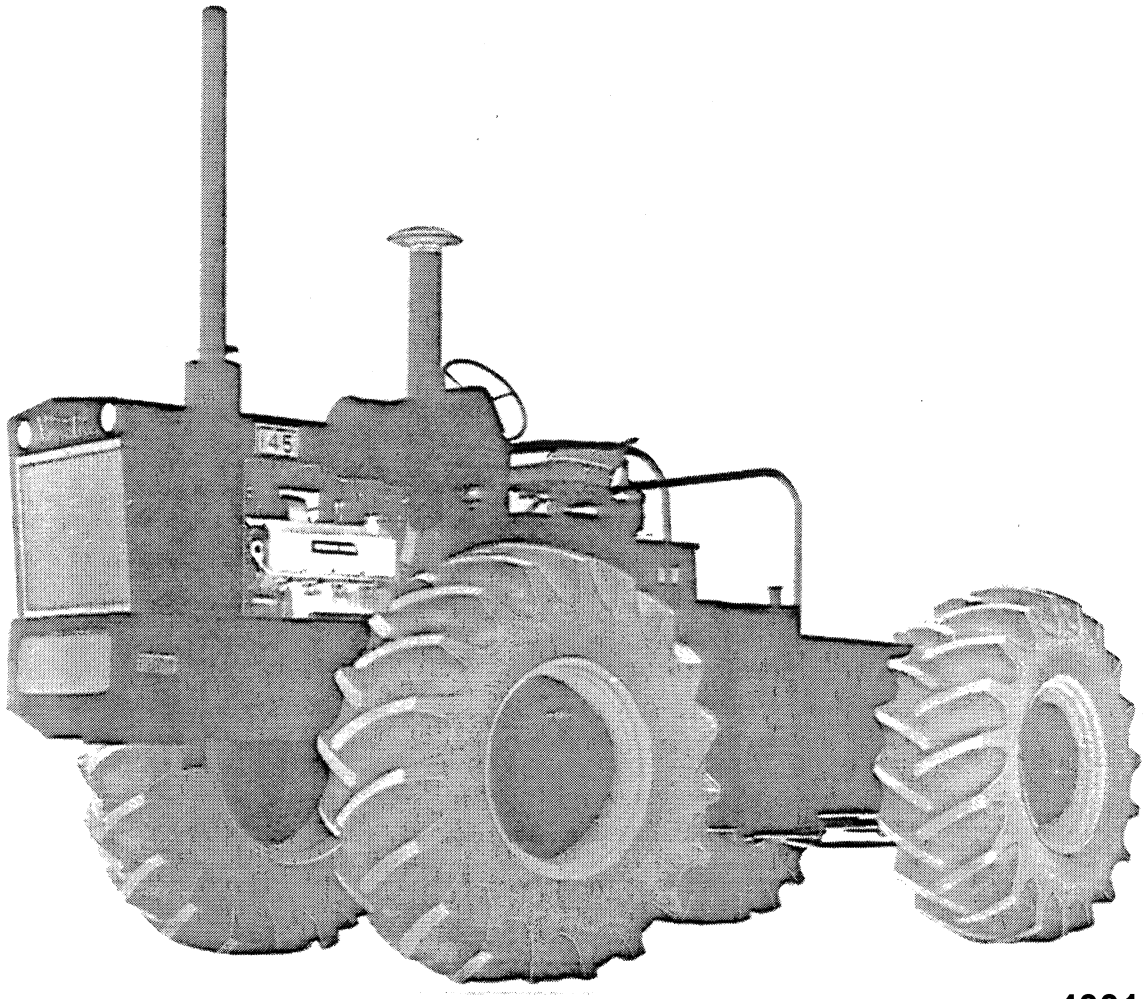
VERSATILE

FORD
NEW HOLLAND

Service Manual

4 Wheel Drive Tractors
Models D118 – G125
and D145



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GENERAL SPECIFICATIONS

ENGINE—MODEL G-125

Make & Model	FORD Industrial engine, Model C4PC, V-8, 90° overhead valve.
Displacement	391 cu. in.
Bore & Stroke	4.05 in. x 3.79 in.
Rated Horsepower	165 hp @ 2,800 rpm.
Compression Ratio	7.6 to one.
Cylinder Heads	Special alloy iron, stress relieved.
Cylinder & Crankcase	Cast integral.
Pistons	Full skirted aluminum alloy with integral steel band, cam ground, tin plated.
Piston Rings	Chrome plated top compression, phosphate coated second compression, chrome plated steel rail oil control.
Crankshaft	Five bearings, precision moulded, special alloy iron, induction hardened.
Valves - Exhaust	Flexible head, tungsten-cobalt faced, sodium filled chrome plated stems.
Valves - Intake	Flexible head, nickel alloy steel.
Valve Seat Inserts - Exhaust	Tungsten-cobalt alloy.
Lubrication	Full pressure to all bearings, full flow filter, rotor type internal oil pump.
Oil Capacity	8 Imp. qt.
Spark Plugs	Turbo action, 18 mm.
Electrical System	12 volt.

Ignition	Battery.
Distributor	Centrifugal and vacuum ignition advance.
Alternator	12 volt, 40 amp.
Carburetor	Two venturi, down draft.
Governor	Mechanical - centrifugal.
Fuel Pump	Mechanical, diaphragm.
Cooling System	Series type.
Temperature Control	Thermostat in coolant outlet.
Water Pump	High volume centrifugal, pre-lubricated.
Engine Weight	Fan to flywheel - 721 lb.

ENGINE—MODELS D-118 & D-145

	D-118	D-145
Make	CUMMINS.	CUMMINS.
Model	V6-140.	V8-185.
Displacement	352 cu. in.	470 cu. in.
Bore & Stroke	4-5/8 in. x 3-1/2 in.	4-5/8 in. x 3-1/2 in.
Rated Horsepower	135 hp @ 3,000 rpm.	180 hp @ 3,000 rpm.
Compression Ratio	17.4 to one.	17.4 to one.
Bearings - Main & Connecting Rod	Precision type, steel backed inserts.	
Cam Shaft	Single cam shaft controls all valves and injector movement.	
Cam Shaft Followers	Roller Type.	
Combustion Chamber	CUMMINS, open type.	
Crankshaft	Fully counterweighted, induction hardened.	

Cylinder Block	Alloy cast iron.
Cylinder Liners	Wet type, easily replaceable.
Fuel System	CUMMINS PT wear compensating system with integral flyweight type governor, internal fuel lines and insert type injectors.
Gear Train	Located at rear of cylinder block.
Lubrication	Full pressure to all bearings, gear type pump.
Pistons	Aluminum cam ground with two compression and one oil ring.
Piston Pins	1-3/8 in. diameter, full floating.
Valves - Exhaust	Dual, stainless steel.
Valves - Intake	Dual, silichrome steel.
Temperature Control	Thermostat in coolant outlet.
Water Pump	Centrifugal, pre-lubricated.
Electrical System	DELCO, 12 volt, negative ground.
Approximate Engine Weight	Model D-118 - 1,116 lb. Model D-145 - 1,380 lb.

CLUTCH

Type	Foot operated.
Size	Model G-125 - 13 in. Models D-118 & D-145 - 14 in.

TRANSMISSION

Make & Type	VERSATILE, spur gear type.

No. of Speeds - Forward	Nine.
No. of Speeds - Reverse	Three.
Lubrication	Pressure lubricated.

DRIVELINES

Motor to Transmission - All Models	614-T-104-V51
Transmission to Axle - All Models	614-T-105-V51 614-T-106-V51 614-T-107-V51

AXLES

- All Models	(Front) 613-T-142-V91 (Rear) 613-T-141-V91

DIFFERENTIAL

- All Models	(Front) 612-T-102-V51 (Rear) 612-T-101-V51

HYDRAULICS

Cessna Pump was used in Models up to Serial #:

D-145 - Serial # 8634
D-118 - Serial # 4627
G-125 - Serial # 2260

Webster Pump is used on all Models after the above serial number.

PUMP

Make & Model	Cessna, Part No. 705-T-112-V51 Webster, Part No. 705-T-124-V51
Capacity at 2180 RPM	Cessna - 12.5 GPM @ 1750 psi Webster - 16.5 GPM @ 1750 psi

FILTERS

- All Models	Gresen Part No. 704-T-101-V51-A Element Part No. 704-T-116

CONTROL VALVE

Make	Gresen Three Spool Part No. 706-T-141-V51
Options	Third Spool Kit Part No. 12397 Vickers Two Spool Part No. 712-T-100-V51

STEERING

Pump Make & Model	Cessna Part No. 705-T-112-V51 Webster Part No. 705-T-124-V51
Capacity @ 2180 Pump RPM @ 3000 Engine RPM	Cessna - 12.5 GPM @ 1750 psi Webster - 16.5 GPM @ 1750 psi
Valve Make & Model	Chra-Lynn, Orbital Control
Releif Valve Make & Model	Gresen Part No. 708-T-101-V51-A, 1500 psi
Cylinder	3-1/2" Bore, 18 in. Stroke
Oil Cooler	Part No. 702-T-102
Filter Make & Model - All Models	Gresen, Part No. 704-T-101-V51-A Element, Part No. 704-T-116

ELECTRICAL

Alternator Make & Type	
- Model G-125	Autolite 12 Volt 40 amp., Negative Ground
- Models D-145 & D-118	Delco 12 Volt, 40 amp., Negative Ground
Regulators Number & Type	
- Model G-125	607-T-122-A, 12 Volt
- Models D-145 & D-118	607-T-124, 12 Volt
Starting Motor Make & Type	
- Model G-125	Autolite, 12 Volt
- Models D-145 & D-118	Delco, 12 Volt
Battery - Type	
- Model G-125	12 V91t, 70 amp. hr.
- Models D-145 & D-118	12 Volt, 204 amp. hr.

