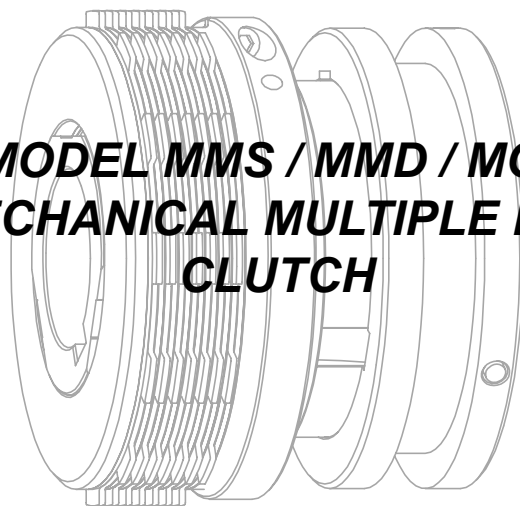




**CARLYLE JOHNSON**

**MAXITORQ®**

**MODEL MMS / MMD / MOR  
MECHANICAL MULTIPLE DISC  
CLUTCH**



**MAINTENANCE  
REPAIR  
TROUBLESHOOTING  
MANUAL**

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## ***SAFETY WARNING***

**ALWAYS DISCONNECT POWER AND AIR  
AND LOCK OUT / TAG OUT MACHINE  
BEFORE PERFORMING SERVICE  
OR REMOVING/REINSTALLING CLUTCH.**

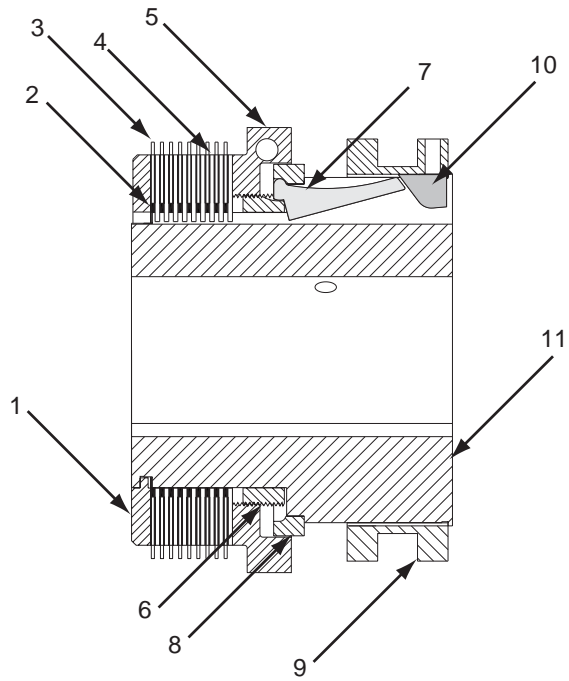
**ON-MACHINE MEASUREMENTS  
MUST BE PERFORMED  
WITH POWER AND AIR DISCONNECTED.**

**WHERE ON-MACHINE ADJUSTMENTS  
ARE REQUIRED,  
MACHINE MUST BE IN A SAFE CONDITION  
WITH POWER AND AIR DISCONNECTED  
BEFORE PERFORMING ADJUSTMENTS.**

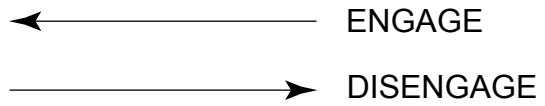
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## SECTION VIEW

