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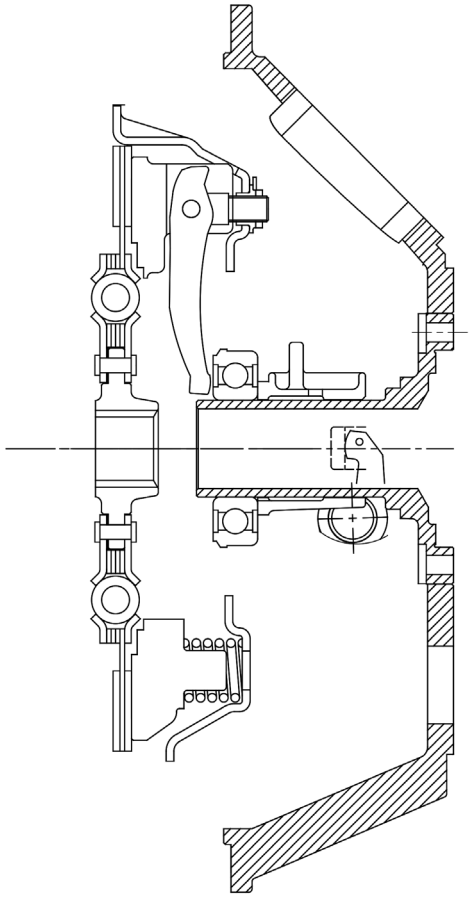
North American Clutch & Driveline, Inc.

Manufacturer of Agricultural & Industrial Clutches

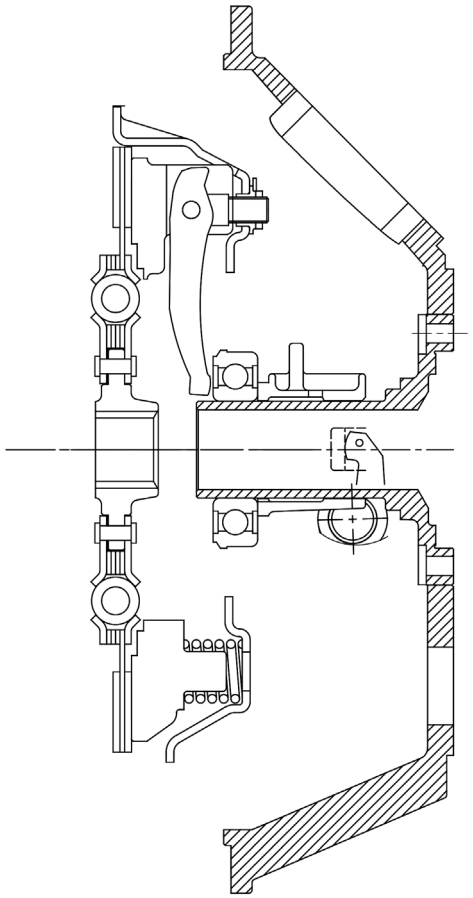


NACD Power Take-Off Service Manual

1019020AM

Spring Loaded Power Take-Off

Includes Installation, Operation, Maintenance and Overhaul Instructions



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NOTICE
IMPORTANT INFORMATION

It is imperative that proper installation, maintenance, operation and safety procedures be followed explicitly regarding products manufactured by North American Clutch & Driveline.

GENERAL:

Safe working and operating practices must be employed by all personnel working on, with, or near NACD products. NACD will not be responsible for personal injury.

SAFETY NOTICE:

Accidents may result from use of manufactured products, resulting in possible danger to person(s) or property. Therefore, it is important and imperative that correct, safe procedures be followed. Products must be installed, maintained, operated and used in accordance with the engineering information specified. Continual and repeated inspections and observations should be employed as necessary to assure that safe operations and a safe environment exist under prevailing conditions. Use proper guards and other suitable safety equipment, devices and procedures that may be desirable or specified in safety codes, or as necessary to prevent accidental injury to person(s) or property. These devices are neither provided by NACD nor are they the responsibility of NACD.

OWNER / OPERATOR / USER RESPONSIBILITIES:

Knowledge of and performance of the procedures specified in this publication are the responsibility of the owner(s), operator(s), user(s) and all person(s) working on or near the products described herein. Following these procedures and explicit adherence to the information described should ensure safe and reliable use, repair, and operation of products provided by NACD.

WARRANTY:

NACD's limited Warranty is described in detail in this publication. It is the responsibility of the original purchaser or manufacturer, successive buyers, users, third parties or employees to make themselves aware of this warranty and all conditions it contains.

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INTRODUCTION

GENERAL INFORMATION

This publication provides the information necessary for the operation and maintenance of the NACD Clutch specified on the cover of this manual. Specific engineering details and performance characteristics can be obtained from the Engineering Department of NACD, Rockford, Illinois, USA.

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.

REPLACEMENT PARTS

Parts Lists

Engineering assembly drawings and bill of materials are provided in appropriate sections of this manual to facilitate ordering spare or replacement parts.

Ordering Parts

⚠ CAUTION

All replacement parts or products (including hoses and fittings) must be of NACD origin or equal, and otherwise identical with components of the original equipment. Use of any other parts or products will void the warranty and may result in malfunction or accident, causing injury to personnel and/or serious damage to the equipment.

Renewal parts and service parts kits may be obtained from any authorized NACD distributor or service dealer.