AIR CLEANER

Type & Model	
- Model G-125	601-T-152 Element 601-T-150-V51 Air Cleaner
- Model D-118	601-T-141 Element 601-T-138-V51 Air Cleaner
- Model D-145	601-T-125 Element 601-T-120-V51 Air Cleaner

COOLING SYSTEM

Thermostat Range	
- Model G-125	157° to 187° F.
- Models D-145 & D-118	175° to 202° F.
Radiator Cap	7 lb. full pressure cap

BRAKES

Type & Location	
- All Models	Hydraulically operated, located on rear driveline
Parking Brake Type	Mechanically Operated

APPROXIMATE CAPACITIES

Cooling System	**All quantities are Imperial measure.**	
- Model G-125	25 qt.	
- Model D-118	29 qt.	
- Model D-145	34 qt.	
Engine Oil		
- Model G-125	7 qt. with filter.	
- Model D-118	20 qt. with filter.	
- Model D-145	22 qt. with filter.	
Transmission	6 gal. with filter.	
Implement Hydraulics	6 gal. with filter.	
FINAL DRIVE	Differential	Planetary
- All Models	4 gal.	7 pt.
FUEL TANKS (Two)	45 Imp. Gal. Each	

APPROXIMATE WEIGHTS—TRACTOR

Model G-125	11,000 lb.
Model D-118	11,000 lb.
Model D-145	14,300 lb.
Cab	600 lb.
Dual Wheels	1,000 lb.

ENGINES

FORD

For warranty service on the FORD gas engine, see your nearest FORD INDUSTRIAL DEALER or refer to your FORD Owner's and Operator's Manual.

CUMMINS

For service on the diesel engines from the fan to the flywheel, contact your nearest Versatile or Cummins dealer. However, if starting is a problem, before you call your CUMMINS distributor make certain the following items have been checked.

1. Fuel supply.
   (a) Check fuel level in tanks.
   (b) Check condition of fuel filter and filter "O" ring.
   (c) Check fuel screen on top of the pump. See Figure A below.

2. Check electrical shut-down solenoid. There should be a definite click when switch is turned on. A manual over-ride knob provided on the rear end of the electric shut-down valve allows the valve to be opened in case of electric power failure. To open the valve, turn the knob in fully in a clockwise direction. See Figure A.
   CAUTION: To prevent cranking motor damage do not crank the engine more than 30 seconds continuously. If the engine does not fire within the first 30 seconds, wait two minutes before recranking.

3. Check air inlet system to ensure an adequate supply of air to the engine.

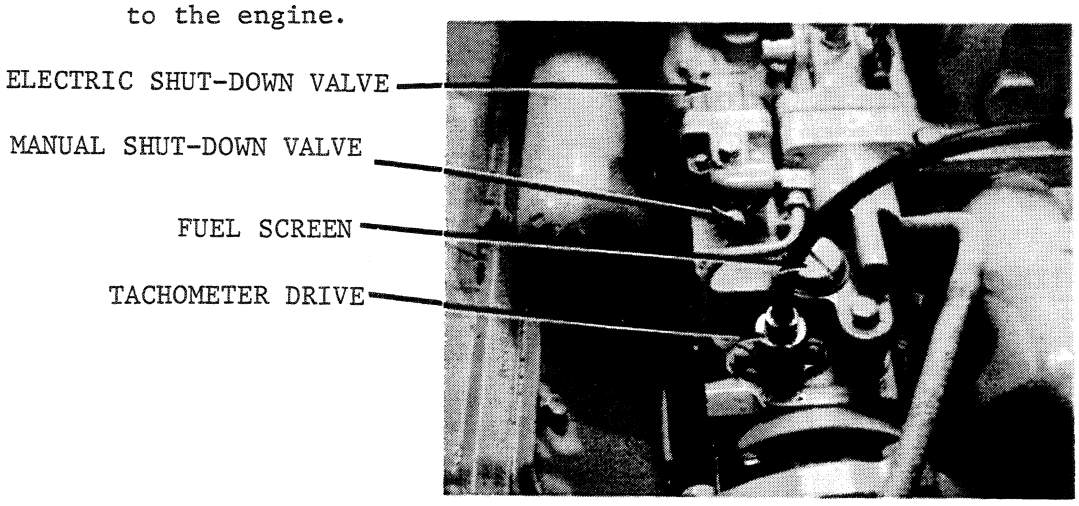


Fig. A

FUEL AND AIR SYSTEM

The fuel system is designed to store fuel and to deliver it to the engine in the form of vapor mixed with air. As the power output of an engine is dependent upon the fuel-air ratio, it is important that these systems be kept clean and operating. Dirty filters or restrictions in either fuel or air systems will cause smoky exhaust, high exhaust temperatures and loss of power.

FUEL TANKS

The two fuel tanks are mounted on the left hand and right hand of the tractor and are connected by a hose at the bottom of each tank. Each tank has a drain cock on the bottom for draining fuel or condensation.

The tanks may be removed for cleaning and and repair as follows:

1. Remove front and rear hand rails.
2. Disconnect cross-over fuel line, fuel suction line, pipe tee and fuel return line.
3. Remove three 3/8" x 1" bolts connecting front of tank and front fender.
4. Remove five 1/2" x 1" bolts from each corner of fuel tank.
5. Remove tank.

When reassembling the fuel tanks, reverse the above procedure.

DIESEL FUEL FILTER

The diesel fuel filter is mounted on a bracket attached to the left hand side of the engine hood. This is a spin-on type filter and must be discarded when it becomes plugged. Replace only with a proper filter made specifically for Cummins engines. Air leaks can develope around the O-rings on the inlet and outlet fittings on the filter. Thic can cause engine to miss, run unevenly, lose power, and surge. This can be remedied by installing a 1/8" thick O-ring under the lock nut on the inlet and outlet fittings on the filter base instead of the 3/32" thick O-ring which are originally installed. Before installing a new filter, always fill the filter with diesel fuel.

GASOLINE FILTER

The gasoline filter on the Model G-125 before Serial No. 2101 is located under the fuel pump. This is a replaceable element type.

After Serial No. 2102 an in-line filter is used. This has a replaceable element.

AIR CLEANER

Donaldson dry-type air cleaners are used on all units. These units are efficient if properly serviced.

TRACTOR		MODEL USED
G-125	Unit	601-T-150-V51
	Element	601-T-152
D-118	Unit	601-T-138-V51
	Element	601-T-141
D-145	Unit	601-T-120-V51
	Element	601-T-125

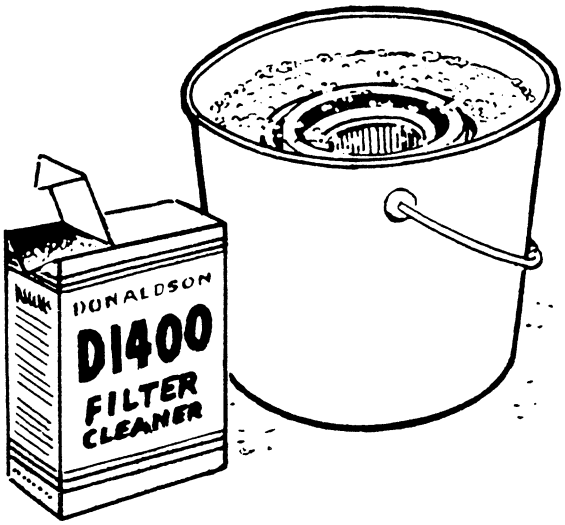
The following instructions are to be used for service and maintenance of the air cleaners.

AIR CLEANER

USED ON MODEL G-125

SERVICE PROCEDURE

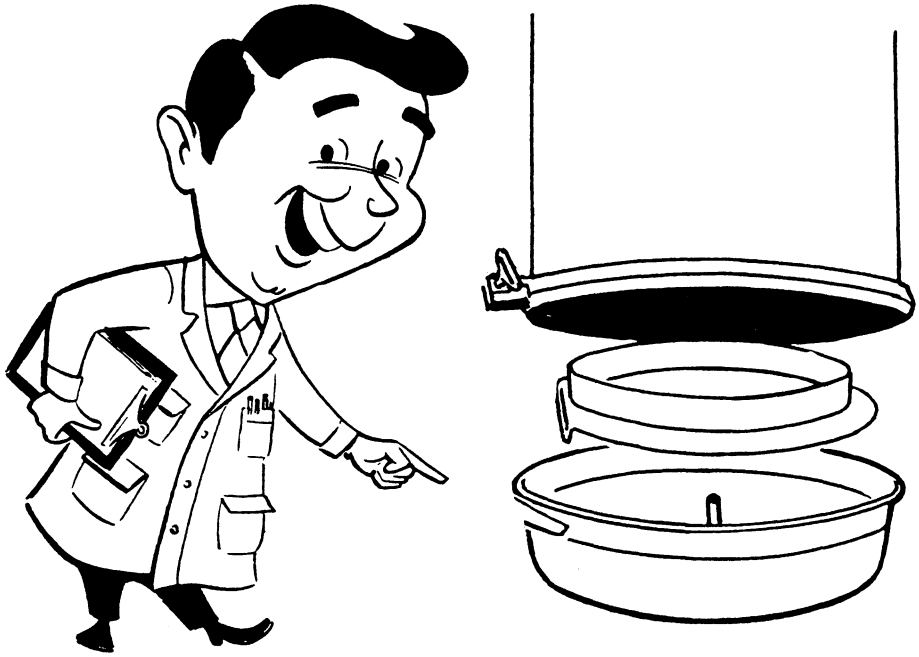
Direct dry, clean air up and down pleats on the clean air side of the Duralife filter. Caution: Air pressure at nozzle must not exceed 100 PSI. Maintain reasonable distance between nozzle and Duralife filter.



To wash filter, *especially effective for oily and soot laden filters,* use Donaldson D1400 Filter Cleaner. Proportions are 2 oz. of Cleaner to 1 gallon of water. For best mixing results use small amount of cool tap water then add to warm (70°-100°F.) water to give proper proportion. The warmer (100°F.) the solution the better the cleaning. Soak for 15 minutes. Rinse the filter thoroughly with clean water from hose (maximum pressure 40 PSI). Air dry completely before reusing.

