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MM

World's Finest Tractors

MINNEAPOLIS-MOLINE, INC., Hopkins, Minnesota • A Subsidiary of WHITE MOTOR CORPORATION

PRINTED IN U.S.A.

SHOP MANUAL FOR MINNEAPOLIS-MOLINE

M-670 TRACTORS

FOREWORD

This Shop Manual has been prepared as a guide for MM dealers and their service men. It contains complete maintenance instructions for the M-670 tractors, from a minor test or adjustment to a complete overhaul. The information and procedures are approved and recommended by the Minneapolis-Moline Service and Engineering Departments.

The manual has been compiled in loose-leaf form. Additional information will be issued from time to time, covering any changes or improvements that may be developed. This supplementary information will also be released in loose-leaf form, and can be inserted in the proper section of the manual. Serial numbers will be included, to denote which tractors are concerned, or affected by, any changes. In this manner, the manual can be kept current, and all service information on the M-670 tractors can be kept in one manual, regardless of the age of the tractor.

Proper use of this manual will result in a more efficient shop operation, less "down time" for the user, and a more satisfied customer.

When the repair work or overhaul is completed, we suggest referring to the Lubrication and Pre-Delivery Sections of the M-670 Operator's Manual. By using this information, the dealer can make certain that the tractor will be delivered to the user in the best possible condition for economical and trouble-free service.

Use only genuine MM parts with that "Like-New" fit, when making any replacements. These parts are made with the same dies, fixtures, etc., and using the same quality materials, as the original parts. Genuine MM parts are an added assurance of a quality repair job.

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MINNEAPOLIS-MOLINE

World's Finest Tractors

Brush tension.....	28 oz.
Field current.....	1.58/1.67 @ 12 volt
Output.....	20 amp @ 2300 rpm

Voltage to close points	11.8 to 14.0 volts
Voltage regulator setting.....	13.6 to 14.5 volts
Current and voltage armature air gap.....	.075"

Cam angle.....	31-34°
Breaker point opening.....	.013-.019"
Condenser capacity.....	.28 to .34 mfd.
Breaker arm spring tension.....	17-21 oz.

Gasoline	0.025"
LP-Gas	0.015"

Torque 32-38 ft-lbs

Gasoline 11° BTC @ 1200 rpm

19° BTC @ 1600 rpm

LP-Gas 10^0 BTC @ 1200 rpm

13° BTC @ 1600 rpm

POWER (Manufacturer's estimate) @ 1600 RPM

Gasoline -- Engine B.H.P. 83

PTO H.P.	71
---------------	----

Drawbar H.P. 61

LP-Gas -- Engine B. H. P. 83

PTO H.P. 71

Drawbar H. P. 62

Diesel -- Engine B.H.P. 79

PTO H.P. 67

Drawbar H.P. 58

Based on 85° F. and 29.00 Hg.

SPEEDS (MPH @ 1600 RPM AND 15.5-38 TIRES)

	1st	2nd	3rd	4th	5th	Rev.
High range	3.01	4.59	6.13	7.49	16.82	4.59
Low range	1.57	2.40	3.22	3.93	8.71	2.40

TRANSMISSION OIL

Capacity (with ampli-torc) 14 gal.

Grade 80 E.P. heavy duty multi-purpose

FUEL CAPACITY

Gasoline and diesel 22-1/2 gal.

LP-Gas (80% full) 31 gal. (approx.)

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OPERATING SINGLE ACTING CYLINDERS

The control valves in the hydraulic system are set at the factory for using double acting remote cylinders. If single acting cylinders are to be used, an adjustment will have to be made in the control valve.

To adjust the control valve for use with single acting cylinders, it will be necessary to remove the lift assembly from the tractor and remove the valve mounting plate from the valve. See page 4-8 for instructions on removing the lift.

With the mounting plate removed from the valve, adjust the position of the set screw shown in Fig. 6. Turn the set screws out 5 or 6 turns until they are against the retaining ring. This adjustment must be made on both valve sections if both valves are to be used with single acting cylinders.

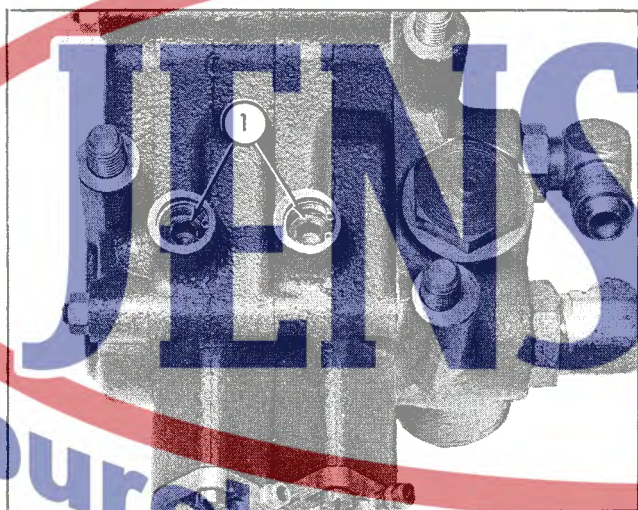


Fig. 6

1. Turn set screws out against retaining ring

Reassemble the mounting plate to the valve, reattach the valve assembly to the lift and reinstall the lift. Note the breakaway couplings that are connected to the LIFT ports in each valve section. Connect the single acting cylinder to the breakaway coupling that is connected to the LIFT port.