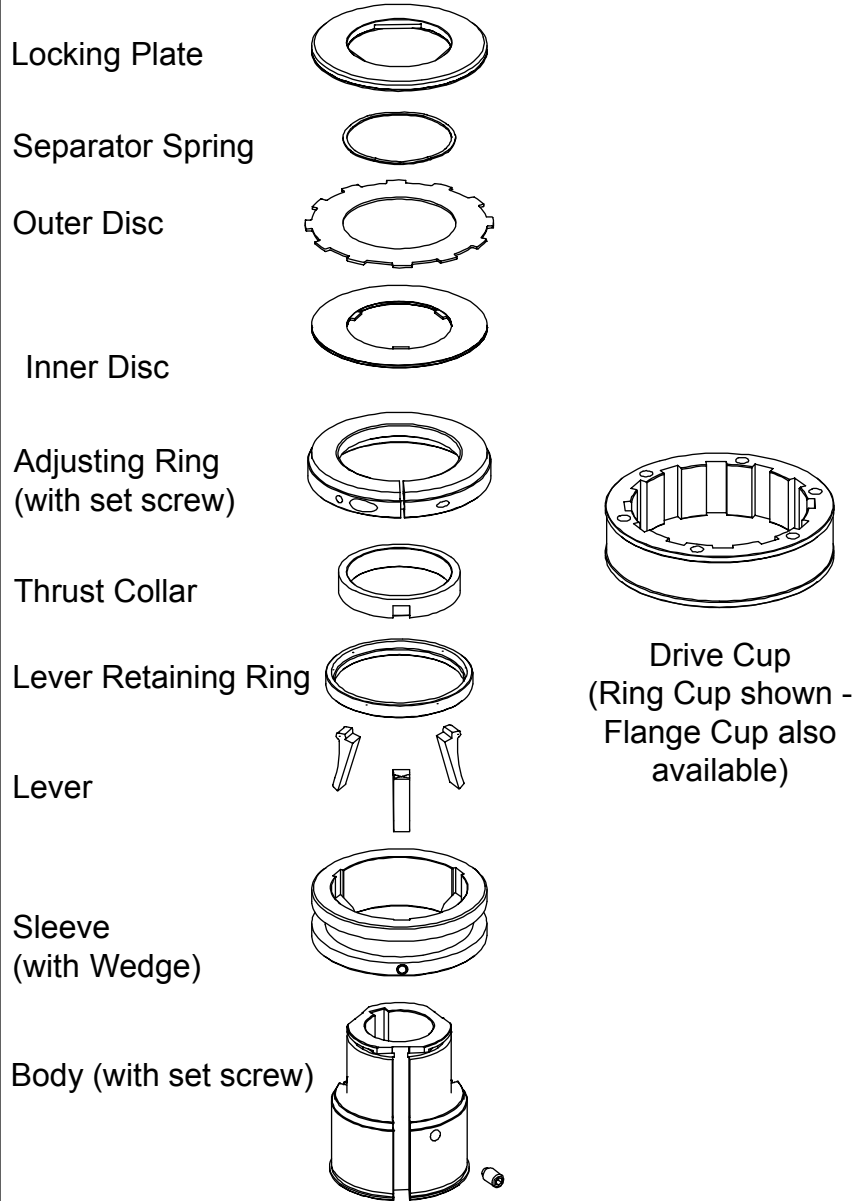


NOTE: Clutch Operation



- 1 Locking Plate
- 2 Separator Spring
- 3 Outer Disc
- 4 Inner Disc
- 5 Adjusting Ring (with Set Screw)
- 6 Thrust Collar
- 7 Lever
- 8 Lever Retaining Ring
- 9 Sleeve
- 10 Wedge
- 11 Body (with Set Screw) (Single or Double, as applicable)

## EXPLODED PARTS DIAGRAM



Model MMS shown - other models similar

## **ROUTINE MAINTENANCE**

### ***Preventive Maintenance***

MAXITORQ® Multiple Disc Clutches need little or no maintenance in normal use. Discs on clutches may be washed in kerosene to remove any foreign material and restore clutch performance.

When a clutch is operated in oil, the oil may eventually break down along the friction surfaces. Over time, the hardened surfaces will wear. Discs should be visually inspected from time to time, to make sure warping and galling have not occurred. If any such wear is evident, disc replacement is necessary.

### ***Replacement of Clutch Discs and Springs***

Always replace discs as a set. Do not mix old and new discs on a clutch. Replace both outer and inner discs at the same time.