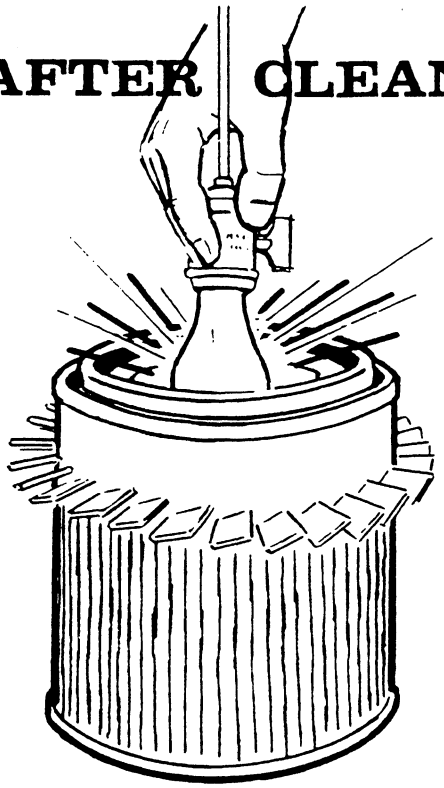
IMPORTANT:

Pre-cleaning fins are NOT removable!



Empty dust cup daily or more often if required. Dust level should not be allowed to build up to less than one-half inch from slot in dust cup baffle. Remove foreign material such as leaves from around filter and tighten wing bolt if necessary.

AFTER CLEANING AND DRYING



After the element has been dried, (a fan or air draft may be used, but do not heat element to hasten drying), inspect element for damage by placing a bright light inside the filter. Thin spots, pin holes or the slightest rupture will render the cartridge unfit for further use.

Re-assemble the air cleaner in reverse order – inspecting all gaskets and replacing any that are questionable.
If air cleaner is mounted in a horizontal position, be sure dust cup arrows point up.

CAUTION:
DO NOT USE OIL IN DUST CUP

Inspect and tighten all air cleaner induction system connections.

FILTER SHOULD BE REPLACED AFTER 6 CLEANINGS OR ANNUALLY

INSPECTION CHECK-OFF LIST

At every air cleaner service inspect the following for damage or leaks. Take the necessary corrective measures.

- Dust cup retainer damage
- Dust cup (sealing edge damage)
- Filter gasket washer
- Filter gasket (part of filter)
- Filter leaks, damage
- Connections between air cleaner and engine

NOTE: Filter leaks are indicated by: (1) Areas of concentrated dust on clean side of filter; (2) Light shining through holes when light bulb is held inside filter.

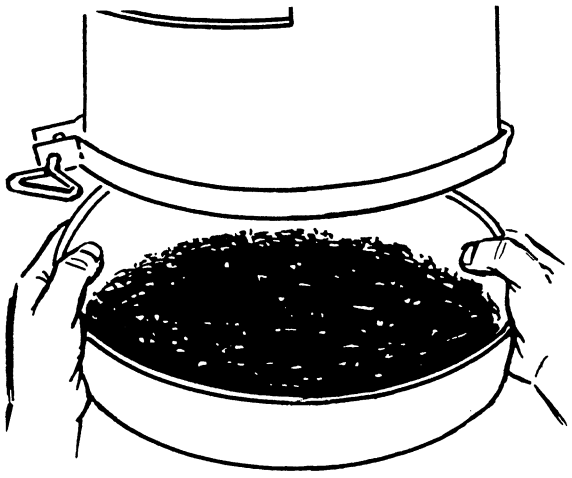
The air cleaner should be inspected constantly for leaks. A damaged air cleaner can seriously affect the performance and life of the engine. The following simple service steps are easily made while the engine is being serviced in the field.

The simple service steps are as follows:

1. Watch all connections for mechanical tightness. Be sure cleaner outlet pipe is not fractured.
2. If cleaner has been dented or damaged, check all connections immediately.
3. In case of leakage and if adjustment does not correct the trouble, replace necessary parts or gaskets.

AIR CLEANERS

USED ON MODELS D-118 & D-145



Empty dust cup daily or more often if required. Dust level should not be allowed to build up to less than one inch from bottom of Donaclone tubes.

Direct dry, clean air up and down the pleats on the clean air side of Duralife filter. Caution — air pressure at nozzle must not exceed 100 PSI. Maintain reasonable distance between nozzle and Duralife filter.

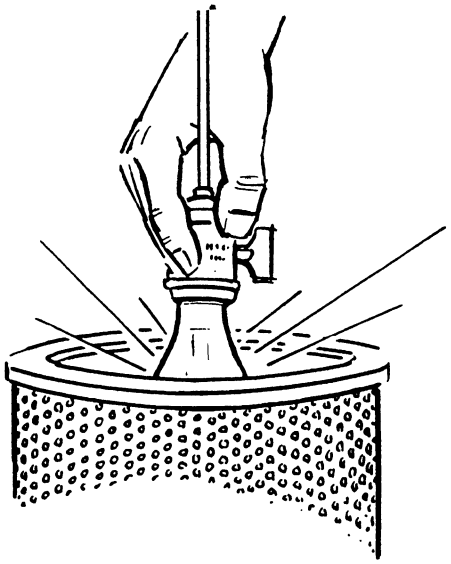
FILTER SHOULD BE REPLACED AFTER 6 CLEANINGS OR ANNUALLY

CAUTION:

DO NOT USE OIL IN DUST CUP.

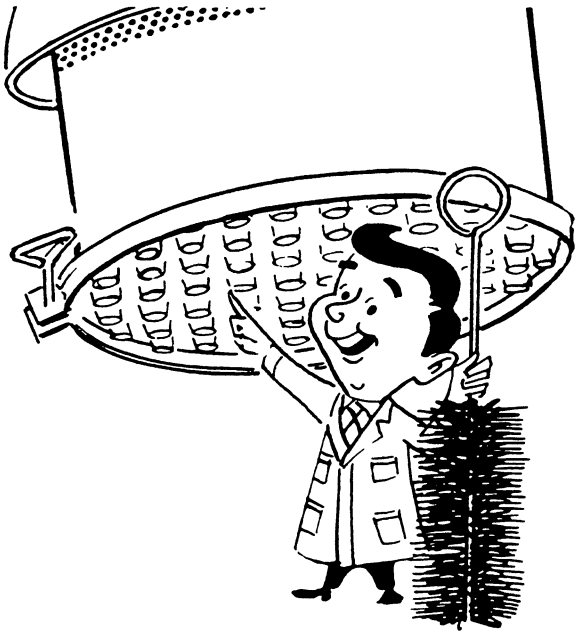
BE SURE DUST CUP FITS AIR TIGHT TO LOWER BODY.

To wash filter, *especially effective for oily and soot laden filters,* use Donaldson D1400 Filter Cleaner. Proportions are 2 oz. of Cleaner to 1 gallon of water. For best mixing results use small amount of cool tap water then add to warm (70°-100°F.) water to give proper proportion. The warmer (100°-F.) the solution the better the cleaning. Soak for 15 minutes. Rinse the filter thoroughly with clean water from hose (maximum pressure 40 PSI). Air dry completely before reusing.



After the element has been dried (a fan or air draft may be used, but do not heat element to hasten drying), inspect element for damage by placing a bright light inside the filter. Thin spots, pin holes or the slightest rupture will render the cartridge unfit for further use.

Inner cover may stick to the element due to temperature change. It is not necessary to remove inner cover for servicing element. If however, element is to be replaced, be sure to re-
inner cover. DO NOT PRY the nner cover off the element. Snug fitting inner cover may be removed easily at room temperature. (Min. 60° F.)



For minimum vehicle down time, replace dirty filter with a new or cleaned Duralife filter. Service later as indicated in the following steps. If element is to be serviced for immediate re-use, re-install outer cover to protect induction system while cleaning element.

Light dust plugging of tubes can be removed with a stiff fibre brush. If heavy plugging with fibrous material is evident, remove lower body section for cleaning with compressed air or water not exceeding 150°F.

INSPECTION CHECK-OFF LIST

At every engine oil change, inspect the following for damage or leaks. Take the necessary corrective measures.

- ☐ Top cover (damage to gasket channel).
- ☐ Top cover gasket.
- ☐ Top cover latches.
- ☐ Inner cover damage (if used).
- ☐ Inner cover gasket (if used).
- ☐ Body, top sealing edge.
- ☐ Restriction tap plug (leaks).
- ☐ Body to outlet joint (leaks).
- ☐ Lower body to upper body sealing edge damage.
- ☐ Lower to upper body retainer damage.
- ☐ Donaclone tubes (plugging and damage).
- ☐ Inlet protecting screen (plugging).
- ☐ Dust cup "O" ring gasket.
- ☐ Dust cup retainer damage.
- ☐ Dust cup (sealing edge damage).
- ☐ Connections between air cleaner and engine.
- ☐ Filter cartridge gasket washer (if used).
- ☐ Filter cartridge gasket.
- ☐ Filter cartridge, leaks, damage.

NOTE:

Filter cartridge leaks are indicated by, 1) Areas of concentrated dust on clean air side of cartridge. 2) Light shining through holes when light bulb is held inside cartridge.

