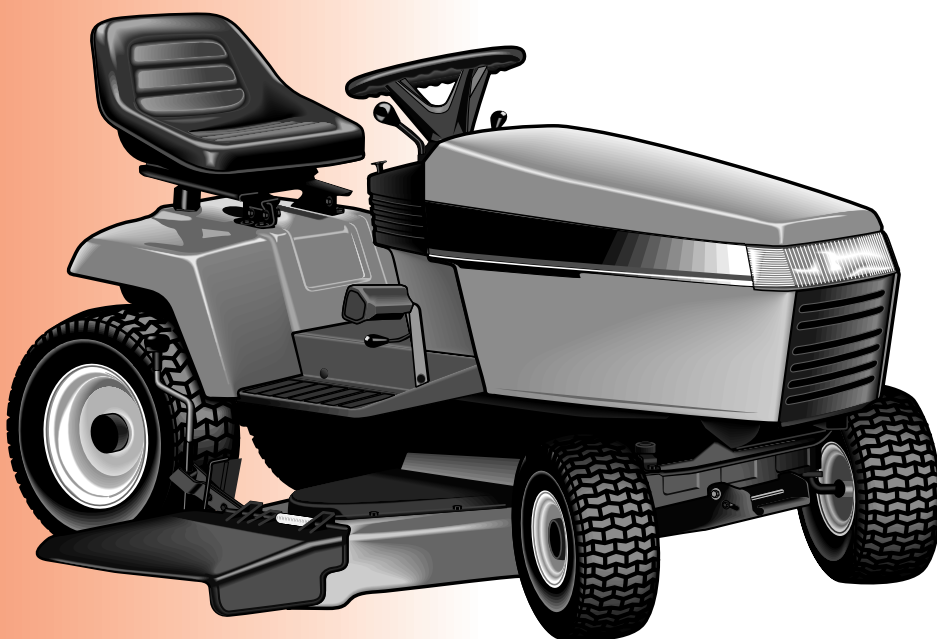


# BROADMOOR SERIES

Also covers Simplicity LTG & LTH Series, AGCO Allis 1600 Series & Massey Ferguson 2600 Series



## Service & Repair Manual



***Simplicity***

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MANUFACTURING, INC.

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# 1 General Information

Models Covered In This Manual \_\_\_\_\_

## MODELS COVERED & IDENTIFICATION NUMBERS

This manual contains service information for the models listed below. Consult the Identification Tag located on the tractor frame for the manufacturer's identification number and serial number.

Always use the manufacturer's identification number and serial number when ordering parts or documentation. Attachments are not covered in this manual. Refer to the attachment operator's manual or authorized dealer for service information.

Transmissions are identified by identification number tags located on the transmission casing.

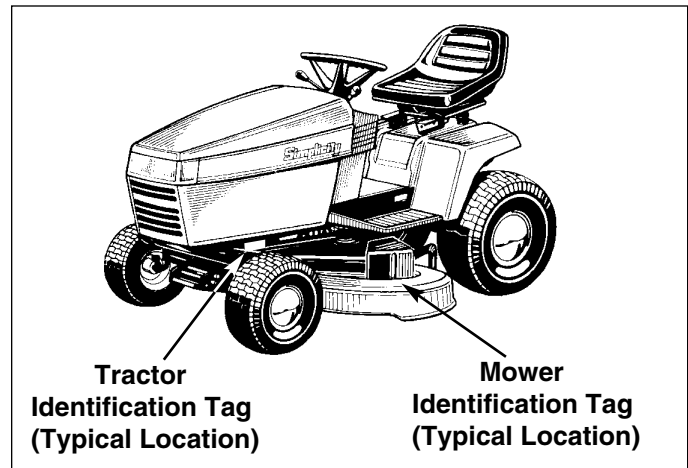


Figure 1. Tractor & Mower Identification Tags

### Tractors

Mfg. No.	Description	Mfg. No.	Description
1691795	12.5LTH	1692285	1616H
1691807	16LTH	1692287	Broadmoor
1691817	1613H	1692289	1615G
1691819	1616H	1692414	Broadmoor
1691886	12.5LTH	1692416	Broadmoor
1691888	1613H	1692416	Broadmoor
1691891	12.5LTG	1692418	Broadmoor
1691893	1613G	1692420	Broadmoor
1692071	16LTH	1692430	1614VH
1692073	12.5LTH	1692432	1614H
1692075	1616H	1692434	1615G
1692076	1613H	1692436	1616H
1692182	Broadmoor	1692497	2614H
1692184	1614H	1692499	2616H
1692261	Broadmoor	1692528	Broadmoor
1692265	1613H	1692530	1615H
1692279	Broadmoor	1692609	Broadmoor
1692281	1614H	1692613	1615H
1692283	Broadmoor		

### Mower Decks

Mfg. No.	Description
1691704	38" Mower Deck
1691705	44" Mower Deck
1691815	38" Mower Deck
1691816	44" Mower Deck

## INTRODUCTION

This manual is divided into eight major sections of service information required for the models specified.

These sections are:

Section	Title
1.	General Information
2.	Troubleshooting
3.	Maintenance
4.	Adjustments
5.	Electrical
6.	General Repair
7.	Transmission Removal & Repair
8.	Mower Deck repair

### 1. General Information

Contains general information such as models and manufacturing numbers, general repair instructions for components, and important safety instructions for operating and servicing the units.

### 2. Troubleshooting

Provides troubleshooting information pertaining to unit operation.

### 3. Maintenance

Contains basic service information for normal maintenance and off-season storage.

### 4. Adjustments

Contains basic service information and procedures for adjustments.

### 5. Electrical

Contains information and service procedures for troubleshooting and repairs of electrical systems.

### 6. General Repair

Covers disassembly, inspection, and repair of all major assembly groups except transmissions.

### 7. Transmission Removal & Repair

Covers removal, disassembly, inspection, and repair of Simplicity serviceable transmissions.

### 8. Deck Repair

Covers common mower deck service procedures.

Since part numbers are subject to change and may vary by model year and manufacturing number, all parts in this manual are referred to by general description.

Specific part number information may be found in the respective Parts Manual for the unit being serviced.

Always use the manufacturing number that appears on the Identification Tag of the unit you are servicing to identify component part numbers.

## MANUAL CONTENT

This manual is intended primarily for use by dealer service personnel as a technical reference manual or as a compliment to normal service training.

While the information in this manual has been developed to permit mechanics and service technicians to perform most service procedures quickly and effectively, it is assumed that those using this manual will have some outdoor power equipment service experience or other basic power equipment service training with similar types of products.

In addition, it is assumed that all those performing service on these units are familiar with the general principles of operation of these units, and understand all operating controls, safety instructions, and normal handling precautions for servicing large, high horsepower riding tractors and mowers.

Engine information is available from the appropriate engine manufacturer in a separate service manual.

General engine information and basic engine troubleshooting information is provided, but is intended for general guidance only. The engine manufacturer's manual should be always be consulted first before making any major adjustments, part changes, or other major repairs.


This manual includes all relevant service information for model years 1990 through 1995, and whenever necessary, includes inset illustrations or other references to help identify previous part designs and alternative service procedures.

The service techniques in this manual also assume that the person providing service has access to a standard assortment of mechanic's hand tools, and approaches most disassembly and repair procedures with availability of these basic tools in mind. Whenever specialized or custom tools are available to save time, reduce effort, or improve overall service efficiency, the most effective safe repair method available should be utilized.

# 1 General Information

## Safety Rules



Read these safety rules and follow them closely. Failure to obey these rules could result in loss of control of rider, severe personal injury or death to you, or bystanders, or damage to property or equipment. **This mowing deck is capable of amputating hands and feet and throwing objects.** The triangle  in text signifies important cautions or warnings which must be followed.

## GENERAL OPERATION

- Read, understand, and follow all instructions in the manual and on the unit before starting.
- Only allow responsible adults, who are familiar with the instructions, to operate the unit.
- Clear the area of objects such as rocks, toys, wire, etc., which could be picked up and thrown by the blade(s).
- Be sure the area is clear of other people before mowing. Stop unit if anyone enters the area.
- Never carry passengers.
- Do not mow in reverse unless absolutely necessary. Always look down and behind before and while travelling in reverse.
- Be aware of the mower discharge direction and do not point it at anyone. Do not operate the mower without either the entire grass catcher or the deflector in place.
- Slow down before turning.
- Never leave a running unit unattended. Always disengage the PTO, set parking brake, stop engine, and remove keys before dismounting.
- Turn off the PTO switch to disengage the blades when not mowing.
- Stop engine before removing grass catcher or unclogging chute.
- Mow only in daylight or good artificial light.
- Do not operate the unit while under the influence of alcohol or drugs.
- Watch for traffic when operating near or crossing roadways.
- Use extra care when loading or unloading the unit into a trailer or truck.

## SLOPE OPERATION

Slopes are a major factor related to loss-of-control and tip-over accidents, which can result in severe injury or death. All slopes require extra caution. If you cannot back up the slope or if you feel uneasy on it, do not mow it.



### WARNING - SLOPE OPERATION

Never operate on slopes greater than 30 percent (16.7°) which is a rise of three feet vertically in 10 feet horizontally. When operating on slopes that are greater than 15 percent (8.5°) but less than 30 percent use front counterweights and rear wheel weights (see your dealer). Select slow ground speed before driving onto slope. In addition to front and rear weights, use extra caution when operating on slopes with rear-mounted grass catcher. Mow UP and DOWN the slope, never across the face, use caution when changing directions and **DO NOT START OR STOP ON SLOPE.**

### Do

- Follow manufacturer's recommendations of wheel weights or counterweights to improve stability.
- Mow up and down slopes, not across.
- Remove obstacles such as rocks, tree limbs, etc.
- Watch for holes, ruts, or bumps. Uneven terrain could overturn the unit. Tall grass can hide obstacles.
- Use slow speed. Choose a low gear so that you will not have to stop or shift while on the slope.
- Use extra care with grass catchers or other attachments. These can change the stability of the unit.
- Keep all movement on the slopes slow and gradual. Do not make sudden changes in speed or direction.

### Do Not

- *Do not* start or stop on a slope. If tires lose traction, disengage the blade(s) and proceed slowly straight down the slope.
- *Do not* turn on slopes unless necessary, and then, turn slowly and gradually downhill, if possible.
- *Do not* mow near drop-offs, ditches, or embankments. The mower could suddenly turn over if a wheel is over the edge of a cliff or ditch, or if an edge caves in.
- *Do not* mow on wet grass. Reduced traction could cause sliding.
- *Do not* try to stabilize the unit by putting your foot on the ground.
- *Do not* use grass catcher on steep slopes.

### CHILDREN

Tragic accidents can occur if the operator is not alert to the presence of children. Children are often attracted to the unit and the mowing activity. Never assume that children will remain where you last saw them.

- Keep children out of the mowing area and under the watchful care of another responsible adult.
- Be alert and turn unit off if children enter the area.
- Before and when backing, look behind and down for small children.
- Never carry children. They may fall off and be seriously injured or interfere with safe unit operation.
- Never allow children to operate the unit.
- Use extra care when approaching blind corners, shrubs, trees, or other objects that may obscure vision.

### TRANSPORTING AND STORAGE

- Always observe safe refueling and fuel handling practices when refueling the tractor after transportation, service, or storage.
- Always follow the engine manual instructions for storage preparations when preparing the tractor for both short and long term periods.

- Always follow the engine manual instructions for proper start-up procedures when returning the unit to service.
- Never store the unit or fuel container inside where there is an open flame or pilot light, such as in a water heater, gas furnace, or stove. Allow unit to cool before storing.

### GENERAL SAFETY

All WARNING, CAUTION, and instructional messages appearing in decals on the tractor and mower being serviced must be carefully read and obeyed. Severe personal injury can result when these instructions are not followed. The information is for your safety, as well as those who operate the equipment, and it is important!

If any of these decals are lost or damaged, replace them at once. See your Parts Manual for replacement information.

These labels are easily applied and will act as a constant visual reminder to you, the operator, and others who may use the equipment, to follow the safety instructions necessary for safe, effective operation.

# 1 General Information

## Safety Rules

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### SERVICE AND MAINTENANCE

The service information provided in this manual is intended to provide you with the knowledge required to perform a wide range of service procedures on the listed equipment.

While appropriate safety reminders and safety warnings have been included here and elsewhere in this manual to help promote the use of safe service techniques, you must also observe all appropriate shop safety rules whenever performing these procedures.

No single manual, including this one, can include every possible warning or safety instruction necessary to guarantee complete safety - you must apply your common sense and knowledge of shop and power equipment safety whenever performing service, whenever working around others who are operating, servicing, or handling equipment, and whenever you are present in a work environment where hand or power tools, shop equipment, or outdoor power equipment may be present.

This includes taking the necessary safety precautions to help ensure a safe workplace, exercising reasonable care to avoid unsafe acts, and being alert for potential hazards as you move about the workplace or engage in various service activities.

If you encounter a service situation involving the use of an unfamiliar tool, procedure, or part, and rereading the appropriate section of this manual does not provide the information you want, contact your Simplicity dealer before proceeding. Never attempt a repair that you're not sure about, since help is usually never more than just a phone call away.

Practicing safe service procedures not only helps protect you and those you work around, it also contributes to providing safe, reliable equipment.

### Personal Protective Equipment

- Wear protective safety glasses whenever using hand or power tools, shop equipment, and whenever working under power equipment to protect your eyes from falling debris and small parts.
- Wear safety goggles or full face protection when handling battery electrolyte fluid, or when performing grinding or sharpening operations that produce sparks or flying debris. Extensive grinding may require the use of protective sleeves and an apron.
- Wear work gloves when handling sharp surfaces such as mower blades, or when working around sharp edges. Never wear gloves that are loose fitting or that have tie straps, as these could cause your hands to get caught by rotating parts, resulting in serious injury. Chemical-resistant Rubber gloves are recommended when handling or pouring battery electrolyte.
- Steel-toe safety shoes are highly recommended to protect feet from falling tools, heavy parts, and other shop equipment.

### Fuel Handling Safety

- Always use extra care when handling gasoline - gasoline is highly flammable, and gasoline vapors are explosive as well as toxic if inhaled.
- Never store fuel indoors, or refuel a unit indoors. Gasoline vapors can easily travel unseen to distant sources of ignition such as pilot lights or open flames on water heaters, furnaces, stoves, or other gas operated appliances, sparks from electric motors or other electrically-operated tools and equipment, welding equipment, grinders, or burning smoking materials. Contact with these or any other sources of ignition will cause an explosion and/or fire, serious personal injury, and damage to property and equipment.
- Never transfer gasoline from one container to another unless the containers are connected by an approved grounding strap. Hand or power operated transfer pumps can generate a static charge of electricity, causing dangerous sparking and ignition of fuel or fuel vapors. Always follow the pump manufacturer's safety and operating instructions.
- Use only approved containers for fuel, and always handle the container with extreme care to avoid spillage or leaking of explosive vapors.
- Never smoke or allow others in the area to smoke while refilling the fuel tank, or when handling gasoline cans. Make sure any smoking materials that had been in use in the area are fully extinguished before opening a fuel can or starting refueling.



### Exhaust Gas Safety

- Internal combustion engines produce and exhaust Carbon Monoxide (CO), an odorless, colorless, gas that causes dizziness, nausea, flu-like symptoms, unconsciousness, or even brain damage or death, if breathed for prolonged periods.
- If exposed to Carbon Monoxide gas, get to a fresh air source immediately and seek medical attention. CO can build up in your blood, and can cause lingering symptoms or permanent damage if left untreated.
- Operate the unit outdoors or in a well ventilated area, or pipe exhaust gases out of the work area to an outside location where the exhaust can be dissipated safely away from doors, windows, air conditioners, or other potential sources of outside-air intake that could permit reentry of hazardous fumes.
- Never enter an enclosed area where an engine has been running and exhaust gases have been allowed to collect. Open adjacent windows or doors first to permit outside air to ventilate the area, and allow sufficient time for a complete air exchange to occur.

### Battery/Electrolyte Safety

- Lead-Acid batteries use an electrolyte containing sulphuric acid, a highly corrosive liquid that can cause severe chemical burns if allowed to come into contact with skin, or blindness if allowed to contact your eyes. Always wear approved eye goggles or a full face shield and protective gloves when handling electrolyte or filling the battery.
- Lead-acid batteries also produce hydrogen, a colorless, highly explosive gas that can be easily ignited by a single spark. Charging the battery incorrectly or hooking up jumper cables improperly can cause sparking, and must be avoided. Always follow recommended battery charging and jumper cable procedures.
- When removing or installing battery cables, disconnect the negative cable FIRST, and reconnect it LAST. If not done in this order, the positive terminal could be accidentally shorted to the frame by a tool, creating a dangerous spark that can ignite nearby fuel vapors or escaping hydrogen gas from the battery.
- Keep battery securely fastened in position with vent tube directed down and out of battery compartment. Replace battery if electrolyte leakage occurs. Make sure the battery vent tube is properly installed, and is not plugged with clippings or other debris. Replace the vent tube if cracked, damaged, or missing from unit.
- Old batteries should be disposed of by recycling.

### Electrical System Safety

- Loose connectors, worn wires, damaged wire insulation, and loose termination hardware can cause sparks, short-circuits, and erratic equipment operation. Always check wiring for damage, and make appropriate repairs before placing unit back into operation.
- Use care when working around exposed terminals to prevent short-circuiting the electrical system. Sparking, electric shocks, and damage to the system may result from accidental contact between terminals and metal hand tools.

### Elevation Of Unit Safety

- Always support unit on approved jack stands when working on an elevated unit, and keep unit from rolling by engaging parking brake and placing wheel chocks behind wheels still on floor or work table.
- Secure unit to work-surface of scissor-lift worktables or other powered lift tables in accordance with the manufacturer's instructions. Unsecured units may roll unexpectedly while work is being done, causing injuries.
- Never work under an elevated unit unless it is properly supported by jack stands, locked from rolling with wheel chocks or equivalent, and you can quickly escape from under the unit in an emergency using a rolling device such as a mechanic's creeper.
- Always protect your eyes from falling debris or small parts by wearing approved safety glasses or goggles.
- Remove the ignition key and disconnect the spark plug wires before working under a unit. Accidental or inadvertent starting could result in serious injuries.

### Proper Tool Use

- Use power and hand tools only for the use that they were designed. Never alter or modify tools, or improvise using tools that are not suitable for the job at hand.
- Keep all hand and power tools in good repair, and put them away when done to avoid cluttering the work area. Use extra care when using corded tools around moving or rotating parts such as belts and pulleys, since the cord could get caught and suddenly pull the tool, or you, into the area of moving parts.
- Always check the unit to ensure that all hand and power tools and tool attachments have been removed from the unit after use. Small tools and tool attachments left on the equipment can fall into the cutting path when the unit is placed into service, and become a hazard to bystanders if struck by mower blades.

# 1 General Information

## Safety Rules

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### Work Area Safety

- Always keep the work area clear of clutter from discarded parts, and debris from parts boxes or packaging materials. Small parts, hardware items, and other debris or refuse left lying around can become slip, trip, and fall hazards if not removed and discarded properly.
- Always observe general shop safety rules for house-keeping, and tend to oil spills and other spilled fluids promptly to prevent slip and fall injuries.
- Allow sufficient work area around the equipment you are working on to permit comfortable working positions. Never put yourself in a position that would prevent you from escaping quickly in the event of emergencies such as sudden shifts in equipment position, fire, or other situations requiring an immediate reaction on your part.

### Compressed Air Safety

- Always use care when using compressed air to blow dirt and debris off equipment - always direct the air blast away from yourself and others in the area, and protect your eyes with safety glasses to prevent injury from particles that may blow back toward your face.
- Never use high pressure air directly against your skin to clean dirt and debris - the air pressure could actually force foreign material or fluids into your skin, causing serious injuries.
- Use care when filling tires - lawn and garden tractors utilize low pressure tires, and over-pressurization is hazardous to you and anyone who operates the equipment with improper tire pressures. Always consult the air pressure recommendations for the unit involved before adding additional air to the tires.

### Grease & Lubricant Safety

- Normal service and maintenance involves the use of oils and greases that could present a fire hazard if not handled properly. Always dispose of oily rags properly to prevent fires caused by spontaneous combustion.
- Spilled lubricants pose dangerous slip hazards and must be taken care of immediately. Wipe up spills carefully, or use absorbent materials to soak up spilled fluids. Always dispose of rags, paper towels, and other saturated absorbents properly.
- Store oils and greases away from flame or other ignition sources. Petroleum-based fluids can be ignited by smoking materials and sparks - always treat oils and greases as potentially flammable materials. Always cap oil and grease containers when done using, and store or dispose of properly.

### General Servicing Safety

- Always check safety devices and switches for proper operation - never alter these devices or make temporary or makeshift repairs. Use only factory-authorized parts and procedures, and check newly-installed parts for proper operation.
- Make sure all hardware items are properly tightened, especially blade attachment bolts. Replace any hardware that appears damaged.
- Check brake operation, and adjust or repair as required. Always comply with factory specifications on settings and adjustments.
- Check grass catcher components for wear, damage, or deterioration, and replace with factory authorized parts if necessary.
- Always make repairs using factory authorized replacement parts only. Using parts that don't meet factory specifications can result in sudden or premature failures, poor or erratic equipment performance, and potential safety hazards to operators and bystanders.
- Always comply with factory specifications on settings and adjustments when installing new parts, making repairs, or performing routine service procedures.
- Always test repairs before releasing units to customers, paying special attention to any items that are safety-related. Correct any problems noted, and re-check to ensure that the problems have been fully remedied.
- Make sure all safety and operating instruction decals are legible, properly located, and securely attached. Replace any decals that can't be read or are in danger of falling off.
- Always advise equipment owners of any potential operating or safety problems that may be arising due to anticipated wear, and request that the owner address the problem before a hazard develops.
- Never allow a unit to be placed back into service if a serious safety or operating problem is evident. Advise the owner of the problem and the possible hazards associated with the problem, and request permission to correct the deficiencies.
- Use extreme care when working on older models that do not have all of the latest safety devices and switches. Disengage the PTO and transmission before starting the unit, or commencing repairs.
- Always use care when removing or installing parts to prevent damage from dropping or rough handling. Support heavy parts properly to prevent damage or personal injury to yourself and others.

### GENERAL REPAIR INFORMATION

In addition to providing specific repair procedures for the equipment listed at the beginning of this section, this manual provides the following additional general instructions for dealing with repairs to various types of components.

This information is designed to help you deal more effectively with these components by providing basic service knowledge and other useful tips.

#### Bearings & Bushings

Roller bearings, ball bearings, and bushings are used to provide support to rotating shafts and other parts such as gears, pulleys, and sprockets that are used to transmit rotary motion. Over time, bearings and bushings may require additional lubrication to transmit this rotary motion with minimal friction, or may need replacement due to normal operation and wear. Normal service for bearings and bushings includes removal, cleaning, inspection, lubrication, and replacement.

#### REMOVAL

Most bearings and bushings used on the listed equipment can be easily removed by following the appropriate detailed procedures found throughout this manual. Care should always be exercised to avoid scratching or damaging the bearing or bushing, the mounting shaft, and surrounding components. Bearing or bushing removal is usually necessary when excessive play or wobble is noticed on the part it supports, when unusual noise or vibration is apparent, or when a burning smell is present at the bearing location.

#### CLEANING

Sealed bearings and bushings can be cleaned by careful wiping with a cloth. Bearings with one-sided or removable shields and plain bushings can be cleaned by immersion in safety solvent, and brushing with a part cleaning brush. Oil-impregnated bushings, and bushings made of nylon or other synthetic materials, can be cleaned with safety solvents, or wiped clean, but should not be immersed in solvent for periods longer than that necessary to remove heavy or caked-on build-ups of grease. All petroleum-based solvents are flammable, so appropriate precautions regarding flames, sparks, and other ignition sources should always be observed. Gasoline should never be used because of its volatility and its highly toxic nature.

#### INSPECTION

Once cleaned, bearings can be properly inspected for wear, scratches, visible damage such as corrosion, cracked seals or scorching, and rough, or noisy, operation. Bushings can be visually checked for scratches, uneven wear, or other visual damage.

#### LUBRICATION

After passing inspection, bearings and bushings should be lubricated in accordance with factory specifications, and reinstalled according to the appropriate installation instructions. New bearings and bushings must also be properly lubricated before use. For optimal performance, and as a practical preventive maintenance measure, bearings and bushings used in pairs or multiple sets should all be replaced at the same time.

#### Belts & Pulleys

Belts and pulleys transmit rotary motion from power sources to work components, providing the force needed to drive transmissions, operate mower decks, and power various attachments. This continual use eventually causes belts to wear out, and over time may also require the replacement of pulleys and pulley bearings.

Belt wear and various types of damage are easily checked by visual examination, which is covered in greater detail elsewhere in this manual. Pulleys may also be checked visually for wear or apparent damage, but pulley bearings usually require removal, cleaning, and inspection to determine if replacement is required.

Belt and pulley life can be optimized by making sure that proper belt tension and alignment are observed when belts are installed. Proper belt tension and alignment should also be maintained by performing periodic checks and adjustments. In addition, only factory authorized replacement belts will minimize problems caused by size, thermal instability, and variations in quality.

#### Electrical Parts

The electrical parts used on these units has been specifically engineered for outdoor power equipment, and is designed to provide years of reliable operation. As with all electrical components and systems, electrical contacts must be kept clean and dry, and all terminations must be securely fastened or connected. Also, all electrical components, wiring, and connectors should be periodically inspected for corrosion, signs of excessive heat build-up, or other damage that signals that it is time to repair or replace the item.

Specific procedures for electrical troubleshooting and most common repairs is covered in separate sections of this manual.

# 1 General Information

## Repair Information

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### Fasteners & Hardware

All hardware and fasteners used in this equipment must meet factory specifications for SAE grade, size, and torque, and must be kept securely tightened. Locking hardware that degrades with use should be replaced when service is performed in affected areas. Always observe factory specifications for torque, or consult the torque chart for torque information.

### Genuine Replacement Parts

Only factory authorized replacement parts should be used when making repairs or performing routine maintenance. The use of parts that do not meet stringent factory specifications can cause poor performance, premature failures, and lead to potential safety hazards. In addition, the use of non-factory authorized replacement parts will void your warranty.

### Hydraulic Parts

Hydraulic parts are adversely affected by dirt and contamination, and care must be exercised when performing service on these parts to prevent foreign material from entering. Specific service information appears elsewhere in this manual, and all precautions and procedures must be followed when repairing or servicing these parts.

### Paint

The paint on outdoor power equipment provides for an attractive appearance, as well as a barrier to corrosion caused by exposure to moisture in the environment.

Scratches, abrasions, and other damage to painted surfaces should be repaired promptly to prevent the formation of rust and premature part failure. Factory supplied paints are available that provide both an accurate color match and superior corrosion resistance.

### Required Tools & Equipment

All repairs in this manual can be accomplished with standard mechanic's hand tools. The use of appropriate power tools such as impact wrenches and power drivers may aid in part removal and replacement, but care must be exercised to avoid causing damage to components from excessive tightening. Transmission service, steering service, tire and wheel service, and service to components located under the frame also requires the use of a jack with suitable capacity, and jack stands to support the unit being worked on.

### Systems Checks

In addition to performing individual component service, components affected by related parts changes should also receive attention at the time service is performed. Examples of this include part replacements that are part of a safety device, electrical components, transmission components, and pulleys that are part of the same power delivery system. Giving attention to related parts will help ensure that the parts most likely to be affected by the wear of similar or nearby parts, or parts subjected to the same amount of stress or wear, are given appropriate attention before a failure can occur.

### Specifications

#### ENGINE

##### 14 & 16 HP Briggs & Stratton

<b>Make</b>	Briggs & Stratton
<b>Model</b>	Vanguard V-Twin
<b>Horsepower</b>	14 & 16 HP @ 3600 rpm
<b>Cylinders</b>	2
<b>Bore</b>	2.68 In. (68 mm)
<b>Stroke</b>	2.60 In. (66 mm)
<b>Displacement</b>	29.3 Cu. In. (480 cc)
<b>Construction</b>	Overhead Valve, Cast Iron Sleeves, Aluminum Crankcase
<b>Electrical System</b>	12 Volt, 16 Amp Alternator Regulated Battery: 340 Cold Cranking Amps, 41 min. Reserve Capacity, Industrial Rated Starter Motor
<b>Ignition</b>	Magnetron Electronic Ignition
<b>Air Cleaner</b>	Ducted Paper Cartridge and Foam Precleaner large 325 sq. in. Air Filtering System
<b>Lubrication</b>	Full Pressure Lube w/Oil Filter
<b>Oil Capacity</b>	3.5 Pints w/Filter (1.6 L)
<b>Fuel Tank</b>	Material: Non-Corrosive Polyethylene Fuel Tank Gauge Built Into Filler Cap Capacity: 4 Gallons (15.1 L)
<b>Muffler</b>	Quiet Compact, Low Back Pressure

##### 14 HP Kohler

<b>Make</b>	Kohler
<b>Model</b>	Command™
<b>Horsepower</b>	14 HP @ 3600 rpm
<b>Cylinders</b>	1
<b>Bore</b>	3.43 In. (87 mm)
<b>Stroke</b>	2.64 In. (67 mm)
<b>Displacement</b>	24.3 Cu. In. (398 cc)
<b>Construction</b>	Overhead Valve, Cast Iron Sleeves, Aluminum Crankcase
<b>Electrical System</b>	12 Volt, 15 Amp Alternator Regulated Battery: 340 Cold Cranking Amps, 41 min. Reserve Capacity
<b>Ignition</b>	High Energy Electronic Ignition
<b>Air Cleaner</b>	Ducted Paper Cartridge and Foam Precleaner
<b>Lubrication</b>	Full Pressure Lube w/Oil Filter
<b>Oil Capacity</b>	4.0 Pints w/Filter (1.9 L)
<b>Fuel Tank</b>	Material: Non-Corrosive Polyethylene Fuel Tank Gauge Built Into Filler Cap

<b>Muffler</b>	Capacity: 4 Gallons (15.1 L) Quiet Compact, Low Back Pressure
<b>15 HP Briggs &amp; Stratton</b>	
<b>Make</b>	Briggs & Stratton
<b>Model</b>	Vanguard
<b>Horsepower</b>	15 HP @ 3600 rpm
<b>Cylinders</b>	1
<b>Bore</b>	3.44 In. (87.3 mm)
<b>Stroke</b>	3.06 In. (77.7 mm)
<b>Displacement</b>	29.3 Cu. In. (480 cc)
<b>Construction</b>	Overhead Valve, Cast Iron Sleeves, Aluminum Crankcase
<b>Electrical System</b>	12 Volt, 9 Amp Alternator Regulated Battery: 340 Cold Cranking Amps, 41 min. Reserve Capacity, Industrial Rated Starter Motor
<b>Ignition</b>	Magnetron Electronic Ignition
<b>Air Cleaner</b>	Ducted Paper Cartridge and Foam Precleaner large 325 sq. in. Air Filtering System
<b>Lubrication</b>	Splash Lube with Circulating Pump & Filter
<b>Oil Capacity</b>	3.5 Pints w/Filter (1.6 L)
<b>Fuel Tank</b>	Material: Non-Corrosive Polyethylene Fuel Tank Gauge Built Into Filler Cap Capacity: 4 Gallons (15.1 L)
<b>Muffler</b>	Quiet Compact, Low Back Pressure

#### TRANSMISSION

##### Gear Models

<b>Type</b>	Spur Gear
<b>Material</b>	Gear: Heat Treated Shaft: Hardened and Ground Bearings: Needle Roller, Sealed Ball and Bushings
<b>Lubrication</b>	Bentonite Grease
<b>Speeds</b>	Five Forward, One Reverse
<b>@ 3400 rpm</b>	<b>1st:</b> 1.1 MPH (1.8 km/h) <b>2nd:</b> 2.2 MPH (3.5 km/h) <b>3rd:</b> 3.4 MPH (5.5 km/h) <b>4th:</b> 4.2 MPH (6.8 km/h) <b>5th:</b> 5.1 MPH (8.2 km/h) <b>Reverse:</b> 2.4 MPH (3.9 km/h)
<b>Differential</b>	Spur Gear Type

##### Hydro Models

<b>Type</b>	Hydrostatic
<b>Pump</b>	Variable Displacement Piston



# 1 General Information

## Specifications

<b>Motor</b>	Fixed Displacement Piston
<b>Hydraulic Fluid</b>	3.5 Quarts (3.3 L) SAE 20W-50 Premium
<b>Control</b>	Single Lever Release Lever for Manual Tractor Movement, Continuously Variable, Forward & Reverse, without Braking
<b>Speeds</b>	Forward: 0-5.5 MPH (0-8 km/h)
<b>@ 3400 RPM</b>	Reverse: 0-1.7 MPH (0-2.7 km/h)
<b>Differential</b>	Automotive Type

### CONTROLS

<b>Steering</b>	Full Circle Steering Wheel System Gear and Sector
<b>Clutch/Brake Pedal</b>	Location Right Front Combination Clutch/Brake/Parking Brake Pedal Standard Equipment
<b>Location</b>	-Mower Lift Lever Right Side, Lower Dash Tower -PTO Clutch Electric, Dash Mounted -Ground Speed Lever Dash Mounted -Ignition Key Switch on dash panel -Throttle Lever and Choke Lever on dash panel -Light Switch on dash panel -Separate Indicator Lights for Safety -Interlock Switch Operator Present -Transmission Neutral, PTO Disengaged -Clutch/Brake Pedal Depressed -Low Oil Pressure Warning Light

### CHASSIS

<b>Frame</b>	Heavy Gauge Steel Channel Power Take-Off Point Front Engine Mounting Above Front Axle Pivot Point Location Front Axle
<b>Rear Wheels</b>	Tire Size 20 x 8.00-10 Turf Type Pneumatic Inflation Pressure 6-8 psi (41-55 kPa)
<b>Front Wheels</b>	Tire Size 15 x 6.00-6 Pneumatic Inflation Pressure 12-15 psi (82-103 kPa)
<b>Front Axle</b>	1-3/4" x 3" 12 Ga. Fabricated Rectangular Tube
<b>Accessibility Seat</b>	Hood Tips Forward Type Bucket, High Back, Adjustable w/ Spring Suspension; Adjustable to Suit Different Size Operators

**Turning Radius** Inside Rear Tire 16 In. (40.6 cm)

### DIMENSIONS

#### Tractor

<b>Overall Length</b>	67 In. (170.2 cm)
<b>Overall Width</b>	35 In. (88.9 cm)
<b>Height</b>	To Top of Steering Wheel 40 In. (101.6 cm) To Top of Engine Cover 34 In. (86.7 cm)
<b>Wheel Base</b>	48 In. (121.9 cm)
<b>Weight</b>	Net: 455 lbs. (206 kg)
<b>(approx.) w/o mower</b>	Shipping: 575 lbs. (261 kg)




#### Mower - 38"

<b>Effective</b>	
<b>Cutting Width</b>	38 In. (96.5 cm)
<b>Overall Width with Deflector</b>	49.5 In. (125.7 cm)
<b>Weight</b>	100 lbs. (45 kg)
<b>Variable</b>	
<b>Cutting Ht.</b>	1-3.6 in. (2.5 to 91 cm)
<b>Blade</b>	
<b>Arrangement</b>	Two Blades
<b>Mower Drive</b>	V-Belt From Tractor PTO Pulley
<b>Spindle</b>	
<b>Bearings</b>	Lubricated and Sealed Ball Bearings

#### Mower - 44"

<b>Effective</b>	
<b>Cutting Width</b>	44 In. (111.8 cm)
<b>Overall Width with Deflector</b>	56 In. (142.2 cm)
<b>Weight</b>	115 lbs. (52 kg)
<b>Variable</b>	
<b>Cutting Ht.</b>	1-3.6 In. (2.5 to 91 cm)
<b>Blade</b>	
<b>Arrangement</b>	Three Staggered Blades
<b>Mower Drive</b>	V-Belt From Tractor PTO Pulley
<b>Spindle</b>	
<b>Bearings</b>	Lubricated and Sealed Ball Bearings

### TORQUE SPECIFICATIONS FOR STANDARD MACHINE HARDWARE (Tolerance $\pm 20\%$ )

SIZE	SAE GRADE #2 		SAE GRADE #5 		SAE GRADE #8 	
	<u>in/lbs</u> ft/lbs	Nm.	<u>in/lbs</u> ft/lbs	Nm.	<u>in/lbs</u> ft/lbs	Nm.
8-32	19	2.1	30	3.4	41	4.6
8-36	20	2.3	31	3.5	43	4.9
10-24	27	3.1	43	4.9	60	6.8
10-32	31	3.5	<u>49</u>	5.5	<u>68</u>	7.7
1/4-20	66	7.6	8	10.9	12	16.3
1/4-28	<u>76</u>	8.6	10	13.6	14	19.0
5/16-18	11	15.0	17	23.1	25	34.0
5/16-24	12	16.3	19	25.8	27	34.0
3/8-16	20	27.2	30	40.8	45	61.2
3/8-24	23	31.3	35	47.6	50	68.0
7/16-14	30	40.8	50	68.0	70	95.2
7/16-20	35	47.6	55	74.8	80	108.8
1/2-13	50	68.0	75	102.0	110	149.6
1/2-20	55	74.8	90	122.4	120	163.2
9/16-12	65	88.4	110	149.6	150	204.0
9/16-18	75	102.0	120	163.2	170	231.2
5/8-11	90	122.4	150	204.0	220	299.2
5/8-18	100	136	180	244.8	240	326.4
3/4-10	160	217.6	260	353.6	386	525
3/4-16	180	244.8	300	408.0	420	571.2
7/8-9	140	190.4	400	544.0	600	816.0
7/8-14	155	210.8	440	598.4	660	897.6
1-8	220	299.2	580	788.8	900	1,244.0
1-12	240	326.4	640	870.4	1,000	1,360.0

### NOTES

1. These torque values are to be used for all hardware excluding: locknuts, self-tapping screws, thread forming screws, sheet metal screws and socket head setscrews.
2. Recommended seating torque values for locknuts:
  - a. for prevailing torque locknuts - use 65% of grade 5 torques.
  - b. for flange whizlock nuts and screws - use 135% of grade 5 torques.
3. Unless otherwise noted on assembly drawings, all torque values must meet this specification.

## 1 General Information

## Notes

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Troubleshooting

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SECTION 2. TROUBLESHOOTING

## 2 Troubleshooting

### Tractor Troubleshooting

## TROUBLESHOOTING

The troubleshooting guide below lists some common problems, their causes, and remedies.

See the repair information on the following sections for instructions on how to perform most of these minor repairs yourself. If you prefer, all of these procedures can be performed for you by your local authorized dealer.



### WARNING

**Never attempt to perform repairs while the engine is running.**

**Always turn the engine off and remove the key.**

**FAILURE TO COMPLY WITH THIS, AND OTHER, SAFETY REQUIREMENTS CAN RESULT IN SERIOUS PERSONAL INJURY.**

### TROUBLESHOOTING THE TRACTOR

<b>Engine will not turnover or start.</b>	1. Ground speed control lever not in neutral-start position.	Shift into neutral.
	2. PTO (electric clutch) switch in ON position.	Place in OFF position.
	3. Out of fuel.	If engine is hot, allow it to cool, then refill the fuel tank.
	4. Engine flooded.	Push choke knob in (twin cylinder models) or move throttle control out of CHOKE position (single cylinder models). Wait one minute for automatic reset. Replace if defective.
	5. Circuit breaker tripped.	See Electrical Troubleshooting Section.
	6. Battery terminals require cleaning.	
	7. Battery discharged or dead.	Recharge or replace.
	8. Wiring loose or broken.	Visually check wiring & replace broken or frayed wires. Tighten loose connections.
	9. Solenoid or starter motor faulty.	Repair or replace. See Electrical Troubleshooting Section.
	10. Safety interlock switch or module faulty.	Replace as needed. See Electrical Troubleshooting Section.
	11. Spark plug(s) faulty, fouled or incorrectly gapped.	Clean and gap or replace. See engine manual.
	12. Water in fuel.	Drain fuel & refill with fresh fuel.
	13. Gas is old or stale.	Drain fuel & replace with fresh fuel.
	14. Foot pedal not depressed.	Depress pedal.
<b>Engine starts hard or runs poorly.</b>	1. Fuel mixture too rich.	Clean air filter. Check choke adjustment (engine speed control).
	2. Carburetor adjusted incorrectly.	See engine manual.
	3. Spark plug(s) faulty, fouled, or incorrectly gapped.	Clean and gap or replace. See engine manual.
<b>Engine knocks.</b>	1. Low oil level.	Check/add oil as required.
	2. Using wrong grade oil.	See engine manual.
<b>Excessive oil consumption.</b>	1. Engine running too hot.	Clean engine fins, blower screen and air cleaner.
	2. Using wrong weight oil.	See engine manual.
	3. Too much oil in crankcase.	Drain excessive oil.
<b>Engine exhaust is black.</b>	1. Dirty air filter.	Replace air filter. See engine manual.
	2. Engine speed control is in choke position.	Change engine speed.
<b>Engine runs, but tractor will not drive.</b>	1. Ground speed control lever in neutral.	Shift in forward or reverse.
	2. Transmission release lever in "push" position. (Hydro models only)	Move into drive position.
	3. Belt is broken.	See Drive Belt Replacement.
	4. Drive belt slips.	See problem and cause below.
	5. Brake is not fully released.	See Brake Adjustment.

## 2 Troubleshooting

### Mower Troubleshooting

#### ***Tractor Troubleshooting Cont.***

<b>Tractor drive belt slips.</b>	<ol style="list-style-type: none"> <li>1. Clutch is out of adjustment.</li> <li>2. Pulleys or belt greasy or oily.</li> <li>3. Belt stretched or worn.</li> <li>4. Idler pulley pivot bracket "frozen" in declutched position.</li> </ol>	<p>See Adjustments Section. Clean as required. Replace with correct belt. Remove idler pulley, clean and lubricate.</p>
<b>Brake will not hold.</b>	<ol style="list-style-type: none"> <li>1. Brake is incorrectly adjusted.</li> <li>2. Internal brake disc on transaxle worn.</li> </ol>	<p>See Brake Adjustment. See Brake Adjustment and Transmission Repair Sections.</p>
<b>Tractor steers hard or handles poorly.</b>	<ol style="list-style-type: none"> <li>1. Steering linkage is loose.</li> <li>2. Improper tire inflation.</li> <li>3. Spindle bearings dry.</li> </ol>	<p>Check and tighten any loose connections. See Steering Gear Adjustment. Check and correct. Grease spindles. See Lubricating the Tractor.</p>
<b>Drive belt does not stop when clutch/brake pedal depressed.</b>	<ol style="list-style-type: none"> <li>1. Belt stops or belt tension out of adjustment.</li> </ol>	<p>See Adjustments Section.</p>

#### **TROUBLESHOOTING THE MOWER**

<b>Mower will not raise.</b>	<ol style="list-style-type: none"> <li>1. Lift link not properly attached or damaged.</li> </ol>	<p>Attach or repair.</p>
<b>Mower cut is uneven.</b>	<ol style="list-style-type: none"> <li>1. Mower not leveled properly.</li> <li>2. Tractor tires not inflated equally or properly.</li> </ol>	<p>See Mower Adjustment. See Maintenance Section.</p>
<b>Mower cut is rough looking.</b>	<ol style="list-style-type: none"> <li>1. Engine speed too slow.</li> <li>2. Ground speed too fast.</li> <li>3. Blades are dull.</li> <li>4. Mower drive belt slipping because it is oily or worn.</li> <li>5. Check PTO (Electric Clutch) Adjustment.</li> <li>6. Blades not properly fastened to arbors.</li> </ol>	<p>Set to full speed. Slow down. Sharpen or replace blades. See Mower Blade Service. Clean or replace belt as necessary.  See Adjustments Section.  See Servicing the Mower Blades.</p>
<b>Engine stalls easily with mower engaged.</b>	<ol style="list-style-type: none"> <li>1. Engine speed too slow.</li> <li>2. Ground speed too fast.</li> <li>3. Carburetor improperly adjusted.</li> <li>4. Cutting height set too low.</li> <li>5. Discharge chute jamming with cut grass.</li> </ol>	<p>Set to full throttle. Slow down. See Engine Manual. Cut tall grass at maximum cutting height during first pass. Cut grass with discharge pointing toward previously cut area.</p>
<b>Excessive mower vibration.</b>	<ol style="list-style-type: none"> <li>1. Blade mounting screws are loose.</li> <li>2. Mower blades, arbors, or pulleys are bent.</li> <li>3. Mower blades are out of balance.</li> <li>4. Belt installed incorrectly.</li> </ol>	<p>Tighten to 50-70 ft.lbs. (74 N.m.).  Check and replace as necessary.  Remove, sharpen, and balance blades. See Servicing the Mower Blades. Reinstall Correctly.</p>
<b>Excessive belt wear or breakage.</b>	<ol style="list-style-type: none"> <li>1. Belt tension too tight.</li> <li>2. Bent or rough pulleys.</li> <li>3. Using incorrect belt.</li> </ol>	<p>Adjust belt tension. Repair or replace. Replace with correct belt.</p>
<b>Mower drive belt slips or fails to drive.</b>	<ol style="list-style-type: none"> <li>1. Idler pulley spring broken or not properly attached.</li> <li>2. Belt stops out of adjustment.</li> <li>3. Mower drive belt broken.</li> </ol>	<p>Repair or replace as needed.  Check belt stops. Replace drive belt.</p>

## Notes

## Notes

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# SECTION 3. MAINTENANCE

# 3 Maintenance

## Storage



### WARNING

Never store a tractor, with gasoline in engine or fuel tank, in a heated shelter or in an enclosed, poorly ventilated enclosure. Gasoline fumes may reach an open flame, spark or pilot light (such as a furnace, water heater, clothes dryer, etc.) and cause an explosion.

Handle gasoline carefully. It is highly flammable and careless use could result in serious fire damage to your person or property.

Drain fuel into an approved container outdoors away from open flame or sparks.

## A. STORAGE

### Temporary Storage

#### (30 Days Or Less)

Remember, the fuel tank will still contain some gasoline, so never store the tractor indoors where fuel vapor could travel to any ignition source. Fuel vapor is also toxic if inhaled, so never store the tractor in any structure used for human or animal habitation.

Here is a checklist of things to do when storing your tractor temporarily or in between uses:

- Do not store the tractor in an area where children may come into contact with it. If there is any chance of unauthorized use, remove the ignition key and keep it in a safe place.
- If the tractor cannot be stored on a reasonably level surface, block the wheels.
- Clean all grass and dirt from the mower.

*NOTE: If storing your tractor between winter snow removal jobs in a cold area, we suggest that you fill the fuel tank at the completion of each job to prevent water condensation in the fuel tank. Wait for the engine to cool before filling the tank.*

### Long Term Storage

#### (Longer Than 30 Days)

Before you store your tractor for the off-season, read the Maintenance and Storage instructions in the Safety Rules section, then perform the following steps:

1. Drain crankcase oil and refill with a grade of oil that will be required when tractor is used again.
2. Prepare the mower deck for storage as follows:
  - a. Remove mower deck from the tractor. (See Operators Manual)
  - b. Clean underside of mower deck.
  - c. Coat all bare metal surface with paint or light coat of oil to prevent rusting.

3. Clean external surfaces and engine.
4. Prepare engine for storage. See engine owner's manual.
5. Clean any dirt or grass from cylinder head cooling fins, engine housing and air cleaner element.
6. Cover air cleaner and exhaust outlet tightly with plastic or other waterproof material to keep out moisture, dirt and insects.
7. Completely grease and oil tractor as outlined in the Lubrication section.
8. Clean up tractor and apply paint or rust preventative to any areas where paint is chipped or damaged.
9. Be sure the battery is filled to the proper level with water and is fully charged. Battery life will be increased if it is removed, put in a cool, dry place and fully charged about once a month. Do not allow the battery to freeze. If the battery is left in the tractor, disconnect the negative cable.
10. Drain the fuel system completely or add a gasoline stabilizer to the fuel system. If you have chosen to use a fuel stabilizer and have not drained the fuel system, follow all safety instructions and storage precautions in this manual to prevent the possibility of fire from the ignition of gasoline fumes. Remember, gasoline fumes can travel to distant sources of ignition and ignite, causing risk of explosion and fire.

*NOTE: Gasoline, if permitted to stand unused for extended periods (30 days or more), may develop gummy deposits which can adversely affect the engine carburetor and cause engine malfunction. To avoid this condition, add a gasoline stabilizer to the fuel tank or drain all fuel from the system before placing unit in storage.*

11. Transport the tractor to a suitable, dry, indoor location. If the tractor is to be stored 6 months or longer, block the tractor up off the wheels to relieve weight and also to keep the tires off a damp floor. Protect tires from prolonged exposure to direct sunlight.

### Starting After Long Term Storage

Before starting the tractor after it has been stored for a long period of time, perform the following steps:

1. Remove the blocks from under the tractor.
2. Install the battery if it was removed.
3. Unplug the exhaust outlet and air cleaner.
4. Fill the fuel tank with fresh gasoline. See engine manual for recommendations.
5. Check crankcase oil level and add proper oil if necessary.
6. Inflate tires to proper pressure.
7. Check all fluid levels.
8. Start the engine and let it run slowly until warm. DO NOT run at high speed immediately after starting. Be sure to run engine only outdoors or in well ventilated areas.

### B. PREVENTIVE MAINTENANCE CHART

The following schedule should be followed for normal care of your tractor and mower. You will need to keep a record of your operating time. Determining operating time is easily accomplished by multiplying the time it takes to do one job by the number of times you've done the job, or you can install the optional hour meter.

Safety Items	Before First Use	Before Each Use	Every 5 Hours	Every 25 Hours	Every 100 Hours	Spring & Fall
Check safety interlock system.	•					•
Check tractor brakes.	•					•
Check mower blade stopping time.		• After adjustment or service of electric PTO clutch •				
<b>Normal Care Items</b>						
Check tractor for loose hardware.	•	•	•			
Check engine oil level.	•	•	•			•
Check engine air filter.				***•		
Change engine oil & filter.**				***50 hrs		***•
Lubricate tractor & mower.				***•		
Check fluid levels & tire pressure.	•	•		**•		
Change transmission fluid. (hydro)****		Only if transaxle is serviced.				
Check fuel filter.					•	
Clean battery & cables.					•	
Clean/sharpen blades.					•	
Inspect spark plug(s).					•	

\* See the engine manufacturer's owner's manual.

\*\* Change original engine oil after first 5 hours of operation.

\*\*\* More often in hot (over 85° F: 30° C) weather or dusty operating conditions.

\*\*\*\* Some transaxles are sealed units and do not require regular interval fluid changes.

## 3 Maintenance

### Engine

#### C. MAINTENANCE & ADJUSTMENTS ENGINE OIL LEVEL

Engine oil level must be checked at regular intervals to ensure that engine oil is maintained at a level that will provide for adequate lubrication of internal components. Operating the engine with insufficient oil in the oil sump will cause engine components to wear prematurely, and prolonged use with low oil levels may cause engine overheating, permanent damage, and voiding of the engine manufacturer's warranty.

In addition to following the engine manufacturer's instructions for checking oil level, the recommendations for oil type and viscosity must also be followed. These recommendations vary based on the season during which the unit is being operated, and may require that the oil be changed to suit different operating conditions.

The location of the oil level indicator and oil fill tube are indicated in the engine manufacturer's manual shipped with each unit. In general, the oil fill tube is marked with an oil can symbol or the word "OIL", and is located next to the engine to permit easy access (See Figures 1 through 3).

The engine oil fill tube is usually also the location of the engine oil level dipstick, allowing oil level checks and filling to be performed using the same tube.

#### ENGINE OIL FILTER

The engine oil filter should be changed in accordance with the engine manufacturer's recommendations, which is generally every 50 hours of operation, or more frequently when operating conditions are hot (over 85°), or dusty.

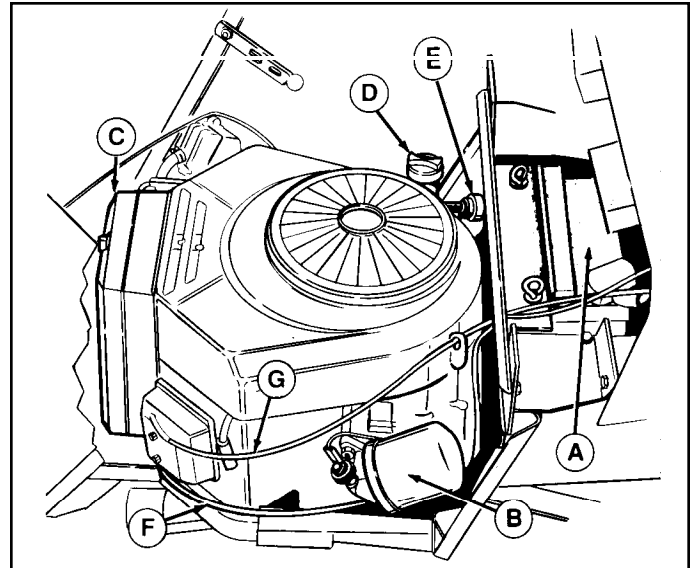
The oil filter removes abrasive particles and other contaminants from the oil, keeping it clean for maximum lubrication efficiency, and should only be replaced with the type of filter recommended by the engine manufacturer.

The oil filter is located at the base of the engine, and is removed by unscrewing the filter from the filter base using an oil filter wrench (See Figures 1 through 3).

#### ENGINE AIR FILTER

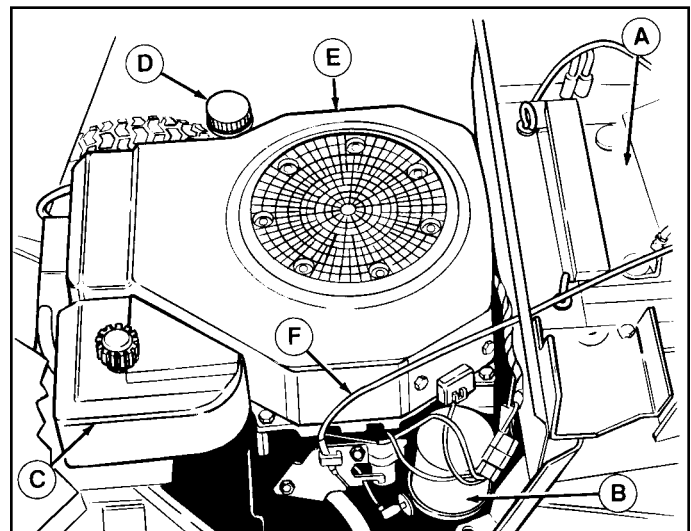
The engine air filter filters out dust and dirt from the air intake of the engine, and must be cleaned or replaced every 25 hours of operation, or more frequently when operating conditions are dusty.

Follow the engine manufacturer's recommendations for removal, cleaning, and replacement. See Figures 1 through 3 for air filter locations.



**Figure 1. Engine Compartment - 14 / 16HP  
Briggs & Stratton Twin Cylinder Engine**

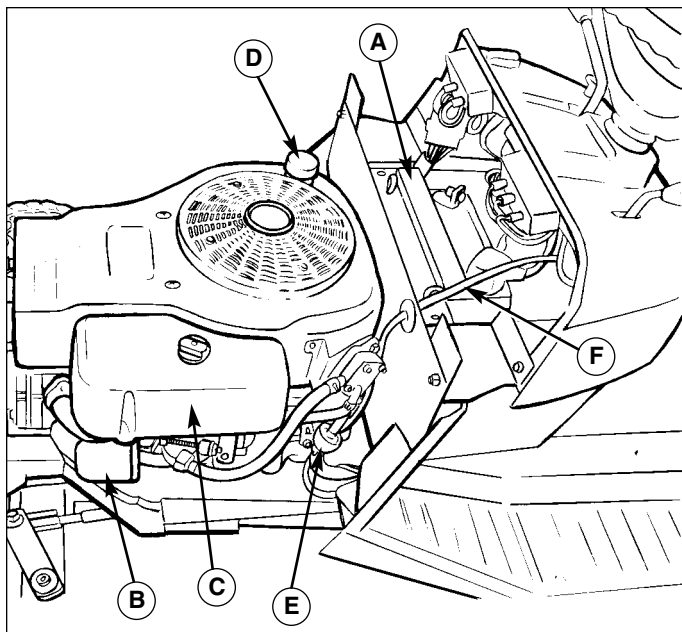
- A. Battery
- B. Oil Filter
- C. Air Filter
- D. Oil Fill/Dipstick
- E. Fuel Filter
- F. Throttle Cable
- G. Choke Cable



**Figure 2. Engine Compartment - 14 HP Kohler Single  
Cylinder Engine**

- A. Battery
- B. Oil Filter
- C. Air Filter
- D. Oil Fill/Dipstick
- E. Fuel Filter
- F. Throttle/Choke Cable





**Figure 3. Engine Compartment - 15 HP Briggs & Stratton Single Cylinder Engine**

- A. Battery
- B. Oil Filter
- C. Air Filter
- D. Oil Fill/Dipstick
- E. Fuel Filter
- F. Throttle Cable

## FUEL FILTER

### DANGER

Do not remove fuel filter when engine is hot, as spilled gasoline may ignite. Follow all precautions for the safe handling of gasoline when removing and installing the fuel filter. **DO NOT** spread hose clamps more than necessary. Replace clamps if they do not provide a secure, leak-proof attachment to the fuel filter when reinstalled.

The fuel filter is located in the engine compartment and is installed in the rubber fuel line between the fuel tank and the fuel pump (See Figures 1 through 4). The fuel filter should be checked every 100 hours of operation, or sooner and replaced if it appears to be dirty or clogged.

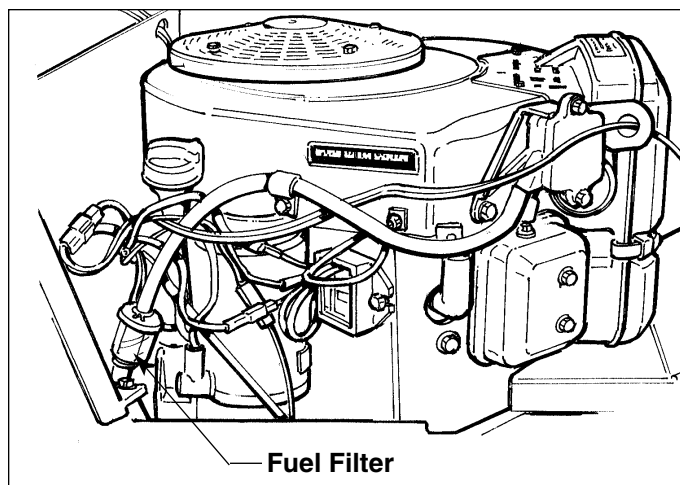
A dirty or clogged filter may cause erratic engine operation, hard starting, or loss of power.

