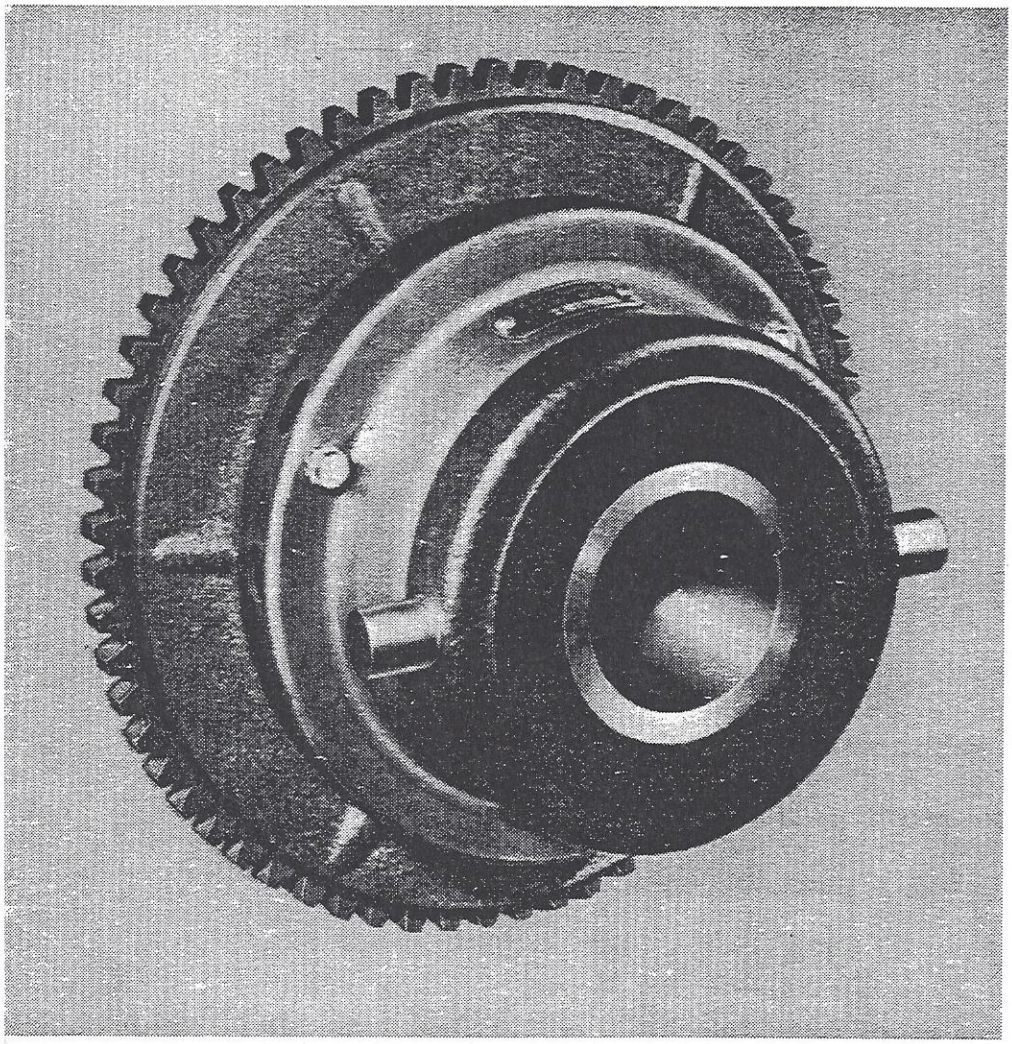
OPERATOR'S MANUAL

OM-505

#1015841



MODEL CL CLUTCHES

TWIN DISC
INCORPORATED

Administrative Offices – Racine, Wisconsin

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OM-505 OPERATORS MANUAL

MODEL CL CLUTCHES

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Twin Disc, Incorporated

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TECH TALK
SERVICE LETTER
TWIN DISC, INCORPORATED
Engineering Department • Racine, Wisconsin

NOTE:
The contents of this Service Letter are intended to be distributed by you to your customers, owners and end users. Your cooperation is required.

Service Letter No.: 84-10
Index: GENERAL PRODUCTS
Original Issue Date: 5/84

"CL" CLUTCHES — ADJUSTING YOKES

The 5", 6" and 7" "CL" Clutch adjusting yoke A3759 and A3759-A have been replaced by A3759-B and A3759-C respectively. Also changed on these models are the levers A3535 and A3535-A which were replaced by A3535-B and A3535-C respectively.

On the 8", 10" and 11" "CL" Clutches, only the adjusting yokes A3747, A3747-A, and A3747-C have been replaced by A3747-D, A3747-E and A3747-F respectively.

These changes were made to provide a cone stop that permits clutch adjustments to be performed with more precision.

The following is a chart of values required to properly adjust "CL" Clutches. A formula has been provided that converts axial force (B) into a torque value (A) at the operating shaft, with (C) representing the centerline to centerline distance of the throwout fork (see sketch *), which may vary with application (example given in chart is a Twin Disc throwout fork).

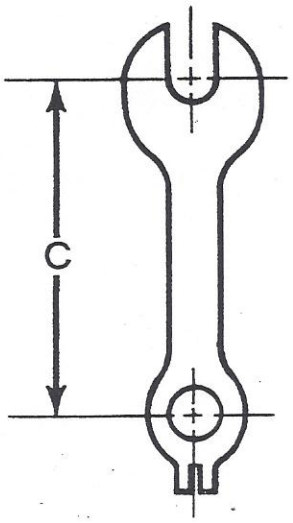
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MODEL	AXIAL FORCE LBS. "B"	OPER. SHAFT ENGAGING TORQUE LB. FT. "A"		THROWOUT FORK C TO C DISTANCE "C" (See Sketch *)
CL-5	353 ± 10%	79 min.	97 max.	3.00"
CL-6	338	76 min.	93 max.	3.00"
CL-7	263	59 min.	72 max.	3.00"
CL-8	448	126 min.	154 max.	3.75"
CL-10	625	175 min.	214 max.	3.75"
CL-11	640	180 min.	220 max.	3.75"

The important factor in clutch adjustment is that axial force be achieved. A formula has been provided that allows this force to be converted into a torque value which can be checked at the operating shaft. In other words, a torque wrench can be used at the end of the operating shaft to check adjustment. This method applies to all units. If a power engager is used, it will have to be disconnected and clutch adjustment checked by hand as indicated.

Power engager travel from engaged to disengaged position and vice versa must be adjusted so that no load from the power engager is continuously transferred to the clutch collar when the clutch is engaged or disengaged.

$$\left[A = \frac{B \times C}{12} \right]$$



WHERE

A = Torque in lb. ft.

B = Axial force in lbs.

C = C to C distance of throwout fork in inches (see sketch *)

EXAMPLE:

CL-5

AXIAL FORCE "B" = 353 lb. ± 10%

"B" = 318-388 lbs.