Although springs may be reused if they are still serviceable, frequently they lose their hardness, and clutch performance - particularly disengagement and "neutral drag" - become a problem. We recommend purchasing a complete disc/spring set to restore like-new performance.

### ***Wear Items***

During routine inspection, check for areas within the clutch which are subject to wear over time. Levers, Wedges, as well as Discs and Springs will need replacement after extended service. The factory can supply new parts or repair your clutch to restore its performance.

Check the surfaces of the Drive Cup where it contacts the tabs on the Outer Discs. Over time, even slight misalignment of the clutch/cup may result in "grooves" being worn into the Drive Cup, preventing reliable engagement or disengagement. Any such wear requires Drive Cup replacement.

Clean the clutch by flushing it with kerosene. The entire assembly may be submerged for cleaning. More thorough cleaning of the discs and springs can be accomplished by removing them as noted above. Using compressed air, blow out any residue or contamination from the shifter area of the clutch, as well as the disc/spring area. Make sure the clutch is dry before reinstallation if it is an oil-bathed application. Lubricate the clutch as outlined in Table 2, Page 15 before installation in a dry application.

Check for smooth engagement/disengagement to determine if wedges or levers need replacement.

## ADJUSTMENTS

### **Notes on Clutch Adjustment**

MAXITORQ® Mechanical Clutches and Overload Release Clutches are shipped from the factory with all adjustments set for installation and use.

In normal use, clutch adjustment should not be required. However after extensive use, or following disc/spring replacement in the field, it may be necessary to adjust the clearance between the Adjusting Ring and the adjacent Inner Disc.

**NOTE: THIS ADJUSTMENT SHOULD BE PERFORMED WITH THE CLUTCH ON A WORKBENCH. DO NOT PERFORM PRELIMINARY ADJUSTMENTS WHILE THE CLUTCH IS INSTALLED ON A SHAFT.**

Movement of the Adjusting Ring on the clutch will allow the clutch to engage and disengage fully when installed.

Insufficient Adjustment (with the ring too loose) may prevent full engagement, allowing the clutch to slip. Excessive heat buildup will damage the clutch and require disc replacement. The clutch will not give satisfactory service if not properly adjusted.

Excessive Adjustment (with the ring too tight) may prevent full disengagement, which is a safety hazard. In addition, excessive adjustment may prevent the levers from having sufficient travel to lock in the engaged position, preventing full clutch engagement and damaging the clutch.

## ADJUSTING MODEL MMS/MMD CLUTCHES

### **Adjusting Clutches Equipped with Standard Levers**

- 1 Place the clutch on a workbench with the *Locking Plate* facing UP.
- 2 Using a hex wrench, loosen the set screw on the *Adjusting Ring*.
- 3 Turn the *Adjusting Ring* until it contacts the adjacent *Inner Disc*.
- 4 Continue turning the *Adjusting Ring* by hand until the ring is firmly seated against the discs. Do not force the ring or overtighten it.
- 5 Turn the clutch over and press down on the *Sleeve*. The clutch should engage and the sleeve should stay in the engaged position. Turn the *Adjusting Ring* as required until this condition is met. The *Adjusting Ring* must not be so loose that it does not firmly contact the discs.
- 6 When the above conditions are achieved, tighten the set screw on the *Adjusting Ring* and again invert the clutch and check its engagement. Frequently an additional slight adjustment may be needed as tightening the set screw changes the relationship of the *Adjusting Ring* and the discs.
- 7 When properly adjusted, the sliding shifter sleeve requires a distinct pressure, or “snap” for full engagement.
- 8 If the clutch shifts into full engagement with little or no axial pressure, it is under-adjusted and will slip when loaded. If excess pressure is required, the clutch will not completely engage except by applying excess pressure. This will prevent the clutch discs from separating, preventing full disengagement.
- 9 Verify the setting using the values in Table 1, below, or, to a value specified by the Equipment Manufacturer.