Before removing the hoses from the fuel filter, place a small container under the filter to catch the gasoline in the hoses and filter that will drain out as the filter is removed.

1. Squeeze the tabs on the hose clamps together using a pliers, and slide the clamps away from the fuel filter.
2. Note the fuel flow direction indicated on the filter, and remove the filter by pulling the hoses away from the filter with a twisting motion. Be prepared for fuel in the hoses and fuel filter to drain out as the hoses are disconnected, and catch the fuel in the container.
3. Observing the same fuel filter flow direction noted during removal, install the new fuel filter in the fuel line by sliding the hoses onto the filter.
4. Squeeze the tabs on the hose clamps together, and slide the clamps into place over the fuel filter tubes to secure the fuel lines to the fuel filter.

*NOTE: The hose clamps must connect the fuel line hoses to the fuel filter securely to prevent fuel leakage and the possibility of engine compartment fire. Replace the hose clamps if they do not provide a secure, leak-proof attachment to the fuel filter.*

*NOTE: Replace old, brittle, hard, or cracked fuel line.*



**Figure 4. Fuel Filter Location - Right Side Of Engine - Twin Cylinder Engine**

## 3 Maintenance

### Engine / Battery

#### SPARK PLUG

The spark plug(s) should be inspected at the regular intervals specified in the engine manufacturer's owner's manual and cleaned or replaced as required.

Dirty, worn, or fouled spark plugs may cause hard starting, rough engine operation, or loss of power, and may contribute to premature starter failure from excessive cranking of the engine.

The spark plug(s) can be found by looking for the thick black spark plug cable(s) at the engine head, and removing the spark plug boot(s) that connect(s) the cable to the spark plug.

The spark plug boot can be removed from the spark plug by pulling the boot away from the spark plug with a slight side-to-side motion.

To remove the spark plug(s) from the engine for inspection or replacement:

1. Turn the ignition off and remove the key.
2. Raise the hood.
3. Locate the spark plug cable and boot, and pull the boot off the spark plug (Figure 5).
4. Using a spark plug socket and socket wrench or equivalent spark plug removal tool, unscrew the spark plug from the engine by turning the spark plug counter-clockwise.
5. Inspect the spark plug in accordance with the engine manufacturer's instructions, and clean, re-gap, or replace the spark plug as required.
6. When reinstalling the spark plug, start the plug into the engine by first turning it clockwise by hand to prevent cross-threading and possible damage to the spark plug port. Tighten as instructed in engine manufacturer's manual.

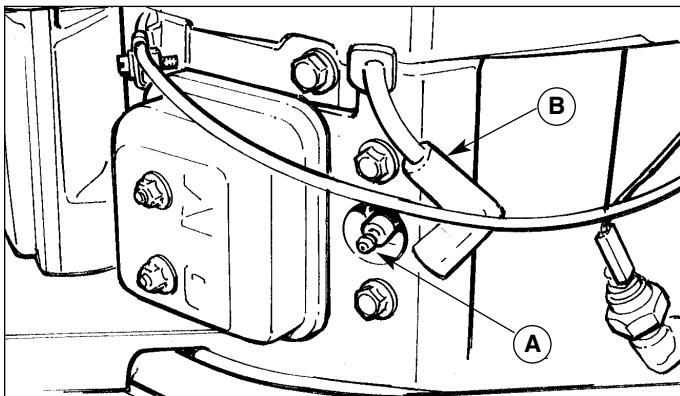


Figure 5. Typical Spark Plug Location

- A. Spark Plug  
B. Spark Plug Cable & Boot

#### BATTERY MAINTENANCE

##### WARNING

Be careful when handling the battery. Avoid spilling electrolyte. Keep flames and sparks away from the battery.

##### WARNING

When removing or installing battery cables, disconnect the negative cable FIRST and reconnect it LAST. If not done in this order, the positive terminal can be shorted to the frame by a tool.

#### Checking the Battery Fluid

1. Raise the hood.
2. Remove battery filler cap. Fluid must be even with split ring full mark. If not, add distilled water.
3. Reinstall filler cap.

#### Cleaning the Battery and Cables

1. Disconnect the cables from the battery, negative cable first (B, Figure 6).
2. Remove the battery clamp, then remove the battery.
3. Scrub the battery, cables and battery compartment with baking soda and water.
4. Clean the battery terminals and cable clamps with a wire brush and battery post terminal cleaner.
5. Reinstall battery and clamp.
6. Connect cables, positive cable first.
7. Coat battery cable clamps and battery terminals with a protective anti-corrosive coating such as grease or petroleum jelly.

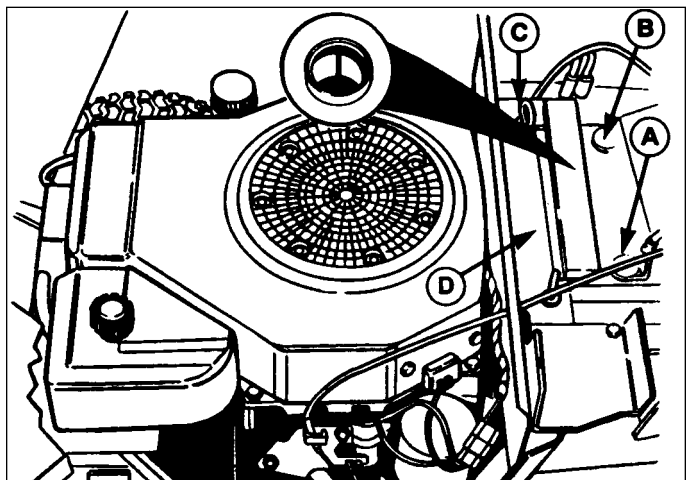


Figure 6. Battery

- A. Positive Battery Terminal    C. Hold Down Rod  
B. Negative Battery Terminal    D. Battery Clamp

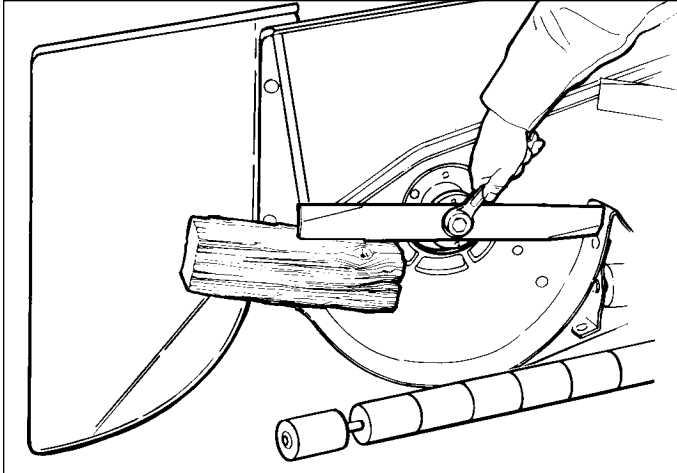


Figure 7. Removing The Blade

**⚠ WARNING**

For your personal safety, do not handle the sharp mower blades with bare hands. Careless or improper handling of blades may result in serious injury.

## MOWER BLADE SERVICE

1. Remove mower from the tractor. See Operators Manual.
2. Blades should be sharp and free of nicks and dents. If not, sharpen blades as described in following steps.
3. To remove blade for sharpening, use wooden block to hold blade while removing the blade mounting cap-screw (Figure 7).
4. Use a file to sharpen blade to fine edge. Remove all nicks and dents in blade edge. If blade is severely damaged, it should be replaced.
5. Balance the blade as shown in Figure 8. Center the blades' hole on a nail lubricated with a drop of oil. A balanced blade will remain level.
6. Reinstall each blade with the tabs pointing up toward deck as shown in Figure 9. Secure with a capscrew (D), cup washer (C) and spline washer (B). Use a wooden block to prevent blade rotation and torque capscrews to 50-70 ft.lbs. (67-95 N.m.).

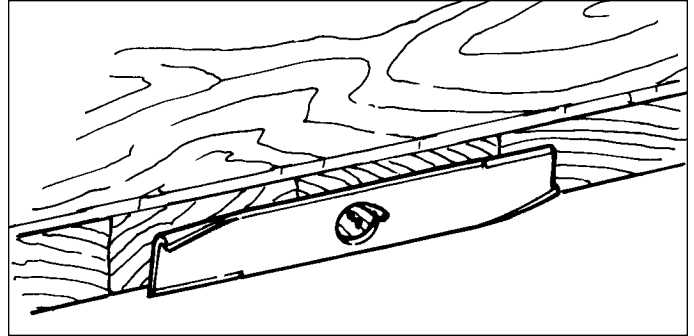


Figure 8. Balancing The Blade

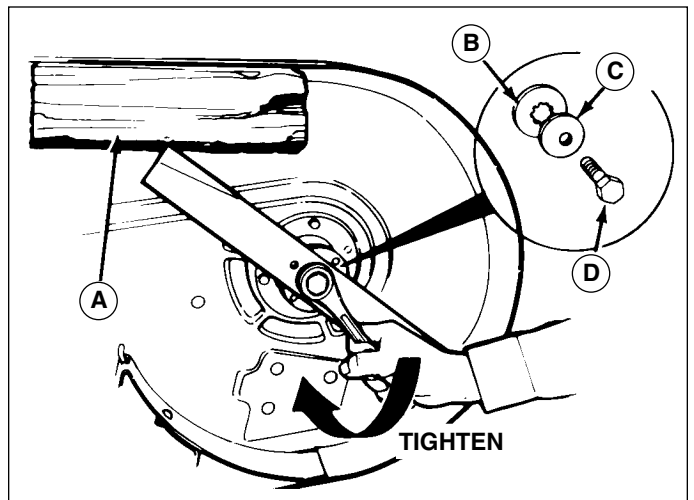


Figure 9. Installing The Blade

- |                     |               |
|---------------------|---------------|
| A. 4X4 Wooden Block | C. Cup Washer |
| B. Spline Washer    | D. Capscrew   |

**⚠ WARNING**

Blade mounting capscrews must each be installed with a cup washer and spline washer, then securely tightened. Torque blade mounting capscrew to 50-70 ft.lbs. (67-95 N.m.)

## 3 Maintenance

### Lubrication

## LUBRICATION

### Lubricating the Tractor

Lubricate the tractor as shown in Figures 10 through 17. When a grease gun is shown, wipe the fitting clean, apply two or three pumps of lithium base automotive grease, and wipe off excess grease. When an oil can is shown, wipe the area clean, apply a few drops of SAE 30 weight oil, then wipe up drips or spills.

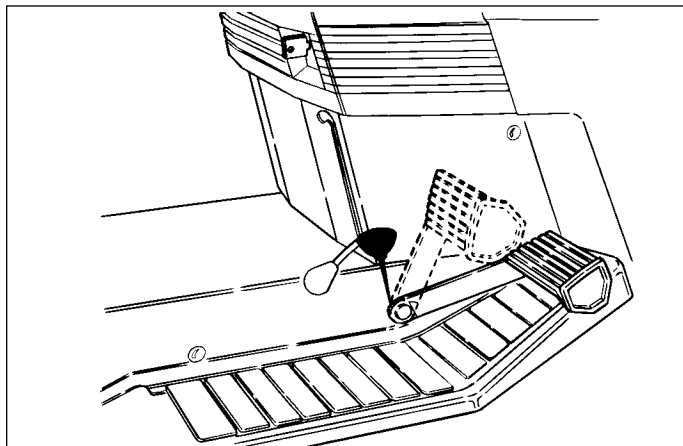


Figure 10. Brake Pedal Pivot Point

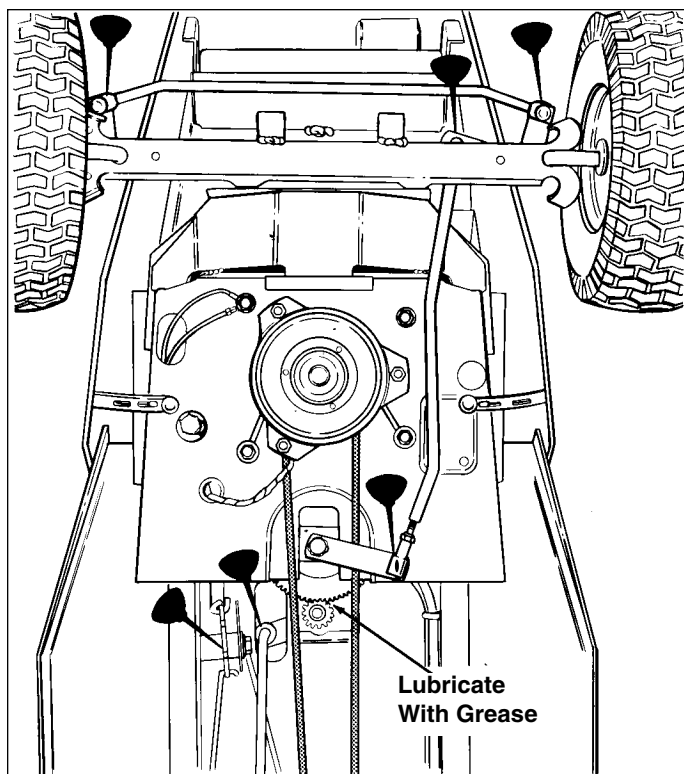


Figure 11. Tractor Lubrication Points - Front Half

In general, linkage connections and other parts that have partial rotational or sliding movement (pedal pivot points, steering links, etc.) should be lubricated periodically with SAE 30 weight oil. Avoid applying excessive amounts of oil since this may cause a build-up of dirt and grass clippings around the lubricated area, making subsequent lubrication more difficult to accomplish.

Roller bearings, bushings, axles, rotating assemblies with grease fittings, and mechanisms with exposed gear teeth (steering gears) require periodic lubrication with lithium grease.

When grease fittings are present, a manual or pneumatic pressure-feed grease gun should be utilized to inject enough grease through the fitting to fully permeate the enclosed area containing the bearings or other moving parts.

Plain bushings, bearings, axles without grease fittings, and exposed gear teeth require the direct application of grease to all wear surfaces. Use a small, clean applicator brush or other means of applying and spreading the grease evenly.

Special care should be taken with ball and roller bearings to ensure that a liberal application of grease is applied to the bearing rollers or balls, and both inner and outer races or bearing and bearing cups.

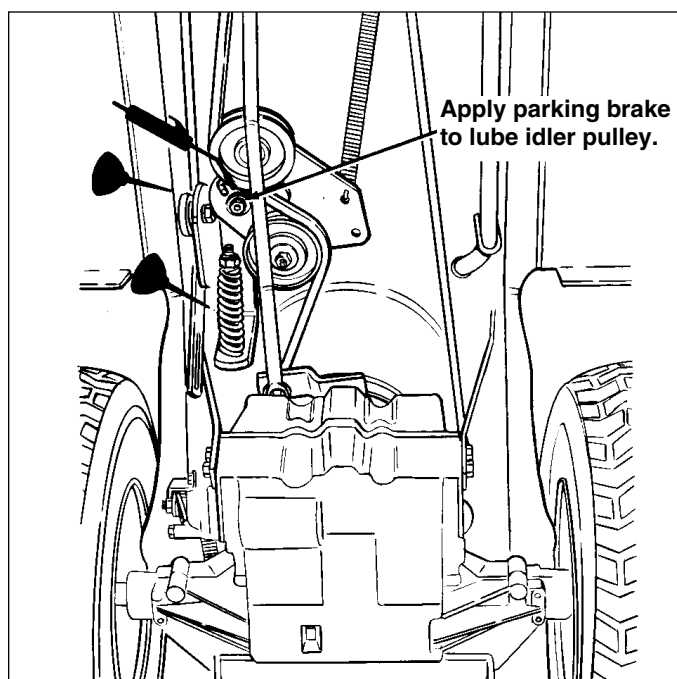
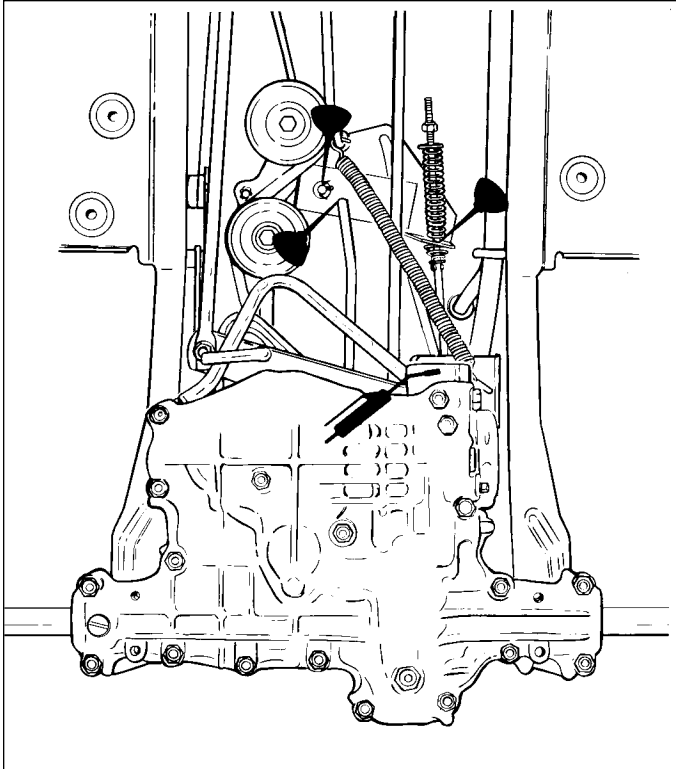
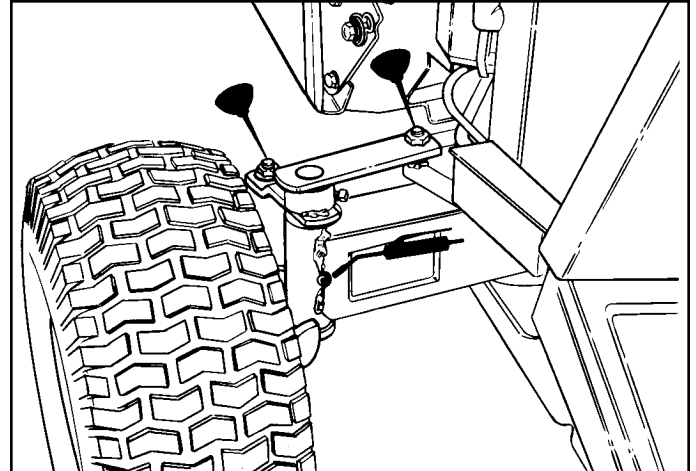


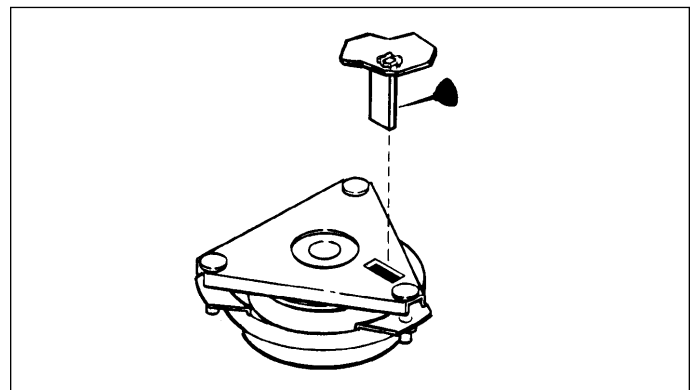
Figure 12. Tractor Lubrication Points - Rear Half (Gear Models)



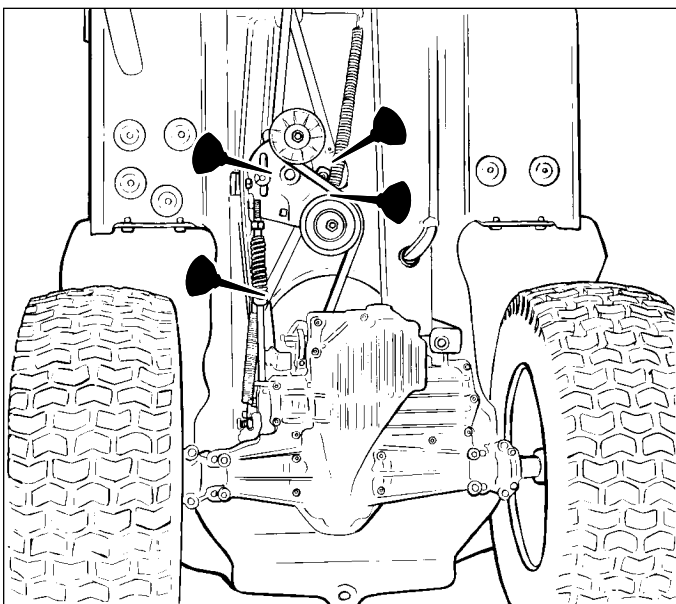
**Figure 13. Tractor Lubrication Points - Rear Half (Early Hydro, Eaton 750/751)**



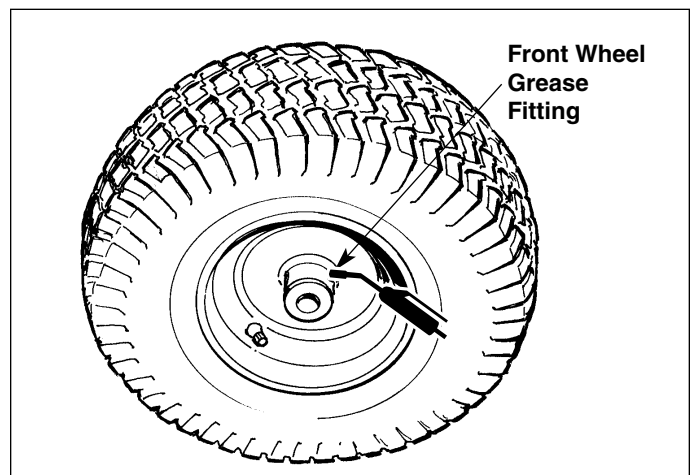
**Figure 15. Front Axle Lubrication Points**



**Figure 16. PTO (Electric clutch) Lubrication - Lubricate tab welded to the underside of frame lightly whenever the electric clutch is removed for service, replaced, or when a squeaking sound develops.**



**Figure 14. Tractor Lubrication Points - Rear Half (Later Hydro Models Tuff Torq K60)**



**Figure 17. Front Wheel Bushing Lubrication - Grease Fitting Location (Inside hub of wheel). Wheel shown removed from axle for visual clarity.**



# 3 Maintenance

## Lubrication

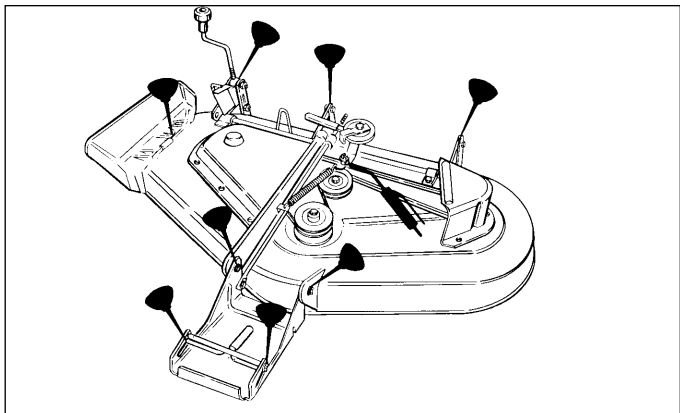


Figure 18. Mower Lubrication Points

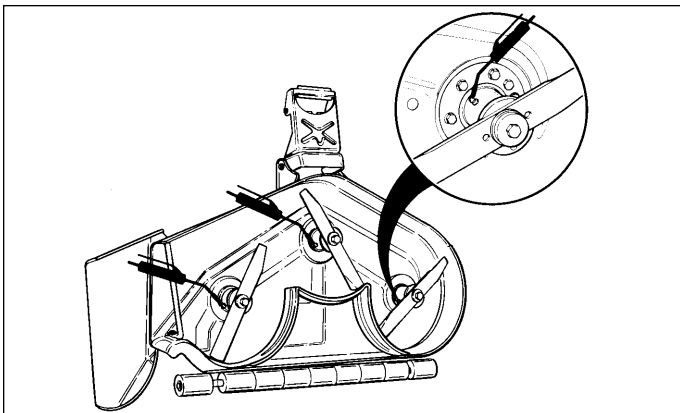


Figure 19. Arbor Lubrication Points

## LUBRICATING THE MOWER

Lubricate the mower as shown in Figures 20 through 22. Be sure to include the grease fittings on the mower idler pulley and arbors, which are located underneath the mower deck. Always wipe the grease fittings clean before adding grease to help prevent forcing dirt and other wear-causing contaminants into the lubrication area.

When oil is indicated, use SAE 30 weight oil. Brush any dirt and grass from the area to be lubricated, and wipe lubrication points clean before applying oil. This will ensure that oil can get into the area where it is required.

Avoid getting grease or oil on belts and pulley when applying lubricants, and always wipe away excess oil and grease to prevent a rapid build-up of dirt and debris from accumulating.

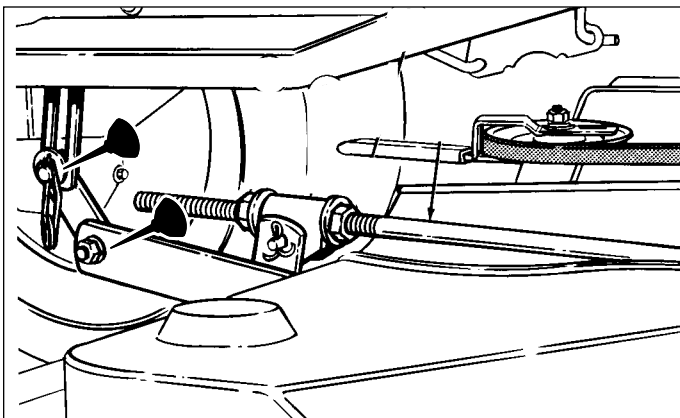


Figure 20. Lubricate Lift Arm Pivot Points

## TIRE PRESSURE

Front and rear tires should be checked periodically to ensure that proper tire pressure is maintained. Note that these pressures differ slightly from the “Max Inflation” stamped on the side-wall of the tire. Keeping the tires properly inflated to these settings helps provide proper traction, extend tire life, and improved cut quality.

Tire	Pressure
Front	12-16 psi (82-103 kPa)
Rear	6-8 psi (41-55 kPa)

### SECTION CONTENTS

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#### **Neutral & Return to Neutral Adjustments**

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Later Models w/ Plastic Support Bracket ..... 4-6

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#### **Clutch / Brake Adjustment**

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## SECTION 4. ADJUSTMENTS

*NOTE: This section contains service information involving minor service procedures and external adjustments that can be performed without requiring extensive disassembly. See the "REPAIR" section for detailed disassembly and repair information.*

## 4 Adjustments

### Electric PTO

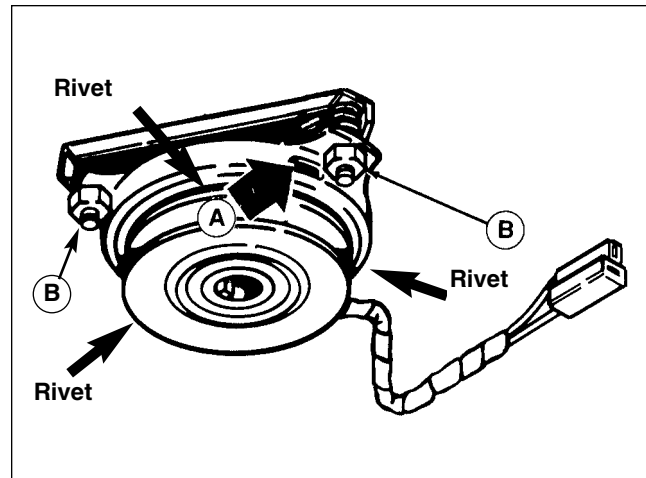
## Electric PTO Clutch Adjustment

Adjustment of the PTO clutch is usually not necessary on new units.

1. Remove key from ignition switch and disconnect spark plug wires to prevent the possibility of accidental starting while the PTO is being adjusted.
2. See Figure 1. Note the position of the 3 adjustment windows (A) in the side of the brake plate, then rotate the pulley so that each of the three rivet joints (visible inside the gap between the pulley and the brake plate) is positioned approximately midway between the three adjustment windows.
3. Insert a .012" feeler gauge through each window, positioning the gauge between the rotor face and the armature face as shown in Figure 2.
4. With all three feeler gauges in place, alternately tighten the adjustment nuts (B, Figure 1) until the rotor face and armature face just contact the gauges.
5. Check the gauges for an equal amount of tension when inserted and removed, and make any necessary adjustments by tightening or loosening the adjustment nuts.
6. Remove the feeler gauges.

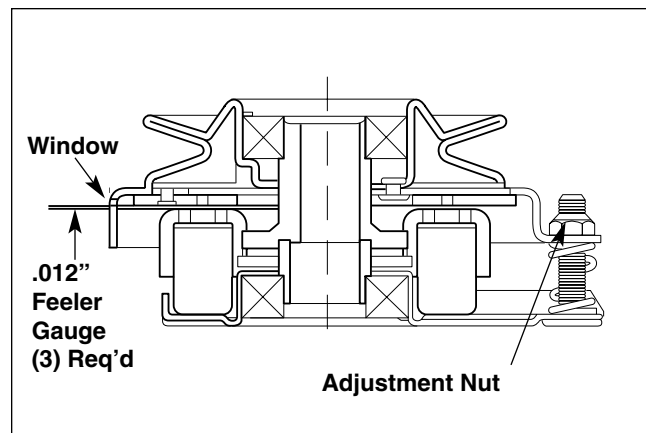
**NOTE:** The actual air gap between the rotor and armature may vary even after performing the adjustment procedure. This is due to dimensional variations on component parts, and is an acceptable condition.

8. Check the mower blade stopping time. The mower blades and mower drive belt should come to a complete stop within five seconds after the electric PTO switch is turned off.



**Figure 1. PTO Clutch Adjustment**

- A. Adjustment Window (Qty. 3, one shown)  
B. Adjustment Nut (Qty. 3, two shown)



**Figure 2. Feeler Gauge Position**



#### NEUTRAL ADJUSTMENT

**Broadmoor (Hydro-Gear 311-0750 and 311-0800 Transaxle Models)**

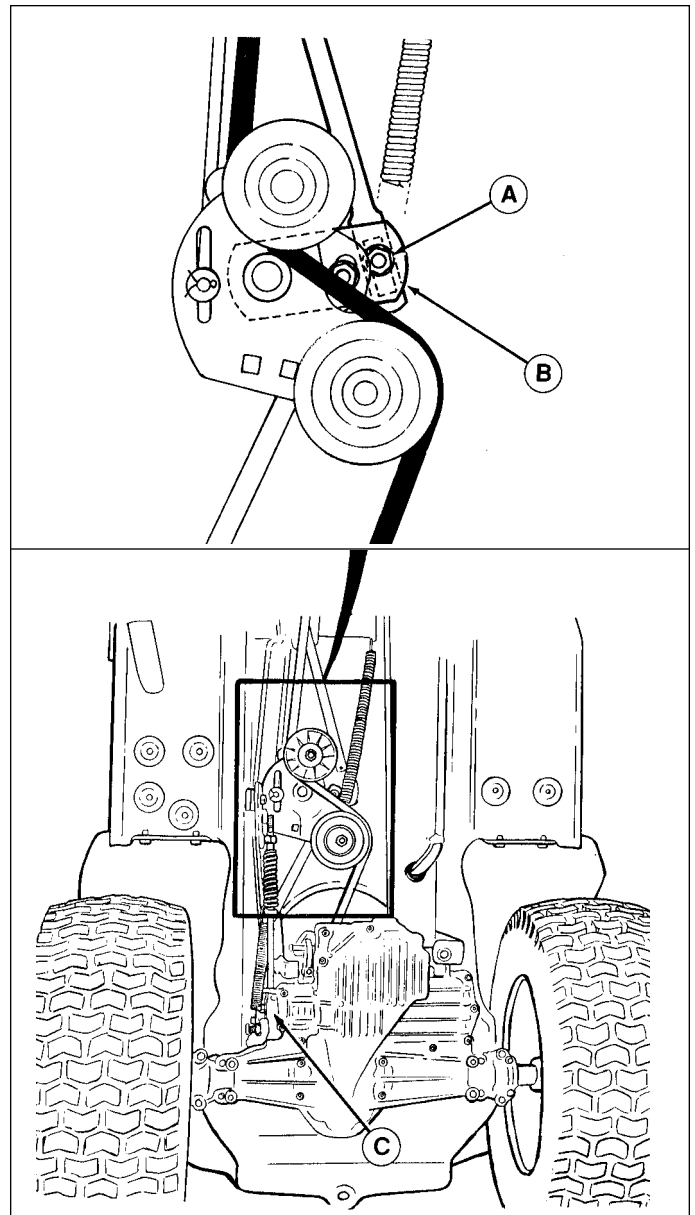


#### WARNING

When making adjustment, keep hands, hair, clothing, and tools away from rotating belts. Grasp cam lever at base to keep hand several inches below belt rotating around idler pulley assembly. Careless or improper attention may result in serious injury.

Perform the following adjustment if the shift lever must be moved out of the neutral gate to prevent forward or reverse tractor movement. With the clutch/brake pedal released, a small amount of travel in the shift lever may be required to fully stop tractor.

1. Position tractor on flat level ground. Make sure the ground speed control lever is seated securely in the neutral gate.
2. Raise the rear of tractor off the ground . See Elevating Rear End for Safe Service.
3. Loosen nut (A, Figure 3) securing the front shift rod to the idler pivot assembly (B). The carriage bolt must be free to move in the shift rod slot.
4. Start the tractor and rotate the hydro cam lever (C) until rear wheels stop moving. Shut off tractor engine.
5. Tighten nut (A) securely.
6. Check operation of tractor for any movement with shift lever in neutral gate. Perform the return-to-neutral adjustment (refer to the following page).



**Figure 3. Neutral Adjustment**

**A. Nut**

**B. Idler Pivot Assembly**

**C. Hydro Cam Lever**

## 4 Adjustments

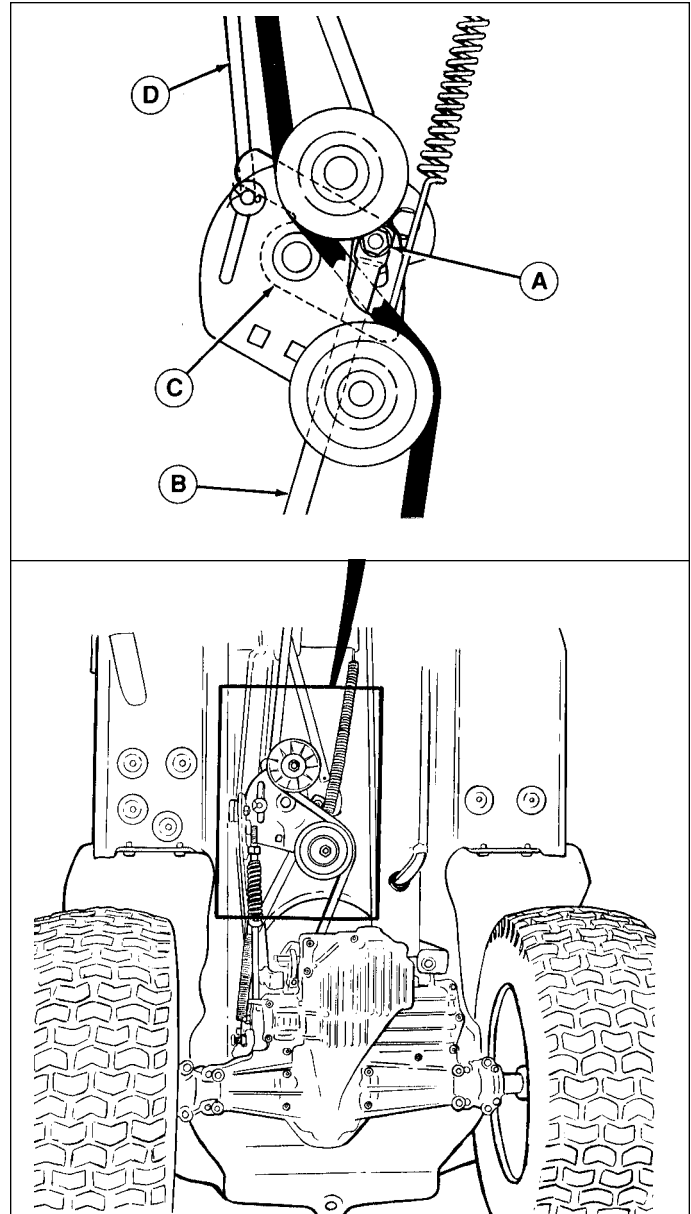
### Return-to Neutral - Hydro-Gear

#### RETURN-TO-NEUTRAL ADJUSTMENT

##### Broadmoor (Hydro-Gear 311-0750 & 0800 Transaxle Models)

Perform the following adjustment if the shift lever does not return to the neutral gate when the clutch/brake pedal is fully depressed.

1. Make sure the Neutral Adjustment is correct (refer to preceding paragraph).
2. Loosen the nut (A, Figure 4) that secures the rear shift rod (B) to the return-to-neutral cam (C).
3. Hold the clutch/brake pedal fully down against the right footrest. Pedal can be clamped in this position with large C-clamp if required. Do not apply parking brake as pedal will not be held against footrest without free play.
4. Rotate the return-to-neutral cam (C) securely against the front clutch rod (D). There should be no gap between the clutch rod and cam.
5. Tighten nut (A) with pedal held down against footrest.
6. Start tractor and check return-to-neutral operation. With pedal released, a small amount of travel in the shift lever may be required to fully stop tractor.



**Figure 4. Return-to-Neutral Adjustment**

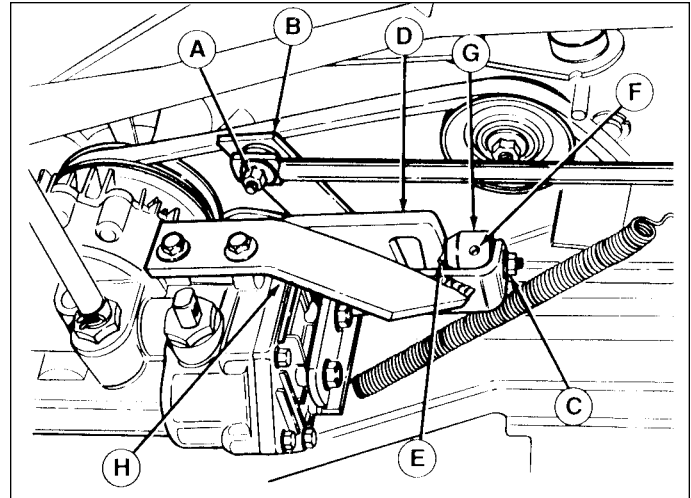
- A. Nut**
- B. Rear Shift Rod**
- C. Return-to-Neutral Cam**
- D. Front Clutch Rod**

## NEUTRAL ADJUSTMENT

**LTH/Broadmoor (Eaton 750 Hydrostatic Transaxle - Early Models with Welded Support Bracket "H" - See Figure 5).**

*NOTE: Perform the Clutch/Brake Adjustment before doing the Neutral Adjustment.*

1. Park tractor on level surface. Shut off PTO switch and engine. Do not apply parking brake. Make sure transmission control lever is in neutral and has activated neutral switch light (ignition switch on).
2. Raise the rear of tractor off the ground . See Elevating Rear End for Safe Service..
3. Loosen nut (A, Figure 5), which secures transaxle shift rod to speed control lever, (B).
4. Loosen nut (C), which secures the ball retainer (G) to the welded support bracket.
5. Rotate shift cam (D) so that neutral detent is aligned with roller ball (E).
6. Start engine and increase to full throttle. If wheels rotate, continue with adjustment. If wheels do not rotate, go to step 8.
7. Place a 1/4" rod or #2 Phillips screwdriver into hole (F) in eccentric ball retainer (G). Rotate ball retainer until wheels stop moving.
8. Tighten nut (C) securing ball retainer (G).
9. Make sure dash transmission control lever is in neutral position and has activated neutral switch light (ignition switch) before tightening nut (A).
10. Check the "Return-To-Neutral" by following these steps:
  - a. Shift transmission lever into forward (drive) position and fully depress clutch/brake pedal.
  - b. Lever should return to neutral slot.
  - c. If lever does not return to neutral, repeat above steps 1 - 9.
11. Shut off engine and remove tractor from jackstands.



**Figure 5.**

- A. Nut**
- B. Speed Control Lever**
- C. Nut**
- D. Shift Cam**
- E. Roller Ball**
- F. Adjustment Hole**
- G. Eccentric Ball Retainer**
- H. Support Bracket (Welded)**

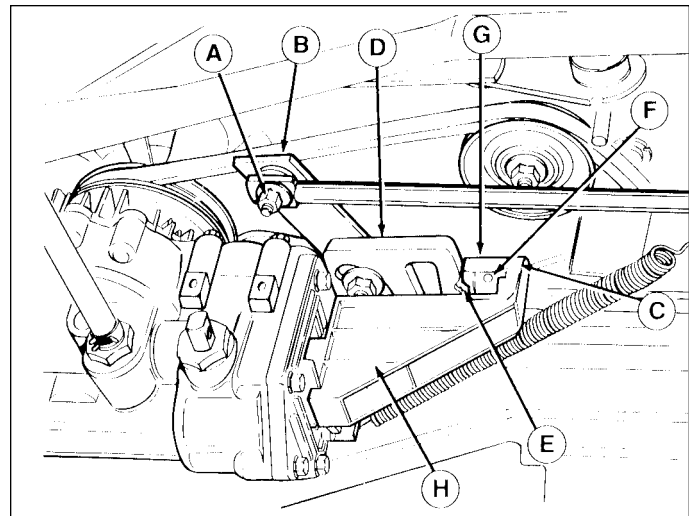
## 4 Adjustments

### Neutral Adjustment - Eaton

#### NEUTRAL ADJUSTMENT

**Broadmoor (Eaton 750 Hydrostatic Transaxle with Plastic Support Bracket "H" - See Figure 6).**

1. Park tractor on level surface. Shut off PTO switch and engine. Do not apply parking brake. Make sure transmission control lever is in neutral and has activated neutral switch light (ignition switch on).
2. Raise rear of tractor off ground with a suitable hoist or floor jack. Install jackstands underneath transaxle and block front wheels.
3. Loosen nuts (A, Figure 6) on both left side and right side of speed control lever (B). (Left side nut is located next to spring and not shown in illustration.)
4. Loosen nut (C) which attaches ball retainer (G) to plastic support bracket (H).
5. Rotate shift cam (D) so that neutral detent is aligned with roller ball (E).
6. Start engine and increase to full throttle. If wheels rotate, continue with adjustment. If wheels do not rotate, go to step 8.
7. Place a 1/4" rod or #2 Phillips screwdriver into hole (F) in eccentric ball retainer (G). Rotate ball retainer until wheels stop moving.
8. Tighten nut (C) securing ball retainer (G).
9. Shut off engine and make sure dash transmission control lever is in neutral position, and has activated neutral light (ignition switch on).
10. Pull right end of speed control lever (B) fully forward. Tighten the left side 1/4" nut (not shown).
11. Push the right end of speed control lever B fully rearward and tighten the right side 5/16" nut (A).
12. Check the "Return-To-Neutral" by following these steps:
  - a. Shift transmission lever into forward (drive).
  - b. Lever should return to neutral slot.
  - c. If lever does not return to neutral, repeat above steps 1 - 11, and make necessary adjustments.
  - d. Recheck following steps 12a - 12c.
13. Remove tractor from jackstands.



**Figure 6.**

- A. Nut**
- B. Speed Control Lever**
- C. Nut**
- D. Shift Cam**
- E. Roller Ball**
- F. Adjustment Hole**
- G. Eccentric Ball Retainer**
- H. Support Bracket (Plastic)**

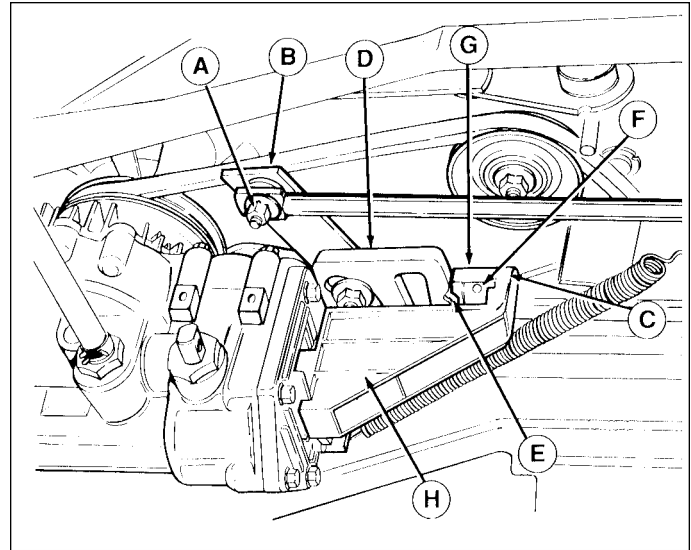
## NEUTRAL ADJUSTMENT

### Broadmoor (Eaton 751 Hydrostatic Transaxle)

1. Park Tractor on level surface. Shut off PTO switch and engine, and remove key. Do not apply parking brake. Make sure transmission control lever is in neutral and has activated neutral.
2. Raise the rear of tractor off the ground . See Elevating Rear End for Safe Service.
3. Loosen nuts (A, Figure 7) on both left side and right side of speed control lever (B). (Left side nut is located next to spring and not shown in illustration.)
4. Rotate shift cam (D) so that neutral detent is aligned with roller ball (E).
5. Start engine and increase to full throttle. If wheels rotate, continue with adjustment. If wheels do not rotate, go to step 9.
6. Loosen nut (C) which secures the ball retainer (G) to the plastic support bracket (H).
7. Place a 1/4" rod or #2 Phillips screwdriver into hole (F) in eccentric ball retainer (G). Rotate ball retainer downward (looking from right hand side) until wheels rotate forward. Rotate ball retainer slowly upward (from right hand side) until wheels stop moving.

*NOTE: Neutral must be obtained coming from forward.*

8. Tighten nut (C) securing ball retainer (G).
9. Shut off engine and make sure dash transmission control lever is in neutral position against rear edge of neutral slot in dash.
10. Pull right end of speed control lever (B) fully forward. Tighten the left side 1/4" nut (not shown).
11. Push the right end of the speed control lever (B) fully rearward, and tighten right side 5/16 nut (A).
12. Start the engine and run at full throttle. Check for neutral by moving the control lever into forward and reverse and back into neutral gate. Control lever can be moved a small amount forward or backward in neutral gate to avoid tractor movement. Continue with adjustments if neutral cannot be obtained.



**Figure 7.**

- A. Nut**
- B. Speed Control Lever**
- C. Nut**
- D. Shift Cam**
- E. Roller Ball**
- F. Adjustment Hole**
- G. Eccentric Ball Retainer**
- H. Support Bracket**

13. Shut off engine. Loosen 1/4" nut at left hand end of speed control lever. Position transmission control lever out of neutral slot toward reverse to the point where notched out portion of lever is even with rear edge of neutral slot. Pull speed control lever toward right. Retighten 1/4" nut.
14. Repeat step 12.
15. Shut off engine. Loosen 1/4" nut at left hand end of speed control lever. Position transmission control lever out of neutral slot toward reverse to the point where notched out portion of lever is even with rear edge of neutral slot. Pull speed control lever toward right. Retighten 1/4" nut.
16. Repeat step 12.
17. Return-To-Neutral Adjustment is correct when the above adjustment steps are followed.
18. Remove the unit from the jackstands.

## 4 Adjustments

### Neutral Adjustment - Tuff Torq

#### NEUTRAL ADJUSTMENT

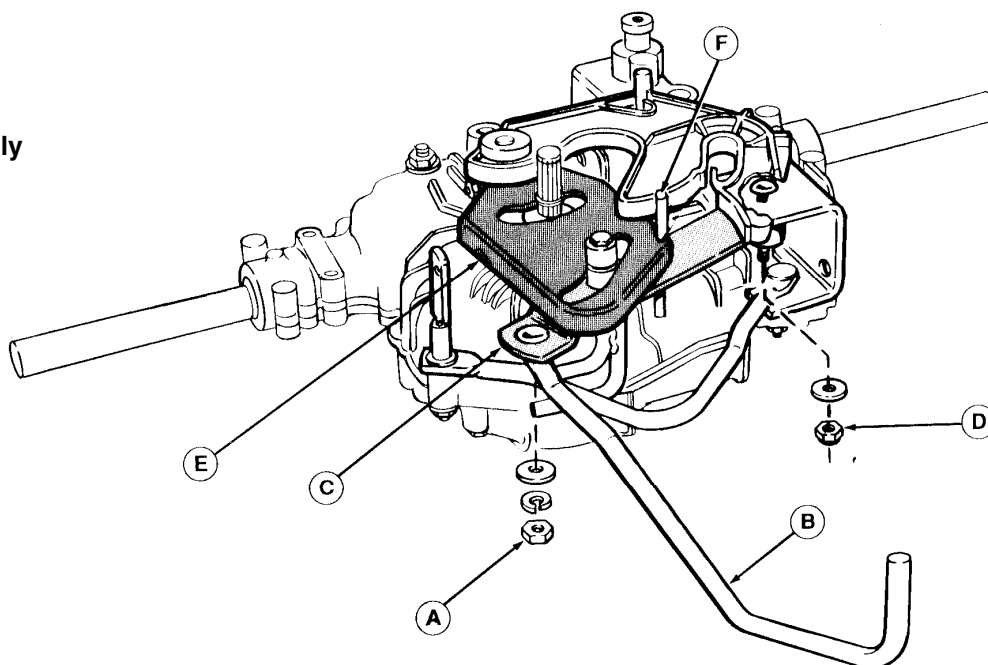
##### Broadmoor (Tuff Torq K60 Hydrostatic Transaxle)

*NOTE: Perform this adjustment procedure only if tractor moves forward or reverse when ground speed control lever is in neutral gate.*

1. Place jackstand under each side of rear drawbar. Adjust jackstand height until rear wheels are off the ground.
2. Hydro transmission has pre-set internal neutral adjustment. If tractor creeps when control lever is in neutral, first loosen nut (A, Figure 8) that attached shift rod lever (B) to shift pivot assembly (C). Directional cam (E) will return to factory pre-set neutral. If wheels continue to move with control lever in neutral, a problem exists with internal adjustment. See the repair section of this manual for detailed service instructions. If wheels do not move, perform the following steps to align cams.
3. Loosen nut (D) securing lever assembly pivot.
4. With nut (A) loosened, make sure ground speed control lever is in neutral slot on dash.
5. Push spring-loaded directional cam (E) side-to-side and allow cam to return-to-neutral.
6. With cam (E) stationary, move shift pivot assembly (C) until 1/4" hole in cam and pivot assembly line up. Insert 1/4" positioning pin F or 1/4" rod through both parts. Cam (E) must remain in neutral position.
7. With positioning pin in place, tighten nut (D), and then tighten nut (A).
8. Remove positioning pin and move ground speed control lever through forward and reverse ranges and return lever to neutral.
9. Check to see if positioning pin can be freely inserted (from bottom side) through directional cam (E), and lever assembly (C). If alignment is good, go to step 10. If pin cannot be inserted, repeat steps 2 - 8.
10. With ground speed control lever in neutral position, start unit (with rear wheels off the ground), and check for wheel movement. Wheels should not move due to internal neutral adjustment. If wheels move, recheck that positioning pin can be inserted freely through directional cam (E) and lever assembly (C) with ground speed control lever in neutral position. If neutral cannot be found, a problem exists with the unit's shift linkages.
11. After neutral adjustment, move the ground speed control lever to forward range and depress the clutch/brake pedal. The control lever should return to the neutral position in dash, and wheels should not move. Move ground speed control lever to reverse range and repeat check. Return-To-Neutral Adjustment is correct when the above adjustment steps are followed.

**Figure 8.**

- A. Nut, 1/4**
- B. Shift Rod Lever**
- C. Shift Pivot Assembly**
- D. Nut, 5/16**
- E. Cam**
- F. Positioning Pin**





## 4 Adjustments

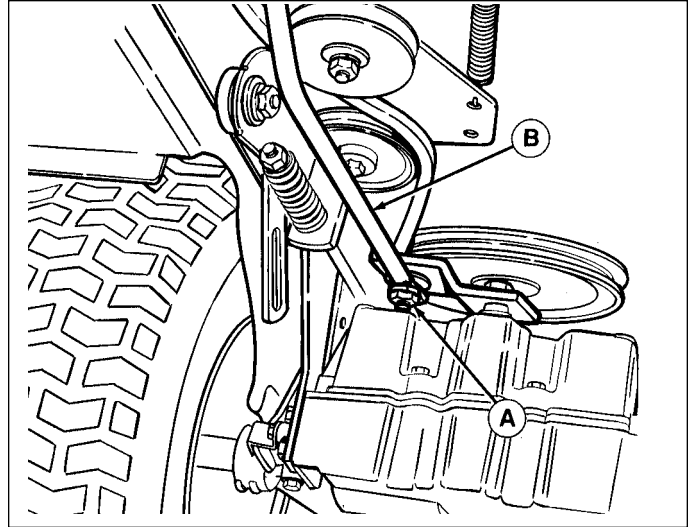
### Neutral Adjustment - Peerless

#### NEUTRAL ADJUSTMENT

##### Peerless 801-059B

If the tractor moves forward or backward with the transmission control speed lever positioned in the neutral gate, perform the following adjustment.

1. Raise the rear of the tractor off ground with suitable hoist or floor jack. Install jackstands underneath transaxle and block the front wheels.
2. Start the engine and use the transmission control speed lever to find neutral, even if control lever is not in the neutral gate. Shut off engine.
3. See Figure 9. Loosen the nut (A) so that the transmission control rod (B) is free to move.
4. Shift the transmission control lever firmly into the neutral gate on the dashboard. Retighten nut (A).
5. Remove tractor from jackstands.



**Figure 9 Neutral Adjustment - Gear Model**

**A. Nut**

**B. Transmission Control Rod**

## 4 Adjustments

### Brake Adjustment

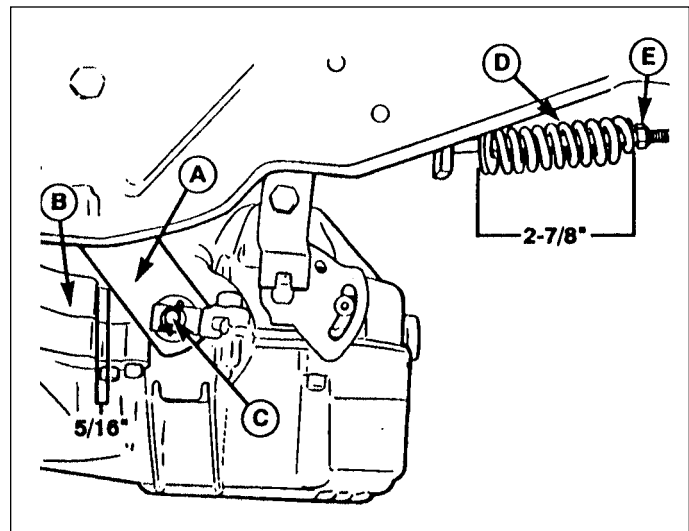
#### CLUTCH / BRAKE ADJUSTMENT

**Brake Spring:** Approximate Compressed Spring Length:

Hydro-Gear 0750/0800	2-7/8"
Tuff Torq K60	2-7/8
Eaton 750	1-3/4
Peerless 801	2-7/8"

#### Hydro-Gear 311-0750 & 311-0800

1. See figure 10. With parking brake released, rotate the brake cam (A) forward until it stops. There should be 5/16" gap between transaxle housing (B) and rear point of brake cam.
2. If adjustment is required, remove cotter pin (early models had an "elastic nut" instead of a cotter pin) and turn adjusting nut (C) until proper 5/16" clearance is achieved. Turning the nut in will decrease clearance, and turning the nut out will increase clearance. Install cotter pin (or nut) after adjustment.
3. Fully depress the clutch/brake pedal and lock the parking brake by pulling up on the parking brake knob.
4. The brake rod spring (D) should measure 2-7/8" when compressed. Turn the adjustment nut (E) as necessary to obtain correct spring length.

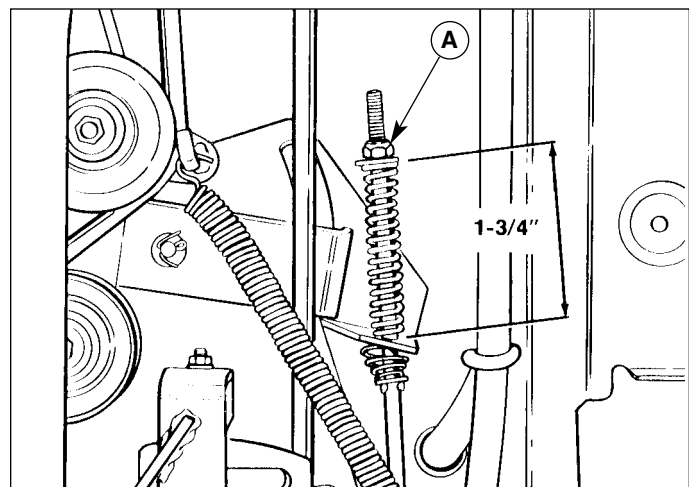


**Figure 10. Brake Adjustment – Hydro Models**

A. Brake Cam  
B. Transaxle Housing  
C. Adjusting Nut  
D. Brake Rod Spring  
E. Adjustment Nut

#### Eaton 750 & 751 Transmission

1. Engage the parking brake.
2. The brake spring should be compressed to a length of 1-3/4". Turn the adjustment nut (A, figure 12) to increase or reduce spring tension until the correct spring length is reached.

