Massey Harris
Massey Ferguson

Service Manual

MF65

Gas & Diesel

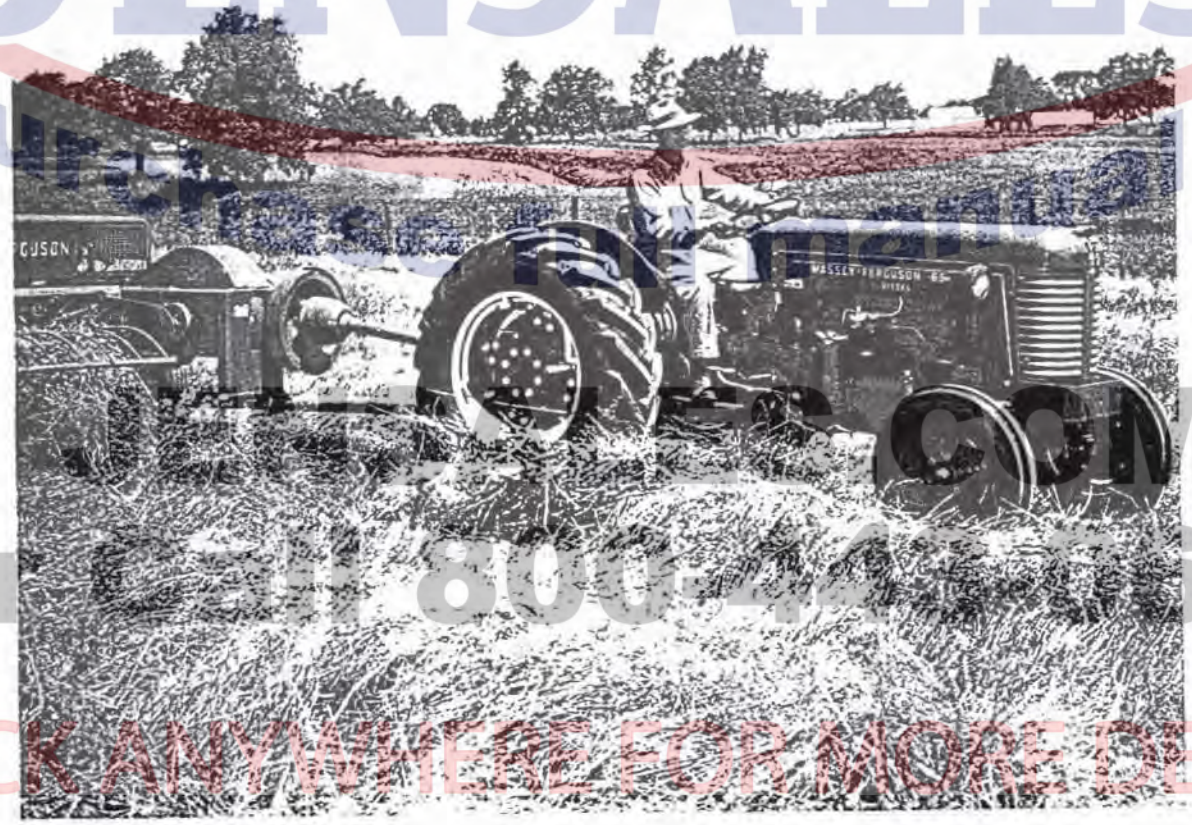
Service® Manual

JENSALES

MH-S-MF65

MF 65
TRACTOR

WORKSHOP SERVICE MANUAL



PART 2. FRONT AXLE ASSEMBLIES
MF 50 AND 65 TRACTORS

INDEX

SERVICING MF 50 & 65 MULTI-PURPOSE, STANDARD, HI-ARCH, AND UTILITY FRONT AXLE ASSEMBLIES

Similiarities between front axle assemblies of the Multi-Purpose, Standard, Hi-Arch and Utility description permit servicing procedures of these assemblies to be combined and discussed as one.

Single wheel front axle assemblies and twin wheel front axle assemblies each deserve separate discussions of servicing procedures. The procedures concerning axles of this type will include servicing the front pedestal and support assemblies.

Consult the Parts Book for information regarding the inter-change features of parts.

REMOVING FRONT AXLE AS A UNIT

Front axle assemblies of this description are removed as a unit when complete disassembly is not necessary.

Support the tractor with front wheel slightly touching the ground, refer to Fig. 1, and remove:

1. Lower grill panel.

2. Lower steering arm, No. 3, from pedestal shaft.

3. Thrust plate, No. 20, and shims from end of front pivot pin.

4. Front pivot support.

5. Front axle assembly by rolling the unit forward and out from tractor (a floor jack supporting the front axle center member facilitates easy handling when following this procedure). See Fig. 5.

Install the assembly as a unit by reversing the procedures for removing.

REMOVING FRONT AXLE TO DISASSEMBLE

When front axles of this description are to be completely disassembled, remove the assemblies as follows:

1. Slightly loosen the wheel lug nuts.

2. Support tractor with front wheels clearing the ground.

3. Remove:

a. Front wheels.

b. Lower grill panel.

c. Grease fittings.

d. Tie rods ends, Nos. 1 and 9, from spindle steering arms, Nos. 10 and 27. Fig. 1.

e. Tie rods end No. 6, from main steering arm, No. 3.

f. Main steering arm from pedestal shaft.

g. Both R.H. and L.H. axle extension assemblies, Nos. 15 and 25, Fig. 1, (if so equipped).

h. Pivot thrust plate, No. 20, and shims, No. 21.

NOTE: Save the shims.

PART 5—POWER STEERING PUMPS—MF 35, 50 AND 65 TRACTORS

INDEX

DESCRIPTION

The power steering pump is constant running, gear type and is driven by the camshaft gear train. The pump delivers a volume of oil to the system with a regulated pressure of 1100 to 1200 psi, except on the MF 65 Diesel with the direct injection engine, tractor Serial No. 685 996 and up, which has a regulated pressure of 1500 psi. A relief valve is located in the pump to maintain this pressure.

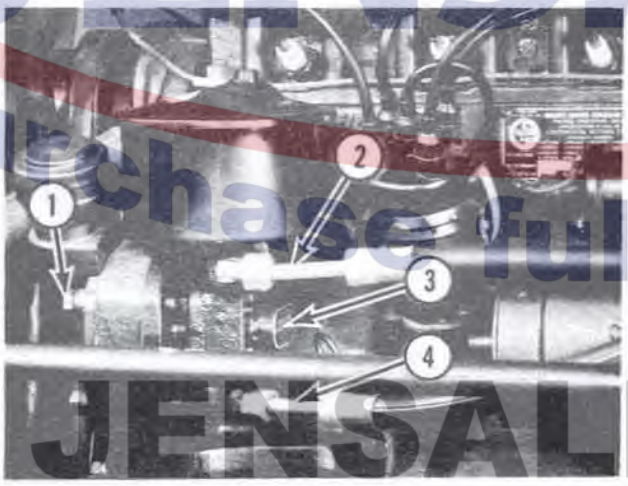


Fig. 1 – Barnes Power Steering Pump
1. Mounting Bolt 2. Return Line 3. Name Plate 4. Pressure Line

Fig. 2 – Cessna Power Steering Pump

SERVICING PUMP (Gas Tractors)

The power steering pumps listed in this section are used on MF and TO 35, 40 and 50 Tractors, also MF 65 Tractors. The early model 35, 40, 50 and 65 Gas Tractors use the Barnes pump, which can be identified by a tag on the housing; see Fig. 1. This pump can be replaced for service by a Cessna pump which is also used on late model gas tractors. See Fig. 2 for identification of this pump.

NOTE: The pump drive gear used on the 35, 40 and 50 gasoline model tractors is different from that used on the 65 gasoline tractors.

GROUP IV — SECTION A — PART 6

MANUAL AND POWER STEERING GEAR HOUSING

MF 50 AND MF 65 TRACTORS

INDEX

The power and manual steering gear housing are exactly the same. There are slight variations between the 50 (MF and MH) (Utility, Multi-Purpose, Hi-Arch Axle) models, the MF 65 (Standard and Hi-Arch Axle) models and the 50 (MF and MH) and MF 65 Row Crop models. As this difference is slight, servicing instructions will be given only once.

NOTE: Be sure to note the type of axle and model of tractor and the tractor serial number before ordering parts.

SERVICING THE STEERING GEAR HOUSING

REMOVING AND DISASSEMBLING THE STEERING GEAR HOUSING

If repair of the steering mechanism only is involved, it is desirable to leave the steering gear housing attached to the top of the transmission. Remove the instrument panel and battery carrier as a unit as outlined in Group IV, Section C, Part 3. This completely exposes the steering gear housing (see Fig. 1).

Fig. 1 – Steering Gear Housing

If it is deemed necessary to remove the steering gear housing from the transmission, however, simply remove the attaching cap

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GROUP IV – SECTION A – PART 7

SERVICING THE MANUAL STEERING PEDESTAL AND DRAG LINK ASSEMBLY MF 50 & 65 TRACTORS

INDEX

The manual steering pedestal and drag link assembly information found in this part of the Shop Manual, concerns the assembly required by axles of the wide type. Pedestal assemblies for Row Crop Single and Twin Front Axles are discussed in Group IV, Section A, Part 2.

Certain preparations must be made before this assembly can be completely removed and disassembled. Refer to Group IV, Section C, Part 6, and remove the grill, hood and side panels, and lower grill panel. Refer to Group IV, Section C, Part 6, and remove fan shroud and radiator assembly. Refer to Group IV, Section A, Part 2, and remove the front axle assembly from the front axle support (remove front axle as a unit, including wheels). Figs. 2, 3 and 4 show cut-away views of the pedestal, drag link and steering for the various front axle assemblies.

