clutch hub on shaft until snap ring bottoms against shaft.

4.5.26
Install pilot bearing, Fig. 1 (3), on shaft; secure at I. D. with snap ring (2). Be sure plug is firmly seated in shaft and that its orifice is not restricted.

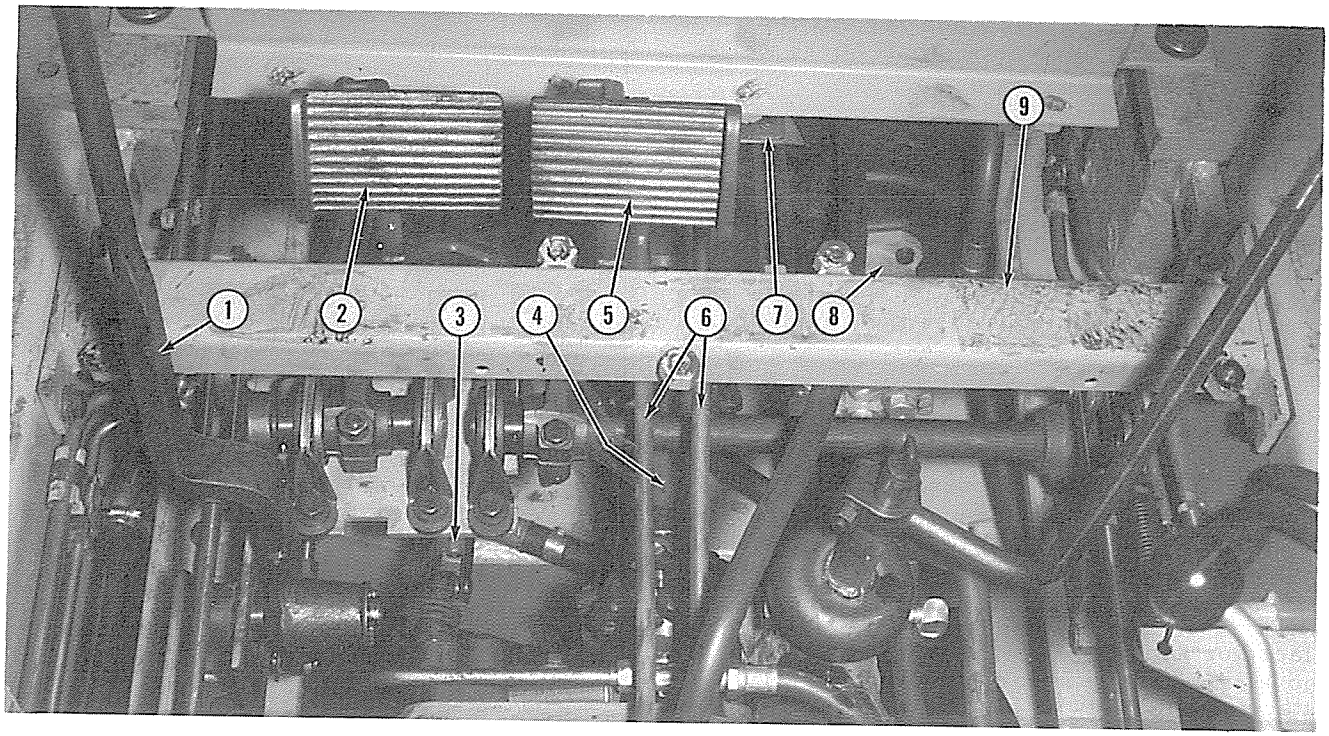

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FIG. 7 CLUTCH INSTALLED -- FLOOR PLATES REMOVED

1. Clutch operating lever
2. Left brake pedal
3. Transmission high-low shift lock linkage
4. Universal joint
5. Right brake pedal
6. Steering control lower rods
7. Engine clutch access cover
8. Steering pump
9. Floor supporting channel

4.6 INSTALLATION

4.6.1
Check condition of engine flywheel before installing; refer to Engine Service Manual 0645121-5 for specifications and inspection procedure.

4.6.2
Install new O-ring, Fig. 2 (16), around groove in front of clutch housing; be sure O-ring is not twisted. Lubricate O-ring with light grease.

4.6.3.
Bump engine with starter to bring the "A" mark on engine flywheel, Fig. 3, around so it is near the top. Install two guide studs (3/8"NC x 5") in engine flywheel. Attach suitable hoist to clutch housing and lower it into tractor. Align the "A" mark on flywheel and back plate, Fig. 3, and slide the back plate over guide studs. Mesh teeth on steel discs and pressure plate with splines in engine flywheel as clutch is moved forward. Tap rear end of clutch shaft to seat pilot bearing in engine flywheel and move housing forward to seat it in engine flywheel housing.

Keep clutch housing straight while installing to prevent damage to O-ring.

NOTE: Weight of housing and clutch assembly is approximately 330 lbs. (149 kg).

4.6.4
Attach engine clutch housing to flywheel housing; torque attaching capscrews to 43 -- 47 lbs.ft. (5.94 -- 6.50 kg-m). Use a copper washer with the two capscrews under clutch access cover, Fig. 5.

4.6.5
Attach engine clutch back plate to engine flywheel. Tighten the twelve attaching capscrews evenly to prevent binding the clutch discs; bump engine with starter to bring the capscrews around to the clutch access opening. Torque capscrews to 43 -- 47 lbs. ft. (5.94 -- 6.50kg-m)

4.6.6
Connect clutch oil return line, Fig. 5 (14); tighten supporting clip. Connect oil supply line (15) to tee (13) or (23) and clutch housing.

4.6.7
Adjust length of control rod, Fig. 5 (7) to 20.4" (518.3 mm) and install it. Install control rod, Fig. 5 (8), and over-travel (9); refer to 4.8 for adjustment procedure.