Parts Shipment

Furnish the complete shipping information and postal address. All parts shipments made from the factory will be FOB factory location, USA. State specifically whether the parts are to be shipped by freight, express, etc. If shipping instructions are not specified, the equipment will be shipped the best way, considering time and expense. NACD will not be responsible for any charges incurred by this procedure.

NACD having stipulated the bill of material 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 NACD. All returned parts, new or old, emanating from any of the abovestated changes will not be accepted for credit. Furthermore, any equipment which has been subjected to such changes will not be covered by a NACD warranty.

PREVENTATIVE MAINTENANCE/TROUBLESHOOTING

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 equipmant and, if observed, minimum repairs (aside from normal wear) will result.

Lifting Bolt Holes

Most NACD products have provisions for attaching lifting bolts. The holes provided are always of adequate size and number to safely lift the NACD 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 practices must be employed by all personnel operating and servicing this unit. NACD will not be responsible for personal injury resulting from careless use of hand tools, lifting equipment, power tools, or unaccepted maintenance/operating 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 codes should be provided. These devices are neither provided by NACD nor are the the responsibility of NACD.

SOURCES OF SERVICE INFORMATION

Each series of manuals issued by NACD 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.

For the latest service information on NACD products, contact any NACD distributor, or contact the sales department, NACD, Rockford, IL 61132-5130, USA or by email at sales@naclutch.com.

WARRANTY

Equipment for which this manual was written has a limited warranty. For details of the warranty, refer to the warranty statement at the end of this manual.

DESCRIPTION AND SPECIFICATIONS

GENERAL INFORMATION

The NACD Spring Loaded clutch unit is designed to mount directly to an engine with a SAE (Society of Automotive Engineers) No. 4 flywheel housing. NACD assembly drawings provide dimensional information. This clutch is shipped with an appropriate clutch alignment tool for installation.

Clutch

This clutch assembly consists of a clutch releasing apparatus, a spring loaded clutch assembly and clutch disc located in a housing.

SPECIFICATIONS

Note: The Bill of Material number listed on the power take-off nameplate is also the assembly drawing number for the power take-off. Contact NACD for further information or drawings.

TORQUE VALUES

Note: All threads and bearing face to be lubricated with light oil film prior to assembly.

Table 1. TorqueValues for U.S. Standard Fine and Coarse Thread Capscrews, Bolts, and Nuts.

Thread Diameter	SAE Grade 5		SAE Grade 8	
	lb - ft	Nm	lb - ft	Nm
1/4	6 - 8	8 - 11	10 - 12	14 - 16
5/16	13 - 17	18 - 23	20 - 24	27 - 32
3/8	25 - 29	34 - 39	35 - 41	48 - 55
7/16	37 - 43	51 - 58	55 - 65	75 - 88
1/2	60 - 70	81 - 95	83 - 97	113 - 131
9/16	82 - 98	111 - 132	120 - 140	163 - 190
5/8	120 - 140	163 - 190	165 - 195	224 - 264
3/4	205 - 245	278 - 332	295 - 345	400 - 467
7/8	330 - 390	448 - 528	470 - 550	638 - 745
1	495 - 595	671 - 806	715 - 845	970 - 1145
1 1/8	615 - 745	834 - 1010	1015 - 1185	1377 - 1606
1 1/4	850 - 1000	1163 - 1355	1375 - 1625	1865 - 2203

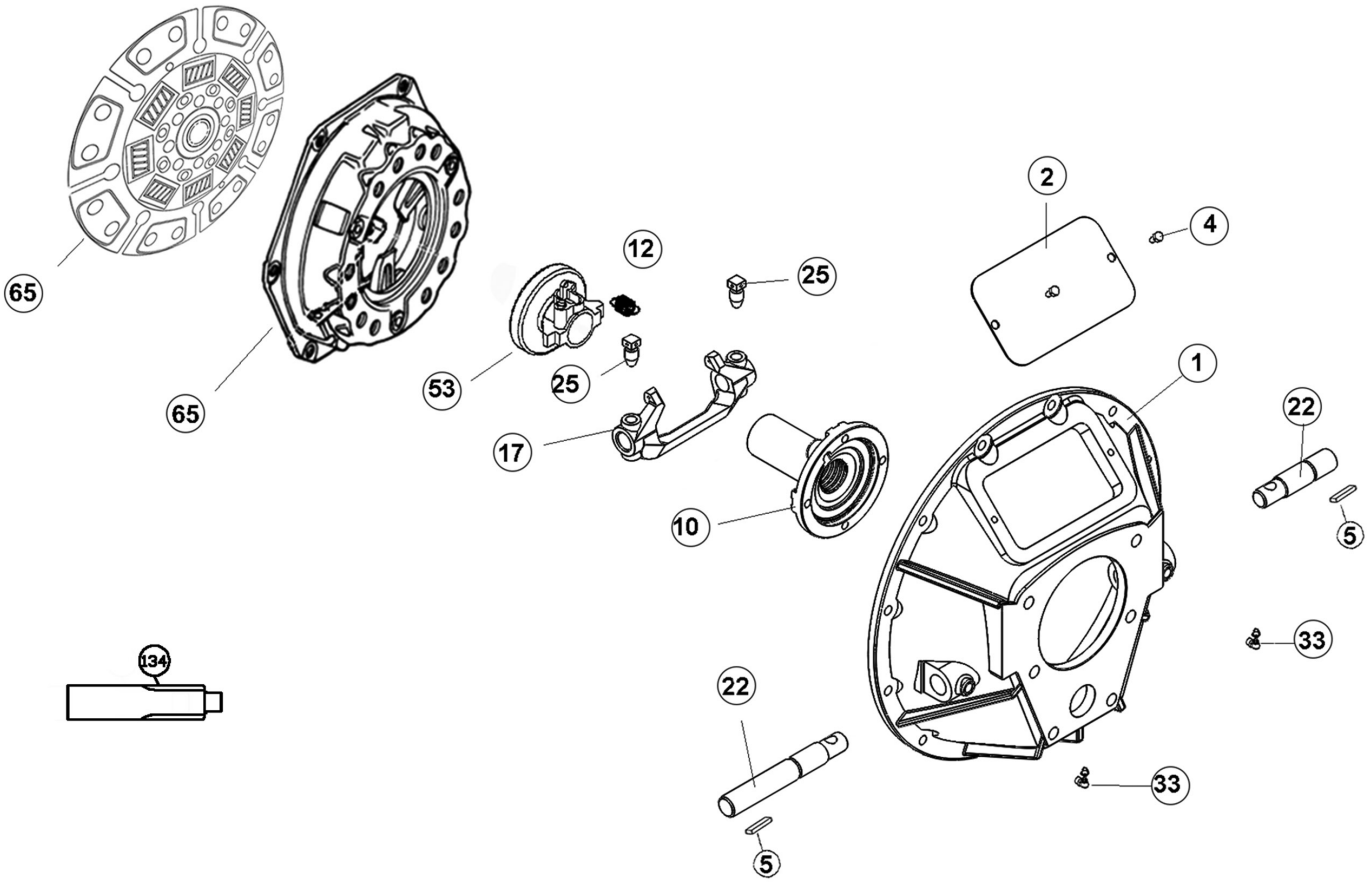
Note: All threads and bearing face to be lubricated with light oil film prior to assembly.