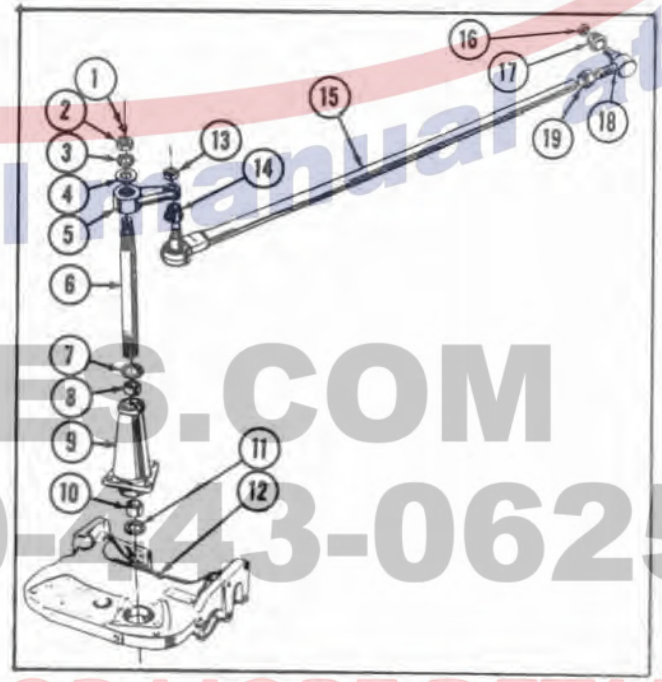

Fig. 1 – Pedestal and Drag Link Assembly Nomenclature

1. Grease Fitting
2. Nut
3. Lock Washer
4. Flat Washer
5. Upper Arm
6. Pedestal Shaft
7. Upper Dust Seal
8. Upper Bushing
9. Pedestal Housing
10. Lower Bushing
11. Lower Dust Seal
12. Axle Support Assembly
13. Nut
14. Dust Seal
15. Drag Link
16. Nut
17. Dust Seal
18. Tie Rod End
19. Lock Nut

REMOVING THE PEDESTAL

Suport the tractor at the rear of the front axle support casting. Refer to Fig. 1, and proceed to remove:

1. Drag link, No. 15, from upper arm, No. 5.
2. Upper pedestal assembly, No. 9, pedestal shaft, No. 6, and upper arm as a unit by removing the cap screws securing the unit to front axle support, No. 12.

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PART 8. SERVICING THE POWER STEERING PEDESTAL, CYLINDERS AND VALVES MF 50 & 65 TRACTORS

INDEX

Both manual and power steering utilize many common parts such as the steering housing, gears, etc.; however, the power steering requires an altered pedestal assembly and upper arm and the addition of a pump, power cylinder, control valve, connecting linkage and hoses.

The power cylinder and control valve mounted next to the pedestal are the external type; that is, they are not integral with the steering housing. By opening the R.H. or L.H. grills, the adjustments on the power steering mechanism may be readily made. The control valve, atop the power cylinder, regulates the flow of oil to and from the cylinder while the power cylinder provides the force to rotate the front wheels. The piston end of the power cylinder is attached to a bracket on the top of the main front support casting and barrel end of the cylinder is secured to the splined arm on the pedestal shaft. The control valve is connected to the same arm that the drag link is fastened to. This arm is not splined to the pedestal shaft and is free to turn. The only connection between the valve arm and the cylinder arm is a valve adjusting pin. This pin secured to the valve arm extends into the cylinder arm in a loose fitting socket.

SERVICING THE POWER STEERING VALVES

The following procedure is for valves on MF 50 tractors prior to Serial Number 516 788 and on MF 65 tractors prior to Serial Number 650 369. This valve may be further identified as being the one which sets on top of the cylinder and is not a part of the cylinder end cap. Fig. 1 shows the oil flow for a right and left turn.

REMOVING THE VALVE

1. Drain the power steering system.

2. Open the R.H. grill door and disconnect the hoses to the valve.

3. Remove the bolts securing the valve to the cylinder.

4. Disconnect the linkage to the pedestal at pin (No. 1, Fig. 2) and lift away the valve.

DISASSEMBLING THE VALVE

1. Drive out the roll pin attaching the adjusting linkage (No. 2) to the link (No. 3, Fig. 2).

NOTE: Make sure that the slotted end of the valve end rod assembly (No. 13, Fig. 3) is not collapsed while driving the roll pin in or out.

2. Pierce with a sharp center punch and pry out the dust seal retainer (No. 17) and take out the dust seal (No. 16, Fig. 3).

3. Remove the snap ring (No. 15) and remove the spool from the valve body (No. 4, Fig. 3).

4. Slide the thrust washer (No. 14) from the valve link (No. 13, Fig. 3).

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GROUP IV — SECTION B — PART 4

FRONT WHEEL AND HUB ASSEMBLIES
35, 50 & 65 (MF & TO) TRACTORS

INDEX

Similarities exist between various wheel and hub assemblies that allow the servicing procedures involving several assemblies to be discussed as one group.

Front wheel and hub assemblies have interchange features that permit some exchange of parts and assemblies between the 35, 50 and 65 (MF & TO) tractors as well as permitting an exchange between several front axle assemblies. However, the interchange features are limited to the combinations as discussed in this text.

Hub assemblies for the following combinations are interchangeable within this group inclusively:

1. The 35 (MF & TO) tractor front axle.
2. The MF 50 tractor equipped with Utility, Hi-Arch, or Row Crop Twin Front Axle.
3. The MF 65 tractor equipped with Standard, Hi-Arch, or Row Crop Twin Front Axle.

Hub assemblies may also be interchanged within another group of combinations which are listed as follows:

1. The MF 50 tractor equipped with Row Crop Single Wheel Front Axle.
2. The MF 65 tractor equipped with Row Crop Single Wheel Front Axle.

No interchangeable features are provided for hub assemblies required for the combinations listed within the group as follows:

1. The MF 50 tractor equipped with a Multi-Purpose Front Axle.
2. The MF 65 tractor equipped with a Utility Front Axle.

Wheel assemblies may be interchanged within certain limitations. Refer to the Tractor Parts Book.

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PART 3. INSTRUMENT PANEL AND SHEET METAL

MF 65 TRACTOR

INDEX

This Part shall cover the removal of the larger, and more important, sheet metal items. Along with this, the removal and installation of the instrument panel and battery carrier is also covered.

The procedures listed are not specific, but will aid in the removal and installation of the various sheet metal items of all MF 65 tractors (gas, Diesel or L.P.G.).

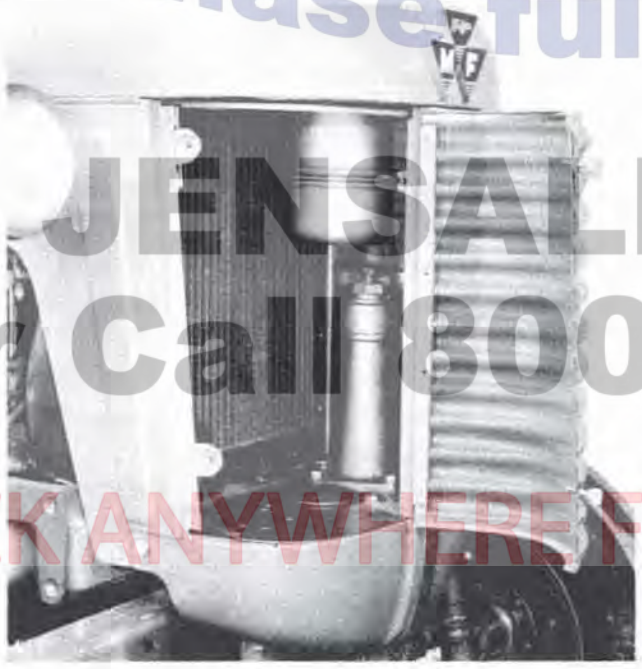

Fig. 1 — Opening Right Grill Door

SERVICING THE GRILL ASSEMBLY

The grill consists of two corrugated panels of 18 gauge perforated steel with 1/16 inch diameter staggered holes.

REMOVING THE GRILL ASSEMBLY

The right side of the grill is hinged to the center bar and secured in position by two thumb screws. Loosening the thumb screws allows this side of the grill to swing open, as shown in Fig. 1.

The left side of the grill is held in position by two pins at the bottom and two at the top of the grill. To remove the left grill section, open the hood panel and lift the grill section off the pins, as shown in Fig. 2.

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GROUP 1 — SECTION A — PART 3

CYLINDER HEAD ASSEMBLY SERVICING

INDEX

The cylinder head assembly as referred to in this part consists of the cylinder head complete with valves, rocker arm assembly and push rods. To obtain specifications and step by step removal and installation procedures, refer to the individual engine sections.

When the head is removed from the block, it is possible to remove the valves by compressing the valve springs with the valve spring compressor as shown in Fig. 1. The locks, spring retainer and spring may then be lifted off from the valve stem. Always place the valves in a numbered rack so that they can be reinstalled in their original position.

