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This Part of the Manual contains the recommended removal, overhaul and installation procedures that should be taken when servicing the steering system on the MF 150, 165 and 175 Tractors.

Determine the possible cause of any malfunction by consulting the "Trouble-Shooting" Section of this Manual before any attempt is made to repair the system. Following this practice will result in more accurate maintenance of the steering system and will aid in preventing unnecessary repairs.
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.

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Fig. 1 - Using a Valve Spring Compressor
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.
Dry Sleeves - TO 35 Diesel 23C Engine, MF 35 and 65 Perkins Diesel

The manner in which the dry sleeves fit the cylinder bores plays a very important part in the successful operation of the engine.

The efficiency with which heat is transferred from a sleeve to the coolant depends upon the fit of the sleeve. A sleeve fit too loosely does not make good contact with the cylinder block and results in a poor heat transfer. This can cause scuffing of both the cylinder wall and the piston rings.

A tight-fitting sleeve can be just as harmful as a loose-fitting sleeve. Refer to the individual engine sections for proper fit.

CAUTION: Chrome plated piston rings are not compatible with chrome plated cylinder liners, and the two should NEVER be used together.

DEGLAZING

Hard Steel or Hardened Cast Iron Sleeves

If new piston rings are installed in engines with hard steel sleeves or hardened cast iron sleeves, the cylinder surface should be broken with a spring-loaded "glaze breaker" as shown in Fig. 10.

Some initial wear of new piston rings or the cylinder walls -- or both -- is essential if the rings are to mate with the cylinder walls and do a satisfactory job of controlling oil and sealing against blow-by. If the cylinder walls have the smooth surfaces of hard steel or hardened cast iron, new rings may "skate" over the surface, no wear will take place, the rings will not seat, and high oil consumption and blow-by will result.

When hardened cylinders are deglazed, they must be thoroughly cleaned. Too often deglazing is not performed carefully and the cleaning is not thorough.

Chrome Lined Sleeves MF 35 and 65 Perkins Diesel

DO NOT ATTEMPT TO DEGLAZE OR HONE CHROME LINED SLEEVES. Because the chrome lining is very thin, the liner will be damaged beyond repair if a cylinder hone or a "Glaze Breaker" is used. Refer to individual Engine Sections for further information.

DEGLAZING PROCEDURE

The following procedure has been found to produce satisfactory results.

1. With the piston and rod assemblies removed from the engine, a clean, dry rag or paper dampened with water should be carefully packed at the bottom of the holes to prevent abrasives and dirt, resulting from the deglazing operation, from getting onto the crankshaft.

2. Wipe the cylinders out with a clean cloth.

3. Swab the cylinder walls with SAE 10 engine oil.
SUPPLEMENTAL AND CHANGE INFORMATION CONCERNING PERKINS AG4.212 AND AG4.236 GASOLINE ENGINES

This material includes new supplemental and change information which affects the servicing procedures for the AG4.212 and AG4.236 Engine write up within Group O - Section X.

Holders of the Five Volume Technical Maintenance Manual should insert this information within their Manual and use it until such time that Section X is reprinted.

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This information is also applicable to ICM machines using the AG4.212 or AG4.236 Engine.
This service information should be inserted into the Technical Maintenance Manual under Group O—Section X.

The information within this Section has an altered format utilizing major topic headings instead of separate Parts as used in previous engine Sections. This improved format having only one index, will allow the reader to more quickly locate the desired information without referring to other indexes.