"C" = 3"

$\left(A = \frac{B \times C}{12} \right)$ $\left(A = \frac{318 \times 3}{12} = 75 \text{ lb. ft. min.} \right)$ $\left(A = \frac{388 \times 3}{12} = 97 \text{ lb. ft. max.} \right)$

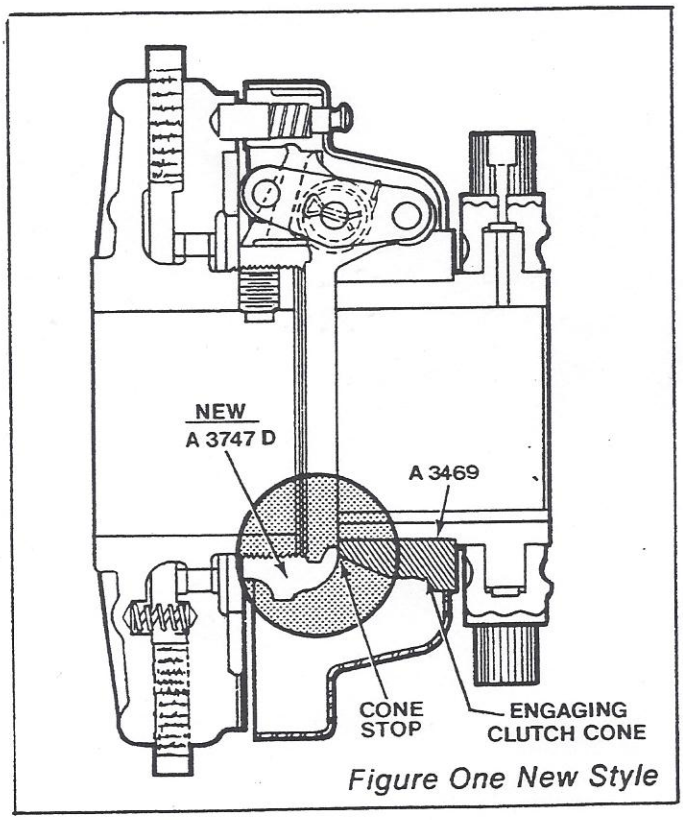


Figure One New Style

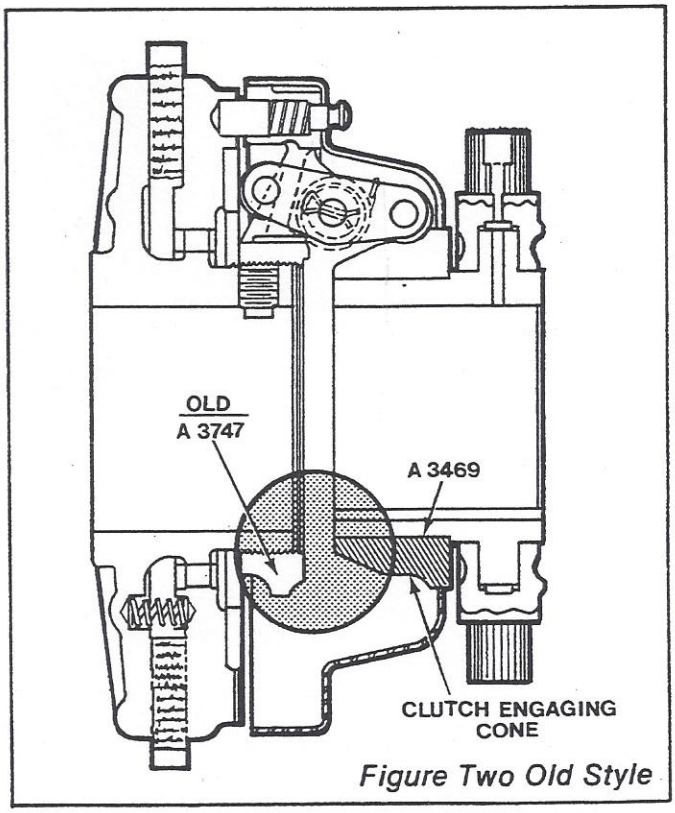


Figure Two Old Style

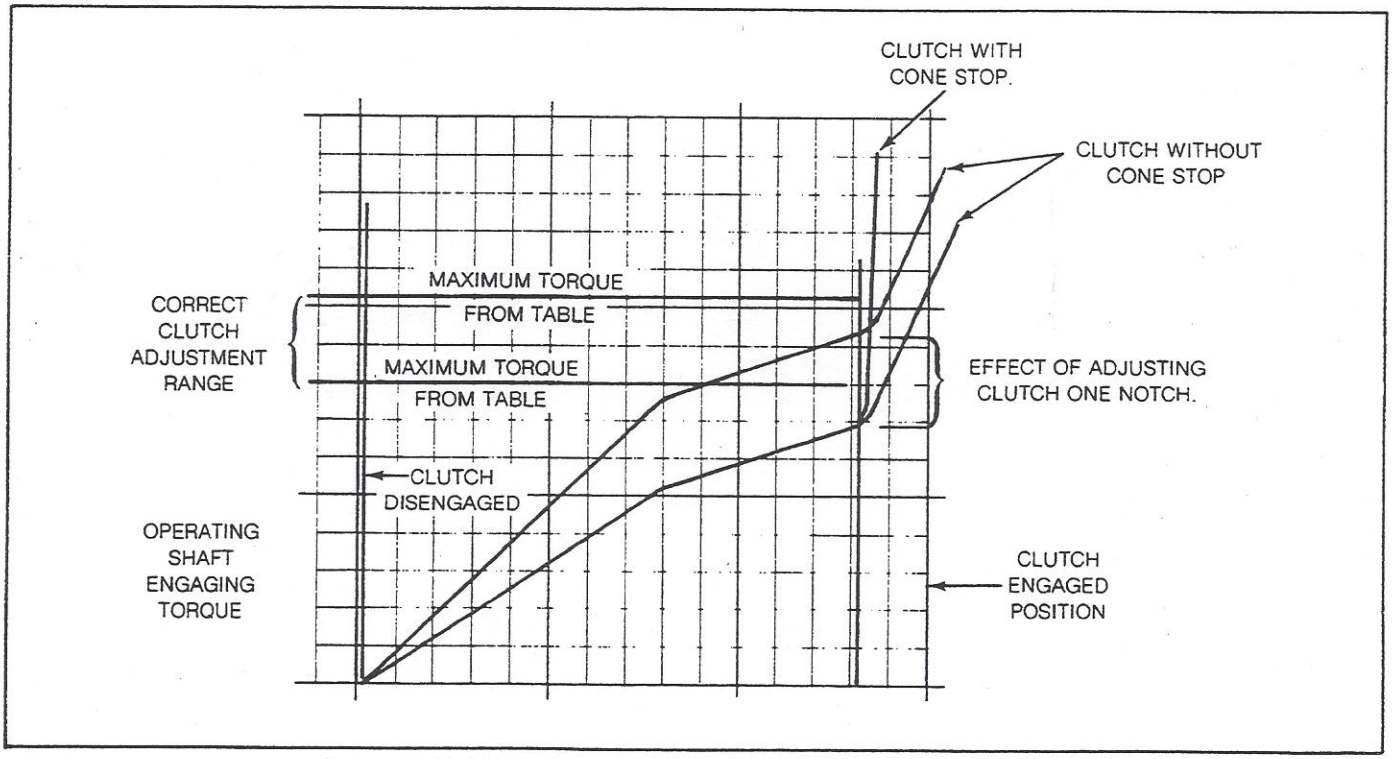
D

The new adusting yokes (with cone stop) should reach the appropriate torque value at the same time the cone reaches the stop. This applies to both the overlocking and non-overlocking styles. The older models without the cone stop should be adjusted with the applicable torque setting being achieved when going over center on the overlocking style. On the non-overlocking style the torque setting should be reached between the marks put on the shaft as indicated below and in Operator Manual OM-505.