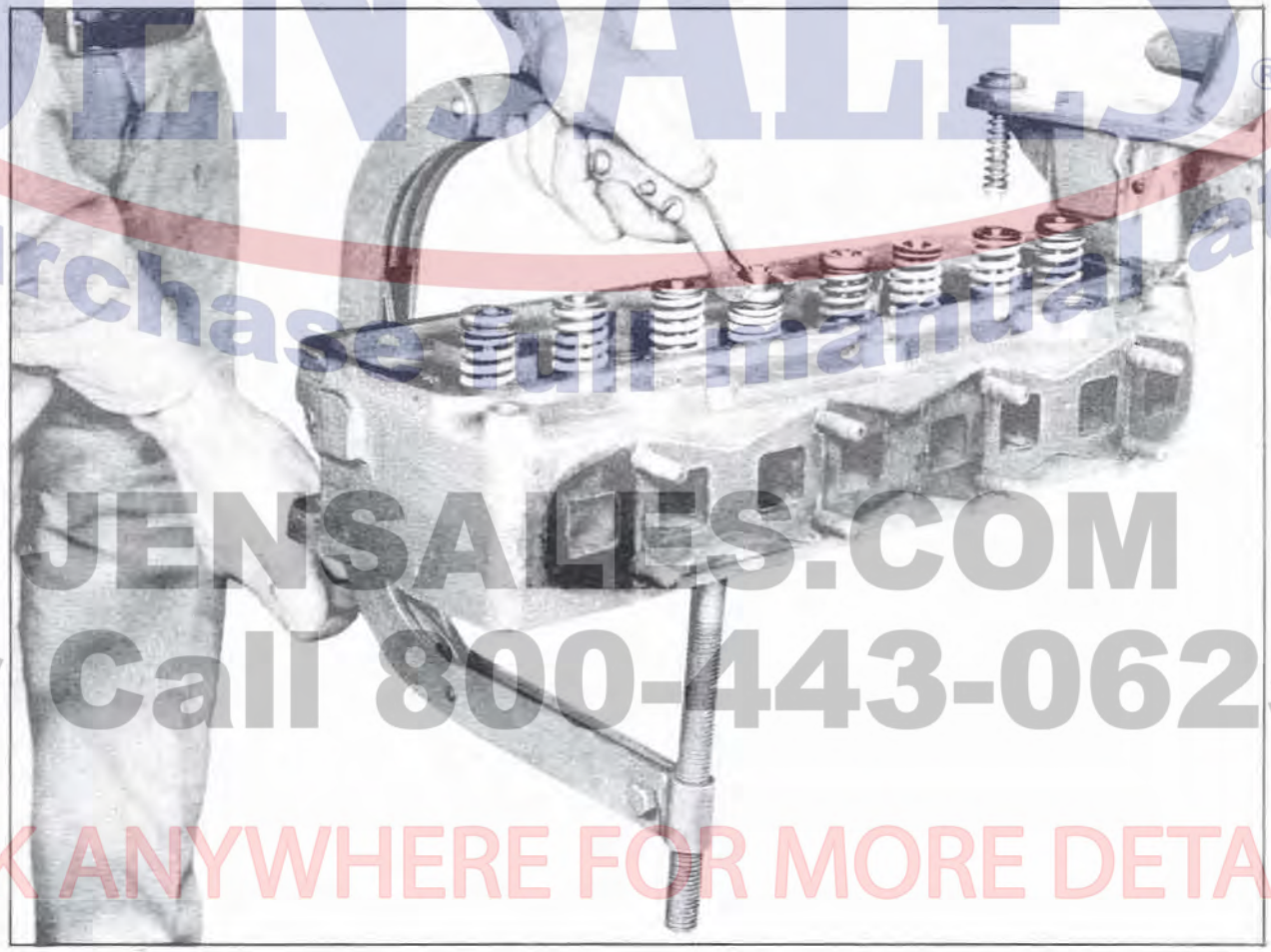

Fig. 1 - Using a Valve Spring Compressor

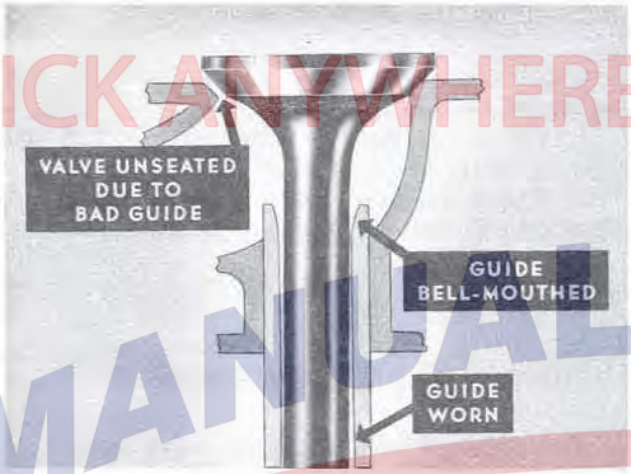

Fig. 17 - Valve Guide Wear

RESULTS OF WORN VALVE GUIDES

Wear from side pressures exerted on the valve stem by the rocker arm eventually make the bore of the valve guide egg-shaped or bell-mouthed at the ends as shown in Fig. 17.

Worn valve guides cause an improper seating action and early valve failure.

When the valve guide bore in a gas engine becomes excessively worn, it can be a cause of excessive oil consumption. The pressure differential resulting from the partial vacuum in the intake port and atmospheric pressure on the top side of the cylinder head forces the oil down between the guide and stem into the combustion chamber where it is burned.

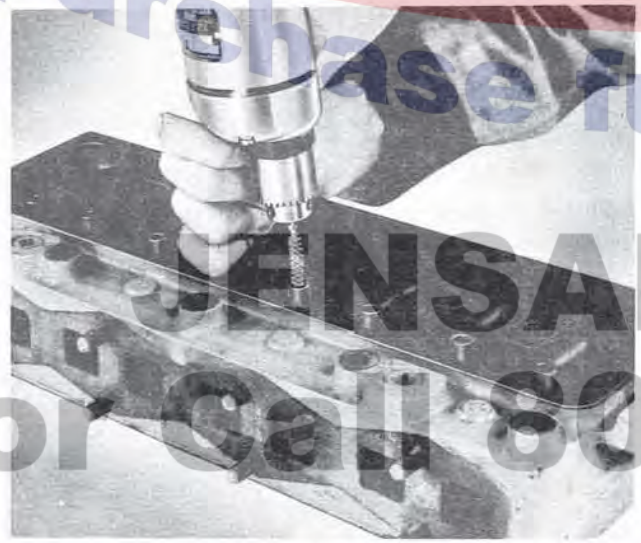

Fig. 18 - Cleaning Valve Guides

INSPECTING THE VALVE GUIDES

Valve guide inspection is important and cannot be over-emphasized. The guides should be inspected as follows:

1. Clean the valve guides thoroughly with a suitable solvent and a valve guide cleaning tool as shown in Fig. 18. Blow dry with compressed air.

2. Inspect and replace any guides which are damaged or show severe scoring.

3. Measure the inside diameter at both ends of the guide with a small-bore gauge and a micrometer as shown in Figs. 19 and 20. If the guide does not meet specifications it must be replaced.

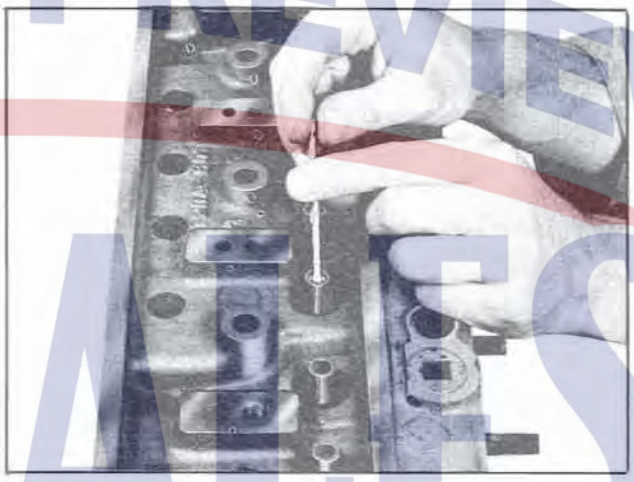

Fig. 19 - Fitting Small-Bore Gauge

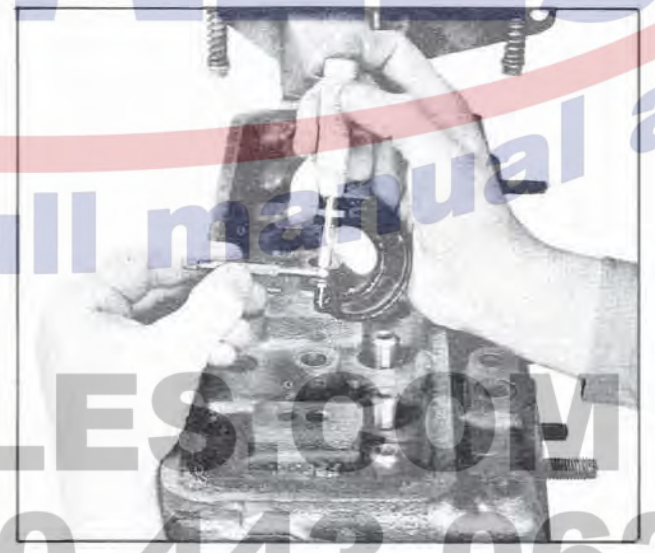

Fig. 20 - Miking the Small-Bore Gauge

NOTE: If the guide is excessively worn, worn off-center, bell-mouthed or egg-shaped, check to make sure that the rocker arm and cap are not worn and that they are positioned directly over the center of the valve stem. REPLACE WORN VALVE GUIDES BEFORE SERVICING THE VALVE SEATS.

GROUP 1 — SECTION A — PART 4

CYLINDER BLOCK ASSEMBLY SERVICING

INDEX

The cylinder block assembly, as referred to in this section, consists of the pistons, sleeves, wrist pins, connecting rods, crankshaft and block.

The text in this section is basic to most of our engines and is written to supplement the specific information given in the individual engine sections.

CYLINDER SLEEVE SERVICING

Whenever it is determined that the cylinders require servicing, a decision must be made whether or not to replace the sleeves. This decision is generally based on the maximum taper in the cylinder wall. A measurement of taper that is accurate enough to indicate whether a cylinder should be resleeved can be made before the pistons are removed from cylinders.

INSPECTING THE CYLINDER SLEEVE

Position the piston at the bottom of its stroke to facilitate the examination of the cylinder walls above the piston.

Scoring or Uneven Wear

As a first step in checking the sleeve, wipe it clean and examine it carefully for scoring and uneven wear (which shows up as dark, unpolished spots). Replace any sleeves that show evidence of scoring or uneven wear.

Cylinder Taper and Excessive Wear

Using an inside micrometer or a cylinder gauge, measure the sleeves for taper and excessive wear. To determine the amount of taper, measure the smallest cylinder diameter just above the piston (when the piston is at the bottom of its stroke), then subtract that reading from the largest diameter taken just below the highest point in the ring travel. The difference will be cylinder taper. See Fig. 1. Replace sleeves if measurements are not within engine specifications.

Fig. 1 - Measuring Cylinder Taper

CYLINDER SLEEVE SERVICING

Ridge Removal

Clean the top of the cylinder block with a scraper or rotary steel brush; be careful to keep dirt from getting down into the valve ports and water jacket.

COOLING SYSTEM SERVICING

Engine cooling is basically the dissipation of heat from the cylinder walls. This is accomplished in Massey-Ferguson tractors by using a pressurized, forced circulation cooling system. This system is composed of a pump, radiator, thermostat and a fan.

