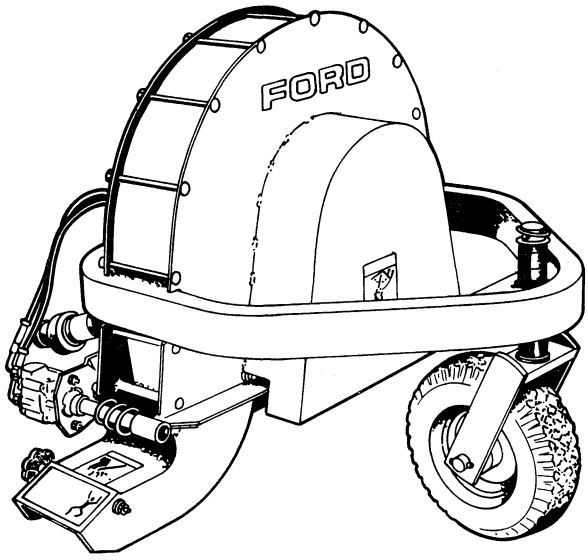
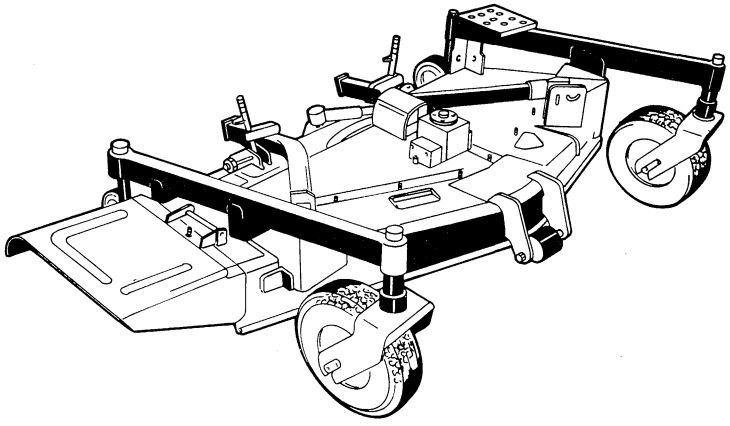
FORD

Service Manual

FORD
NEW HOLLAND

Commercial Mower Implements





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CAUTION! THIS SYMBOL IS USED THROUGHOUT THIS BOOK WHENEVER PERSONAL SAFETY IS INVOLVED. TAKE TIME TO READ AND FOLLOW THE INSTRUCTIONS. BE CAREFUL!

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INTRODUCTION
SAFETY PRECAUTIONS

Practically all Service work involves the need to drive a tractor. The Operator's Manual, supplied with each tractor or implement, contains detailed safety precautions relating to Driving, Operating and Servicing. These precautions are as applicable to the service technician as they are to the operator, and should be read, understood and practiced by all personnel.

Prior to undertaking any maintenance, repair, overhaul, dismantling or re-assembly operations, whether within a workshop facility or out "in the field", consideration should be given to factors that may have an effect upon Safety, not only upon the mechanic carrying out the work, but also upon bystanders.

PERSONAL CONSIDERATIONS

- The wrong clothes or carelessness in dress can cause accidents. Check to see that you are suitably clothed.

  Some jobs require special protective equipment.

- **Eye Protection**
  The smallest eye injury may cause loss of vision. Injury can be avoided by wearing eye protection when engaged in chiselling, grinding, discing, welding, painting, etc.

- **Breathing Protection**
  Fumes, dust and paint spray are unpleasant and harmful. These can be avoided by wearing respiratory protection.

- **Hearing Protection**
  Loud noise may damage your hearing and the greater the exposure the worse the damage. If you feel the noise excessive, wear ear protection.

- **Hand Protection**
  It is advisable to use a protective cream before work to prevent irritation and skin contamination. After work clean your hands with soap and water. Solvents such as white spirit, paraffin, etc., may harm the skin.

- **Foot Protection**
  Substantial or protective footwear with reinforced toe-caps will protect your feet from falling objects. Additionally, oil-resistant soles will help to avoid slipping.

- **Special Clothing**
  For certain work it may be necessary to wear flame or acid-resistant clothing.

- Avoid injury through incorrect handling of components. Make sure you are capable of lifting the object. If in doubt get help.

EQUIPMENT CONSIDERATIONS

- **Machine Guards**
  Before using any machine, check to ensure that the machine guards are in position and serviceable. These guards not only prevent parts of the body or clothing coming in contact with the moving parts of the machine, but also ward off objects that might fly off the machine and cause injury.

- **Lifting Appliances**
  Always ensure that lifting equipment, such as chains, slings, lifting brackets, hooks and eyes are thoroughly checked before use. If in doubt, select stronger equipment than is necessary.

  Never stand under a suspended load or raised implement.

- **Compressed Air**
  The pressure from a compressed air line is often as high as 100 psi (6.9 bar) 7 (kgf/cm^2). It is perfectly safe if used correctly. Any misuse may cause injury.

  Never use compressed air to blow dust, filing, dirt, etc., away from your work area unless the correct type of nozzle is fitted and eye protection is used.

  Compressed air is not a cleaning agent, it will only move dust, etc., from one place to another. Look around before using an air hose as bystanders may get grit into their eyes, ears or skin.

- **Hand Tools**
  Many cuts, abrasions and injuries are caused by defective tools. Never use the wrong tool for the job, as this generally leads either to some injury, or to a poor job.

Never use

— A hammer with a loose head or split handle.
— Spanners or wrenches with splayed or worn jaws.
— Spanners or files as hammers; or drills, clevis pins or bolts as punches.

For removing or replacing hardened pins use a copper or brass drift rather than a hammer.

For dismantling, overhaul and assembly of major and sub components, always use the Special Service Tools recommended.

These will reduce the work effort, labor time and the repair cost.

Always keep tools clean and in good working order.

- **Electricity**
  Electricity has become so familiar in day to day usage, that its potentially dangerous properties are often overlooked. Misuse of electrical equipment can endanger life.

  Before using any electrical equipment — particularly portable appliances — make a visual check to make sure that the cable is not worn or frayed and that the plugs, sockets, etc., are intact. Make sure you know where the nearest isolating switch for your equipment is located.

GENERAL CONSIDERATIONS

- **Solvents**
  Use only cleaning fluids and solvents that are known to be safe. Certain types of fluids can cause damage to components such as seals, etc., and can cause skin irritation. Solvents should be checked that they are suitable not only for the cleaning of components and individual parts, but also that they do not affect the personal safety of the user.

- **Housekeeping**
  Many injuries result from tripping or slipping over, or on, objects or material left lying around by a careless worker. Prevent these accidents from occurring. If you notice a hazard, don't ignore it — remove it.

  A clean, hazard-free place of work improves the surroundings and daily environment for everybody.

- **Fire**
  Fire has no respect for persons or property. The destruction that a fire can cause is not always fully realized. Everyone must be constantly on guard.

  — Extinguish matches/cigars/cigarettes, etc., before throwing them away.
  — Work cleanly, disposing of waste material into proper containers.
  — Locate the fire extinguishers and find out how to operate them.
  — Do not panic — warn those near and raise the alarm.
  — Do not allow or use an open flame near the fuel tank, battery or component parts.

- **First Aid**
  In the type of work that mechanics are engaged in, dirt, grease, fine dusts, etc. all settle upon the skin and clothing. If a cut, abrasion or burn is disregarded it may be found that a septic condition has formed within a short time. What appears at first to be trivial could become painful and injurious. It only takes a few minutes to have a fresh cut dressed, but it will take longer if you neglect it. Make sure you know where the First Aid box is located.

- **Cleanliness**
  Cleanliness of the tractor hydraulic system is essential for optimum performance. When carrying out service and repairs plug all hose ends and component connections to prevent dirt entry.

  Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficiency and working life of a component and lead to costly replacement. Use of a high pressure washer or steam cleaner is recommended.

OPERATIONAL CONSIDERATIONS

- Stop the engine, if at all possible, before performing any service.

- Place a warning sign on tractors which, due to service or overhaul, would be dangerous to start. Disconnect the battery leads if leaving such a unit unattended.

- Do not attempt to start the engine while standing beside the tractor or attempt to by-pass the safety start switch.

- Avoid prolonged running of the engine in a closed building or in an area with inadequate ventilation as exhaust fumes are highly toxic.

- Always turn the radiator cap to the first stop, to allow pressure in the system to dissipate when the coolant is hot.

- Never work beneath a tractor which is on soft ground. Always take the unit to an area which has a hard working surface — concrete for preference.

- If it is found necessary to raise the tractor or implement for ease of servicing or repair, make sure that safe and stable supports are installed, beneath axle housings, casings, etc., before commencing work.

- Certain repair or overhaul procedures may necessitate "separating the tractor", either at the engine/front transmission or front transmission/rear transmission locations. These operations are simplified by the use of the Tractor Splitting Kit/Stands. Should this equipment not be available, then every consideration must be given to stability, balance and weight of the components, especially if a cab is installed.

- Use footsteps or working platforms when servicing those areas that are not within easy reach.

- Before loosening any hoses or tubes connecting implements to remote control valves, etc., switch off the engine, remove all pressure in the lines by operating levers several times. This will remove the danger of personal injury by oil pressure.

- Prior to pressure testing, make sure all hoses and connectors not only of the tractor and implement, but also those of the test equipment, are in good condition and tightly sealed. Pressure readings must be taken with the gauges specified. The correct procedure should be rigidly observed to prevent damage to the system or the equipment, and to eliminate the possibility of personal injury.

- When equipment or implements are required to be attached to the hydraulic linkage, either for testing purposes or for transportation, then "position control" should be used.

- Always lower equipment to the ground when leaving the tractor.

- If high lift attachments are installed on a tractor beware of overhead power, electric or telephone cables when traveling. Drop attachment near to ground level to increase stability and minimize risks.

- Do not park or attempt to service a tractor on an incline. If unavoidable, take extra care and block all wheels.

- Observe recommended precautions as indicated in this Service Manual when dismantling the air conditioning system as escaping refrigerant can cause frostbite.

- Prior to removing wheels and tires from a tractor, check to determine whether additional ballast (liquid or weights) has been added. Seek assistance and use suitable equipment to support the weight of the wheel assembly.

- When inflating tires beware of over inflation — constantly check the pressure. Over inflation can cause tires to burst and result in personal injury.

Safety precautions are very seldom the figment of someone's imagination. They are the result of sad experience, where most likely someone has paid dearly through personal injury.

Heed these precautions and you will protect yourself accordingly. Disregard them and you may duplicate the sad experience of others.

SERVICE TECHNIQUES

SERVICE SAFETY

Appropriate service methods and proper repair procedures are essential for the safe, reliable operation of all motor vehicles as well as the personal safety of the individual doing the work. This Service Manual provides general directions for accomplishing service and repair work with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedures, techniques, tools, and parts for servicing vehicles, as well as in the skill of the individual doing the work. This Manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this Manual must first establish that he compromises neither his personal safety nor the vehicle's integrity by his choice of methods, tools or parts.

SERVICE TECHNIQUES

Clean the exterior of all components before carrying out any form of repair. Dirt and abrasive dust can reduce the efficient working life of a component and lead to costly replacement.