<b>Model MMS/MMD Torque Rating Chart</b> (for clutches using standard levers)			
Clutch Model (MMS / MMD)	Shifting Force (LBS)	Clutch Model (MMS / MMD)	Shifting Force (LBS)
<b>20</b>	<b>15</b>	<b>25</b>	<b>60</b>
<b>21</b>	<b>20</b>	<b>26</b>	<b>80</b>
<b>22</b>	<b>30</b>	<b>27</b>	<b>105</b>
<b>23</b>	<b>30</b>	<b>28</b>	<b>150</b>
<b>24</b>	<b>40</b>		

Axial Shifting Sleeve Force (in LBS) required to attain full engagement of  
Model MMS/MMD Mechanical Clutches and handle rated torque  
(when equipped with standard levers)

Table 1

## **ADJUSTING MODEL MMS/MMD CLUTCHES**

### ***Adjusting Clutches Equipped with Non-Locking Levers***

- 1 Place the clutch on a workbench with the *Locking Plate* facing UP.
- 2 Using a hex wrench, loosen the set screw on the *Adjusting Ring*.
- 3 Turn the *Adjusting Ring* until it contacts the adjacent *Inner Disc*.
- 4 Continue turning the *Adjusting Ring* by hand until the ring is firmly seated against the discs. Do not force the ring or overtighten it.
- 5 When the above conditions are achieved, tighten the set screw on the *Adjusting Ring*.
- 6 The Non-Locking Levers are designed to allow the clutch to be held in the engaged position from the force applied by the Shifter. Rapid engaging and disengaging is possible in applications where intermittent action is required. In a brake application, the braking action is proportional to the shifter force, since the Shifter Sleeve never locks itself.
- 7 After completing the above rough adjustment, check the clutch behavior when installed. Frequently an additional slight adjustment may be needed as tightening the set screw can change the relationship of the *Adjusting Ring* and the discs.

### ***Adjusting Clutches Equipped with Locking Style Levers***

- 1 Locking levers are often used in machinery that is subjected to exceptional levels of vibration. The engagement force for such clutches can be set using the same procedure outlined under "Adjusting Clutches Equipped with Standard Levers".
- 2 Table 1 values for engagement force are used for Locking-Style levers.
- 3 Disengagement force required is approximately twice that of clutches equipped with Standard Levers.
- 4 Always adjust the clutch to achieve the proper engagement force. The disengagement force is controlled by the design of the levers, and should NOT be adjusted.

## ADJUSTING MODEL MOR CLUTCHES

MAKE SURE ALL DISC SURFACES ARE CLEAN BEFORE ATTEMPTING ADJUSTMENT OF OVERLOAD RELEASE CLUTCHES.

- 1 Place the clutch on a workbench with the *Locking Plate* facing UP.
- 2 Using a hex wrench, loosen the set screw on the *Adjusting Ring*.
- 3 Turn the *Adjusting Ring* until it contacts the adjacent *Inner Disc*.
- 4 Continue turning the *Adjusting Ring* by hand until the ring is just lightly seated against the discs. Do not overtighten the ring at this time.
- 5 Turn the clutch over and press down on the *Sleeve*. The clutch should engage very easily and the sleeve should stay in the engaged position. Turn the *Adjusting Ring* as required until this condition is met. The *Adjusting Ring* must not be so loose when disengaged that it does not lightly contact the discs.
- 6 When the above conditions are achieved, tighten the set screw on the *Adjusting Ring* and again invert the clutch and check its engagement. Frequently an additional slight adjustment may be needed as tightening the set screw changes the relationship of the *Adjusting Ring* and the discs.

**WARNING! The following steps require installation and operation of the Model MOR Overload Release Clutch on the equipment. When on-machine adjustments are required, POWER AND AIR MUST BE DISCONNECTED.**

- 7 Install the clutch and tighten the set screw in the body. Apply power to the clutch. Because it was previously adjusted to a very light engagement position, the clutch should immediately throw out when power is applied. If it does not, remove power and air, loosen the set screw on the *Adjusting Ring*, and back the ring off by 10° until this setting is achieved. It is best to start the final on-machine adjustment process from a very light disengagement setting.
- 8 Remove power and air from the machine. Loosen the set screw on the *Adjusting Ring* and rotate the ring to increase or decrease (as appropriate) the holding power of the clutch. Do not turn the ring more than 10° at a time in either direction before tightening the set screw and rechecking the setting.
- 9 After each adjustment, apply power to the clutch, until it is able to just hold the required torque. DO NOT OVER ADJUST THE CLUTCH. If the clutch is “over-adjusted”, too much torque will have to be applied before overload occurs, creating a dangerous condition.
- 10 When setting the clutch for very light loads, more careful adjustments must be made - using 5° increments or less.