COMMON COOLING SYSTEM PROBLEMS

Following are some of the more common troubles found with tractor cooling systems.

1. Loose or damaged fan belt - Inspect the fan belt for looseness or damage. Replace fan belts that are frayed or damaged. See the individual engine sections for proper fan belt deflection.

2. Clogged air passages in the radiator - Foreign matter in the air passages of the radiator, reduce the cooling efficiency of the fan and the radiator. These passages must be kept clean and open for proper cooling.

3. Clogged water passages in the radiator - The water passages in the radiator may become clogged with silt, mineral deposits, or other foreign material. Normally the radiator can be returned to full efficiency, by thoroughly flushing the radiator with a suitable cleaning agent.

4. Faulty thermostat - A thermostat that is not operating properly may cause overheating, or underheating. Both conditions are harmful.

5. Collapsed or clogged radiator hose - As the radiator hose becomes old, the inner lining may become flabby or tear loose. These pieces restrict the water passages and sometimes plug the passages completely.

6. Scaled or clogged water jackets - Whenever an engine is completely overhauled, the water passages must be thoroughly examined and all loose scale removed. Use of good rust inhibitors keep this problem to a minimum.

7. Frequent filling of the radiator - If frequent filling of the radiator is required, the cooling system should be carefully examined to determine the cause.

PREPARING THE COOLING SYSTEM FOR INSPECTION

If the results of any extensive inspection are to be accurate, the cooling system must first be prepared for inspection as follows:

1. Check the cooling system for external leaks.
2. Make sure that the deflection of the fan belt is correct.
3. Fill the radiator to the proper level.
4. Check the operation of the thermostat. This may be done by starting the engine and watching the coolant through the filler cap opening while the engine is still cold. If the coolant is circulating, the thermostat is stuck in the open position. When the engine is warm and the coolant does not circulate, the thermostat is stuck in the closed position. See page 3 for thermostat checking procedure.
5. Start the engine, and run until the coolant reaches "operating temperature".

INSPECTING THE COOLING SYSTEM

WATER PUMP

See the individual Engine Sections, Group I.

HOSES, CONNECTIONS AND GASKETS

1. Inspect all of these areas for signs of leaking.
2. Inspect all connections for tightness.
3. Replace all hoses which are old and show signs of deterioration.

ENGINE WATER JACKET

1. Reverse flush the engine water jacket. When the engine has been left dry for several days, be sure the cooling system is thoroughly cleaned before placing the engine back into operation.

GROUP I - SECTION C - PART 2

ENGINE OVERHAUL PROCEDURE

INDEX

Before starting disassembly of the tractor, make a complete diagnosis of the engine to be sure that an overhaul is really necessary. If it is determined that an overhaul is necessary, then inspect the entire engine for any evidence of external leaks, or defective parts, that must also be corrected before the tractor is assembled and returned to the customer.

Where the right and left-hand sides are mentioned in this section, it refers to the tractor or engine as viewed from the rear. Direction of engine rotation, however, is viewed from the front of the engine.

ENGINE

The 4A - 203 diesel engine is a four cylinder, overhead valve type engine using dry sleeves with a bore of 3.6 inches and a stroke of 5 inches. The compression ratio is 17.4 to 1. The combustion system utilizes both direct and indirect fuel injection. Maximum engine torque is 151 ft.-lbs. occurring at an engine speed of approximately 1,350 r.p.m.

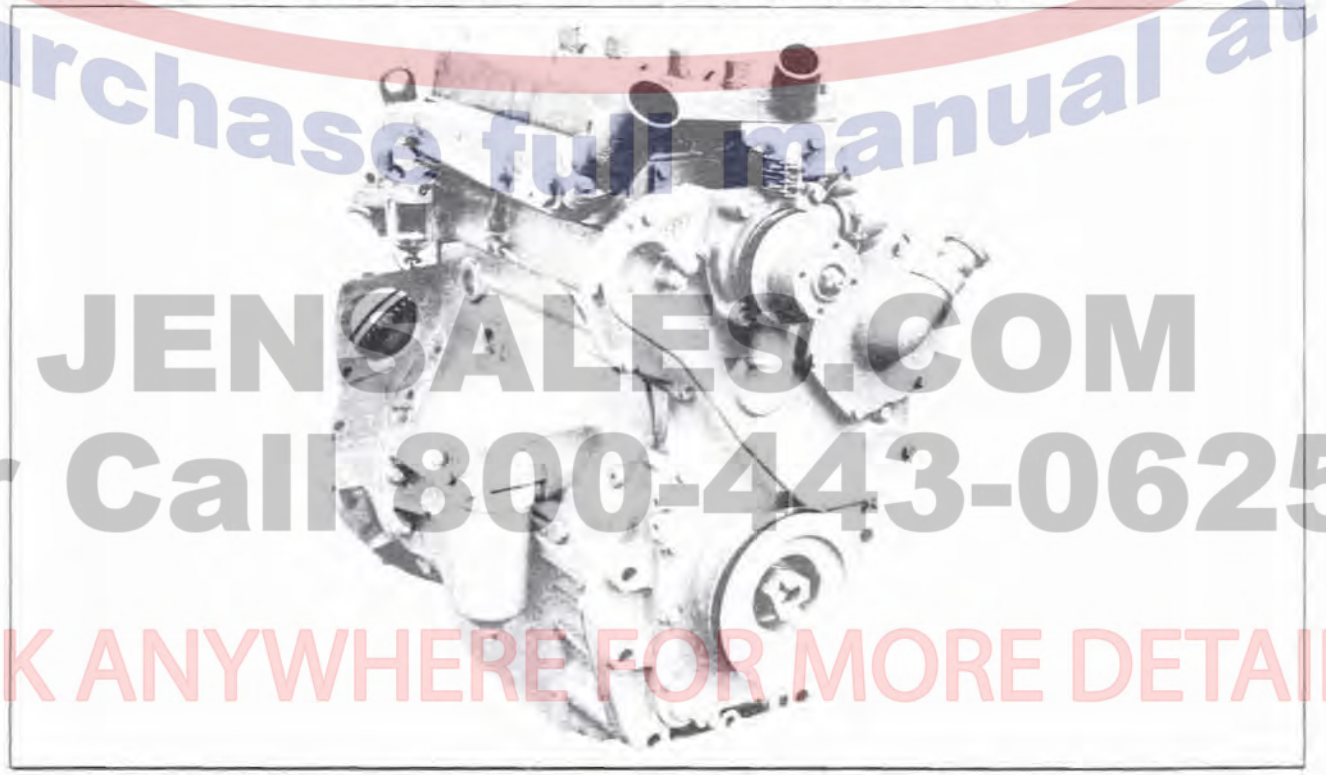

Fig. 1 - Front Right Hand View of 4A-203 Engine

Fig. 36 – Measuring Timing Gear Backlash

CHECKING TIMING GEAR BACKLASH

To check timing gear backlash proceed as follows:

1. Remove the timing gear cover.

2. Check the backlash between the timing gears with a dial indicator or feeler gauge as shown in Fig. 36. The backlash between any two gears in the timing gear train must be between 0.003 - 0.006 inch.

3. If the backlash of the timing gears is not within these limits, the gears must be replaced. Replacement gears are available only in standard size and are marked for correct installation.

REMOVAL OF IDLER GEARS AND HUBS

To remove the idler gears and hubs, refer to Fig. 37, and proceed as follows:

1. Remove the lock wire on the banjo type bolt securing the oil line, No. 14, Fig. 37, to the lower idler gear hub, No. 18, Fig. 37.

2. Remove the banjo bolt and oil line.

3. Unlock and remove the three securing nuts.

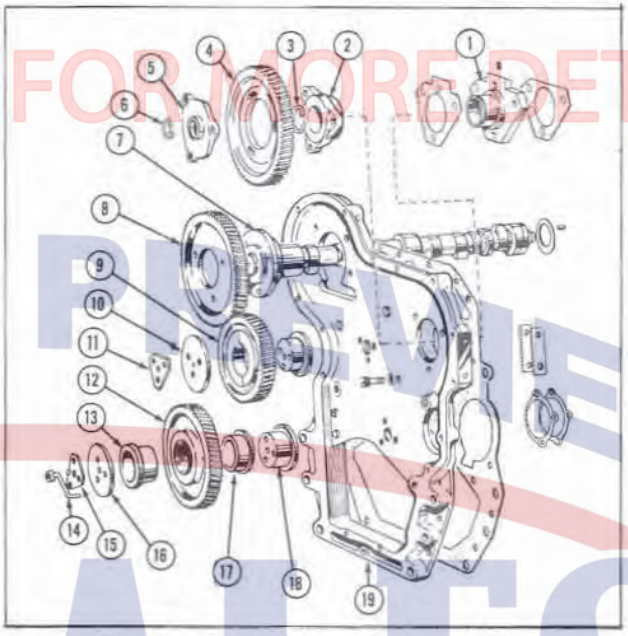

Fig. 37 – Nomenclature and Sequence of Parts

1. Injection Pump Support
2. Injection Pump Gear Hub
3. Hub Retaining Snap Ring
4. Injection Pump Gear
5. Injection Pump Gear Adapter
6. Adapter Retaining Snap Ring
7. Camshaft
8. Camshaft Timing Gear
9. Upper Idler Gear
10. Upper Idler Gear Retaining Plate
11. Idler Gear Lock
12. Lower Idler Gear
13. Lower Idler Gear Bushing
14. Oil Spray Pipe Assembly
15. Idler Gear Lock
16. Lower Idler Gear Retaining Plate
17. Lower Idler Gear Bushing
18. Idler Gear Hubs
19. Timing Gear Housing

4. Remove the lock washer, No. 15, Fig. 37 and idler gear retaining plate, No. 16, Fig. 37.

5. Remove the lower idler gear, No. 12, Fig. 37.

6. Remove the upper idler gear in a similar manner, as shown in Fig. 38.

Fig. 38 – Removing Upper Idler Gear
1. Oil Passages

GROUP 1 - SECTION C - PART 3

PART 3 - FUEL AND AIR SYSTEM SERVICING

INDEX

FUEL AND AIR SYSTEM

The fuel and air system of the 4A-203 engine is shown in Figs. 1 and 2.