Time spent on the preparation and cleanliness of working surfaces will pay dividends in making the job easier and safer and will result in overhauled components being more reliable and efficient in operation.

Use cleaning fluids which are known to be safe. Certain types of fluid can cause damage to O-rings and cause skin irritation. Solvents should be checked that they are suitable for the cleaning of components and also that they do not risk the personal safety of the user.

Replace "O"-rings, seals or gaskets whenever they are disturbed. Never mix new and old seals or O-rings, regardless of condition. Always lubricate new seals and "O"-rings with hydraulic oil before installation.

When replacing component parts use the correct tool for the job.

HOSES AND TUBES

Always replace hoses and tubes if the cone end or the end connections are damaged.

When installing a new hose, loosely connect each end and make sure the hose takes up the designed position before tightening the connection. Clamps should be tightened sufficiently to hold the hose without crushing and to prevent chafing.

The hoses are the arteries of the unit, be sure they are in good condition when carrying out repairs or maintenance, otherwise the machine's output and productivity will be affected.

After hose replacement to a moving component check that the hose does not foul by moving the component through the complete range of travel.

Be sure any hose which has been installed is not kinked or twisted.

Hose connections which are damaged, dented, crushed or leaking, restrict oil flow and the productivity of the components being served. Connectors which show signs of movement from the original swaged position have failed, and will ultimately separate completely.

A hose with a chafed outer cover will allow water entry. Concealed corrosion of the wire reinforcement will subsequently occur along the hose length with resultant hose failure.

Ballooning of the hose indicates an internal leakage due to structural failure. This condition rapidly deteriorates and total hose failure soon occurs.

Kinked, crushed, stretched or deformed hoses generally suffer internal structural damage which can result in oil restriction, a reduction in the speed of operation and ultimate hose failure.

Free-moving, unsupported hoses must never be allowed to touch each other or related working surfaces. This causes chafing which reduces hose life.

BEARINGS

Bearings which are considered suitable for further service should be cleaned in a suitable solvent and immersed in clean lubricating oil until required.

Installation of a bearing can be classified in two ways: press fit on rotating parts such as shafts, and gears, and push fit into static locations such as reduction gear housings. Where possible, always install the bearing onto the rotating component first.

Use the correct tools or a press, to install a bearing or bushing. In the absence of the correct tools or press, heat the bearings and/or the casing in hot oil to assist the installation of the bearing.

When bearings or bushings are removed always carefully check that the bearing is free from discoloration and signs of over-heating. Also check for mechanical damage such as excessive clearance, nicks and scuffing. If in doubt replace the bearings or bushings.

Bearings should never be removed unless absolutely necessary. Always use the recommended puller to reduce the risk of bearing or related component damage.

The reliability and durability of a unit depends on the effective operation of the many types of bearings and bushings which are incorporated in the complete assembly.

These bearings and bushings are subjected, in normal operation, to high working loads and adverse conditions.

Be sure during normal routine servicing, maintenance or repair that bearings are given the right attention and are installed with care.

PRESSURE TESTING

Prior to pressure testing be sure all hoses are in good condition and all connections tight. Pressure readings must be taken with gauges of specified pressure ratings.

The correct procedure should be rigidly observed to prevent damage to the system or the equipment and to eliminate the possibility of personal injury.

PART 0
GENERAL INFORMATION

Chapter 1
DRIVELINE

A. COMPONENT REPAIR

Ford New Holland implements are manufactured by various suppliers using several different PTO shaft designs. Although the PTO shafts are not identical, they are similar in most respects.

There may be differences in the method of retaining the shaft to the tractor or implement, retention of the universal joint bearing cups (outside vs inside snap ring), and rotating safety shield removal.

This part is a general overview of the disassembly and assembly of one PTO shaft. The methods described can be used as a guide for any Ford New Holand inmplement.

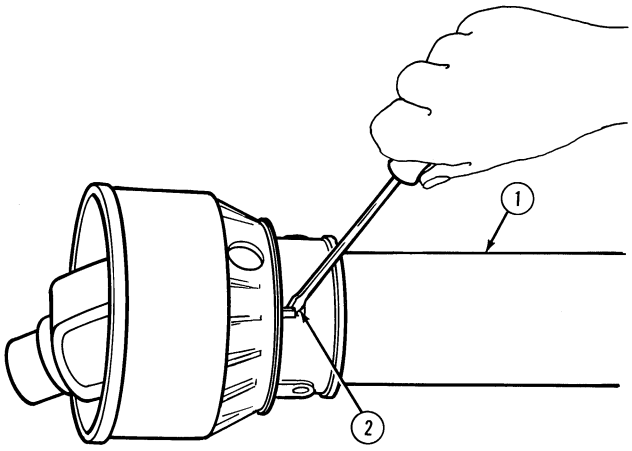


Figure 1

PTO SHAFT REMOVAL

1. Disconnect the PTO shaft from the tractor. There are several methods used to release the PTO shaft from the tractor including rotation of the collars, sliding the collar forward or backward, or a latch pin. The method used depends on the supplier.

2. Disconnect the PTO shaft from the implement. The implement end may be disconnected by depressing a latch pin, rotation of a collar, or if a shear bolt is used, it may be held on by a snap ring. The method used depends on the supplier.

PTO SHAFT DISASSEMBLY

1. Remove the rotating shield (1), Figure 1, by removing the locking screw (2) and aligning the bearing tabs with the cone pockets. Remove the half guard (1), Figure 2, and bearing ring (1), Figure 3. Examine the shaft for dents or gauling in the area of the slip joint. If a dent or evidence of bending of the slip joint is present, the shaft must be replaced. Examine the bearing ring for nicks or burrs.

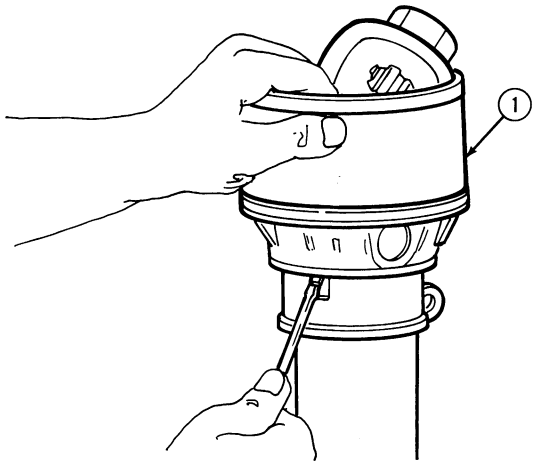


Figure 2

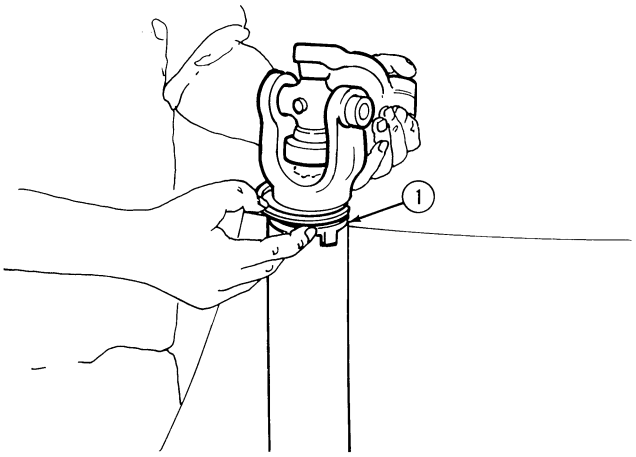


Figure 3

2. Depress the lock collar (1), Figure 4, and remove the snap ring (2). Remove the lock collar (1), compression spring (2) and balls (3), Figure 5. Examine all parts for nicks or burrs. Replace parts as required.

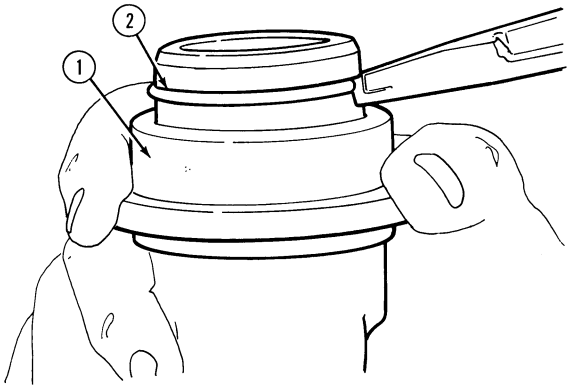


Figure 4

PTO SHAFT REASSEMBLY

1. Install the balls (3), Figure 5, compression spring (2), and lock collar (1). Compress the spring with the lock collar and install the snap ring.

2. Install the bearing ring (1), Figure 3. Install the half guard and retaining screw.

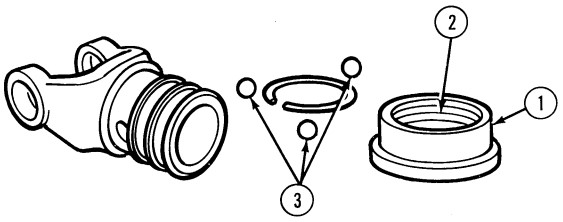


Figure 5

UNIVERSAL JOINT DISASSEMBLY

1. Separate the PTO shaft at the slip joint.

2. Thoroughly clean the universal joint with solvent and air dry.

3. Remove the snap rings (1), Figure 6, that hold the bearing cups in the yoke. The snap rings may be inside the yoke (as shown) or on the outside depending on the supplier.

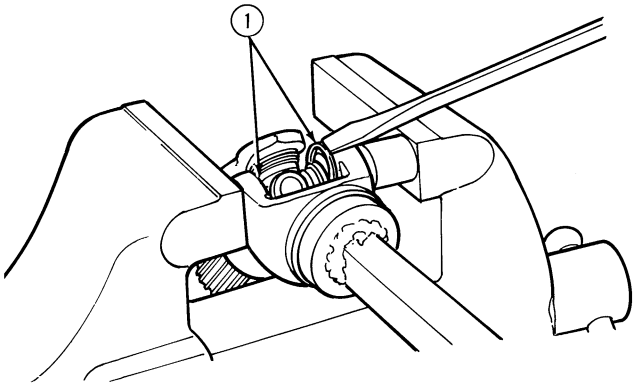


Figure 6

4. It will be necessary to choose a socket or a piece of pipe that will just fit (1/32" clearance), in the bearing cup bore in the yoke. Also choose a socket or a piece of pipe that is slightly larger (1/32" clearance), than the bearing cup bore in the yoke.

5. Place the universal joint in a press or large vise with the larger socket (1), Figure 7, or pipe supporting the yoke and the smaller socket (2), Figure 7, or pipe against the bearing cup.

6. Increase the load on the press or tighten the vise until the universal joint cross is pressed as far as it can move. Remove the assembly from the press or vise. If the bearing cup is out of the bore, proceed to step 8, if not, proceed to step 7.