Table 2. Metric Coarse Thread Capscrews, Bolts, and Nuts

Thread Size	Property Class 8.8		Property Class 10.9		Property Class 12.9	
	lb - ft	Nm	lb - ft	Nm	lb - ft	Nm
M6	6.5 - 7.5	9 -10	9 -10	12 -14	10 - 12	14 - 16
M8	16 - 18	21 - 25	23 - 26	31 - 35	25 - 29	34 - 40
M10	32 - 36	43 - 49	44 - 51	60 - 68	51 - 59	70 - 80
M12	55 - 63	74 - 86	77 - 88	104 - 120	89 - 103	121 - 139
M16	132 -151	179 - 205	189 - 217	256 - 294	219 - 253	298 - 342
M20	257 - 295	348 - 400	364 - 418	493 - 567	429 - 493	581 - 669
M24	445 - 511	603 - 693	626 - 720	848 - 976	737 - 848	1000 - 1150
M30	714 - 820	987 - 1113	1235 - 1421	1674 - 1926	1475 - 1697	2000 - 2301

EXPLODED VIEW DRAWING

Figure 2. Exploded View Drawing



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PARTS DESCRIPTION

Table 3. Parts Description.

Quantity	Reference #	Description
1	1	Housing
1	2	Instruction Plate
2	4	Machine Screw
2	5	Key
1	10	Bearing Retainer
1	12	Spring
1	17	Release Yoke
1	22	Yoke Shaft
2	25	Set Screw
1	53	Release Bearing Assy
1	65	Clutch Set
1	134	Alignment Tool
1	NS	Alignment Guide

INSTALLATION

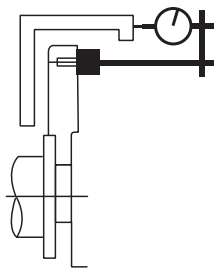
This clutch is intended for direct mounting to an industrial engine that is supplied with a Society of Automotive Engineers No. 4 housing. NACD assembly drawings provide dimensional information.

PREPARATION

Prior to the mounting of the clutch, the engine flywheel housing and flywheel must be checked for concentricity and runout. The allowable deviations are provided here for reference. Values are TIR (total indicator reading) tolerances.

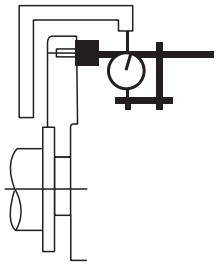
1. **Alignment tolerance for flywheels and flywheel housings.**
   Check the alignment of the engine flywheel and the engine flywheel housing. Excessive bore and face runout of the flywheel, flywheel housing, and flywheel housing adapters, if used, can adversely affect the performance of the PTO and the system of which it is a part. A dial indicator will be required to measure which it is a part.

2. **Flywheel housing face runout deviation check.**
   Mount the indicator base on the face of the flywheel and position the dial indicator tip perpendicular to the flywheel housing mounting flange face. Rotate the flywheel through 360 degrees. *Note: The flywheel and crankshaft of the engine must be held against either the front or rear of the crankshaft thrust bearing while the total indicator sweep (TIR) measurement is being made.*

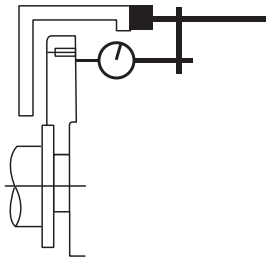
   The total indicator reading should not exceed:
   SAE #4, .006" (.152 mm.)

3. **Flywheel housing bore runout deviation check.**
   Mount the indicator base on the face of the flywheel and position the dial indicator tip so its movement is perpendicular to the pilot bore surface of the flywheel housing. Rotate the flywheel through 360 degrees.