The essential parts of the fuel system are the fuel tank, fuel shut-off valve, fuel pump, primary fuel filter, secondary fuel filter, fuel injection pump, fuel lines and injectors. In operation, fuel is drawn from the tank by the fuel pump through the sediment bowl assembly. From the sediment bowl fuel flows through the primary and secondary fuel filters to the injection pump. The fuel is then metered and at the proper time pumped under high pressure to the injectors where it is forced into the combustion chambers.

The air system is composed of the air cleaner, connecting tubing, manifolds and thermostart (cold weather starting equipment). The air is drawn into the cylinders through the air cleaner and the intake manifold. The thermostart which is inserted into the intake manifold pre-heats the air before it enters the cylinders.

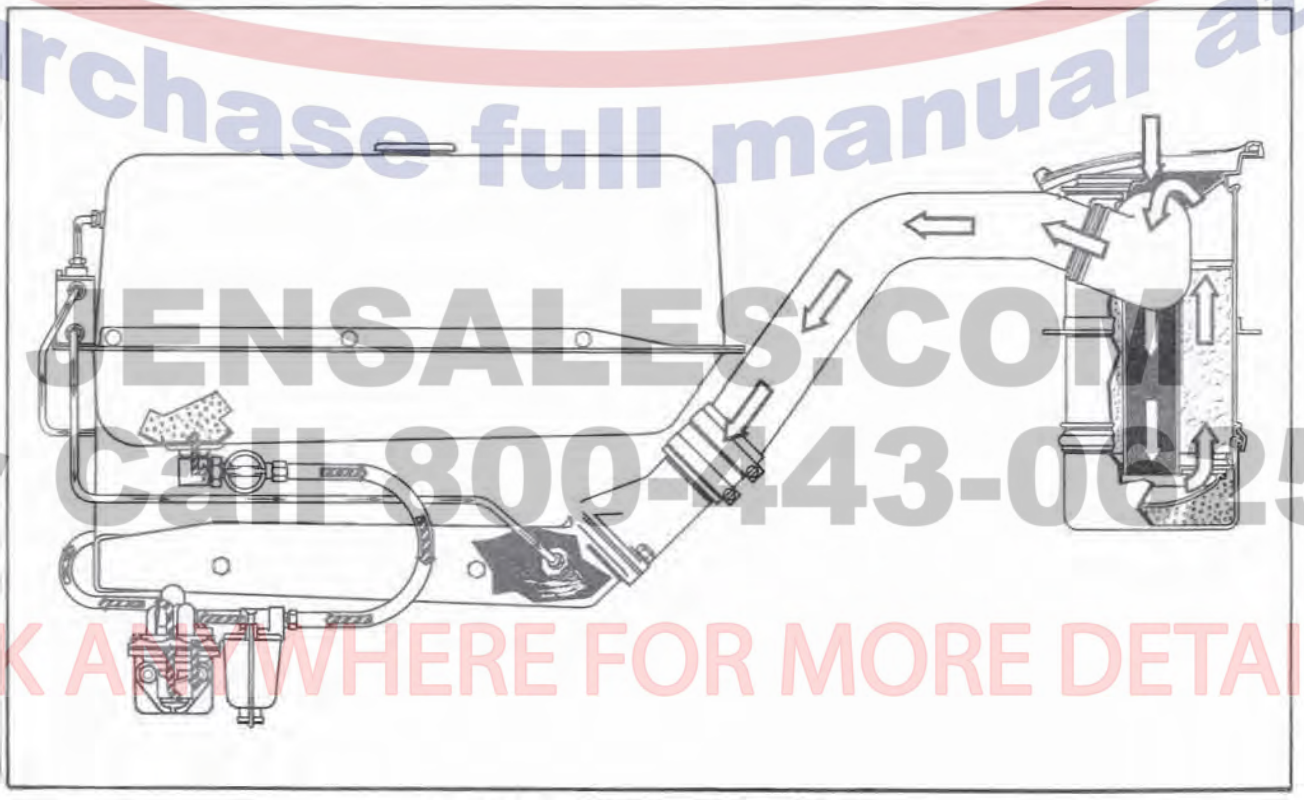

Fig. 1. Fuel and Air System of 4A–203 Engine

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PART 4. LUBRICATION SYSTEM SERVICING

INDEX

LUBRICATION SYSTEM

The 4-A-203 engine uses a forced-feed type lubrication system, the oil being circulated under pressure by an eccentric lobe rotor-type pump bolted to the front main bearing cap and driven through an idler gear by the crankshaft gear.

In operation, oil is drawn into the oil pump through an oil strainer and a suction pipe. The oil pump, being equipped with a plunger-type relief valve that controls the maximum oil pressure, then pumps the oil through a pipe and into a drilling in the cylinder block to the oil filter on the right hand side of the engine. From the filter the oil then passes through a crosswise drilling to the main oil gallery drilled lengthwise through the left hand side of the crankcase. Crosswise passages through the main bearing housing webs carry the oil from the oil gallery to the main bearings. The oil then passes through drilled holes in the crankshaft to the connecting rod bearings. The cylinder walls and piston pins are splash lubricated by oil from the connecting rod bearings.

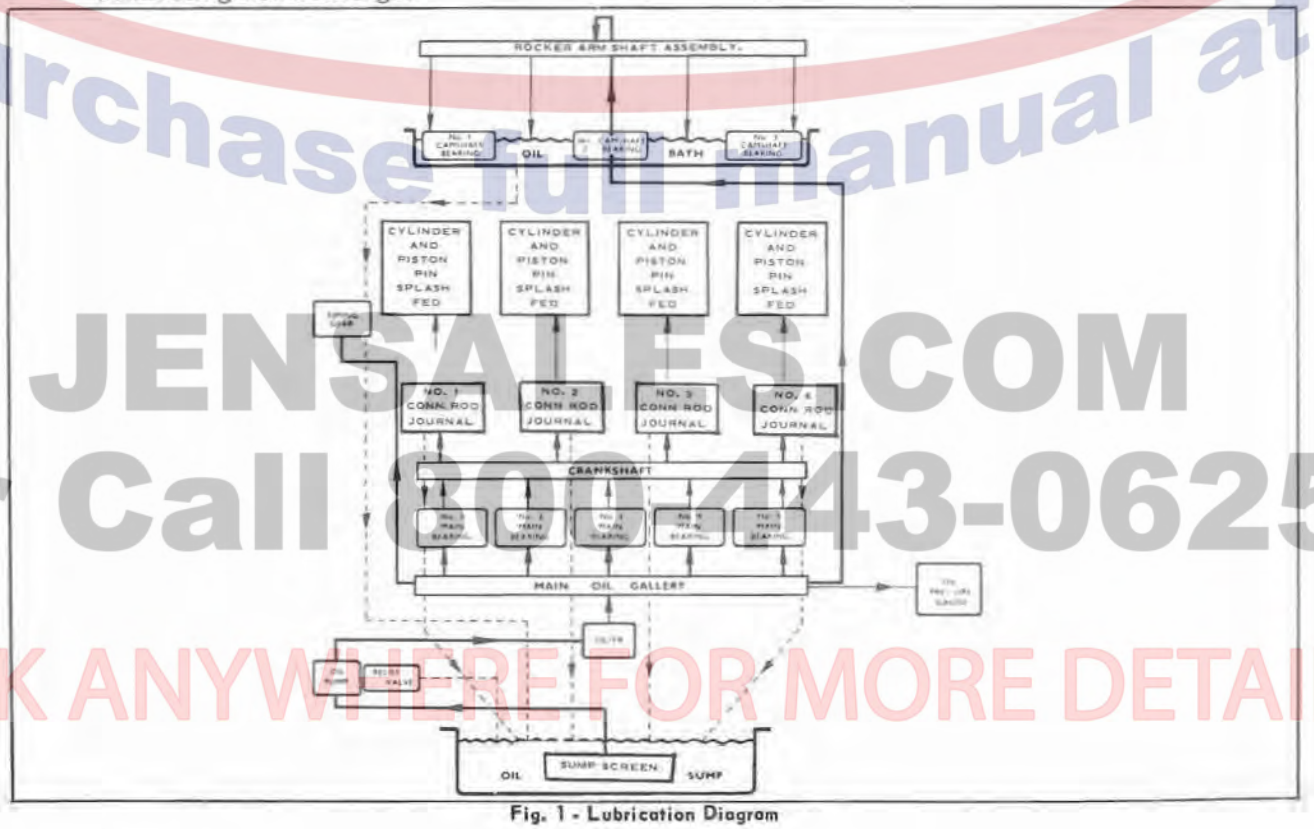

Fig. 1 - Lubrication Diagram

PART 5. COOLING SYSTEM SERVICING

INDEX

The cooling system for the 4A-203 engine is the pressure circulated type, i.e., pressurized radiator, belt driven pump, thermostat, and cylinder block jacket containing dry sleeves. The cooling system capacity is 10 U.S. or 8 Imp. quarts. The radiator cap is the pressurized type, set to release radiator pressure at 10 pounds per square inch. The thermostat begins to open at 172°F and is fully opened at 176°F.

The coolant liquid is circulated through the system from the water pump, around the cylinder walls, up through the cylinder head, then either through a by-pass tube from the thermostat housing direct to the water pump, or through the thermostat to the top of the radiator, down through the radiator core and back to the pump, depending on coolant temperature.

When the coolant temperature is below 172°F, the thermostat remains completely closed, thus preventing any circulation through the radiator. As the coolant temperature rises above 172°F, the thermostat opens slightly which permits a limited flow of coolant through the radiator. As the coolant temperature continues to rise, the thermostat opens in proportion. Thus the thermostat can regulate the engine temperatures by regulating the volume of flow of coolant through the radiator up to that point of maximum opening of the thermostat which is attained at 176°F.

In those areas where there is a high content of calcium (Lime) or iron in the water that will be used for filling the cooling system, it is recommended that either a preventive inhibitor be added to the water or rain water be used. There are a number of reputable commercial inhibitors on the market that are satisfactory.