Start with the clutch loose enough to permit the rollers to hit the stop on the cone, .125 and .250 inches from the cone sleeve toward the released position. Turn the adjusting yoke clockwise to tighten the clutch. Adjust the clutch tight enough to stop the cone and sleeve assembly between these marks on the shaft with full engaging effort applied.

If a power engager is used, piston travel should be limited to the following. On the 5", 6" and 7" models, the nominal sleeve and cone assembly travel for correct clutch operation is 11/16" and on the 8", 10" and 11" models it is 7/8".

The plot that follows shows typical operating shaft engaging torque vs. the axial location of the clutch engaging cone (see planographs). The approximate shape of this torque vs. cone position curve for clutches with and without a cone stop is not shown. From this plot, it is apparent that correct adjustment of the CL Clutches with and without a cone stop is not difficult. The cone stop does make it even easier to determine when the clutch engaging cone is in the correct clutch engaged position within the specified range of operating shaft engaging torque.



Axial Location of Clutch Engaging Cone.

Maintaining proper adjustment is very important to operation and safety. The above information has been provided to give maximum and minimum adjustment values.

Planographs of a 108 model have been included to show the old and new style adjusting yokes, and a dimension indicating engagement travel.

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Section 1.
INTRODUCTION

GENERAL INFORMATION.

Scope.

This publication provides the information necessary for the operation and maintenance of the Twin Disc, Incorporated equipment specified on the cover of this manual. Specific engineering details and performance characteristics can be obtained from the Service Engineering Department of Twin Disc, Incorporated, Racine, Wisconsin, U.S.A.

Operation and maintenance personnel responsible for this equipment should have this manual at their disposal and be familiar with its contents. Applying the information in the manual will result in consistent performance from the unit and help reduce downtime.

Special Tools.

Engineering drawings are included for the fabrication of special tools that should be used during disassembly and assembly of a unit. Repair of this equipment should not be attempted without special tools. Twin Disc does not manufacture these tools for general use.

RENEWAL PARTS AND KITS.

Parts Lists.

Illustrations with complete parts listings are provided in appropriate sections of the manual to facilitate ordering spare or renewal parts and kits.

Ordering Parts.

Renewal Parts and Service Parts Kits, may be obtained from an authorized Twin Disc distributor or service dealer. They are listed under POWER TRANSMISSION EQUIPMENT in the Yellow Pages of most metropolitan telephone directories.

NOTE

Do NOT use planographs included in this manual for ordering parts. Parts must be ordered from the bill of material (formerly specifications). Bill of material numbers are stamped on the unit's nameplate.

If the bill of material sheet from which part numbers are obtained is unavailable, proceed as follows:

1. Provide the figure number of the illustration containing the part, the item number of the part, the description of the part, and the quantity required.

2. Do not use the word "complete", but state exactly each item wanted.

3. Do not designate the quantity by "sets", but specify the part required.

4. Specify the model, bill of material (formerly specifications), and serial number of the unit involved. These numbers are stamped on the unit's nameplate.

Parts Shipment.

Furnish the complete shipping destination and postal address. All parts shipments made from the factory will be F.O.B. factory location, U.S.A. State specifically whether the parts are to be shipped by freight, express, etc. If shipping instructions are not specified on the order, the equipment will be shipped the best way, considering time and expense. Twin Disc, Incorporated will not be responsible for any charges incurred by this procedure.

Twin Disc, Incorporated, having stipulated the bill of materials (formerly specifications) number on the unit's nameplate, absolves itself of any responsibility resulting from any external, internal, or installation changes made in the field without the express written approval of Twin Disc. All returned parts, new or old, emanating from any of the above stated changes will not be accepted for credit. Furthermore, any equipment which has been subjected to such changes will not be covered by a Twin Disc Warranty.

PREVENTIVE MAINTENANCE-TROUBLE SHOOTING.

Frequent reference to the information provided in this manual regarding daily operation and limitations of this equipment will assist in obtaining trouble free operation. Schedules are provided for the recommended maintenance of the equipment, and if observed, minimum repairs, aside from normal wear, will result.

In the event a malfunction does occur, a trouble shooting table is provided to help identify the problem area, and list information that will help determine the extent of the repairs necessary to get a unit back into operation.

LIFTING BOLT HOLES.

Most Twin Disc products have provisions for attaching lifting bolts. The holes provided are always of adequate size and number to safely lift the Twin Disc product.

CAUTION

These lifting points must not be used to lift the complete power unit. Lifting excessive loads at these points could cause failure at the lift point (or points) and result in damage or personal injury.

CAUTION

Select lifting eyebolts to obtain maximum thread engagement with bolt shoulder tight against housing. Bolts should be near but should not contact bottom of bolt hole.

SAFETY.

General.

Safe operating practices should be employed by all personnel servicing this unit. Twin Disc, Incorporated will not be responsible for personal injury resulting from careless use of hand tools, lifting equipment, power tools, or unaccepted maintenance/working practices.

Important Safety Notice.

Because of the possible danger to person(s) or property from accidents which may result from the use of manufactured products, it is important that correct procedures be followed. Products must be used in accordance with the engineering information specified. Proper installation, maintenance, and operation procedures must be observed. Inspection should be made as necessary to assure safe operations under prevailing conditions. Proper guards and other suitable safety devices or procedures that may be desirable or specified in safety codes should be provided. These devices are neither provided by Twin Disc, Incorporated nor are they the responsibility of Twin Disc, Incorporated.

SOURCE OF SERVICE INFORMATION.

Each series of maintenance manuals issued by Twin Disc, Incorporated is current at the time of printing. When required, changes are made to reflect advancing technology and improvements in state of the art.

Individual product service bulletins are issued to provide the field with immediate notice of new service information. These service bulletins are distributed to all the Twin Disc distributorships throughout the United States and in many foreign countries.

For the latest service information on Twin Disc products, contact a Twin Disc Distributor, or write to the Service Engineering Department, Twin Disc, Incorporated, Racine, Wisconsin, U.S.A.

WARRANTY

Equipment for which this manual was written has a limited warranty. For details of the warranty, contact any Twin Disc distributor, service dealer, or the Warranty Administration Department, Twin Disc, Incorporated, Racine, Wisconsin, U.S.A.

NOTE

Oil torque values are given for all screws; therefore, screws should be oiled before installing.

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Section II GENERAL INFORMATION

6. GENERAL.

Twin Disc Model CL Clutches incorporate the latest features in clutch design. They meet the need for a heavy-duty, enclosed-type clutch from 5.5 to 11.5 inches in diameter. These clutches are used in power transmission applications of different types, such as: couplings for line shaft, drives for pulleys, or for use with driving spiders carrying gears, sprockets or pulleys.

SIZES AND CAPACITIES

Model CL Clutches have working capacities based upon ample safety factors to ensure satisfactory operation under all normal working conditions. The standard sizes (listed below) are built to transmit loads from 1.5 to 19.5 horsepower per 100 rpm. These ratings should not be exceeded.