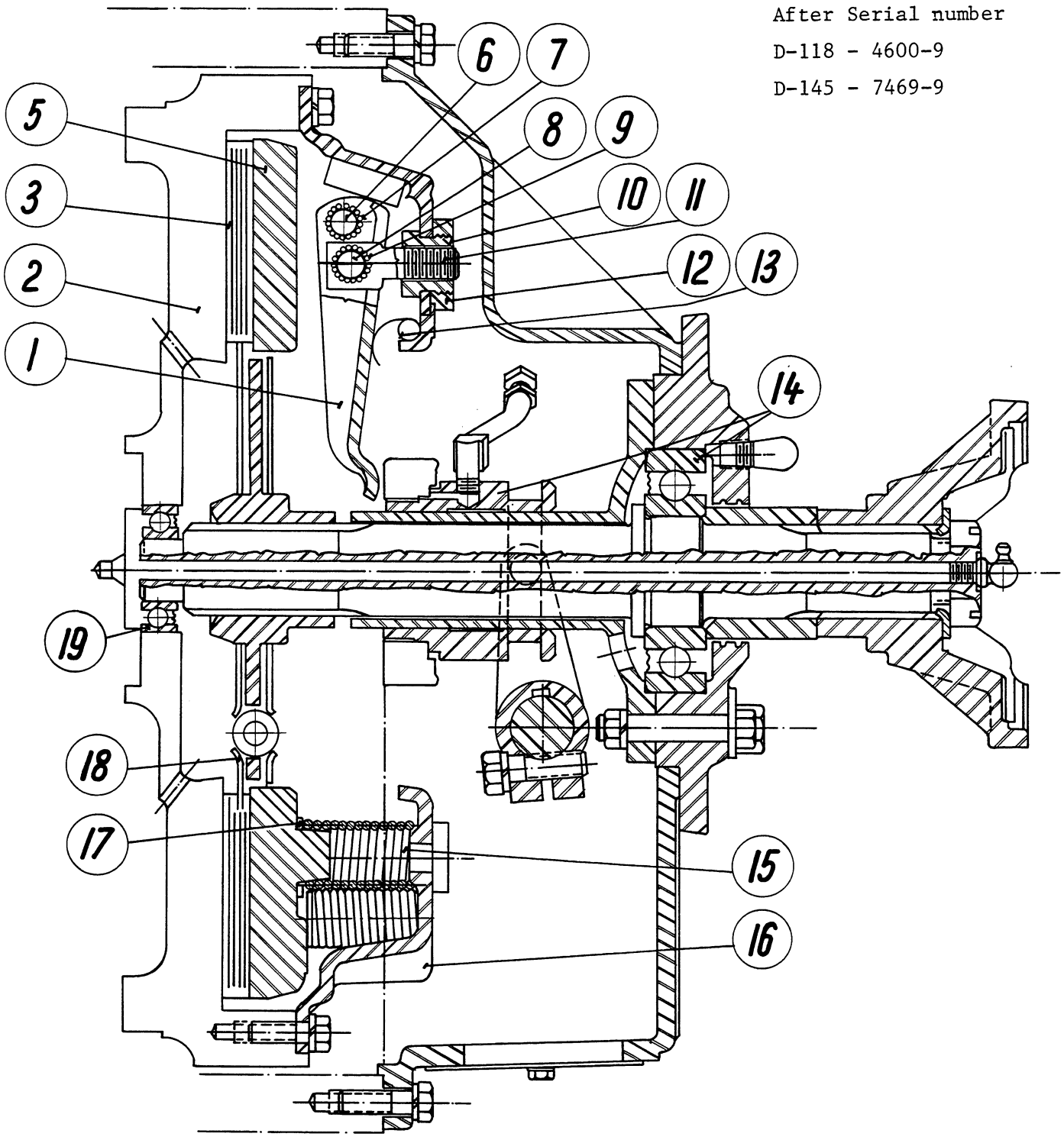
CLUTCH ASSEMBLY

1. Release Lever
2. Engine Flywheel
3. Facing
5. Pressure Plate
6. Pressure Plate Pin
7. Needle Bearing (pressure plate pin)
8. Eye Bolt Pin
9. Needle Bearing (eye bolt)
10. Adjusting Nut
11. Eye Bolt Assembly
12. Lock Nut
13. Retractor Springs
14. Release Bearing
15. Pressure Spring
16. Clutch Flywheel Ring (cover)
17. Insulating Washer
18. Driven Disc Assembly
19. Pilot Bearing

After Serial number

D-118 - 4600-9

D-145 - 7469-9



The Model G-125 uses a 13" single plate dampener type clutch with a feramic facing. The Models D-118 add D-145 use a 14" single plate dampener type clutch with Cera-Metallic pads. The clutch shaft size is 1-1/2" with 10C SAE spline.

OPERATION

The clutch operation is explained by reference to key numbers in Figure 1. The clutch flywheel ring (16) is attached to the engine flywheel (2). The pressure plate (5) is driven by means of driving lugs and mating slots in the flywheel ring (6).

Depressing the clutch pedal disengages the clutch by forcing the release bearing (14) into contact with the release levers (1) and moving them towards the flywheel (2). This retracts the pressure plate (5) from contact with the driven disc assembly (18), thereby disengaging the clutch.

Releasing the clutch pedal engages the clutch by allowing the release bearing (14) and release levers (1) to move away from the engine flywheel (2) and the pressure springs (15) to exert pressure against the pressure plate (5) resulting in the disc assembly (18) being gripped between friction surfaces of engine flywheel (2) and pressure plate (5), thereby completely engaging the clutch.

CLUTCH REMOVAL

1. Remove clutch and brake pedal pads by driving out 1/4" rollpins.

2. Remove front section of floor plate. See Figure A.

3. Disconnect front universal joint on top drive line.

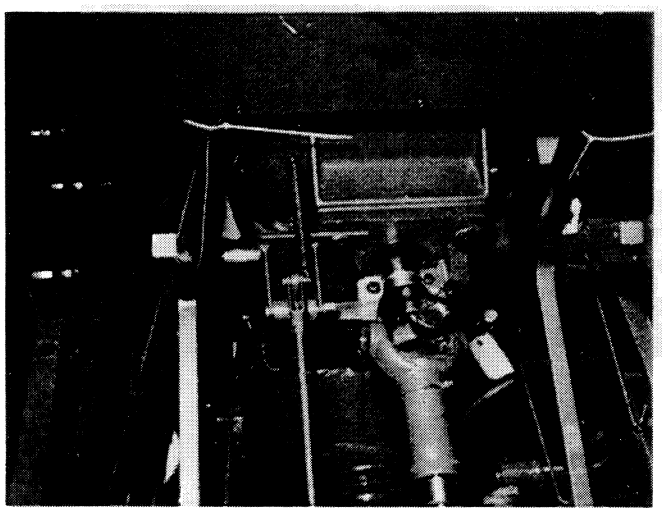


Fig. A
FLOORBOARD REMOVAL

4. Disconnect clutch and brake return springs.

5. Disconnect clutch control rod and transmission brake control rod.

6. Remove 3/8" capscrews around the clutch housing.

7. Remove housing. Clutch shaft and release bearing will remain in the housing. See Figure B.

NOTE: To facilitate removal and reinstallation of the clutch, install three 3/8" x 2-1/4 NC capscrews through the clutch cover

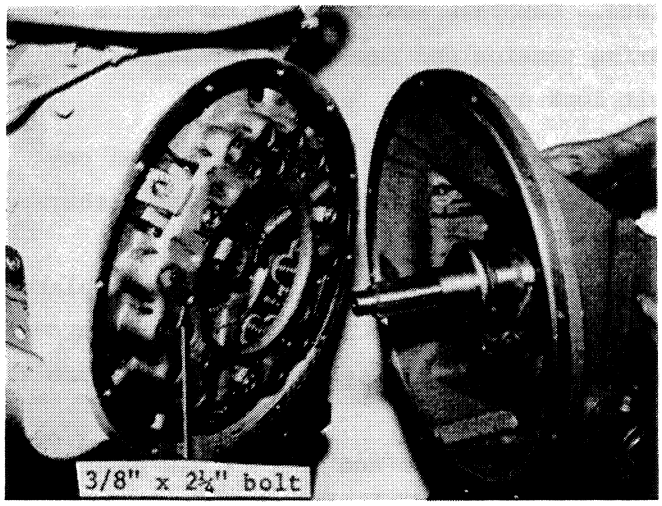


Fig. B
CLUTCH HOUSING

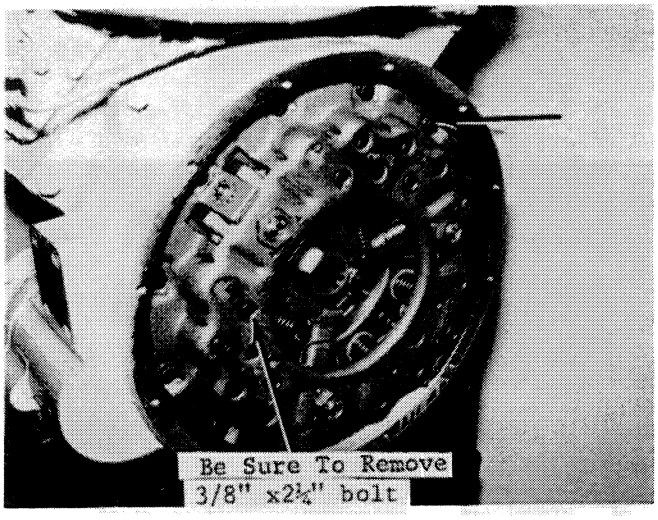


Fig. C
CLUTCH ASSEMBLY

plate and into tapped holes in the pressure plate. This will hold the pressure plate in compression. Be sure to remove these capscrews after installation is completed.

8. Remove 3/8" capscrews from around the perimeter of the clutch plate cover. See Figure C.

9. Remove clutch assembly.

10. Remove clutch driving plate.

CLUTCH OVERHAUL

1. Place cover assembly on table of arbor press or clutch machine, resting on pressure plate. Compress the assembly to relieve spring tension and remove finger adjusting bolt lock nuts.

2. Release the press. Remove flywheel cover, pressure springs and insulating washers.

3. Remove retaining rings and pressure plate pins. Remove release lever assemblies, eyebolt assemblies and adjusting nuts. Figure 2.