It might be advisable to consult a local chemist to determine what particular type of inhibitor is most suitable for local conditions. When an anti-freeze solution is used in the cooling system, it will not be necessary to add an inhibitor since all reputable anti-freeze solutions contain this additive.

RADIATOR

The radiator is a copper tube and fin-type. It is equipped with a spring loaded pressure-type cap calibrated to open the overflow at 10 pounds pressure per square inch. This eliminates spilling of coolant through the overflow pipe. It also reduces evaporation losses because it raises the boiling point of the coolant to approximately 240°F.

REMOVAL

Remove the following:

1. Radiator cap, drain the cooling system and remove the hood.
2. Disconnect the lines from the thermostart reservoir. This is the small fuel container mounted on top of the upper radiator support.
3. Power steering oil reservoir from the top radiator support, lay it on its side and drain the oil into a clean container.
4. Disconnect the upper and lower hose tubes and remove the upper radiator support.
5. Fan blade assembly from the front end of the water pump and lay it in the radiator shroud.
6. Grommet support from the left side of the radiator.
7. Four cap screws securing the radiator on the tractor.

GROUP 1 – SECTION C – PART 6

ELECTRICAL SYSTEM SERVICING

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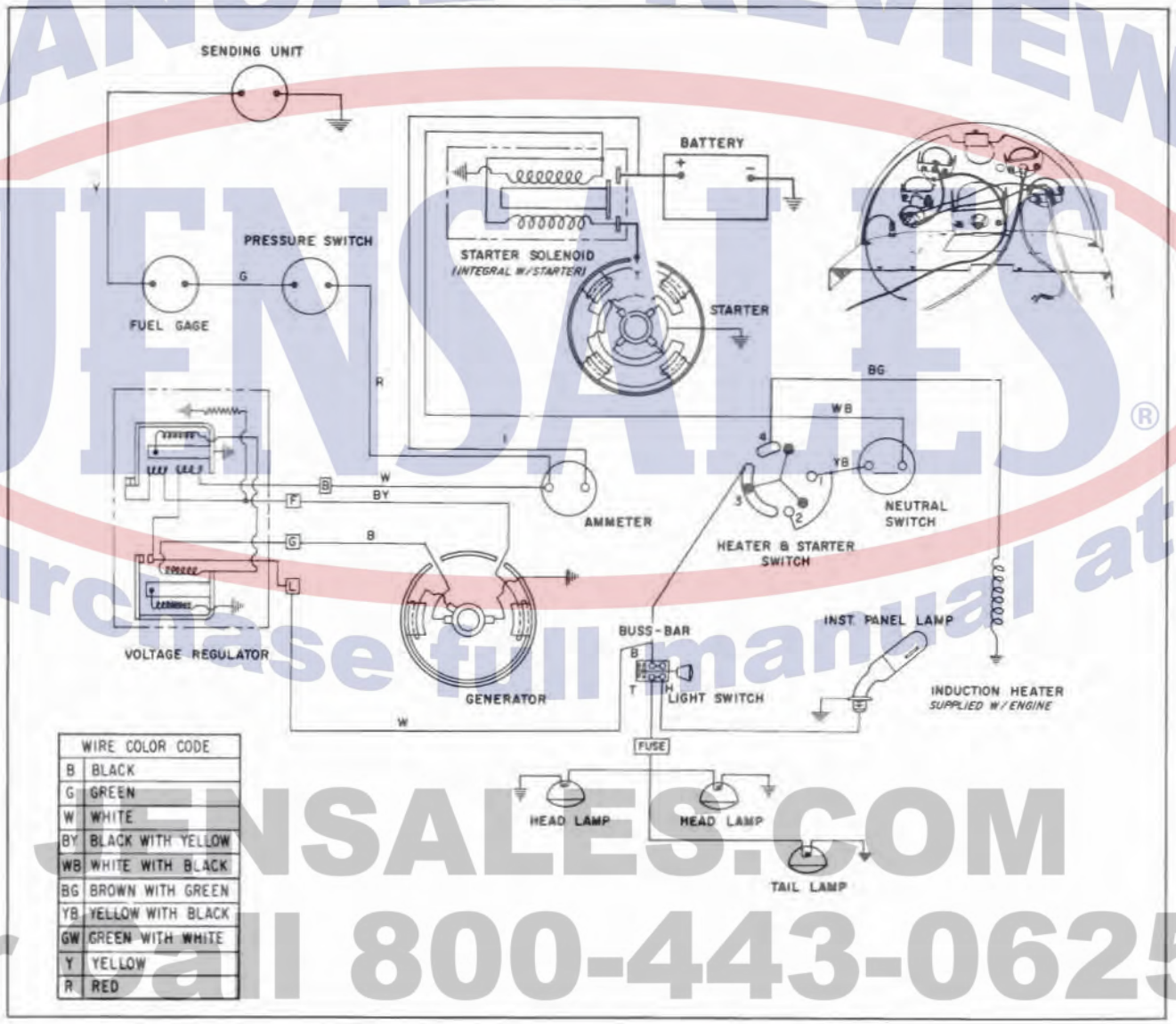

Fig. 1 - Electrical System

BATTERY

The battery in the electrical system for the 4A/203 engine is a 12-volt, 96 ampere-hour lead-acid storage battery. It is a Willard, type CW-5SH, each of the six cells containing 17 plates. Its dimensions are: length 13-1/2", width 6-13/16", case height 8-9/32", overall height 9-9/32", or two 6-volt, 140 ampere hour lead-acid batteries. These are Willard type 3H-140, having 3 cells per battery, each with 19 plates per cell.

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PART 2— AD4.203 ENGINE OVERHAUL PROCEDURE

INDEX

This part of the manual is concerned with the AD4. 203 Diesel Engine, as used in MF 65 Tractors, starting with tractor serial number 682157.

Before starting disassembly of the tractor, make a complete diagnosis of the engine to be sure that an overhaul is really necessary. If an overhaul is necessary, inspect the entire engine for any evidence of external leaks, or defective parts, that must also be corrected before the tractor is assembled and returned to the customer.

Thoroughly steam clean the engine before disassembling it, or removing any component parts of the fuel system. Also; make sure to cap, or otherwise cover, all fuel openings as soon as they are exposed, to prevent dirt from entering the fuel

Fig. 1 – Front Left-Hand View of AD4.203 Engine

Fig. 2 – Rear Right-Hand View of AD4.203 Engine

DUAL CLUTCH

35, 50 AND 65 MF & TO TRACTORS

INDEX

The Dual Clutch consists of a forward (primary) pressure plate and dry cushioned disc which is attached to the transmission input shaft, and a rearward (secondary) pressure plate and dry disc which is attached to the hydraulic pump and power take-off input shaft. The primary pressure plate is spring-loaded by twelve silicon-chrome alloy coil springs located between the clutch cover and the primary pressure plate. The secondary pressure plate is spring-loaded by an annular Belleville type spring located between the clutch cover and the secondary pressure plate or false flywheel ring.

The false flywheel ring is interposed between and integrated with the primary and secondary clutch sub-assemblies, and is secured to the flywheel by the same cap screws that attach the clutch cover. In operation, the clutch springs exert pressure against the clutch pressure plates, this in turn transmits the pressure through the discs to the false flywheel ring for the secondary clutch and to the engine flywheel for the primary clutch, thus establishing a firm frictional contact between the respective discs and flywheel faces.

Depressing the clutch pedal through the 1st stage moves the clutch release fork, which in turn contacts the clutch release bearing, moving it forward on the retainer and bringing it in contact with the clutch release fingers. The bearing depresses the fingers which in turn causes the primary pressure plate to retract from the disc and release the pressure on it. This interrupts the power flow to the transmission. Depressing the clutch pedal further through the 2nd stage (noticeable by an increased resistance to overcome) causes the same release fingers to move the primary pressure plate to a point where it contacts and causes the secondary pressure plate to retract from its respective disc, thus releasing the frictional contact between the disc and the false flywheel ring face. This interrupts the power flow to the hydraulic pump and power take-off input shaft.

The combination coil and Belleville spring dual clutch has been used in all 35 (MF & TO) tractors since Tractor Serial Number 177395, MF 50 Tractors since Tractor Serial Number 515395 and all models of the MF 65 Tractor.

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PART 7—CLUTCH LINKAGE AND RELEASE MECHANISM

MF 65 TRACTORS ALSO MF 50 TRACTORS AFTER SERIAL NO. 533 422

INDEX

DESCRIPTION

The MF 65 and 50 Tractors have two types of clutch linkage and release mechanism. The MF 65 Tractors, prior to Serial No. 692 932, have the type linkage shown in Fig. 1. For MF 65 Tractors, after Serial No. 692 932, also MF 50 Tractors after Serial No. 533 422, refer to Fig. 2. Before attempting any adjustment of clutch external linkage, note serial number of tractor. Refer to the appropriate heading for the particular type linkage to be adjusted.