LOAD CHECK VALVE

A load check valve (14R296) is available for installation in the control valve to prevent the load on the cylinder from dropping momentarily, or going deeper into the ground, when the control lever is pulled back to raise the load.

One check valve assembly is required for each section of the control valve. To install the check valves, disconnect the oil lines and remove the bolts that secure the lift to the tractor. Lay the lift assembly on its side with the filter end cap up. Remove the plugs next to the LIFT

ports and install the piston and spring. Fig. 7 shows only one of the plugs removed. Reinstall the plugs and reinstall the lift assembly on the tractor.



Fig. 7

1. Install load check valve these ports

IMPORTANT: IN ORDER FOR THE LOAD CHECK VALVE TO WORK SATISFACTORILY, BE SURE THE REMOTE CYLINDERS ARE CONNECTED TO THE BREAKAWAY COUPLINGS SO THE CYLINDER WILL EXTEND WHEN THE CONTROL LEVER IS PULLED BACK.

DRAINING AND REFILLING

Drain the hydraulic system every 500 hours of operation. Remove the pipe plug below the filter to drain the filter compartment. Fig. 8 shows the location of the drains.



Fig. 8

1. Reservoir drain
2. Filter compartment drain

Reinstall the drain plugs and place a gallon of clean hydraulic oil in the reservoir. Start the tractor engine and run it a few minutes to circulate the clean oil through the system. If remote cylinders are connected, extend and contract them a few times to distribute the oil. Drain and discard the oil used for flushing.

of metals used in the valve seats. These instructions are included with the valve refacing machines. The exhaust valve seat inserts are of hardened alloys; the intake valve seats, which are machined directly into the head, are cast iron. Use the stones recommended by the valve refacing equipment manufacturers for these types of seats. Carefully dress the face of the abrasive wheel or grinding stone to 45°. When dressing a stone, draw the dressing diamond slowly and evenly across the cutting face of the stone.

Make certain the valve guide is absolutely clean, then insert the correct size pilot or arbor. Fig. 22. The pilot or arbor must fit snugly in the guide. It is extremely important that the pilot or arbor used be kept clean and free from grit. Some valve equipment manufacturers recommend using light oil on the pilot while refacing valve seats. Follow the recommendations provided with the equipment being used.

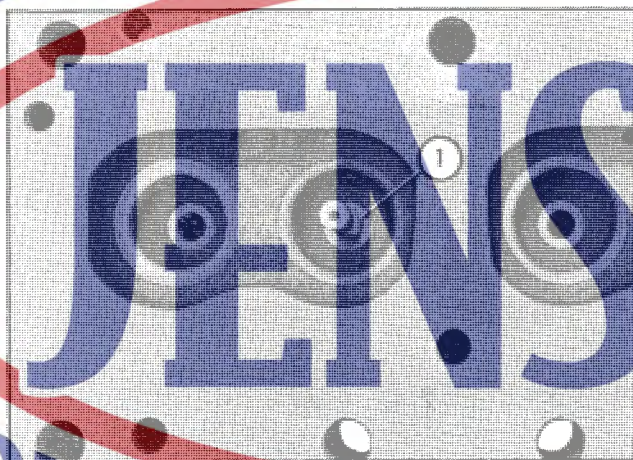


Fig. 22

1. Arbor fits snugly in guide

The first step in grinding any seat should be to "top" the seat with a flat or a 15° stone. "Topping" the seat will help to insure a flat surface which is square with the centerline of the valve guide. This sharp edge at the top of the seat also tends to break off face deposits thereby lengthening the useful life of the valve. Only very light cuts should be taken, and only a minimum amount of material should be removed.

After topping the valve seat, the seat itself can be refaced with a 45° stone. Do not exert too much pressure on the stone or abrasive wheel. Very light touches of the stone to the seat face are all that should be required when refacing valve seats. Remove only enough metal from the seat to obtain a smooth, continuously bright surface all the way around the seat. Some valve refacing equipment manufacturers recommend the use of a coarse abrasive stone for the initial seat refacing then using a fine abrasive stone for the finish grind. Follow the recommendations of the manufacturers for the particular type of refacing equipment being used.

It should be kept in mind that the intake valve seats are machined directly into the cylinder head. When refacing these seats, they must be ground very carefully so no more material is removed than is absolutely necessary to provide a smooth, continuously bright surface. Usually only a light polishing cut is all that will be required.