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### Key to Trouble-Shooting

1. Dirty or incorrectly gapped spark plugs
2. Piston slap
3. Worn valve guides
4. Oil pan overfilled
5. Carburetor float setting incorrect
6. Exhaust system restricted
7. Partially choked breather pipe
8. Worn or sticking piston rings
9. Cylinder head gasket blown
10. Governor faulty or set wrong
11. Thermostat stuck
12. Fan belt slipping
13. Radiator or system partially blocked
14. Coolant level in system too low
15. External oil leak
16. Loose or restricted lubricating oil pipes
17. Pressure relief valve sticking open
18. Pressure relief valve sticking closed
19. Oil pump suction pipe faulty
20. Oil pump worn
21. Pressure gauge incorrect
22. Incorrect grade of lubricating oil
23. Insufficient oil in oil pan
24. Worn bores
25. Worn or damaged bearings
26. Piston striking a valve
27. Broken valve spring
28. Valve clearances incorrect
29. Worn, burned or pitted valves
30. Incorrect valve timing
31. Starter motor unserviceable
32. Incorrect ignition timing
33. Incorrect automatic advance
34. Unserviceable rotor arm
35. Battery not fully charged
36. Distributor drive shaft worn
37. Distributor cam worn
38. Poor electrical connections
39. Cracked distributor head
40. Unserviceable H.T. coil or condenser
41. Unserviceable H.T. leads
42. Contact points dirty, pitted or incorrectly gapped
43. Damp H.T. leads
44. Air leak in intake manifold
45. Fuel tank vent blocked
46. Incorrect grade fuel
47. Dirt or water in carburetor
48. Idling speed incorrect
49. Lean carburetor mixture
50. Carburetor jets dirty or partially blocked
51. Choke adjustment incorrect
52. Idling mixture incorrect
53. Vapor lock
54. Dirty or blocked fuel feed pipe
55. Carburetor flooded
INTRODUCTION

This part of the Manual is concerned with the overhaul procedures for the Perkins AD4.203 Diesel Engine. All of the procedures and service information contained in this part assume that the engine has been removed from the tractor or combine and pertain only to the basic engine itself, without regard to any particular application in which the engine may be used.
The dual clutch consists of two dry-type clutch discs (a primary and secondary). The primary pressure plate is spring-loaded by twelve coil springs located between the clutch cover and the primary pressure plate. The secondary pressure plate is spring-loaded by a Belleville type spring located between the clutch cover and the secondary pressure plate. Two different clutches are used on the MF 135 Tractor. Either an 11” or a 12” primary disc drives the tractor power train and a 9” or 10” disc drives the PTO shaft and the hydraulic pump.

The clutch assemblies can be identified by the type of flywheel they are attached to. The 9” and 11” discs are attached to a vented flywheel with an air ring. The 10” and 12” discs are attached to a common flywheel without an air ring. The 10” and 12” disc clutch is used on the MF 135 tractor with an 8-speed transmission. The 9” and 11” discs will be used with a 6-speed or Multi-Power transmission.

The service procedures for either type clutch are the same, except the setting of the release levers. The 9” and 11” discs release levers are adjusted by the use of special tool FT 366 as shown in Fig. 21. The 10” and 12” discs release levers are adjusted by the use of a fabricated tool made to dimensions shown in Fig. A.
DESCRIPTION AND OPERATION

The clutch assembly includes a cover with a splined hub, a spring-loaded pressure plate and a friction disc. See Fig. 1.

The splined hub in the clutch cover is connected to the PTO input shaft and the cover is bolted to the engine flywheel. Therefore, the clutch cover and the PTO input shaft will turn whenever the engine is running.

Nine coil pressure springs (Pink Colored) are used to obtain a pressure plate loading of 1900 to 2050 lbs. The pressure plate is controlled by three release levers.

The friction disc is connected to the main transmission input shaft and is released by the clutch release levers and pressure plate. This controls the tractor drive train and permits the tractor ground travel to be stopped or started while the PTO shaft continues to rotate.

SPLITTING THE TRACTOR

To remove the clutch, it will be necessary to
This Section contains the recommended overhaul procedures for the standard 6-speed transmission (dual clutch), removed from the tractor and placed on a stand. Although some components will vary slightly, (depending upon the unit in which the transmission is installed i.e. gasoline or diesel engine) the basic overhaul procedures will remain the same. Refer to the Tractor Parts Book to ensure that the correct parts are ordered.