Fig. 1 – Clutch External Linkage Early MF 65
1. Normal Operating Position 2. Modified Operating Position

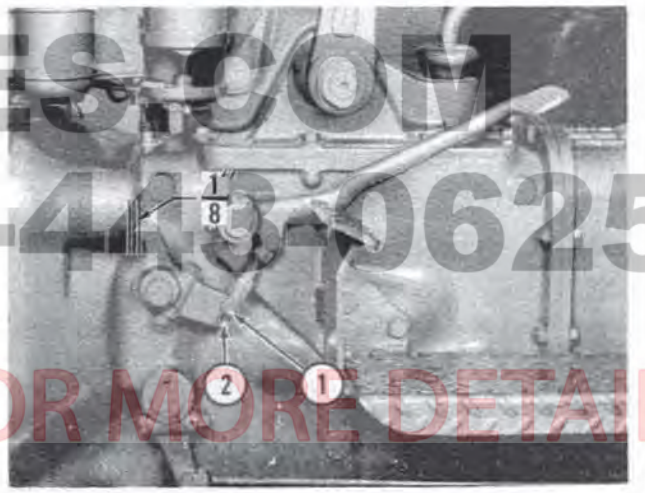

Fig. 2 – Clutch External Linkage Late MF 65 and Late MF 50
1. Normal Operating Position 2. Modified Operating Position

GROUP II — SECTION B — PART 1

35, 50 AND 65 TRACTOR TRANSMISSION ASSEMBLY

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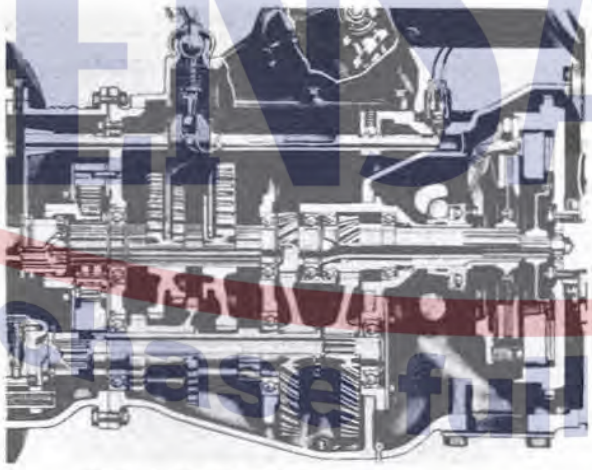
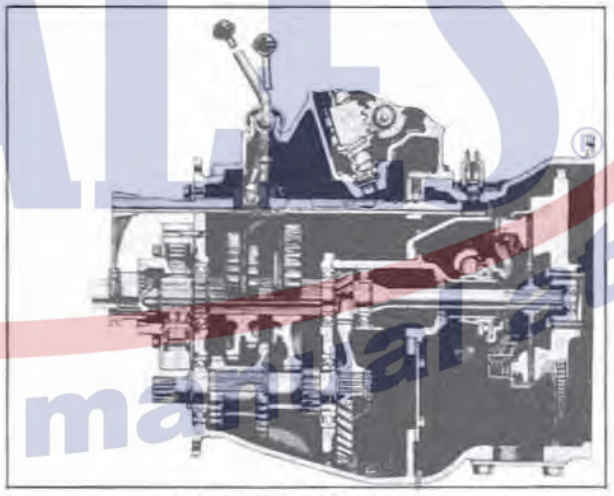


35 and 65 Dual Clutch Transmission



35 Single Clutch Transmission

REMOVING THE TRANSMISSION

To disassemble the transmission, it is necessary to split the tractor between the transmission housing and the engine as outlined in the Individual Engine Sections, Group I.

The following items are removed so the transmission can be removed from the differential center housing and mounted on a stand.

1. Drain the oil from the transmission and differential housings.

2. Remove step plates from either side of the tractor.

3. Remove exhaust system from manifold back through the muffler.

4. Remove brake pedals from right side of the tractor and the brake cross shaft. Remove brake rod assembly from both sides of the tractor.

NOTE: To remove the brake cross shaft, take out the woodruff key on one side of the tractor and slide the shaft out of the opposite side of the tractor.

5. Remove the neutral safety switch (No. 1, Fig. 1) from the transmission housing.

6. Attaching an overhead crane to the steering column as shown in Fig. 1, remove the attaching bolts and lift off the steering gear mechanism and instrument panel as a unit.

GROUP II - SECTION B - PART 3

MULTI-POWER TRANSMISSION MF 35-50-65

Index

DESCRIPTION

The multi-power transmission although similar in design to the Dual Range, incorporates a hydraulically actuated clutch mounted on the input shaft and operated by an externally mounted lever, and an over-running clutch assembly mounted on the forward end of the transmission countershaft.

A control valve mounted on the input shaft retainer and connected to the external lever, provides the method for directing the hydraulic fluid from the hydraulic pump to the hydraulic clutch.

OPERATION

With the lever in the "LOW RANGE POSITION" no hydraulic fluid enters the hydraulic clutch, and the transmission is driven thru the main drive pinion No. 17, Fig. 7, and the countershaft drive gear No. 45.

Movement of the control lever to the "High" position allows the fluid to enter the hydraulic clutch and engages the clutch discs, thus transferring the drive through the input overdrive pinion No. 13 and the countershaft overdrive gear No. 43.

REMOVE TRANSMISSION

With the tractor split between the transmission and engine as outlined in the Individual Engine Section, the transmission may be removed as follows:

1. Drain the lubricant from transmission and differential.

2. Disconnect and remove the step plate from each side of tractor.

3. Remove the muffler and muffler inlet pipe.

4. Disconnect and remove the brake rods and brake pedals. Remove Woodruff key from brake cross shaft and withdraw shaft.

5. Remove the bolts securing the transmission cover. Then with a chain hoist attached to the steering mechanism as shown in Fig. 1, lift cover and steering assembly straight up and away from transmission.

Fig. 1 - Removing or Installing Transmission Cover and Steering Mechanism

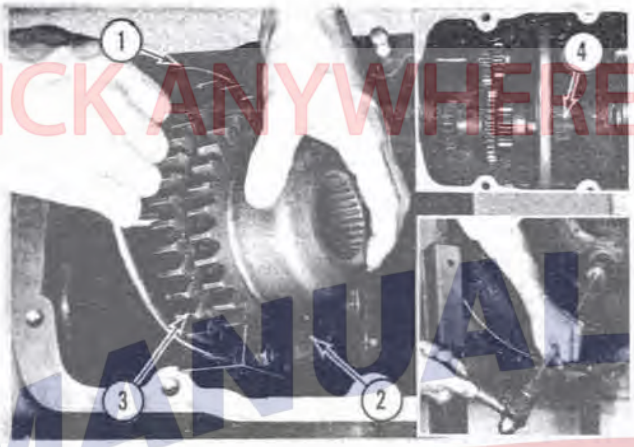


Fig. 11 - Removing or Installing Overdrive and Countershaft Drive Gear Assembly
1. Holder – Gear – Tool MFN 830
2. Gear – Overdrive
3. Gear – Countershaft – Drive
4. Countershaft

Fig. 12 - Removing or Installing Transmission Countershaft
1. Countershaft
2. Bearing – Countershaft

ASSEMBLE INPUT SHAFT RETAINER

1. If removed, start bearing No. 7, Fig. 13 over forward end of pinion. Support bearing on bed of press and press pinion into bearing. Install snap ring No. 4.

2. Place new sealing rings No. 6 on pinion.

3. Refer to Fig. 15 and place a new seal No. 3 over end of installer, tool MFN 849, with the lettered end down, then carefully drive in pinion and against shoulder.

4. Start pinion No. 5, Fig. 13 in retainer. Using a soft hammer, drive pinion and bearing into position and install snap ring No. 8

5. Refer to Fig. 16 and place seal guide No. 3, tool MFN 848-B in seal installer No. 2. Place oil seal No. 4 on installer with the sealing portion up.

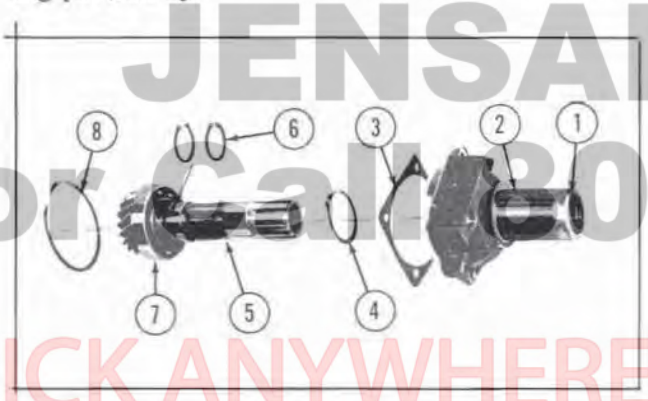


Fig. 13 - Input Shaft Retainer Details and Relative Location of Parts
1. Seal – Oil
2. Retainer – Input Drive Shaft
3. Gasket
4. Snap Ring
5. Pinion – PTO
6. Ring – Sealing
7. Bearing
8. Snap Ring

Start seal over forward end of retainer and carefully drive into position.

DISASSEMBLE HYDRAULIC CLUTCH

1. Refer to Fig. 18 and remove snap ring No. 9 from clutch housing.

2. Remove clutch retaining plate No. 8, piston return springs No. 7, clutch discs No. 6 and plates No. 5.

3. Allow the clutch housing No. 1 to be dropped on bench several times with the open end down and jar the piston out of housing.

4. Remove and discard sealing rings No. 2 and No. 3 from piston and inner hub of housing.

INSPECT HYDRAULIC CLUTCH

Wash all parts in a clean solvent and dry with compressed air.

NOTE: Do not wipe parts with a material that leaves lint particles.

1. Inspect the clutch discs for damage, scoring or excessive wear and replace if any of the above conditions are noted.

2. Check the clutch plates for damage or score marks. Light score marks may be dressed off with crocus clutch.

PART 2. DIFFERENTIAL, PINION AND REAR AXLE
MF 65 TRACTOR

INDEX

The power input from the transmission main drive shaft is transmitted through the rear drive shaft and shear coupling to a spiral bevel driving pinion and ring gear. The power is then transmitted through the differential unit and the planetary gear assemblies for an overall reduction of 10.9:1.

REMOVING THE DIFFERENTIAL CENTER HOUSING

1. Drain the oil from the differential housing and transmission.

2. Support the tractor with floor jacks under the transmission and the differential center housing.

3. Drive wooden wedges in between the front axle beam and the front axle support on both sides of the tractor.

4. Disconnect and remove:

a. Step boards from both sides of the tractor.

b. Brake rods (at the rear clevis) and brake lever springs.

c. The exhaust pipe.

d. The clutch pedal pivot assembly from the PTO shifter lever cover. Remove the cover assembly.

e. The clutch shaft arm clevis pin from the rod. Remove the clutch pedal and clutch pedal pull-rod.

f. The bolts securing the transmission housing to the differential center housing. Push the rear axle assembly to the rear.

5. Place the differential housing on a stand or block up securely.

DISASSEMBLING THE DIFFERENTIAL CENTER HOUSING

The center housing must first be separated from the transmission as outlined in "Removing the Differential Center Housing". To disassemble the center housing without separating it from the tractor, remove the hydraulic lift cover, hydraulic pump, rear drive shaft and coupler. See Group III, Section A, Part 1. The differential center housing may then be disassembled through the lift cover opening.