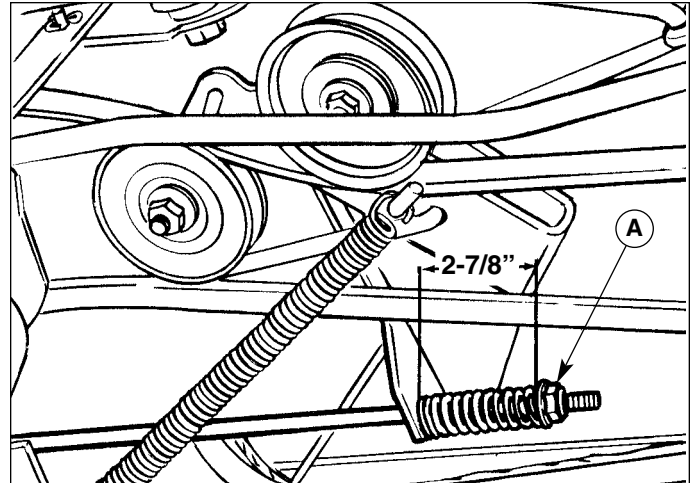


**Figure 12. Eaton 750/751 Clutch/Brake Rod Adjust nut (A) to provide correct spring length.**



#### Tuff Torq K60 Transmission

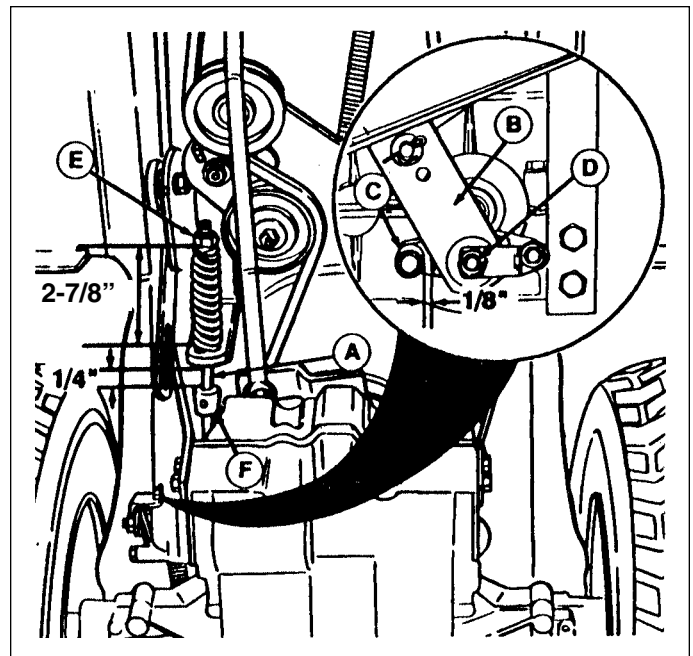
1. Engage the parking brake..
2. The brake spring should be compressed to a length of 2-7/8". Turn the adjustment nut (A, Figure 13) to increase or reduce spring tension until correct spring length is reached.



**Figure 13. Tuff Torq K60 Clutch/Brake Rod Adjust nut (A) to provide correct spring length.**

#### Peerless 801

1. Place the transmission in gear and release the parking brake.
2. See Figure 11. Move the brake rod (A) back and forth to be sure there is no tension on the brake pads.
3. Push the cam lever (B) forward (toward front of tractor) to take out any slack. The gap between lever (B) and stop (C) should be 1/8" (0.3mm). Use a feeler gauge to measure. if adjustment is required, proceed to step 4.
4. Loosen or tighten the adjustment nut (D) to obtain the correct dimension.
5. Fully depress the clutch/brake pedal and lock the parking brake by pulling up on the parking brake knob.
6. The brake rod spring should measure 2-7/8" when compressed. Turn the adjustment nut (E) as necessary to obtain correct spring length.
7. With spring compressed to 2-7/8", adjust set collar (F) 1/4" from brake arm assembly (if present).



**Figure 11. Brake Adjustment – Gear Model**

- |                           |                                 |
|---------------------------|---------------------------------|
| <b>A. Brake Rod</b>       | <b>D. Adjustment Nut</b>        |
| <b>B. Brake Cam Lever</b> | <b>E. Spring Adjustment Nut</b> |
| <b>C. Stop</b>            | <b>F. Set Collar</b>            |

## 4 Adjustments

### Purging Transaxle / Steering Adjustment

#### PURGING AIR FROM TRANSAXLE

Air may become trapped in the inlet hydraulic filter or closed loop passages of the hydro transaxle during assembly or shipment of the tractor. It is very important for proper operation to release any trapped air that may cause damage to the internal transaxle parts.

1. Park the tractor on a flat, level surface.
2. Place the hydro release lever (A, Figure 14) in the "PUSH" position by pulling rearward on the lever. The lever is located under the rear left-hand corner of the frame.
3. Start the tractor engine and run at a low idle.
4. Move the ground speed control lever from the neutral position to the full forward position for five seconds. Move lever to the full reverse position for five seconds. Repeat this procedure three times in forward and reverse direction.
5. Return the control lever to the neutral gate.
6. Place the hydro release lever (A) in the "DRIVE" position by pushing lever fully forward.
7. Drive the tractor at least five feet in the forward and reverse directions with full throttle and full ground speed. Repeat this procedure three times in the forward and reverse directions.
8. Check oil level (if applicable)

Repeat the above steps if tractor has noisy or erratic operation, lack of performance after transmission warm-up, or oil leakage from the transaxle vent tube.

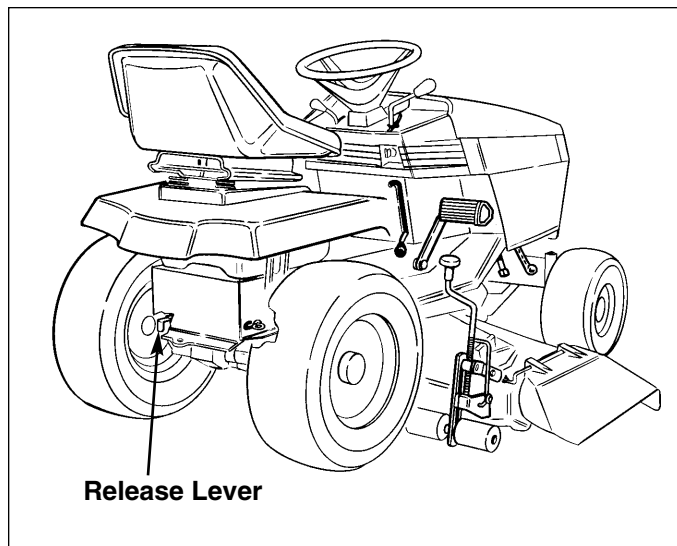


Figure 14. Release Lever

#### STEERING GEAR ADJUSTMENT

If there is excessive back-lash in the steering system, the steering gear can be adjusted to the steering shaft gear for better engagement. Refer to Figure 15. Loosen two capscrews (A) and adjust bracket so that gear teeth are more closely meshed. Retighten nuts after adjustment.

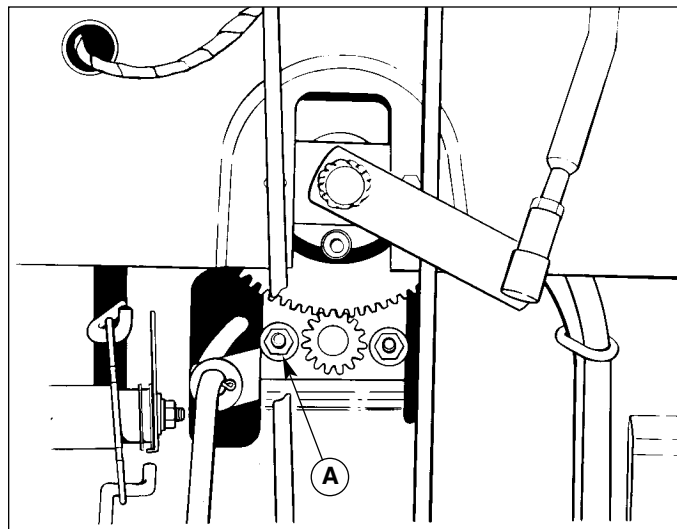


Figure 15. Steering Gear Adjustment  
A. Capscrews

### MOWER ADJUSTMENT

#### WARNING

**Before checking mower, shut off PTO and engine. Allow all moving parts to stop. Remove ignition key, then disconnect the spark plug wire and fasten it away from the spark plug.**

#### Leveling The Mower

If the cut is uneven, the mower may need leveling. Unequal or improper tire pressure may also cause an uneven cut. Make sure tire pressure is correct as specified in Checking Tire Pressure.

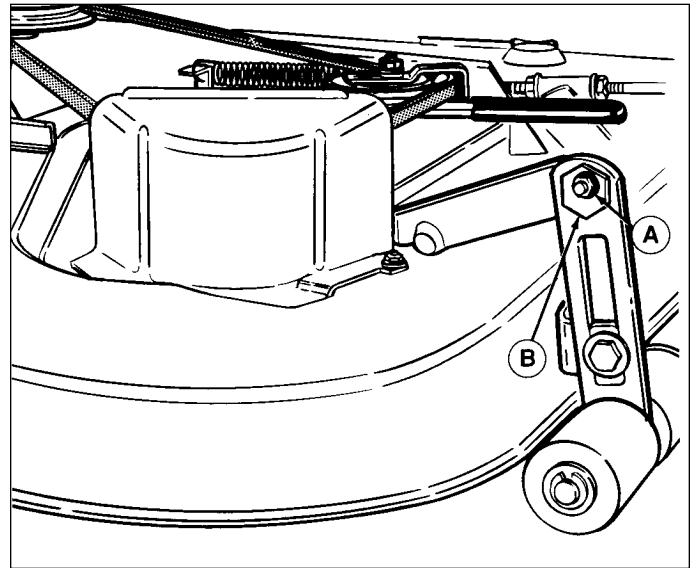
1. With the mower installed, place the tractor on a smooth, level surface such as a concrete floor. Turn the front wheels straight forward.
2. Check for bent blades and replace if necessary.
3. Disengage the PTO. Place the mower in mid-cutting height position. Arrange the mower blades so that they are pointing from side-to-side.
4. Measure the distance between the outside tips of each blade and the ground. If there is more than 1/8" (3mm) difference between the measurements on each side, proceed to step 5. If the difference is 1/8" (3mm) or less, proceed to step 6.
5. See Figure 16. Loosen the outside nut (A). Turn the eccentric nut (B) to raise or lower left-hand side of mower. When mower is level, hold the eccentric nut while tightening the outside nut.

#### **TURBO COLLECTION SYSTEM NOTE:**

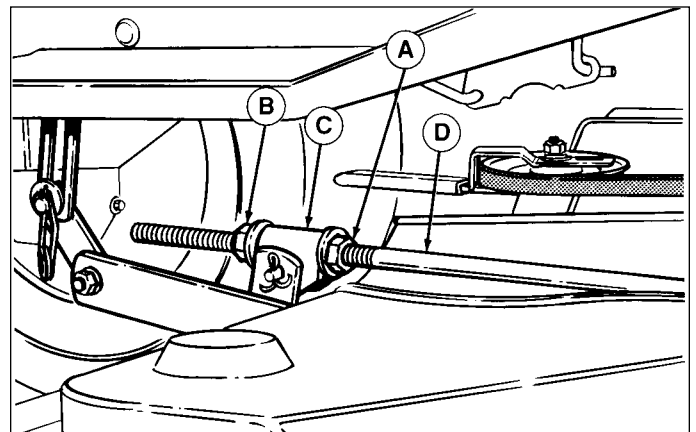
*When using a turbo collection system, raise the discharge side of the mower approximately 1/4" to compensate for turbo assembly weight. Check the level of the cut grass and adjust the 1/4" measurement as necessary for a smooth, even cut.*

6. Arrange the blades so they face front-to-back.
7. On 38" deck, measure the distance from the ground to front tip of the right blade and from the ground to the rear tip of the left blade.  
On 44" decks, measure the distance from the ground to the front tip of the center blade, and from the ground to rear tips of left-hand and right-hand blades. Front tips on either deck should be 1/4" higher. If not, proceed with steps 8 - 10.

8. See Figure 17. To raise front of mower deck, loosen front nut (A) and turn rear nut (B) against bracket (C).
9. To lower front of mower deck, loosen rear nut (B) and bracket (C) will move backwards to lengthen rod.
10. Re-check measurement before tightening front nut (A) against bracket.



**Figure 16. Leveling The Mower Side-to-Side**  
A. Outside Nut      B. Eccentric Nut



**Figure 17. Leveling The Mower Front-To-Back**  
A. Front Nut      C. Mower Bracket  
B. Rear Nut      D. Adjustment Rod

## Notes

## Notes

[illegible]

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# SECTION 5. ELECTRICAL TROUBLESHOOTING

# 5 Electrical Troubleshooting

## General Information - Theory

---

### INTRODUCTION

#### Tools Needed

- VOM (Volt-Ohm meter, multi-meter, or equivalent)
- Test Light.
- Jumper wires with clips at both ends.

#### Electrical System Changes

Early and later model Broadmoors may have different electrical components. However, the basic configurations and troubleshooting procedures given in this section still apply. For instance: If the troubleshooting procedure instructs you to test the clutch / brake pedal switch, and your tractor doesn't have a clutch / brake pedal switch, simply skip that step.

#### System Description

The tractor has four basic electrical systems: ignition, charging, cranking, and the safety interlock system.

- The ignition system, contained in the engine, is connected through a harness from the magneto to the ignition switch and interlock module.
- The charging system replenishes lost power to the battery. The alternator supplies power through a wiring harness that is connected to a circuit breaker, and then to the battery.
- The cranking system provides the high energy needed to start the engine. Current is drawn from the battery, through the solenoid, to the starter when the ignition switch is activated.
- The safety interlock system incorporates safety circuits for safe starting, operation, and shutdown under unsafe conditions. It consists of the neutral safety switch, PTO switch, "Operator present" seat switch, clutch/brake switch, and the interlock module.

### PRINCIPALS OF OPERATION

#### Ignition System

When the ignition switch is turned to OFF, the ignition circuit closes and grounds the ignition coil stopping the engine by terminating spark

When the ignition switch is in the RUN position, the ignition circuit is open, allowing the engine to run.

#### Charging System

While the engine is running, current flows from the alternator through a rectifier to the positive battery post and charges the battery. The circuit breaker, normally closed, opens if the circuit is shorted.

#### Cranking System

Battery voltage is present at the "B" terminal of the ignition switch at all times (see Figure 8). Turning the ignition switch to START supplies 12 volts to one of the solenoid coil terminals. Current is then passed through the other solenoid coil post to the safety ground circuit. If all safety switches are closed, the solenoid coil is grounded engaging the solenoid and sending power to the starter.

If the PTO, transmission, or clutch/brake pedal is engaged, or if the operator present seat switch is open--the solenoid will not be grounded and the starter will not crank the engine.

#### Safety Interlock System

The safety system can be divided into two sub-systems. The first grounds the engine ignition module if the operator leaves the seat with the transmission engaged or the PTO engaged.

If the operator leaves the seat, the engine will run only if:

- the PTO is disengaged, AND
- the the parking brake is ON, AND
- the ground speed control lever is in the neutral gate.

The second sub-system prevents the engine from cranking if the operator is not in the seat with the transmission disengaged and the PTO disengaged.

The engine will crank only if::

- the operator is in the seat, AND
- the PTO is disengaged, AND
- the clutch / brake pedal is depressed, AND
- the groundspeed control lever is in the neutral gate.

#### Operation

If the seat switch system is functioning properly, the following statements are true:

1. The engine will not start unless an operator is in the seat.
2. The engine will stop running if the operator leaves his seat while:
  - a.) the parking brake off, or
  - b.) the PTO is engaged, or
  - c.) the ground speed control lever is outside the neutral gate.
3. If the operator is in the seat, the operator can engage and disengage the transmission and PTO while engine continues to run.

## CHECKING OUT THE SYSTEM

### General

Both the ignition and charging systems are internal to the tractor engine. Follow the Troubleshooting Guide, Section 2, or refer to your engine manual for information. See an authorized dealer or appropriate service manual for additional engine troubleshooting information.

The cranking and safety start systems have interconnected components. The testing of these components and troubleshooting procedures is covered in detail in this section.

The testing procedures contained in this section are intended to be performed as a series. Skipping a step or leaving it uncompleted can create a dangerous situation and produce incorrect test results.

Unless otherwise instructed, all tests must be performed with the ground speed control lever in the neutral gate with the parking brake engaged, the operator present seat switch activated, and the PTO switch off.

Reattach components after each test and touch only points mentioned in the test procedure to avoid possible damage to testers or components.

### Basic Electrical Terms:

"Ground" is the negative battery post or any other conductive part of the frame. For best results, use the negative battery post as ground.

"VOM" is a volt-ohm meter, multi-meter, or equivalent.

"VDC" is volts of direct current or the VOM setting used to measure DC voltage.

"Ohms" are units of resistance or the VOM setting used to measure resistance.

"Continuity" is an continuous, unbroken circuit. In this manual continuity is determined with a VOM set to measure Ohms. Zero Ohms is true continuity. However, due to contact point corrosion and resistance within wires, continuity may measure several Ohms.

"No Continuity" is a broken circuit. In this manual no continuity is determined with a VOM set to measure Ohms. No continuity will register as infinite Ohms.

"Battery Voltage" is the approximate voltage output of the battery. Keep in mind that "battery voltage" tested at any component will be slightly lower than "battery voltage" tested at the battery terminals due to resistance within connections and wires.

## Test Series

### CHECKING THE POWER SUPPLY

1. Wiring
2. Battery Tests
  - Check fluid level
  - Clean battery and terminals
  - Hydrometer (charge) test
  - Heavy load test
3. Battery Cables

### ISOLATE STARTING AND SAFETY SYSTEMS

#### CHECKING THE CRANKING SYSTEM

1. Test Circuit Breaker
2. Test Power to Ignition Switch
3. Test Ignition Switch
4. Test Power to Solenoid
5. Test Solenoid
6. Solenoid Bench Test
7. Test Power To Starter

#### TEST SAFETY INTERLOCK SYSTEM

1. PTO Interlock Switch
2. Seat Switch (Mechanical)
3. Seat Switch (Electrical)
4. Clutch/Brake Switch (Mechanical)
5. Clutch/Brake Switch (Electrical)
6. Neutral Safety Switch (Mechanical)
7. Neutral Safety Switch (Electrical)
8. Interlock Module

#### MISC. TESTS

1. Headlights
2. Power to Headlights
3. Headlight Switch
1. Hour Meter
2. Power to Hour Meter
1. Inspect and replace Dash Lights
1. PTO Clutch



# 5 Electrical Troubleshooting

## Lower Wiring Harness

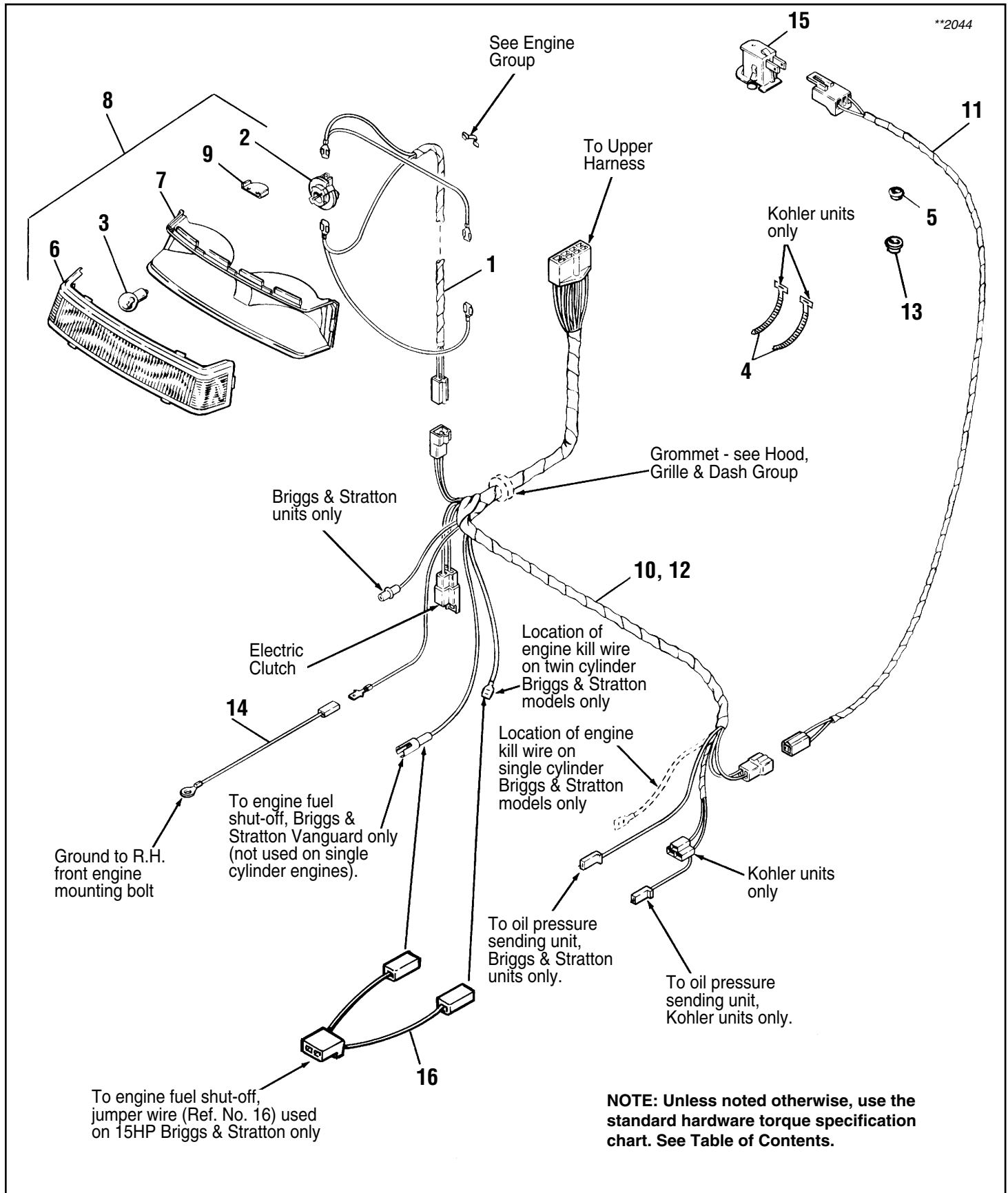


Figure 1. Lower Wiring Harness

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#### LOWER WIRING HARNESS

REF. NO.	QTY.	DESCRIPTION
1	1	WIRE ASSY., Headlight
2	2	SOCKET, Bulb
3	2	BULB, Headlight, 12.8V
4	2	TIE, Cable
5	2	BUSHING, Snap, Small
6	1	LENS, Headlight
7	1	BEZEL, Headlight
8	1	HEADLIGHT ASSY. (Incl. Ref. Nos. 2, 3, 6, 7 & 9)
9	2	HEAT SHIELD
10	1	HARNESS ASSY., Lower (14, 15 & 16 HP Briggs & Stratton)
11	1	WIRE ASSY., Seat Switch
12	1	HARNESS ASSY., Lower (14 & 15 HP Kohler)
13	1	BUSHING, Snap, Large (14 & 15 HP Kohler only)
14	1	WIRE ASSY., Engine Ground
15	1	SWITCH, Seat, Operator Present
16	1	WIRE ASSY., Jumper (15 HP Briggs & Stratton only)

# 5 Electrical Troubleshooting

## Main Wiring Harness

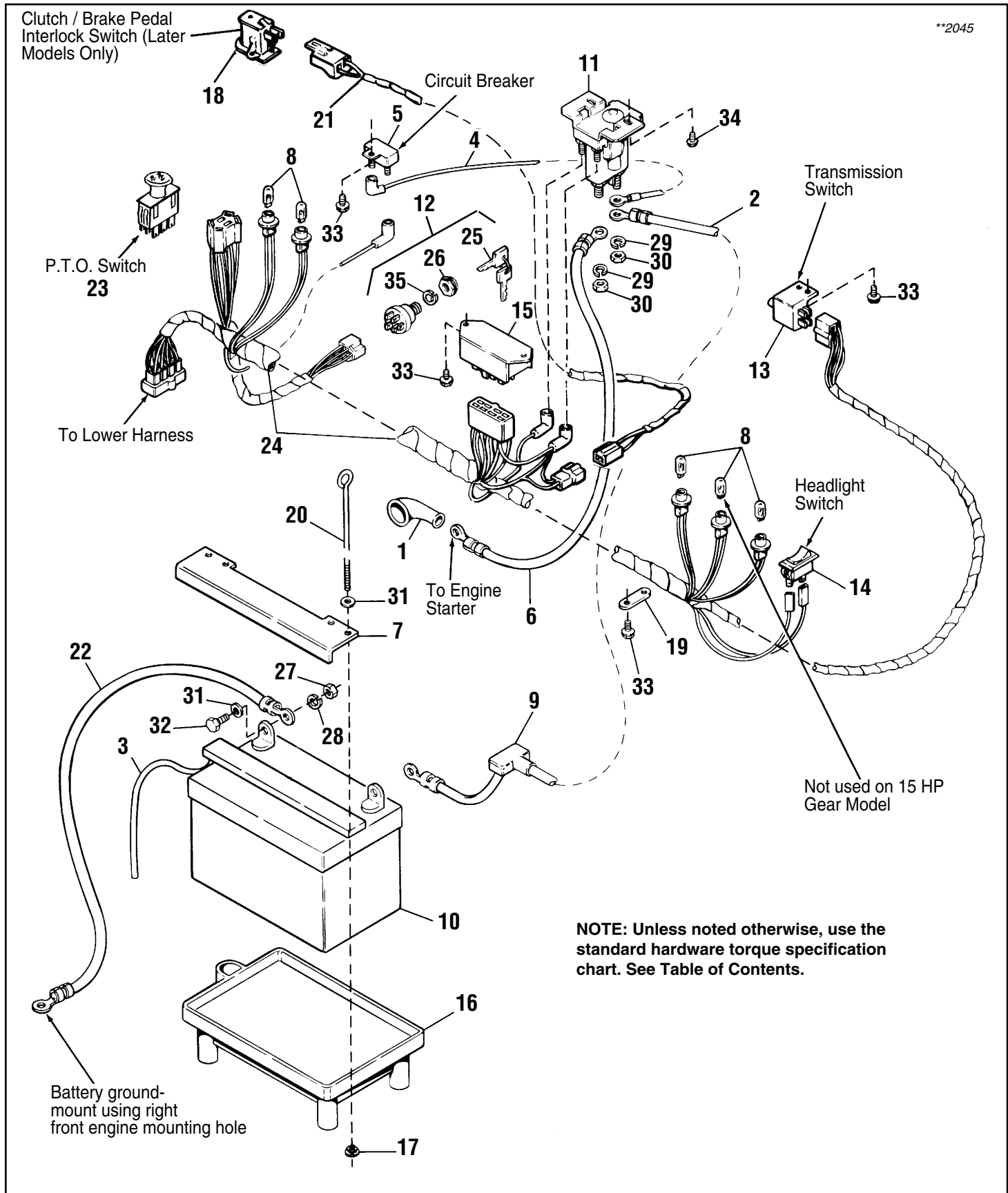


Figure 2. Main Wiring Harness

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**MAIN WIRING HARNESS**

REF. NO.	QTY.	DESCRIPTION
1	1	COVER, Terminal
2	1	CABLE, Battery to Solenoid
3	1	HOSE, Battery, Drain
4	1	WIRE ASSY.
5	1	CIRCUIT BREAKER
6	1	CABLE, Solenoid to Starter
7	1	HOLD DOWN, Battery
8	5	BULB, Indicator Light (Qty. 4 used on 15 HP models)
9	1	BOOT, Insulator
10	1	BATTERY
11	1	SOLENOID
12	1	IGNITION SWITCH ASSY. (Incl. Ref. Nos. 25, 26 & 35)
13	1	SWITCH, Transmission, Neutral Start
14	1	SWITCH, Headlight
15	1	MODULE
16	1	TRAY, Battery
17	2	NUT, Plastic, 1/4-20
18	1	SWITCH, Interlock, Clutch / Brake Pedal
19	1	STRAP, Wire Retainer
20	2	ROD, Battery Hold Down
21	1	WIRE ASSY.
22	1	CABLE, Battery to Ground
23	1	SWITCH, PTO Electric Clutch
24	1	HARNESS, Upper
25	2	KEY, Ignition
26	1	NUT
27	2	NUT, Hex, Full, 1/4-20 (15 HP models only)
28	2	LOCKWASHER, 1/4
29	2	LOCKWASHER, 5/16
30	2	NUT, Hex, 5/16-24
31	6	WASHER, Plain, 9/32
32	2	CAPSCREW, Hex, 1/4-20 x 3/4
33	7	SCREW, Plastite, #8-16 x 1/2
34	2	SCREW, Plastite, 1/4-20 x 1/2
35	1	LOCKWASHER, Internal Tooth, 5/8

# 5 Electrical Troubleshooting

## Battery & Cable Tests

### 1. CHECKING THE POWER SUPPLY

#### A. Check Wiring Condition and Tightness

1. Check all wires for cracked or worn insulation.
2. Check all connectors, terminals, and receptacles for looseness or corrosion. See Figures 1 and 2.

#### B. Battery Tests

##### GENERAL

If the battery is producing 12 volts and the battery cables have continuity, the rest of the cranking system can be systematically tested. However, a full test of the battery includes cleaning, testing battery charge (hydrometer test) and testing its ability to deliver current (heavy load test).

*NOTE: Before testing, check the battery for any damage such as a loose post or cracks. Damaged batteries must be replaced.*

##### CHECK ELECTROLYTE LEVEL

1. Remove the battery vent cap/caps and make sure the breather holes are open.
2. Check that fluid is even with the bottom of the split rings (see Figure 3). If not, fill with distilled water.

##### TEST BATTERY VOLTAGE

1. Test the battery voltage: set VOM to VDC.
2. Place one test probe of the VOM on the battery's positive post and one probe on the negative post. Note and record the battery voltage as it will be referenced in later tests.

##### HEAVY LOAD TEST

1. Follow the load tester manufacturer's instructions; connect the battery tester to the battery.
2. Discharge the battery under a fixed load at three times the ampere-hour rating for approximately 15 seconds, then read the terminal voltage.



#### WARNING

TO PREVENT ACCIDENTAL STARTING, DISCONNECT AND SECURE THE SPARK PLUG WIRES BEFORE CONDUCTING ANY ELECTRICAL TESTS.



#### WARNING

UNLESS OTHERWISE INSTRUCTED, ALL TESTS MUST BE PERFORMED WITH THE GROUND SPEED CONTROL LEVER IN NEUTRAL, THE PARKING BRAKE ENGAGED, AN OPERATOR IN THE SEAT, AND THE PTO SWITCH OFF.



#### CAUTION

REATTACH COMPONENTS AFTER EACH TEST.

DO NOT PROBE COMPONENTS UNLESS SPECIFICALLY INSTRUCTED TO DO SO.

TO AVOID A SHORT CIRCUIT AND THE POSSIBILITY OF SPARKS, DO NOT TOUCH THE TERMINALS EXCEPT AS DIRECTED.



#### CAUTION

BATTERY ACID CAUSES SEVERE BURNS

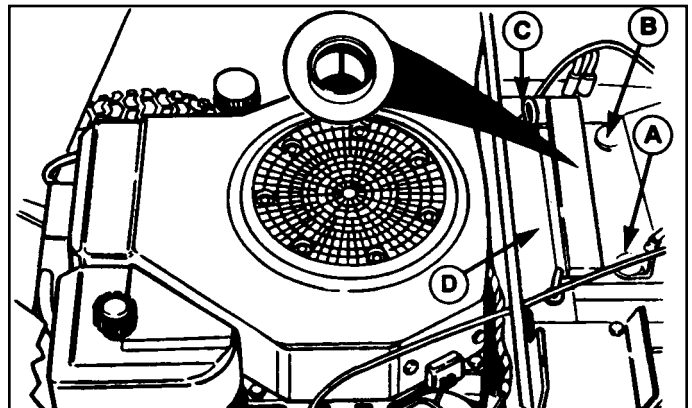


Figure 3. Battery Location and Checking Electrolyte Level

#### HYDROMETER TEST

1. Check each cell using a hydrometer.

All cells should have a specific gravity of 1.27 or better. If the cells vary by more than .050 points, charge the battery and recheck.

If one or more cells reads below 1.265 charge at 5 Amps checking hourly. If the low cell or cells do not improve within 3 hours of charging, replace the battery.

#### CLEAN BATTERY

1. Disconnect the negative battery cable, then the positive. See Figure 4.
2. Remove the battery from the battery compartment.
3. Replace the vent cap and remove dirt and corrosion with a solution of 1 part baking soda and 7 parts water.
4. Clean the posts with a wire brush until the metal is shiny.
5. After the battery is reinstalled coat the terminals with petroleum jelly to prevent corrosion.

#### C. Clean and Test Battery Cables

**NOTE:** Be sure to label record where and to which posts each cable is connected.

1. Remove the negative battery cable from the battery and from the ground. Clean the cable terminals and the engine ground with a wire brush until the metal is shiny.
2. Remove the positive cable from the battery and solenoid. Clean the terminals and solenoid post with a wire brush until the metal is shiny.
3. Remove the cable going from the solenoid to the starter. Clean the cable terminals, solenoid post, and starter post with a wire brush until the metal is shiny.
4. Clean the terminal connecting the circuit breaker to the solenoid.
5. Set the VOM to Ohms and check the cables for continuity. Replace any cable that has more than 2 Ohms of resistance or is damaged in any way.
6. Reconnect all cables and terminals to their original connections.



#### WARNING

**FOLLOW BATTERY CHARGER MANUFACTURER'S INSTRUCTIONS. BATTERY ACID FORMS EXPLOSIVE GASSES, KEEP FLAMES AND SPARKS AWAY.**



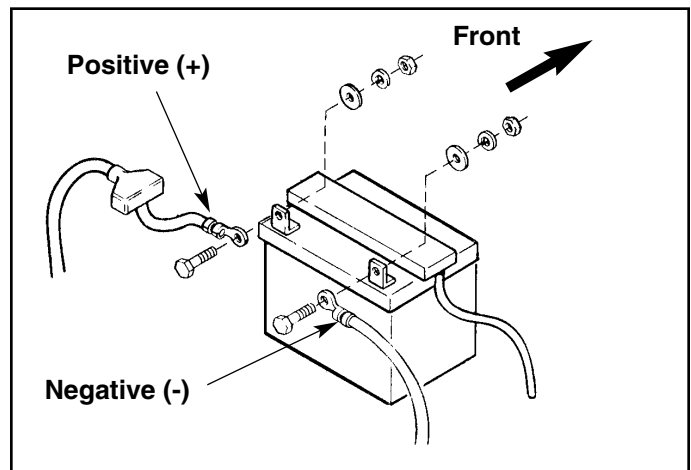
#### CAUTION

**BATTERY ACID CAUSES SEVERE BURNS**

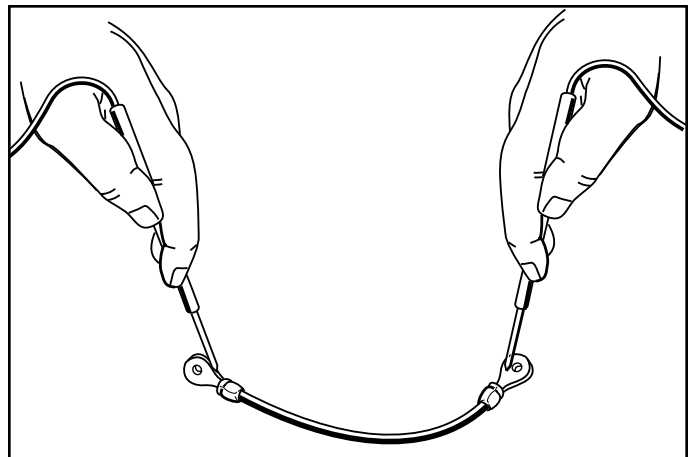


#### WARNING

**ALWAYS DISCONNECT THE NEGATIVE BATTERY CABLE FIRST AND RECONNECT IT LAST TO PREVENT SPARKS IF THE POSITIVE TERMINAL IS ACCIDENTALLY GROUNDED TO THE FRAME BY A TOOL**



**Figure 4. Battery Cable & Hardware Removal**



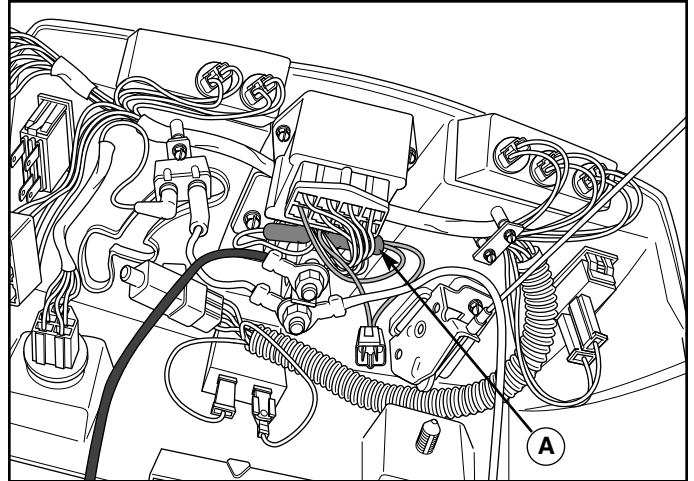
**Figure 5. Testing Cable Continuity**

# 5 Electrical Troubleshooting

## System Isolation / Cranking System Tests

### 2. ISOLATE CRANKING AND SAFETY SYSTEMS

1. Disconnect the spark plug wire(s) from the spark plug(s) to prevent accidental starting.
2. Remove the black/yellow and green/black connector (A, Figure 6) from the small solenoid post.
3. Connect a jumper lead from the small solenoid post to good ground.
4. With an operator in the seat, the PTO switch off, the parking brake engaged, and the ground speed control lever in the neutral gate, attempt to crank the engine.
  - a.) If the starter turns the engine over, proceed to part 4 TESTING THE SAFETY INTERLOCK SYSTEM.
  - b.) If the starter does not turn the engine over, proceed to part 3 TESTING THE CRANKING SYSTEM.
5. Remove the jumper and reconnect the black/yellow and green/black connector to the solenoid.



**Figure 6. Isolating the Cranking and Safety System**  
**A. Black/Yellow & Green/Black Connector**

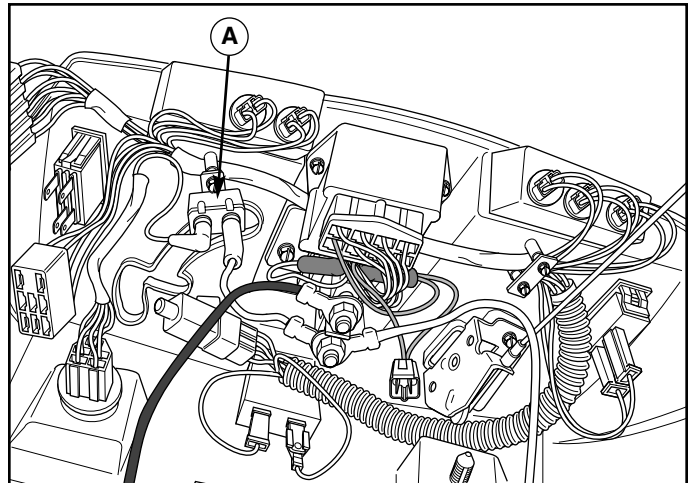
### 3. TESTING THE CRANKING SYSTEM

For the following tests it is assumed that the battery is fully charged and all connections and wires are good.

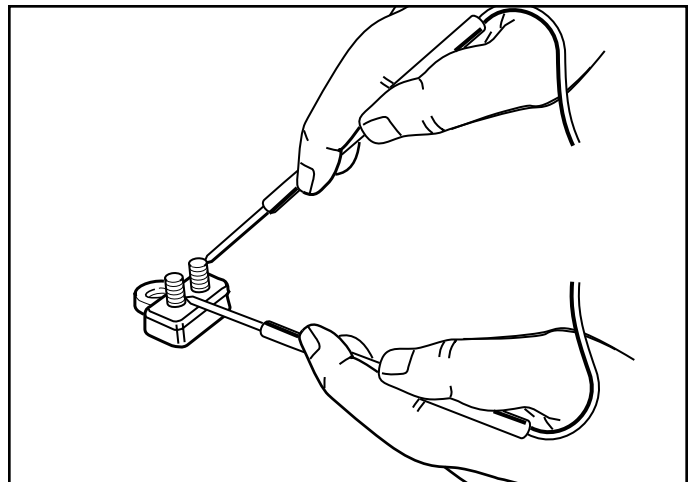
#### A. Test Circuit Breaker

The circuit breaker (A, Figure 7) is connected to the positive post of the battery through the positive battery cable connected at the large post of the solenoid.

1. Set the VOM to VDC.
2. With the negative probe, touch ground.
3. Touch the positive probe to one post of the circuit breaker, and then, the other. Both posts should have close to full battery voltage going to them. If not, replace the breaker.
4. Set VOM to Ohms.
5. See Figure 8. Probe both circuit breaker terminals. If the VOM reads 5 Ohms or more, replace the circuit breaker.



**Figure 7. Circuit Breaker Location**  
**A. Circuit Breaker**

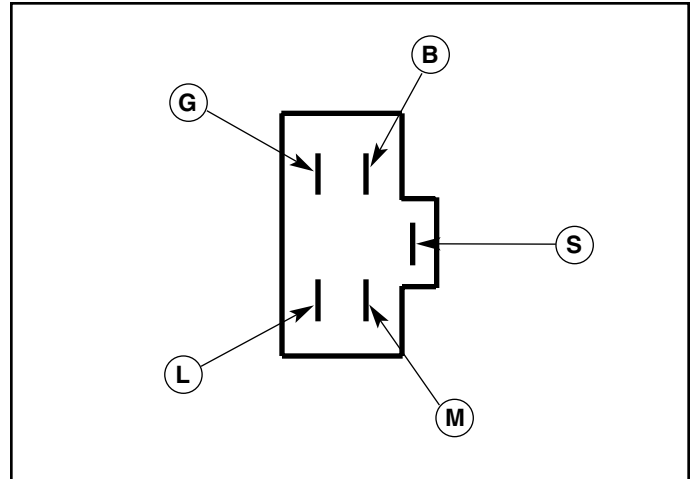


**Figure 8. Testing the Circuit Breaker**



### B. Test Power to Ignition Switch

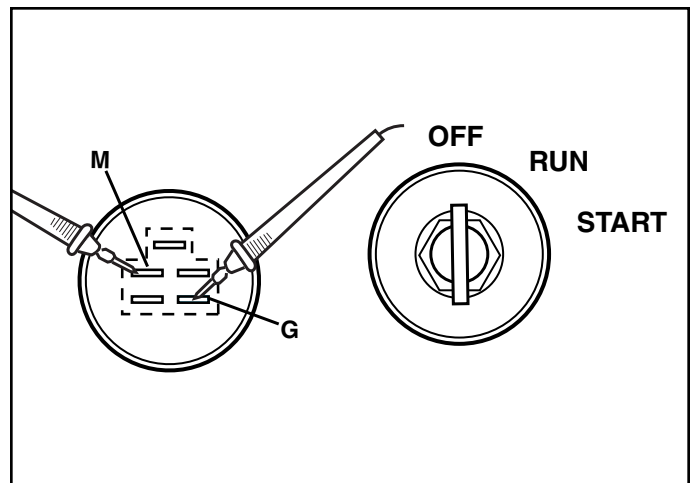
1. Pull plug off ignition switch.
2. Set VOM to VDC
3. Probe ground. Probe the "B" receptacle (see Figure 9) on the ignition switch plug. The VOM should show battery voltage. If not, check the battery, circuit breaker, and all connections.
4. Reinstall the ignition plug.



**Figure 9. Ignition Switch Wire Harness (As Viewed From Engaging End)**

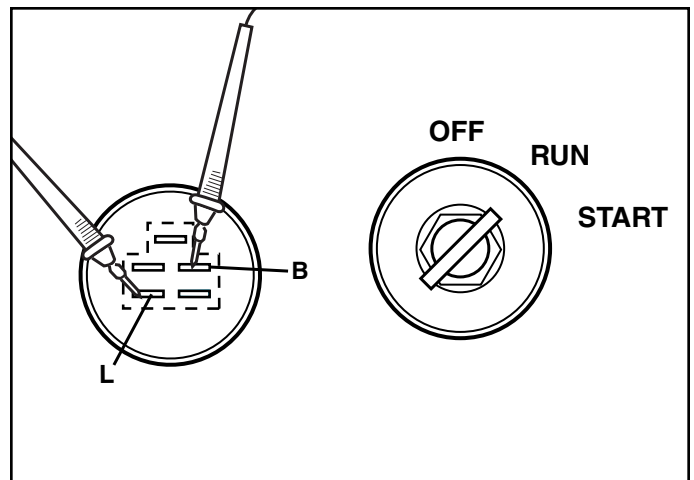
### C. Test Ignition Switch

1. Remove the plug from the ignition switch.
2. Remove the ignition switch from the dash board.
3. Set VOM to Ohms.
4. With key switch in the OFF position connect test leads to terminals G and M. There should be a reading of 0.3-3 (continuity) on multi-meter.
5. Check all other connection combinations for no continuity. G to M should be the only combination that has continuity; all other connection combinations should have no continuity.



**Figure 10. Testing the Ignition Switch**

6. With the key switch in the RUN position, connect the VOM to terminal B and terminal L. There should be a reading of 0.3-3 Ohms (continuity) on the VOM.
7. Check all other connection combinations for no continuity. B to L should be the only combination that has continuity; all other connection combinations should have no continuity.



**Figure 11. Testing the Ignition Switch**

## 5 Electrical Troubleshooting

### Ignition Switch / Solenoid Tests

8. Hold switch in START position. Test the following connections for continuity: B to L, B to S, L to S. There should be a reading of 0.3-1.0 ohms (continuity) on the multi-meter (see Figures 12-14).
  9. Check all other connection combinations for no continuity. B to L, B to S, and L to S should be the only combinations that have continuity; all other connection combinations should have no continuity.
- Replace a switch that does not meet all of the above test results.
10. Reinstall the ignition switch and reattach the plug.

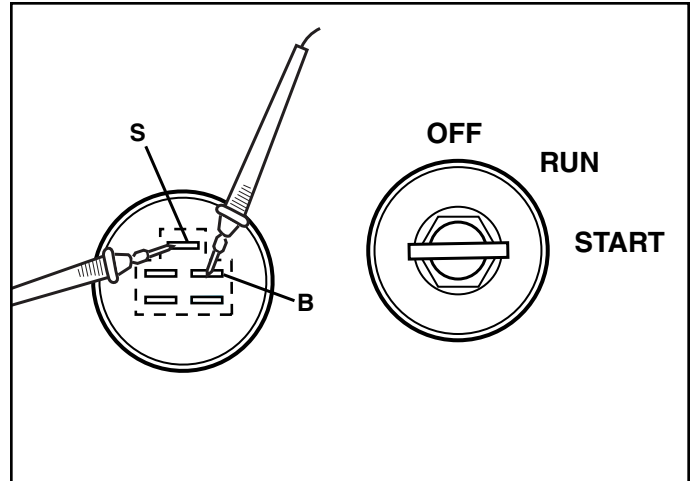


Figure 13. Testing the Ignition Switch

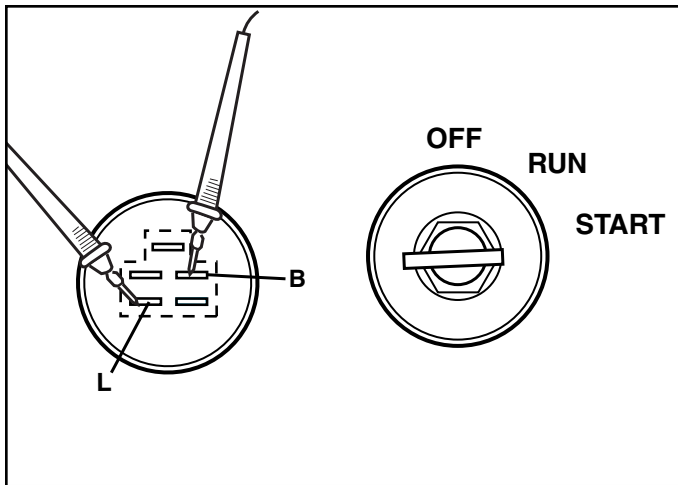


Figure 12. Testing the Ignition Switch

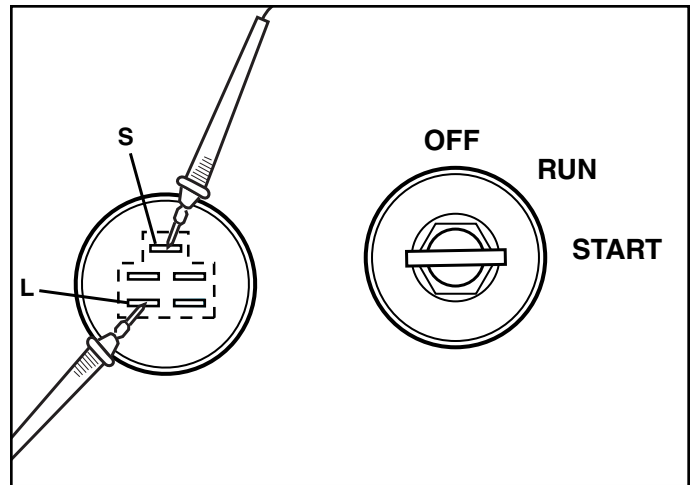


Figure 14. Testing the Ignition Switch

#### D. Test Power to Solenoid

1. Unplug the blue / white wire (A, Figure 15) from solenoid post 1 (see Figure 15).
2. Probe ground. Probe the blue / white wire plug.
3. Turn the ignition switch to START. The VOM should show battery voltage. If not, recheck the key switch, circuit breaker, and all connections.

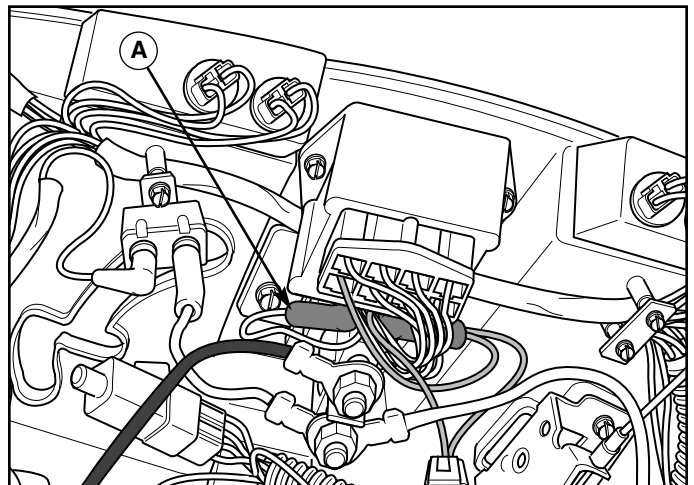


Figure 15. Solenoid Location  
A. Blue/White Wire & Plug

#### E. Test Solenoid

For this, and all tests, the ground speed control lever must be in neutral, the parking brake set, and the PTO switch must be OFF. Unplug and secure all spark plug wires. Read completely through the instructions before performing this and all tests.

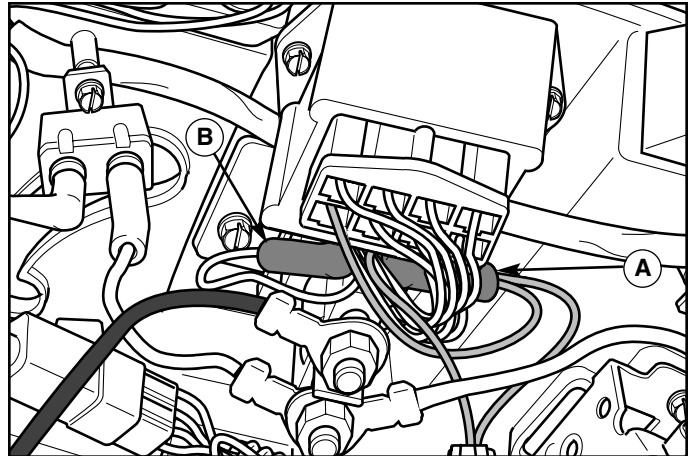
1. Disconnect the Green/Black & Black/Yellow plug (A, Figure 16) and Blue/White plug (B, Figure 16) from the small posts of the solenoid.
2. Connect a jumper lead from one small post to ground.
3. Connect a jumper lead to the other small post and then touch it to the positive battery post. The lead may arch to the battery post—this is normal.

There should be a single audible “click” heard as the solenoid engages and the engine should turn over. If no click is heard, proceed to SOLENOID BENCH TEST. If the solenoid clicks but the starter does not turn the engine over, check the starter cable and the starter itself. If the solenoid “clicks” rapidly or repeatedly, recheck the battery and all connections for corrosion.

#### F. Solenoid Bench Test

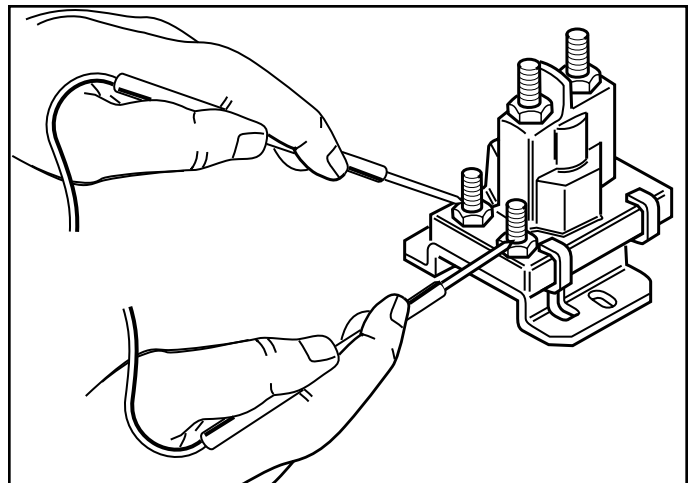
Replace a solenoid that does not pass all of the following tests.

1. Identify and remove all wires from the solenoid.  
Remove the solenoid.
2. Set the VOM to the Ohms setting. Probe the small posts of the solenoid (Figure 17). The VOM should read less than 10 Ohms.
3. Connect the VOM probes to the large posts (Figure 18). The meter should read no continuity.

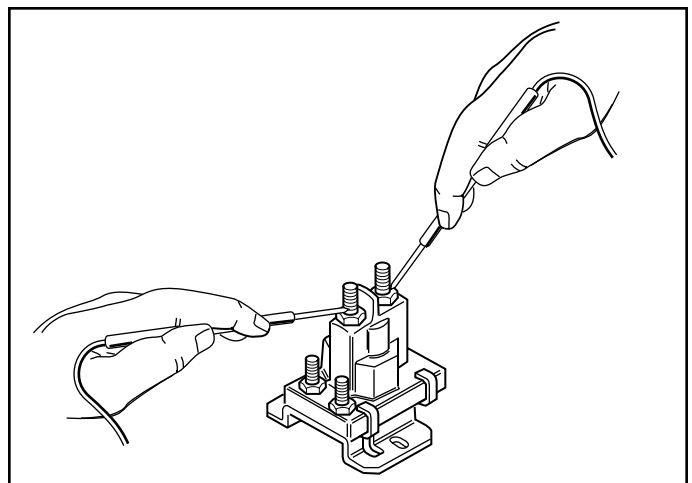


**Figure 16. Solenoid Location**

- A. Green/Black & Black/Yellow Plug**
- B. Blue/White Plug**



**Figure 17. Testing Solenoid Resistance**



**Figure 18. Testing Solenoid Short**

## 5 Electrical Troubleshooting

### Solenoid / Starter Tests

4. Probe the mounting base of the solenoid. Probe small post #1 and observe the VOM. Probe post #2 and observe the VOM. The VOM should read no continuity in both cases.

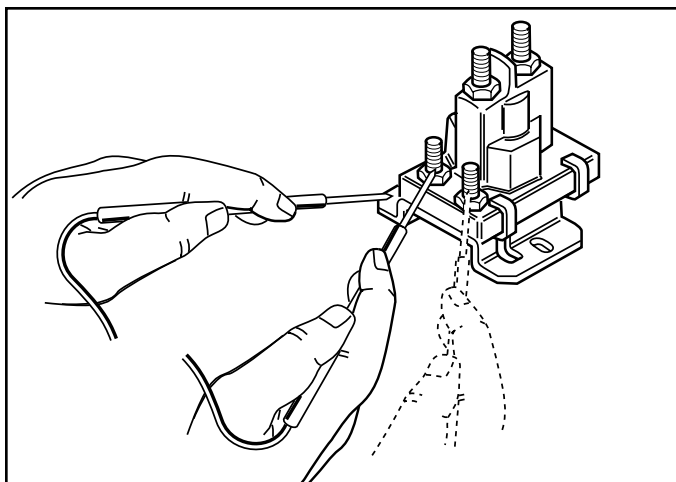


Figure 19. Testing for Solenoid Short

5. Apply 12 VDC to the two small posts. There should be an audible click as the solenoid engages.
6. With the solenoid engaged (12 VDC to the small posts), measure the resistance at the two large posts. The VOM should read less than 10 ohms (continuity).
7. Correctly reinstall the solenoid and all related wires and connectors.

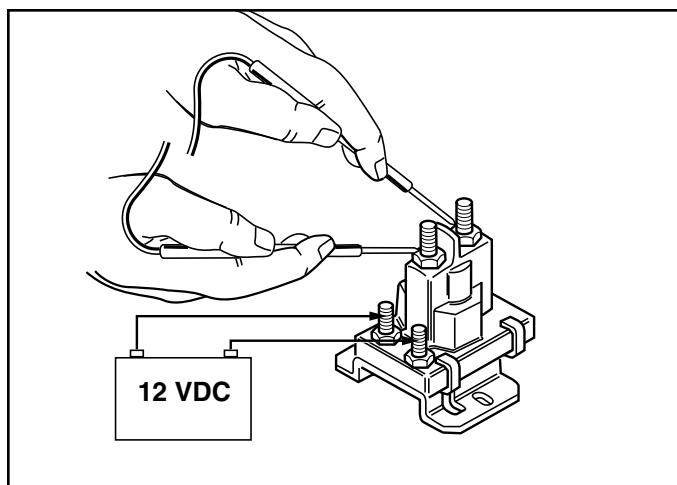


Figure 20. Testing Solenoid Continuity

### G. Test Power to Starter

For this, and all tests, the ground speed control lever must be in the neutral gate, the parking brake set, and the PTO switch must be OFF. Unplug and secure all spark plug wires.

1. Set VOM to VDC.
1. Probe ground. Pull the boot back and probe the starter post (see Figure 21).
2. Turn the ignition switch to start.

The VOM should read battery voltage.