Clutch O.D.	Number of Driving Plates
5.5	1 or 2
6.5	1, 2 or 3
7.5	1
8	1, 2 or 3
10	1, 2 or 3
11.5	1, 2 or 3

Section III CONSTRUCTION

7. GENERAL CONSTRUCTION.

Over-all dimensions of Model CL clutches are held to a minimum, consistent with good design, to conserve the space required for installation. The clutch cover is designed to permit operation in the open without the addition of special protective housings and guards. This minimizes the possibility of any projecting parts being caught during rotation.

A. The clutch action is counterbalanced through the use of clutch levers that are equipped with hardened rollers moving on a hardened disc and on the hardened and ground cone ring. The roller disc is made of a special heat-treated, high carbon steel. The surface of the disc that contacts the rollers of the adjusting yoke assembly also is ground. This prevents the rollers from cutting into the cast iron floating plate.

B. Wide friction surfaces are used. High-grade, molded-asbestos, friction material and highly-finished contact surfaces keep wear to a minimum and assure smooth, positive operation.

C. All model CL Clutches are equipped with gear tooth driving plates.

Section IV OPERATION

8. OPERATION.

All Model CL Clutches are cone engaged. When the cone assembly is moved towards the clutch, the roller end of the three levers, which contact the cone, travel up the contour of the cone. This action causes the opposite roller ends of the levers to apply pressure against the hardened disc and floating plate; hence, the clutch is engaged. When the cone assembly is moved out, the pressure against the floating plate is released and the clutch is disengaged.

Section V. INSTALLATION

9. INSTALLATION.

The Model CL Clutch must be properly aligned with the driving member during installation in order to avoid excessive wear or scrubbing of parts. If such unnecessary wear is experienced, the service life of the clutch will be reduced considerably. Immediately upon recognizing a misalignment condition, the entire installation should be examined for alignment with the aid of a dial indicator.

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Section VI. LUBRICATION

10. LUBRICATION.

The ball bearing and plain cone assemblies on all Model CL Clutches are manufactured with drilled and tapped trunnions for the installation of grease fittings. If a Twin Disc driving spider is used, it is factory-equipped with a grease fitting on the hub end of the spider. These fittings should be lubricated every 10 hours with a high-grade, high temperature Grade 2 or better lithium base grease, recommended by anti-friction bearing manufacturers.

Section VII PREVENTIVE MAINTENANCE

11. PREVENTIVE MAINTENANCE.

A. Lubricate the cone assembly and driving spider assembly once a day.

B. Make certain transmitted power of engine does not exceed rated capacity of clutch.

C. Make certain the clutch and driving member are aligned within .005 inch total indicator reading.

D. Make certain clutch does not heat up due to improper adjustment.

E. Make certain bearing temperatures do not exceed a maximum of 200 degrees F.

F. On ball bearing collar units, the user must apply either oil or grease to the shaft beneath the sliding sleeve periodically to prevent sliding sleeve from sticking to shaft.

Section VIII CLUTCH ADJUSTMENT

12. ADJUSTMENT FOR STANDARD OVER-LOCKING CONE.

A new clutch may require several adjustments when first placed in operation in order to run-in the clutch plates and the moving parts. After these initial adjustments, the clutch will operate for a considerable length of time without further adjustment.

NOTE

If the clutch heats, jumps out of engagement, or does not hold, the clutch must be adjusted.

Disengage the clutch, and turn the clutch until the adjusting lock pin (Fig. 1, 12h) can be reached. Pull the pin out, and lock in the "out" position by means of a piece of wire or small nail pushed through the cross-drilled hole in the pin. *(If the clutch is used without a cover, a washer 1/16-inch thick and of sufficient diameter must be used under the piece of wire or nail during adjustment to compensate for the missing cover).* Turn the adjusting yoke (12f) clockwise one or two adjusting holes, or until the clutch requires a distinct pressure to engage. Slotted holes are provided in the clutch cover (13) for the insertion of a drift pin for tapping the adjusting yoke should the yoke be too snug to be moved by hand.

13. ADJUSTMENT FOR SPECIAL NON OVER-LOCKING CONE.

IMPORTANT

This clutch has a non over-locking cone. If clutch does not pull and heats, adjustment may be necessary.

Turn the adjusting yoke (fig. 1, 12f) clockwise to tighten the clutch. Start with the clutch loose enough to permit the rollers to hit the stop on the cone (18a) in the engaged position. Make two marks on the shaft, 0.125 and 0.250 inches from the cone sleeve (18b) towards released position. Adjust the clutch tight enough to stop the cone and sleeve assembly between these marks on the shaft with full engaging effort applied. A new clutch requires several adjustments until driving plates (friction discs) are worn in to mate.

CAUTION

Prior to operating the clutch, make certain to release and properly engage the adjusting lock pin into the nearest locking hole after removing the piece of wire or nail from the cross-drilled hole.

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14. INPUT GROUP.

There are three optional input groups shown as Items 1, 2 and 3 on Figure 1.

A. Removal of Clutch assembly From Prime Mover or Shaft Line.

(1) If equipped with bolt-on driving ring (fig. 1, 1) proceed as follows: place sliding sleeve (17 or 18b) in the fully disengaged position with the clutch control lever. Remove the lever linkage and lube hose from the collar assembly. Remove the three round-head machine screws (16) that secure the clutch cover (13) to the adjusting yoke (12). Set the adjusting lock pin (12h) in the "out" position. (See "Adjustments" section for procedure). Rotate the adjusting yoke assembly (12) in a counterclockwise direction until it comes off of the threaded hub of the hub and back plate (6).

NOTE

The Drive ring (1) type drive is usually used with an open end engine and is bolted to the flywheel. In this configuration, the drive ring is the driving member and the clutch is the driven member, coupling the drive to a shaft key-driven from the hub and back plate. This shaft is pilot-bearing supported in the flywheel.

When the yoke assembly (12) is removed, the split type drive plates, if used, will be free to fall. Be aware of this. Slide the roller disc (11), floating plate (10), drive plates (8) and center plates (9) from the hub and back plate (6) onto the driven shaft. Remove the dog point setscrew (7) and remove the shaft from the hub and back plate. Remove the hub and back plate. At the same time, remove the components previously slid back on the shaft (driving plates, center plates, floating plate, roller disc, yoke assembly and cover). The release springs (4) will fall free from the hub and back plate on the units which use them. Be aware of this. Remove the drive ring (1) from the prime mover only if replacement of the part is necessary.

(2) If equipped with an input spider (fig. 1, 2c) proceed as follows: place the sliding sleeve (17 or 18b) in the fully disengaged position, with the control lever and remove lever linkage and lube hose from collar assembly. Remove the three round-head machine screws (16) that secure the clutch cover (13) to the adjusting yoke. Set the adjusting lock pin (12h) in the "out" position, (see "Adjustments" section for procedures). Rotate the adjusting yoke assembly (12) in a counterclockwise direction until it comes off of the threaded hub of the hub and back plate (6). When the yoke assembly (12) is removed the split type drive plates will be free and will fall. Be aware of this. Slide the roller disc (11), floating plate (10), drive plates (8) and center plates (9) from the hub and back plate (6) onto the driving shaft. Remove the dog point setscrew (7) and remove the shaft from the hub and back plate. At this same time, remove the components slid back on the shaft previously (driving plates, center plates, floating plate, roller disc, yoke assembly and cover). The release springs (4) will fall free from the hub and back plate on the units which use them. Be aware of this.