## **TROUBLESHOOTING**

### **General Troubleshooting**

- 1 Check for worn parts. Obviously damaged or worn parts must be replaced to insure correct clutch operation. Determine whether this wear is due to normal operation over a long period of use, or improper installation, maintenance, or clutch contamination. Replacing worn parts will provide only temporary improvement if a more fundamental problem is present and goes undetected.
- 2 Check alignment of clutch and drive cup. Review the paragraph on *Alignment* . Improper alignment will asymmetrically load the clutch and drive cup, causing premature wear, and possibly interfering with clutch operation.
- 3 Check for contamination of clutch discs. Discs in dry applications may become contaminated with oils from adjacent bearings or other external sources, which will prevent the clutch from transmitting full torque. Slippage is frequently caused by such contamination. Clean the discs as outlined under *Contamination*.
- 4 Check clearances. Check that the relationship of the drive cup to the Adjusting Ring meets our specifications as outlined under *Alignment* . Also verify that when the clutch is disengaged, it will rotate freely with no binding or interference.
- 5 Check for missing or damaged parts. If the clutch has been subjected to repair, removal, and reinstallation, check to see if the clutch has been reassembled correctly. Review the parts diagram included in this manual and replace or repair any damaged or missing parts.
- 6 Check engagement and disengagement. It may be necessary to adjust the clutch if it does not fully engage and fully disengage. Any slippage when engaged, or continuing torque transmission when disengaged indicates the need for adjustment. Review the page on *Adjustments* for instructions.

## **TROUBLESHOOTING, con't**

### ***Clutch Fails to Engage - No Torque Transmitted***

Check the following with the clutch installed (see **SAFETY WARNING** inside front cover)

- 1 Alignment
- 2 Drive Cup engagement
- 3 Yoke assembly
- 4 Drive Cup to Adjusting Ring clearance
- 5 Secure Installation

Remove the clutch to check the following:

- 6 Disc Contamination
- 7 Drive Cup wear
- 8 Disc wear

### ***Clutch Slips - Only Partial Torque Transmitted***

Check the following with the clutch installed (see **SAFETY WARNING** inside front cover)

- 1 Alignment
- 2 Secure Installation

Remove the clutch to check the following:

- 3 Disc Contamination
- 4 Drive Cup wear
- 5 Disc wear
- 6 Separator Springs

## **TROUBLESHOOTING, con't**

### ***Clutch Fails to Disengage***

**WARNING: DO NOT OPERATE EQUIPMENT IF CLUTCH FAILS TO PROPERLY DISENGAGE. REPAIR OR REPLACE CLUTCH BEFORE CONTINUING OPERATION.**

Check the following with the clutch installed (see **SAFETY WARNING** inside front cover)

- 1 Alignment
- 2 Yoke assembly
- 3 Drive Cup to Adjusting Ring clearance
- 4 Secure Installation

Remove the clutch to check the following:

- 5 Disc Contamination
- 6 Drive Cup wear

### ***“Neutral Drag” - Clutch Transmits Torque when Disengaged***

**WARNING: DO NOT OPERATE EQUIPMENT IF CLUTCH FAILS TO PROPERLY DISENGAGE. REPAIR OR REPLACE CLUTCH BEFORE CONTINUING OPERATION.**

NOTE: A small amount of torque is transmitted in the neutral “disengaged” position. This is normal with multi-disc clutches. At very low speeds, up to 2% of the static torque may be transmitted. At high neutral speeds, this value will fall to 1% or less. If significant torque transmission is evident when the clutch is disengaged, the clutch should be repaired.