4.6.8
Install drive shaft universal joint and attach to front and rear yokes; lock attaching capscrews.

4.6.9
Attach steering pump and dozer pump to clutch housing. Connect oil lines and vent line to clutch housing; attach supporting clips. Connect oil lines to steering pump and dozer pump. Remove ball which was placed in dozer hydraulic tank to prevent oil from draining or replace oil which was drained.

4.6.10
Connect steering control lower (horizontal) rods to front bellcranks; connect control rods and retracting springs to steering control valve. Install floor supporting channel (with shims) and decelerator pedal.

4.6.11
Install cowl; attach it to rear fenders. Attach cowl bracing rod to front of cowl.

4.6.12
Connect wires, engine control linkage, and gauge lines to front of cowl, Fig. 6; connect air inlet hose and air cleaner restriction indicator hose to air cleaner. Install engine hood and exhaust stack.

4.6.13
Service the hydraulic system (see 2.2.2). Fill hydraulic system to about 75% capacity with specified lubricant; oil filler pipe is located under the operator's seat. Run engine at low idle for a few minutes to charge the system. Stop engine and add lubricant required to complete filling the system (2.2.1). Check oil level with engine stopped.

4.6.14
Adjust clutch (4.7) and clutch brake(4.9); operate tractor to be certain the clutch is working properly.

4.7 CLUTCH ADJUSTMENT

4.7.1
Attach spring scale to engine clutch operating lever just below the hand grip, Fig. 8. Check pull required to engage engine clutch with engine stopped; pull must be adjusted to 40 lbs. (18.1 kg).

4.7.2
Bump engine with starter until adjusting ring lock can be reached through access cover, Fig. 7. Loosen lock retaining nuts and pull lock out of notch in back plate.

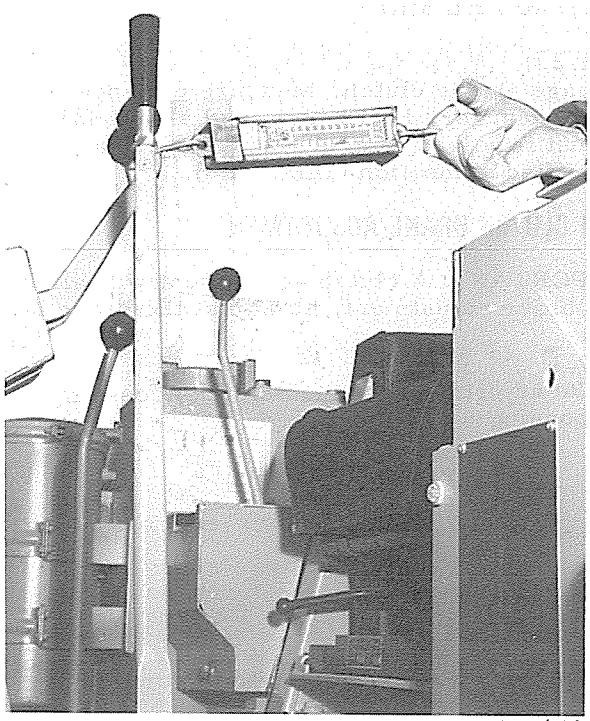

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FIG. 8 CHECKING PULL REQUIRED TO ENGAGE ENGINE CLUTCH

4.7.3
Turn adjusting ring clockwise to increase operating lever pull; use suitable driver against lugs on rear side of adjusting ring to turn it. Align tang and adjusting ring lock with notch in back plate and install the lock when specified pull is obtained.

NOTE: Turn lock end for end to make half-notch adjustments. Subsequent clutch adjustments should be made when operating lever pull, Fig. 8, drops to 30 lbs. (13.6 kg).

4.8 CLUTCH LINKAGE (SHIFT LOCK) ADJUSTMENTS

NOTE: Make adjustments with engine stopped.

4.8.1 HIGH-LOW RANGE

4.8.1.1
If control rod, Fig. 5 (7), is not installed adjust it to a length of 20.44"(518.3 mm) before installing it.

4.8.1.2
Engage engine clutch. Measure distance between plunger, Fig. 5 (10) and sleeve (11); make necessary adjustment at front end of over-travel (9) to obtain specified dimension (DIM. "A").

4.8.2 SPEED SHIFT

4.8.2.1
Engage engine clutch. Measure distance between plunger, Fig. 5 (20), and sleeve (21); adjust length of control rod (19) to obtain specified dimension (DIM. "B").

4.9 CLUTCH BRAKE ADJUSTMENT

IMPORTANT: A clutch adjustment will affect the brake adjustment, so adjust the brake last.

4.9.1
Make adjustment through clutch access opening in housing.

4.9.2
Engage engine clutch. Measure clearance between pressure plate, Fig. 1 (32), and apply plate (24); hold pressure plate back against brake plates when taking measurement. Specified clearance is 1.54" -- 1.60" (39.1 -- 40.6 mm), Fig. 1 (DIM. "A").

4.9.3
If adjustment is necessary, loosen jam nut and back setscrew, Fig. 1 (23), out of slot in throwout bearing carrier. Turn brake apply plate (24) counterclockwise to decrease clearance or clockwise to increase clearance. Plate must be turned in full turn increments to locate setscrew (23) over its locking slot. Bottom setscrew in slot and tighten jam nut when specified clearance is reached.

TOPIC 5 FITS AND TOLERANCE

Refer to 4.4 for sizes of parts and their wear limits.

TOPIC 6 SERVICE TOOLS

All tools required to perform the repair operations described in this manual are considered to be standard service tools; these tools can be ordered from local tool suppliers.

ALPHABETICAL INDEX