NOTE

The drive spider flange assembly (fig. 1, 2) is normally used on a line shaft for ninety degree change of drive direction with a "V" belt or chain take-off pulley. The spider becomes the driven member, driving the chain sprocket or "V" belt pulley. The line shaft is the driving member, driving the hub and back plate then the spider flange through the clutch driving plates.

Remove the drive spider assembly (2) from the line shaft with a suitable puller only if the replacement of the parts is necessary. Remove the grease fitting (hydraulic), specification plate (2d), and bushings (2a) from the spider only if replacement of the parts is necessary.

(3) If equipped with an input spider (fig. 1, 3c), proceed as follows: place the sliding sleeve (17 or 18b) in the fully disengaged position with the control lever and remove lever linkage and lube hose from collar assembly. Remove the three round-head machine screws (16) that secure the clutch cover (13) to the adjusting yoke. Set the adjusting lock pin (12h) in the "Out" position (see "Adjustments" section for procedure). Rotate the adjusting yoke assembly (12) in a counterclockwise direction until it comes off of the threaded hub of the hub and back plate (6).

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NOTE

The drive spider flange assembly (fig. 1, 3) is normally used as a cut-off coupling type drive to a machine from a prime mover. The input drive member is the spider flange and the driven member of the clutch is the hub and back plate being driven by the spider flange and clutch driving plates. The hub and back plate then drives a shaft to the machine. The driven shaft pilots in the ball bearing located in the hub bore of the spider hub. This configuration provides a cut-off and coupling capability to the machine from prime mover.

When the yoke assembly (12) is removed, the split clutch drive plates (if used) will be free to fall. Be aware of this. Slide the roller disc (11), floating plate (10), drive plates (8) and center plates (9) from the hub and back plate (6) onto the driven shaft. The clutch release springs (4) will be free to fall. Be aware of this. Remove the dog point setscrew (7) from the hub and back plate and remove the driven shaft to the machine from the machine and hub and back plate. The clutch components can be removed from the shaft at this time. Remove the hex-socket head cup point setscrew (3a) from the spider hub (3c) and remove the spider drive assembly from the input shaft of the prime mover only if replacement of the parts is necessary.

B. Disassembly of Unit Assembly As Received From Twin Disc.

(1) Pull the collar and cone assembly (fig. 1, 17, 18) rearward from the rollers of the yoke assembly, removing them from the unit.

(2) To disassemble the plain collar unit, remove the two nuts (fig. 1, 17 (C2)) which secure the bolts (17 (C1)), shims (17 (C3)), and collar halves (17 (C4)) to the sleeve (17b). Remove these parts from the sleeve (17b). Pull the cone (17a) from the sleeve only if replacement of the parts is necessary.

(3) To disassemble the ball bearing collar unit (fig. 1, 18) remove the internal snap ring (18c) and washer (18d) from the sleeve (18b) and remove the collar from the ball bearing (18e) and the sleeve (18b). Remove the cone (18a) from the sleeve (18b) only if replacement of the part is necessary. Remove the external snap ring (18f) from the sleeve (18b) and remove the ball bearing (18e) from the sleeve only if replacement of the part is necessary.

(4) Remove counterclockwise the cover (fig. 1, 13) and yoke assembly (12) from the hub-and-back plate (6). Remove the nail or wire from the adjusting pin (12h), and remove the pin and spring (12g) from the cover (13) and yoke (12f).

(5) Remove the three cover capscrews (fig. 1, 16), and remove the cover (13) from the yoke (12f).

(6) Remove the three cotter pins (fig. 1, 12e), and remove the three retaining pins (12j) from the yoke (12f). The three spacers (12c) will fall free on removal of the pins. The six levers (12a) are under tension from the three lever springs (12d), so exercise care when removing pins (12j). Remove the six levers (12a), three springs (12d) and six rollers (12b) from the yoke (12f). Remove the roller disc (11), floating plate (10), driving plate/plates (8), and centering plate/plates (9) from the hub-and-back plate (6). Where split drive plates are used, the plates will be free to fall upon removal of the adjusting yoke from the hub and back plates. Be aware of this. Remove release springs (4) from the hub and back plate (6).

(7) Remove the cup point setscrew (fig. 1, 3a) from the drive spider (3) and with a suitable puller remove the drive spider (3) from the prime mover. Remove the ball bearing (3d) from the drive spider hub (3c) only if replacement of the parts is necessary. Remove the specification plate (3g) and hydraulic fitting (3b) from the drive spider hub (3c) only if replacement of the parts is necessary. Remove the eight nuts (3e), and eight capscrews (3j) from the hub and spider driving flange (3f), and remove the hub from the spider driving flange.

C. Assembly.

(1) Generally, the assembly procedures are the reverse of the disassembly procedures.

(2) Press a new ball bearing (fig. 1, 3d) into the bearing bore of the hub (3c) to bottom. Press only on the outer bearing race. Assemble the flange (3f) and the hub (3c) together, securing them with eight capscrews (3j), and eight nuts (3e). Install the hydraulic fitting (3b) in the spider (3c). Install the new specification plate (3g) if removed previously. Press the spider assembly (3) on the prime mover shaft and install the cup-point setscrew (3a) to secure the spider hub to the shaft.

(3) Use a suitable press and at room temperature, press the bushings (2a) into the spider aligning the grease fitting holes with those in the

bushings. Ream to shaft size plus 0.003 inches for lubrication clearance after bushing assembly. Install a hydraulic fitting (2b) in the spider (2c). Install the specification plate (2d), using two drive screws (2e) to secure the plate to the spider.

(4) Install the driving ring (fig. 1, 1) on the prime mover drive wheel with six capscrews.

(5) Install release pins (5) in hub and back plate. Pins to be flush with back of plate.

NOTE

Install the hub and back plate (fig. 1, 6) on the shaft. Make sure the hub and back plate is properly secured to the shaft with the dog point setscrew (7), and keyed to shaft.

Install springs (4) into their holes and pins in the hub and back plate (6) on the models which have them. Install the clutch driving plates (8), center plate (9), and floating plate (10) onto the hub and back plate (6). The center plate holes must locate over the release pins and springs which index in blind holes of the floating plate. Install the roller disc (11) against the floating plate.

(6) Set the yoke (fig. 1, 12f) on the bench with the lever mounting supports facing up. Pre-assemble the six levers (12a), three springs (12d), and six rollers (12b) and spacers (12c) in their supports on the yoke and secure them in the supports with three lever pins (12j) and cotter pins (12e).

(7) Install the adjusting pin (fig. 1, 12h) and spring (12g) in its hole in the yoke. Push the pin through, compressing its spring and hold it in the released position with a pin or nail through the cross-drilled hole. Use a one-eighth inch thick washer over the pin to substitute for the cover (13). Screw the yoke with attached parts, onto the hub of the hub and back plate (6).

(8) Install specification plate (fig. 1, 14) with new drive screws (15), (if removed previously) on the cover (13). Remove the pin or nail and washer from the adjusting pin (12g). Install the cover (13) over the yoke and onto the hub and back plate. Secure the cover to the hub and back plate with three round-head machine screws (16).