   The total indicator reading should not exceed:
   SAE #4, .006 (.152 mm.)

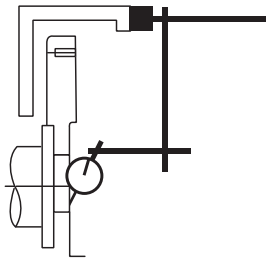
4. Flywheel face runout deviation check.



Mount the indicator base on the flywheel housing and position the dial indicator tip so its movement is perpendicular to the face of the flywheel. The indicator tip should be positioned JUST INSIDE the clutch mounting bolt circle diameter. Rotate the flywheel through 360 degrees. *Note: The flywheel and crankshaft of the engine must be held against either the front or rear of the crankshaft thrust bearing while the total indicator sweep (TIR) measurement is being made.*

The total indicator reading should not exceed:
Clutch Size: 10" - .005" (.127 mm.)

5. Flywheel pilot bore runout deviation check.



Mount the indicator base on the flywheel housing and position the dial indicator tip so its movement is perpendicular to the pilot bearing bore surface of the flywheel. Rotate the flywheel through 360 degrees.

The total indicator reading should not exceed:
0.005 inches (0.127 mm.)

6. Check crankshaft endplay and record for reference_____

⚠ CAUTION

Note: Capscrews, sheaves and other miscellaneous hardware are not supplied by NACD

Most NACD products are made to be mounted directly on the flywheel of the engine. It is possible, due to mismatch of components or many other reasons, to have flywheel to driven component interference. As a result, it is necessary that engine crankshaft end play be measured before the driven component is installed. After installation of the driven comonent, crankshaft end play should again be measured. The second measurement should be the same as the first end play measurement. If it is not the same, it could be an indication of interference. Consequently, the driven component should be removed, and the source of interference found and corrected. NACD will not be responsible for system damage caused by engine to NACD component interference regardless of the cause of interference.
This engine crankshaft end play check is considered mandatory.

OPERATION

GENERAL INFORMATION

The following information is intended for use by the machine operator. Instructions apply to the clutch only. See the machine's operator's manual for procedures applicable to other machine systems.

CLUTCH ENGAGEMENT PROCEDURE

⚠ CAUTION

Make sure that there is freeplay in the engagement handle prior to operation of the power take-off. If no freeplay is evident, see adjustment procedure.

1. Prime mover (engine) should be started and running at low idle speed, 1000 rpm or less.

2. Driven machinery should be unloaded.

3. Engage the clutch.

CLUTCH ADJUSTMENT

1. This spring-loaded model clutch is self compensating for wear and is not field adjustable.

PREVENTATIVE MAINTENANCE

GENERAL INFORMATION

Lubrication of the spring loaded power take-off is accomplished using a grease gun to force grease into three (3) hydraulic fittings. Recommended quantities to be applied are based on use of a grease gun delivering approximately 1 cc of grease per “shot.” Refer to the info provided on the instruction nameplate.

RECOMMENDED GREASE

A good grade of NGLI No. 2 lithium-base grease with a 149° C (300°F) minimum drop point.

LUBRICATION SCHEDULE AND AMOUNT

1. Operating Shaft Fittings and Release Sleeve Fitting: One (1) “shot” per fitting every 100 hours of operation.

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DISASSEMBLY

GENERAL INFORMATION

Refer to the Bill of Material that is identified on the nameplate for the correct part numbers for the repair of the clutch assembly. This may be obtained from NACD or from your machine manufacturer. An exploded view of the assembly with a parts identification chart is shown in the Description and Specifications section of this manual.

DISASSEMBLY

Note: The clutch assembly is bolted to the engine flywheel, and should be removed, inspected, and replaced if necessary any time that the housing assembly is removed for service.

Housing Assembly

1. Remove engagement actuator if it has not been previously removed.

2. Remove shielding from gearbox and drive-shaft.

3. Disconnect drive-shaft assembly from gearbox output shaft.

4. Remove gearbox and housing assembly from engine flywheel housing.

5. Remove set screws from yoke assembly.

6. Remove both yoke shafts.

7. Remove yoke and inspect for wear.

8. Remove the bell housing from the gearbox.

9. Remove return spring from release sleeve and tube assembly.

10. Remove release sleeve and bearing assembly from tube. Inspect release bearing for damage or grooves and rotate bearing to feel possible internal damage. Discard if damage to bearing can be felt.

11. Remove tube from gearbox. Inspect tube for wear or grooves. Discard if wear or grooves can be felt.

Clutch

1. Remove the clutch assembly (#83) from the engine flywheel.

2. Inspect engine flywheel. Repair if necessary. Surface should be cleaned with an appropriate oil free solvent such as brake cleaning solvent.

3. Inspect clutch disc for loose rivets or wear. It is recommended that the clutch disc be replaced if the following occurs:
   1. Ceramic buttons are glazed.
   2. Friction disc is blue and/or warped from heat.
   Replace if necessary.

4. Inspect clutch mating surface and release fingers for damage or wear. Replace entire clutch assembly if there is damage in these areas.

INSTALLATION TO ENGINE

Tools & Materials Needed:

Ratchet, 3/8" Drive

6" Socket Extension, 3/8" x 3/8"

13mm socket

¾" socket

¾" box wrench

9/16" box wrench

Torque wrench, 3/8" drive

Grease

Loctite 243 and 609

5/16 Hex Head Socket

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Procedure:

Note: All fasteners are to be torqued to spec using a torque wrench. All bolt patterns are to be tightened in a star-shaped order.