4. Clean all parts and inspect all parts as indicated in the following procedure.

1. Replace pressure plate if:
   (a) friction surface is severely heat heat checked.
   (b) it is warped in excess of .015".
   (c) driving surfaces are worn.
   (d) pin holes are elongated.
2. It is recommended that not over 1/32" be removed from friction face by regrinding.
3. Install new needle bearings by pressing on the end of bearing on which part numbers are stamped. This prevents damage to the bearing case. *CAUTION: Using a scored, warped or heat checked pressure plate will cause the facings to disintegrate rapidly and seriously affect clutch life.*

5. Inspect flywheel cover for distortion or cracks. Bolting flanges should be flat to within .015" when checked on a surface plate. A check of the clearance of wear of the driving surfaces should be made by using a new pressure plate as a gauge. There should be not less than .004" or more than .014" movement possibly between the two mating parts. A tight fit may hamper smooth engagement and release while an excessive amount of clearance may cause noise or allow the pressure plate to shift off center and create an unbalanced condition.

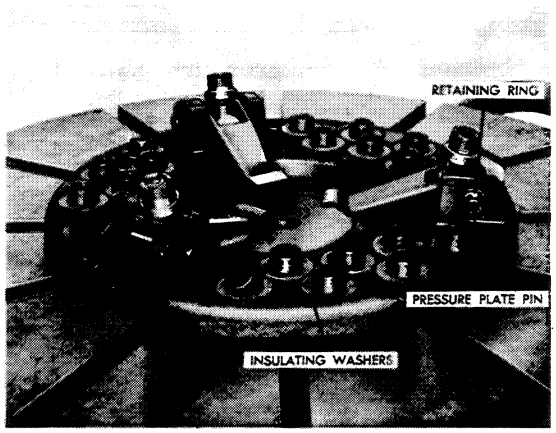


Fig. 2
RELEASE LEVER ASSEMBLY

6. The D-118 and D-145 cover assemblies are piloted to the flywheel by an accurately machined outside diameter of the flywheel cover which fits into a recess machined in the flywheel. In the G-125 assemblies the cover is piloted by body fitting capscrews which hold the assembly to the flywheel. In this case the tapped holes in the flywheel will have a reamed recess to receive the special attaching screws. It is important that the correct capscrews be used.

7. In placing driving lugs in the covers extreme care must be taken to ensure accurate alignment. Before tightening the nuts on the drive lugs place the cover over a new pressure plate with each lug engaging a mating slot in the pressure plate. With a screw driver or pinch bar force the pressure plate against the driving lug as the nut is tightened. Nuts should be torqued to 50 ft.-lb. and be sure that the pressure plate has drive lug clearance as indicated above. Figure 3. *CAUTION: Burred edges on flange surface should be filed so as to ensure flange being drawn tight to the rim of the engine flywheel at time of clutch installation.*

8. It is of vital importance that the pressure springs should be checked for compression weight. This should be 130 lb. at 1-27/32".

CAUTION: Under weight compression springs will reduce clutch capacity and possibly cause slippage of clutch. Therefore, to ensure best clutch performance, new springs should be installed.

9. Release levers must be replaced if the holes for the eyebolt and pressure plate pins are worn, or if worn severely by the release bearing.

10. The disc assembly should be replaced if the following conditions are present.

(a) Hub splines worn.

(b) Disc distorted.

(c) Disc is cracked or broken.

Relining of the clutch disc is not recommended.

CLUTCH ASSEMBLY

1. Place pressure plate on arbor press or table of rebuilding machine with friction face down.

2. Assemble adjusting nuts to eyebolts. Then assemble to release levers using new pins.

3. Assemble levers to pressure plate. Install washers and retaining rings on pressure plate pins.

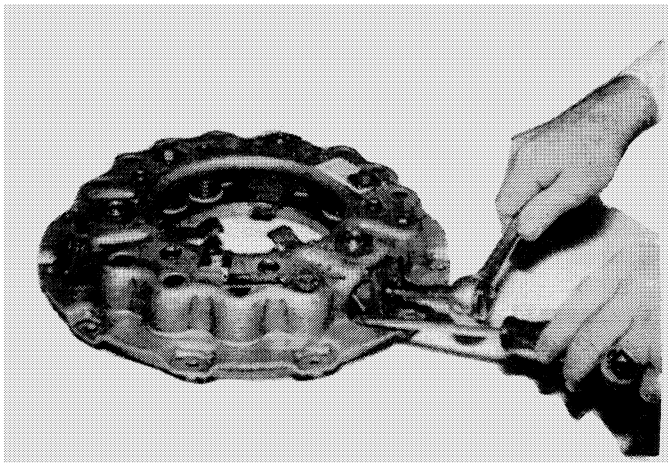


Fig. 3
ALIGNMENT OF DRIVING LUGS

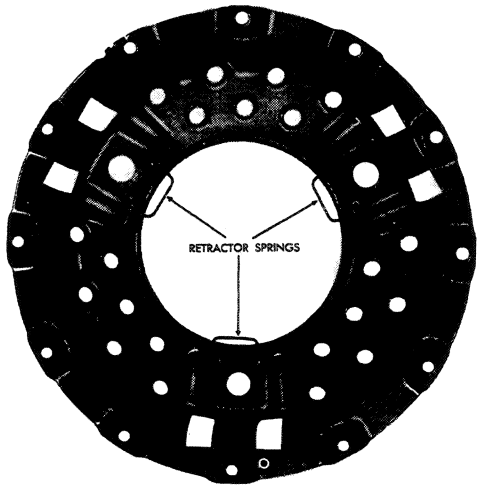


Fig. 4
RETRACTOR SPRINGS

4. Place insulating washers over spring bosses on pressure plate and install springs.

5. Install new finger retractor springs to flywheel cover. Place flywheel cover over pressure springs, making sure each pressure spring is properly positioned.

6. The flywheel cover can now be pressed into position, exercising care to engage the driving lugs into the slots of the cover to avoid distortion.

7. After the flywheel cover has been pressed into position, the adjusting nuts may be pulled up through the holes in the flywheel cover and lock nuts installed.

8. The cover assembly should have three 3/8 - 16 NC x 2-1/4" capscrews installed through the cover into tapped holes in the pressure plate to hold it under compression to facilitate assembling to the flywheel. Press can now be released.

CLUTCH INSTALLATION

1. Before installing clutch check pilot bearing in the flywheel. Replace if necessary. Also check clutch shaft and clutch shaft bearing. Replace if there is indication of excessive wear.
Check release bearing and replace if necessary.
Inside the release bearing carrier there are two felt washers in a machined groove. These should be soaked in oil before installation. Replace release bearing and carrier and flywheel pilot bearing. Pilot bearing should be a hand press fit in the flywheel recess and on the clutch shaft.

2. Install driven disc making sure that it is properly positioned, and install a pilot shaft. Spline is 1-1/2" in diameter. The long end of driven disc hub extends toward the transmission.

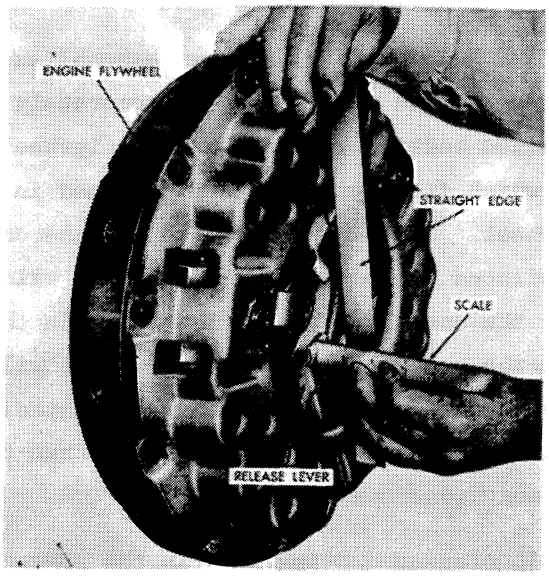


Fig. 5
LEVER ADJUSTMENT

3. Bolt the cover assembly to the flywheel, tightening each capscrew gradually until the cover is drawn up tight. Torque to 25 to 30 ft.-lb. On the D-118 and D-145 make sure the cover is in the recess in the flywheel. Remove three capscrews which hold the cover assembly under compression before removing the aligning shaft.

4. Release levers must be adjusted for height. This can be accomplished by placing a straight edge across the cover assembly and measuring from the end of the lever to the straight edge. See Figure 5. This dimension for the G-125 is 1-1/16", and for the D-118 and D-145 the measurement should be 29/32". Adjusting the lever height is facilitated by starting with the levers low and with the lock nut just snug. Turn the adjusting nut and the lock nut as a unit clockwise until the lever is raised to the desired height. Then hold the adjusting nut firmly with a suitable tool and tighten lock nut securely.

5. Install clutch housing and connect drive line. Adjust clutch linkage for "free pedal". Loosen lock nut and turn the adjustable yoke.
TO INCREASE "FREE PEDAL", LENGTHEN THE ROD UNTIL 2½" FREE TRAVEL IS OBTAINED.

CLUTCH PEDAL ADJUSTMENT

Never wait for the clutch to slip before making a pedal adjustment.

1. Frequently check clutch pedal for pedal "free travel" which is the first easy movement of the pedal.

2. Check clutch pedal "free travel" with hand to be positive that "free travel" is the result of release bearing clearance and not caused by worn linkage.

3. Proper "free pedal" travel is approximate mately $2\frac{1}{2}$" This results in $\frac{1}{4}$" clearance between the release bearing and the clutch release levers. See Fig. 6.

CLUTCH BRAKE

The purpose of the clutch brake is to quickly stop the transmission input shaft for quick and easy shifting of the transmission. When difficulty in shifting is encountered, check the clutch brake as follows:

1. Push clutch pedal down until bottom face of pedal is 1-1/2" from floorboard.

2. The brake block should now be in contact with the drive shaft.

3. Adjust brake by shortening or lengthening the linkage rod. See Figure 7.

NOTE: The clutch brake action is not affected by engine clutch adjustment.