Obtaining a smooth, continuously bright seat surface all the way around is not enough to produce a satisfactory valve job. The seat **MUST** also be concentric in relation to the bore of the valve guide. The concentricity of the seat and guide can be checked by using an eccentricimeter as shown in Fig. 23.

In Fig. 23 a Kwik-Way Eccentricimeter and a Kwik-Way Tapered Arbor are used to check the concentricity of the valve seat. Check to make certain there is no play between the pilot and the eccentricimeter.

The runout of the seat must not exceed .002". If the runout exceeds .002", it indicates that the guide was worn excessively and the pilot or arbor used did not locate the seat concentric with the bore of the guides.

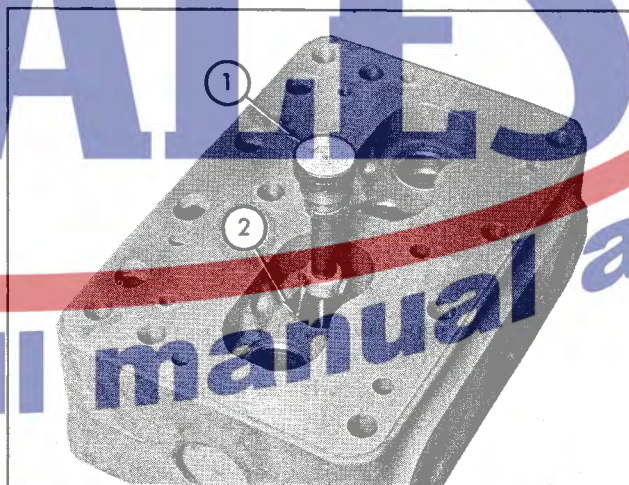


Fig. 23

1. Eccentricimeter
2. Runout must not exceed .002"

Install a new guide, and ream it to the correct size as explained previously. The seat must then be refaced with a pilot or arbor that will properly align the seat and guide bore.

After checking the concentricity of the valve seat, check the width of the valve seat. The portion of the seat that contacts the face of the valve should be no more than 3/32" wide and should contact the center of the valve face.

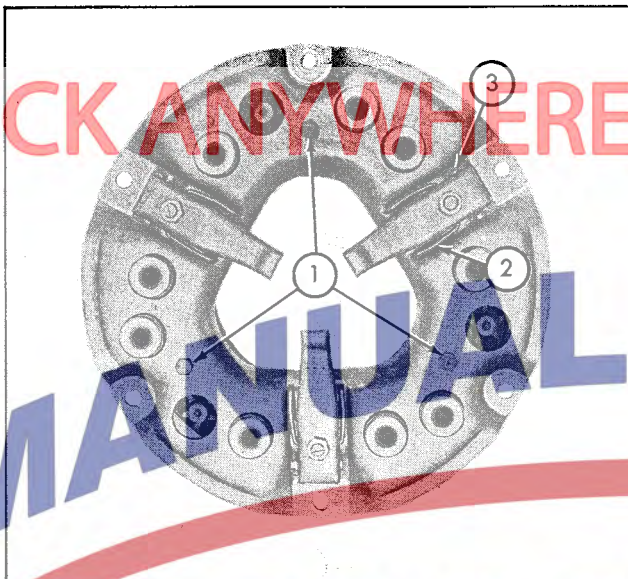


Fig. 6

1. 5/16\"-18 x 2\" bolts
2. Pressure springs
3. Pivot pins



Fig. 7

Check the pressure plate. If it is scored badly, checked, or warped, it should be replaced. If it is not replaced, the clutch driving plate will be damaged before long.

If the release lever assemblies show excessive wear on the throwout bearing contact points, or at the pivot points, they should be replaced. All three lever assemblies should be replaced at the same time.

Place the back plate over the springs, making certain the marks previously made are in alignment, and install the three 5/16\" cap screws.

Tighten the 5/16\" cap screws evenly and gradually, until the unit is compressed enough to allow installation of the release levers springs, and pins. Install the pins from the left. Be sure the lever springs fit under the spring clips on the back plate. Place the clutch assembly on a clean flat surface, with the back plate up. Turn the lever adjusting screws until the tops of the release levers are approximately 2-5/8 inches above the flat surface. (This is an approximate adjustment, until the clutch is installed.)



Fig. 8

1. Adjusting screw and lock nut
2. 2-5/8"

Position the clutch driving plate on the flywheel with an old clutch shaft or other suitable aligning device. (NOTE: The opposite end of bushing driver 10A12741 can also be used to align the driving plate.) Attach the clutch to the flywheel with the six bolts. Tighten the bolts to 53 to 57 ft-lbs. Remove the three cap screws EVENLY from the back plate.



Fig. 9

1. Align driving plate with flywheel
2. Remove cap screws