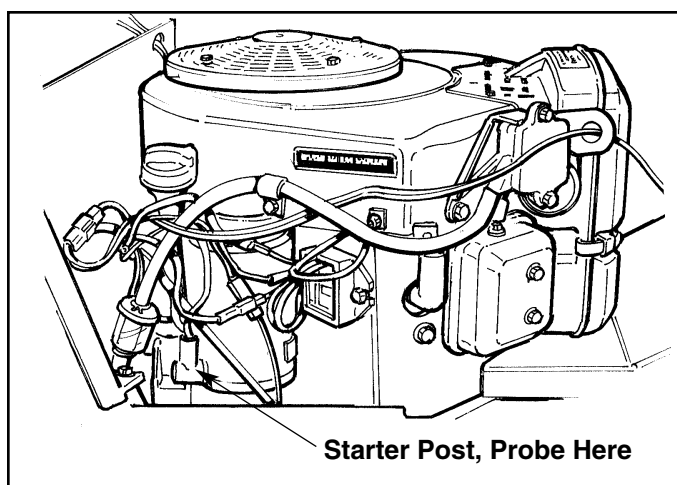


Figure 21. Testing Power to Starter

### 4. TESTING THE SAFETY INTERLOCK SYSTEM

#### A. Test PTO Interlock Switch

When a switch is replaced, test the new switch to make sure it works correctly.

1. Turn the PTO switch (A, Figure 22) OFF.
2. Remove the PTO switch wire harness plug.
3. Set VOM to Ohms ( ). Touch one probe to each of the back row of terminals. The VOM should show no continuity. (Terminals closer together)

4. Touch one probe to each of the front row of terminals. The VOM should show continuity (Terminals further apart)

5. Move PTO switch to the ON position.
6. Touch one probe to each of the back row of terminals. The VOM should show continuity

7. Touch one probe to each of the front row of terminals. The VOM should show no continuity.

#### B. Test Seat Switch (Mechanical)

1. Tilt the seat forward and rest it against the steering wheel. The switch button should not be depressed.
2. Tilt the seat down to operating position and have someone sit in the seat. The weight of the operator should depress the switch button.

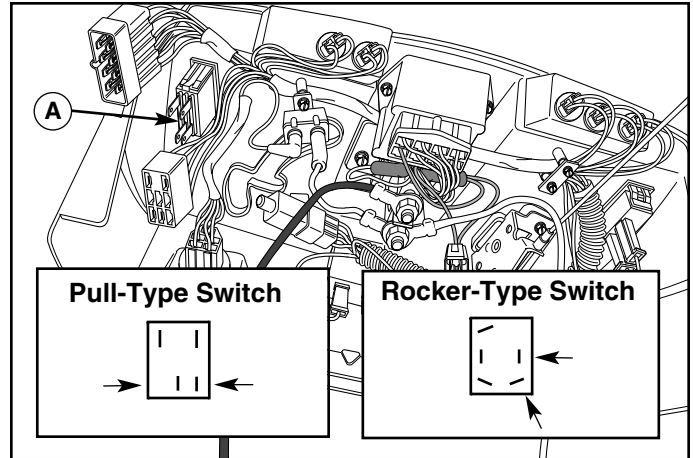


Figure 22. PTO Switch Testing  
A. PTO Switch



Figure 23. PTO Switch Testing



Figure 24. PTO Switch Testing

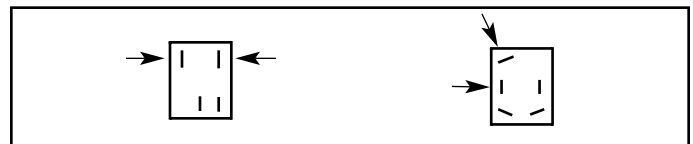


Figure 25. PTO Switch Testing

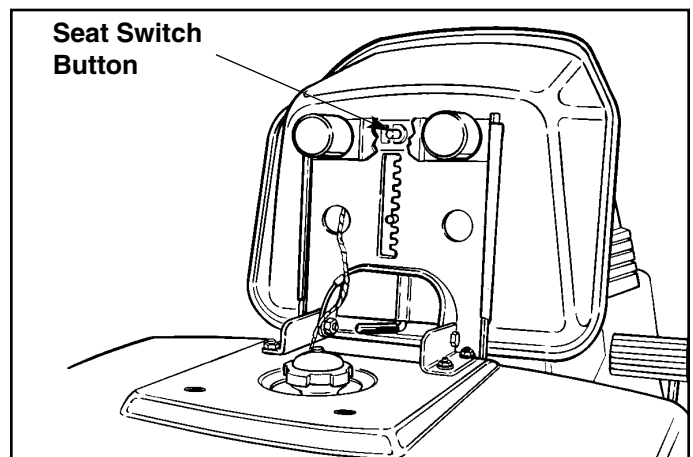


Figure 26. Test Seat Switch (Mechanical)

## 5 Electrical Troubleshooting

### Seat Switch / Clutch / Brake Switch Tests

#### C. Test Seat Switch (Electrical)

1. Raise seat and disconnect the harness plug.
2. Set VOM to Ohms.
3. Connect probes to seat switch terminals. The VOM should read no continuity.
4. Depress seat switch. The meter should show continuity.

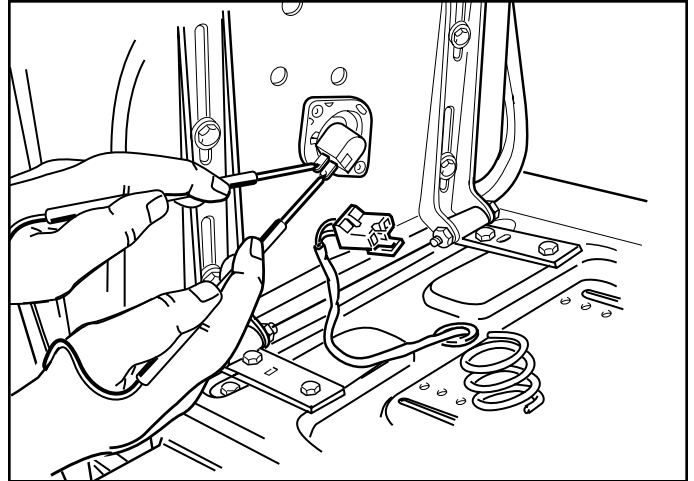


Figure 27. Test Seat Switch (Electrical)

#### D. Test Clutch / Brake Interlock Switch (Mechanical, Later Models Only)

1. Release the parking brake.
2. Check the clutch / brake switch. The switch button should not be depressed.
3. Set the parking brake.
4. Check the clutch / brake switch. The switch button should be depressed.

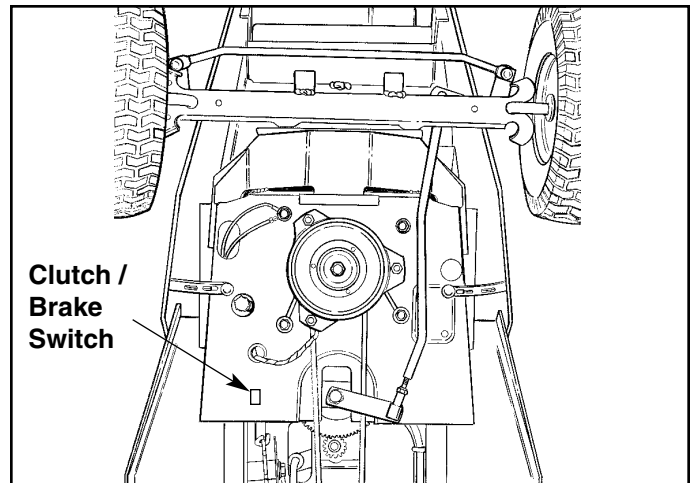


Figure 28. Test Clutch / Brake Switch (Mechanical)

#### E. Test Clutch / Brake Interlock Switch (Electrical, Later Models Only)

1. Release the parking brake.
2. Remove the plug from the clutch/brake pedal interlock switch.
3. Set the VOM to Ohms and probe the terminals of the switch. It should read no continuity.
4. Set the parking brake. The VOM should show continuity.

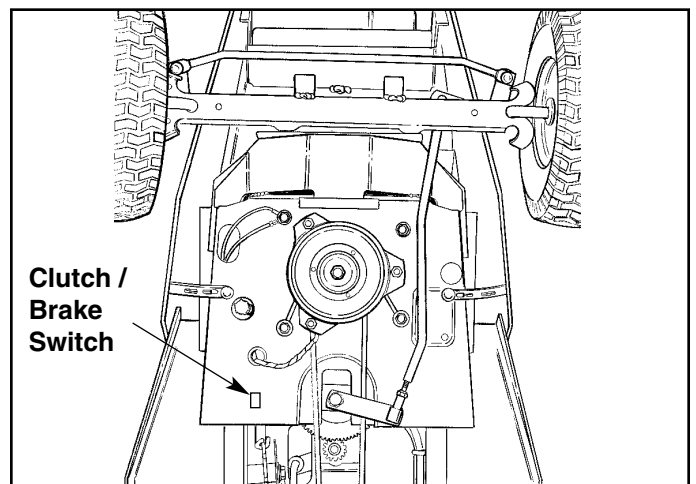


Figure 29. Test Clutch / Brake Switch (Electrical)



#### F. Test Neutral Safety Switch (Mechanical)

*NOTE: When a switch is replaced, test the new switch to make sure it works correctly.*

1. Move ground speed control lever out of the neutral gate.
2. Move ground speed control lever slowly back into the neutral position while observing switch through the dashboard. The lever should depress the switch when in the neutral gate.

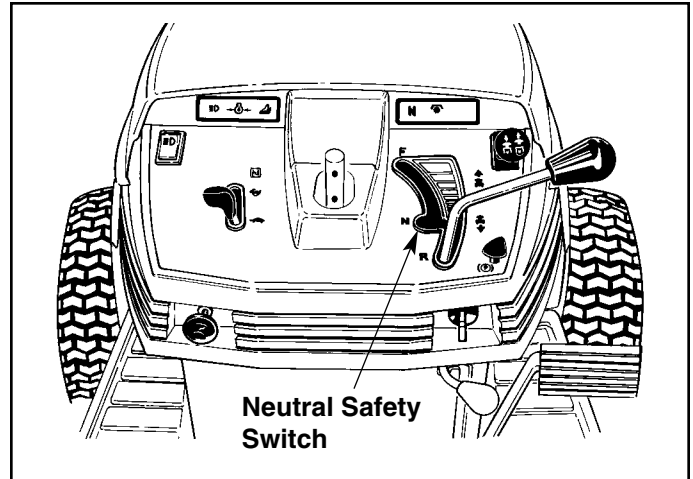


Figure 30. Test Neutral Safety Switch (Mechanical)

#### G. Test Neutral Safety Switch (Electrical)

*NOTE: When a switch is replaced, test the new switch to make sure it works properly.*

*NOTE: The neutral safety switch is located under the dashboard and may be easier to test if removed. Use a 1/4" drive ratchet, a 1" extension, and 1/4" shallow socket to remove the two plastite screws that secure the switch to the dashboard.*

1. Remove the wire harness plug.
2. Place the ground speed control lever in neutral (depress the switch).

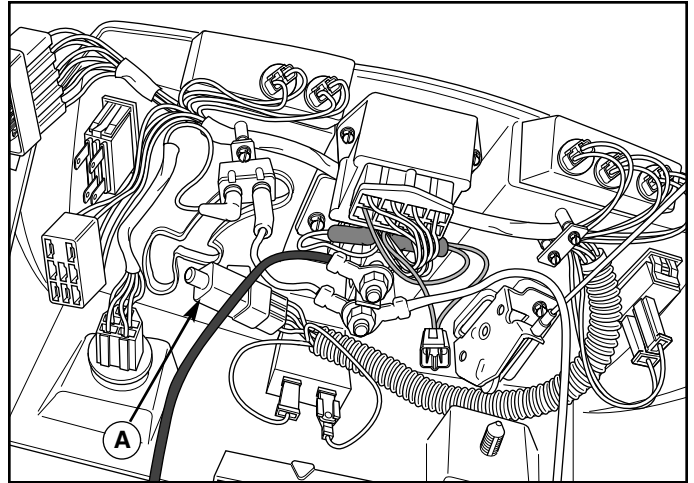


Figure 31. Test Neutral Safety Switch (Electrical)  
A. Neutral Safety Switch

3. Set the VOM to Ohms. Touch one probe to each of the top row terminals and then the bottom row terminals as shown. With the ground speed control lever in neutral (switch depressed) both rows should have continuity.

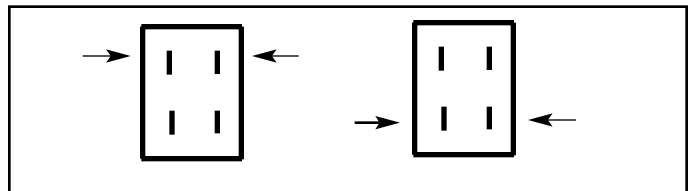


Figure 32. Neutral Safety Switch Testing

4. Move the ground speed control lever out of neutral (switch not depressed).
5. Touch one probe to each of the top row terminals and then the bottom row terminals as shown in Figure 33. With the ground speed control lever in forward (switch not depressed) both rows should have no continuity.

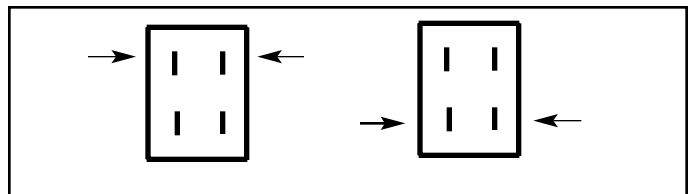


Figure 33. Neutral Safety Switch Testing



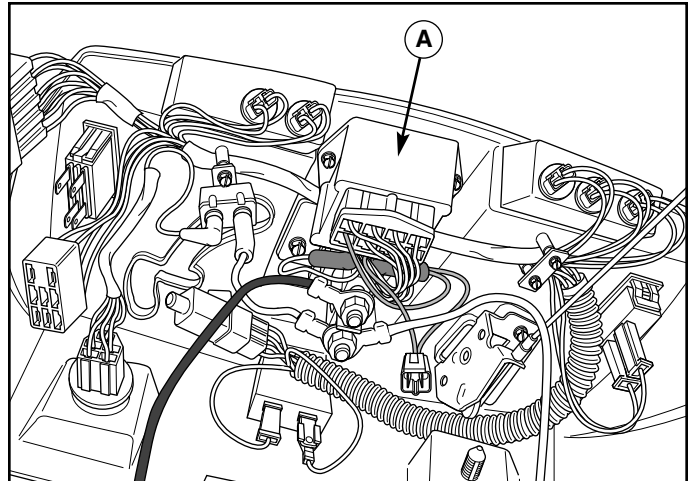
# 5 Electrical Troubleshooting

## Interlock Module / Headlight Tests

### H. Interlock Module

If all other switches, connectors, wires, and cables have tested OK, the interlock module is at fault and must be removed and replaced. The module is not testable. However, if available, a known-good module can be used to test the system.

1. Unplug and remove the old module (A, Figure 34).
2. Substitute the know-good module for the old module.
3. Turn the ignition switch to START. If the engine turns over, the old module is bad and must be replaced.

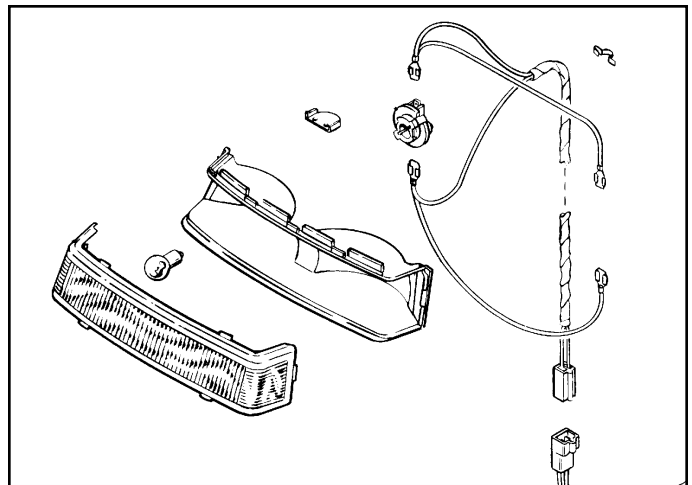


**Figure 34. Interlock Module Location**  
**A. Interlock Module**

## 5. MISCELLANEOUS TESTS

### A. Test Headlight Bulbs

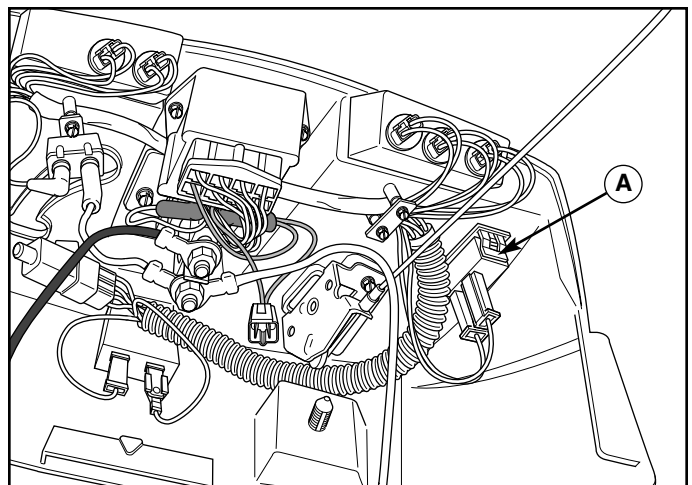
1. Remove the headlights from the headlight assembly by twisting the socket counterclockwise and pulling it out of the reflector assembly.
2. Visually inspect the bulb. If the element is burned out, replace the bulb.



**Figure 35. Headlight Assembly**

### B. Test Power to Headlight Circuit

1. Turn the ignition switch to ON (RUN) and the headlight switch OFF.
2. Set VOM to VDC. Touch the negative probe to ground. Use the positive probe to probe the white / black wire of the headlight switch plug (see Figure 36). The VOM should read battery voltage. If not, check the ignition switch and all connections and wires.
3. Turn the headlight switch ON.
4. Probe ground and the white/green plug on the back of the switch. The VOM should read battery voltage. If not, check the headlight switch (see TEST HEADLIGHT SWITCH).



**Figure 36. Headlight Switch Location**  
**A. Headlight Switch**

## 5 Electrical Troubleshooting

### Headlight / Hour Meter Tests

5. Keep the headlight switch ON. Probe ground and probe the terminal at the headlight connection. The VOM should read battery voltage. If not, check the switch and the continuity of all wires and connectors.

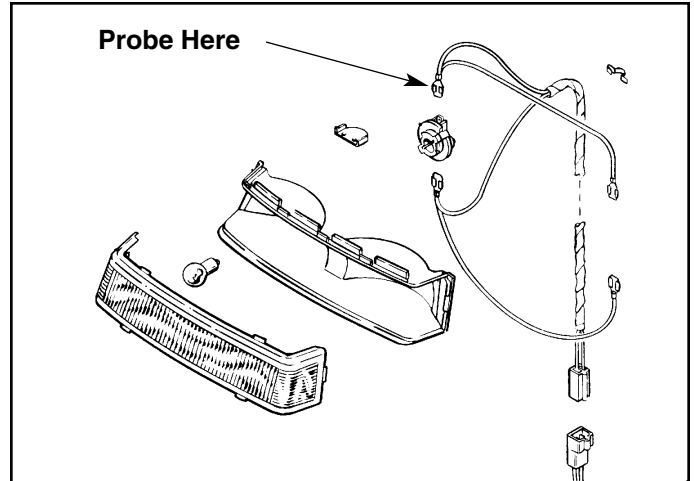


Figure 37. Test Power to Headlights

#### C. Test Headlight Switch

1. Remove the plugs from the headlight switch.
2. Set the VOM to Ohms.
3. With the switch OFF probe both terminals. The VOM should read no continuity.
4. Turn the switch to ON. The VOM should read continuity.

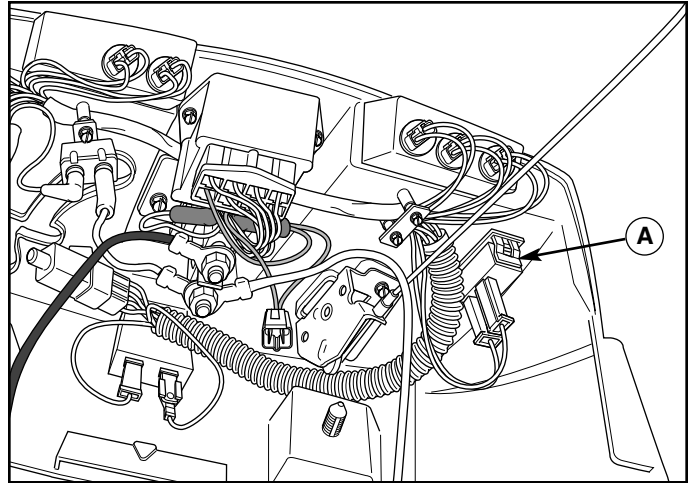


Figure 38. Headlight Switch Location  
A. Headlight Switch

#### D. Test Hour Meter (Where Applicable)

The hour meter (A, Figure 39) can be easily tested by turning the ignition switch to RUN and observing the meter. The meter should register the passage of time.

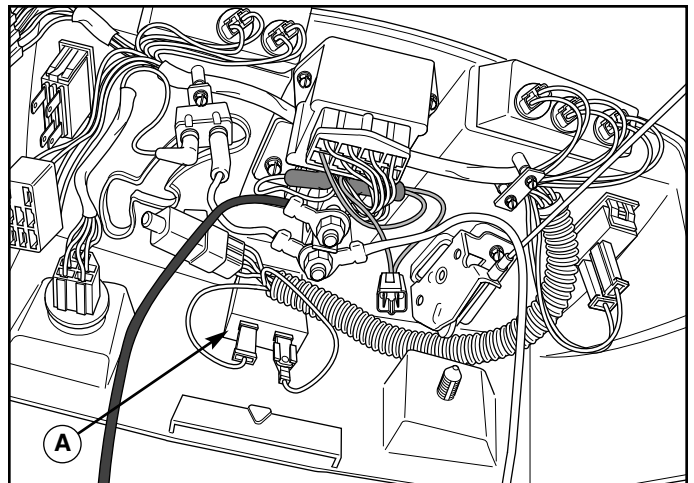


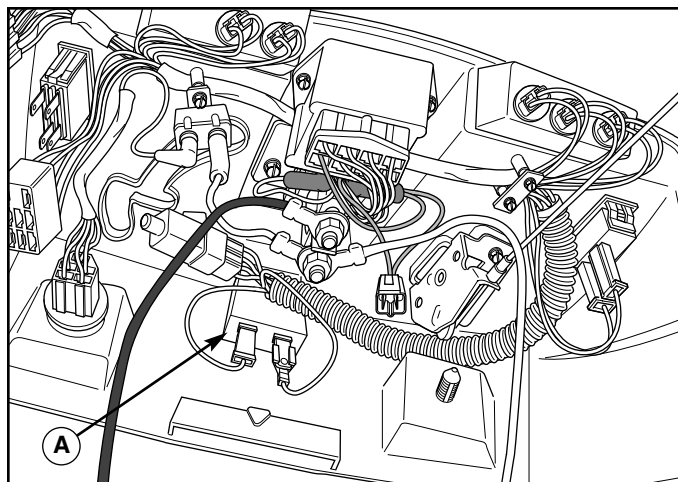
Figure 39. Hour Meter Location  
A. Hour Meter

## 5 Electrical Troubleshooting

### Hour Meter / Dash Light Tests

#### E. Test Power to Hour Meter (Where Applicable)

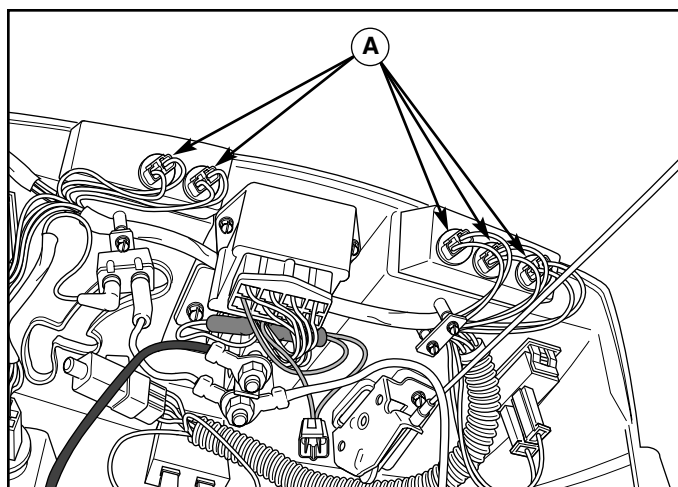
1. Turn the ignition switch to RUN.
2. Set VOM to VDC.
3. Probe ground. Probe the white/blue wire at the hour meter terminal. The VOM should read battery voltage. If not, check the key switch and all wires and connections.
4. Probe ground. Probe the blue/white wire at the hour meter terminal. The VOM should read battery voltage. If not, check the ignition switch, all wires and connections, and the hour meter.



**Figure 40. Hour Meter Location**  
**A. Hour Meter**

#### F. Inspect and Replace Dash Lights

1. Open the hood.
2. Remove the dash lights (A, Figure 41) by twisting the socket counterclockwise and pulling it out of the dash assembly.
3. Visually inspect the bulb and replace if burned out.



**Figure 41. Dash Light Assembly Location**  
**A. Dash Lights**

#### G. Test Electric PTO Clutch

##### TEST PTO CLUTCH RESISTANCE

1. Set VOM to Ohms.
2. Unplug the PTO clutch connector.
3. Probe PTO clutch connector terminals.

The VOM should read approximately 2-3 Ohms. If the clutch has more resistance than 3 Ohms, replace the field assembly or clutch assembly.

##### TEST ELECTRIC PTO CLUTCH FOR SHORT CIRCUITS

1. Set VOM to Ohms.
2. Probe the clutch body with the negative test lead.
3. Probe one of the connector terminals with the positive lead. The VOM Should show no continuity.
4. Probe the other connector terminal with the positive lead. Again, the VOM should show no continuity.

If the VOM shows continuity to the clutch body from either terminal, the clutch has an internal short and should be replaced.

##### TEST ELECTRIC PTO CLUTCH ENGAGING

1. Connect the PTO clutch terminals to a 12 VDC power supply.

An audible “click” should be heard as the clutch engages. If the clutch does not engage, replace the field assembly or clutch assembly.

Reconnect the clutch wire connector after testing.

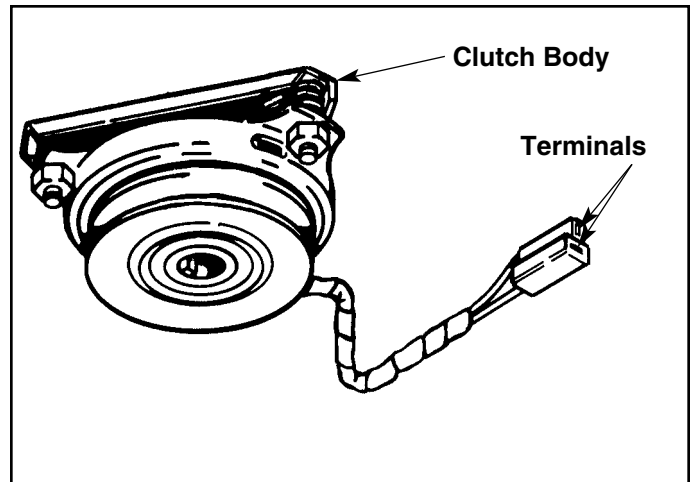
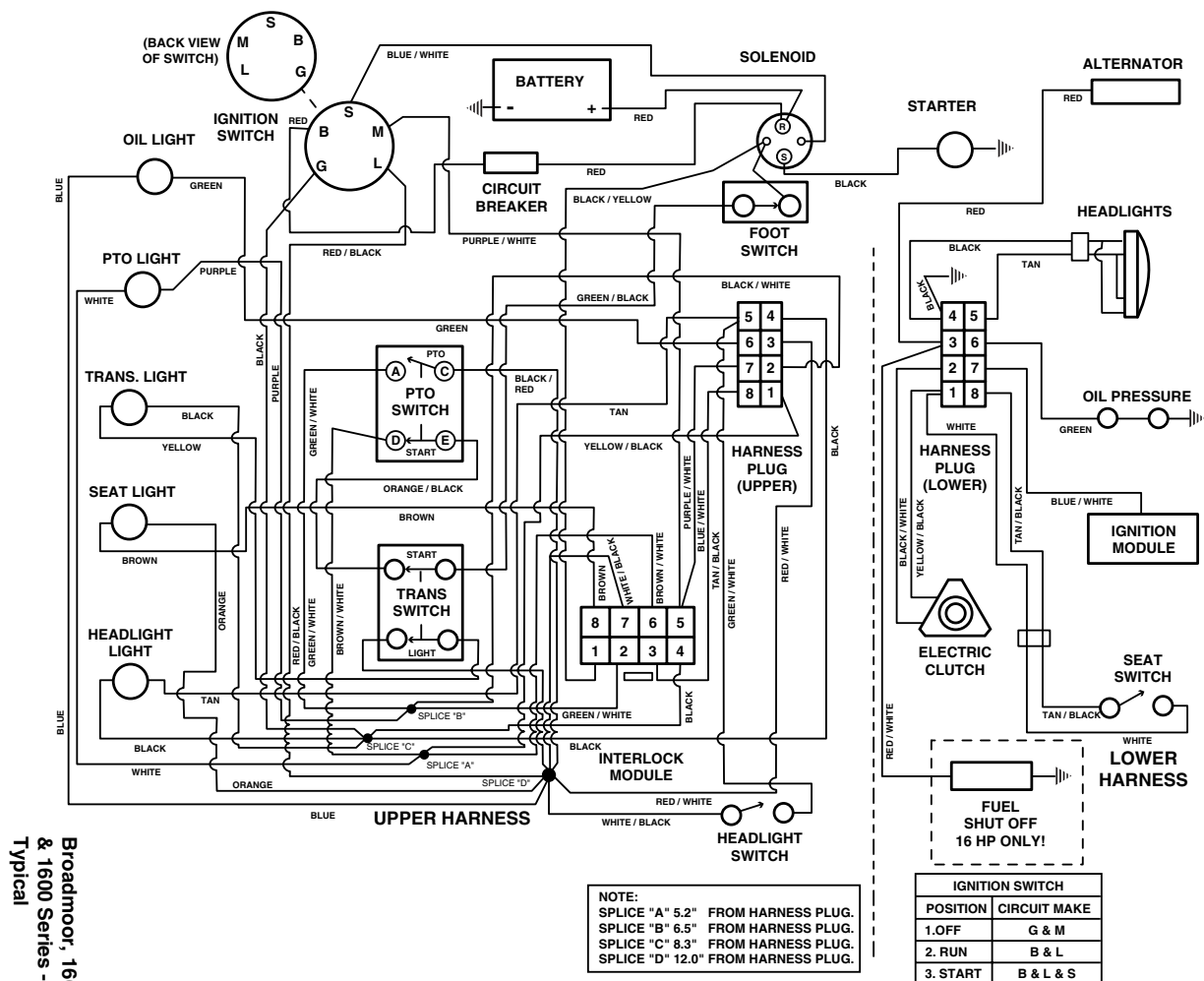
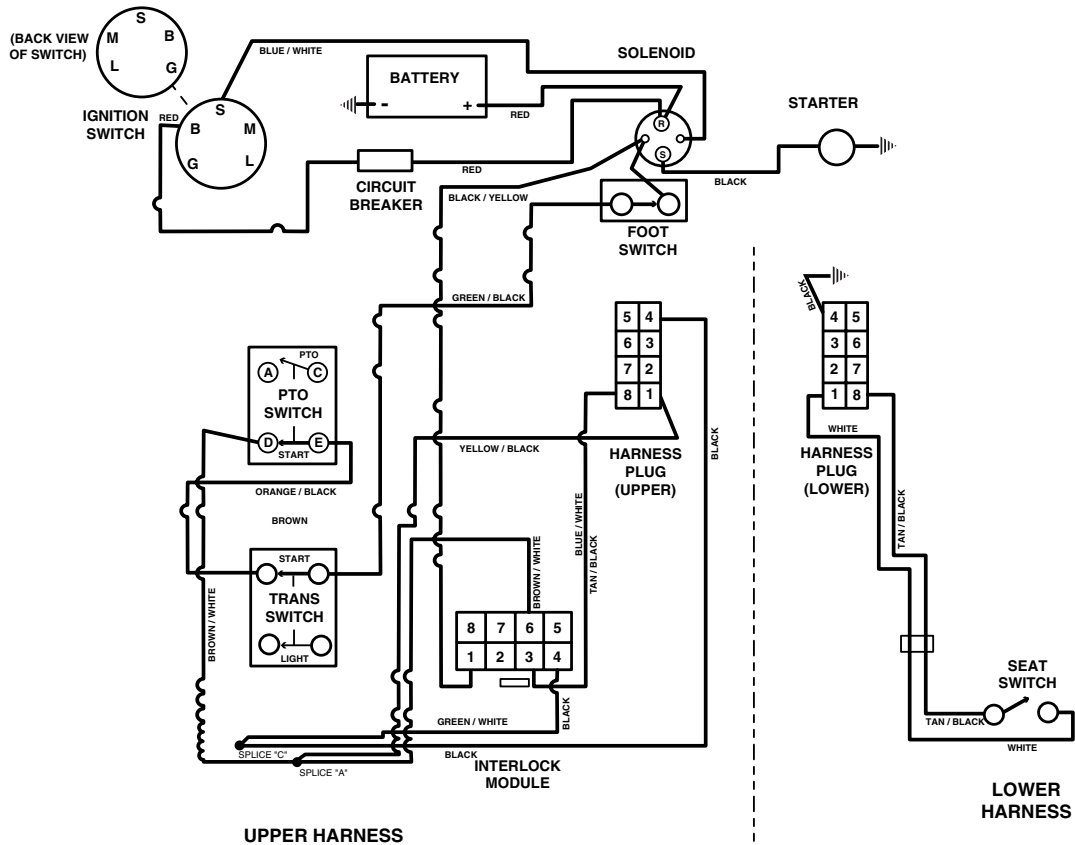


Figure 42. PTO CLutch Terminals

# 5 Electrical Troubleshooting

## Wiring Diagram





NOTE:  
SPlice "A" 5.2" FROM HARNESS PLUG.  
SPlice "B" 6.5" FROM HARNESS PLUG.  
SPlice "C" 8.3" FROM HARNESS PLUG.  
SPlice "D" 12.0" FROM HARNESS PLUG.

IGNITION SWITCH	
POSITION	CIRCUIT MAKE
1.OFF	G & M
2. RUN	B & L
3. START	B & L & S

Broadmoor, 1600.  
& 1600 Series -  
Typical

## Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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## 6 General Repair

### 6A Steering & Front Wheel Repair



#### **DANGER**

##### **PREVENT SERIOUS INJURY OR DEATH FROM FALLING UNIT**

**Always use a properly working lifting device with a capacity suitable for the weight of the unit being serviced.**

**Always use a jack stand to support the unit while performing service, and chock remaining wheels to prevent the unit from rolling off the supports.**

**Never work under or around an elevated unit that is not properly supported and secured in position with wheel chocks.**

## GENERAL

Servicing the lower steering mechanism and front wheel spindles should be performed with the front end of the unit elevated and supported evenly on both sides with jackstands.

Although service can be performed with the mowing deck and hood assembly on the unit, removing the deck and hood assembly provides clear access to all lower steering mechanism components and helps simplify the job.

## REQUIRED TOOLS & EQUIPMENT

Tools required for performing disassembly and assembly in these areas include:

- socket wrench set
- open end wrench set
- Flat blade screwdriver
- Metal striking hammer
- Claw hammer, or pry bar
- Center punch or carbide scribe
- Torque wrench (0 - 75 ft. lbs.)

Specialized equipment required for servicing these areas include:

- Jackstands (2)
- Scissor jack or hydraulic jack
- Wheel blocks (2)
- Grease gun w/Lithium-base automotive grease
- Oil can (use SAE 30 weight oil)

## ELEVATING FRONT OF UNIT FOR SAFE SERVICE

1. Remove the ignition key, and disconnect the spark plug wire to prevent accidental starting while working on unit.
2. Remove mowing deck. See Operator's Manual.
3. Remove the hood assembly as described in Section 6D. Hood, Grille & Dash Repair.
4. Engage parking brake, block the rear wheels, and using a hydraulic or scissors jack positioned at the center of the front axle assembly, carefully jack the unit up until the front tires are approximately 1" - 2" off the ground (Figure A-1-1).

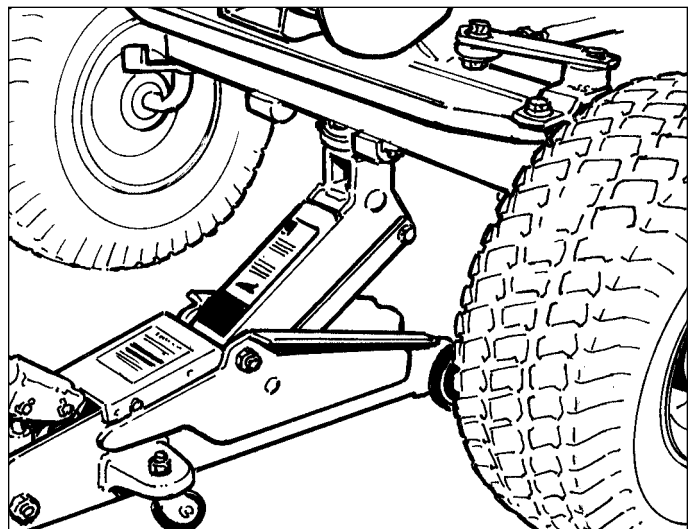
*NOTE: For overall unit stability during service, do not jack front end higher than required for adequate access to steering and spindle components. Excessive elevation may result in fuel leakage from gas tank or electrolyte leakage from battery vents.*

5. Position jackstands at each end of front axle assembly and lower the unit slowly until jack stands fully support unit. Make sure the jackstands engage the bottom of the front axle assembly so that weight is evenly distributed on each of the jackstands.
6. Check the rear wheel blocks and make sure that they are tight against the rear wheels to prevent rolling.

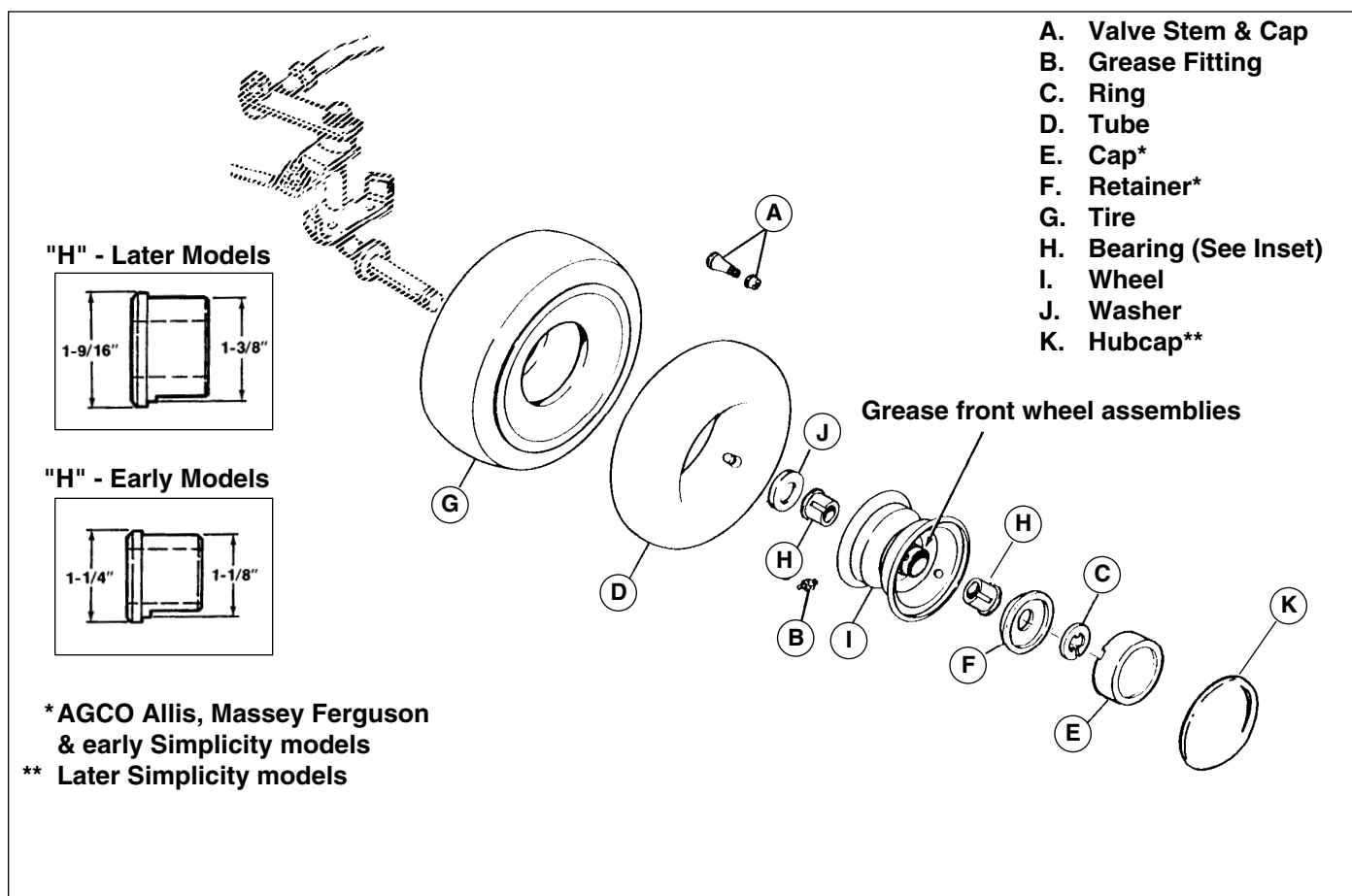


#### **DANGER**

**Do not begin work on the unit unless it is stable and you are sure wheels are chock to prevent rolling.**



**Figure A-1. Elevate Front End Of Unit**



**Figure A-2. Front Wheel Assembly**

## 6 General Repair

### 6A Steering & Front Wheel Repair

#### Front Wheel Repair

##### BROADMOOR MODELS

**NOTE:** Illustrations show AGCO Allis, Massey-Ferguson, and earlier Simplicity model style of hubcap and hardware. Later model Simplicity units have a large snap-on hubcap cover that must be removed for access to the wheel retaining ring.

1. Using a flat blade screwdriver, pop off the plastic hub cap to gain access to the retaining ring.
2. Insert the tip of the flat blade screwdriver into the area at the open end of the retaining ring, and twist the blade against the retaining ring to force the retaining ring out of the groove (Figure A-3).
3. With the retaining ring partially out of the groove, insert the blade tip between the retaining ring and spindle shaft, and pop the retaining ring out of the groove.
4. Slide the wheel off the spindle shaft (Figure A-4). Note that the tire air valve and axle grease fitting are located on the inside of the wheel.
5. Removal of the wheel provides an opportunity to inspect the inside of the tire for sidewall damage, as well as to check inflation pressure. Also, visually check wheel bushings for wear or damage before reinstalling the wheel on the unit, and replace as required. Wheel bushings are pressed into the wheel hub with a press fit and may be removed by pressing or driving out. Align the flat on the bushing with the grease fitting before pressing in the bushing. When installing new bushings, measure the I.D. of the wheel hub to determine the correct bearing O.D. size. See inset illustration in Figure A-2 for sizes.

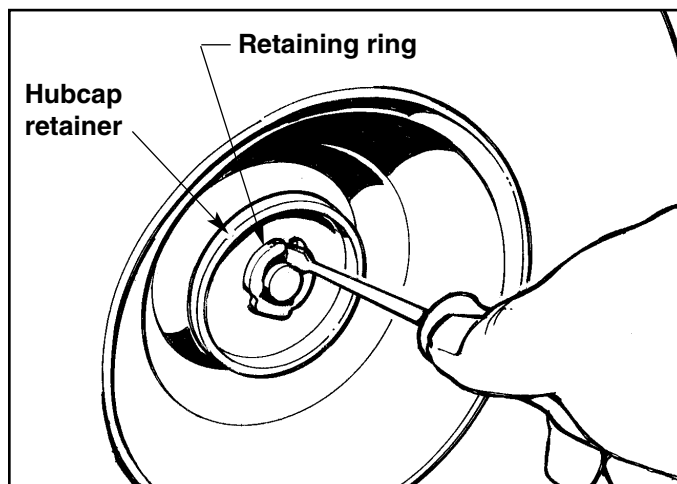


Figure A-3. Front Wheel Retaining Ring - Broadmoor

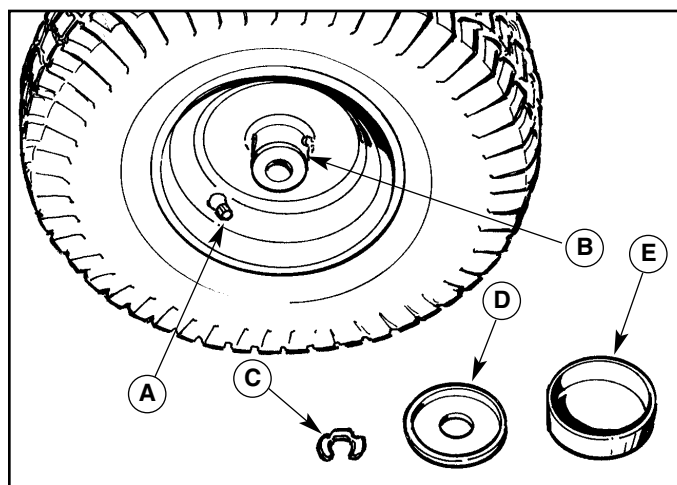
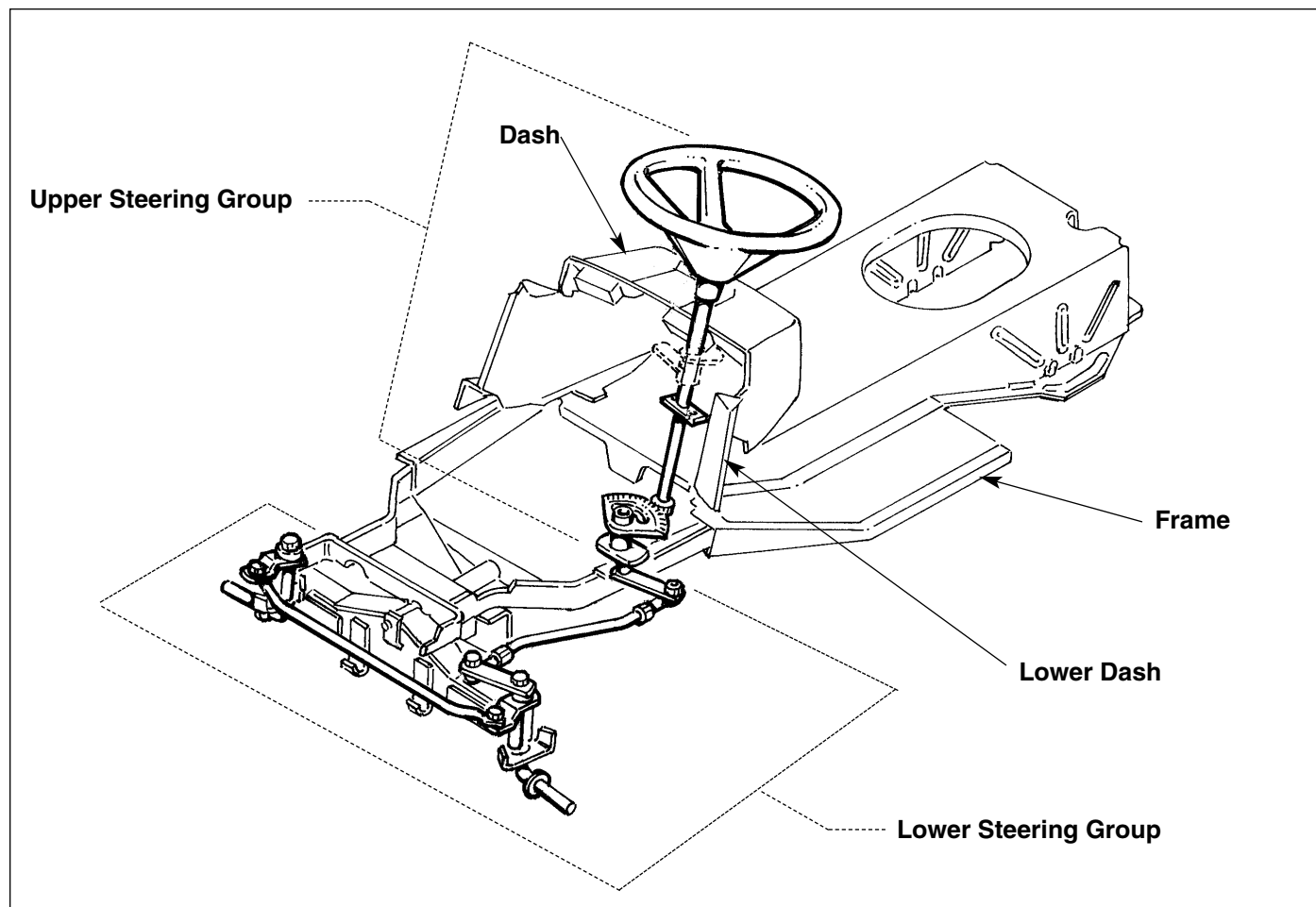


Figure A-4. Wheel And Assembly Hardware - Broadmoor

- |                   |                    |
|-------------------|--------------------|
| A. Air Valve      | D. Hubcap Retainer |
| B. Grease Fitting | E. Hubcap          |
| C. Retaining Ring |                    |

#### STEERING GROUP ASSEMBLIES



**Figure A-5. Broadmoor Steering Group - Typical Assembly  
(Frame & Dash Shown For Component Position Reference)**

## 6 General Repair

### 6A Steering & Front Wheel Repair

#### LOWER STEERING GROUP

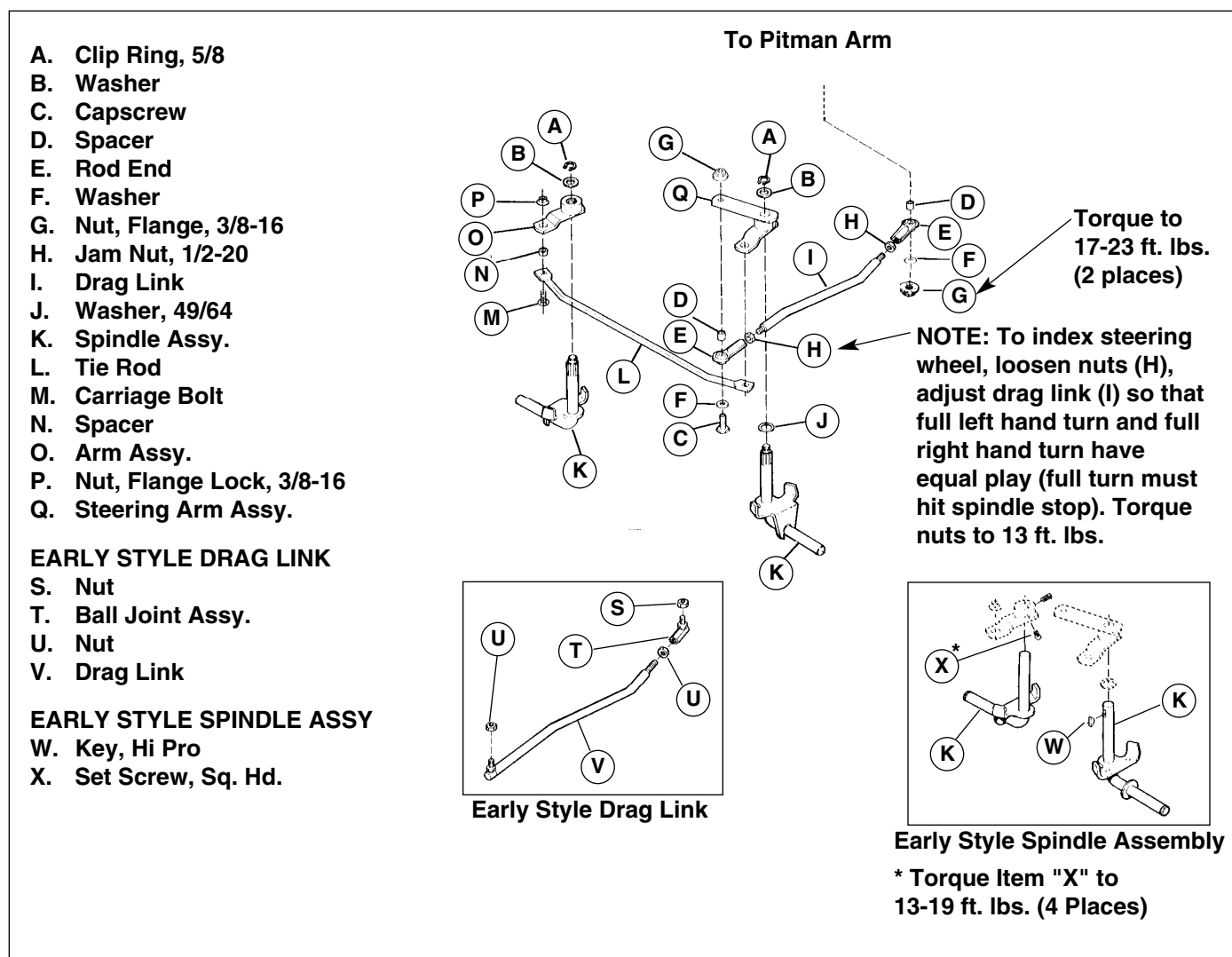


Figure A-6. Lower Steering Assembly

#### LH Spindle Repair

1. Remove the wheels as described previously under Front Wheel Repair.
2. Using a flat blade screwdriver, position the tip of the screwdriver blade at the open end of the steering arm clip ring, and twist the blade against the clip ring to force the ring partially out of the groove (Figure A-7).
3. Insert the tip of the screwdriver blade in the gap between the inside edge of the clip ring and the spindle shaft, and pop the clip ring completely out of the groove.

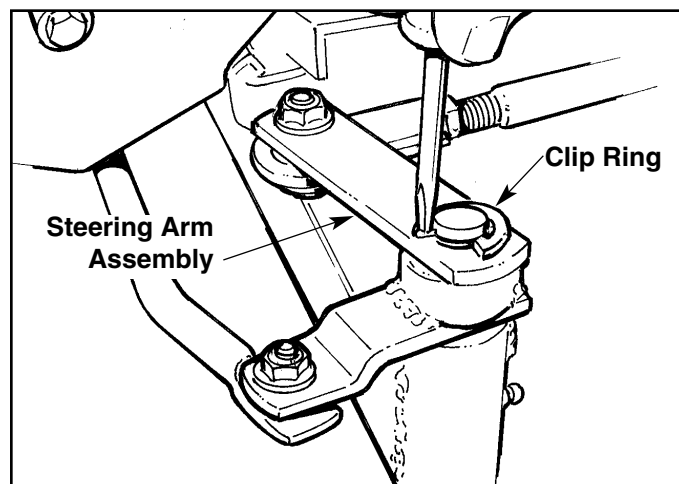
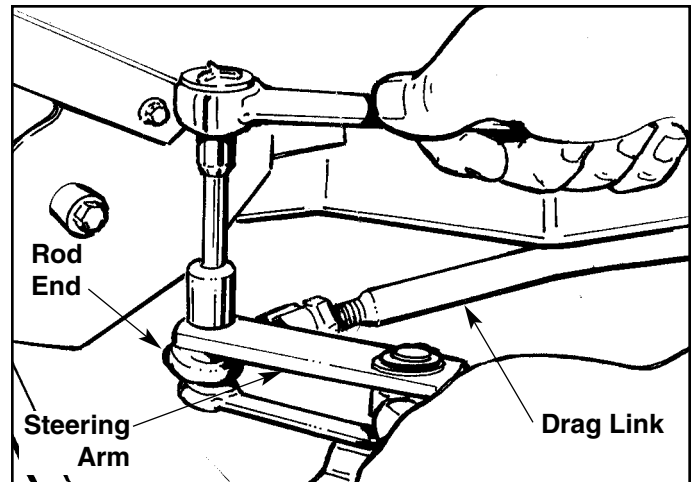


Figure A-7. Remove Clip Ring

4. Using a 9/16" socket and 9/16" open end or box wrench, remove the capscrew/washer and flanged hex nut that secure the steering arm assembly to the rod end (Figure A-8).

*NOTE: A spacer is located over the capscrew threads in the rod opening to permit rotation of the steering arm. Damage to the spacer or washer caused by excessive tightening or wear may adversely affect steering, so be sure to inspect these parts and replace them if necessary before reassembly.*

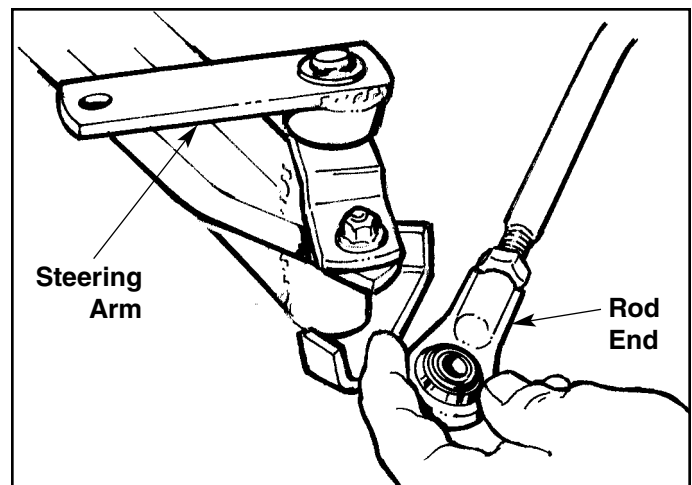
5. The rod end is screwed onto the drag link arm and is secured in place with a 1/2-20 jam nut.



**Figure A-8. Remove Rod End**

6. Inspect the rod end for free movement/rotation of the rod end bearing, and replace the rod end if necessary (Figure A-9).
7. To remove the rod end, loosen the jam nut by turning it clockwise (looking at the end of the drag link shaft) one or two turns with a 3/4" open-end wrench, and then unscrew the rod end by turning it counter-clockwise.