To remove the axle shafts, housing, differential, etc., it is necessary to remove some external assemblies and connections. See "Removing the Differential Center Housing".

REAR AXLE SHAFTS

The axle shafts are forged alloy steel. Their inner ends are splined into the differential gears; the outer ends are supported by tapered roller bearings.

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PART 2. BRAKES - MF 65 TRACTOR

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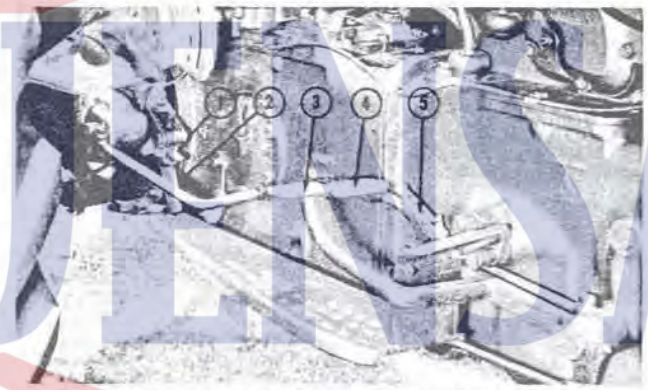

Fig. 1 – Brake Linkage Nomenclature
1. Adjusting Nut
2. Brake Actuating Lever
3. Right Brake Pedal
4. Left Brake Pedal
5. Parking Brake Latch

The MF 65 is equipped with two seven-inch diameter double-disc brakes fitted internally in the inner end of the rear axle bell housing and separated from the differential housing by a carrier plate interposed between the two. See Fig. 1.

One surface of this carrier plate and one surface of the axle housing are machined and serve as stationary housings for the brake. The brakes are mechanically activated and, by means of servo action, the momentum of the tractor is utilized to obtain high braking torque with low pedal effort. The linings are riveted to the discs and are approximately 3/16 inch thick for long service life. Each wheel can be braked independently by pedals mounted on the right-hand side of the transmission housing.

Each pedal is mounted on the brake cross-shaft. The individual brake rods are connected to the brake pedal and to the respective brake actuating lever. The right and left pedals brake the right and left wheel respectively. An interlocking latch locks the pedals together for a master brake. A spring-loaded pawl on the left pedal locks the left brake (or both brakes if the pedals are locked together) in an engaged position.

SERVICING THE BRAKES

ADJUSTING THE BRAKES

When adjusting the MF 65 brakes, always jack up both rear wheels of the tractor and adjust the pedals independently.

NOTE: The pedals must both engage and release at the same time and pedal height. This may be adjusted by screwing the brake rod yoke on (or off) the brake rod, thus changing the length of the brake rod.

Tighten (or loosen) the adjusting nut (No. 1, Fig. 6) on each respective brake rod.

Fig. 2 – Brake Assembly Installed

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GROUP II — SECTION D — PART 1

POWER TAKE-OFF SHAFT ASSEMBLY

35, 50 AND 65 (MF & TO) TRACTORS

INDEX

The power take-off shaft, shown in Fig. 1, projects from the rear of the tractor center housing and has a 1-3/8 inch spline with an annular groove for positive connection of implement couplings.

A removable cap protects the splines when the shaft is not in use. The shaft itself is supported at the rear by a ball bearing and at the front by a needle roller bearing. The pilot on the front of the PTO shaft inserts into a needle bearing in the hydraulic pump thus supporting the rear of the pump. Double seals keep dirt out of the bearing and prevent oil from leaking out of the differential center housing. The power take-off is engaged by a lever, located on the left side of the tractor center housing, which selects either proportional engine speed or proportional ground speed. The lever also has a neutral position which disconnects the drive.

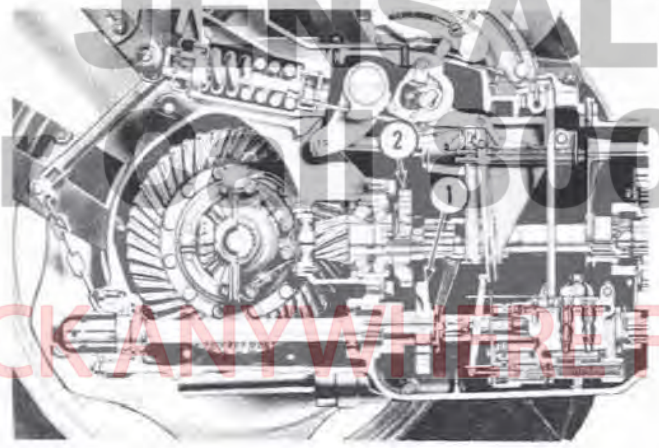

Fig. 1 — PTO Shaft

1. PTO Ground Speed Drive Gear 2. PTO Ground Speed Driven Gear

LIVE PTO

The deluxe tractor is fitted with dual clutch and live PTO. The PTO drive from the engine is controlled by the clutch pedal in the bottom half of its range. The initial movement of the clutch disengages the transmission only; additional downward movement disconnects the hydraulic pump and PTO shaft. On the basic tractor the hydraulic pump and PTO shaft and transmission are driven directly by the transmission countershaft, and on the deluxe tractor by a drive shaft which passes through a hollow countershaft assembly, and is therefore independent of the transmission. (See also Clutch and Transmission Sections of this Service Manual.)

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GROUP II – SECTION D – PART 3

SERVICING THE BELT PULLEY
35, 50 AND 65 (MF & TO) TRACTORS

INDEX

SERVICING THE 35 & 50 (MF & TO) BELT PULLEY AND THE MF 65 LIGHT-DUTY BELT PULLEY

The belt pulley is a self-contained attachment mounted to the PTO housing and driven by the PTO shaft. The ratio of speeds of the pulley to the PTO shaft and engine is 1.84 to 1, and 1 to 1.51 respectively.

SELECTING DRIVEN PULLEY DIAMETER

To determine the diameter of the driven pulley, necessary to obtain a given RPM, refer to the right hand side of the table, Fig. 1.

Note that there is a choice of pulley sizes for any one pulley rate; however, each size is based on a specific engine RPM. In most cases the engine RPM required to operate the belt equipment will be determined to a large degree by the horsepower or load requirements of the equipment. In general, the greater the load involved, the more horsepower will be required, and consequently a higher engine RPM will be necessary.

CAUTION: To avoid static electricity when using the belt and pulley, ground the tractor by wrapping a chain around the front axle and drop one end on the ground.

Engine RPM	PTO RPM	Pulley RPM	Belt Speed (ft/min)	DRIVEN PULLEY – RPM DESIRED 600	800	1000	1400	1800	2200	2600	3000	3400
				DRIVEN PULLEY – DIAMETER NECESSARY								
1000	360	662	1547	10	7½	6	4½	3½				
1200	432	795	1859	12	9	7½	5	4	3½			
1400	504	927	2165	14	10½	8½	6	4½	4	3½		
1500	540	992	2320	15	11	9	6	5	4	3½		
1600	576	1060	2478	16	12	9½	7	5½	4½	3½		
1700	611	1127	2632	17	13	10½	7½	5½	4½	4	3½	
1800	648	1192	2788	18	13½	11	8	6	5	4	3½	
1900	684	1250	2920	19	14½	11½	8	6½	5½	4½	4	3½
2000	720	1325	3097	20	15	12	8½	6½	5	4½	4	3½
2100	756	1391	3253	21	16	12½	9	7	6	5	4½	4

This table is based on an average slippage loss of 3% between the drive and driven pulleys at all speeds. However, it should be noted that as the diameter of a pulley decreases the per cent of slippage will increase; thus pulleys smaller than 3½ in. should not be used unless absolutely necessary.

Fig. 1 – Pulley Diameter Selection Table

PART 1
INTERNAL HYDRAULIC SYSTEM

MF & TO 35, 50, AND 65 TRACTOR

INDEX

There is no "sure-fire" shortcut by which the internal adjustment of the hydraulic system can be checked externally. It is strongly recommended that whenever any malfunction of the hydraulic system of the Massey-Ferguson Tractor is encountered, the cause of which is not readily apparent, the hydraulic adjustments should be checked in a careful, systematic manner, following the procedure outlined in this manual.

NOTE: Always check implements for proper adjustment and damage. Damaged or bent plow beams, cultivator frames, etc, will have an adverse effect on the operation of the system.

It is not necessary to split the tractor when working on the hydraulic system. It must be kept in mind that excessive "tear-down" is done throughout this manual for reasons of clarity and ease of photography.

HYDRAULIC SYSTEM CHANGES

Some changes were made in the hydraulic system of the early "35" tractors.

The main change was the increase of pressure of the hydraulic system from 2,000 p.s.i. to 2,500 p.s.i. This change required that the lift cover and lift linkage also be strengthened.

CAUTION: Only the strengthened parts may be used when servicing the 2,500 p.s.i. hydraulic system.

The pressure relief valves are easily identified; however, extreme care must be exerted that the relief valve of the correct pressure is used.

Notice in Fig. 1 the identifying shoulder present on the 2,500 p.s.i. pressure relief valve.

Along with this change, the bore size of the pump piston was changed. This increased the efficiency of the pump by approximately 30% and makes the pump capable of delivering slightly over 4 gallons per minute at approximately 2,000 r.p.m.

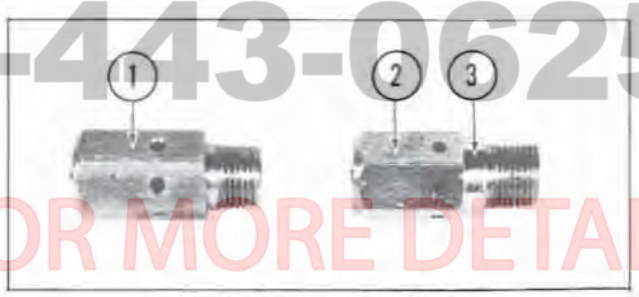

Fig. 1 - Pressure Relief Valves
1. 2000 p.s.i. Valve
2. 2500 p.s.i. Valve
3. Identify Shoulder