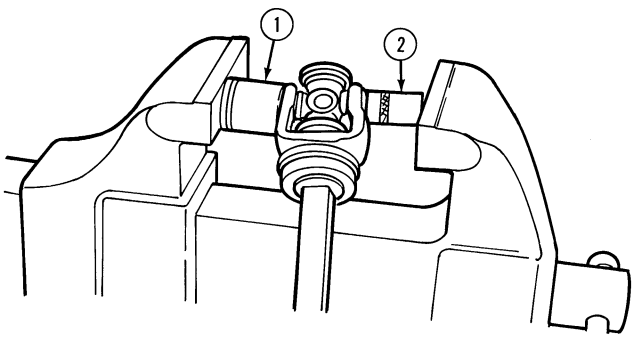


Figure 7

7. Place the protruding portion of the bearing cup in the vise and just snug the jaws so the bearing cup will not be distorted. Use a prying motion on the yoke to work the bearing cup out of the joke as shown in Figure 8.

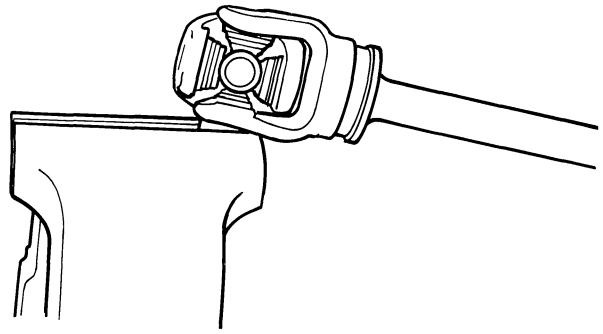


Figure 8

8. Insert the yoke in the vise with the smaller socket against the cross and the larger socket supporting the yoke as shown in Figure 9.

9. Tighten the vise until the cross is pressed as far as it can move. Loosen the vise and remove the bearing cup as described in step 7.

10. Remove the cross from the yoke and examine it and the bearing cups for evidence of scoring or discoloration on the bearing surfaces. Examine the needle bearings for scoring or wear. Replace the cross and bearing cups if required. Use this procedure for all of the bearing cups. Replace the cross and bearings as an assembly.

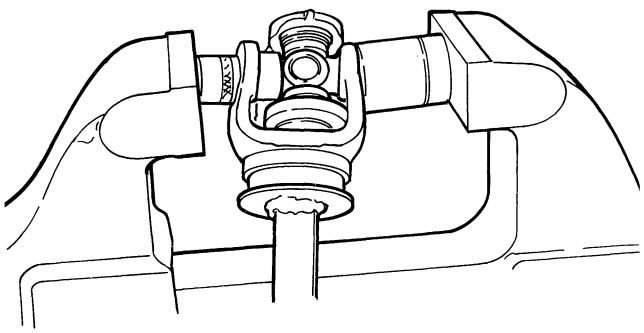


Figure 9

UNIVERSAL JOINT ASSEMBLY

1. Thoroughly lubricate the bearings cups with a good grade of grease. If a new cross and bearing cups are being installed, they will be pre-lubricated.

2. Place the cross in the center of the yoke and start a bearing cup using hand pressure only.

3. Place the yoke in a large vise with the jaws tight against the bearing cup. Slowly tighten the vise while moving the cross to assure it moves into the bearing cup correctly, as shown in Figure 10. Repeat this procedure for the other bearing cup.

4. When the bearing cups are flush with the end of the yoke loosen the vise and place the smaller socket against one of the bearing cups and press it in until the snap ring can be replaced, as shown in Figure 11.

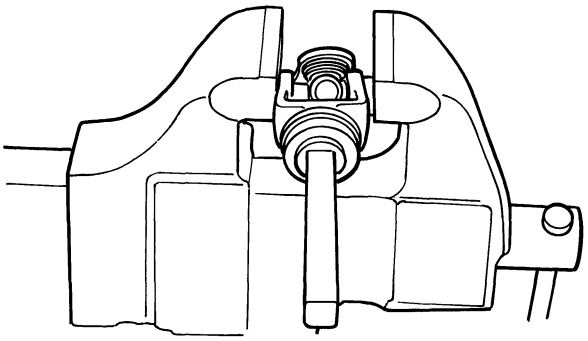


Figure 10

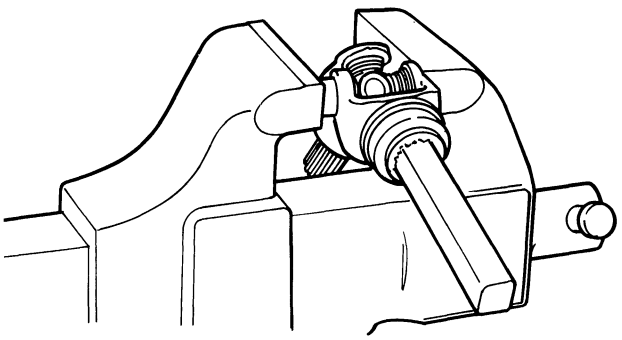


Figure 11

5. Loosen the vise and repeat step 4 for the other bearing cup. Install the snap ring (1), Figure 12, in the yoke.

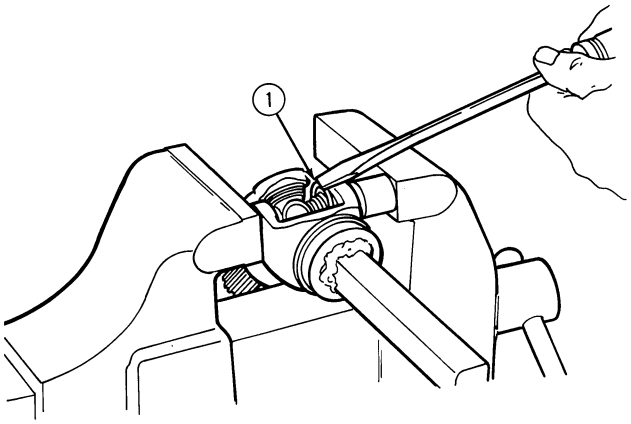


Figure 12

6. Rotate the cross by hand. The cross must rotate smoothly, however, it may rotate somewhat tight. This assembly procedure should be used for all of the bearing cups.

   NOTE: *If the joint is stiff strike the yoke ears with a soft hammer to seat the needle bearing.*

PTO SHAFT INSTALLATION

1. Slide the slip joint together and lubricate with a good grade of grease.
2. Reassemble the rotating shield to the PTO shaft.
3. Attach the PTO shaft to the implement by depressing the latch pin shaft until it latches.
4. Attach the PTO shaft to the tractor by sliding the coupling until it releases and slide it on the shaft until it latches.
5. Replace all safety shields.

B. SIZING DRIVELINE

Due to the many variations in tractor/implement hitch points and corresponding differences in distances between tractor P.T.O. shafts and implement input shafts, drivelines may need to be shortened as described in the following steps:

1. Attach the implement to the tractor lift arms and level right to left.
2. Adjust the tractor top link until the implement gearbox input shaft is parallel with the tractor PTO shaft as shown in Figure 13.

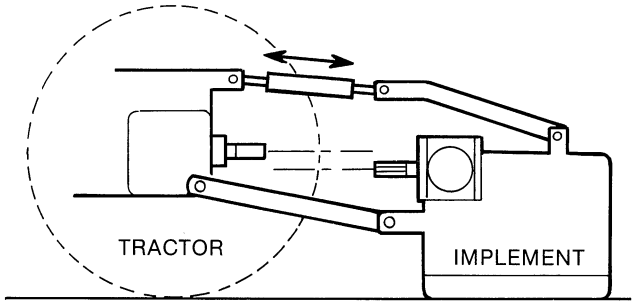


Figure 13
Implement Level

3. Raise the implement until the gearbox input shaft is level with the tractor PTO shaft as shown in Figure 14.
4. Install the rear driveshaft half onto the implement gearbox.

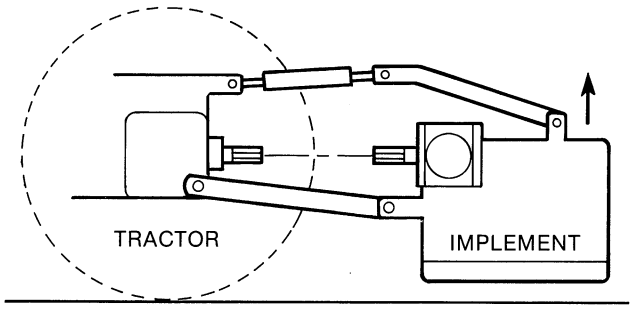


Figure 14
Implement Raised Driveline Level

5. Hold the tractor end of the driveshaft against the rear end of tractor PTO shaft, then align the front and rear driveshaft halves side-by-side.

6. Determine the excess driveshaft length by measuring from the rearmost edge of the front half shield to just behind the bell-shaped shield on the rear driveshaft half as shown at (2), Figure 15.

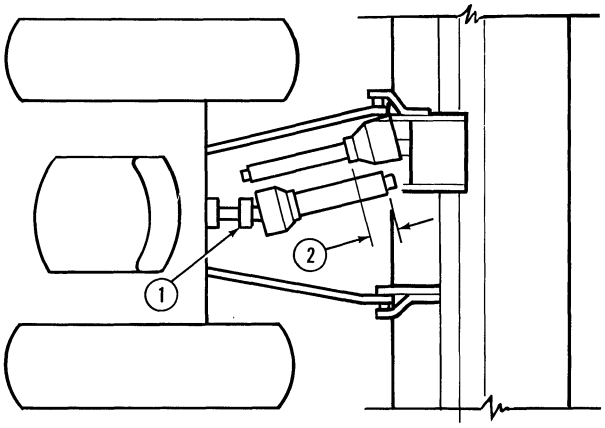


Figure 15
Driveline Overlap
1. End of Tractor PTO Shaft
2. Driveline Cutoff Dimension

7. Hold the driveline sections parallel to each other and check for a minimum of 5" overlap as shown at, (1), Figure 16. The overlap will be the distance between the two marks on the shields. If the driveline has less than minimum overlap, DO NOT USE. Recheck the mounting of the implement. Adjust the top link to assure the implement is level front to rear. Adjust the lower links to assure the implement is level right to left.

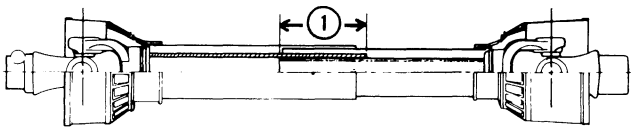


Figure 16
Driveline Overlap
1. 5" (127 mm) Minimum

8. Clamp the driveline in a well padded vice to prevent damage to the shield. Cut off the shield where it was marked in step 6 as shown in Figure 17.