(9) If ball bearing throwout collar is used, press a new ball bearing (fig. 1, 18e) onto the sleeve (18b) to bottom. Press only on bearing inner race. Secure the bearing on the sleeve with external snap ring (18f). Install the collar (18g) over the ball bearing outer race. Support the bearing race and press on the collar to assemble. Install the washer (18d) against the bearing in the collar. Secure the washer and bearing in the collar with the internal snap ring (18c). Install the cone (18a) to bottom on sleeve (18b), relocating roller wear surfaces of old cone radially to place between lever rollers. New cone can be assembled in any position radially. Install sleeve (18b) with attached parts on load shaft.

(10) If a bronze collar is used, assemble the collar (17 (C4)), to the sleeve (17b) with two capscrews (17 C1)), shims (C3), and nuts (17 C2)). Install cone (17a) against the shoulder on the sleeve. Relocate roller wear surfaces between rollers radially, when using same cone cover. This is done to expose new wear surfaces to rollers. New cone can be located in any position radially. Install sleeve with attached parts on shaft.

(11) See "Adjustment" section for proper adjustment.

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Section X DRIVING PLATE REPLACEMENT

15. SYMPTOMS INDICATING DRIVING PLATE REPLACEMENT

A. The adjusting yoke cannot be drawn tighter to compensate for driving plate wear.

B. In a clutch with riveted-on friction discs, the rivet heads are flush with the face of the disc.

NOTE

If molded split driving plates are used, the entire plate must be replaced. Driving plates with riveted-on friction discs require only friction disc replacement.

The Illustration Fig. 1 is an exploded view drawing of a Model CL Clutch with various driving spider and cone assemblies shown. The item numbers listed are not part numbers, and only should be used to identify the proper part names. If desired, a parts drawing and a specification sheet for your particular unit may be obtained upon request from your nearest Twin Disc distributor parts source.

C

LIMITING OPERATING CONDITIONS FOR "CL" CLUTCHES						
MODEL	MAXIMUM ALLOWABLE R.P.M.					
	CAST IRON DRIVING RING		STEEL OR NOD.IRON DRIVING RING		CAST IRON DRIVE SPIDER	
	SOLID DR. PLTS.	SPLIT DR. PLTS.	SOLID DR. PLTS.	SPLIT DR. PLTS.	SOLID DR.PLTS.	SPLIT DR.PLTS.
CL 105	3500	3200				
CL 205	3500	2950				
CL 106	3500	2850				
CL 206	3500	3150				
CL 306	3500	2250				
CL 107	3200	3000				
CL 108	3100	3000	4750*	4000*	3500*	
CL 208	3100	3100	5100*	4600*	3500*	
CL 308	3100	3100	5100*	4550*	3500*	
CL 110	3100	2400	3900	3200	3500	
CL 210	3600	2750	4100	3750	3500	
CL 310	3650	2650	4100	3600	3500	
CL 111	2850	2200	3600	2800	3200	
CL 211	2850	2200	3600	2800	3200	
CL 311	3250	2450	3600	3350	3200	

MAXIMUM SPEED OF SPIDERS TO BE THE SAME AS CORRESPONDING DRIVING RING UNLESS OTHERWISE SHOWN.

* THESE SPEEDS ARE FOR BALANCED CLUTCHES ONLY. MAXIMUM SPEED IS 3100 R.P.M. IF NOT BALANCED. CHECK WITH THE SALES DEPARTMENT FOR AVAILABILITY AND BALANCING COSTS.

SEE S392 FOR MAX. RECOMMENDED SPEEDS FOR CLUTCH RELEASE AT HIGH SPEEDS.

ENGINE GOVERNOR OVERRUN IS TO BE 8% MAXIMUM.

CL CLUTCH DESCRIPTIVE PARTS LIST

Item	Description	Quantity
1	RING, Driving	1
2	SPIDER, Driving, bushing assembly	1
a	BUSHING, Bronze	2
b	FITTING, Hydraulic	1
c	SPIDER, Driving	1
d	PLATE, Specification, spider, driving	1
e	PIN, Drive	1
3	SPIDER, Driving, ball bearing assembly	1
a	SETSCREW, Cup-point, hex-socket	1
b	FITTING, Hydraulic	1
c	HUB, Ball bearing type	1
d	BALL BEARING, Spider, driving	1
e	NUT, Hex-slotted	8
f	FLANGE, Spider, driving	1
g	PLATE, Specification, spider, driving	1
h	PIN, Drive	1
j	SCREW, Hex-head cap	8
4	SPRING, Release *	6
5	PIN, Spring, release **	6
6	PLATE, Hub and back	1
7	SETSCREW, Dog-point, half	1
8	PLATE, Driving (split)	A/R
9	PLATE, Center	A/R
10	PLATE, Floating	1
11	DISC, Roller	1
12	YOKE, Adjusting, assembly	1
a	LEVER	6
b	ROLLER	6