For instructions pertaining to removal and re-installation from the tractor using this transmission, refer to the appropriate tractor “write-up”.

MASSEY-FERGUSON

STANDARD 6-SPEED TRANSMISSION
(Dual Clutch)

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PART 11 — 8-SPEED TRANSMISSION
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The Drive Axle Assembly includes the center housing, axle housing, axle planetaries, drive pinion assembly and ring gear, differential carrier assembly, and brakes.

Removing and installing this assembly from the tractor or unit is covered under the appropriate Model heading because of the many variations in external connections and mounting. This Assembly is attached to the transmission and may be further attached to side frames at the axle housing, depending on Model.

Locations given as front, rear, left and right are based on a "normal" tractor and axle arrangement where the engine is located at the front of the unit, and the drive axle assembly, the rear. Left and right are determined standing behind the drive axle facing forward.

Other arrangements are noted under the appropriate Model elsewhere in this Manual. For instance, the differential lock is located on the right side of the drive axle assembly, and carrier bearing pre-load is determined on the right side of the center housing regardless of their location when installed in a specific Model. The drive pinion assembly is located at the front of the ring gear.

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**DRIVE AXLE ASSEMBLY**

**PLANETARY TYPE**

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DESCRIPTION AND OPERATION

The Independent Power Take-Off (IPTO) feature allows the PTO shaft to operate completely independent of the transmission and at a speed which is proportional to engine speed. Independent PTO is accomplished by incorporating a hydraulic pump, a clutch pack and a control valve to engage and disengage the PTO shaft.

Power is transmitted by the engine through a "split torque clutch" and through the Ferguson hydraulic pump to the PTO clutch assembly. This power is transmitted any time the engine is running, regardless of the position of the tractor clutch pedal.

Operation of the PTO drive shaft is accomplished by moving the control lever to the "on" position, which directs oil to the clutch pack and engages the clutch. Moving the lever to the "off" position releases the clutch and directs oil to a brake which is integral to the PTO clutch pack. The brake stops the PTO shaft.

Figs. 1 and 2 show sectional views of the Independent PTO mechanism.
PART 4—INTERNAL HYDRAULIC SYSTEM—

MF 135, 150 AND 165 TRACTORS

DESCRIPTION AND OPERATION

The Hydraulic System described in this part is similar to the one used on the MF 35, 50 and 65 Tractors. It has Draft Control through the top link and Master Control Spring, also Position Control regulated by the operator.

One difference in the two systems is that the MF 35, 50 and 65 Tractors have a slow response control which restricts the dropping of the implement by regulating the amount of travel of the control valve to an exhaust position. On this system, the rate of lowering an implement is controlled by a dash pot, which retards the control valve toward the exhaust position. This enables the tractor to be operated in slow response over an uneven terrain and still maintain an even depth of the implement. The control valve is spring-loaded toward the intake side, rather than toward the exhaust, as is the earlier system. The hydraulic system can be raised into transport position or lowered position with either the draft control lever or the position control lever. Fig. 1 shows a view of the lift cover assembly, stand-pipe and the hydraulic pump assembly positioned as they would appear in the tractor—also shows identification of Controls.

To operate the hydraulic system in position control, the draft control lever must be all the way to the rear of the quadrant. The lower links can then be positioned by the position control lever. When the position control lever is moved toward the rear of the quadrant, the lower links will raise. When moved toward the forward side of the quadrant, the lower links with lower in proportion to the position of the lever. This lever is used for attaching implements and for operating implements that are not draft controlled.

To operate the system in draft control, the position control lever must be placed in transport position (to the rear of the quadrant against stop). The draft control lever, which is on the outer quadrant, is provided with an adjustable locator which allows the operator to lower the implement to the same depth each time. When operating in draft control, the implement is raised to transport and lowered with the draft control lever.

HYDRAULIC LIFT COVER

The hydraulic lift cover is mounted on top