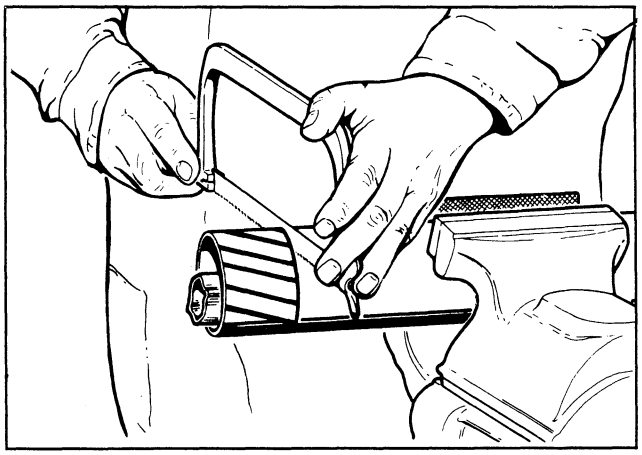


Figure 17
Cutting Shield

9. Using the cut off section as a guide, cut the shaft the same amount. (Figure 18)

NOTE: *The shaft should be longer than the shield before and after sizing.*

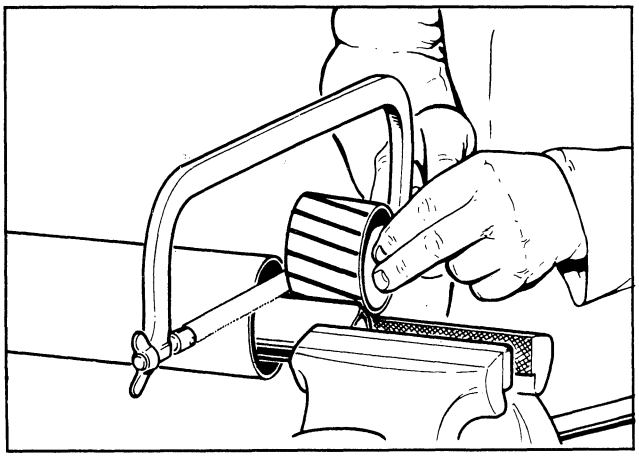


Figure 18
Cutting Shaft

10. Repeat steps "8" and "9" to the other driveline section.

11. Deburr the ends of the driveline sections and clean away all chips and filings as shown in Figure 19.

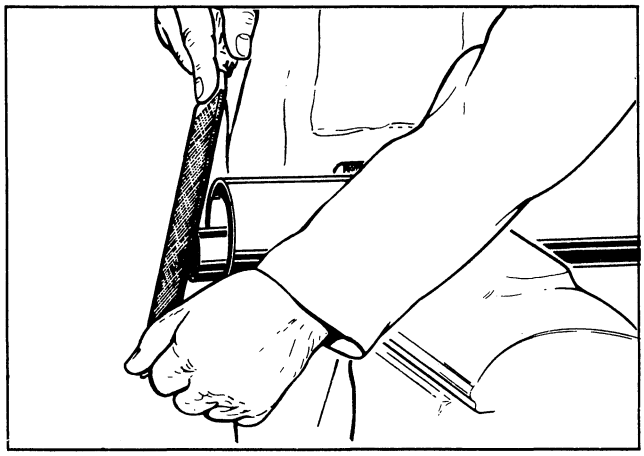


Figure 19
Deburring Shaft

12. Apply grease to the outside of the inner (male) driveline section as shown in Figure 20. Assemble the driveline and install on the tractor and implement. Pull on each driveline section to be sure the yokes lock into place. Make certain the driveline shielding is in place.

    Raise and lower the implement to both extremes to assure the driveline does not come apart nor bottom out.

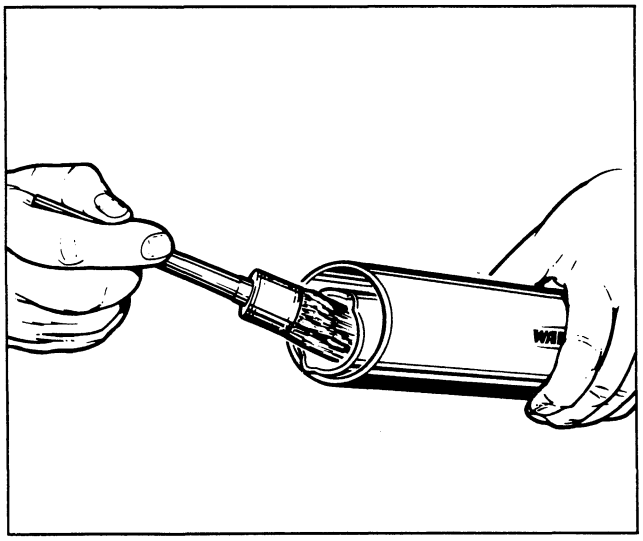


Figure 20
Lubrication

PART 0
GENERAL INFORMATION

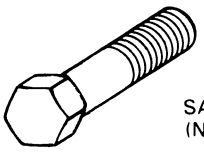
Chapter 2
TORQUE SPECIFICATIONS

A. TORQUE SPECIFICATIONS

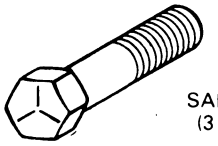
Proper torque for American fasteners used on Ford New Holland equipment. Recommended Torque in Foot Pounds (Newton Meters).*

AMERICAN

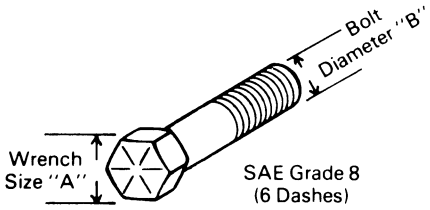
Bolt Head Markings



SAE Grade 2
(No Dashes)



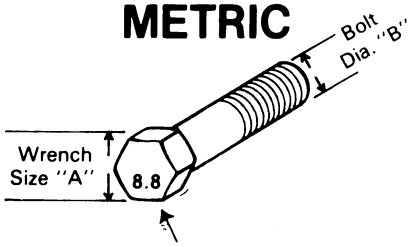
SAE Grade 5
(3 Dashes)



SAE Grade 8
(6 Dashes)

WRENCH SIZE (IN.) "A"	BOLT DIAMETER (IN.) "B" AND THREAD SIZE	SAE GRADE 2	SAE GRADE 5	SAE GRADE 8
7/16	1/4 - 20 UNC	6 (7)	8 (11)	12 (16)
7/16	1/4 - 28 UNF	6 (8)	10 (13)	14 (18)
1/2	5/16 - 18 UNC	11 (15)	17 (23)	25 (33)
1/2	5/16 - 24 UNF	13 (17)	19 (26)	27 (37)
9/16	3/8 - 16 UNC	20 (27)	31 (42)	44 (60)
9/16	3/8 - 24 UNF	23 (31)	35 (47)	49 (66)
5/8	7/16 - 14 UNC	32 (43)	49 (66)	70 (95)
5/8	7/16 - 20 UNF	36 (49)	55 (75)	78 (106)
3/4	1/2 - 13 UNC	49 (66)	76 (103)	106 (144)
3/4	1/2 - 20 UNF	55 (75)	85 (115)	120 (163)
7/8	9/16 - 12 UNC	70 (95)	109 (148)	153 (207)
7/8	9/16 - 18 UNF	79 (107)	122 (165)	172 (233)
1	5/8 - 11 UNC	97 (131)	150 (203)	212 (287)
1	5/8 - 18 UNF	110 (149)	170 (230)	240 (325)
1-1/8	3/4 - 10 UNC	144 (195)	266 (360)	376 (509)
1-1/8	3/4 - 16 UNF	192 (260)	297 (402)	420 (569)
1-5/16	7/8 - 9 UNC	166 (225)	430 (583)	606 (821)
1-5/16	7/8 - 14 UNF	184 (249)	474 (642)	668 (905)
1-1/2	1 - 8 UNC	250 (339)	644 (873)	909 (1232)
1-1/2	1 - 12 UNF	274 (371)	705 (955)	995 (1348)
1-1/2	1 - 14 UNF	280 (379)	721 (977)	1019 (1381)
1-11/16	1-1/8 - 7 UNC	354 (480)	795 (1077)	1288 (1745)
1-11/16	1-1/8 - 12 UNF	397 (538)	890 (1206)	1444 (1957)
1-7/8	1-1/4 - 7 UNC	500 (678)	1120 (1518)	1817 (2462)
1-7/8	1-1/4 - 12 UNF	553 (749)	1241 (1682)	2013 (2728)
2-1/16	1-3/8 - 6 UNC	655 (887)	1470 (1992)	2382 (3228)
2-1/16	1-3/8 - 12 UNF	746 (1011)	1672 (2266)	2712 (3675)
2-1/4	1-1/2 - 6 UNC	870 (1179)	1950 (2642)	3161 (4283)
2-1/4	1-1/2 - 12 UNF	979 (1327)	2194 (2973)	3557 (4820)

METRIC



Numbers appearing on bolt heads indicate ASTM class.

Proper torque for metric fasteners used on Ford New Holland equipment. Recommended Torque in Foot Pounds (Newton Meters).*

WRENCH SIZE (mm) "A"	BOLT DIA. (mm) "B"	ASTM CLASS 4.6	ASTM CLASS 8.8	ASTM CLASS 9.8	ASTM CLASS 10.9
8	5	1.8 (2.4)		5.1 (6.9)	6.5 (8.8)
10	6	3 (4)		8.7 (12)	11.1 (15)
13	8	7.3 (10)	19 (26)	21.1 (29)	27 (37)
16	10	14.5 (20)	38 (52)	42 (57)	53 (72)
18	12	25 (34)	67 (91)	73 (99)	93 (126)
21	14	40 (54)	107 (145)	116 (157)	148 (201)
24	16	62 (84)	167 (226)	181 (245)	230 (312)
30	20	122 (165)	325 (440)		449 (608)
33	22		443 (600)		611 (828)
36	24	211 (286)	563 (763)		778 (1054)
41	27		821 (1112)		1138 (1542)
46	30	418 (566)	1119 (1516)		1547 (2096)

Use 75% of the specified torque value for plated fasteners. Use 85% of the specified torque values for lubricated fasteners.

FOR BOLTS USED WITH WAXED PREVAILING TORQUE LOCKNUTS, TORQUE SHOULD BE 70% OF VALUES SHOWN IN CHART

PRINTED IN U.S.A.

PART 10
COMMERCIAL MOWER IMPLEMENTS

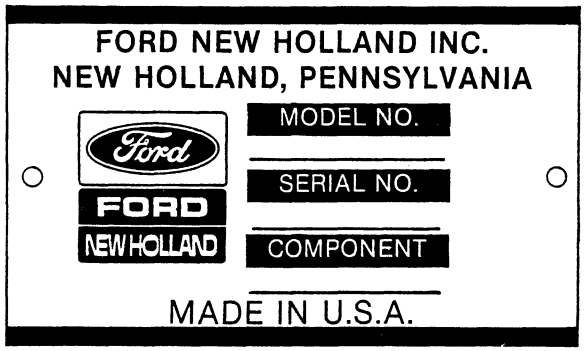
Chapter 1
FM72 ROTARY MOWER

A. GENERAL INFORMATION AND SPECIFICATIONS

The front mounted 72" rotary mower was designed to be used on the CM222, 224, 272 and 274 commercial mowers.

The mower is an efficient unit that is used for commercial and residential mowing.

The serial number plate is located on the left side of the mower deck.