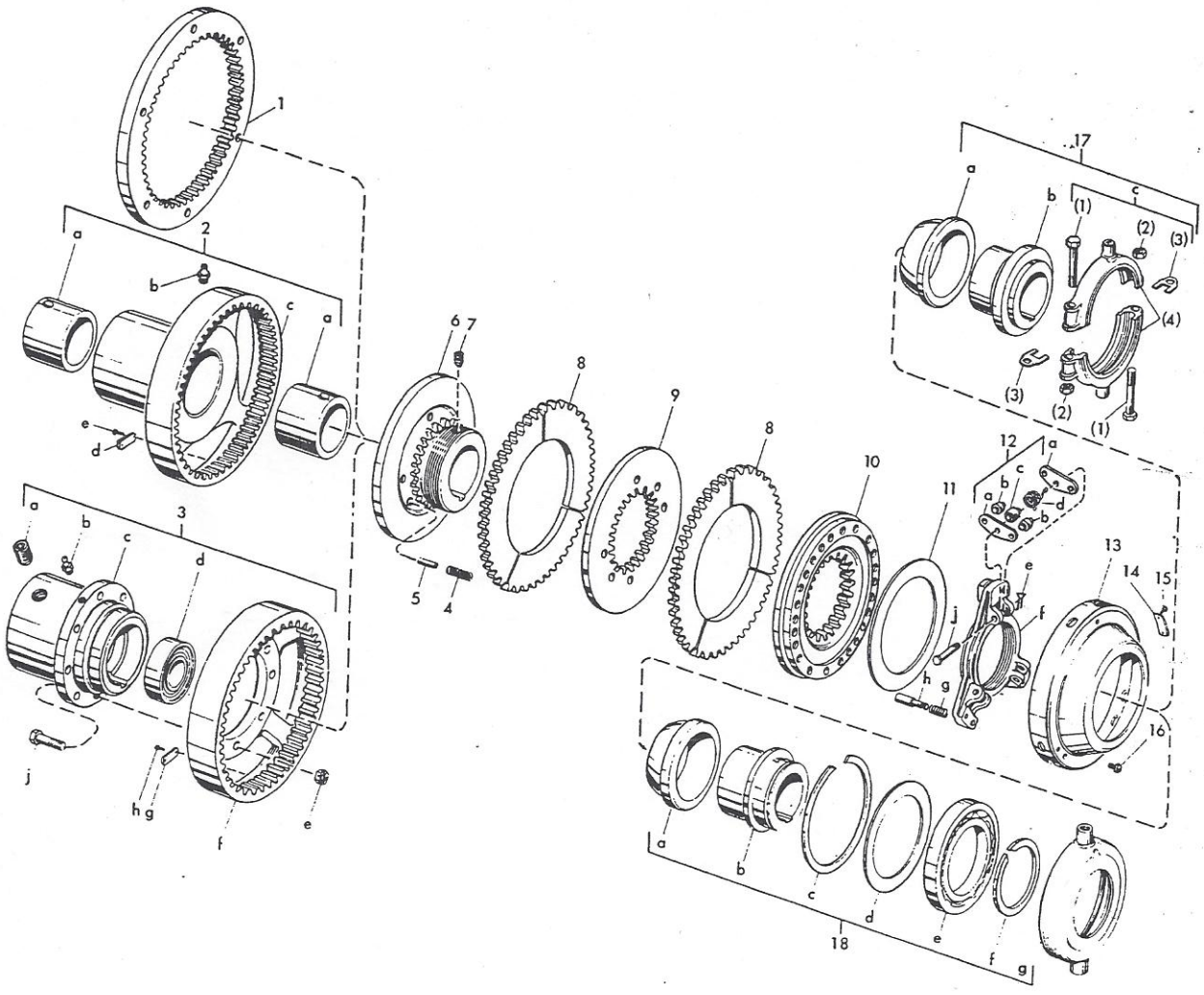
Item	Description	Quantity
c	SPACER	3
d	SPRING, lever	6
e	COTTER PIN	3
f	YOKE, Adjusting	1
g	SPRING, Pin, lock, adjusting	1
h	PIN, lock, adjusting	1
j	PIN, lever	1
13	COVER, Clutch	1
14	PLATE, Specification, clutch	1
15	PIN, Drive	2
16	SCREW, Machine, round-head	3
17	CONE, Plain, assembly	1
a	CONE	1
b	SLEEVE, Cone	1
c	COLLAR, Cone, plain, assembly	1
	(1) SCREW, Hex-head, cap	2
	(2) NUT, Lock, hex	2
	(3) SHIM, Collar, cone	2
	(4) COLLAR, Cone, split †	2
18	CONE, Ball bearing, assembly	1
a	CONE	1
b	SLEEVE, Cone	1
c	RING, Snap, Collar cone	1
d	WASHER, Cone collar	1
e	BALL BEARING, Cone collar	1
f	RING, Snap, Cone sleeve	1
g	COLLAR, Cone, ball bearing	1

† *Cannot be purchased separately*

* Models 108, 208, 308, 110, 210, 310, 111, 211, and 311 use six release springs. Models 105, 205, 106, 206 and 207 use four release springs.

** Models 208, 308, 210, 211, and 311 use six release spring pins. Models 105, 205, 106, 206 and 207 use four release spring pins. Models 108, 110 and 111 do not use any release spring pins.

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Figure 1. Exploded View.

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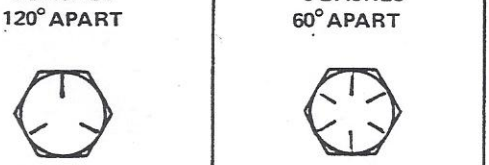
TORQUE VALUES

FOR TIGHTENING CAPSCREWS, BOLTS, NUTS, TUBE FITTINGS AND PLUGS.

CAP SCREWS, BOLTS & NUTS

TORQUE (LB. FT.) FOR COURSE AND FINE THREADS (1)

NOMINAL THREAD DIAMETER	SAE GRADE 5		SAE GRADE 8		Screws for Universal Joint Bearing Caps
	AS RECEIVED (2)	LUBRICATED (3)	AS RECEIVED (2)	LUBRICATED (3)	LUBRICATED (3)
1/4	9 ± 1	7 ± 1	14 ± 1	11 ± 1	----
5/16	19 ± 2	15 ± 2	27± 2	22 ± 2	----
3/8	33 ± 3	27 ± 2	46 ± 4	38 ± 3	----
7/16	52 ± 4	40 ± 3	73 ± 6	60 ± 5	64 ± 4
1/2	80 ± 6	65 ± 5	112 ± 8	90 ± 7	100 ± 7
9/16	112 ± 8	90 ± 8	158 ± 12	130 ± 10	----
5/8	158 ±12	130 ± 10	224 ± 16	180 ± 15	190 ± 10
3/4	280 ±20	225 ± 20	390 ± 30	320 ± 25	330 ± 17
7/8	448 ±32	360 ± 30	630 ± 50	510 ± 40	510 ± 25
1	680 ±50	540 ± 45	960 ± 70	775 ± 60	----
1 1/8	850 ±60	675 ± 60	1360 ±100	1100 ± 85	----
1 1/4	1175 ±85	925 ± 75	1850 ±150	1500 ±125	----



SAE STANDARD HEX BOLT HEAD MARKINGS



12 Pt. Head and Undercut Body

TAPERED PIPE PLUGS

RECOMMENDED TORQUE (LB. FT.)

NPTF SIZE	LUBRICATED (a)	
	In Cast Iron or Steel	In Aluminum
1/16-27	8.5 ±1.0	5.5 ±0.7
1/8-27	10.5 ±1.3	6.5 ±0.8
1/4-18	25 ±3	16 ±2
3/8-18	27 ± 3	17 ±2
1/2-14	50 ± 6	30 ±4
3/4-14	54 ± 7	34 ±4
1 -11 1/2	80 ±10	50 ±6
1 1/4-11 1/2	85 ±10	55 ±7
1 1/2-11 1/2	85 ±10	55 ±7

(a) THE LUBRICANT IS TO BE JOHN CRANE INSOLUBLE PLASTIC LEAD SEAL NO. 2 OR EQUIVALENT OR LOCTITE NO. 92 OR EQUIVALENT AND PLUGS ARE TO BE CAPABLE OF REMOVAL WITHOUT DAMAGE. OVERTIGHTENING MAY CAUSE INITIAL LEAKAGE PLUS POTENTIAL REMOVAL DAMAGE. AN OPTION OF A MAX. OF TWO FULL TURNS AFTER FINGER TIGHTENING THE PLUG MAY BE USED IF REQUIRED AND IF REMOVAL CONDITIONS ARE MET.

B

(1) THESE TORQUE VALUES APPLY TO USE OF IRONS, STEELS AND ALUMINUM TAPPED HOLES.
THE THREAD ENGAGEMENT LENGTH IN ALUMINUM IS TO BE TWICE THE NOMINAL THREAD DIAMETER AND ENGAGEMENT LENGTH RATIO IS TO BE 1.5 FOR IRONS AND SOFT STEEL. WHEN ZINC PLATING IS USED. LUBRICATE THE ZINC PLATED SURFACES OF THE SCREWS AND/ OR NUTS AND USE SPECIAL TORQUE VALUES.

(2) USE FOR ALL CAPSCREWS, BOLTS AND NUTS COATED ONLY WITH THE FASTENER MANUFACTURER'S RUST PREVENTATIVE OIL AND USE FOR PARTS WIPED OR WASHED NEARLY FREE OF OIL. DO NOT USE FOR PLATED PARTS.