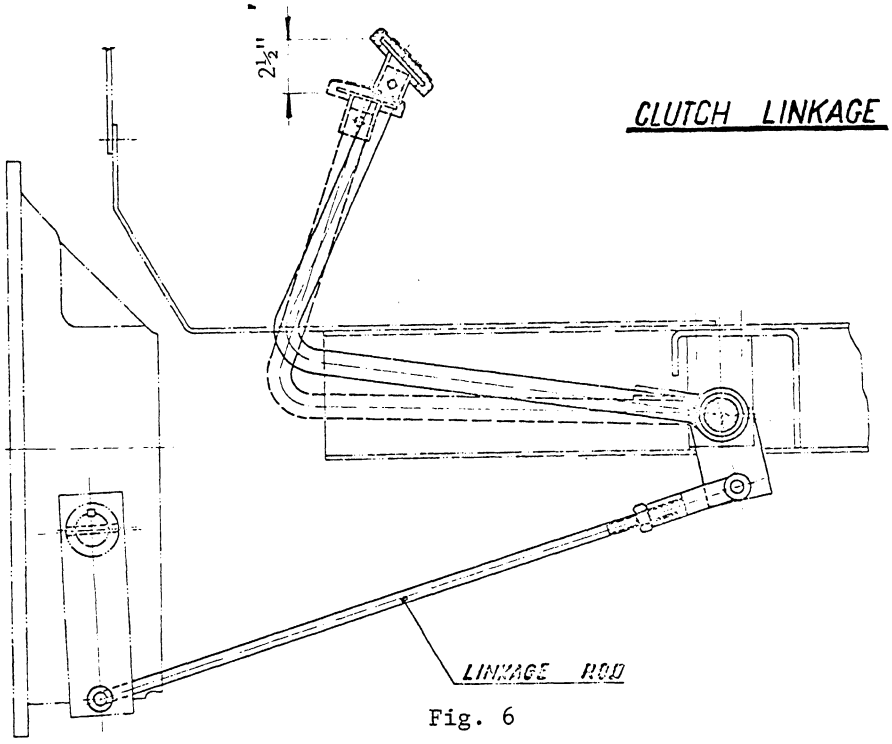


Fig. 6

CLUTCH LINKAGE ADJUSTMENT

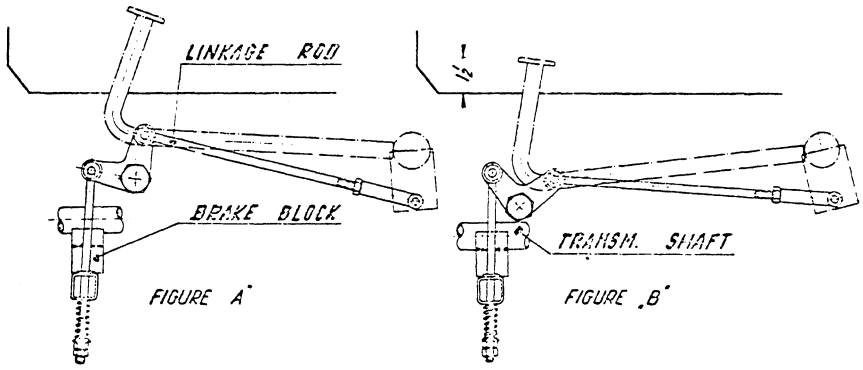


Fig. 7

CLUTCH BRAKE ADJUSTMENT

TRANSMISSION

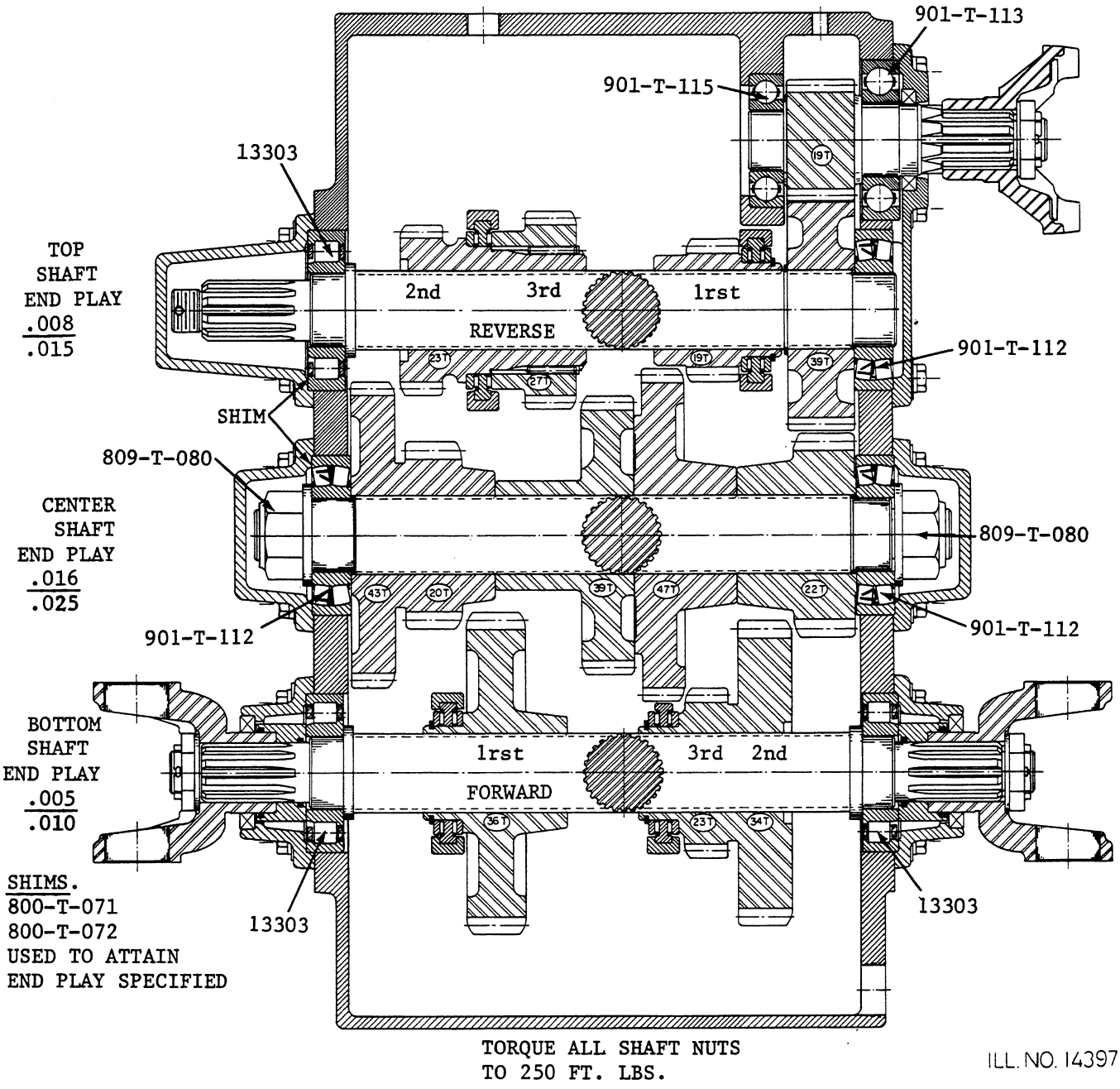
The transmission in all models is a sliding spur gear type. It has three forward and one reverse in three ranges giving a total of nine forward and three reverse speeds. The three forward speeds are selected by sliding spur gears on the bottom shaft of the transmission, and the three range speeds are selected by sliding spur gears on the top shaft of the transmission. The reverse idler is driven by a spur gear on the center shaft and drives a sliding spur gear on the bottom shaft of the transmission.

The transmission case serves as a reservoir for the steering system and transmission lubrication. The return flow of oil is directed from the steering valve through the oil cooler and to a manifold on the transmission which distributes the oil to each bearing of the transmission by external lines.

The following repair procedures may be performed without removing the transmission from the tractor frame.

1. Replacing side cover gasket.
2. Replacing shifter rail and shifter shaft "O" rings.
3. Replacing end cap gaskets and universal joint yoke seals.
4. Replacing shifter forks.
5. Replacing yoke spacer "O" rings.

For all other repair operations the transmission must be removed from the tractor frame.



SECTIONAL VIEW OF THE VERSATILE TRANSMISSION INDICATING POSITION OF SHAFTS, GEARS AND BEARINGS IN THE TRANSMISSION CASE.

TRANSMISSION REMOVAL

The following steps in removal apply to a tractor with or without a cab.

1. Drain transmission oil. The plug is located on the suction line at the bottom front end of the transmission.
2. Remove seat assembly.
3. Remove battery.
4. Remove battery box with rear section of floor board. (If the tractor has a cab, it will be necessary to fold the rug in order to get at the bolts.)
5. Remove transmission filler hose.
6. Remove upper transmission mounting plate.
7. Disconnect the top drive line at the transmission yoke.
8. Remove range lever lock bracket and bracket mounts from right hand side of the transmission.
9. Disconnect oil line to top of transmission oil manifold.
10. Disconnect the shifting rods at the transmission.
11. Remove oil hose from bottom front end of transmission.
12. Remove bottom front drive line by taking out all four bearing caps and seals at both ends of the line. (The driveline is easiest to remove if the rear of the tractor is jacked up enough to allow the erear wheels to turn freely.)
13. Remove bottom transmission mounting bolts.
14. Disconnect bottom rear drive line at the transmission yoke.
15. Loop lifting chain around the top rear bearing cap, and top front drive line yoke. (If the tractor has a cab, it will be necessary to use a suitable crane or a front end loader with a beam long enough to go through the cab door and over the top of the transmission.) Turn the transmission counterclockwise at about a 45° angle while lifting it, in order to clear the hydraulic lines. Care must be taken or hoses will be damaged. The transmission will come out through the cab door.