*NOTE: When reinstalling the rod end, be sure to adjust the length of the drag link arm so that the left and right spindle stops stop against the axle assembly with full left and right turns respectively. See the adjustment procedures section for complete details.*

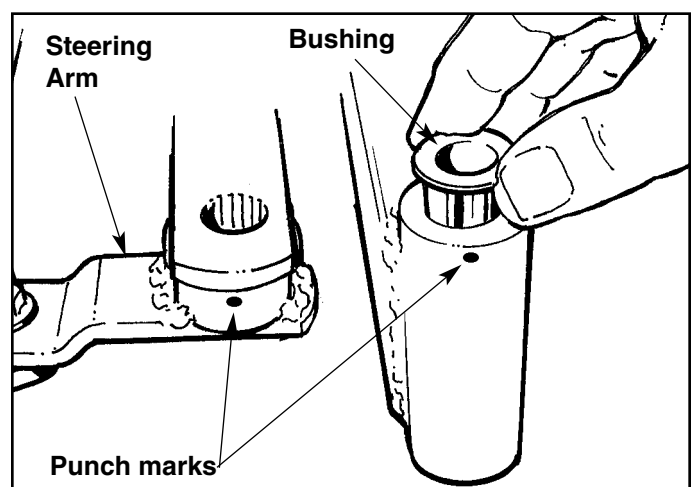


**Figure A-9. Inspect Rod End**

8. Tap the left hand steering arm assembly up off the spindle shaft with a hammer to remove it from the axle/spindle shaft assembly.

*NOTE: It will be helpful to mark the relative positions of the steering arm, splined spindle shaft, and shaft housing with punch marks to simplify realignment later (See Figure A-10).*

9. Tap the top of the splined spindle shaft down with a few light hammer blows, and remove the spindle shaft from the bottom of the axle assembly housing, noting alignment.
10. With the spindle shaft removed, the bushings can be removed and inspected for signs of wear (Figure A-10). Use a brass drift or punch to tap out the bushings from opposite ends of the housing. Replace the bushings if worn, scored, or cracked.



**Figure A-10. Remove Spindle Shaft Bushings**



## 6 General Repair

### 6A Steering & Front Wheel Repair

#### RH Spindle/Steering Arm Repair

1. Remove right front wheel using same procedure as used for left front wheel. (Figure A-11)
2. Use a center punch to mark the relative assembled positions of the right hand steering arm, right hand spindle assembly, and the right side of the front axle assembly (Figure A-11 and A-12).

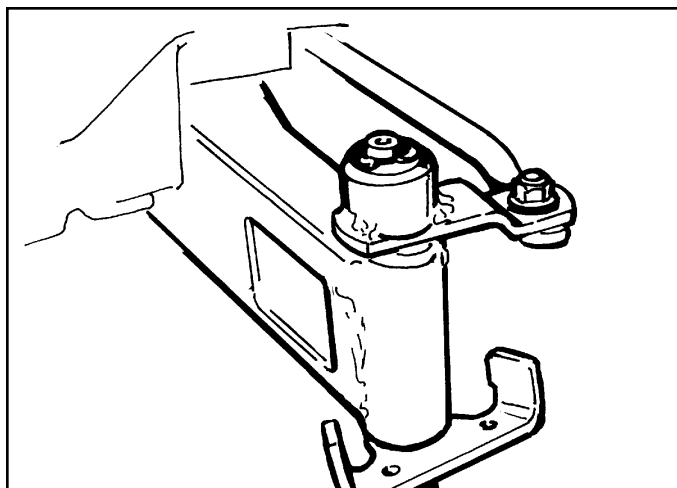


Figure A-11. Right Front Spindle Assembly

3. Remove the hex nut and carriage bolt securing the right hand steering arm to the tie rod (Figure A-12).

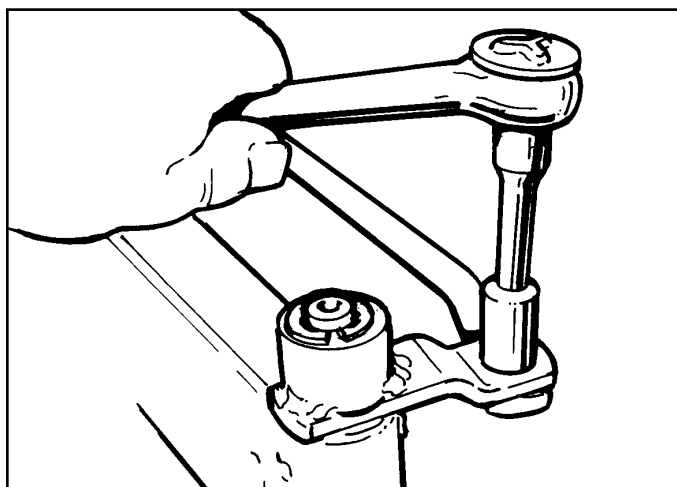


Figure A-12. Disassemble Tie Rod From RH Steering Arm

4. Using a flat blade screwdriver, position the tip of the screwdriver blade at the open end of the steering arm clip ring, and twist the blade against the clip ring to force the ring partially out of the groove (Figure A-13).
5. Insert the tip of the screwdriver blade in the gap between the inside edge of the clip ring and the spindle shaft, and pop the clip ring completely out of the groove.
6. Slide the right hand spindle assembly straight down to remove it from the front axle assembly. Inspect parts and replace as required. Grease spindle bushings as described earlier in left side disassembly instructions.

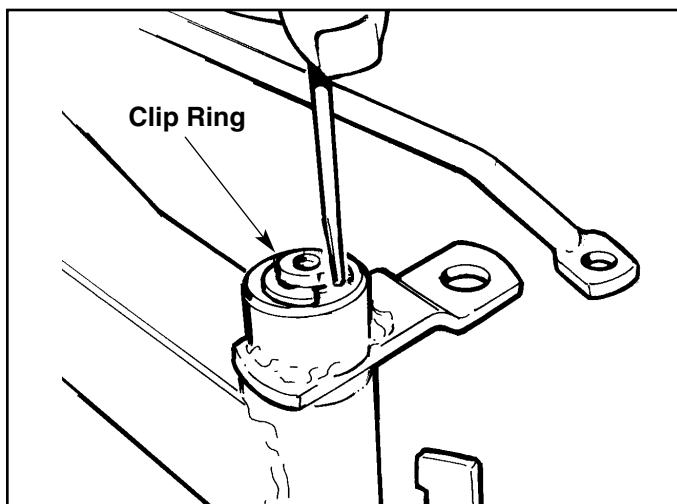


Figure A-13. Remove Retaining Ring

#### Reassembly

1. Reassemble parts in the reverse order of disassembly, using particular care to realign the steering arm assembly, spindle assembly, and axle housing.
2. Observe torque specifications on Figure A-6.

*NOTE: If alignment marks are obscured during service or if parts are replaced, proper steering alignment can be performed later with wheels installed using the distance between tires as a guide. The distance between tires at the front should be 1/8" less than the distance between tires at the rear (measured at the the outer edge of the tire tread) when the wheels are pointed straight ahead. This slight toe-in is permanently set by the tie rod, and is not adjustable.*

3. Before reassembling rod end hardware to left hand steering arm, squirt a few drops of SAE 30 weight oil on the outer surface of the spacer (Figure A-14).
4. Before reinstalling the wheel and related hardware, grease the spindle bushings using the grease fitting on the front axle assembly (Figure A-15). Use a lithium-base, automotive-quality grease such as that provided with the optional Grease Gun Kit.

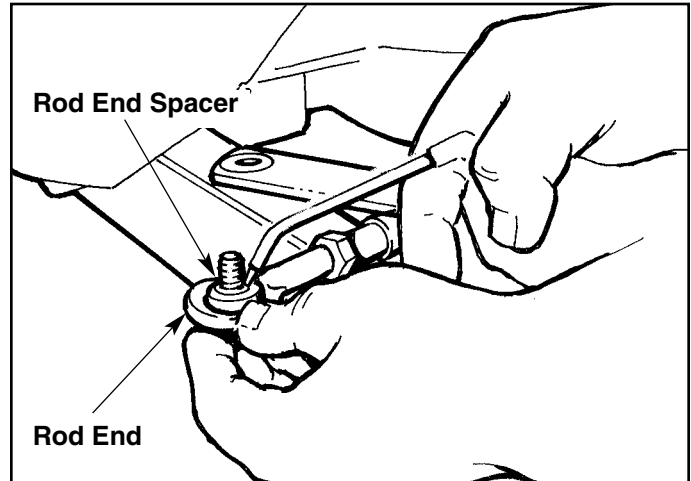


Figure A-14. Lubricate Rod End Spacer

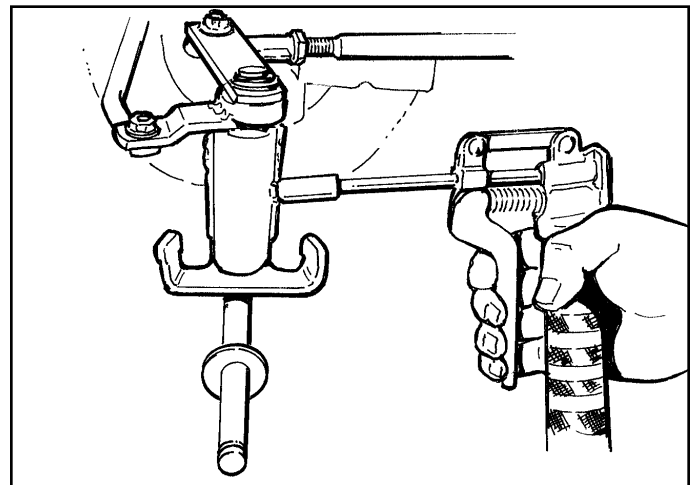


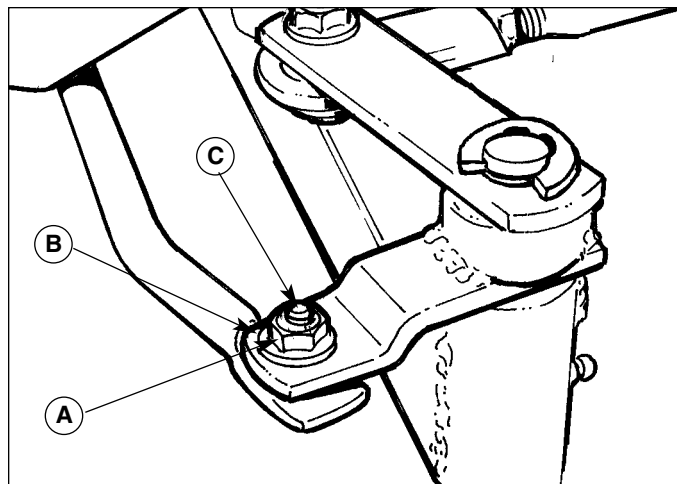
Figure A-15. Grease Wheel Bushings

## 6 General Repair

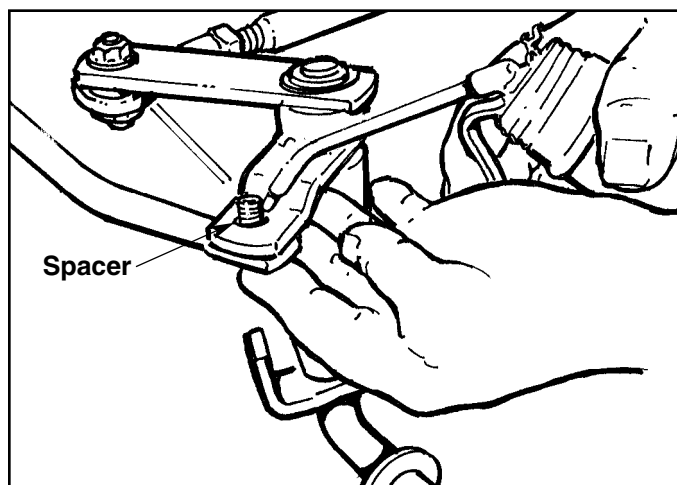
### 6A Steering & Front Wheel Repair

#### Tie Rod Repair

1. The tie rod can be removed by disassembling the flanged hex lock nuts and carriage bolts that secure the tie rod to the left and right steering arm assemblies (Figure A-16). Use care when removing the hardware to prevent the internal spacers from falling out.
2. Check the spacer for signs of excessive wear, damage, or flattening due to over-tightening of the assembly hardware, and replace if required. (The spacer allows the steering arms to pivot freely at the tie rod joint.)
3. Check the tie rod for cracks or other damage at the rod ends, and replace if necessary. Also the center portion of the tie rod must be straight to provide the correct center-to-center distance for wheel alignment. If the tie rod is bent, replace the tie rod.
4. Reassemble the tie rod to the steering arms using new spacers or hardware if required. Before installing the flanged lock nut, squirt a few drops of SAE 30 weight oil around the spacer (Figure A-17).
5. Tighten the lock nut securely, but do not over-tighten as this will damage the spacer and may prevent free rotation of the steering arms.



**Figure A-16. Tie Rod/ LH Steering Arm Assembly**  
**A. Flanged Hex Lock Nut    C. Carriage Bolt**  
**B. Spacer**



**Figure A-17. Lubricate Tie Rod/Steering Arm Spacer**

### UPPER STEERING GROUP ASSEMBLY

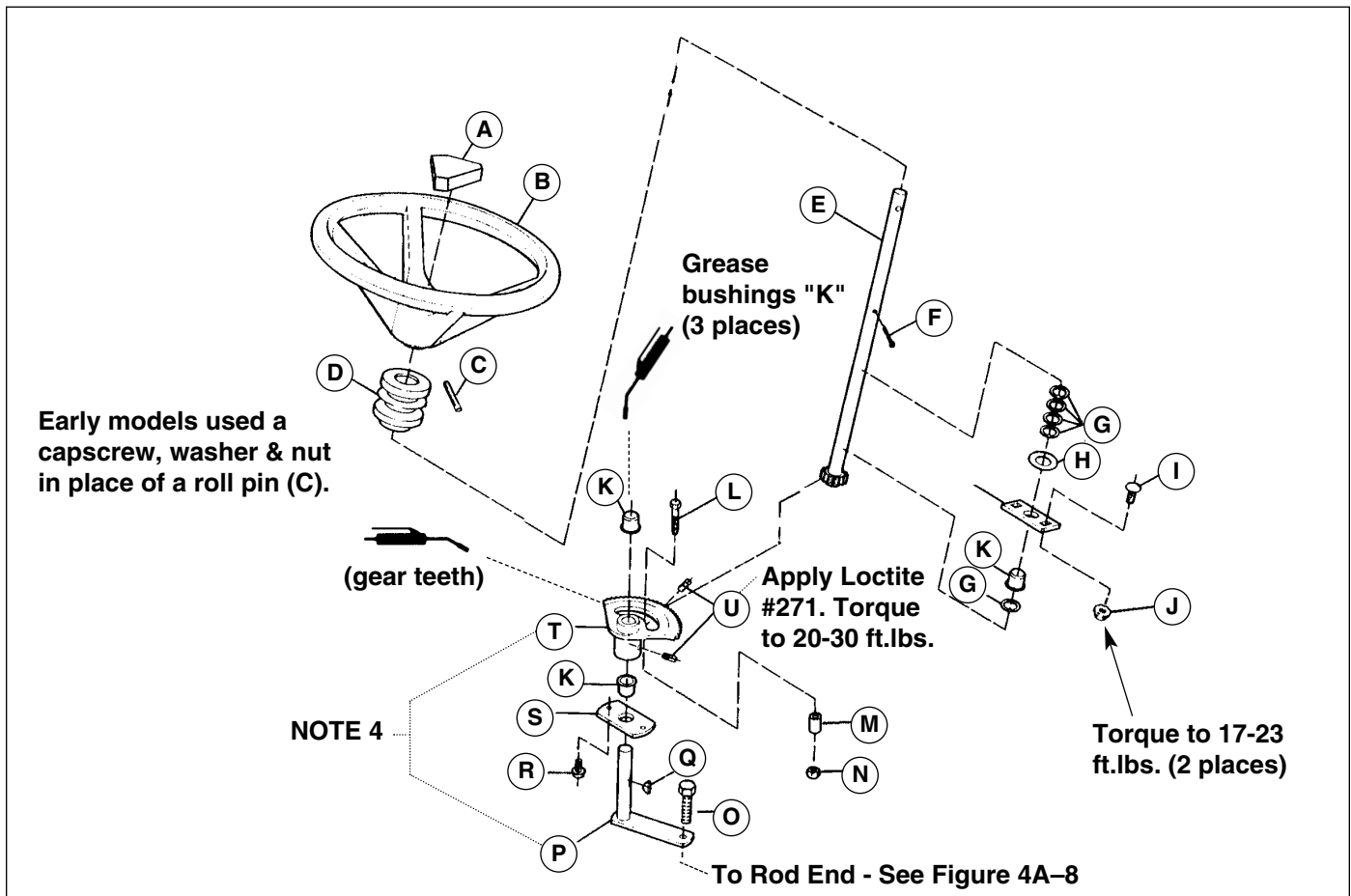




Figure A-18. Upper Steering Assembly

A. Cap	I. Carriage Bolt, 3/8-16 x 1	Q. Key
B. Steering Wheel	J. Nut, Flange Lock, 3/8-16	R. Screw, Taptite, 5/16-18 x 1
C. Pin, 5/16 x 2	K. Bushing	S. Sector Mounting Plate
D. Tube	L. Capscrew, 5/16-18 x 1-1/2	T. Steering Gear Assy. Hub
E. Steering Shaft	M. Spacer	U. Square Head Set Screw
F. Cotter Pin	N. Nut, 5/16-18	
G. Washer, 49/64	O. Capscrew, 3/8-16 x 1-3/8	
H. Washer	P. Pitman Arm	

#### NOTES:

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 
4. Pitman arm shaft (P) should protrude 9/16" above top of steering gear assembly hub (T).

## 6 General Repair

### 6A Steering & Front Wheel Repair

#### Steering Wheel Removal

##### EARLIER MODELS

- 1A. Remove the steering wheel by disassembling the hex head bolt and hex nut that secure the steering wheel to the steering shaft assembly (Figure A-19).

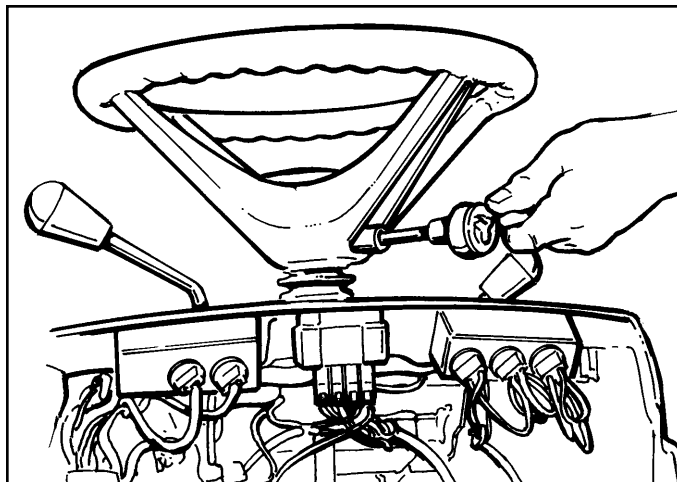


Figure A-19. Remove Steering Wheel Hardware  
Earlier Models

##### CURRENT MODELS

- 1B. Later-model steering wheels are attached to the steering shaft assembly with a long spring pin. Use a pin punch and hammer to drive the spring pin out of the steering wheel and steering shaft assembly (Figure A-20).

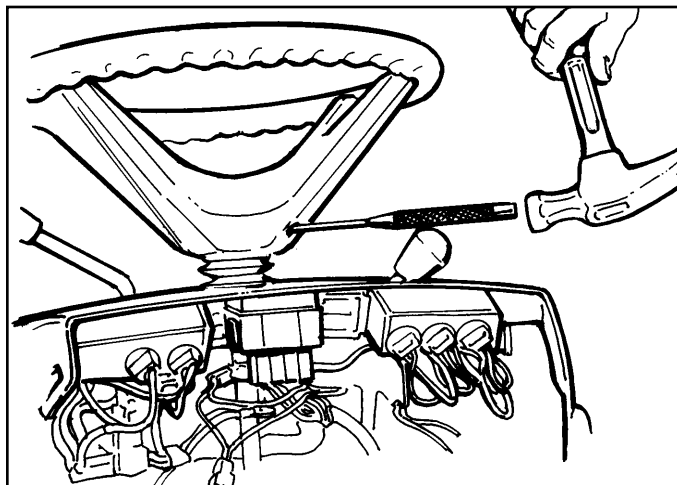


Figure A-20. Remove Steering Wheel Spring Pin  
Later Models

2. Slide steering wheel up to remove from steering shaft assembly, and note positioning of mounting holes for later reassembly (Figure A-21).
3. Inspect steering wheel and hardware for wear or damage, and replace as required. Reassemble steering wheel to steering shaft assembly, or proceed to next step if steering shaft is to be serviced.

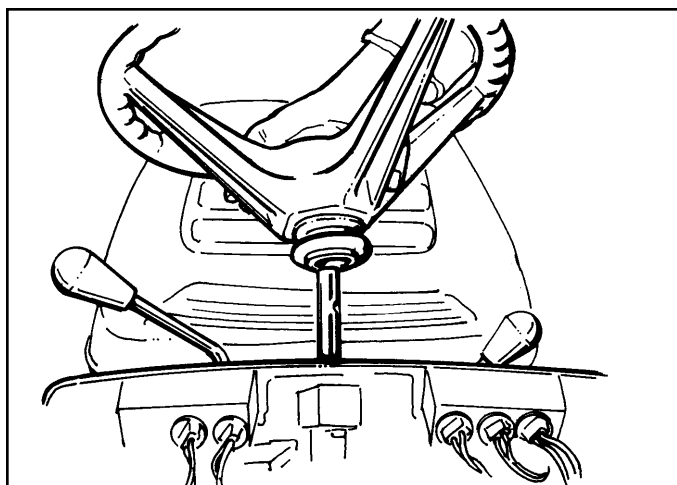
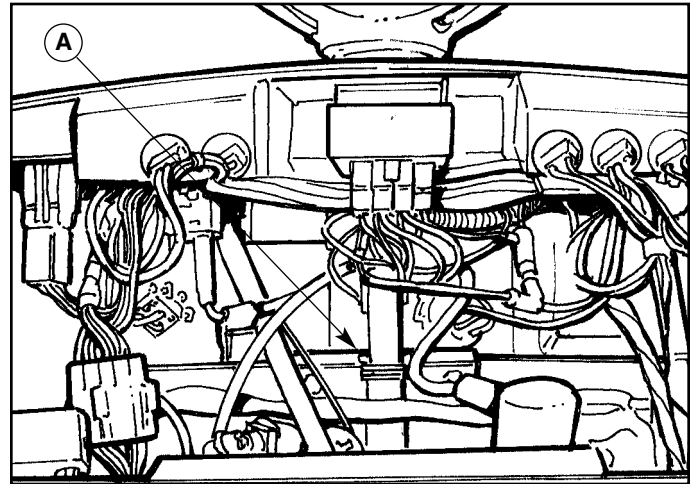


Figure A-21. Remove Steering Wheel

### Steering Shaft Removal

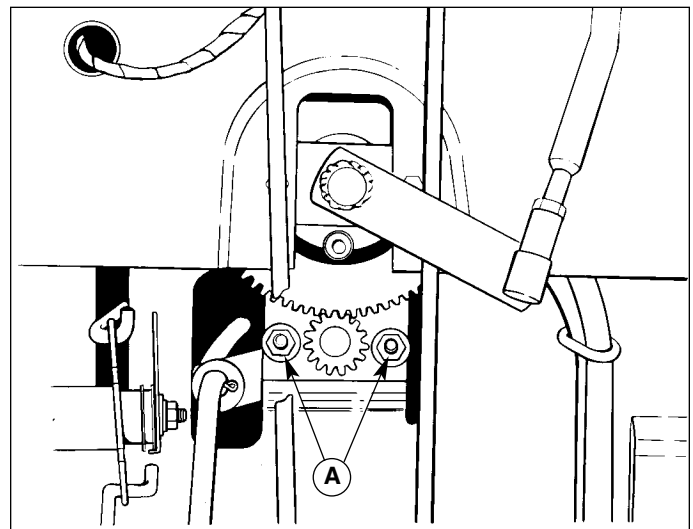
**NOTE:** Unit must eventually be tipped up to remove the shaft.

1. Remove the steering wheel as shown in the steering wheel removal section.
2. Remove the cotter pin from the steering shaft (A, Figure A-22) just above bushing in the frame support.
3. Locate the washers that were held in place by the cotter pin. Slide the washers off the shaft.



**Figure A-22. Remove Cotter Pin**  
A. Cotter Pin

4. Loosen the nuts securing the steering mounting plate (A, Figure A-23).
5. Slide the steering shaft assembly down and out of the bottom of the unit to remove for replacement.  
*Note: Unit must be tipped up at this point to remove the shaft.*
6. Inspect steering shaft assembly and bushings for excessive wear or damage. Replace if required.
7. Install the steering shaft assembly in the reverse order of removal and apply a liberal coating of grease to the steering shaft and drive gear.



**Figure A-23. Steering Mounting Plate**  
A. Nuts

## 6 General Repair

### 6A Steering & Front Wheel Repair

#### Steering Gear / Pitman Steering Arm Service

1. Tilt the unit up or place on an elevated work stand for access to the underside of the frame.
2. Disassemble the drag link from the pitman arm by removing the capscrew, washers, spacer, and flanged hex lock nut (Figure A-24).

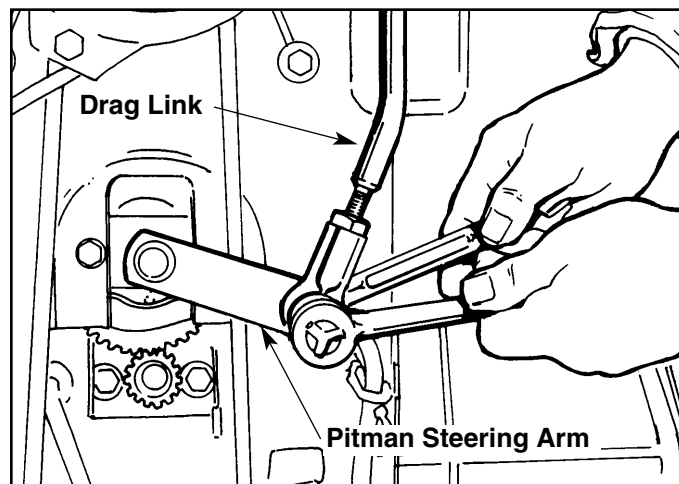


Figure A-24. Disconnect Drag Link Ball Joint

3. Remove taptite hex head capscrews that secure pitman steering arm/assembly to underside of unit (Figure A-25).

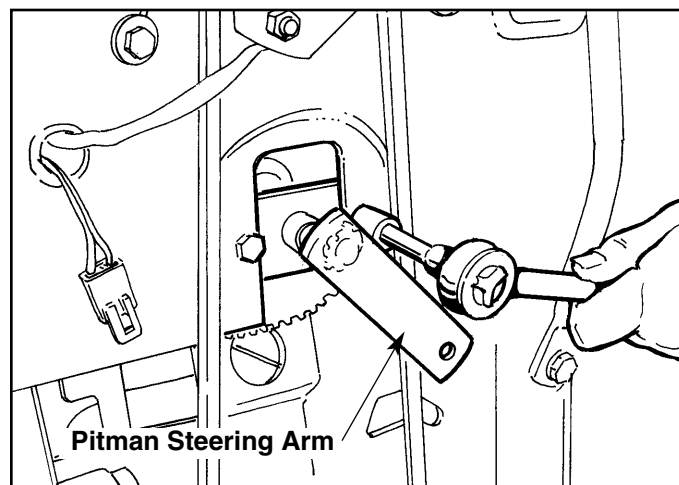


Figure A-25. Remove Hex Capscrews

4. Turn the steering arm assembly mounting plate 90° to allow the assembly to be removed as a unit. Pull the assembly straight out. See Figure A-26.
5. The steering arm assembly may be disassembled by removing the two square head bolts (U, Figure A-18) from the gear assembly.
6. Inspect all parts for excessive wear or damage and replace as required.
7. Reassemble in reverse order of disassembly. Apply a grease to the pitman arm shaft, bushings, and gear teeth. Note the placement of the shaft key for correct gear orientation.

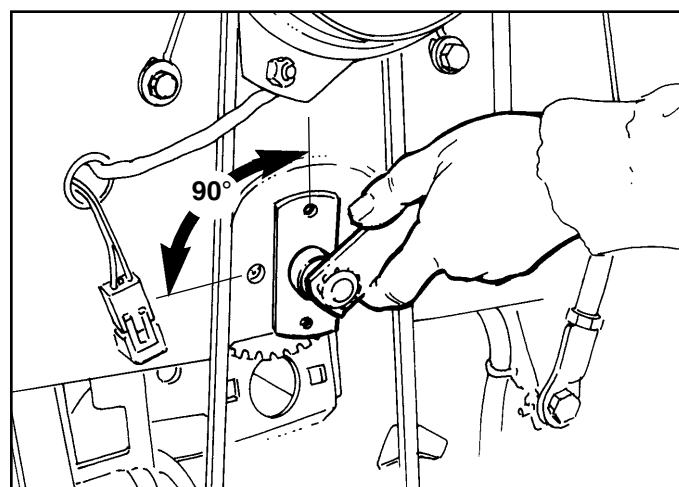


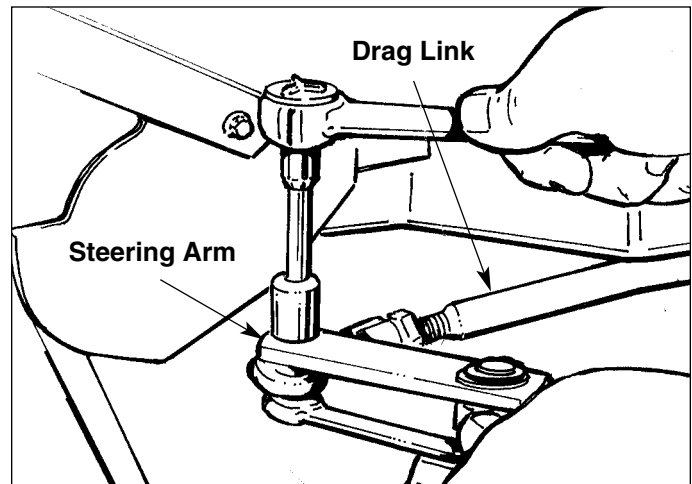
Figure A-26. Remove Steering Arm Assembly



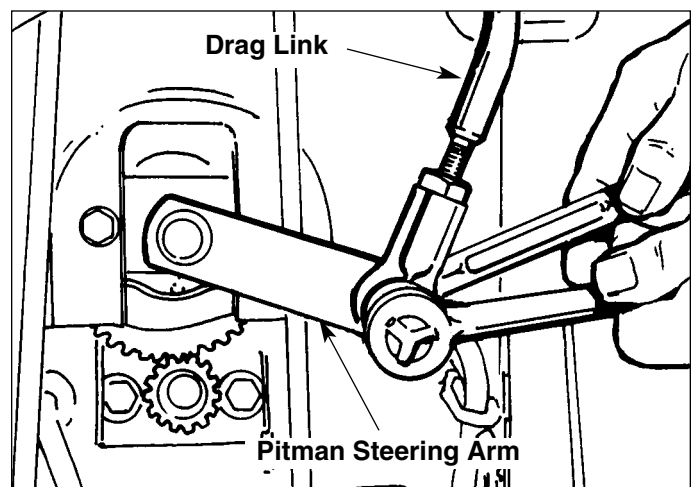
### Drag Link Removal

1. See Figure A-27. Using a 9/16" socket and 9/16" open end or box wrench, remove the capscrew, washer and flanged hex nut that secure the steering arm assembly to the front rod end on the drag link. (For units equipped with early style drag links, see Figure A-6 for correct hardware and assembly).
2. Disassemble rear drag link rod end from pitman arm by removing capscrew, washers, spacer, and flanged hex lock nut (Figure A-28).
3. Remove the drag link rod ends by first loosening the jam nuts. Turn the jam nuts clockwise (looking at the end of the drag link shaft) one or two turns with a 3/4" open-end wrench, and then unscrew the rod end by turning it counter-clockwise.
4. Check the drag link for cracks or other damage, and replace if required. If the drag link is being replaced, position the jam nuts on the new drag link in the approximate positions utilized on the old drag link.
5. Inspect the rod ends for free movement/rotation of the rod end bearing, and replace the rod ends if necessary.
6. Reassemble the rod ends to the drag link, and reassemble the drag link to the unit in the reverse order of disassembly. Do not tighten the jam nuts until final spindle stop adjustments have been made.

**NOTE:** When reinstalling the rod ends, be sure to adjust the overall length of the drag link arm so that the left and right spindle stops stop against the axle assembly with full left and right turns respectively. See the adjustment procedures section for complete details.



**Figure A-27. Disassemble Rod End From Steering Arm**



**Figure 4A-29. Disassemble Rear Drag Link Rod End From Pitman Steering Arm**

## 6 General Repair

## 6A Steering & Front Wheel Repair - Notes \_\_\_\_\_

[illegible]

### GENERAL

The hand controls group consists of the following major components (also see Figures B-1 and B-2):

- Shift Lever
- Throttle Lever
- Choke Lever
- Parking Brake
- Lift Lever

The hand controls group assemblies can often be serviced without elevating the unit, but servicing these components requires removal of the hood assembly, dash assembly, and disconnecting several related parts, as well as disconnecting the battery cables and removing the battery. In general, removing the mower deck also makes service access much easier.

Inspecting parts for wear or breakage, or minor service, such as lubrication or tightening hardware, may, in some cases, be accomplished by simply removing the steering wheel and dash attachment hardware, and pulling the dash assembly up as far as slack in the wiring and control cables permits.

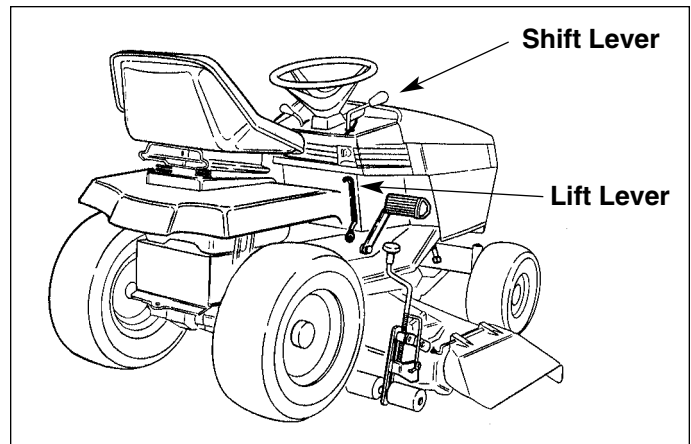


Figure B-1. Hand Controls

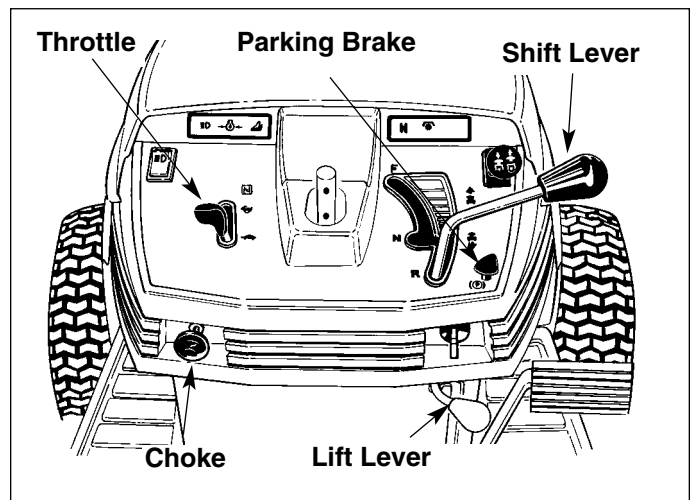


Figure B-2. Hand Controls - Dash View (Steering Wheel Removed For Clarity)

### Required Tools & Equipment

Tools required for performing service on the hand controls group include:

- Hammer or rubber mallet
- Small flat blade screwdriver
- Phillips screwdriver
- Long-nose pliers
- 1/2" deep socket
- 3/8" Nut Driver or 3/8" socket w/6" min. extension
- 3/8" & 7/16" box or combination wrenches
- 3/8" & 7/16" open end wrench



### DANGER

Always obey all safety precautions for working around battery hazards such as electrolyte, hydrogen gas, and live battery terminals when removing and reinstalling the battery. Always disconnect the negative terminal cable first, and reconnect it last, to help prevent dangerous sparking caused by accidental tool contact between the positive terminal of the battery and the frame. Keep the battery level when handling to prevent leakage of electrolyte.

## 6 General Repair

### 6B Hand Controls Repair

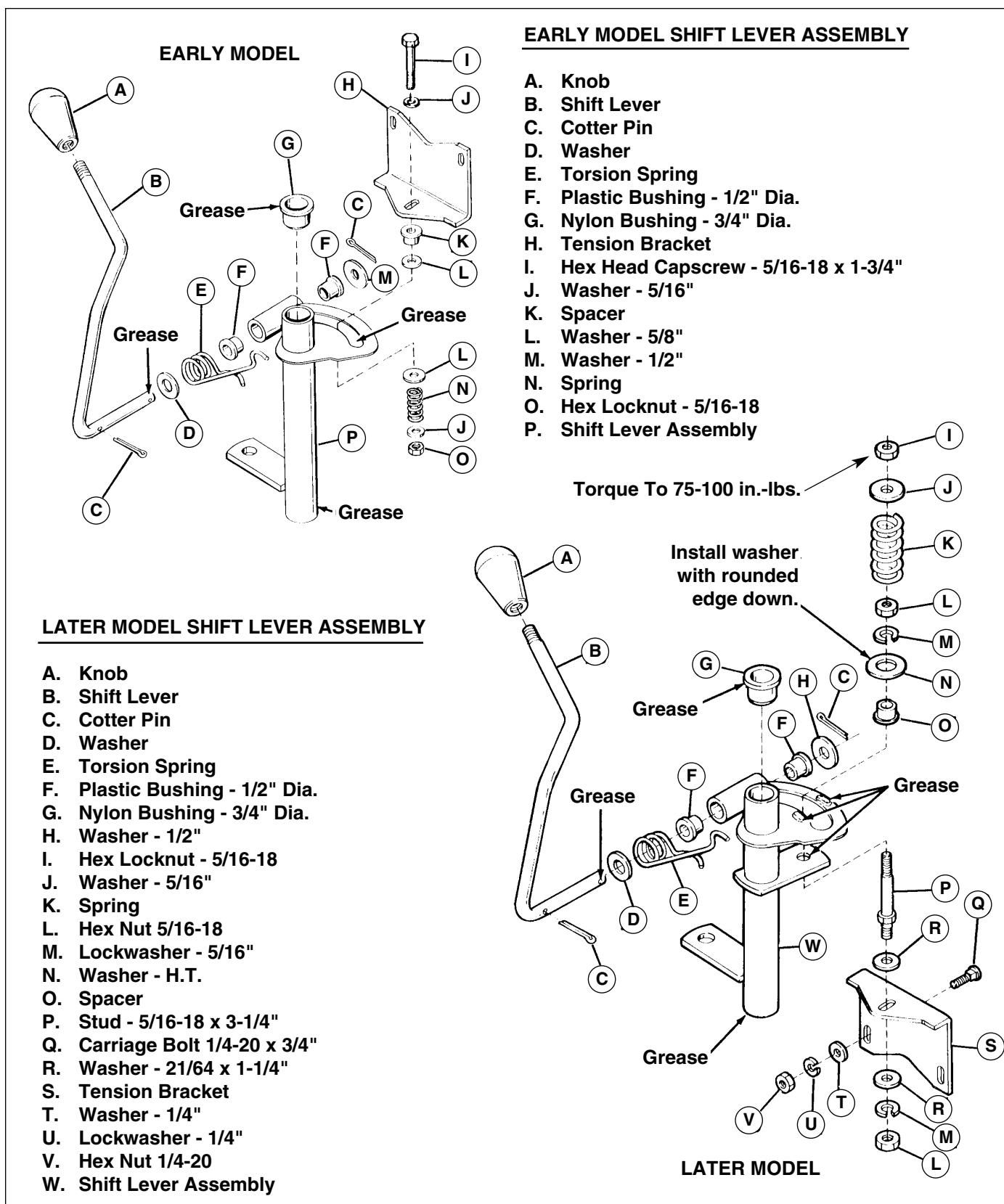


Figure B-3. Typical Shift Lever Assemblies

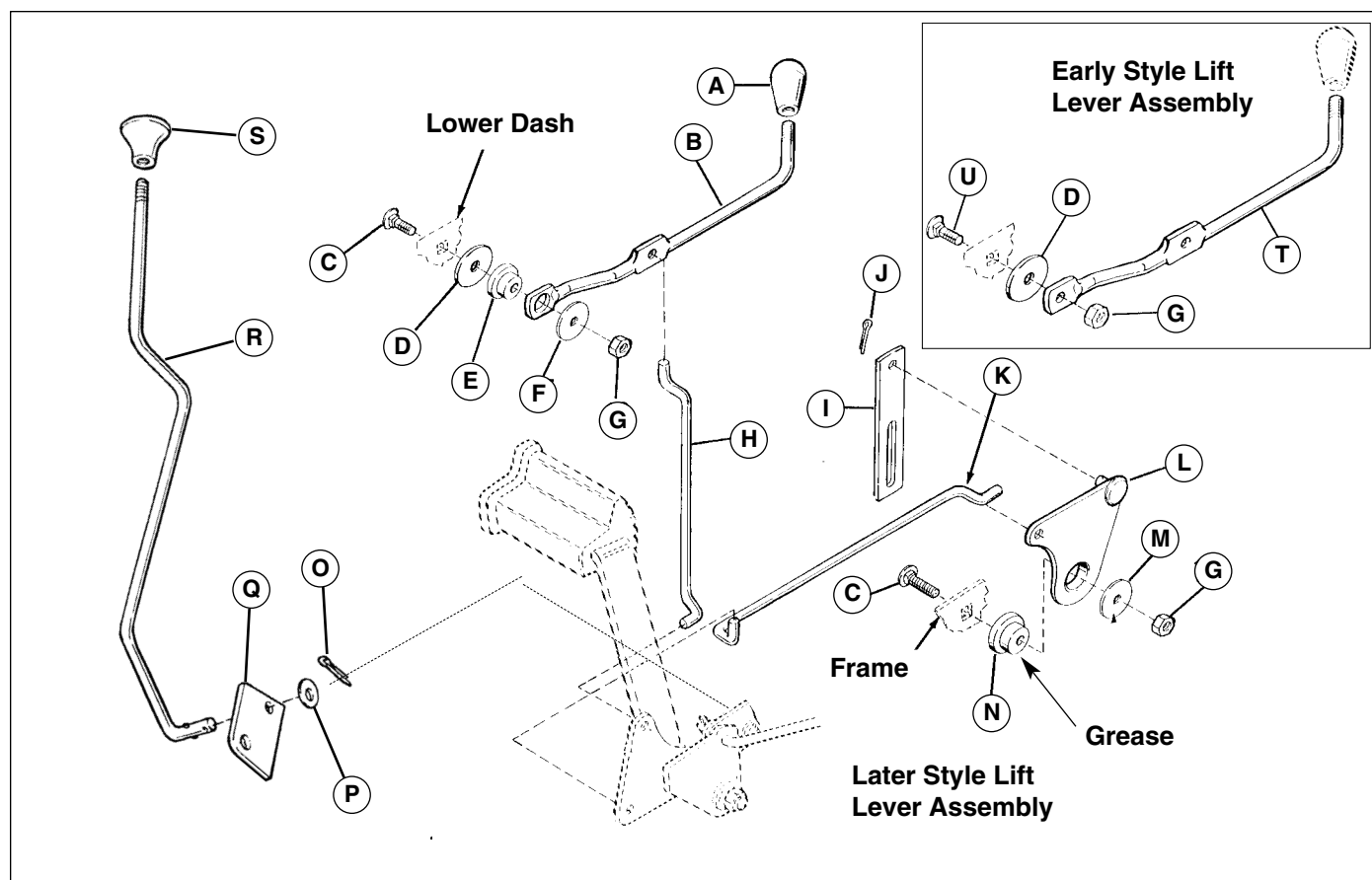


Figure B-4. Broadmoor Lift Handle Assembly

### Later Style Lift Lever Assembly

- |                                     |                           |                                |
|-------------------------------------|---------------------------|--------------------------------|
| A. Knob                             | K. Lift Link              | *T. Lift Handle Rod            |
| B. Lift Handle Rod                  | L. Lift Assembly Cam      | *U. Carriage Bolt 5/16-18 x 1" |
| C. Carriage Bolt - 5/16-18 x 1-1/2" | M. Washer 21/64" x 1-1/4" |                                |
| D. Washer - 13/32 x 1-1/2"          | N. Spacer                 |                                |
| E. Spacer                           | O. Cotter Pin             |                                |
| F. Washer - 5/16"                   | P. Washer - 9/32"         |                                |
| G. Hex Locknut - 5/16-18            | Q. Parking Brake Cam      |                                |
| H. Upper Lift Link                  | R. Parking Brake Rod      |                                |
| I. Upper Transport Lift Link        | S. Plastic Knob           |                                |
| J. Cotter Pin                       |                           |                                |

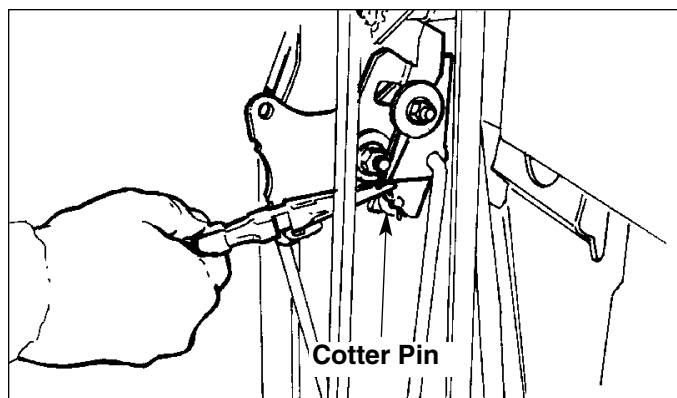
\*Early Style Lift  
Lever Assembly Only

## 6 General Repair

### 6B Hand Controls Repair

#### Parking Brake Rod Service

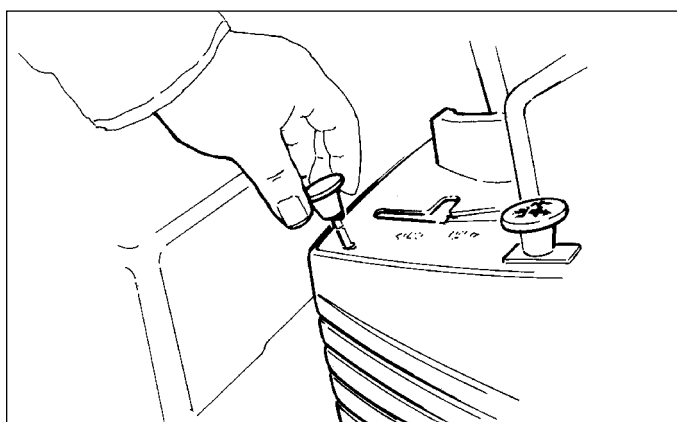
1. See Figure B-5. Remove the cotter pin from the lower end of the parking brake rod, and after noting the correct installation position of the rod, disengage it from the parking brake cam. Lift the parking brake rod up and out of the lower dash/frame area, and inspect for wear or damage. Replace as necessary. Reassemble in reverse order of removal.



**Figure B-5. Remove Cotter Pin From Parking Brake Rod & Disengage From Brake Cam**

#### Parking Brake Knob Removal

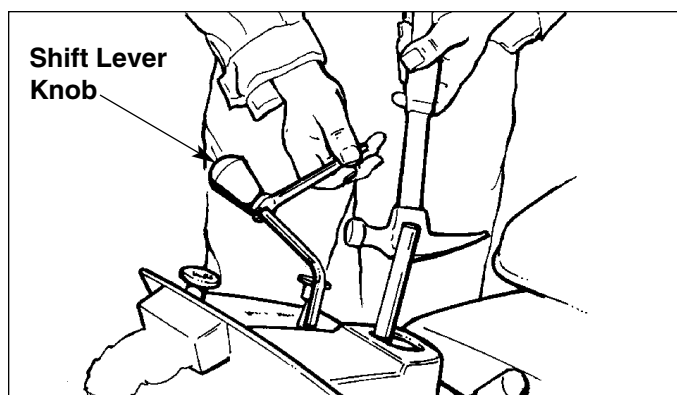
1. The parking brake rod is threaded. Unscrew the parking brake knob from the parking brake rod. (Figure B-6)



**Figure B-6. Unscrew Parking Brake Knob**

#### Shift Knob Removal

3. Remove the shift lever knob from the shift lever as follows.
  - a. Plastic knob - unscrews from shift lever by turning knob counterclockwise.
  - b. Rubber knob - is pressed onto end of shift lever and may be removed by placing a 7/16" open end box wrench under the knob and tapping the wrench outward with a hammer or rubber mallet. (Figure B-7) Knobs that resist removal with this method may be heated with a heat gun or blow dryer to expand the I.D. of the knob slightly and separate it from the end of the shift lever.



**Figure B-7. Remove Shift Lever Knob (Later Model With Rubber Knob)**

**NOTE:** Do not overheat the knob as this may distort the part or cause melting, and could prevent a secure fit when reattaching the knob. Use a low heat setting when using a heat gun, and keep the gun 4-6" away from the knob while moving back and forth to provide even heating.

4. Slide the knob off the shift lever, and check for cracks or excessive wear, and replace as necessary.



#### WARNING

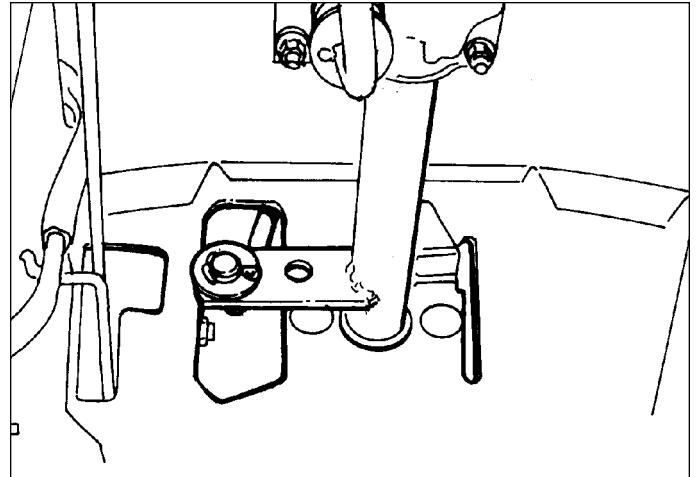
Never use a heat gun or blow dryer if flammable vapors are present, as the heating element could ignite the vapor and cause a fire or explosion.

#### Shift Lever Assembly Service

Shift lever assembly service requires that the dashboard be removed. Refer to the Hood, Dash, and Grill Repair section for dashboard removal instructions.

After the dash assembly is fully separated from the unit, set it aside carefully to prevent damage to electrical components.

The lift lever, and shift lever assemblies are now fully accessible, as is the steering column shaft, and front transmission shift rod connection to the shift lever assembly. (Figure B-8).

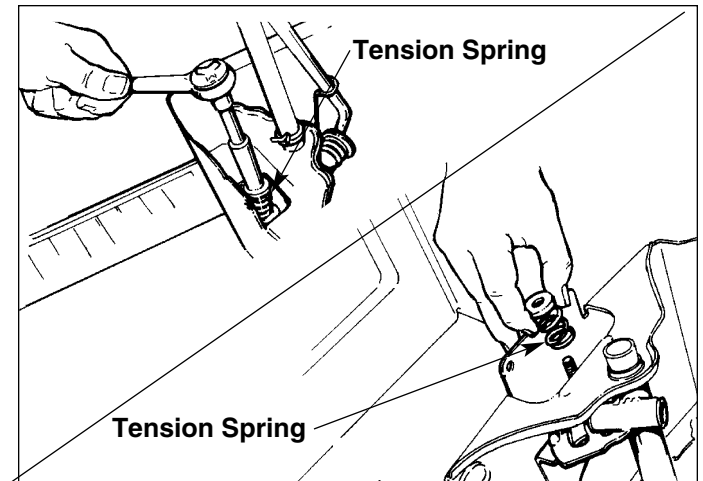


**Figure B-8. Broadmoor Hydro Shift/Lift Lever Access Area**

#### Shift Lever Spring Adjustment

Tension on the shift lever may be increased or decreased by adjusting the tension on the shift lever compression spring (K, Figure B-3 Later Model Shift Lever Assembly). The correct tension for proper shift lever operation should be obtained when the adjustment locknut (I, Figure B-3) is torqued to 75 - 100 in./lbs.

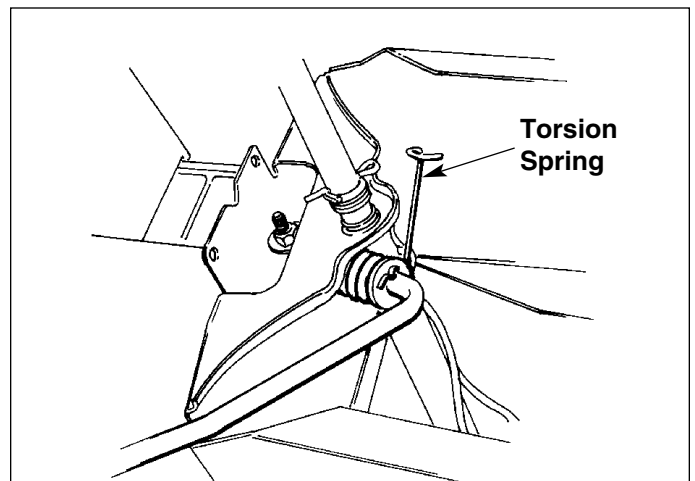
1. Using a 1/2 deep socket with a 4" - 6" extension bar, remove the tension adjustment locknut and compression spring (Figure B-9). Inspect spring and surrounding parts for signs of wear or breakage, and replace as needed.
2. Reassemble parts in position as shown in Figure 4B-4, and torque to 75 - 100 in./lbs.



**Figure B-9. Adjust Spring Tension**

#### Shift Lever Replacement

1. Release tension on the shift lever by disengaging the torsion spring's (E, Figure B-3) hooked end from the shift lever shaft. (Figure B-10)



**Figure B-10. Disengage Torsion Spring**



## 6 General Repair

### 6B Hand Controls Repair

2. Using a long-nose pliers, remove the cotter pin from the end of the shift lever. (Figure B-11)

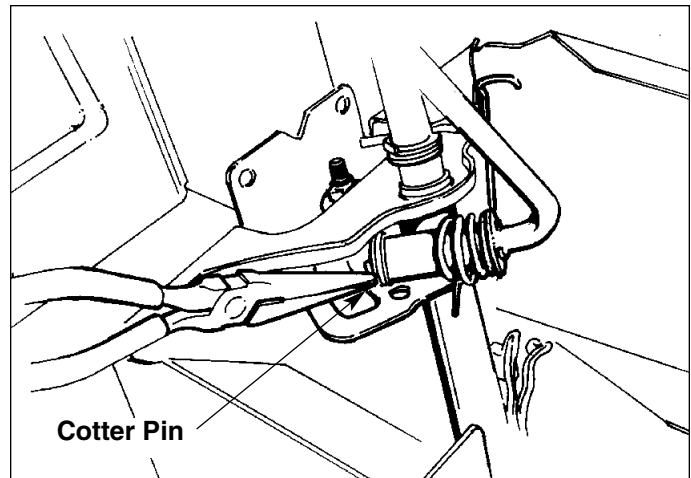


Figure B-11. Remove End Cotter Pin

3. Slide the shift lever out of the shift lever mounting bushings, and inspect for damage. (Figure B-12) Replace as necessary.
4. Apply a light application of grease to the end of the shift lever before reinstalling it into the plastic mounting bushings.
5. Secure the shift lever in place with the cotter pin, and re-engage the hooked end of torsion spring to the shift lever.
6. Check the shift lever for smooth operation.

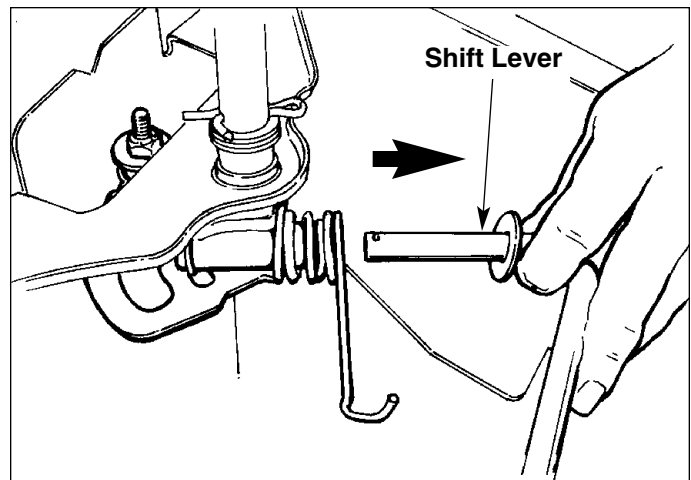


Figure B-12. Slide Shift Lever Out Of Mounting

### Shift Lever Assembly Replacement

The shift lever assembly should be replaced if damaged or worn.

1. Remove the steering wheel and steering shaft. See Steering Wheel Removal and Steering Shaft Removal sections.
2. From the underside of the unit, remove the two steering gear adjustment locknuts (Figure B-13) that secure the steering mounting plate and lower nylon bushing to the frame. Removal of the locknuts allows the two mating carriage bolts to be removed from the inside, near the base of the shift lever assembly.
3. Disassemble the shift lever and related parts as previously shown in the Shift Lever Service section.