Check the following with the clutch installed (see **SAFETY WARNING** inside front cover)

- 1 Alignment
- 2 Drive Cup to Adjusting Ring clearance
- 3 Secure Installation

Remove the clutch to check the following:

- 4 Disc Contamination
- 5 Drive Cup wear
- 6 Separator Springs

## **MAINTENANCE/REPAIR PROCEDURES**

### *Alignment*

Clutch and Drive Cup must be concentric within .005 T.I.R. Misalignment may be caused by improper clutch mounting; improper mounting or support of Drive Cup; or worn bearings supporting Drive Cup.

Clearance between Drive Cup fingers and Adjusting Ring must be approximately 1/16" around the entire circumference. This dimension must be uniform around the circumference of the Drive Cup.

See also "Drive Cup Engagement" below.

### *Drive Cup Engagement*

Drive cup must fully engage all outer discs. Adjust alignment of drive cup if necessary or repair/replace external components or clutch mounting to correct any deficiency.

Inspect carefully the area where the Drive Cup contacts the Outer Discs. Prolonged use with a misaligned or misengaged cup can result in grooves being worn into cup. The Outer Discs will seat themselves in these grooves and fail to properly engage or disengage. If this condition is observed, cup replacement is required.

### *Yoke Assembly*

The Shifter Yoke Assembly normally is attached to the clutch through the Shifter Shoes, which are attached to the Sleeve with studs. The yoke assembly must have sufficient travel range to engage and disengage the clutch. Any binding or restriction must be addressed to insure smooth clutch action.

Shifter shoes are attached to the Sleeve with factory-installed studs. Worn shoes must be replaced. The factory can supply parts for field repair, but factory repair is recommended.

### *Drive Cup to Adjusting Ring Clearance*

Clearance between Drive Cup fingers and Adjusting Ring must be approximately 1/16" around the entire circumference. This dimension must be uniform around the circumference of the Drive Cup.

See also "Drive Cup Engagement" above.

## **MAINTENANCE/REPAIR PROCEDURES, con't**

### *Secure Installation*

The clutch must be secured to a shaft with a key, and locked in place with the body set screw. Check that the installation is secure and that the clutch is not able to move when installed.

### *Disc Contamination*

Disc contamination of clutches run dry may be caused by oils from external sources or other debris. Discs may be flushed with kerosene to remove oils or other contaminants, and restore normal operation.

Bearings in the vicinity of the clutch – for example used to support the Drive Cup – should be adequately shielded to prevent clutch disc contamination. Clutches run in oil must not contain extreme pressure additives. We recommend ATF oils such as Dexron II for this application.

### *Drive Cup Wear*

Improper alignment, support, worn bearings, or extreme service may eventually wear “grooves” into the fingers of the Drive Cup. This will interfere with the compression and separation of discs, preventing proper engagement/disengagement of the clutch. If any such wear is evident, replace the Drive Cup, and if needed, its supporting mechanism. Any further damage to clutch discs may require disc replacement. Verify alignment after reassembly.

### *Disc Wear*

After extended use, clutch discs will wear to the point where replacement is necessary. In a dry application, if normal operation is not restored to a slipping clutch with kerosene flushing, then disc replacement is necessary.

In oil-bathed applications, oil will eventually break down along the friction surfaces. Over time, the hardened surfaces become worn to a point where warping or galling occurs. This damage can be clearly seen by checking the disc surfaces, and requires prompt disc replacement to maintain good clutch performance.

Always replace discs and springs as a set. The factory can supply disc/spring kits.

## **MAINTENANCE/REPAIR PROCEDURES, con't**

### Separator Springs

If the clutch transmits excess torque when in neutral, separator springs may be worn or bent. Springs should be replaced under these circumstances.

Proper spring performance is achieved when discs are uniformly spaced in the disengaged position.

Contact the factory to purchase replacement springs. It is a good idea to replace the discs at the same time, to restore the clutch to like-new performance.