SPECIFICATIONS

Tractor Required	CM unit
Cutting Width, Actual	72 in. (183 cm)
Overall Width	91.5 in. (223 cm)
Cutting Height, Range	1.5 to 4.5 in. (3.8 to 11.5 cm) 7 positions
Spindle Speed	2428 rpm
Blade Tip Speed	15,574 fpm
Number of Blades	3
Blade Type	High Lift
Blade Length	24.5 inches(62.2 cm)
Blade Width	2.75 inches(7.0 cm)
Blade Thickness	0.25 inches(.64 cm)
Shipping Weight - Approximate	450 lbs. (204 kg)

B. TRACTOR REQUIREMENTS

The FM72 Rotary Mower is designed to be used exclusively on the Ford CM222, 224, 272 and 274.

TRACTOR WEIGHTING

The CM unit used with the Rotary Mower must have rear counter weights installed for stability.

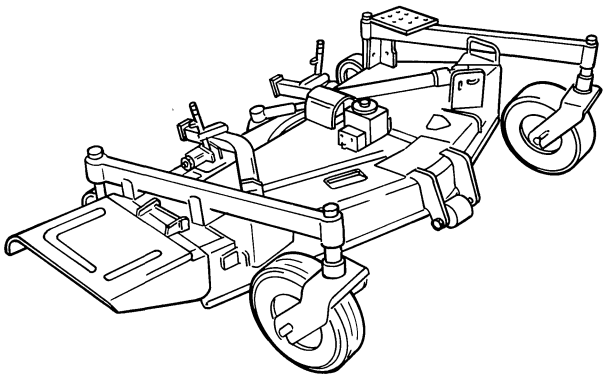


Figure 1
FM72 Rotary Mower

C. ASSEMBLY

1. Remove the crate top and all packing ties and insulating material from the mower and its loose components. Remove the parts and lay them aside.

2. Cut the wire corners and remove the sides of the crate.

3. Remove both rear gauge wheels from their upside-down storage position and reinstall them from the bottom with the wheel down as shown in Figure 1.

4. Remove the discharge deflector (2), Figure 2, from its shipping position. Install one 5/32" x 1" roll pin (4), in one end of the hinge pin (5), with equal lengths of the roll pin protruding thru the hinge pin. Put the deflector in place on the deck and start the hinge pin from one end.

5. Slide the torsion spring (3), Figure 2, onto the hinge pin with the ends down and in torsion, contacting the deck and deflector. Push the hinge pin fully into place and install the last 5/32" x 1" roll pin.

6. Install a 3/8"-16 x 3/4" bolt (6), Figure 2, from the bottom, thru the deck and deflector, and fasten in place with a lock washer and 3/8"-16 nut.

7. Carefully roll the mower deck off of the pallet with the gearbox input shaft toward the CM unit. Position the mower in front of the CM unit, leaving enough space in between for working room.

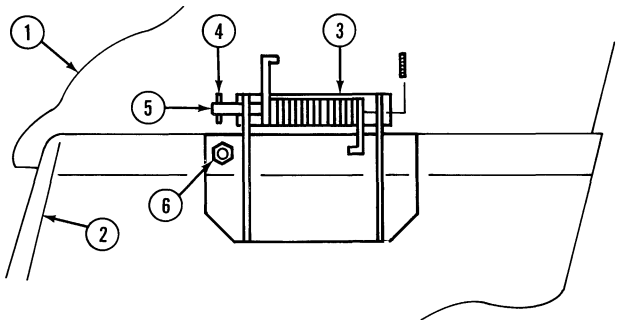


Figure 2
Deflector & Torsion Spring

1. Deck
2. Deflector
3. Spring
4. Roll pin
5. Hinge pin
6. Bolt-3/8"x3/4"

CONNECTING THE DRIVELINE

8. Loosen the driveline shield bolts and tip the shield upward. Install the bored yoke end of the driveline (1), Figure 3, to the gearbox input shaft (5). Retain with a 5/16"-18 x 2-1/2" bolt (2), lock washer (3), and nut (4).

9. Install the external snap ring to the gearbox input shaft.

10. Tip the shield down and tighten the shield bolts.

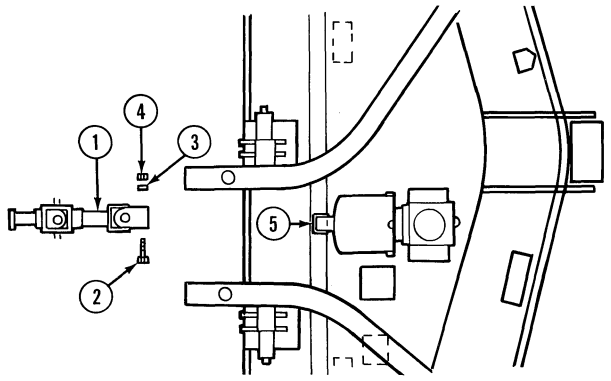


Figure 3
Driveline

1. Driveline
2. Bolt-5/16"x2-1/2"
3. Washer - Lock 5/16"
4. Nut-5/16"
5. Input shaft - gearbox

D. ATTACHING THE IMPLEMENT

1. The lift arms are installed with the lift link bracket up and the arms pointed outward. Fasten each lift arm to the CM unit with the flat lock clevis pins and retain with hairpin clips. The lock tab on the clevis pin should be oriented forward.

2. Assemble the lift link adjusting rod, 5/8"-11 nut, and rod end.

3. Install the lift links to the lift arms and retain in place with hardened 5/8" flat washers and hair-pin clips.

4. Start the engine and raise the lift arms about half way up. Shut off the engine.

5. Roll the mower toward the CM unit, approximately under the lift arms. Move the lift control lever slowly forward to lower and align the arms with the mounting brackets on the deck. Make sure the arm latch brackets are up and the lift link "J" pins are pulled back and latched.

6. Install the clevis pins thru the mount brackets and ball sockets in the lift arms, and retain with 3/4" flat washers and hairpin clips as shown in Figure 4.

7. Pull the "J" pins (2), Figure 4, and rotate the latch bracket (3), into place over the lift arm clevis pin. Place the "J" pins in their locked position.

8. Align the lift link loops within their deck brackets and retain by unlocking the latch pins.

9. Install the driveline to the CM unit.

10. Start the engine and raise the mower. Recheck the latch bracket.

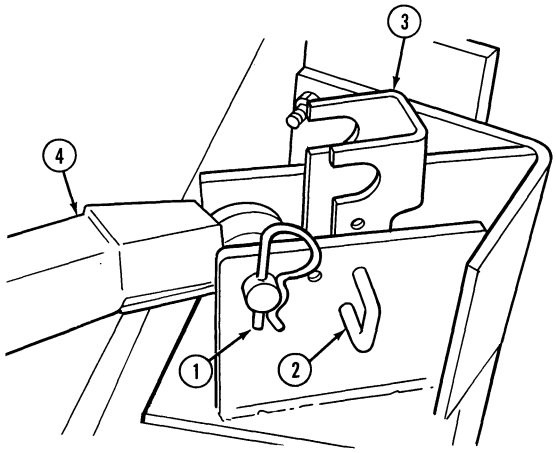


Figure 4
Lift Arm Latch Bracket

1. Clevis pin
2. "J" pin
3. Latch bracket
4. Lift arm

Mower Service Links

Install both Service Links to the front of the CM unit frames, below the leading edge of the step platform. The bolt and link are installed to the outside of the frame, with the spring, flat washer and locknut to the inside of the frame. The offset link is installed on the left tractor frame as shown in Figure 5.

E. DETACHING THE IMPLEMENT

1. Disconnect the driveline from the CM unit PTO by pulling back on the coupler collar, unlocking it from the shaft.

2. Slide the rear half of the driveline off of the front half, connected to the mower gearbox, and lay it aside. The front half of the driveline can remain in place on the mower.

3. Remove the hairpin and latch pin from the CM unit lift arms.

4. Back the CM unit away from the mower.

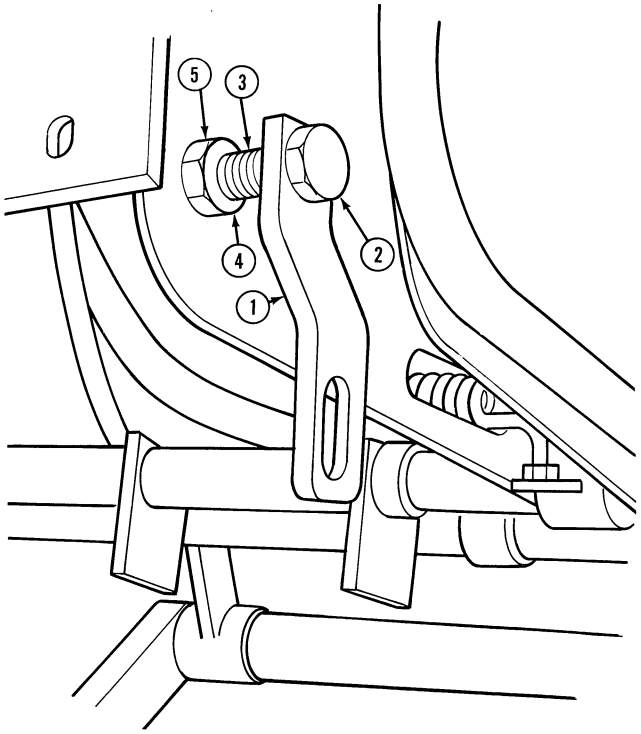


Figure 5
Mower Service Link
LH "Offset" Shown

1. Link
2. Bolt-3/8"x1-1/4"
3. Spring
4. Washer - Flat 3/8"
5. Nut-3/8"

F. OPERATION AND ADJUSTMENTS

TIPS FOR EFFICIENT MOWING

Blade sharpness affects the appearance of the mowed lawn. A dull or damaged blade will cause the grass to appear torn or beaten off, rather than cut cleanly. Mowing blades should be checked regularly and kept sharp to insure the best lawn appearance.

The CM unit engine speed while mowing should be at maximum rated rpm. This will assure proper blade speed for effective cutting and the discharge of grass clippings.

Travel speed greatly effects mowing performance. The operator must use his own best judgement for the ground speed required for encountered mowing conditions. Always use a lower ground speed for slower mowing, rather than lowering engine rpm.

Mow often! Do not wait for the grass to get too tall. Short grass clippings will disperse better and deteriorate faster.

Mowing areas with tall grass or weeds may require cutting at 4-1/2 inches (maximum) height of cut. After mowing once, recut the entire area with the mower reset to the desired final height of cut.

When cutting along sidewalks, driveways, etc., it is advisable to mow with the discharge directed away for 2 or 3 passes. This will keep the grass clippings off of these areas.

The gauge wheels on either side of the front of the mowing deck serve as convenient mowing guides. When mowing, position the mower so the gauge wheel overlaps the edge of the strip previously cut. This will assure full mowing coverage.

When transporting, always disengage the power to the mower.

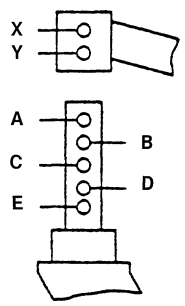
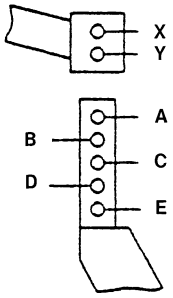
CUTTING HEIGHTS

The FM72 Mower can be adjusted to mow from 1-1/2 inches to 4-1/2 inches (38 to 115 mm) height of cut. Grass mowing height should be determined by encountered conditions and personal preference.