Clutch Mounting Procedure

1. Clean flywheel friction surface and clutch pressure plate. Inspect clutch disc for any grease or dirt on buttons. DO NOT USE CLEANING SOLUTION ON CLUTCH DISC.

2. Measure offset distance between flywheel friction surface and flywheel housing mating surface to ensure proper fitment. Per Lombardini flywheel housing print, offset measures 2.098-2.138".

3. Spread a light film of Loctite 609 retaining compound onto the OD of the clutch alignment guide tool (102365AM) then insert it into the flywheel bore. The guide must be fully seated within the bore of the flywheel.

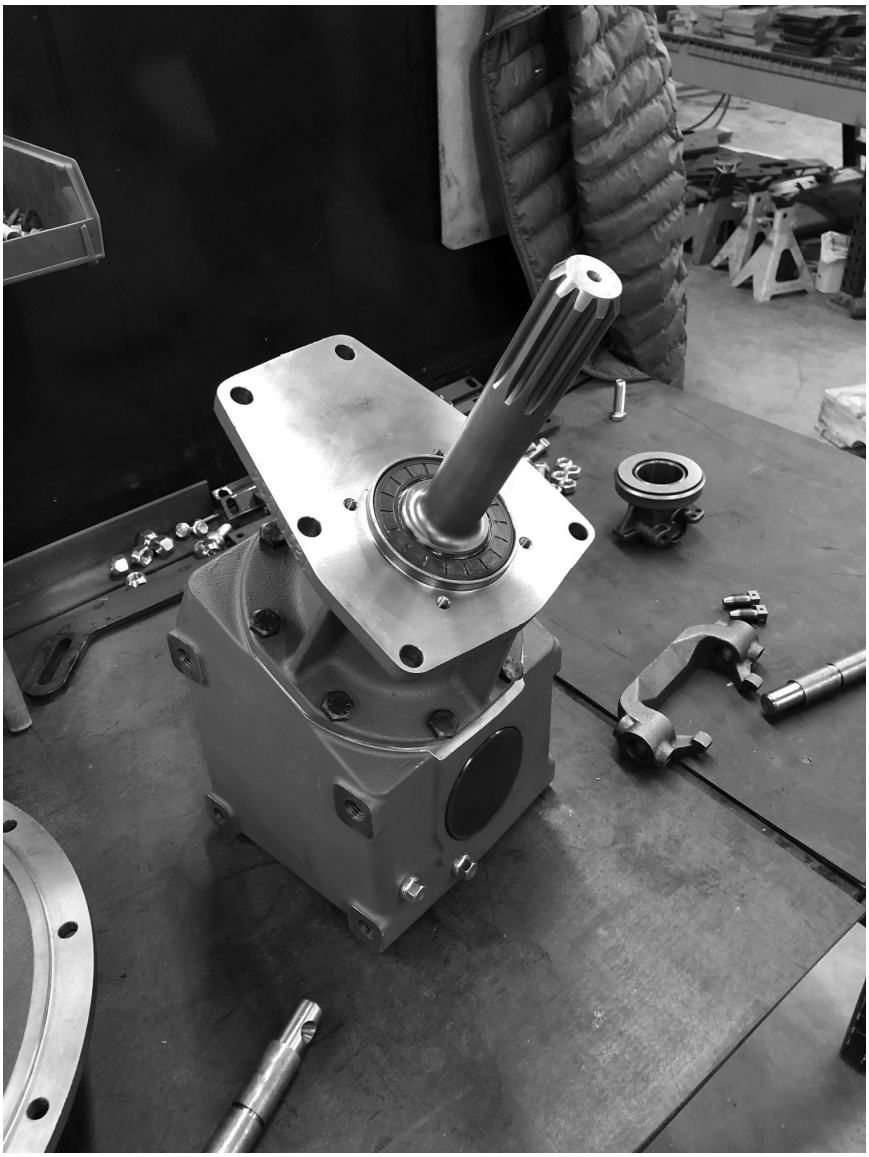
4. Affix the clutch disc to the flywheel friction surface by inserting alignment tool 102388AM through the center of the disc and into flywheel bore guide.

5. Bolt the cover assembly to the flywheel over the disc installed in step 4. Apply Loctite to threads.

6. Remove 3 (three) lever hold down bolts (Red Tag) from the cover assembly. Remove 102388AM Alignment tool from assembly. The clutch disc should remain in place.

Power Take-Off Mounting Procedure

1. Clean all mating surfaces on the gearbox and bell housing.



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2. Bolt retainer/bearing subassembly to gearbox. Apply Loctite to threads. Insure return spring side is facing inspection window.