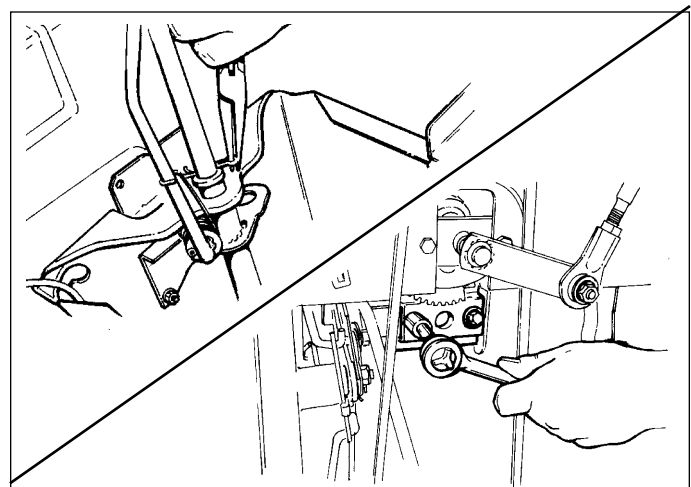
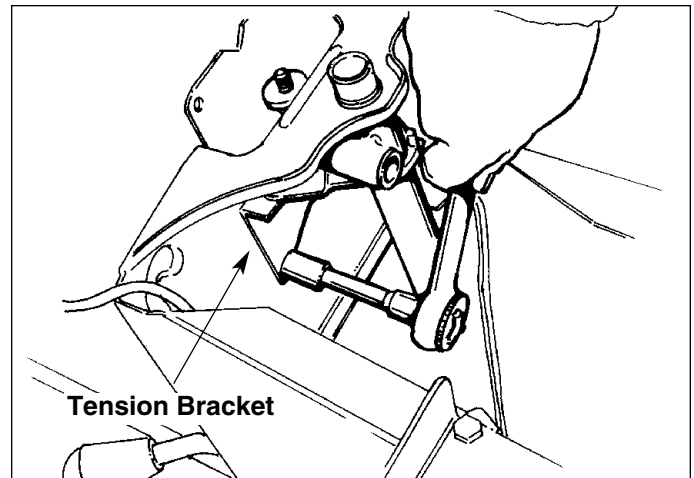


Figure B-13. Shift Lever Assembly Removal

4. Using a 7/16" socket and a short extension bar, remove the two sets of hex nuts, lockwashers, flat washers, and carriage bolts that attach the tension bracket to the inside wall of the lower dash (Figure B-14).

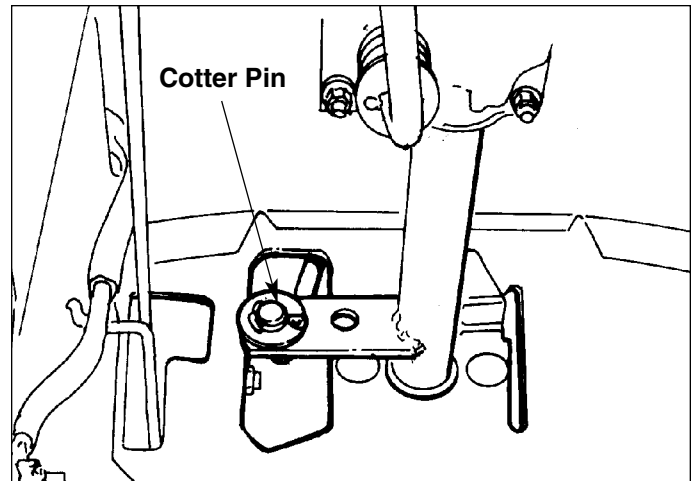


**Figure B-14. Disassemble Tension Bracket From Lower Dash**

5. Remove the cotter pin connecting the shift lever assembly arm to the front transmission shift rod linkage (Figure B-15).
6. The shift lever assembly may now be removed from the unit and inspected for wear or damage. Replace parts as required. Refer to Figure B-3 for proper assembly sequence of parts.
7. Reassemble parts in reverse order of disassembly. Apply a light coating of grease to the inside diameter of all bushings before reinstalling the shift lever assembly in the unit.

**NOTE:** On later models with adjustable tension, attach tension bracket (S, Figure B-3) against lower dash before tightening hex nut (L) on stud (P). Adjust tension on adjustment nut (I) to 75 - 100 in./lbs.

8. If no additional service is to be performed in this area, reassemble dash and related parts in reverse order of disassembly.
9. If lift lever parts are to be serviced, proceed to the Lift Lever Assembly Service section.



**Figure B-15. Disconnect Shift Rod Linkage From Shift Lever Assembly Arm**

## 6 General Repair

### 6B Hand Controls Repair

#### Shift Lever Rod Service

##### BROADMOOR LATE MODEL HYDROS

1. Remove battery from unit to provide access to front shift lever rod assembly at base of shift lever assembly (Figure B-16)
2. Remove cotter pin that secures front shift lever rod to shift lever arm, and set spacer aside for reuse when reassembling rod.

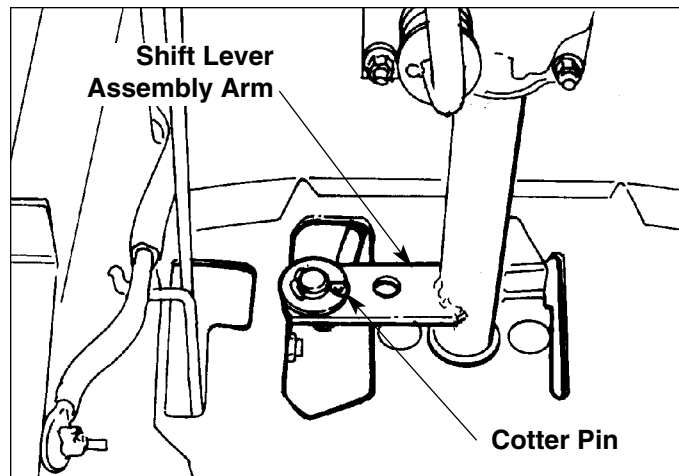


Figure B-16. Front Shift Lever Rod/Shift Lever Assembly Attachment (Broadmoor Model Shown)

3. Safely elevate and support unit (mower deck removed) for working access to idler arm assembly area and related shift linkage parts (Figure B-17)

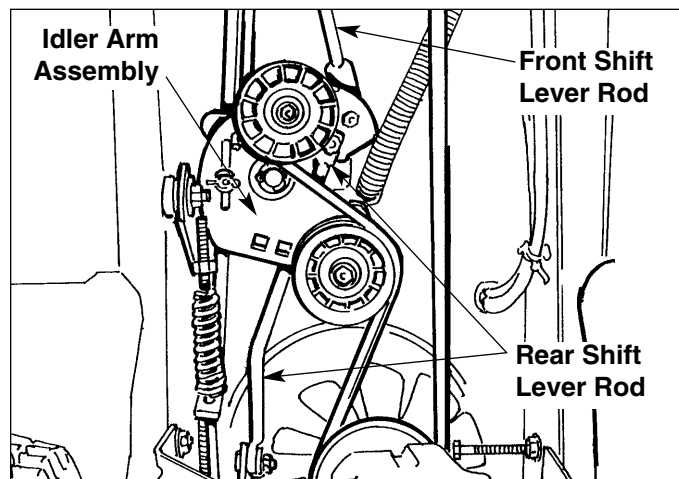


Figure B-17. Idler Arm Assembly Area - Underside Of Unit

4. After noting assembly position of front and rear clutch rods (to ensure proper assembly when reassembling parts), remove cotter pin and washer from clutch rod.
5. Disengage the drive spring from the underside of the frame to release tension on the idler arm assembly, and remove.

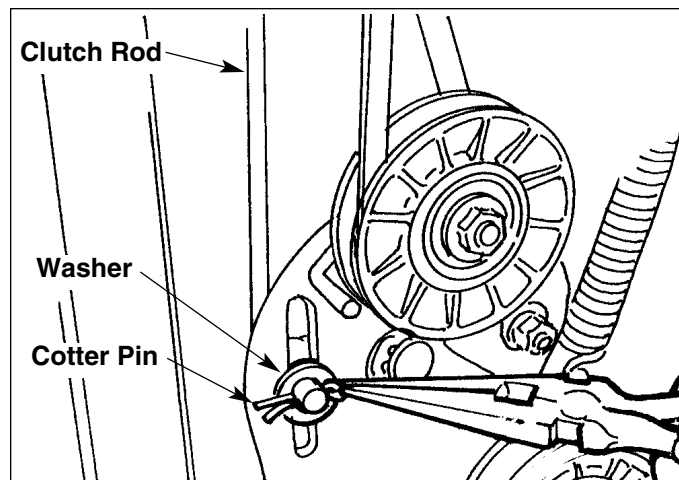
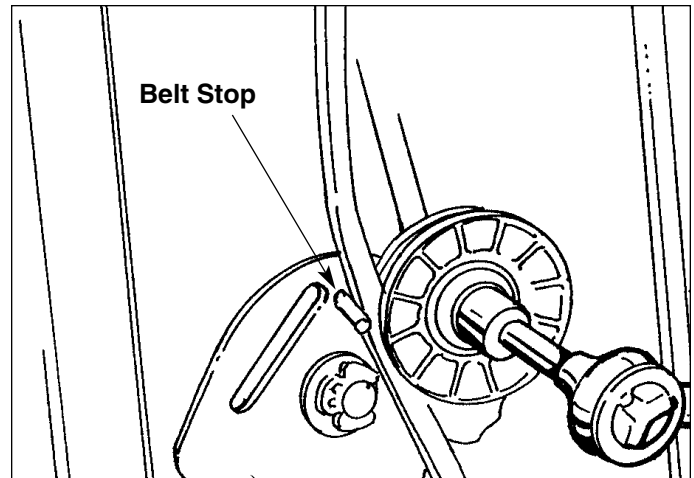


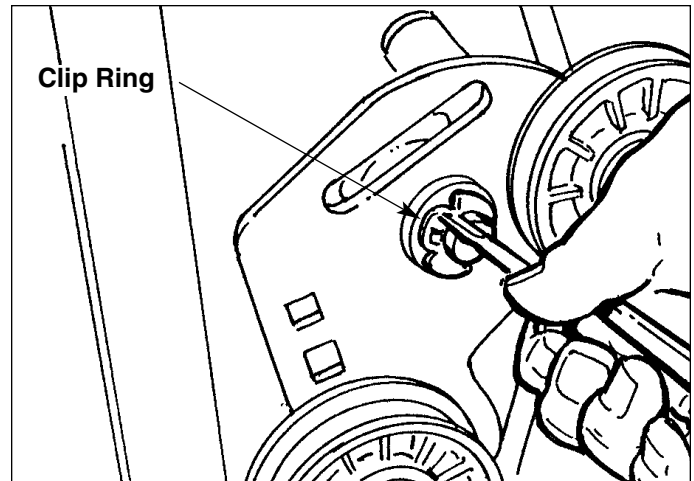
Figure B-18. Remove Cotter Pin

3. See Figure B-19. Note the position of the belt stop relative to the v-pulley, and then loosen the lock nut that secures the v-pulley to the idler. Slide the drive belt out of the gap between the pulley and belt stop.



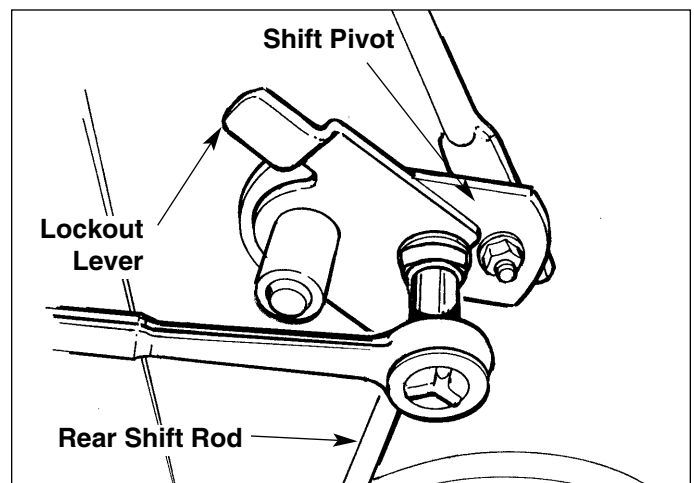
**Figure B-19. Loosen V-Pulley**

4. See Figure B-20. Slide the clip ring out of the groove on the pivot shaft, and remove the idler arm assembly from the unit by pulling it straight out and off the shaft. (See Foot Controls section 6C for specific idler arm assemblies and components used on various models.)



**Figure B-20. Remove Clip Ring And Idler Arm Assembly**

5. See Figure B-21. Remove the hex nut that secures the lockout lever to the shift pivot assembly. (See Figure B-21 for complete hardware details.)
6. Lift the rear shift rod off the screw threads and move it aside, and slide the lockout lever off the pivot shaft.



**Figure B-21. Lockout Lever/Shift Pivot Assembly**

## 6 General Repair

### 6B Hand Controls Repair

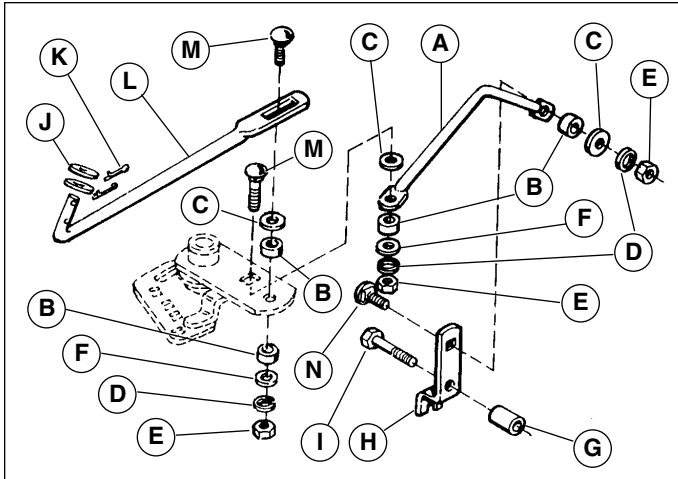


Figure B-22. Front/Rear Shift Rod Assembly - Hydro

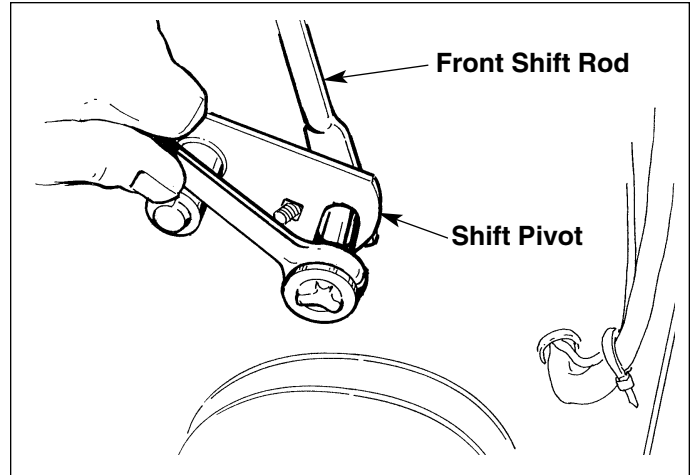


Figure B-23. Disassemble Shift Pivot/ Front Shift Rod Assembly

#### Parts List

- A. Rear Shift Rod
- B. Spacer
- C. 11/32 x 1-1/8 Washer
- D. 5/16 Lockwasher
- E. 5/16-18 Hex Nut
- F. 5/16 Plain Washer
- G. Spacer
- H. Control Lever (Transmission)
- I. 5/16-18 x 1-3/4 Hex Capscrew
- J. 17/32 x 1-1/4 x 5/64 Thk. Washer
- K. Cotter Pin
- L. Front Shift Rod
- M. 5/16-18 x 1-1/4 Carriage Bolt
- N. 5/16-18 X 1 Carriage Bolt

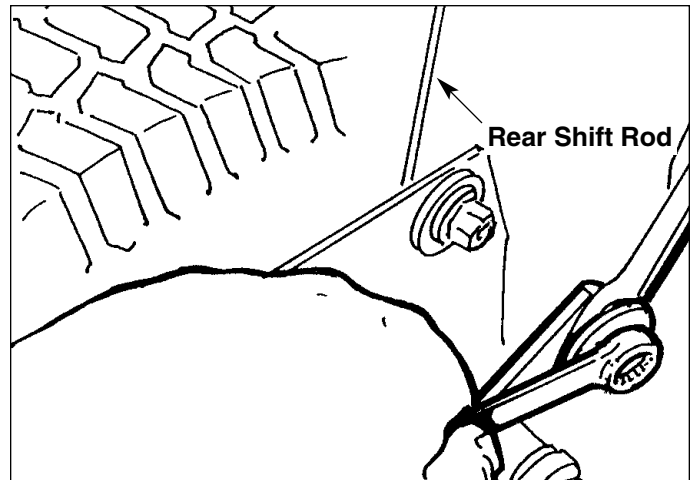
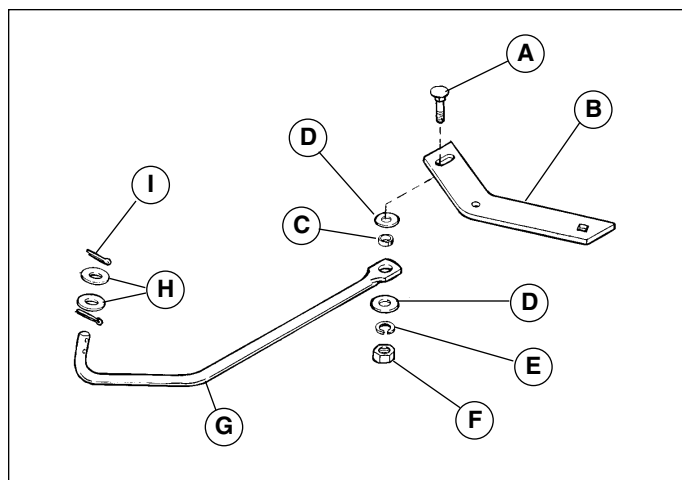


Figure B-24. Disassemble Rear Shift Rod From Transmission Shift Lever

7. See Figure B-23. Unscrew the hex nut and related hardware used to connect the shift pivot assembly to the front shift rod.
8. The shift pivot assembly may now be removed from the shaft, allowing the front shift rod to be removed.
9. Inspect the shift pivot assembly for wear, corrosion, or other damage, giving particular attention to the inside surface of the pivot tube. Replace the shift pivot assembly if worn or corroded.
10. Check the front shift rod for cracks, corrosion, or other damage, and replace if necessary.

11. If no additional service is required, reassemble parts in reverse order of assembly, and make neutral and return-to-neutral adjustments as shown in the adjustments section of this manual.
12. See Figure B-24. If necessary, the rear shift rod may also be removed and replaced at this point. Remove the hex nut and related hardware that secure the rear shift rod to the speed control lever on the transmission.



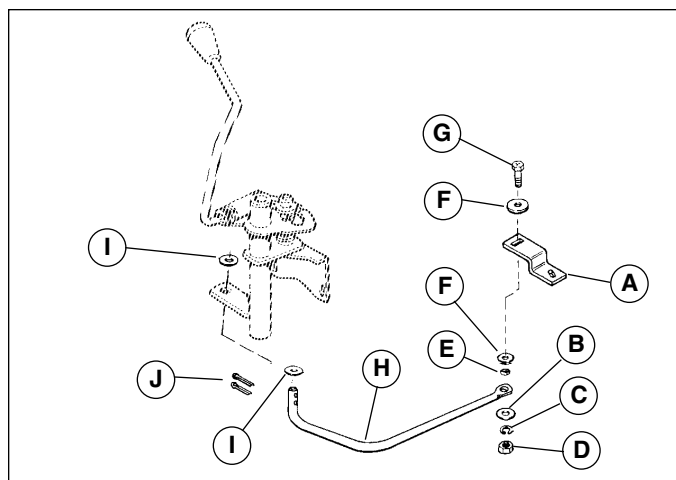
**Figure B-25. Broadmoor Hydro Shift Rod Eaton Transmission**

### Parts List

- A. 5/16-18 x 1-1/4 Carriage Bolt
- B. Speed Control Lever
- C. Spacer
- D. Plain Washer
- E. 5/16 Lockwasher
- F. Full Hex Nut
- G. Shift Rod
- H. 1/2" Washer
- I. Cotter Pin

### BROADMOOR HYDRO SHIFT ROD - EATON TRANS.

1. Remove battery from unit to provide access to front shift lever rod assembly at base of shift lever assembly (See preceding Broadmoor Hydro shift rod service section.)
2. Remove cotter pins that secure front shift lever rod to shift lever arm, and set washers aside for reuse when reassembling rod.
3. Safely elevate and support unit (mower deck removed) for working access to transmission shift lever area.
4. See Figure B-25. Remove carriage bolt, hex nut, washers and spacers connecting shift rod to shift lever, and remove shift rod from unit. Inspect shift rod for wear or damage, and replace as required.
5. Reassemble parts in reverse order of disassembly, applying grease to pivot points as indicated.
6. Adjust transmission as required for proper operation - see "Adjustments" section of manual for specific procedures.



**Figure B-26. Broadmoor Gear Shift Rod Peerless Transmission**

### Parts List

- A. Shift Lever
- B. 5/16 Washer
- C. 5/16 Lockwasher
- D. 5/16-18 Full Hex Nut
- E. Spacer
- F. Washer
- G. 5/16 x 1-1/4 Capscrew
- H. Shift Rod
- I. 1/2 Washer
- J. 3/32 x 3/4 Cotter Pin

### BROADMOOR GEAR SHIFT ROD - PEERLESS TRANS.

1. Remove battery from unit to provide access to front shift lever rod assembly at base of shift lever assembly (See preceding Broadmoor Hydro shift rod service section.)
2. Remove cotter pins that secure front shift lever rod to shift lever arm, and set washers aside for reuse when reassembling rod.
3. Safely elevate and support unit (mower deck removed) for working access to transmission shift lever area.
4. See Figure B-26. Remove capscrew, hex nut, washers and spacers connecting shift rod to shift lever, and remove shift rod from unit. Inspect shift rod for wear or damage, and replace as required.
5. Reassemble parts in reverse order of disassembly, applying grease to pivot points as indicated.
6. Adjust transmission as required for proper operation - see "Adjustments" section of manual for specific procedures.

## 6 General Repair

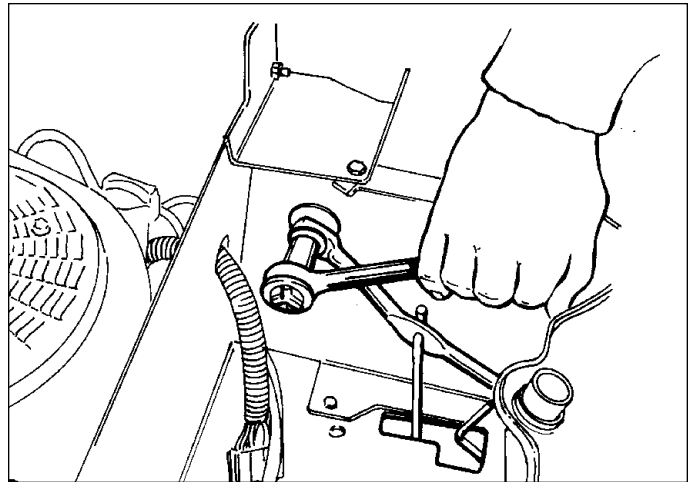
### 6B Hand Controls Repair

#### Lift Lever Assembly Service

Access for lift lever service may be achieved by removing the battery from the lower dash area, or for a greater access area, by removing the dash assembly and related parts as shown in the Hood, Dash, and Grill Repair Repair section. See Figure B-4 for a complete exploded view of all parts.

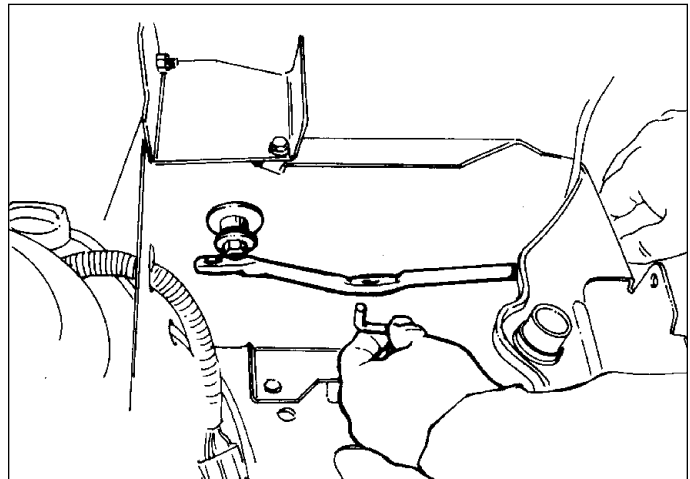
#### LIFT HANDLE ROD/LINK SERVICE

1. Using a 1/2" socket, remove the locknut securing the lift handle rod to the pivot spacer inside of the lower dash (Figure B-27).



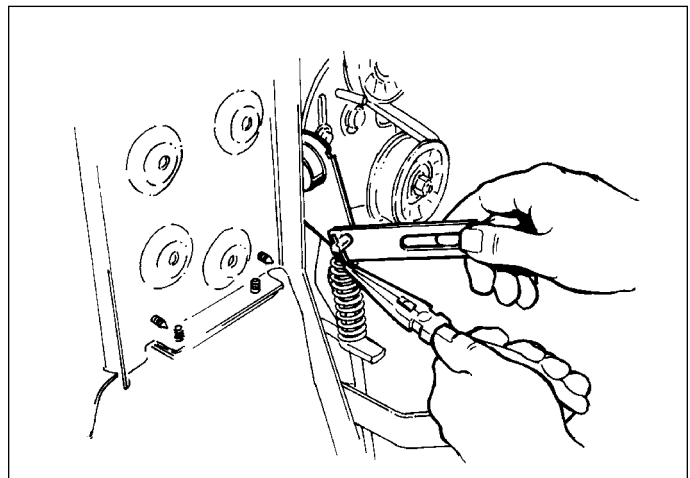
**Figure B-27. Remove Locknut From Lift Handle Rod Pivot Spacer**

2. Slide the lift handle rod off the spacer, and twist 90° to disengage from the upper lift link (Figure B-28). The lift handle rod can be removed through the slot in the lower dash. Inspect for wear or damage, and replace as required.
3. The upper lift link and lift link (H, K, Figure B-4) can be removed and inspected for wear and damage by disengaging them from the lift assembly cams under the unit. Replace links as necessary.



**Figure B-28. Twist Lift Handle Rod 90° To Disengage From Upper Lift Link**

4. See Figure B-29-Top. If necessary, the upper transport lift link can be removed from the lift assembly cam by removing the cotter pin. Inspect the upper transport lift link and replace as required.
5. To remove the lift lever cam, use a box wrench and unscrew the hex nut securing it to the carriage bolt and unit frame. Inspect for wear or damage, and replace if required. Apply grease to the pivot spacer during reassembly.
6. Reassemble parts in reverse order of disassembly. Refer to Figure B-4 for correct part locations.



**Figure B-29. Remove Upper Transport Lift Link & Lift Cam**



#### Engine Choke Control Service (Twin Cylinder Units Only)

On units with a dash-mounted engine choke control, the control is a push-pull button mounted on the lower left portion of the dash assembly (Figure B-30). For easiest service access, the battery should be removed from the unit.

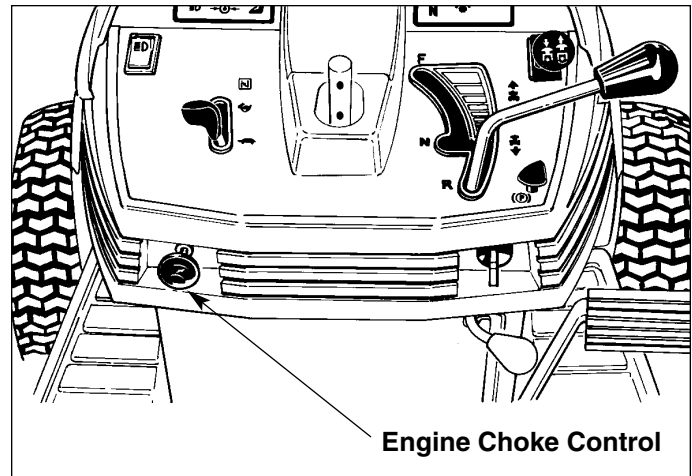


Figure B-30. Engine Choke Control Location

1. Loosen the choke cable clamp on the engine using a phillips head screwdriver, and after noting the engagement of the cable end with the choke lever, remove the cable end from the choke lever (Figure B-31).

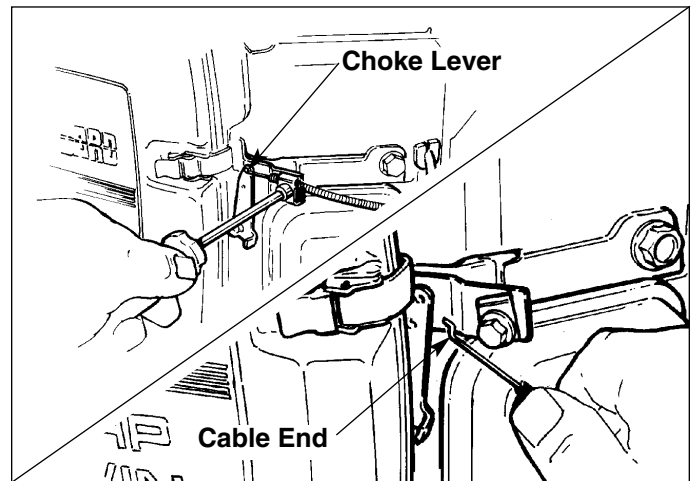


Figure B-31. Disconnect Choke Cable At Engine

2. From inside the dashboard area, unscrew the hex nut that secures the choke cable assembly to the dash, and slide the choke cable and handle assembly out of the front of the dash. See Figure B-32.
3. Inspect all parts for wear or damage, and replace as required.
4. Reassemble parts in reverse order of disassembly.
5. Check the engine choke linkage for proper engagement with the cable and smooth operation of choke. See the engine manufacturer's instructions for complete choke adjustment instructions.

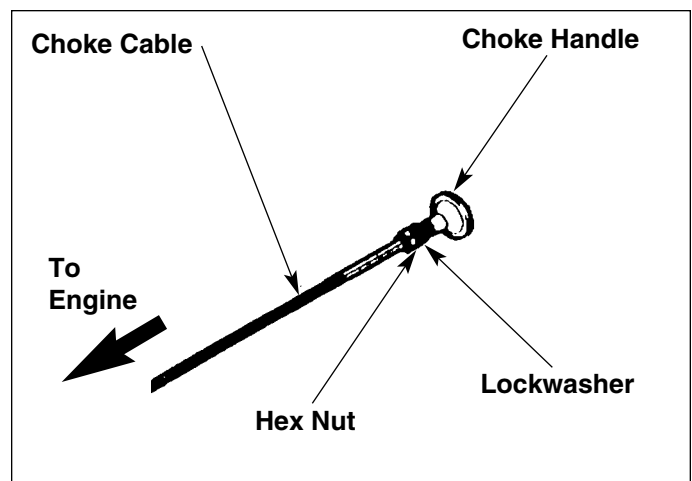


Figure B-32. Choke Cable Assembly

## 6 General Repair

### 6B Hand Controls Repair

#### Throttle (Engine Speed Control) Assembly

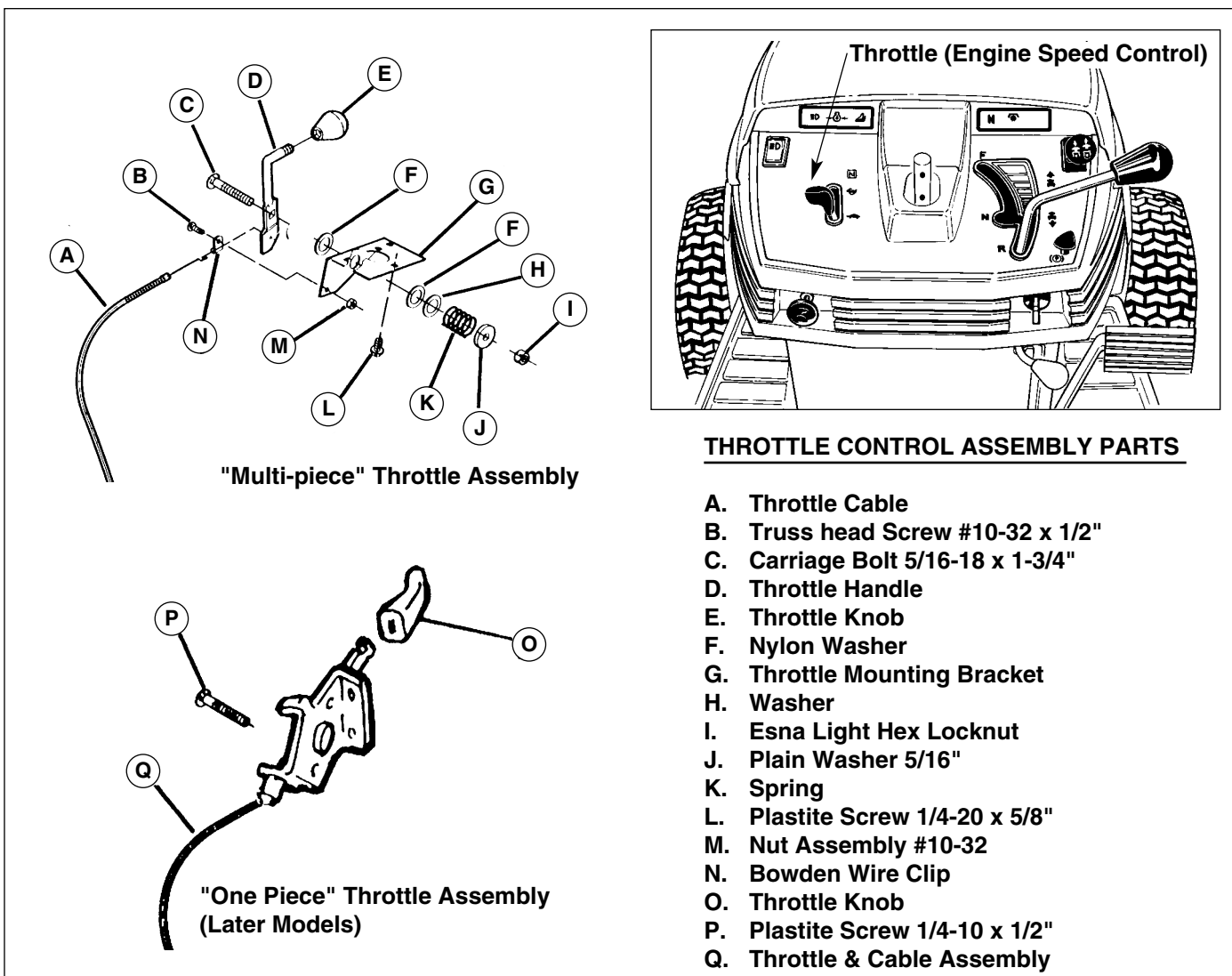


Figure B-33. Throttle Control Assemblies

### Throttle (Engine Speed) Control Service

The throttle control is attached to the underside of the dashboard and may be accessed by raising the unit's hood. For greater access and improved work area, the battery may be removed from the unit.

#### THROTTLE LEVER TENSION (MULTI-PART LEVER ASSEMBLY UNITS ONLY)

*Note: Later models use a "one piece" non-adjustable throttle control that is replaced as an assemble.*

1. Increase Tension - Tighten the locknut (I, Figure B-33) by turning clockwise.
2. Decrease Tension - Loosen the locknut (I, Figure B-33) by turning counterclockwise.

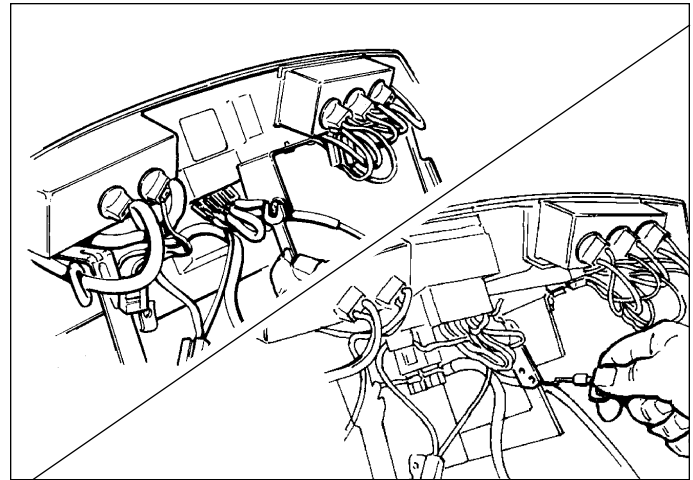
*NOTE: When properly adjusted, the throttle lever will allow positioning with light force, and will maintain the selected position without slippage while the unit is being operated.*

#### THROTTLE LEVER KNOB REPLACEMENT

1. Remove the throttle lever knob:
  - a. **Round throttle knob** - Unscrew the knob from the throttle lever by turning the knob counterclockwise.
  - b. **"Flat" style knob** - Remove the knob by pulling it straight off the throttle lever.
2. Inspect the knobs for cracks or other damage, and replace if required.

#### MULTI-PIECE THROTTLE LEVER ASSEMBLY REPAIR

1. Remove the wire clip securing the throttle cable (N, Figure B-33) to the throttle lever by removing the truss head screw and nut assembly (B & M)
2. Disengage the throttle cable from the throttle lever, and loosely reinstall the screw and nut on the clip to avoid loss during service (Figure B-34).
3. Remove the throttle lever from the throttle mounting bracket by unscrewing the hex locknut (I, Figure B-33) from the carriage bolt (C). (Keep the head of the carriage bolt against the throttle lever to keep the bolt from turning while the locknut is being removed.)
4. Slide the carriage bolt and throttle lever out of the throttle lever mounting bracket, catching the spring and washers as the carriage bolt is removed from the assembly.



**Figure B-34. Remove Wire Clip & Throttle Cable From Throttle Lever**

5. Check the throttle lever mounting bracket (G, Figure B-33) for wear or damage. Remove and replace if necessary by unscrewing the three plastite screws securing the bracket to the underside of the dashboard.
6. Reassemble parts in reverse order of disassembly, using care to position the nylon washers on both sides of the throttle lever mounting bracket, and the metal washers on both sides of the spring, as shown in Figure B-33.
7. Adjust spring tension to provide secure positioning of lever while allowing smooth operation of lever.

#### ONE-PIECE THROTTLE LEVER REPAIR

1. Remove the throttle knob by pulling it straight off the throttle lever.
2. Unscrew the plastite screws (P, Figure B-33) securing the one-piece throttle assembly (Q) to the underside of the dashboard, and remove the one-piece throttle/cable assembly.
3. Inspect the assembly for wear or damage and replace as required. (Consult engine manufacturer's manual for throttle cable connection to engine throttle linkage, if necessary.)
4. Reassemble in reverse order of disassembly.

## 6B Hand Controls Repair - Notes

[illegible]

### GENERAL

Servicing the foot control group assemblies requires access to the underside of the frame, which may be gained by removing the mower deck and elevating the unit to a convenient working height using a properly rated jack or lift table.

The unit front end may also be tilted up for under-frame access using a properly-rigged chain hoist, however this method requires removal of the battery, and drainage of the fuel tank, to prevent hazardous electrolyte and fuel leakage.



#### DANGER

Never work on an elevated unit unless it is securely supported, and wheels are firmly chocked to prevent the unit from rolling off or away from the supports.



#### DANGER

Always obey all safety precautions for working around battery hazards such as electrolyte, hydrogen gas, and live battery terminals when removing and reinstalling the battery. Always disconnect the negative terminal cable first, and reconnect it last, to help prevent dangerous sparking caused by accidental tool contact between the positive terminal of the battery and the frame. Keep the battery level when handling to prevent leakage of electrolyte.

### REQUIRED TOOLS & EQUIPMENT

Tools required for performing service on the foot controls assembly groups include:

- Hammer or rubber mallet
- Small flat blade screwdriver
- Phillips screwdriver
- Long-nose pliers
- 1/2" deep socket
- 3/8" Nut Driver or 3/8" socket w/6" min. extension
- 3/8" & 7/16" box or combination wrenches
- 3/8" & 7/16" open end wrench

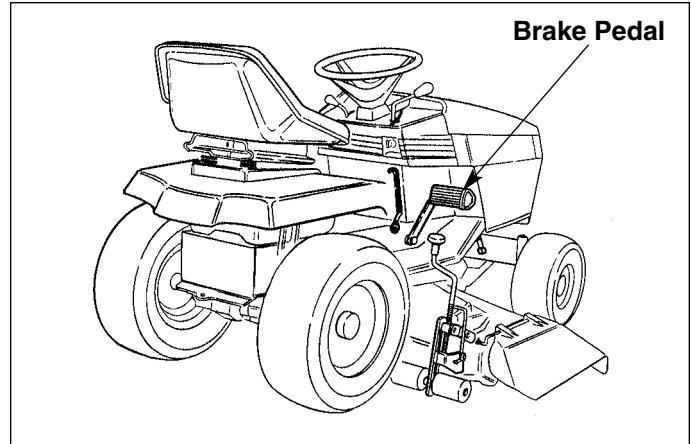


Figure C-1. Broadmoor Hydro Brake Pedal Location

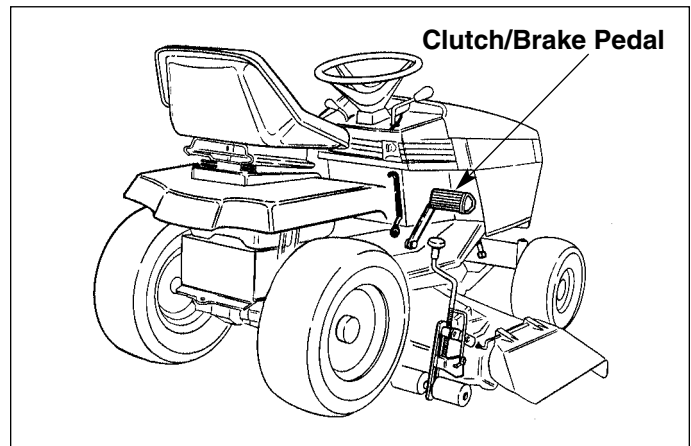


Figure C-2. Broadmoor Gear Clutch/Brake Pedal Location

### Brake Spring: Aproximate Compressed Length:

Hydro-Gear 0750/0800	2-7/8"
Tuff Torq K60	2-7/8
Eaton 750	1-3/4
Peerless 801	2-7/8"

## 6 General Repair

### 6C Foot Controls Repair

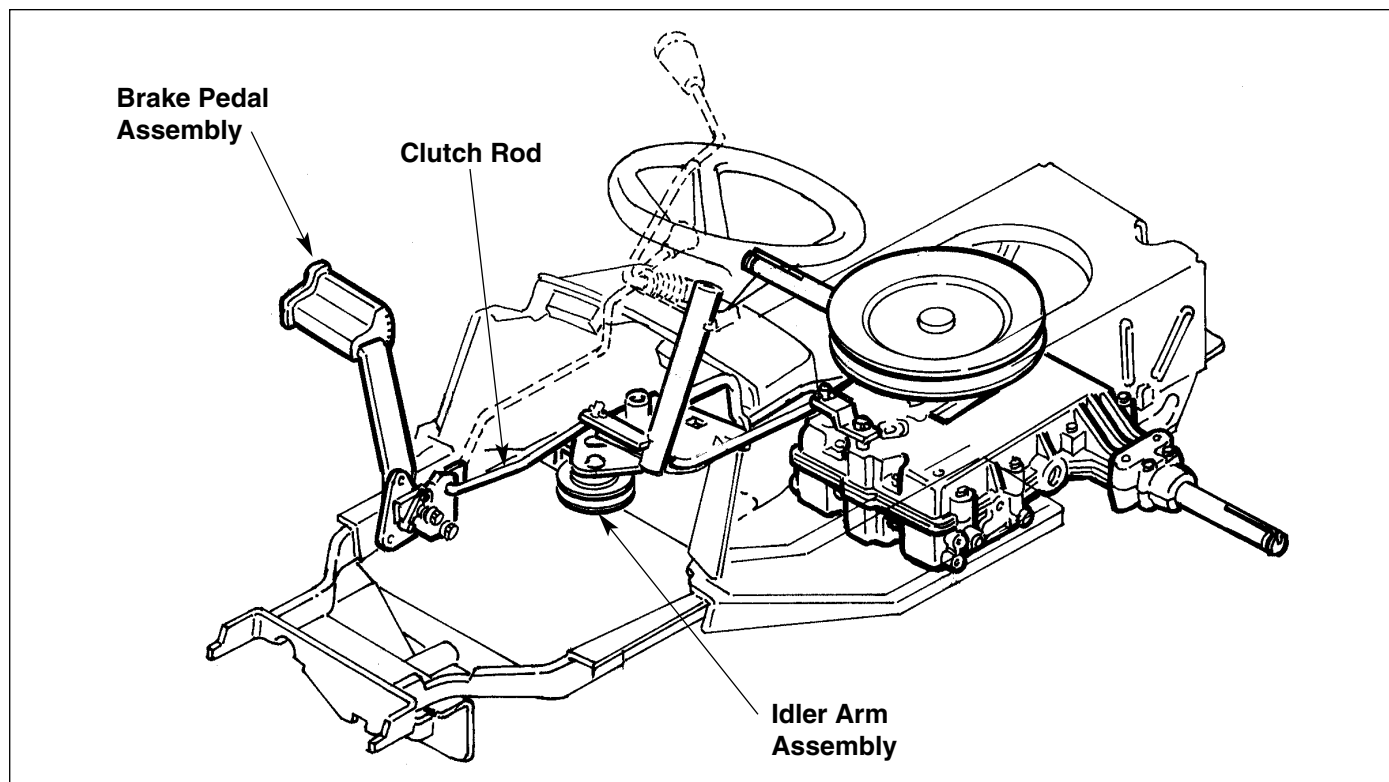


Figure C-3. Gear Foot Controls Group Typical Assembly

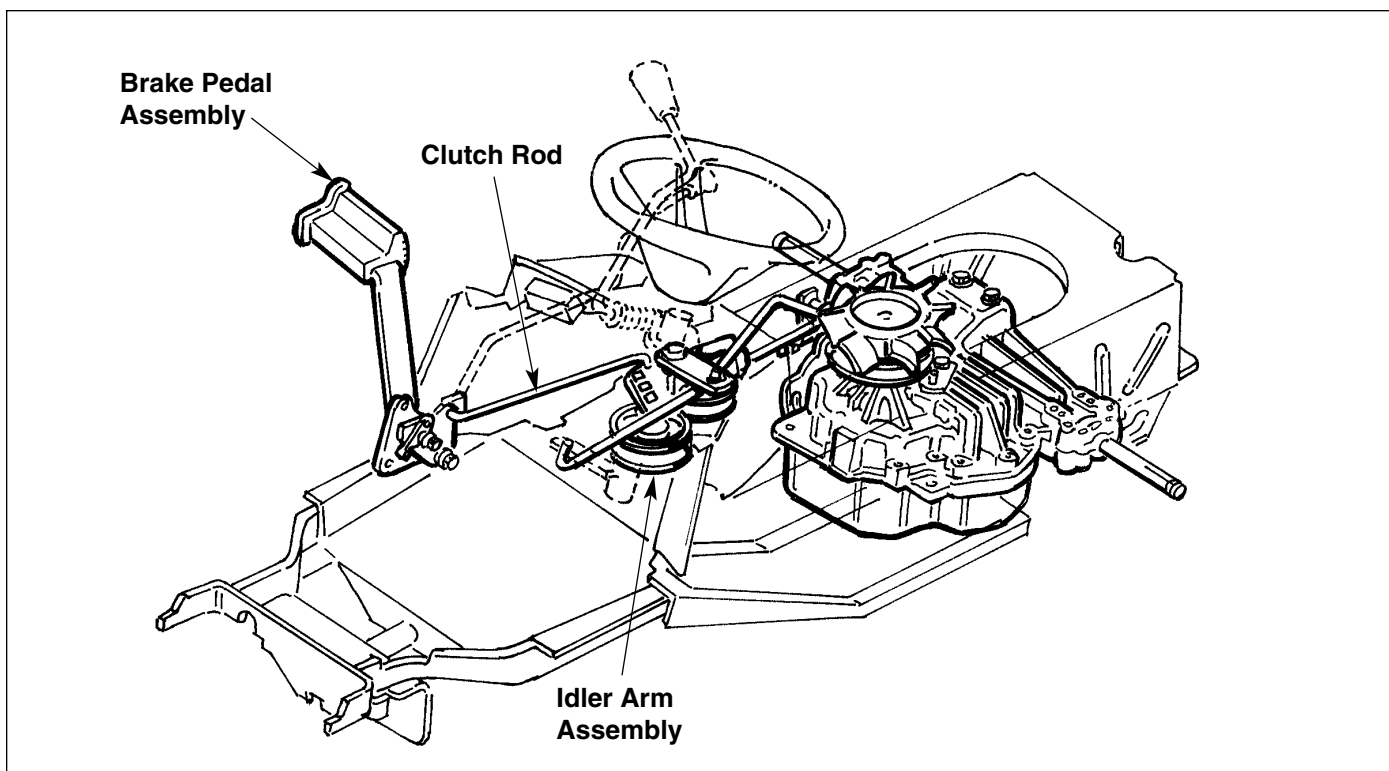


Figure C-4. Hydro Foot Controls Group Typical Assembly

### HYDRO FOOT CONTROLS

#### Clutch / Brake Pedal Arm Assembly Service

Refer to Figures C-11 through C-13 for transmission-specific parts breakdowns.

1. Remove the mower deck, and position the unit to permit safe access to the underside of the frame and the foot control assembly parts (See Figures C-3 through C-4 for approximate part locations.)
2. Using a 9/16 socket wrench, remove the 3/8-16 locknut that secures the brake pedal assembly arm to the lift cam and foot pedal arm (Figures C-5 through C-7)
3. Note the position of the lift cam and foot pedal arms (Figure C-6), and slide the brake pedal arm out of the unit, catching the washers positioned under the lock nut as the brake pedal assembly arm is removed. (The lift cam, foot pedal arm, parking brake cam, switch actuator, and clutch rod may be left in place, partially assembled.)
4. To remove a worn foot pedal pad, clamp the brake pedal arm in a vise, and using a large adjustable open-end wrench placed over the flats of the brake pedal arm next to the pad, tap the wrench with a hammer or rubber mallet to slide the pad off the arm. (Pads that resist removal with this method may be heated lightly with a heat gun or blow dryer to expand the pad slightly, allowing it to be separated from the arm.)

**NOTE:** Heat gun: Use a low heat setting, keep the gun 4-6" away from the pad while moving back and forth to provide even heating. Avoid heating the brake pedal assembly arm, as this will reduce the effectiveness of heating the pad to separate it from the arm.



#### DANGER

**Never use a heat gun or blow dryer if flammable vapors are present, as the heating element could ignite the vapor and cause a fire or explosion.**

5. Before installing a new pad on the brake pedal assembly arm, check the arm, pivot shaft, and threaded end for wear, cracks, corrosion, or other damage, and replace if necessary.
6. Apply a light application of soapy water to the end of the brake pedal arm to act as a lubricant, and slide the new brake pedal pad on to the brake pedal assembly arm after making sure the pedal tread is positioned up toward the operator.
7. Tap the outer portion of the pad with a rubber mallet to make sure it is fully seated on the arm.

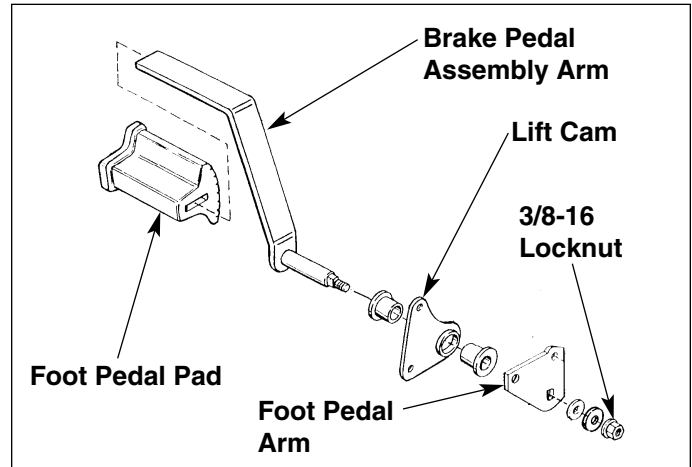


Figure C-5. Hydro Foot Pedal Assembly - Typical

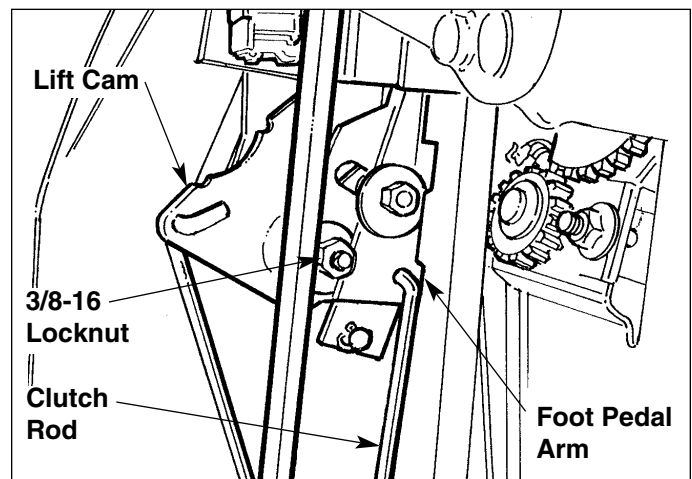


Figure C-6. Hydro Foot Pedal Assembly - Typical

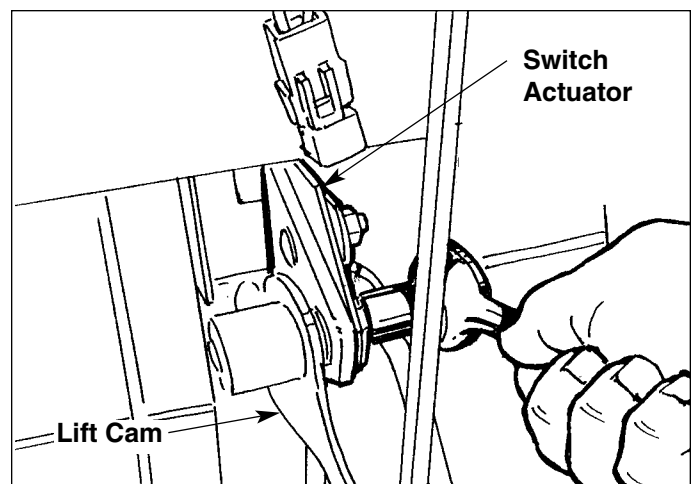


Figure C-7. Remove Brake Pedal Assembly - Typical



## 6 General Repair

### 6C Foot Controls Repair

8. If no additional service is to be performed, reassemble remaining parts in reverse order of disassembly. See Figures C-11 through C-13 for correct parts positioning after reassembly, and check for proper operation of brake pedal assembly parts. If additional service in this area is required, continue to next section.

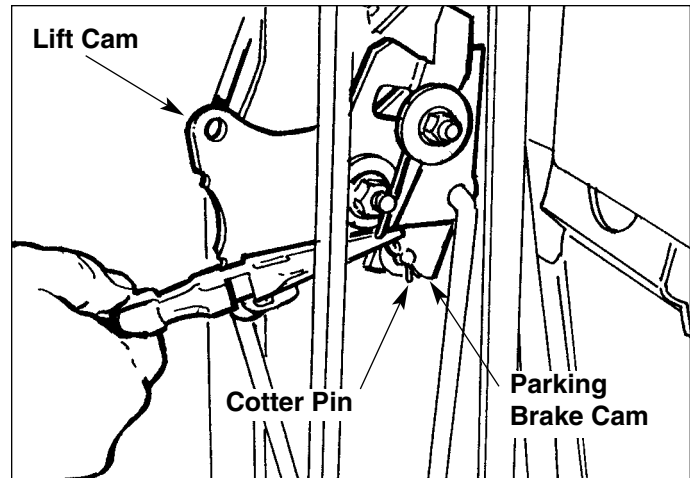
#### Clutch Rod Service

The clutch rod extends from the foot pedal arm through the slot in the guide rod/brake rod assembly, to the idler arm assembly, and is held in place at both ends by cotter pins. (See Figures C-6 & C-9)

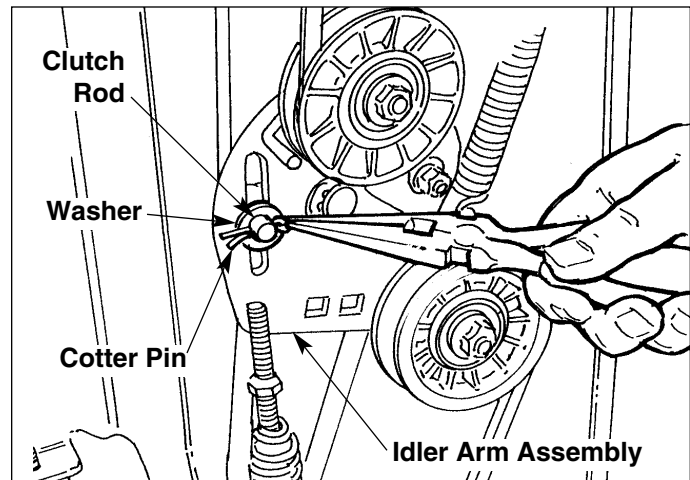
Once the foot pedal assembly has been removed, the foot pedal arm/parking brake cam/switch actuator/ clutch rod assembly can be removed from the unit as an assembled group for bench inspection and any required repair or replacement:

**NOTE:** The lift cam (Figure C-8) remains attached to the upper lift link. See Hand Controls Section for part position and placement.

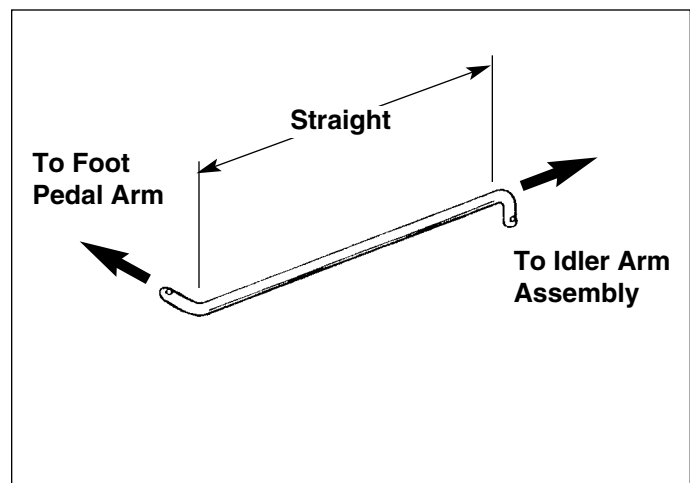
1. Using a needle-nose pliers, remove the cotter pin that secures the parking brake rod to the parking brake cam (Figure C-9). (The parking brake cam uses the front end of the clutch rod as a pivot point, and must be separated from the parking brake rod to permit removal of the clutch rod and related parts as a group.)
2. Remove the cotter pin and washer that secure the rear end of the clutch rod to the idler arm (Figure C-9). The clutch rod and related parts can now be removed from the unit for inspection and any necessary repair.
3. Check all parts for signs of wear, corrosion, or damage, and replace individual parts as required. Before disassembling, note the assembly position of all parts.
4. Hydro Modles only: The clutch rod must be straight between the bends at each end (Figure C-10). If the clutch rod is bent or damaged, remove the cotter pin and washer that secure it to the foot pedal arm/parking brake cam, and replace it.
5. Reassemble all parts in reverse order of disassembly, and check for free movement before reinstalling the clutch rod parts on the unit.
6. When reinstalling rear end of clutch rod to idler arm assembly, be sure to insert the clutch rod end through the hole in the guide rod/brake rod located under the idler arm before inserting the rod end into the slot in the idler arm. If no additional service is to be performed, check foot pedal arm and parking brake rod for proper operation.