The following recommendations are provided as a guide for cutting height selection.

Lawns = 1-1/2" to 3" (38-76 mm)
Field Cutting = 3" to 4-1/2" (76-115 mm)

To change the height of cut it is necessary to adjust the gauge wheels and the rear lift rods as follows.

CUTTING HEIGHT	FRONT WHEEL	REAR WHEEL
		
1 – 1/2" (38mm)	Y-E	Y-E
2" (51mm)	X-C	X-C
2-1/2" (64mm)	Y-D	Y-D
3" (76mm)	X-B	X-B
3-1/2" (89mm)	Y-C	Y-C
4" (102mm)	X-A	X-A
4-1/2" (115mm)	Y-B	Y-B

Gauge Wheel Adjustment

1. Start the CM unit engine and raise the mower by pulling rearward on the hydraulic control lever.

2. Shut off the engine, remove the key, and set the parking brake.

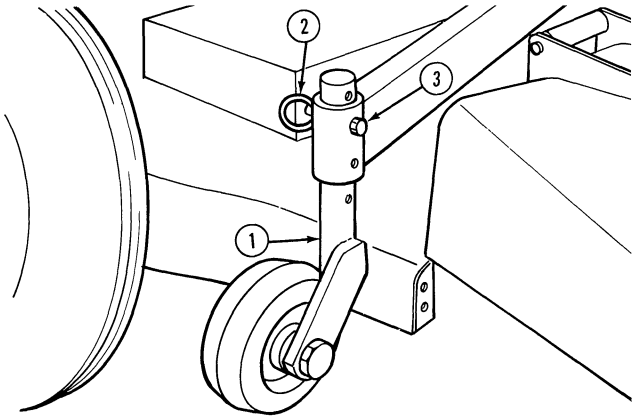
3. After determining the desired cutting height, as shown on the chart below (duplicated as a label on the mower deck), remove the hairpin clip (2), Figure 6, and clevis pin (3), from the gauge wheel spindle (1). Place the spindle in line with the appropriate cross hole, reinstall the clevis and hairpin clip. Repeat on the other gauge wheels.

4. Make sure the gauge wheels are secured with the hairpin clips.

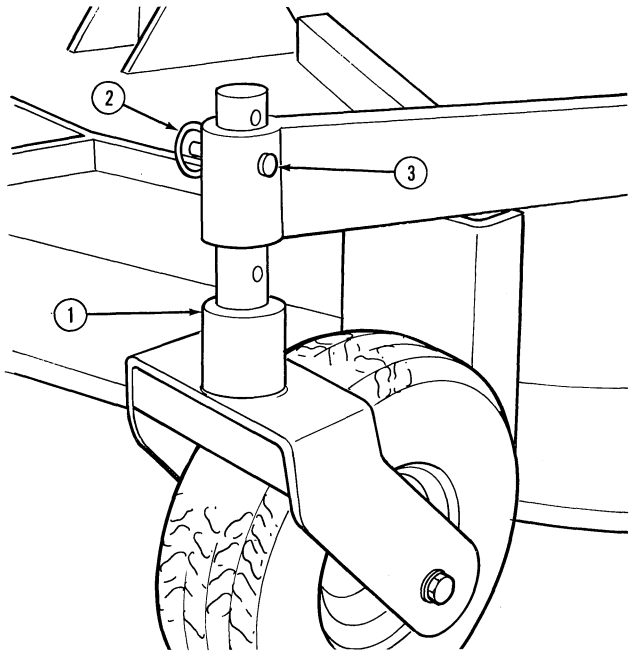
Rear Lift Links

5. Lower the mower by moving the hydraulic control lever forward with the engine shut off.

6. Select a suitable hairpin clip (3), Figure 7, position and adjust the length of the lift link rods (1), so the rear gauge wheels are 1/8 inch off the ground. Jam the 5/8" nut (2), against the rod end.



FRONT GAUGE WHEEL & PIN



REAR GAUGE WHEEL & PIN

Figure 6
Gauge Wheel Assembly

1. Gauge wheel assembly
2. Hairpin
3. Clevis pin

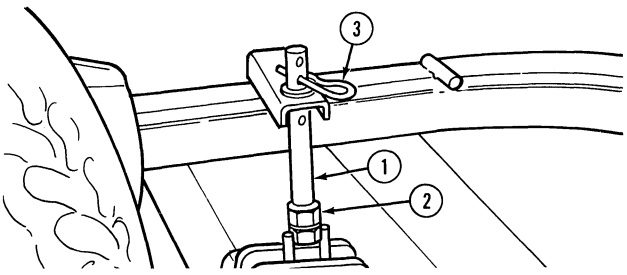


Figure 7
Rear Lift Links

1. Lift link rod
2. Nut-5/8" jam
3. Hairpin

Anti-Scalp Roller

7. The mower may scalp while cutting on uneven terrain at a low height of cut. The front anti-scalp roller is adjustable. Set it in the high position (1), Figure 8, for 1-1/2 and 2 inch mowing, and in the low position (2), for all mowing heights above 2-1/2 inches.

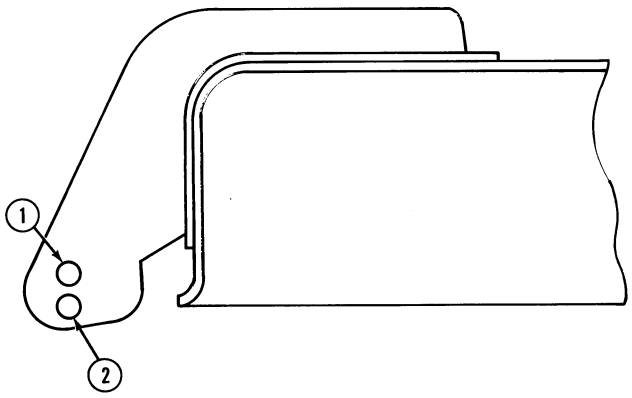


Figure 8
Front Anti-Scalp Roller
1. High position 2. Low position

Uneven Terrain

Pre-plan mowing over uneven terrain so the grass will be dry, minimizing wheel slippage and spinning, which will damage the turf.

Pass diagonally through sharp dips. Avoid sharp drop offs completely to prevent "hanging-up" the CM unit mower.

Before mowing, check the area to determine the best procedure. Consider the grass type and height, and the type of uneven terrain on which the mowing is to take place.

Avoid sudden starts and stops while traveling up or down hill, and slow the ground speed while turning.

Grass Discharge

The FM72 Mower deck has been designed to provide maximum air flow for an even discharge of grass clippings. When mowing tall, or lush grasses, select a lower transmission speed, or reduce the width of cut, for the best discharge efficiency.

For the best lawn appearance, do not mow when the grass is wet or heavy with dew. Wet grass could plug the discharge area of the mower, creating an unnatural load through the blades and spindles, possibly damaging the mower deck belt. Wet grass will also leave unsightly clumps on the lawn.

If the mower should become clogged, back the unit out of the uncut grass. If the mower will not clear itself, raise the deck to the service position (see Section 9 of this manual for procedure), shut off the engine, set the parking brake, and clean the bottom of the deck with a scraper.

In medium and heavy cutting conditions, mow so the discharged clippings will be AWAY from uncut grass. In light cutting, discharged clippings can be directed onto the uncut grass, allowing them to be recut finer, leaving the lawn almost free of unsightly clippings.

ADJUSTING THE WEIGHT TRANSFER VALVE

The Weight Transfer Valve, is used to transfer the mower weight to the CM unit to reduce the possibility of turf gouging and scalping.

Adjustment of this valve should be accomplished as follows.

1. With the engine running at rated rpm, move the hydraulic control (2), Figure 9, forward into the float position.

2. Turn the knob (1), Figure 9, clockwise until the mower lifts off of the ground.

3. Turn the knob counter-clockwise slowly, until the mower front gauge wheels touch the ground. Turn the knob another 1/4 turn counter-clockwise.

4. Operate the mower on uneven terrain at a desired ground travel speed and observe the front gauge wheels. The gauge wheels should be following the contour of the ground.

5. If the gauge wheels DO NOT follow the contour of the ground turn the knob counter-clockwise 1/4 turn at a time until the gauge wheels follow the ground contour.

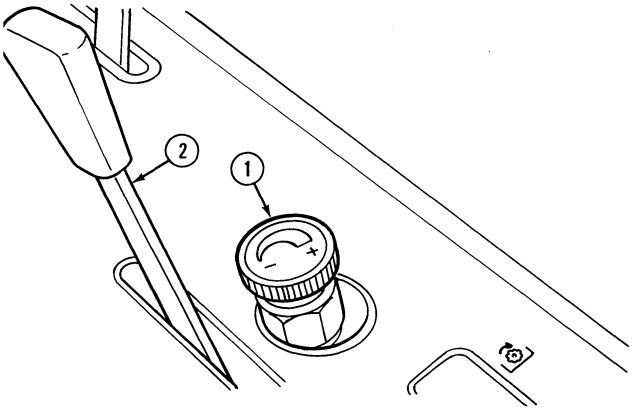


Figure 9
Weight Transfer Valve
1. Adjustment knob 2. Hydraulic control lever

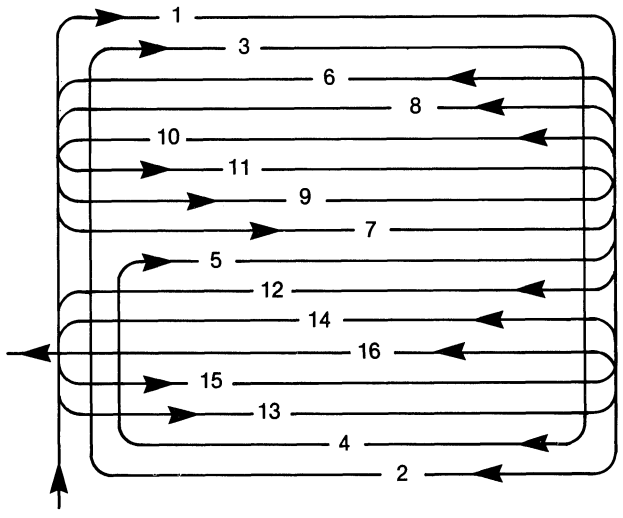
MOWING PATTERN

Proper mowing patterns will be determined by the size and shape of the lawn and by preference for encountered conditions.

If the lawn is small, eliminate the split center of the pattern, and after completing the edge cut clockwise, finish the lawn with counter-clockwise rotations.

Uneven lawn can be divided into square sections where a pattern can be followed.

NOTE: *Mow counter-clockwise if possible when trimming around trees and shrubs.*



MOWING PATTERN - LARGE AREA
(DIVIDE PATTERN IN HALF FOR LARGER AREAS)

G. MAINTENANCE AND REPAIRS

LUBRICATION

Before operating the FM72 Mower, make sure it has been properly lubricated according to the illustrated chart below.

Always wipe the fitting to be lubricated with a clean cloth before using a grease gun. Dirt ingested thru the fitting will damage closely machined parts.