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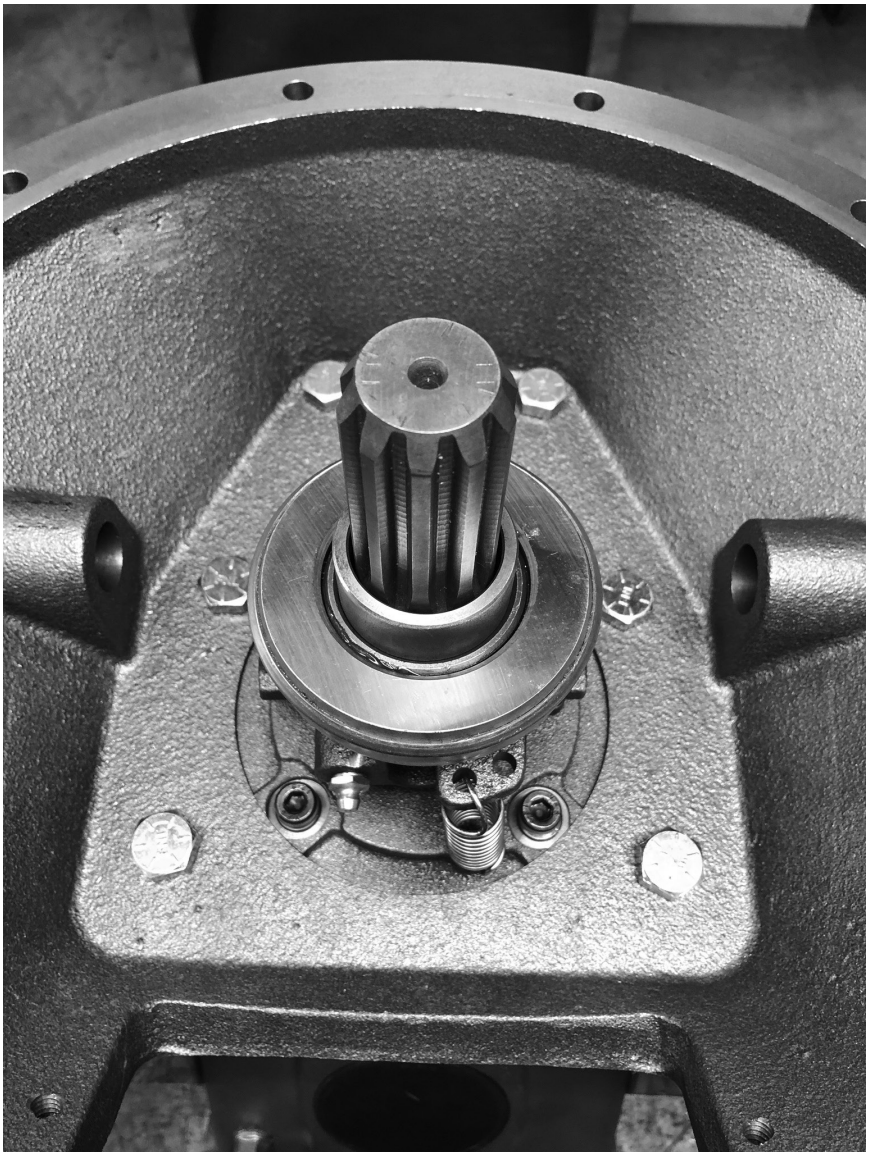
3. Install bell housing onto gearbox with nuts on the exterior of gearbox. Apply Loctite to threads.



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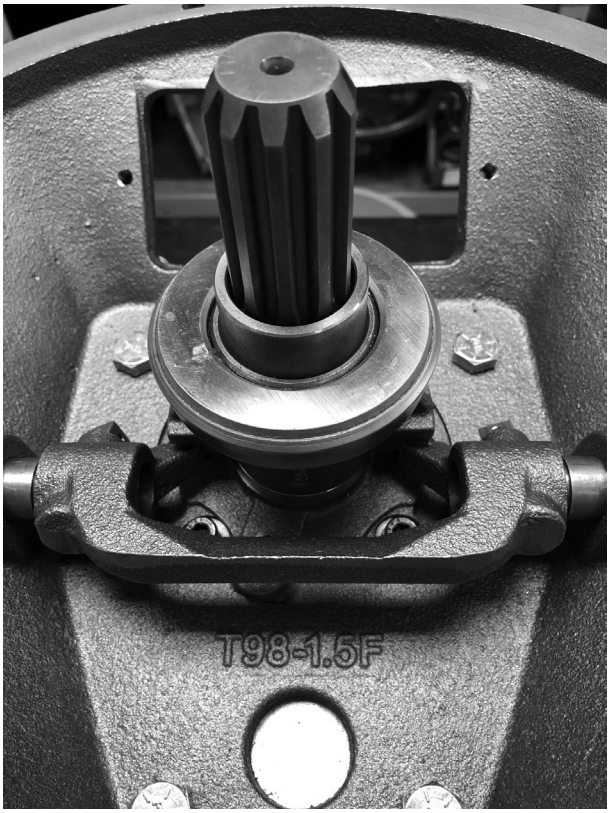
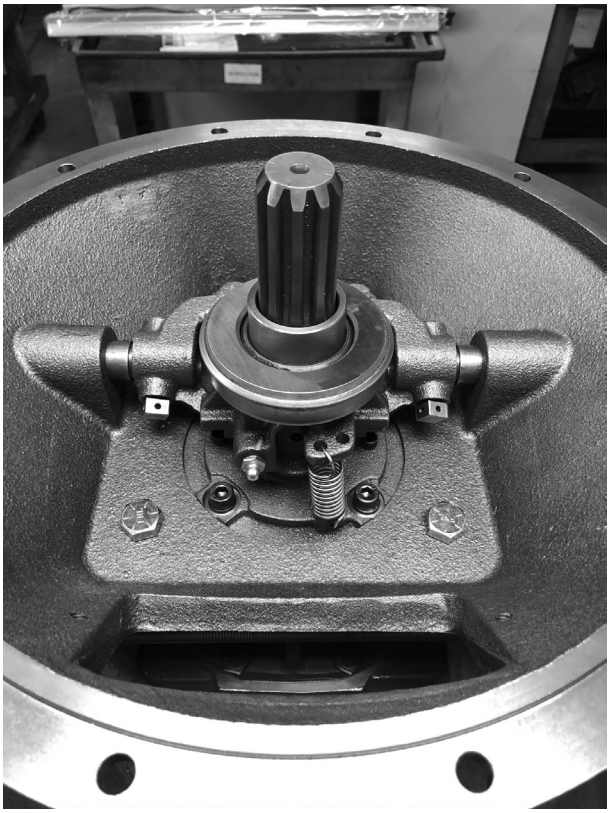
4. Fit yoke into position with forks under release sleeve lugs, and thru holes lined up with bell housing throw-out shaft holes.