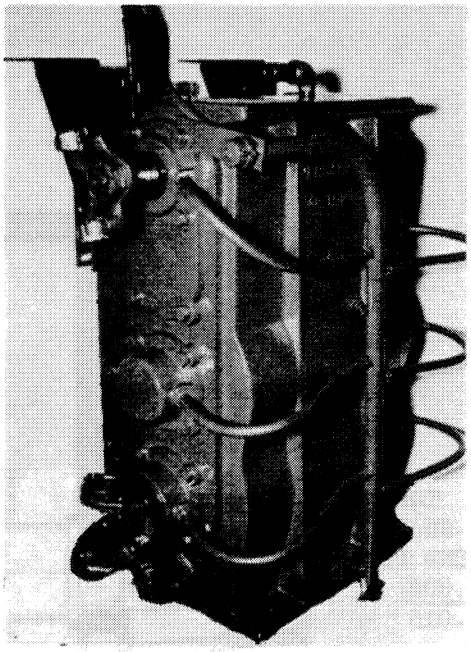


Fig. A

TRANSMISSION ASSEMBLY

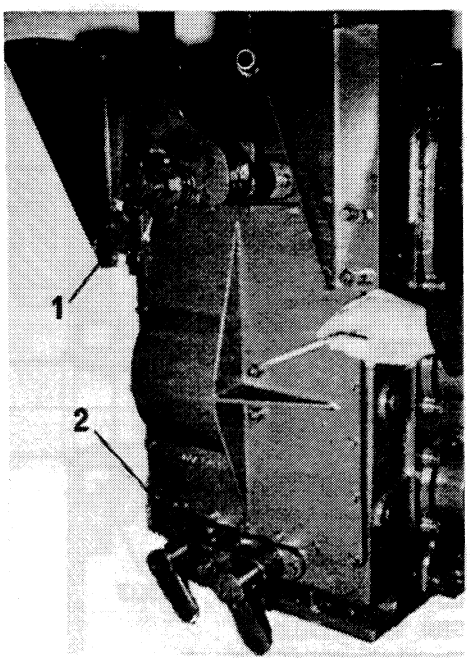


Fig. B

REVERSE IDLER CAPSCREWS

TRANSMISSION DISASSEMBLY

1. Remove lubricating oil manifold and hoses. These hoses are the push-on type as shown in Figure A.
2. Place transmission on stand or suitable bench with side plate up.

3. Drive rollpins out of shifting levers and remove levers. Remove double nuts, springs, shift lever, spacers and interlock plate from top stud, Item 1, Figure B. Remove double nuts and interlock plate from bottom stud, Item 1, Figure B.

4. Remove capscrews around side plate. *NOTE: Capscrews along the side of the plate are 3/8" x 1-1/4". Capscrews along the top and bottom of side plate are 3/8" x 1".*

Remove two 1/2" socket head screws indicated in Figure B. Using two 3/8" jack screws in side plate, lift and remove side plate.

5. Loosen 1/2" socket head screw in the reverse idler shaft support clamp and drive reverse idler shaft out to the rear of the transmission case. Remove reverse idler, thrust washers and spacers.

6. Remove cotterpins, detent springs and balls from shifter forks.

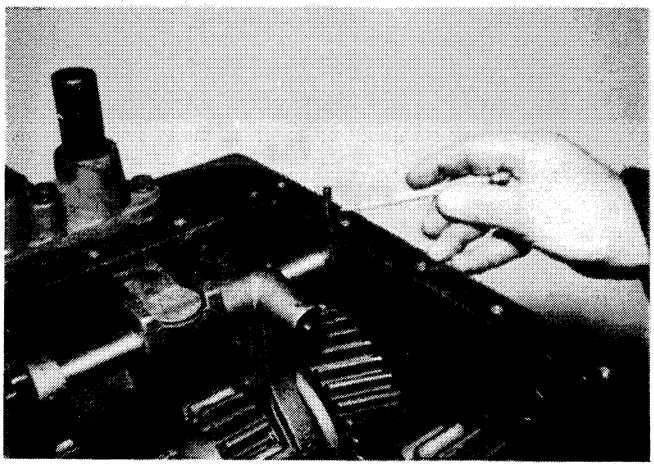


Fig. C
SHIFTER RAIL ROLLPIN

7. On transmissions prior to Serial No. T8-311B, the rollpins retaining shifter rail are on the outside of the transmission case. Remove rollpins or cotterpins and drive shifter rails out of transmission case. On transmissions, Serial No. T8-311B and on the rollpin retaining the shifter rail is located in a drilled hole in the front edge of the transmission case as indicated in Figure C. Drive the rollpins into the center of the shifter rail. Do not drive rollpin any deeper than one inch below the machined surface of the transmission case. Drive shifter rails out of transmission case. Remove rollpin from end of shifter rail.

8. Remove shifter forks. The forks should be tight around the shifting collar, and it will be necessary to pry them off the shifting collars.

9. Shift sliding gears into two gears to lock the shafts and remove the three universal joint yokes.

10. Remove input shaft bearing cap and rear top shaft bearing cap.

11. Using a brass drift, drive top shaft towards the rear until the helical driven gear can be removed. Remove snap ring retaining the driven gear. Pull shaft from the transmission and remove gears noting the position of the gears in the case.

12. Input shaft and bearings can now be driven out the front of the transmission case.

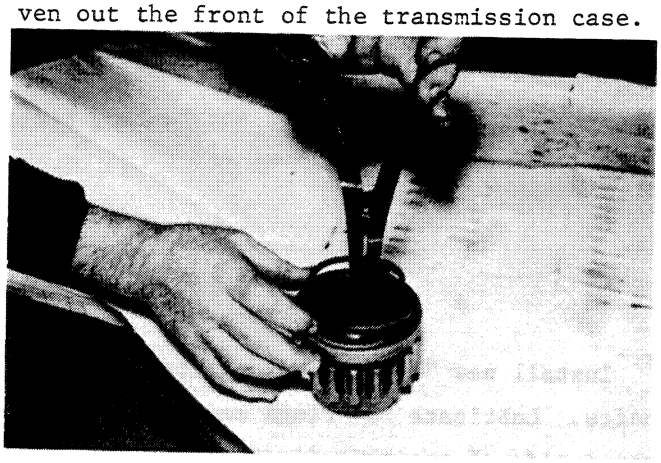


Fig. D
THRUST COLLAR REMOVAL

13. To remove the thrust collar on the low range gear, remove snap ring, thrust washer, thrust bearing, thrust collar and the inner thrust bearing and washer as shown in Figure D. Inspect bearings and collar for wear. Replace if necessary. Thrust collar must turn freely on thrust bearings.

14. To remove the thrust collar on the second and third range gears, the gears must be pressed apart. There is only one thrust washer in this assembly. This thrust washer

is assembled against the smaller second gear. The gears are keyed together with two keys.

15. Remove center shaft bearing caps. Note the number of shims under the cap. Lock the center shaft and bottom shaft together with the sliding gears on bottom shaft and remove nut and washer from rear end of center shaft.

16. Using brass drift or soft hammer, drive center shaft out the front of the transmission case as shown in Figure E. Note position and location of gears. Remove gears from transmission case

17. Remove bearing caps and yoke spacers from bottom shaft. Drive shaft out of transmission case. Note position and location of gears and remove from transmission case.

18. Remove shifter arms by pushing them into the inside of transmission case as shown in Figure F.

19. Clean and wash transmission case and all parts. Inspect all gears for chipped or worn teeth. Check all bearings. Check all shifting collars, thrust bearings and bearing bores.

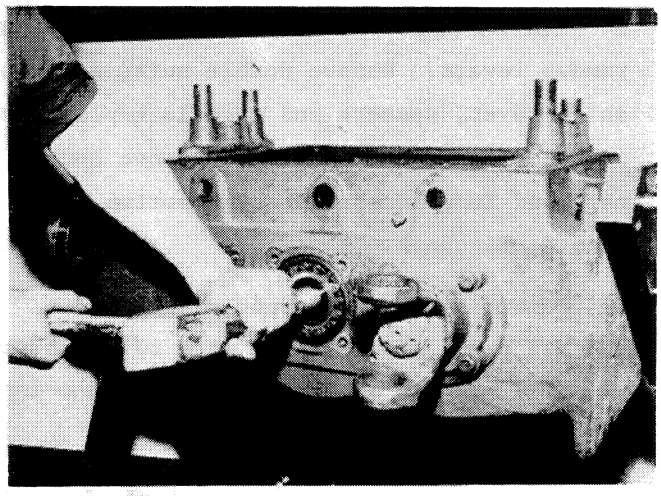


Fig. E

SHAFT REMOVAL

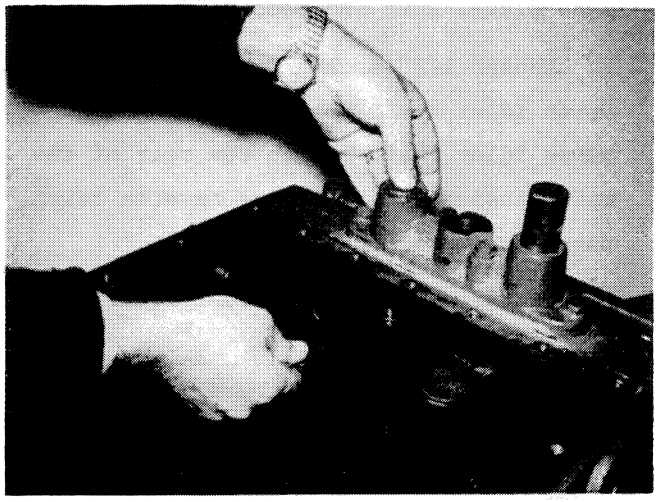


Fig. F

SHIFT ARM REMOVAL

TRANSMISSION ASSEMBLY

Install new "O" rings on shifter arm shafts. Lubricate "O" rings and insert shafts from inside of transmission case. A spacer washer is used between shifter arm and transmission case as shown in Figure F.