Use an SAE multi-purpose lithium base grease on all lube locations shown. Do not let excess grease build-up on or around parts, especially when the mower is used in sandy areas.

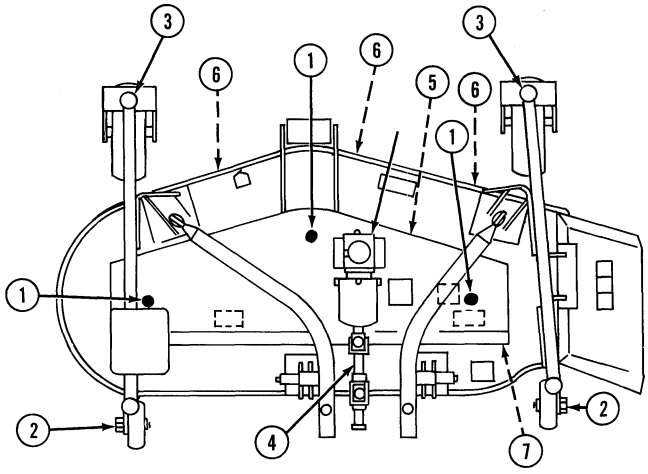


Figure 10
Lubrication

Lubrication Intervals		
Ref	Description	Frequency
1	Blade Spindle (3)	25 hours
2	Rear Wheel Axles (2)	25 hours
3	Front Wheel Pivots (2)	25 hours
4	Driveline U-joints (2) & Shaft Half Tube & Spline	25 hours
5	Idler Arm Pivot (1)	200 hours

Service Intervals	
Ref	Description
6	Blade Retainer Bolts - Check Daily (See Torque Chart).
7	Deck Belt - Check tension weekly, and replace the belt every 200 hours.
8	Gearbox Oil - Drain and change at 200 hour intervals.

Gearbox Oil

The gearbox oil level should be even with the bottom edge of the filler plug hole. Make sure the mower is level and fill with FNH 9821006 oil.

Tire Pressures

Front CM unit tires ..... 10 psi (0.7 bar)
Rear CM unit tires ..... 12 psi (0.8 bar)
Front gauge wheel tires ..... 14 psi (1.0 bar)

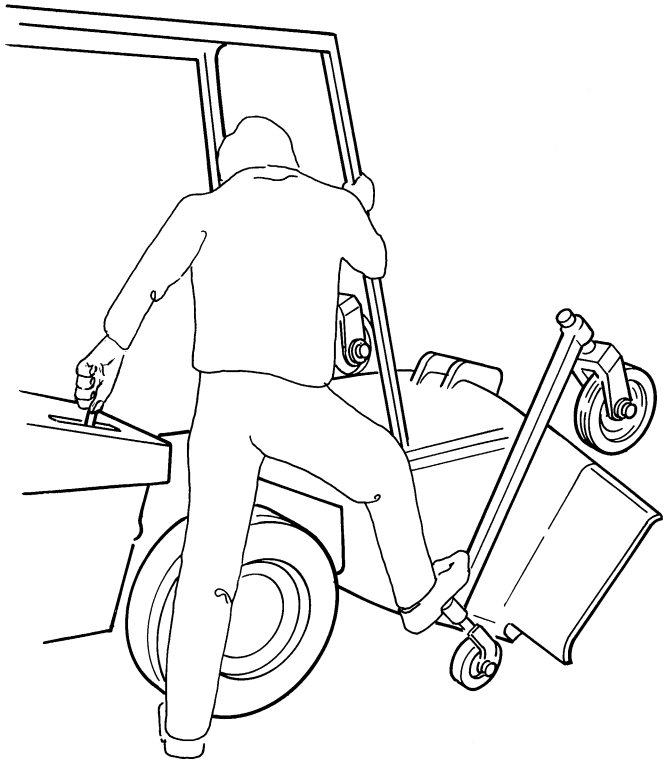


Figure 11
Lowering the Mower

DECK MAINTENANCE POSITION

The FM72 Mower when mounted on the CM224 and CM274 has a deck maintenance position to facilitate certain repairs.

Place the CM unit and mower on a firm and level surface.

1. Disconnect the driveline from the PTO by pulling back on the coupler collar, unlocking it from the CM unit PTO shaft.

2. Slide the rear half of the driveline off of the front half, connected to the mower gearbox, and lay it aside. The front half of the driveline can remain in place on the mower.

3. Pull and unlock the latch pins from the lower loops on the rear lift rods. It is not necessary to remove the rear lift rods.

4. Unlock the "J" pin (2), Figure 4, and swing the latch bracket (3), up. Relock the "J" pin to hold the bracket in an upright position.

5. Start the engine and raise the mower to the full up position by moving the lift control lever rearward. Stop the engine and make sure the parking brake is still set, BEFORE dismounting.

6. Connect both service links to the pins on the lift arms. While pushing the mower deck forward with the foot, lower the mower by placing the lift control lever in the float position.

   The mower deck is now in the maintenance position.

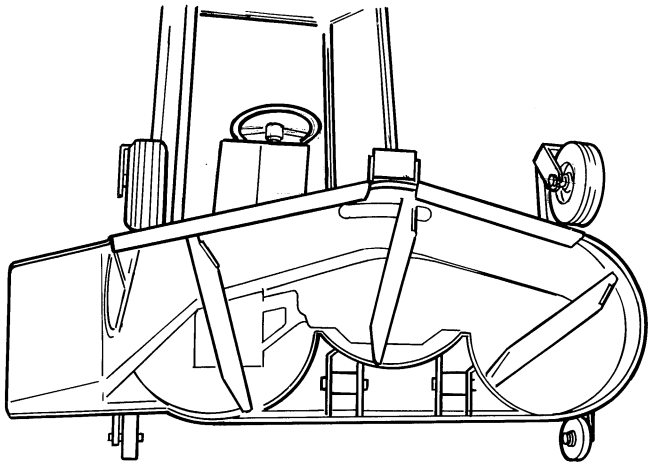


Figure 12
Deck Maintenance Position

RETURN TO OPERATING MODE
(From Maintenance Position)

1. Start the engine and raise the mower fully with the lift control lever. Stop the engine.

2. Disconnect the service links from the lift arms and swing them up against the step platform for storage.

3. Pull rearward on the lower part of the deck while SLOWLY lowering the mower. Release the mower, and STAND CLEAR as the mower passes over center. Place the lift control lever in the float position allowing the deck to return to the ground.

4. Reconnect the rear lift rods to the deck and release the latch pins. Make sure the lock pins are thru the loops on the rear lift rods.

5. Lower and fasten the latch brackets (3), Figure 4, to the front of the lift arms with the "J" pins (2).

   NOTE: *There is a blind spline between the rear and front half of the driveline. Align the blind spline (2), Figure 13, on the mower half with the arrow decal (1), on the CM unit half when putting the shafts together.*

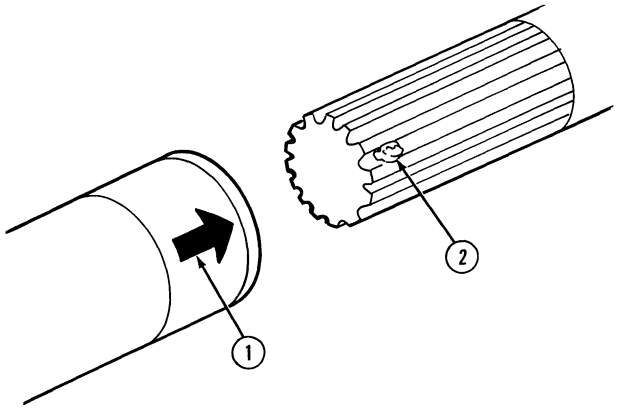


Figure 13
Blind Spline

1. Decal
2. Blind Spline

6. Install the driveline to the CM unit PTO shaft by pulling back on the lock collar as it is installed. Release the lock collar and pull on the shaft to make sure it is locked to the PTO shaft.

BLADE REMOVAL

1. Raise the mower deck into the maintenance position.

2. A blade "stop block" (2), Figure 14, should be used to prevent the blade (1), from turning during loosening or tightening. A tool (7), Figure 14, may be fabricated from 1/4" x 3/4" bar stock, to hold the pulley on the top of the spindle.

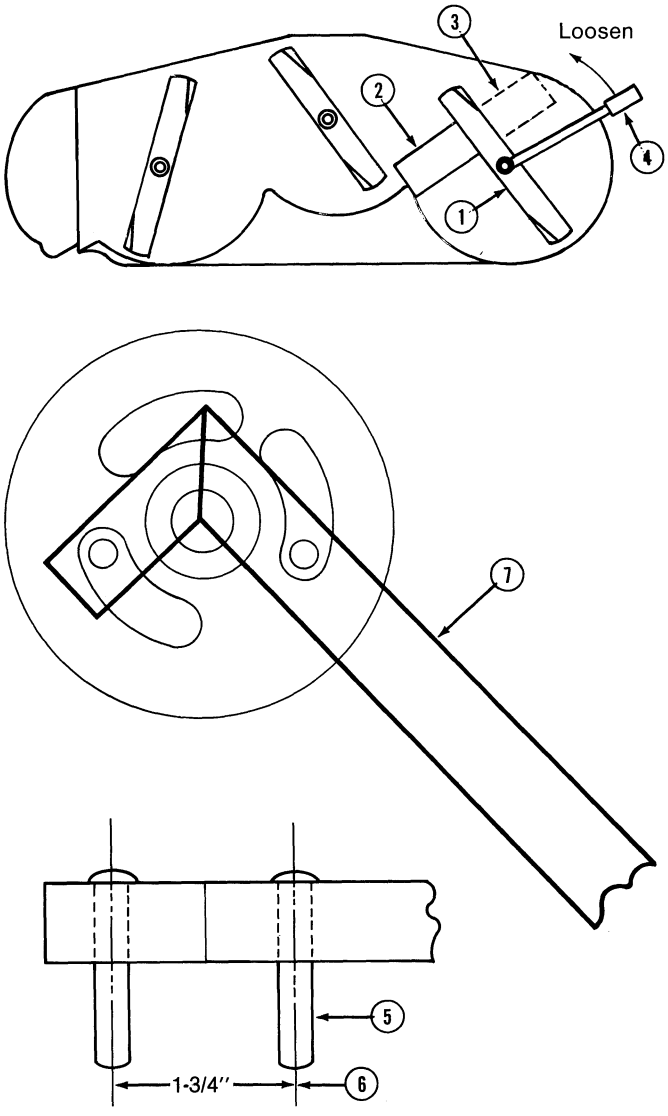


Figure 14
Stop Block and Locking Tool

1. Blade
2. Stop block - removal
3. Stop block - installation
4. Wrench
5. Clevis pins - 5/16" or 3/8"x2"
6. Dimension between pins - 1-3/4"
7. Locking tool

3. Remove the nut (4), Figure 15, securing the mower blade and remove the washer (3), blade (2), and fiber washer (1).

Blade Installation

1. Install the blade (1), Figure 15, flat washer (2), and nut (3), on the spindle (4).

2. Block the blade as shown in Figure 14.

3. Torque the nut securing the blade to 65-75 ft.-lbs.

   NOTE: *The curved edge of the blade goes toward the deck bottom.*

IMPORTANT: *Recheck and retorque the blade spindle bolts after the 1st hour of mower operation, and daily thereafter.*

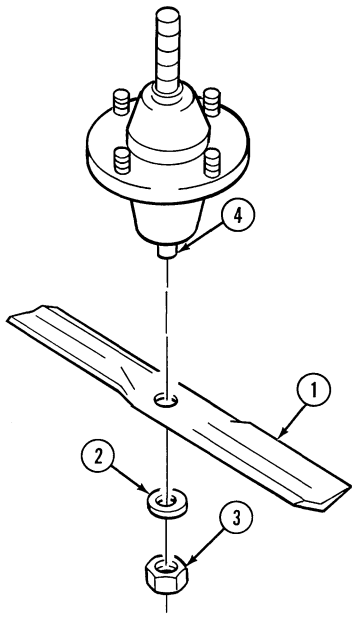


Figure 15
Blade Removal/Installation

1. Blade
2. Washer-7½8"
3. Nut-7/8" jam
4. Spindle

BLADE SHARPENING

Inspect the blades before each use to be sure they are properly installed and are in good condition. Replace any blade that is bent, excessively nicked or worn, or shows signs of other damage. Use only genuine FORD NEW HOLLAND blades on this mower. After market blades do not meet FNH quality specifications, and may be dangerous.