5. Install throw-out shafts with set screw hole lining up with similar hole on yoke.

6. Install the set screws into yoke assembly. Apply Loctite to threads.

7. Final assembly views.





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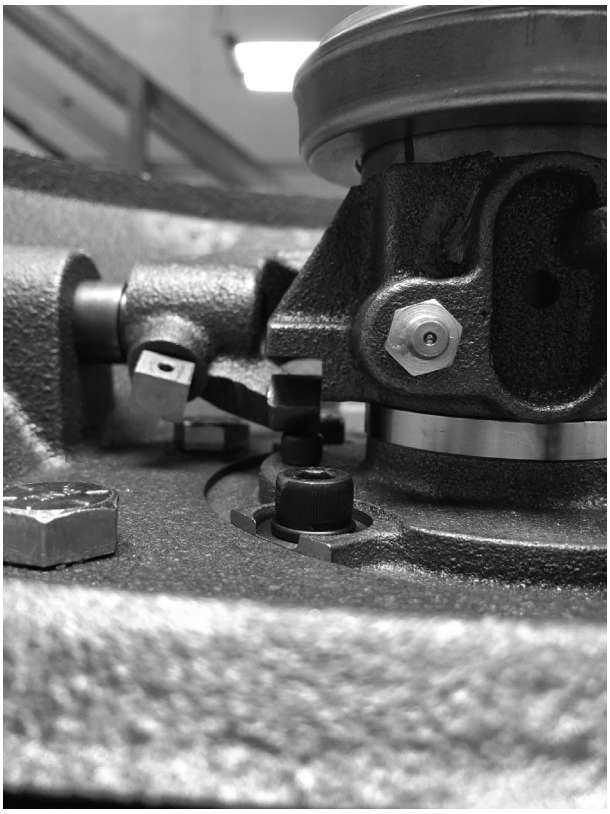
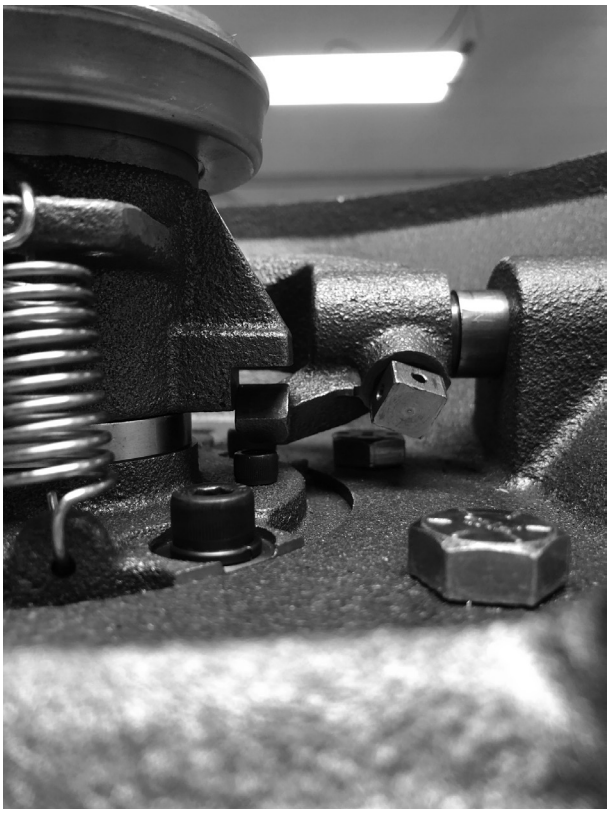
8. Mount Gearbox & Housing assembly to engine and torque bolts as required.

9. Install Clutch Actuator and related mounting hardware per Bandit's instructions.

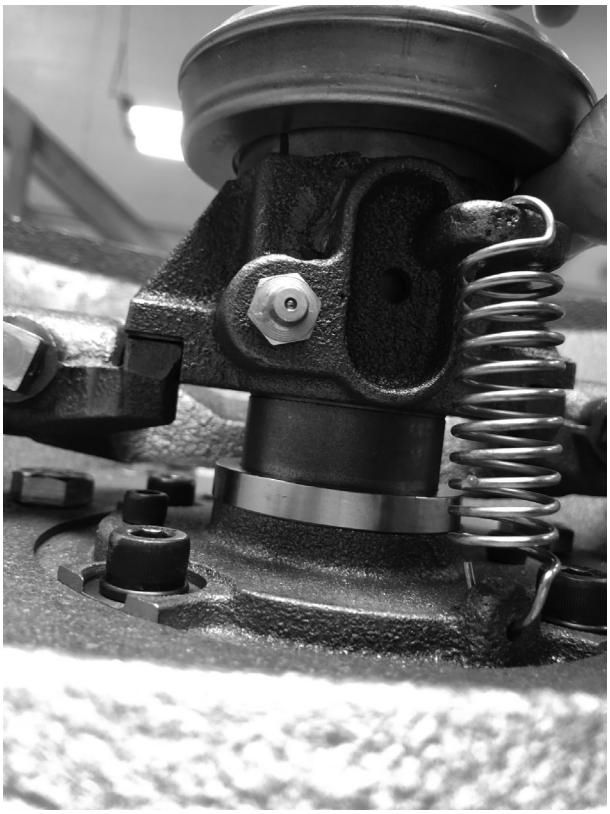
10. Once installation is complete, verify there is a release gap between the release bearing and release levers on the pressure plate assembly before operating machine.