## **CLUTCH DISASSEMBLY**

- 1 Place the clutch on a workbench with the *Locking Plate* facing UP.
- 2 Using a hex wrench, loosen the set screw on the *Adjusting Ring*.
- 3 Turn the *Adjusting Ring* away from the discs until they are free of any contact with the *Adjusting Ring*.
- 4 Remove the *Locking Plate* by pressing down and rotating it 60°. This will free the bayonet lock and allow the *Locking Plate* to be removed.
- 5 Remove the *Outer Discs*, *Separator Springs*, and *Inner Discs* from the body. If you are only replacing discs and springs, no further disassembly is required.
- 6 Remove the *Adjusting Ring*, and *Levers*.
- 7 Remove the *Lever Retaining Ring*, *Sleeve*, and *Thrust Collar*.
- 8 Thoroughly clean all parts before reassembly.
- 9 *Discs*, *Springs*, and *Levers* are easily replaced when worn and unserviceable. Although *Wedges* and *Shifter Shoes* can be purchased from the factory, field replacement is not recommended. Return the body to the factory for proper replacement of these parts.

<b>Mechanical Clutch Recommended Lubricants (for DRY Applications)</b>	
<b>Contact Points</b>	<b>Lubricant</b>
Shifter Sleeve : Body	Light Oil (#10 or #20)
Shifter Shoes : Shifter Sleeve	Grease such as "Lubriplate"
Lever Ends : Wedges	Light Oil (#10 or #20)
Lever Ends : Retaining Ring	Light Oil (#10 or #20)
Discs	Flush with Kerosene, Air Dry

Table 2

## CLUTCH ASSEMBLY

- 1 Place the **Body** on a workbench with the small-diameter end facing UP.
- 2 Place the **Thrust Collar** on the body with the three milled slots facing DOWN. Align the slots with the milled slots on the **Body**.
- 3 Insert a **Lever** into each milled slot on the **Body**, with the flat side of the **Lever** facing the **Body**.
- 4 Place the **Lever Retaining Ring** over the **Body**.
- 5 Raise the **Thrust Collar** and **Levers** UP until the round heads of the **Levers** are in the circular recesses of the **Lever Retaining Ring**.
- 6 Screw on the **Adjusting Ring** until the face of the ring is flush with the face of the **Thrust Collar**.
- 7 Select an **Inner Disc**. **Inner Discs** have an internal lugs to fit in the milled slots on the **Body**. Slide an **Inner Disc** on the **Body**.
- 8 Place a **Separator Spring** over the **Body**, so it rests on the **Inner Disc** previously installed.
- 9 Select an **Outer Disc**. **Outer Discs** have external lugs, to fit into the slots of the **Drive Cup**. Slide the **Outer Disc** on the **Body**.
- 10 Continue installing **Inner Discs**, **Separator Springs**, and **Outer Discs** until the proper number of each are on the **Body**. The last disc to be installed will be an **Outer Disc**. Table 3 below shows the number of discs required by clutch model.
- 11 Place the **Locking Plate** over the **Body**. Press down and rotate the **Locking Plate** approximately 60° until the **Locking Plate** snaps into position and is locked. If the plate cannot be locked into position, check to be sure the **Separator Springs** are not causing a restriction, or that the **Levers** have not fallen out of position.
- 12 The clutch should turn freely without any restriction or interference. The **Sleeve** should move freely engaging and disengaging the clutch (although the engagement force is inadequate in this position and proper adjustment is required before installation).
- 13 Proper lubrication is required before installation. See Table 2 on Page 15.

<b>Model MMS/MMD Disc Complement Chart</b>			
<small>(Inner discs, Outer discs, and Springs are EACH used in quantity shown)</small>			
Clutch Model (MMS / MMD)	Discs/Springs (QTY)*	Clutch Model (MMS / MMD)	Discs/Springs (QTY)*
20	5	25	6
21	5	26	7
22	5	27	8
23	6	28	9
24	6		

Table 3

**NOTES**



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