Remove the blades as described in "BLADE REMOVAL" this section.

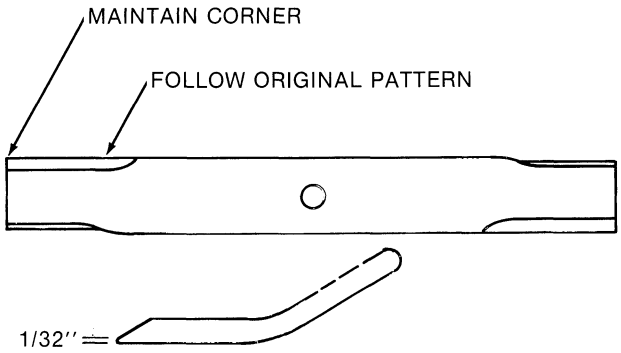


Figure 16
Blade Sharpening

Sharpen the blades following the original pattern illustrated above. If using a grinder or cutting disc, use care so the cutting edge does not get too hot from friction, causing it to lose its heat treat. Do not sharpen to a razor edge! Leave a 1/32 inch edge as shown.

IMPORTANT: *When sharpening blades, remove the same amount of material from each blade to maintain balance. Unbalanced blades will cause excessive vibration which could damage gearbox and mower components.*

Check the blade for balance by placing a horizontal rod through the blade center hole. The heavy side will drop down. Sharpen on the heavy side until the blade remains balanced on the rod.

Install the blades as described in "BLADE INSTALLATION" this section.

BELT ADJUSTMENT

The drive belt is located under two shields on the top of the mower deck. Check and adjust the belt tension after the first 8 hours of mower operation and weekly thereafter.

1. Make sure the CM unit is on a firm level surface, the engine is off, the parking brake is set, and the lift control lever is in the "float" position before proceeding.

   NOTE: *It is not necessary to completely remove the mower from the CM unit.*

2. Unlock the "J" pin (2), Figure 4, and swing the latch bracket (3), up and away from the front of each lift arm.

3. Pull the hairpin clips and remove both clevis pins (1), Figure 4, retaining the lift arms (4), to the front of the deck. Raise the lift arms from the mower deck.

4. Remove both deck shields and clean all debris off of the deck, away from the belt and gearbox. Make sure the idler arm and pulleys rotate freely.

5. Loosen the locknut (1), Figure 17, on the threaded spring adjustment rod (3), and adjust the spring to 5-9/16 inches (142 mm) overall length between the hook ends. Tighten the locknut.

6. Reinstall both deck shields and reinstall the lift arms by reversing steps 1 thru 3.

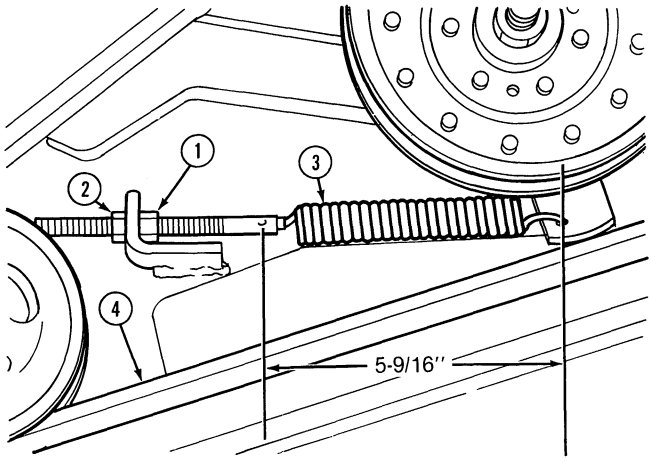


Figure 17
Drive Belt Adjustment

1. Locknut
2. Adjusting nut
3. Spring adjustment rod
4. Belt

BELT REPLACEMENT

The mower deck belt should routinely be replaced every 200 hours of mower operation or any time the belt shows evidence of extreme wear, cracking or other unusual damage.

Prepare the mower by following "BELT ADJUSTMENT" steps 1 thru 4 on page 10.1 -00.

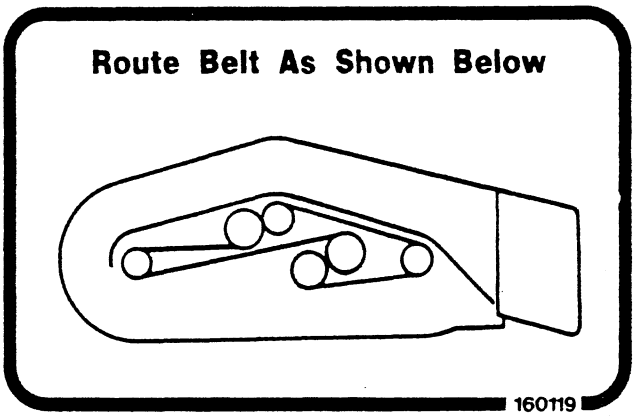
1. Loosen and release the belt spring tension rod (3), Figure 17.

2. Loosen both gearbox bracket mount bolts thru the rear (shaft end) of the bracket, and remove both bolts from the front of the bracket.

3. CAREFULLY roll the belt off of the idler pulley and disconnect the belt from all other pulleys.

4. Raise the front of the gearbox and bracket and pull the old belt thru the opening between the bracket and the deck top.

5. Install the new belt, reversing steps 1 thru 4, route the belt as illustrated below.



6. Adjust the belt. See "BELT ADJUSTMENT" this section.

SPINDLE REMOVAL

Reconditioning procedures for all three spindles are the same. Make sure the deck, especially the bottom around the spindle, is well cleaned of grass build-up before spindle removal.

1. Remove the belt. See "BELT REMOVAL" this section.

2. Remove the blade. See ''BLADE REMOVAL'' this section.

3. Remove the pulley nut and remove the pulley.

4. Remove all four 7/16''-20 nuts, from the spindle housing studs, on the top of the deck. Remove the spindle thru the bottom of the deck.

SPINDLE INSTALLATION

1. Install the spindle through the bottom of the deck and secure with the four 7/16'' nuts removed. Torque the nuts to 35-45 ft./lbs.

2. Install the pulley and secure with the nut removed. Torque the nut to 65-75 ft./lbs.

3. Install the blade. See ''BLADE INSTALLATION'' this section.

4. Install the belt. See ''BELT REPLACEMENT'' this section.

SPINDLE DISASSEMBLY
Refer to Figure 18

1. Remove key (2), and shaft (10). Remove seal (3), seal (9), and bearing cone (7).

2. Remove bearing cone (5), spacer (6), spacers (11) and (12).

3. If required remove bearing cups (4) and (8).

Clean all parts in a suitable solvent and air dry. Examine all parts for nicks and burrs. Rotate the bearings by hand. They should rotate freely and easily. Measure the center spacer (6). The spacer length must be 1.147 ±0.001 inches. If the spacer is not to this specification it must be replaced. The spacer (6), controls the spindle bearing preload.

SPINDLE ASSEMBLY
Refer to Figure 18

1. Install bearing cups, (4 and 8), if removed. Place bearing cone (7), in the housing.

   NOTE: *The lower seal (9), is different from the upper seal (3). It can be identified by the backup spring behind the seal lip. This seal cannot be used as an upper seal.*

2. Press the lower seal (9), into its bore, seal lip inward, until it bottoms in the housing. Install the seal spacer (12), into the seal. Insert the spindle shaft (10), thru the lower seal and spacer until it is fully in place.

3. Turn this assembly right side up, holding the shaft so it does not fall out. Slide the bearing spacer (6), over the shaft, into the housing cavity. Install the upper roller bearing cone (5), and the seal spacer (11), on the shaft against the bearing.

4. Install the upper seal (3), (no seal lip back-up spring) over the shaft and press into place, flush with the housing top. The upper seal lip points up (away from the bearing).

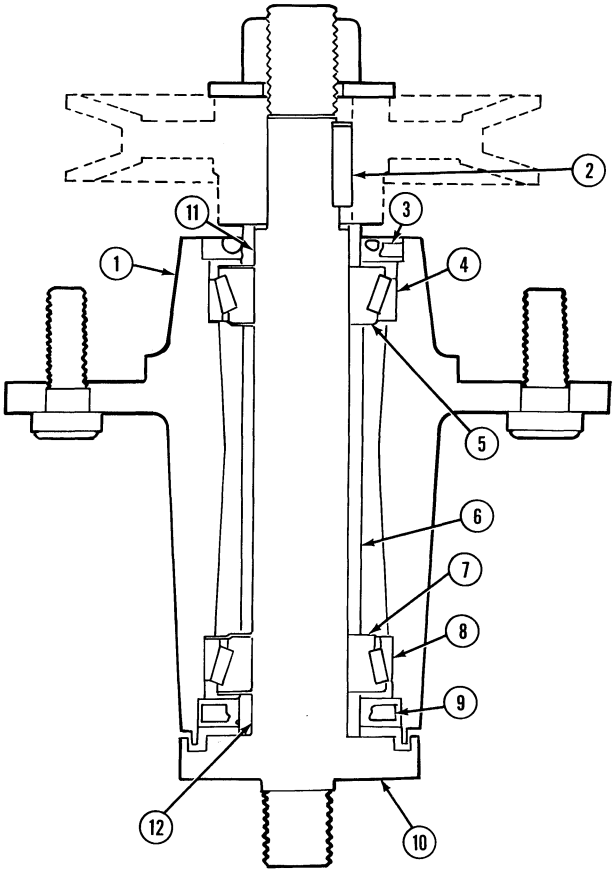


Figure 18
Mower Spindle

1. Housing
2. Key
3. Upper seal
4. Bearing cup
5. Bearing cone
6. Spacer
7. Bearing cone - L44643
8. Bearing cup
9. Lower seal
10. Shaft
11. Spacer
12. Spacer