1. Press bearings on input shaft as shown in Figure J, and install in transmission case.
2. Install bearing spacer and bearing on splined end of top shaft. If original bearing were S.K.F # 6311 ball bearing, replace with 901-T-112 roller bearings. Insert shaft through rear bearing bore, and install double gear assembly (23 & 27 tooth) with the smaller gear to the rear. Install 19 tooth gear with the shift collar towards the front as shown in

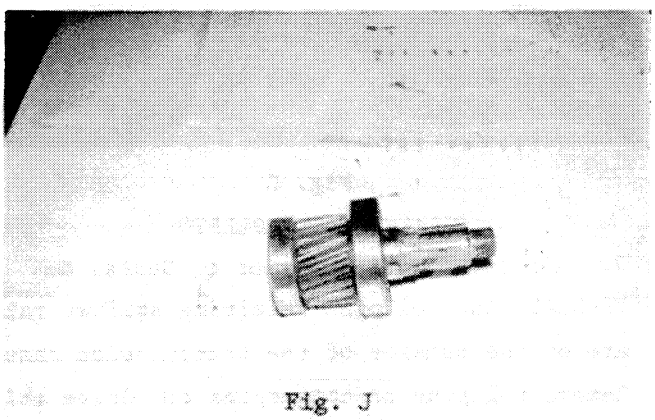


Fig. J

INPUT SHAFT ASSEMBLY

Figure K. Slide retaining ring (901-T-114) approximately one inch into the spline. Position helical gear (800-T-002-B) to engage with gear on input shaft, push the shaft through the gear and seat the retaining ring in the groove.

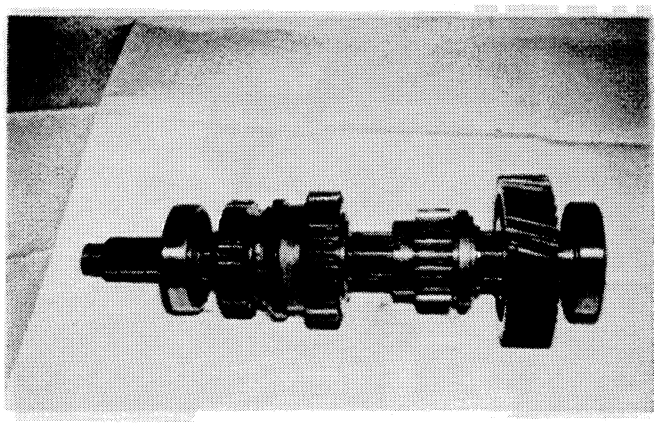


Fig. K
TOP SHAFT ASSEMBLY

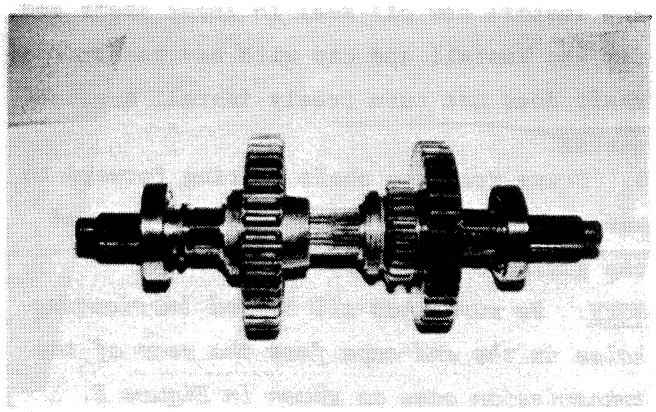


Fig. G
BOTTOM SHAFT ASSEMBLY

3. Install bearing on center shaft and install through rear bearing bore. Install cluster gear, 43 tooth and 20 tooth, with smaller gear to front of transmission. Install 39 tooth gear with long hub to rear. Install 47 tooth gear with long hub towards the front of the transmission. Install 22 tooth gear with long hub to rear. Install bearing, washer and nut. See Figure I for proper stack up. Tighten nut to 250 ft.-lb.

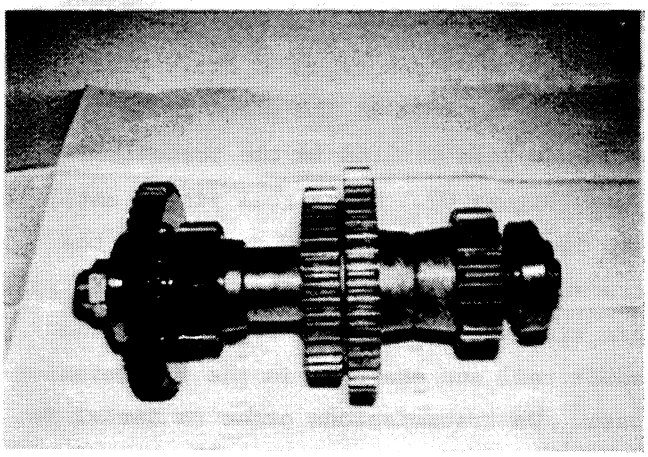


Fig. I
CENTER SHAFT ASSEMBLY

4. Install bearing and bearing spacer on bottom shaft. Insert shaft through rear bearing bore and install 36 tooth gear with shifting collar towards the rear. Install cluster gear, 34 tooth and 23 tooth, on shaft with shifting collar to rear. Drive rear bearing into bearing bore and install bearing spacer and front bearing. See Figure G for proper stack up. Slip yokes on shaft to center oil seals before tightening end caps.

5. Install new "O" rings in yoke spacer and install on rear of bottom shaft as shown in Figure H.
NOTE: Lubricate "O" rings and press spacer on shaft. Do not turn or twist spacer when installing as "O" rings could be damaged.
Drive front bearing in until bearings are properly seated. Spacer washers should be tight between bearing and shoulder of shaft. Install yoke spacer, end cap gasket and end cap. Slip yoke on shaft to center oil seal before tightening end cap.

Fig. H
YOKE SPACER

6. Install new end cap gasket and end cap on front end of center shaft. Drive rear bearing in to make sure bearing is seated. Measure the distance rear bearing protrudes from case. Measure depth of machine bore in end cap. Add enough gaskets to give .012" to .020" end clearance. Allow .010" per gasket.

7. Install new oil seal in input shaft end cap and install end cap with new gasket. If shaft does not turn freely install another gasket.

8. Drive rear top shaft bearing forward to ensure proper seating and install new end cap gasket and end cap.

NOTE: Be sure that all tapped lubricating holes in the end caps face the rear of the transmission case as shown in Figure L. Make sure that all shafts turn freely.

Fig. M
SHIFT RAIL ASSEMBLY

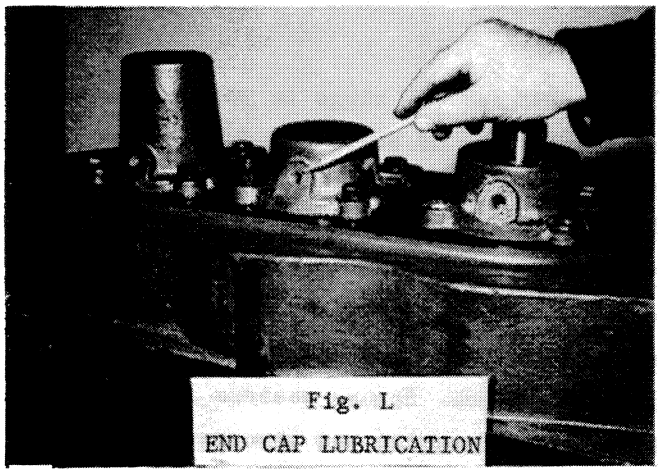


Fig. L
END CAP LUBRICATION

9. Install large diameter shifting fork, Part No. 800-T-028-B, over shifting collar on rear of the top shaft with detent boss facing the center of the transmission as shown in Figure N.

NOTE: All shifting forks must fit tight over the shifting collar so the collars cannot turn inside the fork. The fork should have to be driven on to the shifting collar. If the forks are too loose, bend the forks together with a hammer.

10. Install small diameter shifting fork, Part No. 800-T-026-B, over shifting collar on the small gear on the top shaft with detent boss toward the center of the transmission as shown in Figure N.

11. Install shift rail through transmission case and through shifting forks. The end with only two detent grooves is situated to the front of the transmission. The detent grooves must face the center of the transmission and shown in Figure M. Slide shift rail through both shifting forks before installing

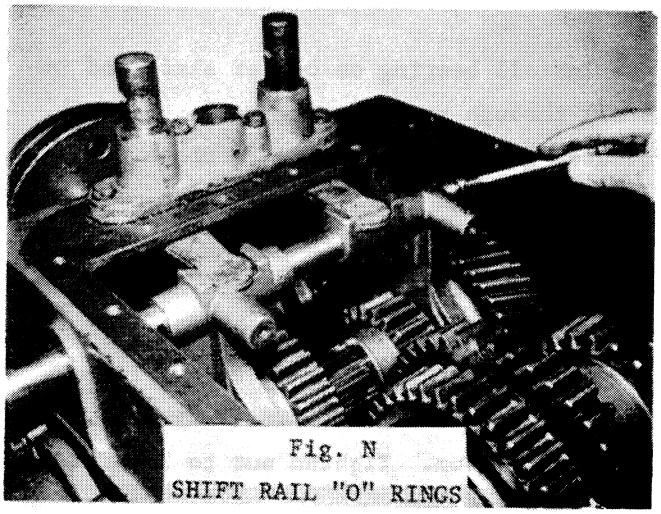


Fig. N
SHIFT RAIL "O" RINGS

O-ring as shown in Figure O. Drive shift rail in until the hole in the shift rail lines up with the hole drilled in the transmission case (Figure O). Drive roll pin in until the end is 1/2" from machined surface of the transmission case. This posistions the roll pin with one half of its length into the shift rail and one half in the transmission case. On transmissions prior to Serial No. T8-311B, the shift rail extends through the

Fig. O
SHIFT RAIL POSITION