**Figure C-8. Remove Parking Brake Rod Cotter Pin & Washer (Assembled Position Shown)**



**Figure C-9. Clutch Rod Cotter Pin & Washer**



**Figure C-10. Check Clutch Rod (Hydro Models Only)**

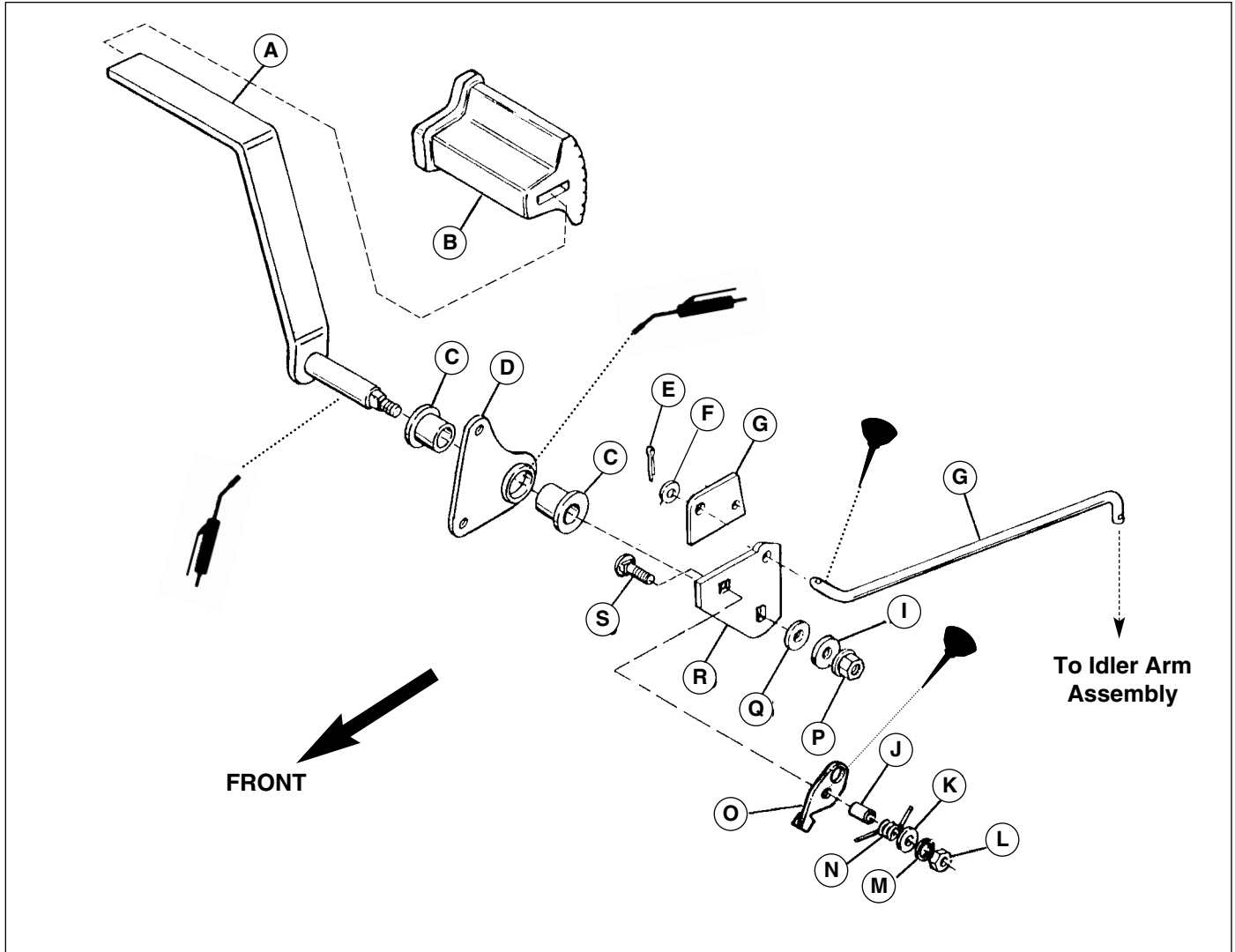
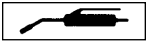



Figure C-11. Broadmoor Hydro Foot Control - Brake Pedal Assembly Parts - Hydro-Gear 0750 / 0800

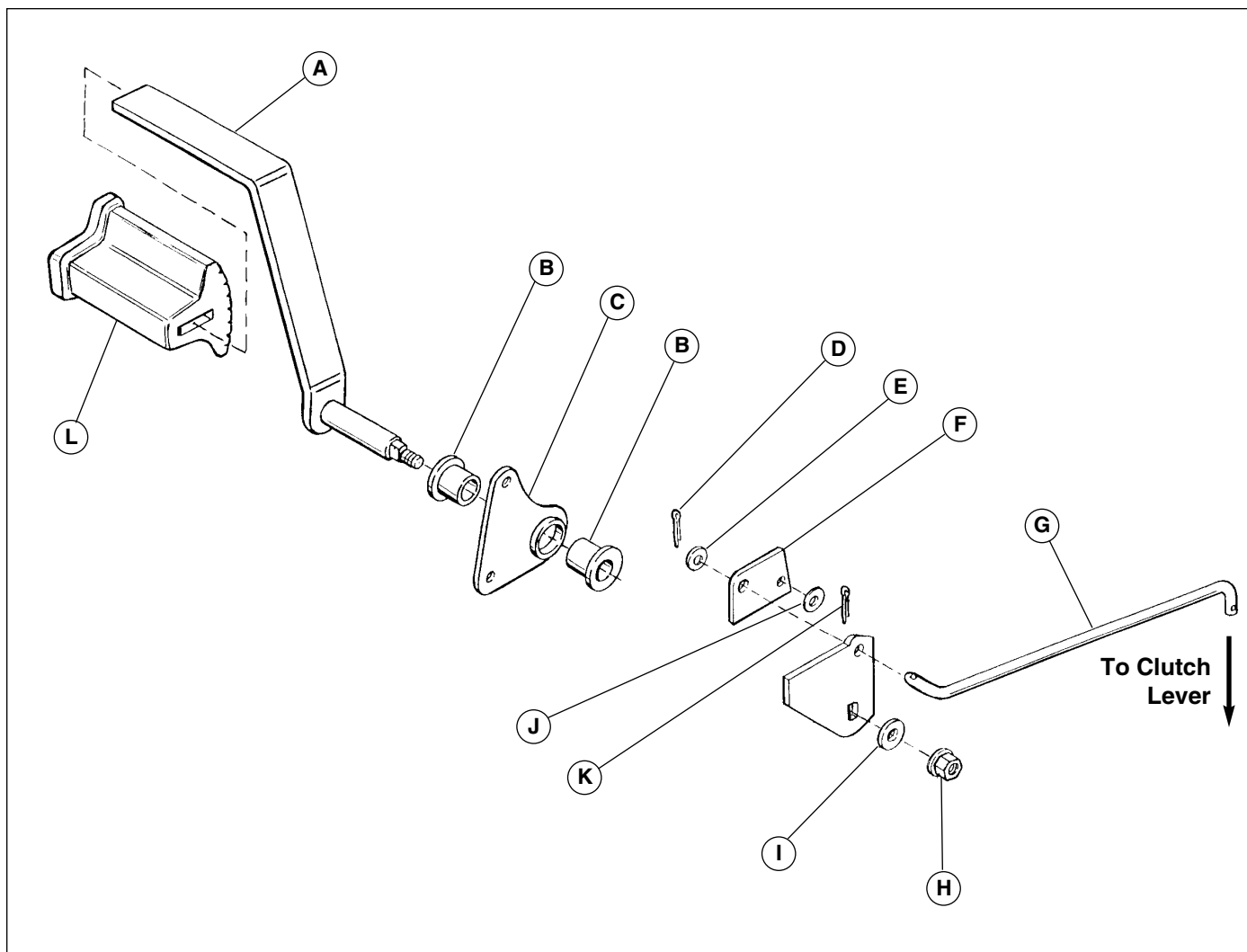
A. Brake Pedal Assembly	H. Clutch Rod	O. Switch Actuator
B. Foot Pedal Pad	I. 13/32" x 1-1/2" x 1/16" Washer	P. 3/8-16 ESNA Hex Nut
C. Plastic Bushing	J. Spacer	Q. Washer
D. Lift Cam	K. 5/16" Washer	R. Foot Pedal Arm
E. Cotter Pin	L. 5/16-18 Hex Nut	S. 5/16-18 x 1-1/4" Carriage Bolt
F. 5/16" Plain Washer	M. 5/16 Lockwasher	
G. Parking Brake Cam	N. Tension Spring	

### NOTES:

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 

## 6 General Repair



### 6C Foot Controls Repair



**Figure C-12. Broadmoor HYDRO Foot Control - Brake Pedal Assembly Parts - Eaton 750 / 751 & Tuff Torq K60**

<b>A. Brake Pedal Assembly</b>	<b>E. 11/32" Washer</b>	<b>I. 3/8" Washer</b>
<b>B. Plastic Bushing</b>	<b>F. Parking Brake Cam</b>	<b>J. 9/32 Washer</b>
<b>C. Lift Cam</b>	<b>G. Clutch Rod</b>	<b>K. Cotter Pin</b>
<b>D. Cotter Pin</b>	<b>H. 3/8-16 ESNA Hex Nut</b>	<b>L. Foot Pedal Pad</b>

#### NOTES:

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 

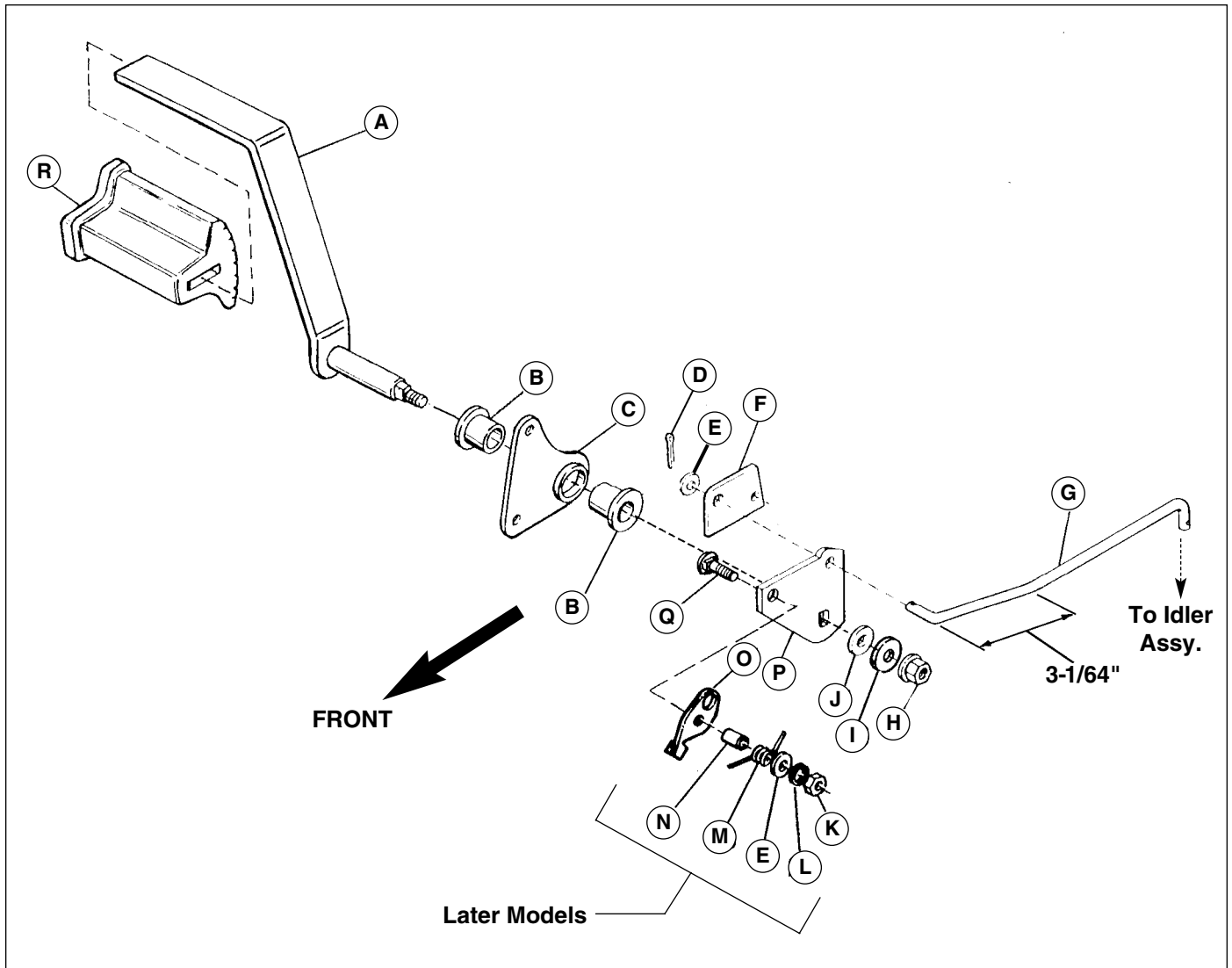
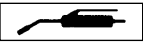



Figure C-13. Broadmoor Gear Foot Controls - Brake Pedal Assembly Parts - Peerless 801

A. Brake Pedal Assembly	G. Clutch Rod	M. Torsion Spring
B. Plastic Bushing	H. 3/8-16 ESNA Hex Nut	N. Spacer
C. Lift Cam	I. 3/8" Washer	O. Switch Adapter
D. Cotter Pin	J. Washer	P. Foot Pedal Arm
E. 11/32" Washer	K. 5/16-18 Hex Nut	Q. 5/16-18 x 1-1/4" Carriage Bolt
F. Parking Brake Cam	L. 5/16" Lockwasher	R. Foot Pedal Pad

### NOTES:

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 

## 6 General Repair

### 6C Foot Controls Repair

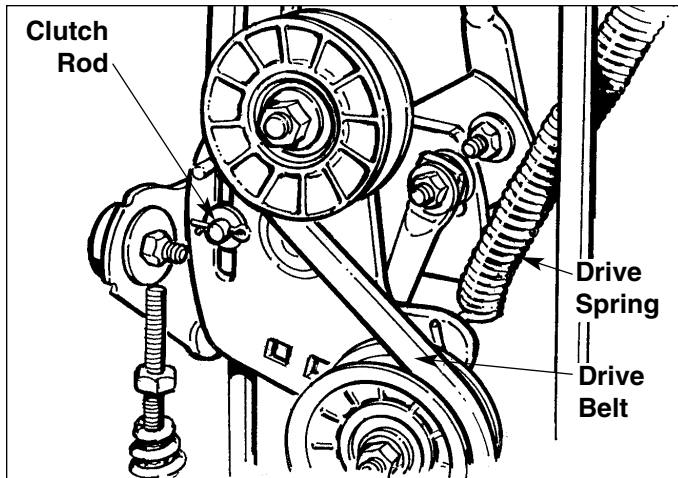


Figure C-14. Broadmoor Hydro Idler Arm Assembly - Typical

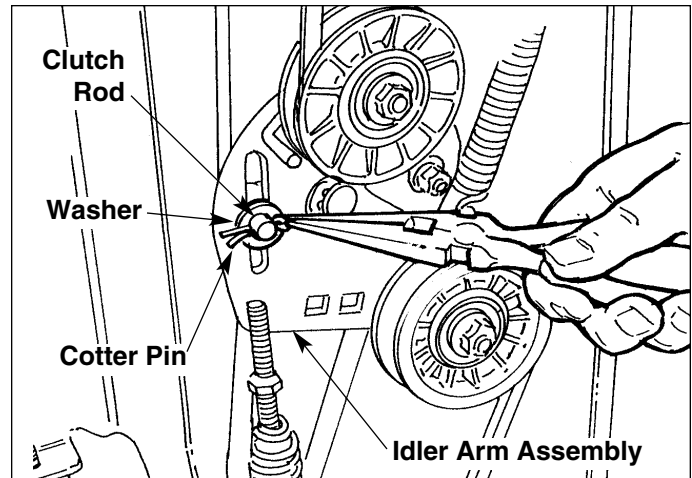


Figure C-15. Remove Cotter Pin & Washer - Typical

### Idler Arm Assembly Service

Refer to Figures C-23 through C-25 for transmission-specific parks breakdowns.

The idler arm assembly is a pivoting, spring-loaded mounting plate with pulleys that acts as a clutch/brake to engage and disengage the main drive belt.

1. Remove the cotter pin and washer that secure the rear end of the clutch rod to the idler arm (Figure C-18). (The clutch rod and rod guide can be left in place while the idler arm assembly is being serviced.)
2. Disengage the drive spring from the underside of the frame to release tension on the idler arm assembly, and remove.
3. See Figure C-19. Note the position of the belt stop relative to the v-pulley, and then loosen the lock nut that secures the v-pulley to the idler. Slide the drive belt out of the gap between the pulley and belt stop.
4. See Figure C-20. Slide the clip ring out of the groove on the pivot shaft, and remove the idler arm assembly from the unit by pulling it off the shaft.
5. Inspect the idler arm assembly for wear, cracked pulleys, or other damage, and replace parts as required. Refer to Figure C-6 for proper assembly position.
6. If service is to be performed on lockout lever or shift pivot assembly, proceed to next section. If no additional service is to be performed on idler arm assembly, reassemble idler arm assembly parts in reverse order of disassembly.

**NOTE:** Before tightening v-pulley locknut, reinstall drive belt and position belt stop in original location. Hold belt stop in position while tightening locknut to prevent stop from moving.

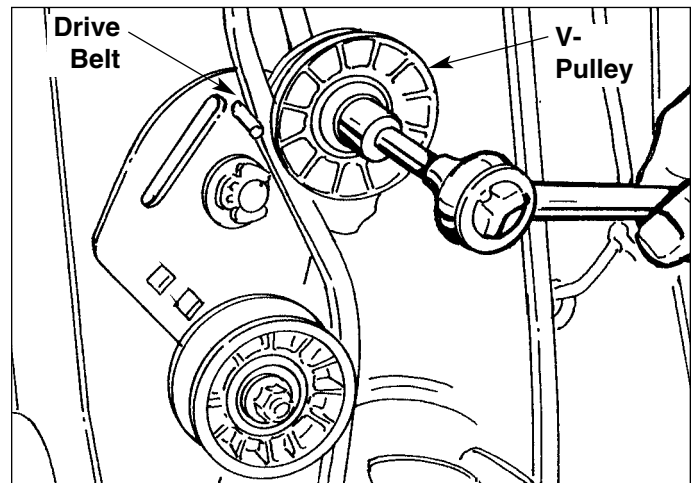


Figure C-16. Loosen V-Pulley - Typical

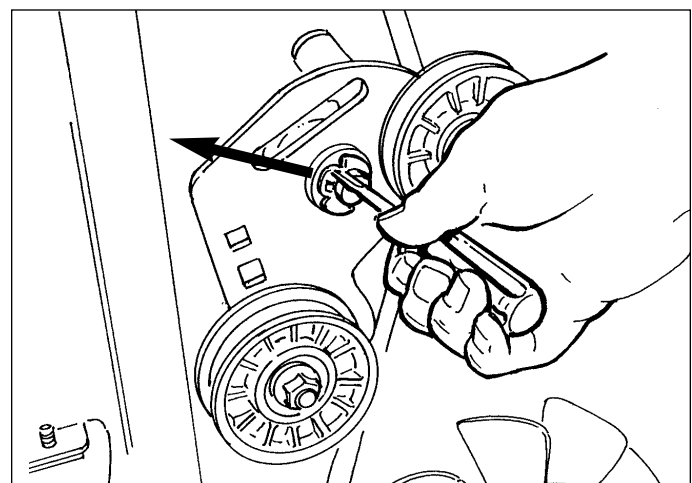


Figure C-17. Remove Clip ring - Typical

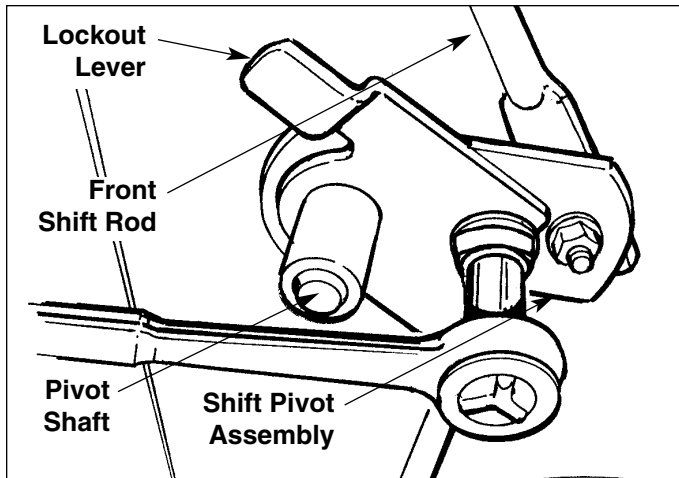


Figure C-18. Lockout Lever/Shift Pivot Assembly

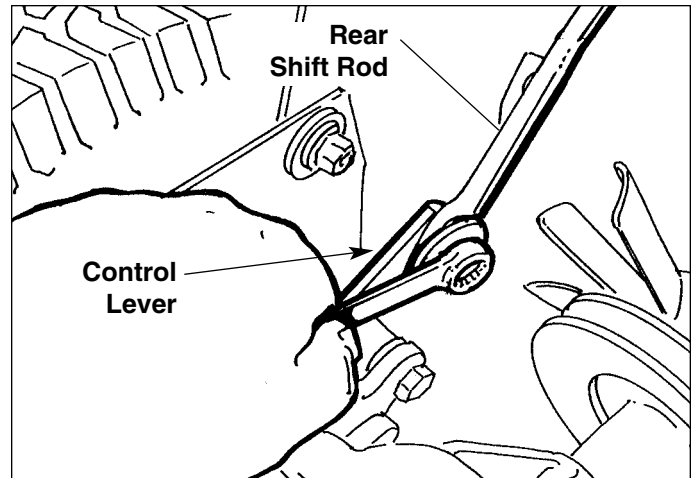


Figure C-19. Rear Shift Rod/Transmission Assembly

### Lockout Lever Service (Hydro-Gear 0750 / 0800 Only)

The lockout lever is located directly under the idler arm assembly and is mounted on the same pivot shaft. The lockout lever, which is also referred to as a "return-to-neutral cam" (See "Adjustments" section of this manual) connects the rear shift rod, shift pivot assembly, and front shift rod.

When the brake pedal is fully depressed, the clutch rod engages the arm on the lockout lever, causing the linkage to pivot. This shifts the transmission into neutral, and automatically repositions the shift lever into the neutral gate. Visually inspect the lockout lever for wear, cracks, corrosion, or other damage, and replace if necessary following the steps below.

See Figure C-23 for a complete part breakdown.

1. See Figure C-21. Remove the hex nut that secures the lockout lever to the shift pivot assembly. (See Figure C-23 for complete hardware details.)
2. Move the rear shift rod to the side, and slide the lockout lever off the pivot shaft.
3. See Figure C-22. If necessary, the rear shift rod may also be removed and replaced at this point. Remove the hex nut and related hardware that secure the rear shift rod to the speed control lever on the transmission (See Figure C-23).
4. If no additional service in this area is required, reassemble parts in reverse order of disassembly, and make any necessary adjustments for proper neutral and "return-to-neutral" operation, as shown in the "Adjustments" section of this manual. If shift pivot assembly or front shift rod service is required, proceed to next section.

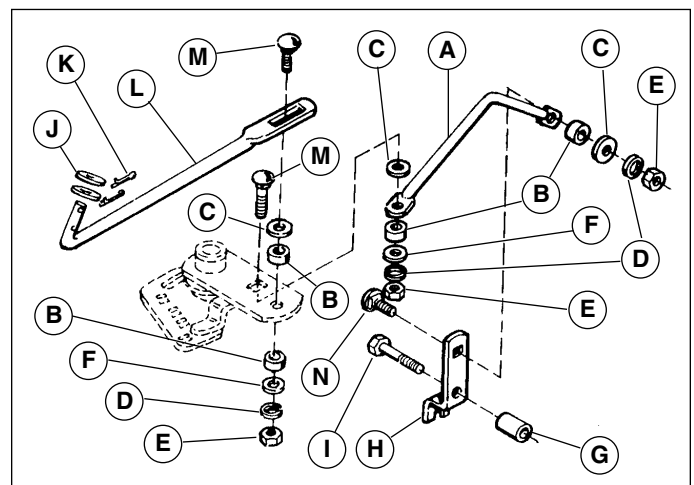


Figure C-20. Front/Rear Shift Rod Assembly - Hydro-Gear 0750 / 0800

- A. Rear Shift Rod
- B. Spacer
- C. 11/32 x 1-1/8 Washer
- D. 5/16 Lockwasher
- E. 5/16-18 Hex Nut
- F. 5/16 Plain Washer
- G. Spacer
- H. Control Lever
- I. 5/16-18 x 1-3/4 Hex Capscrew
- J. 17/32 x 1-1/4 x 5/64 Thk. Washer
- K. Cotter Pin
- L. Front Shift Rod
- M. 5/16-18 x 1-1/4 Carriage Bolt
- N. 5/16-18 X 1 Carriage Bolt



## 6 General Repair

### 6C Foot Controls Repair

#### Shift Pivot Assembly Service (Hydro-Gear 0750 / 0800 Only)

The shift pivot assembly is located on the pivot shaft behind the lockout lever, and attaches to the lockout lever and the front shift rod.

With the lockout lever removed, the shift pivot assembly can be visually inspected for wear, corrosion, or other damage, and can be removed and replaced by disassembling the hardware that attaches it to the front shift rod.

See Figure C-23 for a complete parts breakdown.

1. See Figure C-21. Unscrew the hex nut and related hardware used to connect the shift pivot assembly to the front shift rod.
2. Inspect the shift pivot assembly for wear, corrosion, or other damage, and replace if required.
3. See Figure C-22. If necessary, the front shift rod may also be removed and replaced at this point. For easiest access, remove the battery (see "Hand Controls" section), then remove the cotter pin and washers that secure the front shift rod to the shift lever assembly.
4. Check the front shift rod for wear or damage, and replace if necessary.
5. Reassemble all parts in reverse order of disassembly. Apply a liberal coating of grease to the pivot shaft before replacing linkages, and grease pivot points at both ends of front and rear shift rods.
6. After reassembling parts, make any necessary adjustments for proper neutral and "return-to-neutral" operation, as shown in the "Adjustments" section of this manual.

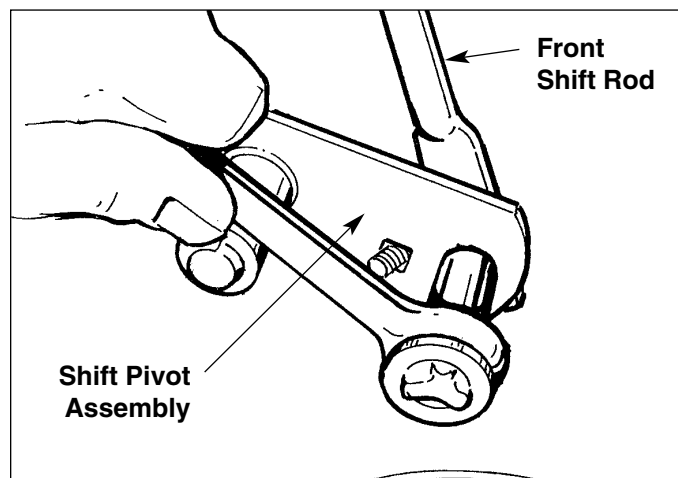


Figure C-21. Shift Pivot/Front Shift Rod Assembly

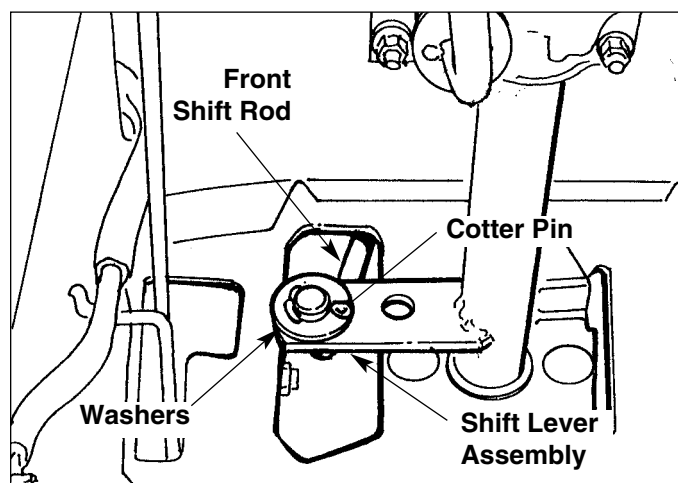


Figure C-22. Front Shift Rod/Shift Lever Assembly (Shown With Battery Removed)



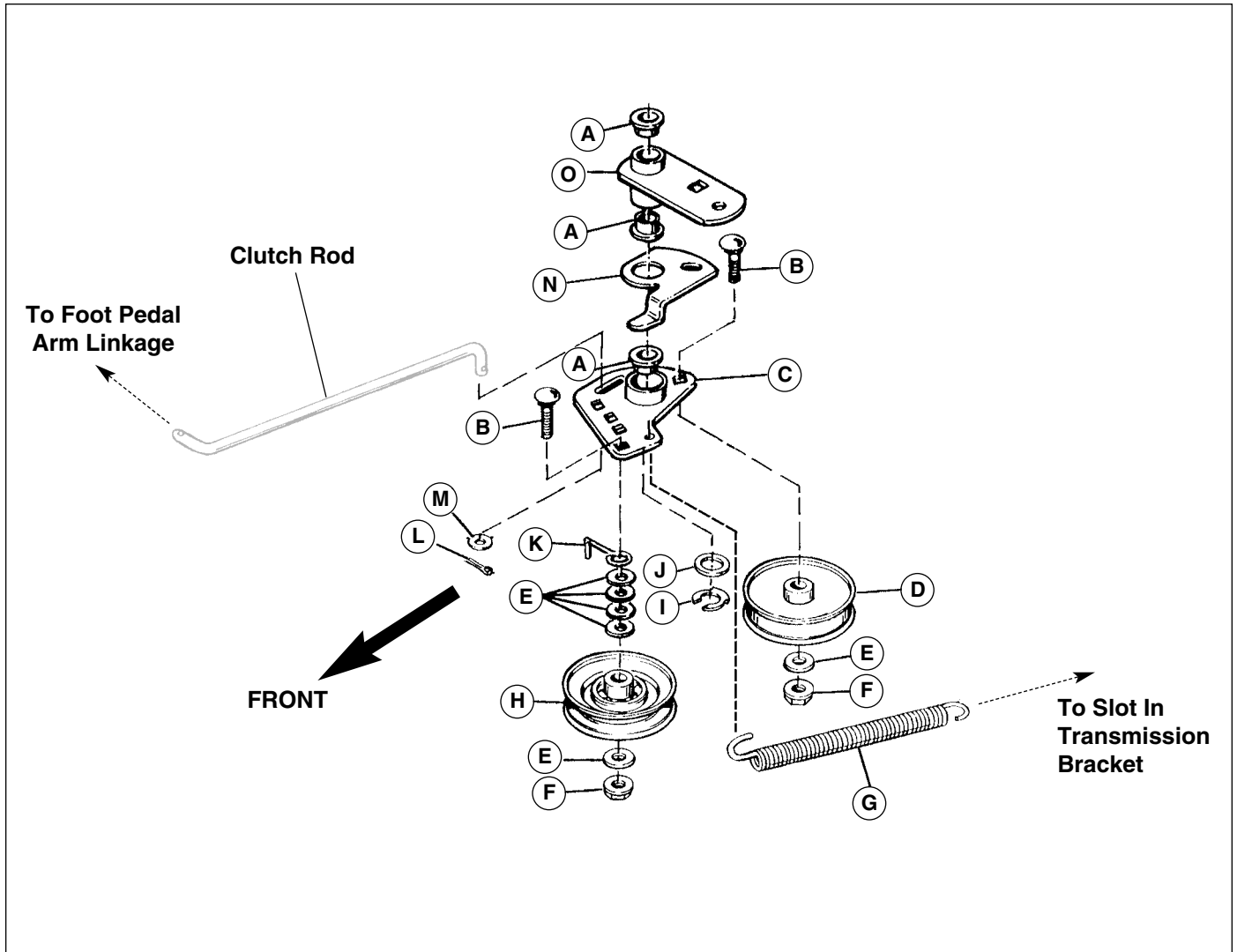
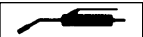



Figure C-23. Broadmoor Hydro Foot Control - Idler Arm Assembly Parts - Hydro-Gear

- |                                  |                               |                         |
|----------------------------------|-------------------------------|-------------------------|
| A. Plastic Bushing               | F. 3/8-16 Flange Whizlock Nut | K. Belt Stop            |
| B. 3/8-16 x 1-3/4" Carriage Bolt | G. Drive Spring               | L. Cotter Pin           |
| C. Idler Arm Assembly            | H. "V" Pulley                 | M. 5/16" Washer         |
| D. Flat Idler Pulley             | I. 5/8" Clip ring             | N. Lockout Lever        |
| E. 13/32 Washer                  | J. 5/8" Washer                | O. Shift Pivot Assembly |

### NOTES:

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 

## 6 General Repair

### 6C Foot Controls Repair

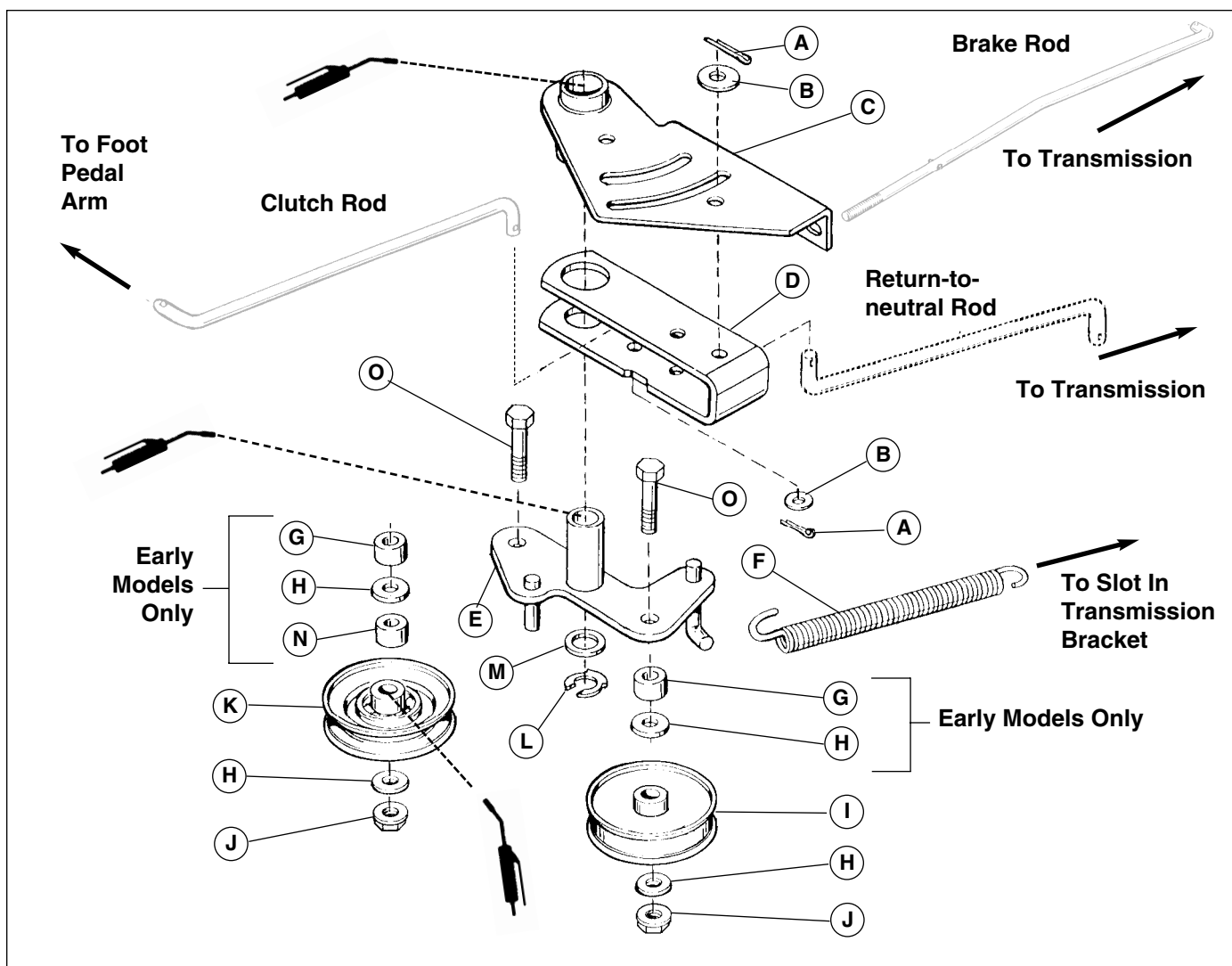




Figure C-24. Broadmoor Hydro Foot Control - Actuator Assembly Parts - Eaton 750 / 751 & Tuff Torq K60

A. Cotter Pin	F. Drive Spring	K. V-Pulley
B. 11/32 Washer	G. Spacer	L. 5/8 Clip ring
C. Actuator Assembly	H. 13/32 Washer	M. 5/8 Washer
D. Clutch Lever	I. Idler Pulley	N. Spacer
E. Idler Pivot Assembly	J. 3/8-16 Flange Whizlock Nut	O. 3/8-16 x 1-3/4 Hex Capscrew

#### NOTES:

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 

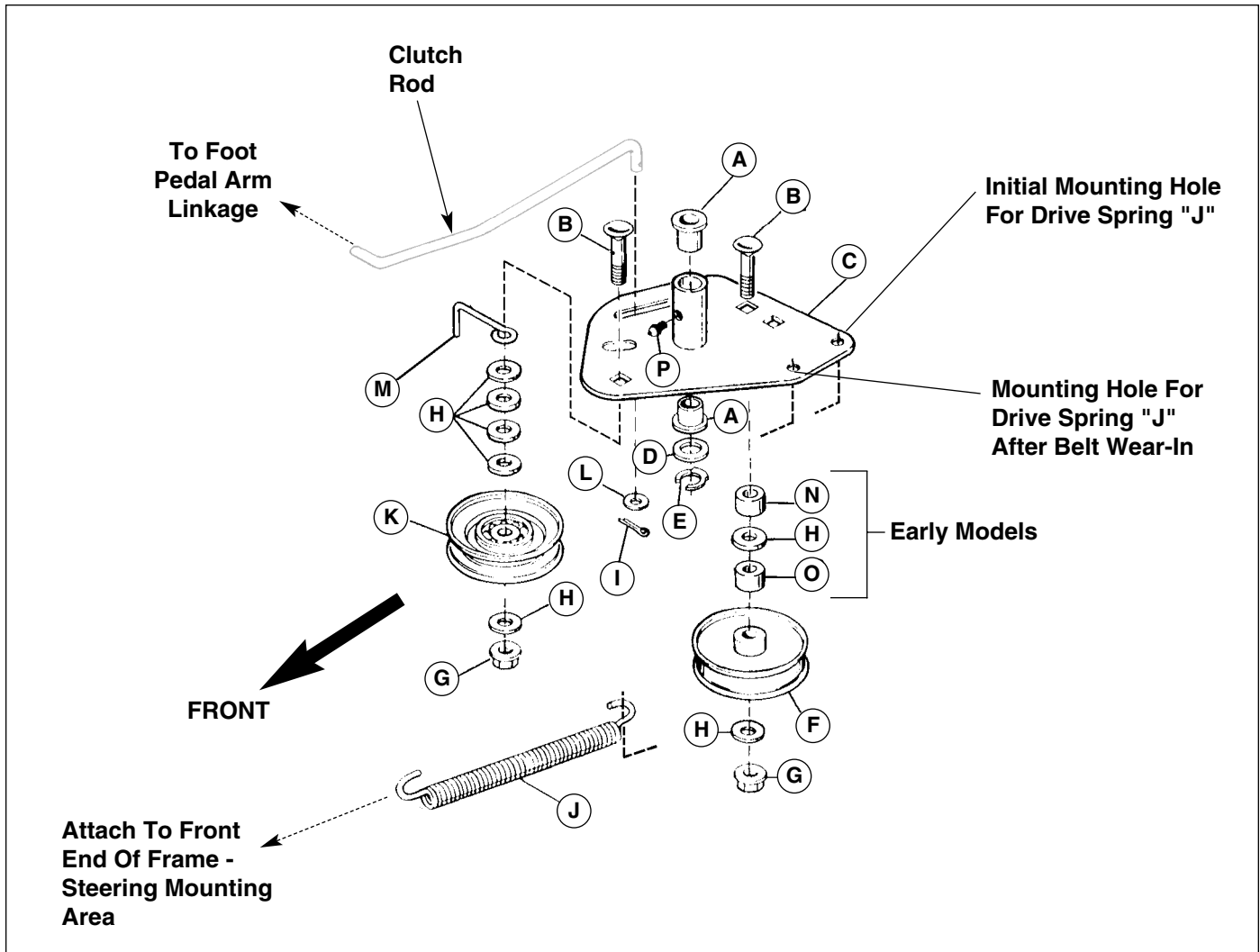
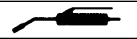



Figure C-25. Broadmoor Gear Foot Controls - Idler Arm Assembly Parts - Peerless 801

- |                                  |                               |                   |
|----------------------------------|-------------------------------|-------------------|
| A. Plastic Bushing               | G. 3/8-16 Whizlock Flange Nut | M. Belt Stop      |
| B. 3/8-16 x 1-3/4" Carriage Bolt | H. 13/32" Washer              | N. Spacer         |
| C. Idler Arm Assembly            | I. Cotter Pin                 | O. Spacer         |
| D. 5/8" Washer                   | J. Drive Spring               | P. Grease Fitting |
| E. 5/8 Clip ring                 | K. "V" Pulley                 |                   |
| F. Idler Pulley                  | L. 11/32" Washer              |                   |

### NOTES:

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 

## 6 General Repair

### 6C Foot Controls Repair

#### Rod Guide / Brake Rod

##### ROD GUIDE SERVICE

The rod guide is installed between the rear of the clutch rod and the front of the brake rod. The brake rod extends from the rear of the rod guide to the brake lever on the transmission (See Figures C-29 through C-32).

1. Remove the cotter pin and washer that secure the rear end of the clutch rod to the idler arm and front end of the rod guide (See Figures C-11 through C-13).
2. Slip the brake arm spring off the rear portion of the rod guide (Figure C-27).
3. Remove the hex lock nut from the threaded end of the brake rod (Figure C-27), and remove the spring and rod guide.
4. Inspect the rod guide and springs for wear or damage. If no additional service in this area is to be performed, replace as required, reassembling in reverse order of disassembly. If brake rod service is required, proceed to next section.
5. Adjust tension on brake rod spring by turning hex lock nut - with parking brake applied. See Brake Spring: Aproximate Compressed Lengths on the first page of this section.

##### BRAKE ROD SERVICE

The brake rod operates the brake lever on the transmission and is actuated by movement of the brake pedal/clutch rod/rod guide linkage (See Figures C-29 through C-32).

1. Remove the cotter pin and washer that secure the rear end of the clutch rod to the idler arm and front end of the rod guide (See Figures C-23 through C-32).
2. Slip the brake arm spring off the rear portion of the rod guide (Figure C-27).
3. Remove the hex lock nut from the threaded end of the brake rod (Figure C-27), and remove the spring and rod guide.
4. Remove the cotter pin and washer that secures the rear of the brake rod to the brake lever on the transmission (Figure C-28), and disengage the brake rod from the brake lever.
5. Inspect the brake rod for wear, corrosion, or other damage, and replace if required.
6. Reassemble parts in reverse order of disassembly, and adjust tension on brake rod spring by turning hex lock nut - with parking brake applied. See Brake Spring: Aproximate Compressed Lengths on the first page of this section.

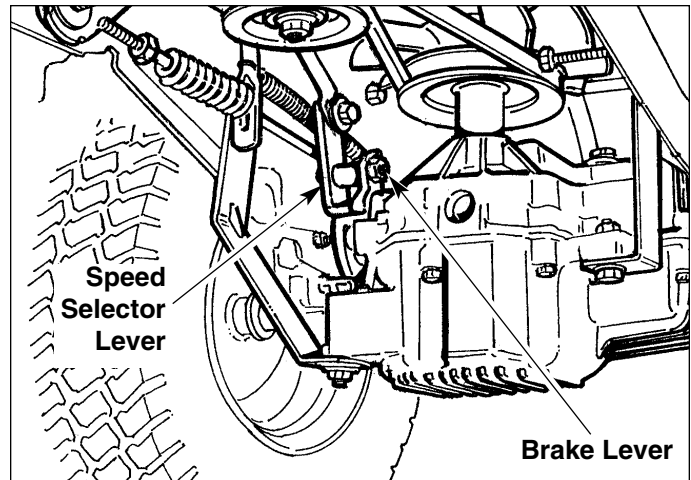


Figure 4C-26 . Hydro Trans Brake Lever & Speed Selector Lever

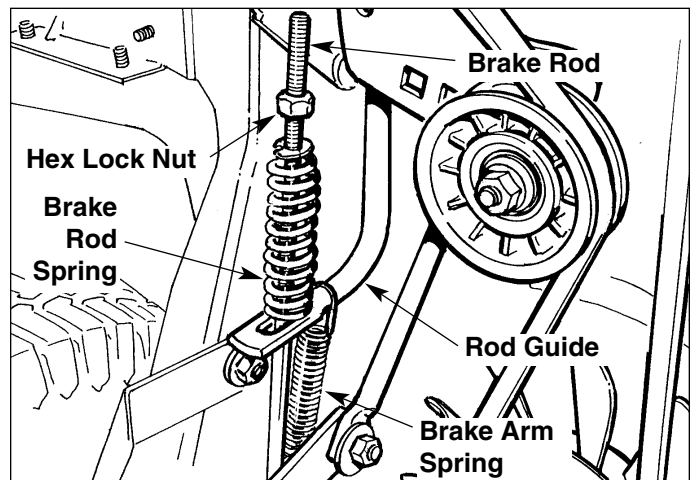


Figure C-27. Rod Guide, Brake Rod, & Springs

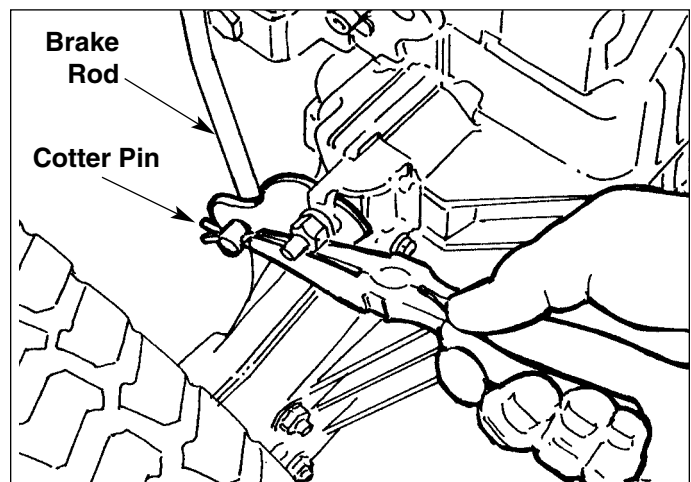
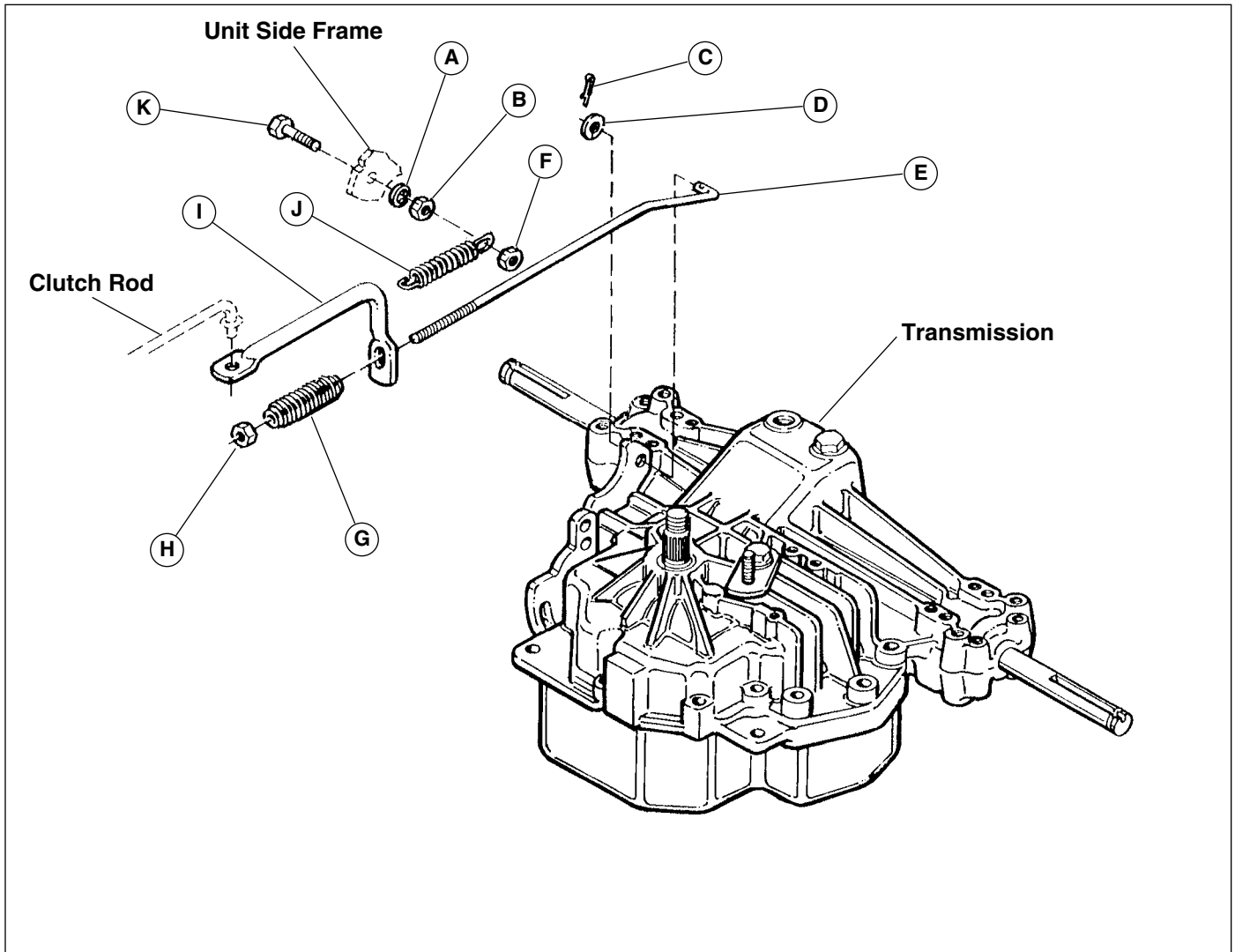


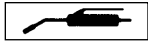

Figure C-28. Remove Brake Rod Cotter Pin



**Figure C-29. Broadmoor Hydro Foot Control - Transmission Model Hydro-Gear 0750 / 0800 Brake Linkage Parts**

- |                   |                              |                                |
|-------------------|------------------------------|--------------------------------|
| A. 3/8 Lockwasher | E. Brake Rod                 | I. Rod Guide                   |
| B. 3/8-16 Hex Nut | F. 3/8-16 Hex Lock Jam-nut   | J. Brake Arm Spring            |
| C. Cotter Pin     | G. Spring                    | K. 3/8-16 x 1-1/4 Hex Capscrew |
| D. 5/16 Washer    | H. 5/16-18 Hex Nylon Locknut |                                |

### NOTES:

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 

## 6 General Repair

### 6C Foot Controls Repair

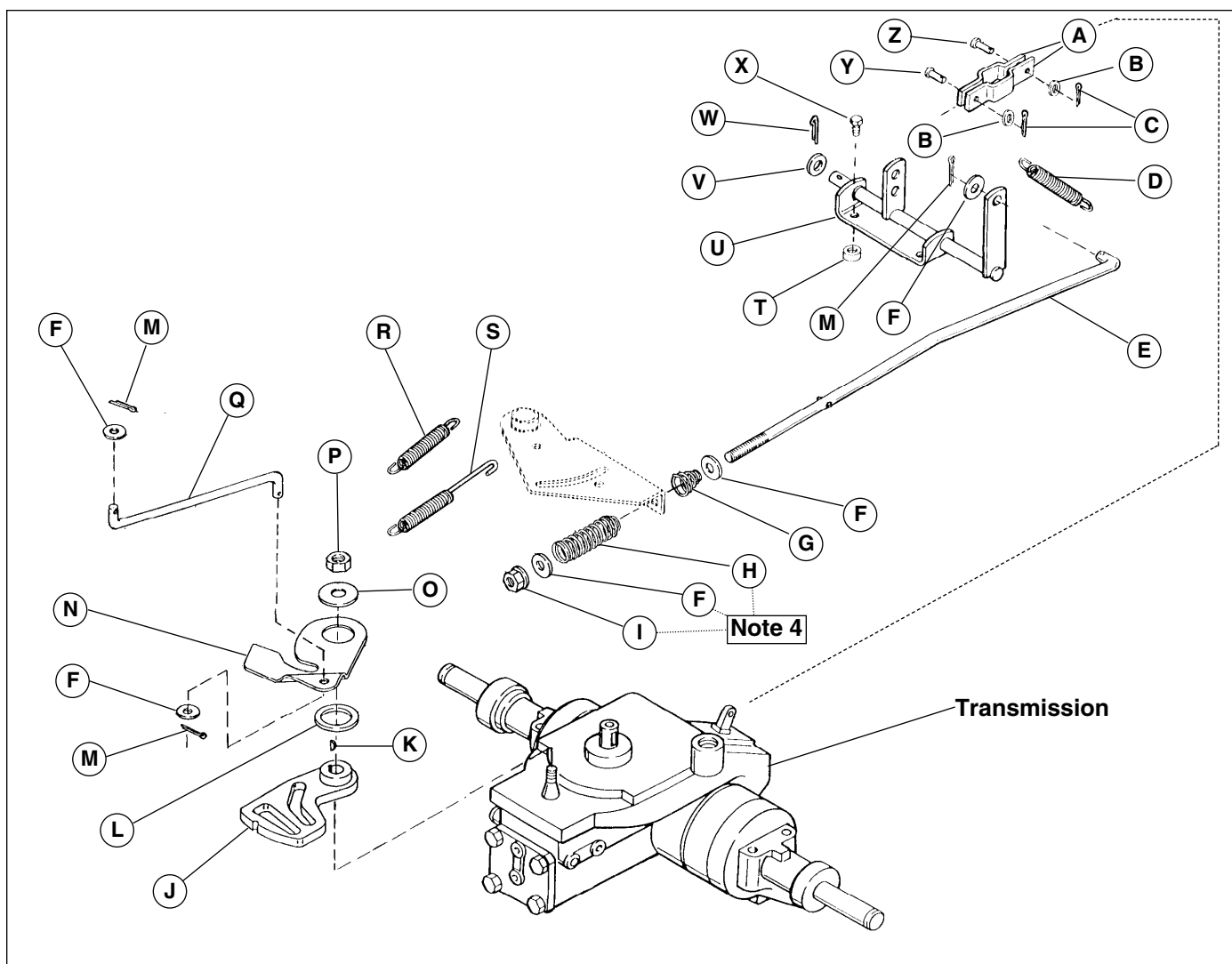


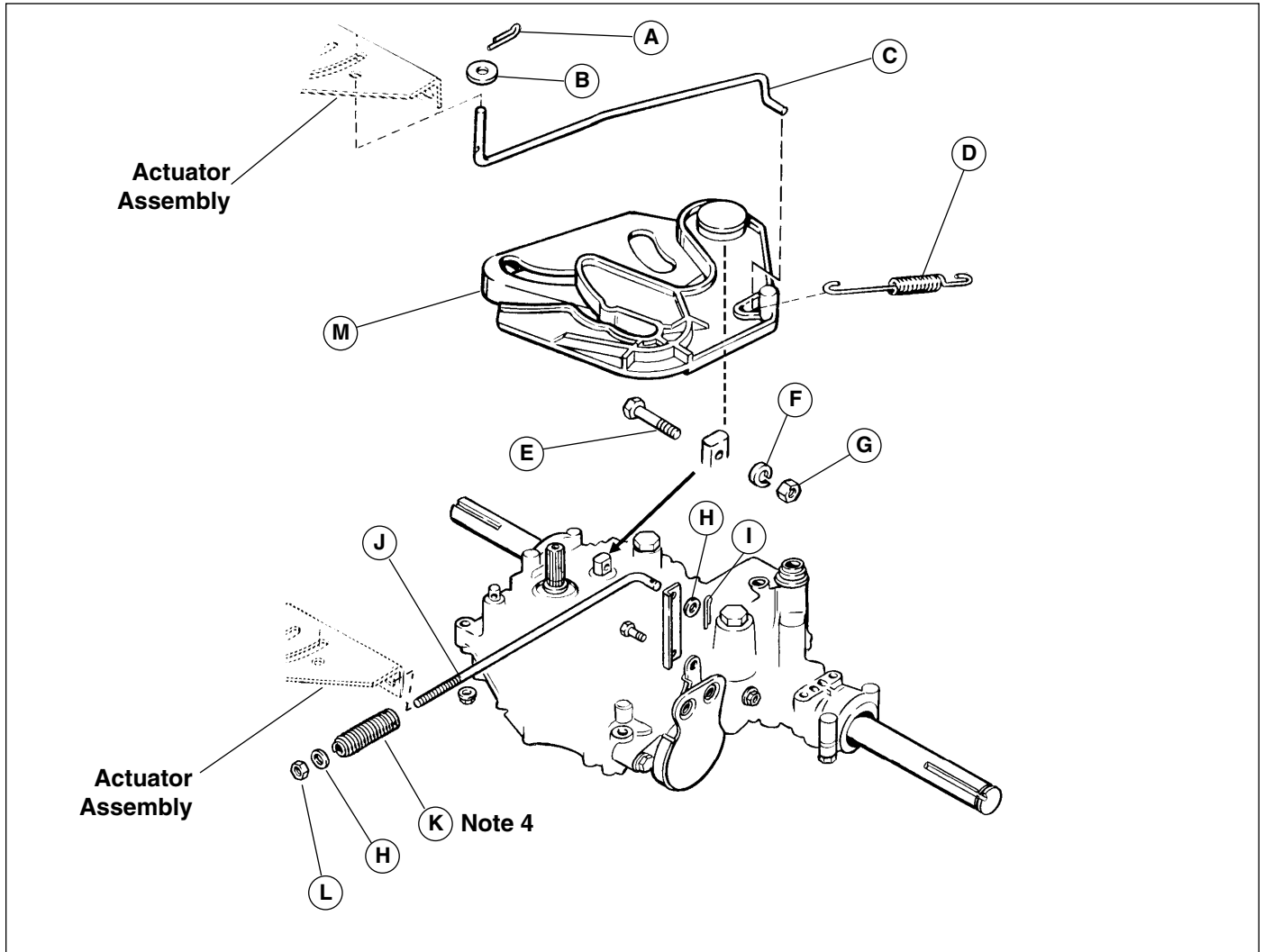


Figure C-28. Broadmoor Hydro Foot Controls - Eaton 750 / 751 Transmission Linkages

A. Clevis Bars	J. Hydro Cam	S. Spring
B. Washer	K. 1/8 x 1/2 Woodruff Key	T. Spacer
C. Cotter Pin	L. Cam Spacer	U. Brake Lever Bracket Assembly
D. Extension Spring	M. Cotter Pin	V. Washer
E. Brake Rod	N. Neutral Return Rod	W. Cotter Pin
F. 13/32 Washer	O. Washer	X. 5/16-18 x 1-1/2 Hex Capscrew
G. Conical Spring	P. 3/8-16 Hex Locknut	Y. Clevis Pin
H. Spring	Q. Neutral Return Rod	Z. Clevis Pin
I. 5/16-18 Flangelock Nut	R. Spring	

#### NOTES:

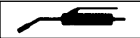

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 
4. With parking brake engaged, length of compressed spring should be 1-3/4" +/- 1/8" (1-5/8" to 1-7/8") Adjust nut "I" as required to obtain correct spring length.