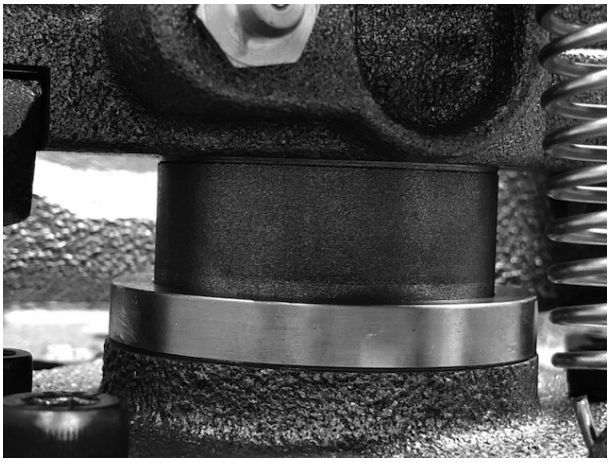
11. When the clutch is engaged, verify the release sleeve assembly rests on the stop collar and the release yoke does not contact the trunions on the release sleeve.





12. When the clutch is disengaged, verify the bottom of the release sleeve assembly does not travel past the line machined line on the bearing retainer tube. **This very important**. If the release sleeve is allowed to over travel it will cause damage to the clutch assembly and related components.





Please contact NACD Service Department if there any questions related to installation or operation of this clutch assembly. (800) 383-9204

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LIMITED NACD GENERAL WARRANTY, LIMITATIONS OF REMEDIES AND LIMITATIONS OF OTHER WARRANTIES

A. North American Clutch & Driveline warrants all assembled products and parts to the original customer. For Power Take-Off products and parts, such warranty shall extend for a period of twenty-four (24) months from the date of original shipment by NACD to the original customer, but not to exceed twelve (12 months of service or one thousand five hundred (1,500) hours of service, whichever occurs first. The warranty set forth above is exclusive and North American Clutch & Driveline, Inc. makes no other warranty, express or implied. NACD hereby expressly disclaims any and all other warranties including warranties of merchatability or fitness for a particular purpose.

B. Limitation of Remedies and Liability: The remedies provided herein are buyer's sole and exclusive remedies. In no event shall NACD be liable for any direct, indirect, special, punitive, incidental or consequential damages including, but not limited to, loss of revenue or profit, loss of use of the product, cost of capital, cost of substitute equipment or facilities, cost of cover, downtime costs, claims of any third parties, including buyers' customers, or any other costs whatsoever, whether based on contract, warranty, tort (including negligence) or any other legal theory.

The above warranty and remedy are subject to the following terms and conditions:

1. Complete parts or products upon request must be returned transportation prepaid and also the claims submitted to NACD within sixty (60) days after completion of the in-warranty repair.
2. The warranty is void if, in the opinion of NACD, the failure of the part or product resulted from abuse, neglect, improper maintenance or accident.
3. The warranty is void if any modifications are made to any product or part without the prior written consent of NACD.
4. The warranty is void unless the product or part is properly transported, stored and cared for from the date of shipment to the date placed in service.
5. The warranty is void unless the product or part is properly installed and maintained within the rated capacity of the product or part with installations properly engineered and in accordance with the practices, methods and instructions approved or provided by NACD.
6. The warranty is void unless all required replacement parts or products are of NACD origin or are NACD authorized replacement parts, and otherwise identical with components of the original equipment. Replacement parts or products not of NACD origin are not warranted by NACD.

C. As considered for this warranty, the original customer and subsequent purchaser agree to indemnify and hold NACD harmless from and against all and any loss, liability, damages or expenses for injury to persons or property, including without limitation, the original customer's and subsequent purchaser's employees and property, due to their acts or omissions or the acts or omissions of their agents, and employees in the installation, transportation, maintenance, use and operation of said equipment.

D. Only an NACD authorized factory representative shall have authority to assume any cost or expense in the service, repair or replacement of any part or product within the warranty period, except when such cost or expense is authorized in advance in writing by NACD.

E. NACD reserves the right to improve the product through changes in design or materials without being obligated to incorporate such changes in products of prior manufacture. The original customer and subsequent purchasers will not use any such changes as evidence of insufficiency or inadequacy of prior designs or materials.

F. If failure occurs within the warranty period, and constitutes a breach of warranty, repair or replacement parts will be furnished on a no-charge basis and these parts will be covered by the remainder of the unexpired warranty which remains in effect on the complete unit.

**Note: The above constitutes the basic NACD General Limited Warranty and may be supplemented by additional published warranty terms dependent upon the product involved. Supplementary warranty terms are available upon request.*

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NACD makes no warranty or guarantee of any kind, expressed, implied or otherwise, with regard to the information contained within this manual. NACD assumes no responsibility for any errors that may appear in this manual and shall not be liable under any circumstances for incidental, consequential or punitive damages in connection with, or arising out of, the use of this manual. The information contained within this manual is subject to change without notice.

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