(3) USE FOR ALL CAPSCREWS AND NUTS WHOSE THREADS AND WASHER FACE ARE LUBRICATED, ALSO FOR SCREWS OR NUTS WHOSE WASHER FACE IS ASSEMBLED AGAINST A HARDENED WASHER OR SMOOTH FINISHED HARD PART. (R_c40 OR ABOVE AND 40AA MAX.). ALSO USE FOR PLATED SCREWS (EXCEPT ZINC PLATED). LUBRICATING THE THREADS AND SCREW OR NUT FACE WITH SAE 20 OR 30 OIL IS RECOMMENDED FOR BEST RESULTS FOR ALL THE GRADE 8 SCREWS AND IS REQUIRED FOR ALL THE UNIVERSAL JOINT BEARING CAPSCREWS.

DO NOT USE MOLY-DISULFIDE, WHITE LEAD, COPPER FILLED OR OTHER SUCH FILLED LUBRICANTS WITH THESE TORQUE VALUES. SUCH LUBRICANTS REQUIRE SPECIAL TORQUE VALUES.

(4) SOCKET HEAD SCREWS AND 12 POINT HEAD SCREWS WITH FULL BODY ARE GRADE 8 OR BETTER QUALITY AND ARE TO BE ASSEMBLED WITH THE ABOVE TORQUE VALUES.

BEARING LOCKNUT TORQUE

Size	M-2012	M-2281	(1) Torque Lb. Ft.	M2012	(1) Torque Lb. Ft.	M-2037	(1) Torque Lb. Ft.
01	BC		15± 2				
03	A		34 ± 5				
04	B		46 ± 6				
05	C	C	75 ± 10				
06	D		92 ± 12				
07	E		125 ± 16			E	150 ± 20
08	F	F	160 ± 20	AF	230 ± 30	(3) F	190 ± 25
09	G	G	200 ± 25	(2) AG	300 ± 40	G	240 ± 30
10	H	H	240 ± 30	AH	370 ± 50	H	290 ± 40
11	J	J	290 ± 40	AJ	440 ± 55	J	350 ± 45
12	K	K	350 ± 45	AK	530 ± 70	K	430 ± 55
13	L		400 ± 50	AL	600 ± 75	L	490 ± 65
14	M	M	460 ± 60	AM	710 ± 90	M	580 ± 75
15	N	AJ	550 ± 70	AN	830 ±110	N & AN	680 ± 85
16	P	P	660 ± 85	AP	1000 ±130	P	800 ±100
17	Q		770 ± 100	AQ	1200 ±150	Q	950 ±120
18	R		900 ± 120	AR	1350 ±170	R	1100 ±140
19	S	S & AH	1000 ± 130	AS	1500 ±190	S	1300 ±170
20	T		1150 ± 150	AT	1700 ±225	T	1400 ±180
21	U		1300 ± 170	AU	2000 ±250	U	1600 ±200
22	V	V	1400 ± 180	AV	2200 ±275	V	1800 ±225
24	W		1800 ± 225	AW	2700 ±350	W	2200 ±275
26	X	X	2200 ± 275	AX	3300 ±425	X	2700 ±350
28	Y		2600 ± 325	AY	4000 ±500	Y	3300 ±425
30	Z		3100 ± 400	AZ	4800 ±600	Z	4000 ±500

B

(1) TORQUE VALUES APPLY TO SOLID SHAFTS.
TORQUE VALUES MAY OR MAY NOT BE SATISFACTORY ON THIN-WALLED SHAFTS.
TORQUE VALUES APPLY TO THREADS LUBRICATED WITH SAE 20 OR 30 OIL.

(2) M-2281-AG IS TO HAVE SAME ASSEMBLY TORQUE AS M-2012-AG.

(3) M-2037-AA IS TO HAVE 120 ±15 LB. FT. ASSEMBLY TORQUE.

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CL CLUTCH LEVER AND ROLLER CHANGE

The lever and roller used with 8, 10 and 11 inch CL clutches has been changed. New parts introduced by this change are: B3388 lever, B2189 roller, and A2798DM spacer.

These new parts supersede A3470 lever and A2234 roller *in new production units only.*

Parts A3470 and A2234 are and will be available for service of older units. Any new clutch orders received are being assigned new specification numbers which reflect the new lever construction. As new orders are received, customers are being advised of the new specification number of the units ordered, by letter.

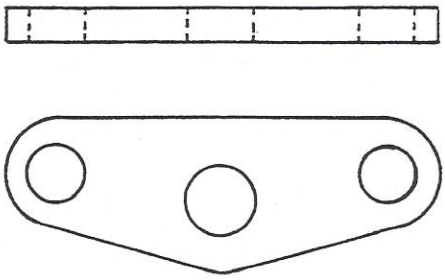
Do not mix old and new levers in an adjusting yoke assembly. Use the parts called for from the specification of the clutch you are servicing. The new parts *are not* directly interchangeable with the old as individual parts.

New and old levers are easily identified even if the specification number of the clutch is not known. See sketches for old and new lever identification.

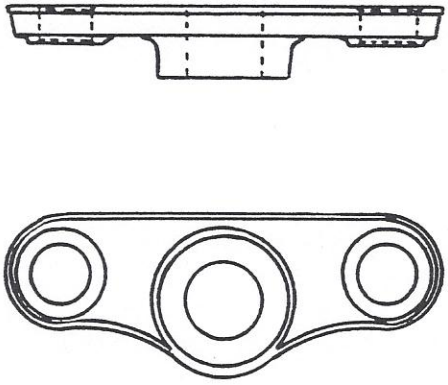
NOTE

Lever spring and lever pin do not change with the new lever construction. The same lever spring and pin are used with old and new.

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NEW LEVER B-3388.
USE WITH B-2189 ROLLER
AND A-2798-DM SPACER

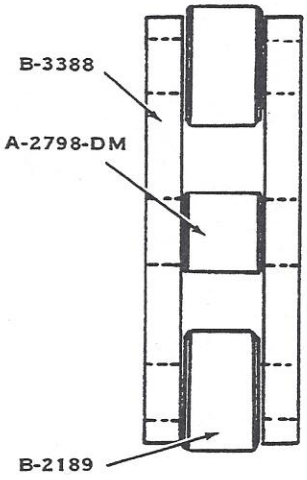


OLD LEVER A-3470

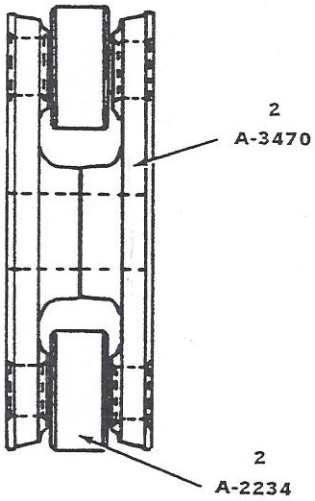
NEW LEVER ASSEMBLY

LEVER ASSEMBLY XB-3388
IS AVAILABLE AS A SERVICE GROUP.

XB-3388 CONSISTS OF:
2 B-3388 LEVERS
2 B-2189 ROLLERS
1 A-2798-DM SPACER



OLD LEVER ASSEMBLY



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