**Figure C-31. Broadmoor Hydro Foot Controls - Tuff-Torq K60 Transmission Linkages**

- |                             |                   |                              |
|-----------------------------|-------------------|------------------------------|
| A. Cotter Pin               | F. 1/4 Lockwasher | J. Brake Rod                 |
| B. 11/32 Washer             | G. 6 mm Hex Nut   | K. Brake Spring              |
| C. Return-to-neutral Rod    | H. Washer         | L. 5/16-18 Nylon Hex Locknut |
| D. Spring                   | I. Cotter Pin     | M. Cam Assembly              |
| E. 6mm x 55 mm Hex Capscrew |                   |                              |

### NOTES:

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 
4. With parking brake engaged, length of compressed spring should be 1-5/8" - 1-7/8"



## 6 General Repair

### 6C Foot Controls Repair

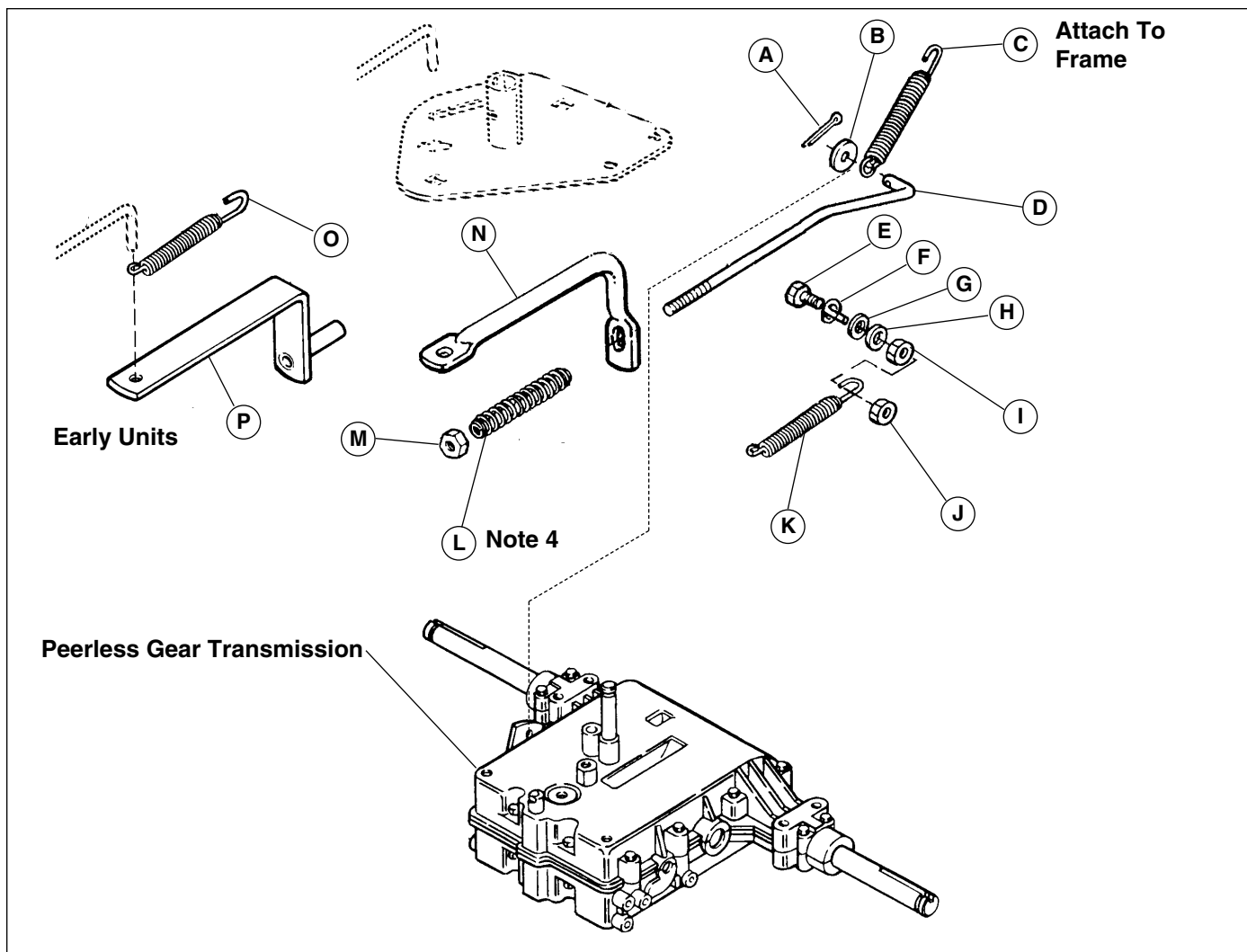
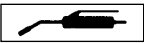



Figure C-32. Broadmoor Gear Foot Control - Brake Pedal Assembly Parts - Peerless 801

A. Cotter Pin	G. 3/8 Washer	M. 5/16-18 Nylon Lock Nut
B. 5/16 Washer	H. 3/8 Spring Lockwasher	N. Brake Rod Guide
C. Spring	I. 3/8-16 Hex Nut	O. Spring
D. Brake Rod	J. 3/8-16 Centerlock Jam Nut	P. Brake Arm Assembly
E. 3/8-16 x 1-1/2 Hex Capscrew	K. Spring	
F. Belt Stop	L. Compression Spring	

#### NOTES:

1. Unless specified, use torque specifications shown on standard hardware torque specification chart.
2. Grease locations indicated by grease gun symbol: 
3. Oil locations indicated by oil can symbol: 
4. With parking brake engaged, compressed length of spring should be 2-7/8".

### HOOD, GRILLE & DASH REPAIR

#### General

The hood and grille are easily removed as an assembly for repair or engine access. No special tools are required to disconnect the headlight wire assembly during the hood removal.

Once the hood assembly is removed, access is gained to both the hood and the dash for inspection or repair. Hood removal is recommended prior to removal of the dash.

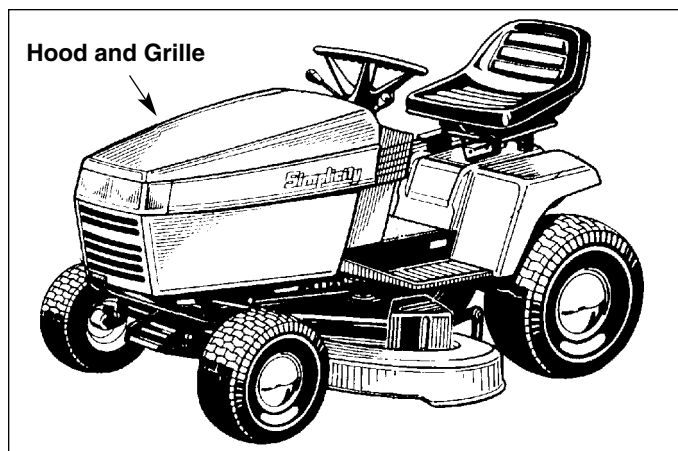


Figure D-1. Tractor Overview

#### Hood & Grille Removal

1. Unlatch the rubber hood strap (G, Figure D-2) on each side of the hood and raise the hood to its upright position.

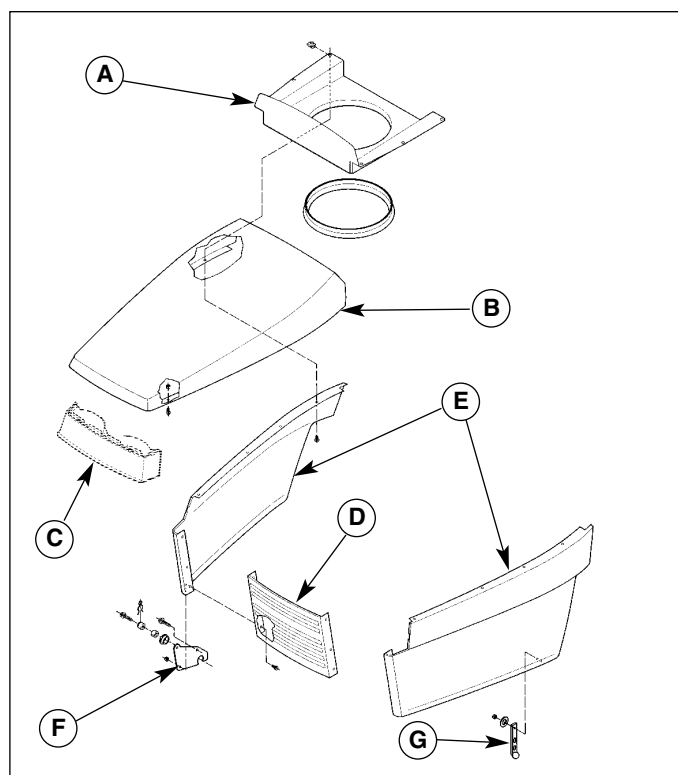


Figure D-2. Hood Assembly Parts

- |                   |                        |
|-------------------|------------------------|
| A. Air Duct       | E. Side Panels         |
| B. Hood           | F. Hood Hinge Assembly |
| C. Headlight Assy | G. Hood Strap          |
| D. Grille         |                        |

## 6 General Repair

### 6D Hood, Dash, & Grill Repair

2. Disconnect the headlight wire harness at the two pin connector (D, Figure D-3) located near the oil fill tube on the right side of the engine. Thread the wire harness out through the engine lift bracket and remove it from the speed clip attaching the harness to the hood.

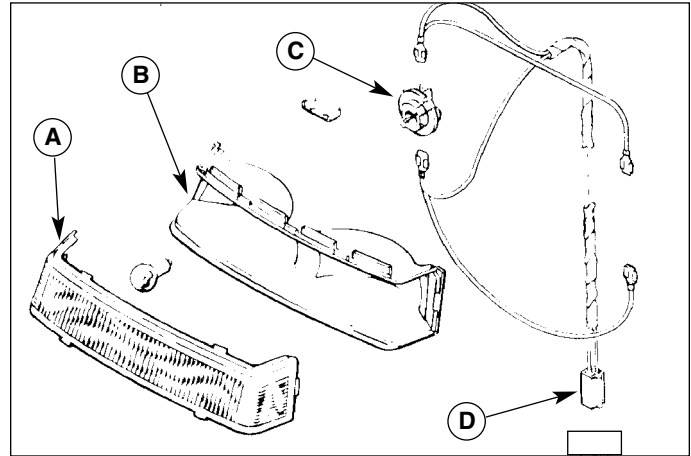


Figure D-3. Headlight Assembly

A. Lens  
B. Bezel

C. Bulb Socket  
D. Pin Connector

3. Using needle-nose pliers, remove the clip (A, Figure D-4) on each of the hood pivot points.
4. Slide out and remove the hood pivot spacer (B) from each of the hood hinges.
5. Lift the hood off of the tractor.
6. For hood installation, perform Steps 1 through 5 in reverse order.

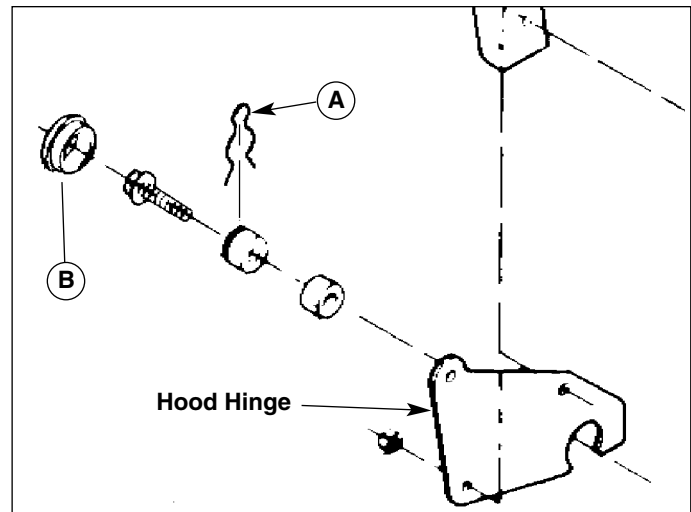


Figure D-4. Hood Hinge Assembly

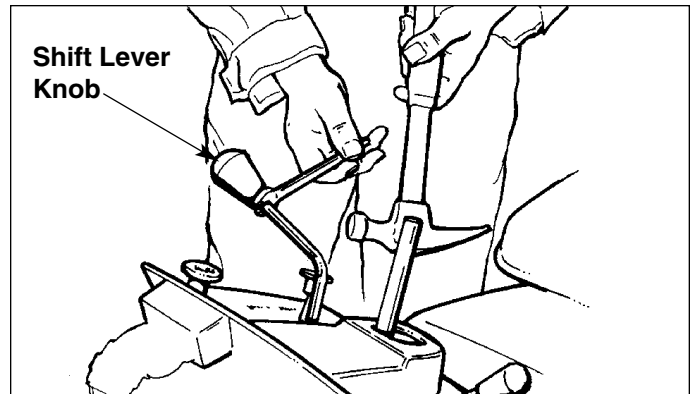
A. Clip  
B. Pivot Spacer

### Dash Removal

1. Remove the hood according to the instructions in the previous section.
2. Remove the steering wheel. See Steering and Front Wheel Repair.
3. Remove the shift lever knob from the shift lever.
  - a. Plastic knob - unscrews from shift lever by turning knob counterclockwise.
  - b. Rubber knob - is pressed onto end of shift lever and may be removed by placing a 7/16" open end box wrench under the knob and tapping the wrench outward with a hammer or rubber mallet. (Figure D-5) Knobs that resist removal with this method may be heated with a heat gun or blow dryer to expand the I.D. of the knob slightly and separate it from the end of the shift lever.

**NOTE:** Do not overheat the knob as this may distort the part or cause melting, and could prevent a secure fit when reattaching the knob. Use a low heat setting when using a heat gun, and keep the gun 4-6" away from the knob while moving back and forth to provide even heating.

4. Slide the knob off the shift lever, and check for cracks or excessive wear, and replace as necessary.
5. Unscrew the parking brake knob from the parking brake rod. (Figure D-6)

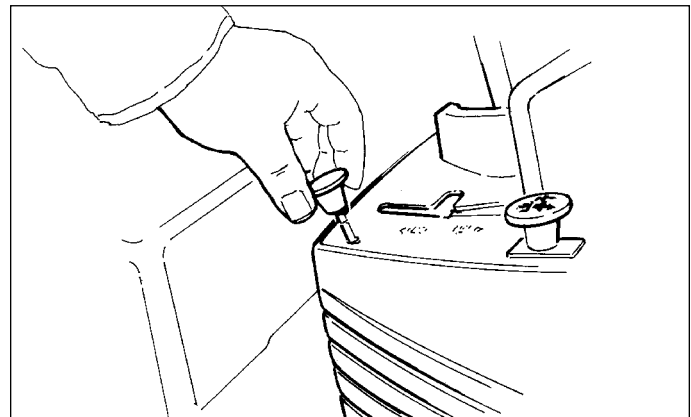


**Figure D-5. Remove Shift Lever Knob (Later Model With Rubber Knob)**



### WARNING

Never use a heat gun or blow dryer if flammable vapors are present, as the heating element could ignite the vapor and cause a fire or explosion.



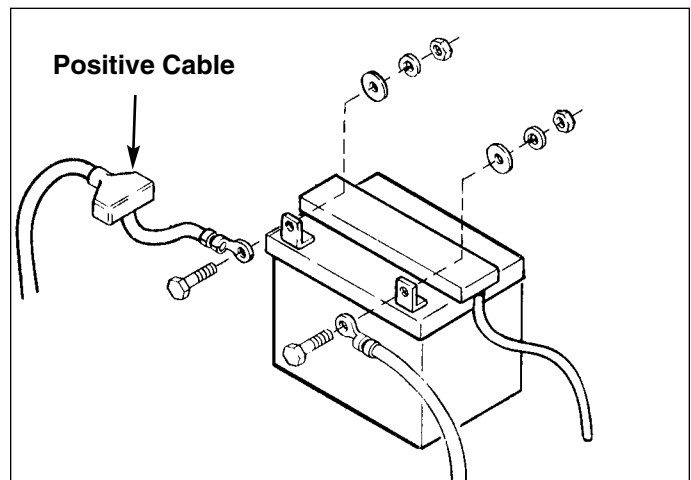
**Figure D-6. Unscrew Parking Brake Knob**



### DANGER

Always disconnect the negative battery cable first and reconnect it last. The positive terminal can easily be shorted to the tractor frame by a wrench or other tool if this is not done. Avoid spilling electrolyte. Keep flames and other sparks away from the battery to avoid an explosion. After reconnecting the cables, make sure the cover is in place over the positive terminal.

6. Disconnect the battery cables, negative cable first.
7. Remove the battery hold-down and remove the battery.

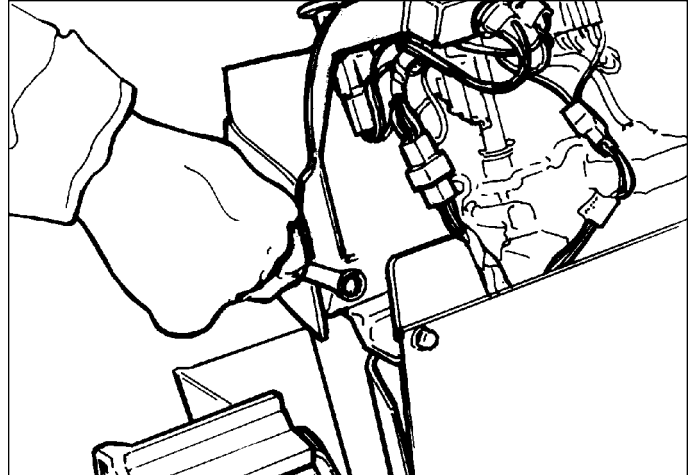


**Figure D-7. Battery and Cables**

## 6 General Repair

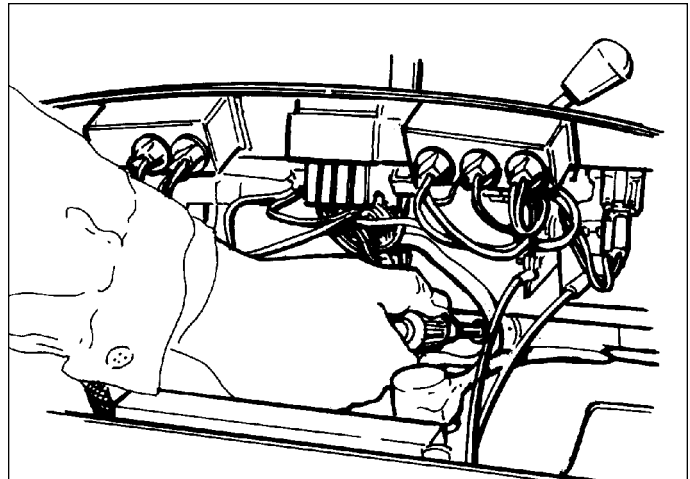
### 6D Hood, Dash, & Grill Repair

8. Remove the whizlock capscrews from the lower front corners of the dash using a 3/8" box wrench. These screws fasten into captive palnuts on the dash, and require no additional tools for hardware removal. (Figure D-8)



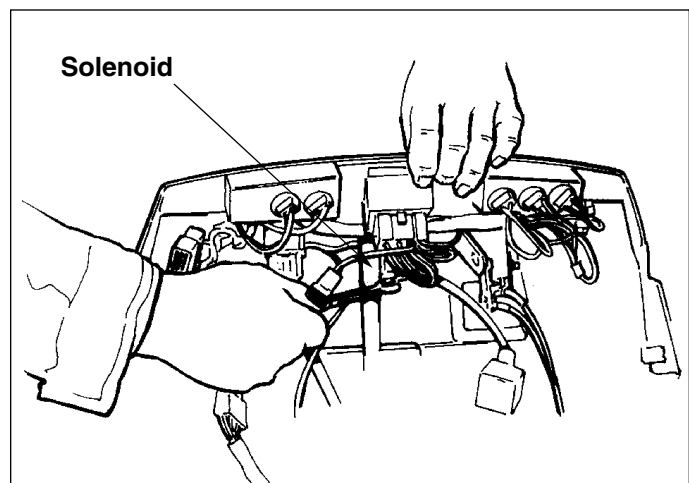
**Figure D-8. Remove Front Dash Mounting Screws**

9. Using a 3/8" nutdriver or 3/8" socket with a 6" extension bar, remove the two whizlock capscrews with washers that secure the rear of the dash to the lower dash. Use care to avoid dropping the washers as the screws are removed. (This location also uses captive palnuts to simplify disassembly.) (Figure D-9)



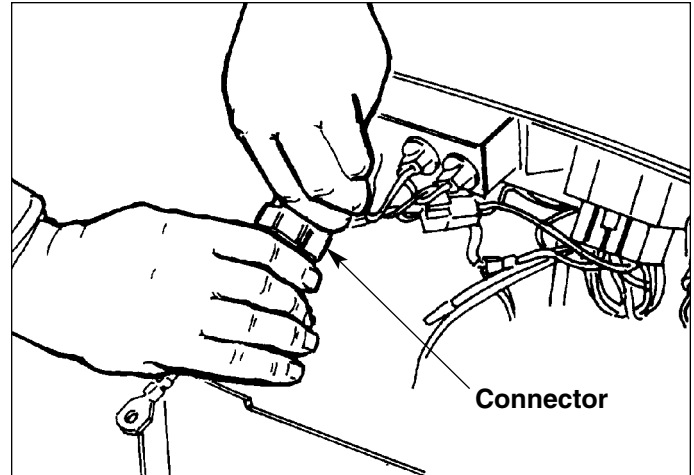
**Figure D-9. Remove Rear Dash Mounting Screws**

10. Disconnect the starter cable from the solenoid using a 1/2" box wrench. Temporarily reinstall the hex nut and lockwasher on the threaded solenoid post to prevent parts loss during service (Figure D-10).



**Figure D-10. Disconnect Starter Cable At Solenoid**

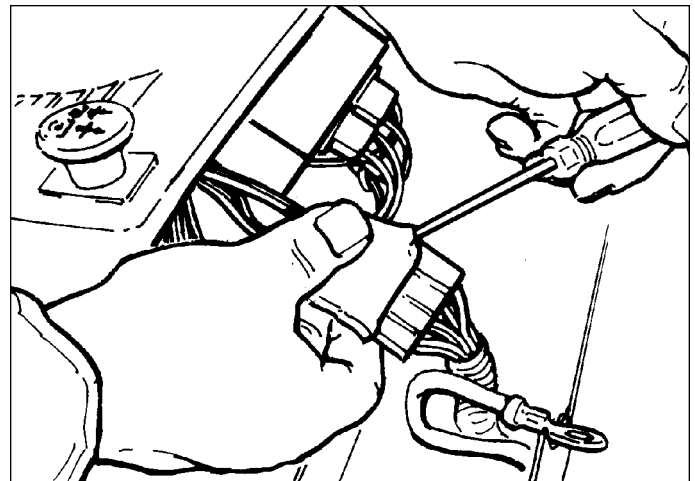
11. See Figure D-11. Disconnect the lower harness connector by pulling the two halves apart. Use a firm grip and a light, side-to-side flexing motion on the connector to separate the connector halves.



**Figure D-11. Disconnect Lower Harness Connector**

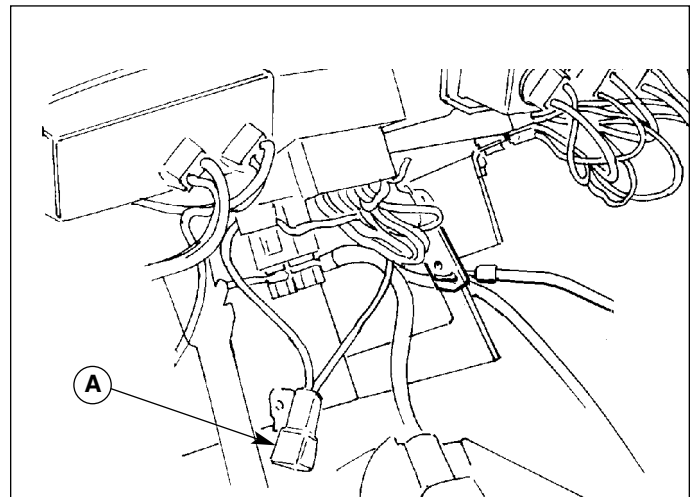
12. See Figure B-11. If the connector cannot be separated by using a gentle flexing motion on each of the two halves, insert a small, flat-blade screwdriver between the halves, and use a gentle prying motion to separate the connector (Figure D-12).

*NOTE: Do not use excessive force when prying the connector apart, as this could crack the plastic connector housing. Apply light pressure on opposite sides of the connector, and gradually work the connector apart. The electrical connectors used on these units are designed to withstand continuous vibration, and may require repetitive prying to separate.*



**Figure D-12. Gently Pry Connector Apart With Screwdriver**

13. Locate the two green/black wires that connect the upper wire harness to the switch located at the base of the brake pedal. Disconnect the two wire connector (A, Figure D-13) located under the dash.

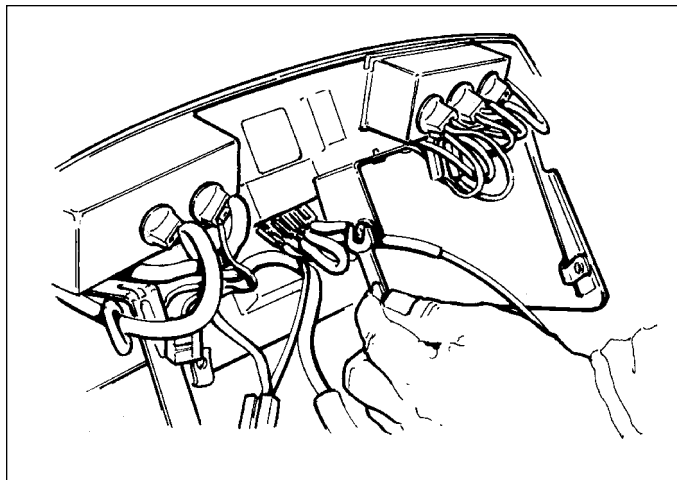


**Figure D-13. Wire Connection  
A. 2-Wire Connector**

## 6 General Repair

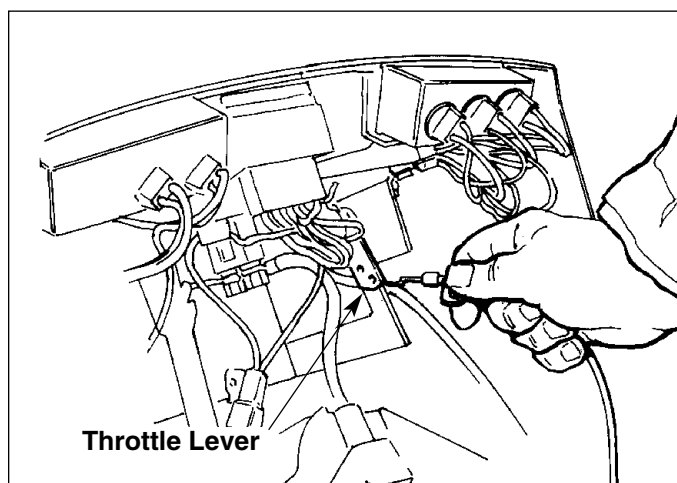
### 6D Hood, Dash, & Grill Repair

- 14 Using a 3/8" open end wrench, loosen the hex nut that secures the throttle cable end clamp to the throttle cable mounting bracket, and detach the clamp from the bracket. Reinsert the screw and hex nut into the clamp to prevent loss (Figure D-14).



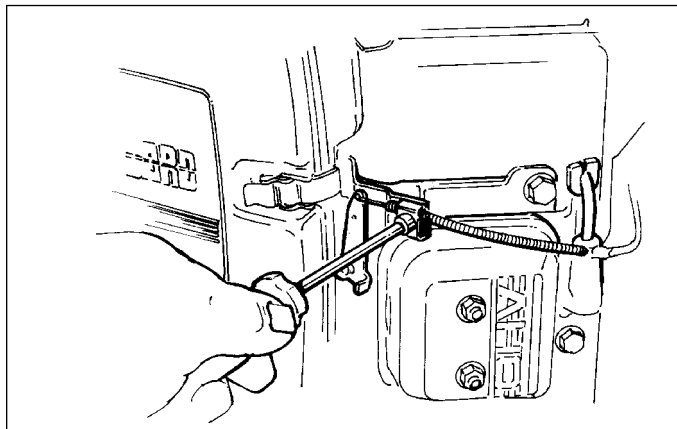
**Figure D-14. Disconnect Throttle Cable From Lever**

15. See Figure D-15. Note the engagement of the cable end in the throttle lever, and remove the throttle cable from the hole in the throttle lever. Position the throttle cable out of the way so that it does not interfere with shift lever and lift lever service.



**Figure D-15. Remove Cable From Throttle Lever**

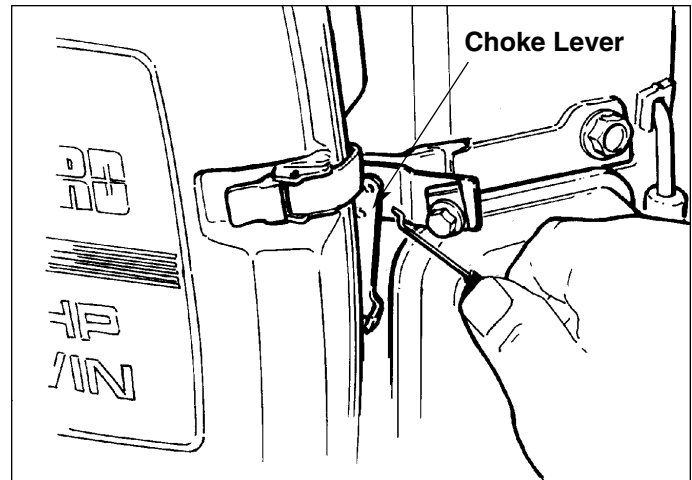
16. See Figure D-16. On models equipt with a choke, loosen the choke cable clamp on the engine using a screwdriver. Note the position of the choke lever and the engagement of the cable end in the choke lever.



**Figure D-16. Remove Choke Cable From Engine**

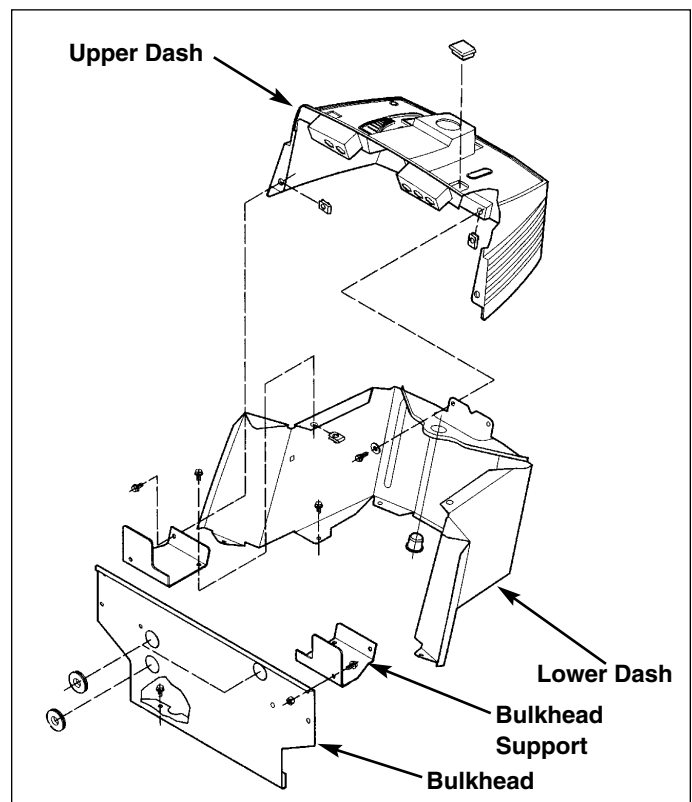


17. See Figure D-17 Remove the cable end from the choke lever. Pull the choke cable back toward the dash assembly, and through the access hole in the bulkhead to permit removal of the dash assembly from the unit.



**Figure D-17. Remove Cable End From Choke Lever**

18. Carefully lift the dash assembly up and away from the lower dash, steering column, and shift lever assembly. As the dash assembly is lifted, it may be helpful to move the shift lever forward and backward slightly.
19. After the dash assembly is fully separated from the unit, set it aside carefully to prevent damage to electrical components.



**Figure D-18. Dash Mounting**

## 6D Hood, Dash, & Grill Repair - Notes \_\_\_\_\_

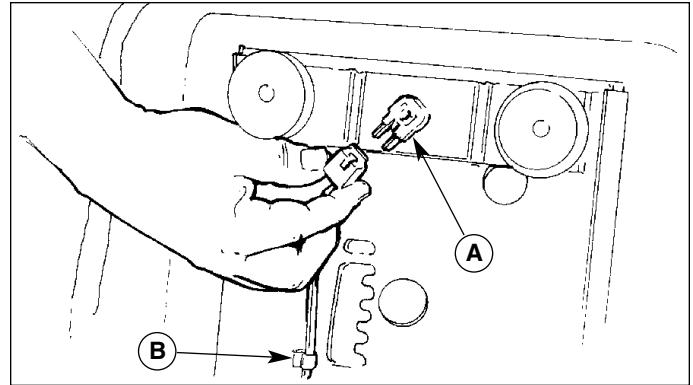
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### SEAT, DECK & FUEL TANK REPAIR

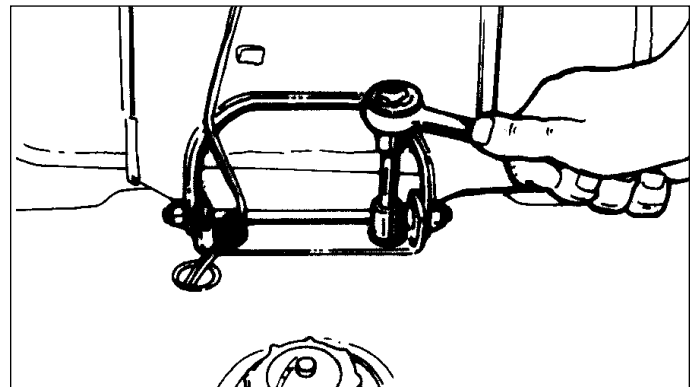
#### Seat Removal

*Note: Seat and seat deck can be removed as an assembly if individual component repair is not required. Go to "Seat Deck Removal".*

1. Tilt the seat forward and disconnect the two wire cable harness attached to the operator present safety switch (A, Figure E-1). Note that the harness plug has a locking tab that must be released before disconnecting plug.
2. Remove the wire harness from the speed clip (B) that holds the harness to the bottom of the seat.
3. Push the wire harness back through the hole in the seat deck it comes through.
4. Remove the two nuts connecting the seat assembly to the seat deck as shown in Figure E-2.
5. Remove the seat assembly from the seat deck.

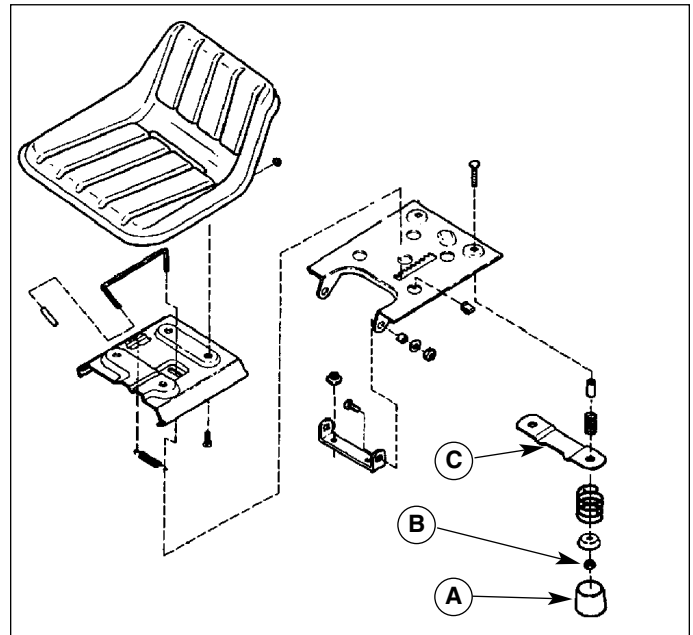


**Figure E-1. Disconnect Operator Present Switch**  
A. Safety Switch  
B. Speed Clip



**Figure E-2. Seat Removal**

6. For replacement of the Operator Present Seat Switch, remove a spring cover (A, Figure E-3) from one of the seat springs. Remove the nut (B) from the carriage bolt. Pull the switch plate (C) over the end of the carriage bolt and pivot the switch plate to the rear. Access is now available for removal of the Operator Present Seat Switch.



**Figure E-3. Seat Assembly Parts**  
A. Cover  
B. Nut  
C. Switch Plate

## 6 General Repair

### 6E Seat, Deck, & Fuel Tank Repair

#### Seat Deck Removal

*NOTE: If the seat has already been removed, proceed to step 3.*

1. Tilt the seat forward and disconnect the two wire cable harness attached to the operator present safety switch (A, Figure E-1). Note that the harness plug has a locking tab that must be released before disconnecting plug.
2. Remove the wire harness from the speed clip (B, Figure E-1) that holds the harness to the bottom of the seat.
3. Remove the two bolts (located at the rear of the foot rests, Figure E-4) connecting the seat deck to the tractor frame.
4. Repeat on the other side of the tractor.
5. Remove the two bolts connecting the seat deck to the deck supports (Figure E-5).
6. Remove the seat deck.
7. For seat installation, follow removal steps in reverse order.

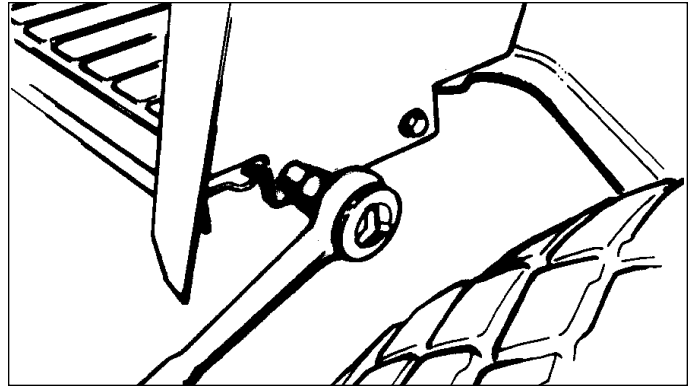


Figure E-4. Removal of Front Bolts

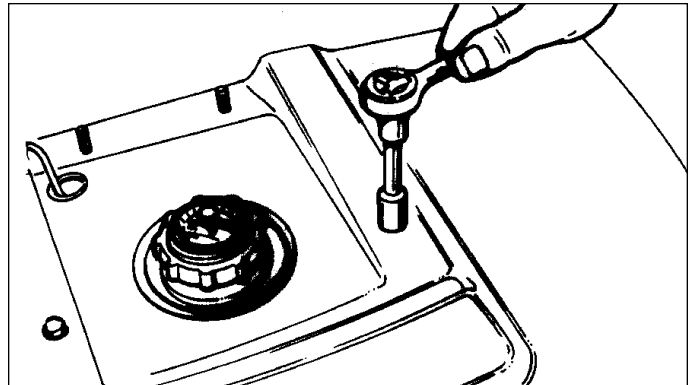


Figure E-5. Removal of Top Bolts

#### Fuel Tank Removal

1. Remove the seat and deck before removing the gas tank. (Refer to the Seat and Deck Removal section.)
2. Using a pliers, loosen the clip holding the gas line to the tank and slide it down the gas line. See Figure E-6.
3. Disconnect the gas line from the gas tank.
4. Loosen the capscrews (A, Figure E-7) attaching the seat support to the tractor frame.
5. Repeat Step 4 for the second seat support.
6. Remove the gas tank.
7. For gas tank installation, follow removal steps in reverse order.

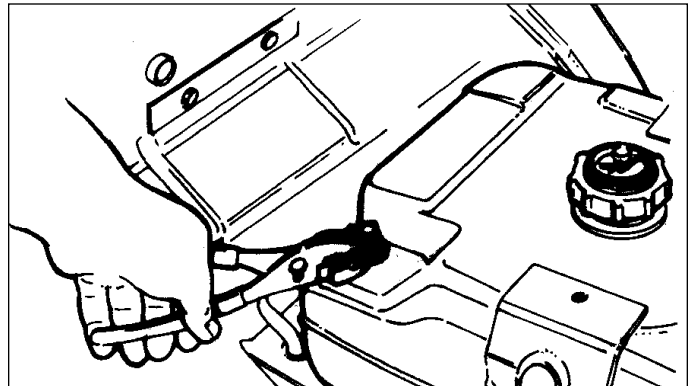


Figure E-6. Disconnect Gas Line

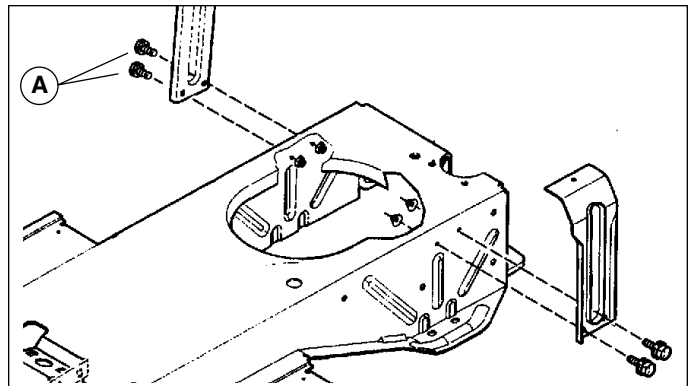
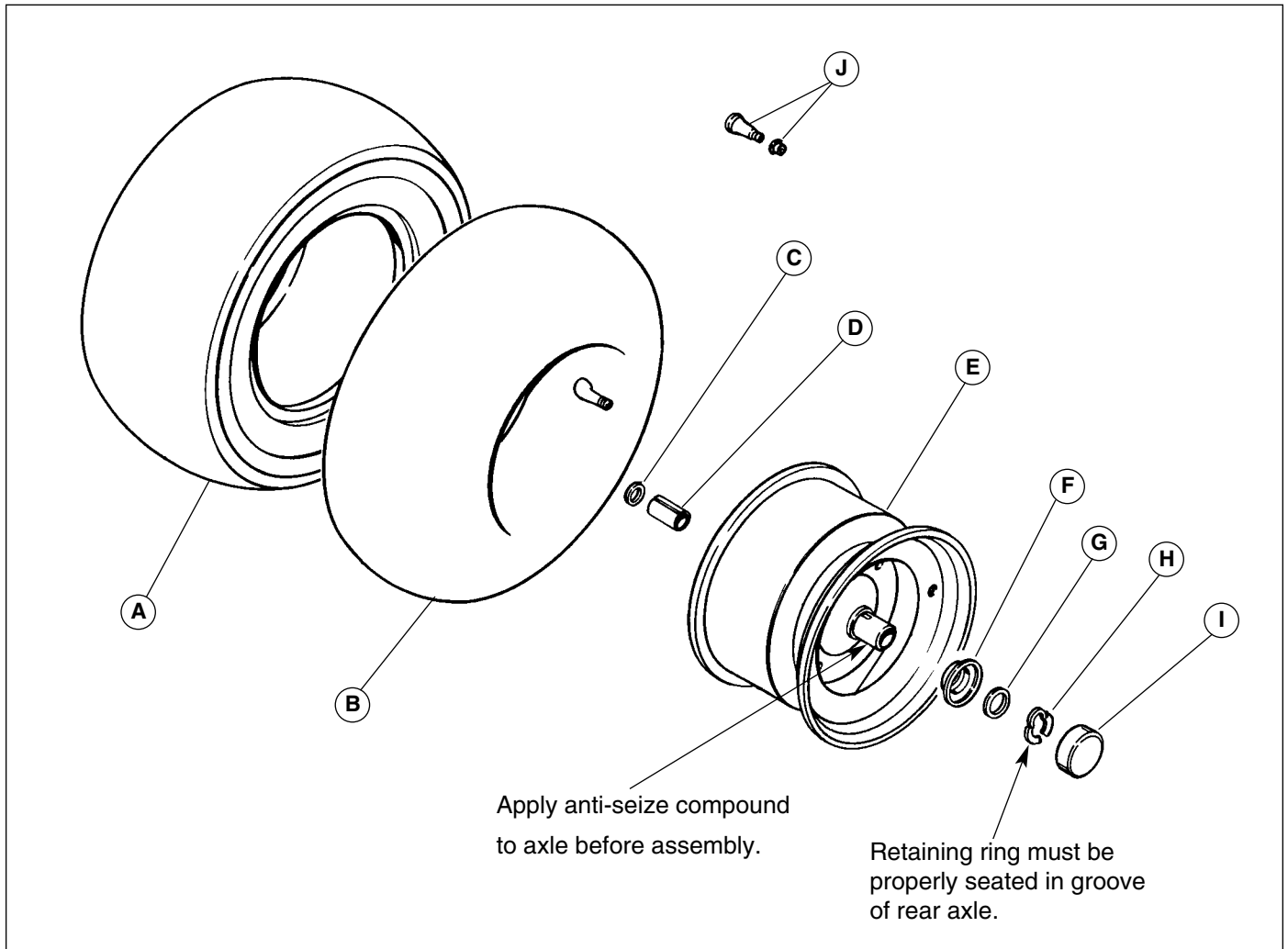


Figure E-7. Seat Supports  
A. Capscrews, Whizlock, 3/8-16 x 1"

## REAR WHEEL REPAIR

### General

The following is an exploded view of the rear wheel assemblies.



**Figure F-1. Rear Wheel Assembly**

- A. Rear Tire**
- B. Tube (Optional)**
- C. Washer**
- D. Spacer**
- E. Rim Assembly**

- F. Washer, Hub Cap Retainer**
- G. Washer**
- H. Retaining Ring**
- I. Hub Cap**
- J. Valve Stem & Cap**

## 6 General Repair

### 6F Rear Wheel Repair



#### **DANGER**

##### **PREVENT SERIOUS INJURY OR DEATH FROM FALLING UNIT**

Always use a properly working lifting device with a capacity suitable for the weight of the unit being serviced.

Always use a jack stand to support the unit while performing service, and chock remaining wheels to prevent the unit from rolling off the supports.

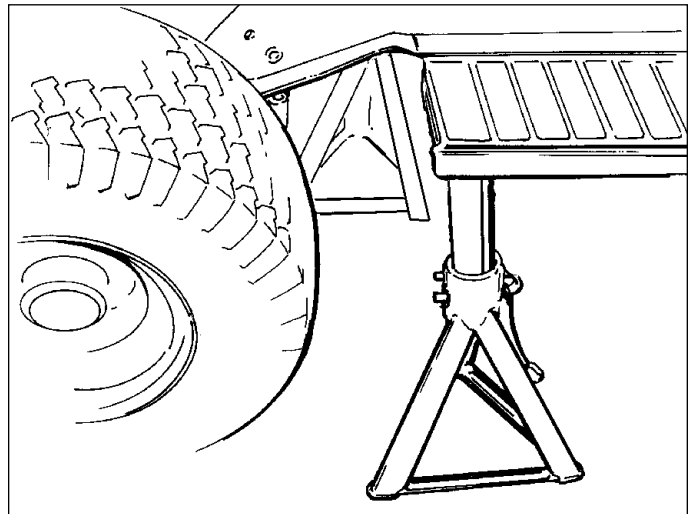
Never work under or around an elevated unit that is not properly supported and secured in position with wheel chocks.

### **ELEVATING REAR END FOR SAFE SERVICE**

1. Remove ignition key, and disconnect spark plug wire to prevent accidental starting while working on the unit.
2. Engage the parking brake, block the front wheels, and using a hydraulic or scissors jack positioned at the center of rear frame assembly, carefully jack the unit up until the rear tires are approximately 1" - 2" off the ground.

*NOTE: For overall unit stability during service, do not jack rear end higher than required for tire removal.*

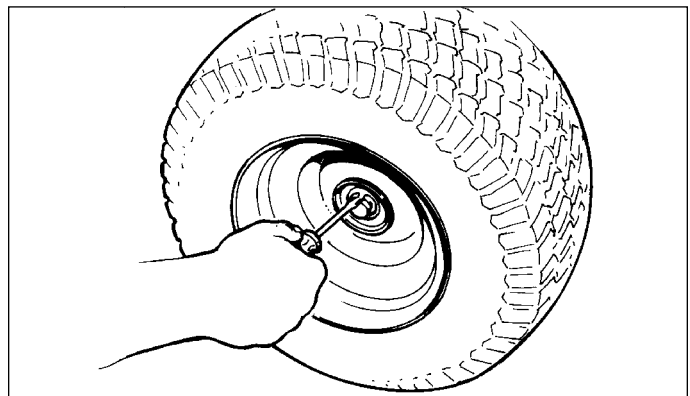
3. Support the rear of the unit on jackstands positioned under each footrest as shown in Figure F-2.



**Figure F-2. Jacking and Supporting Tractor**

### **REAR WHEEL REMOVAL**

1. Elevate the rear end. (See previous section)
2. Remove the plastic dust cover.
5. Remove the retaining ring, washer, and hub cap retainer (See Figure F-3).
6. Remove the wheel, key, spacer, and washer.



**Figure F-3. Rear Wheel Removal**

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# 7 Transmission Repair

7A Peerless 801

## PEERLESS 801-059B FIVE SPEED GEAR TRANSAXLE

### General

The Peerless 801-059B five speed gear transaxle is a rugged and efficient gear drive transaxle using an automotive style differential and rugged disc brakes.

*NOTE: This transaxle is serviced by the manufacturer and not by Simplicity. The exploded parts view is shown here and in the parts manual for reference purposes only.*

*Should service be required, contact an authorized Peerless Service Repair Dealer for technical data and repair specifications.*

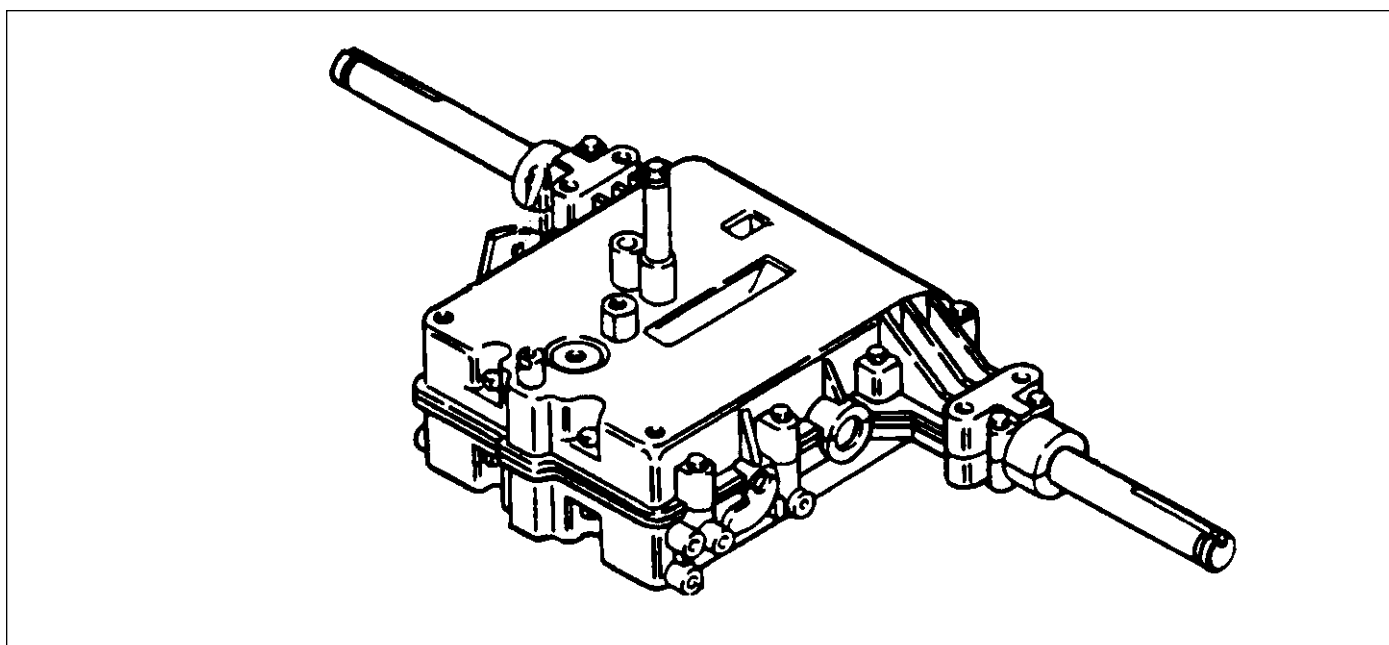


Figure A-1. Peerless Five Speed Gear Transaxle

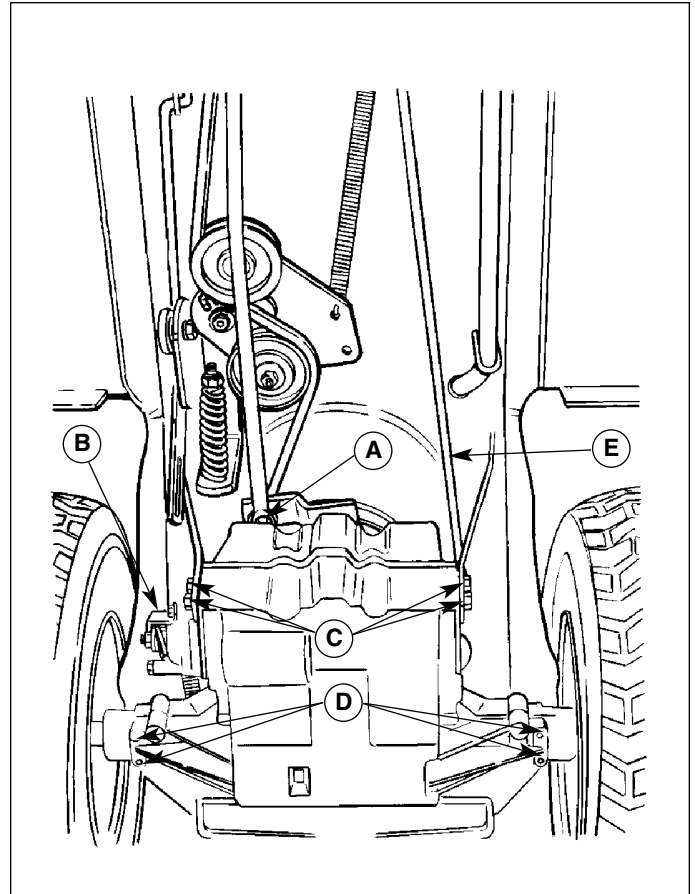
**IMPORTANT:** *Cleanliness is a primary means of assuring satisfactory life on new or repaired units. Cleaning parts by using a solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign materials and chemicals.*

- Protect all exposed sealing surfaces and open cavities from damage and foreign material.
- Prior to removing and disassembling transaxle, the tractor should be steam cleaned or blown with compressed air before beginning any repairs.
- It is recommended that all seals be replaced before transaxle is reassembled. Lightly lubricate all seals with a clean petroleum jelly prior to assembly.
- After transaxle is removed from the tractor, remove all external components such as the brake arm, brake actuating pins, control arm, input pulley, and frame mounting hardware before separating case halves.

### Transmission Removal

1. Safely elevate the rear of the tractor on jackstands (see Elevating Rear for Safe Service).
2. Remove the rear wheels (See Rear Wheel Removal)
3. Disconnect the shift rod from the shift lever on top of the transmission (A, Figure A-3).
4. Disengage the parking brake (if not already done) and disconnect the brake extension spring and brake rod from the brake lever on the transmission (B).
5. Disconnect the transmission support brackets from the transmission case by removing the two taprite screws on each side (C).
6. Engage the parking brake to slacken the belt.
7. Loosen the capscrews securing the transmission to the frame (D).
8. Take the drive belt off the transmission pulley (E).
9. While supporting the transmission with a floor jack, remove the capscrews (D) and lower the transmission making sure the pulley and all linkages clear the frame.

For installation follow removal instructions in reverse order.



**Figure A-3. Transmission Removal**

**A. Shift Rod**

**B. Brake Linkage and Spring**

**C. Transmission Support Brackets**

**D. Capscrews**

## 7 Transmission Repair

7A Peerless 801

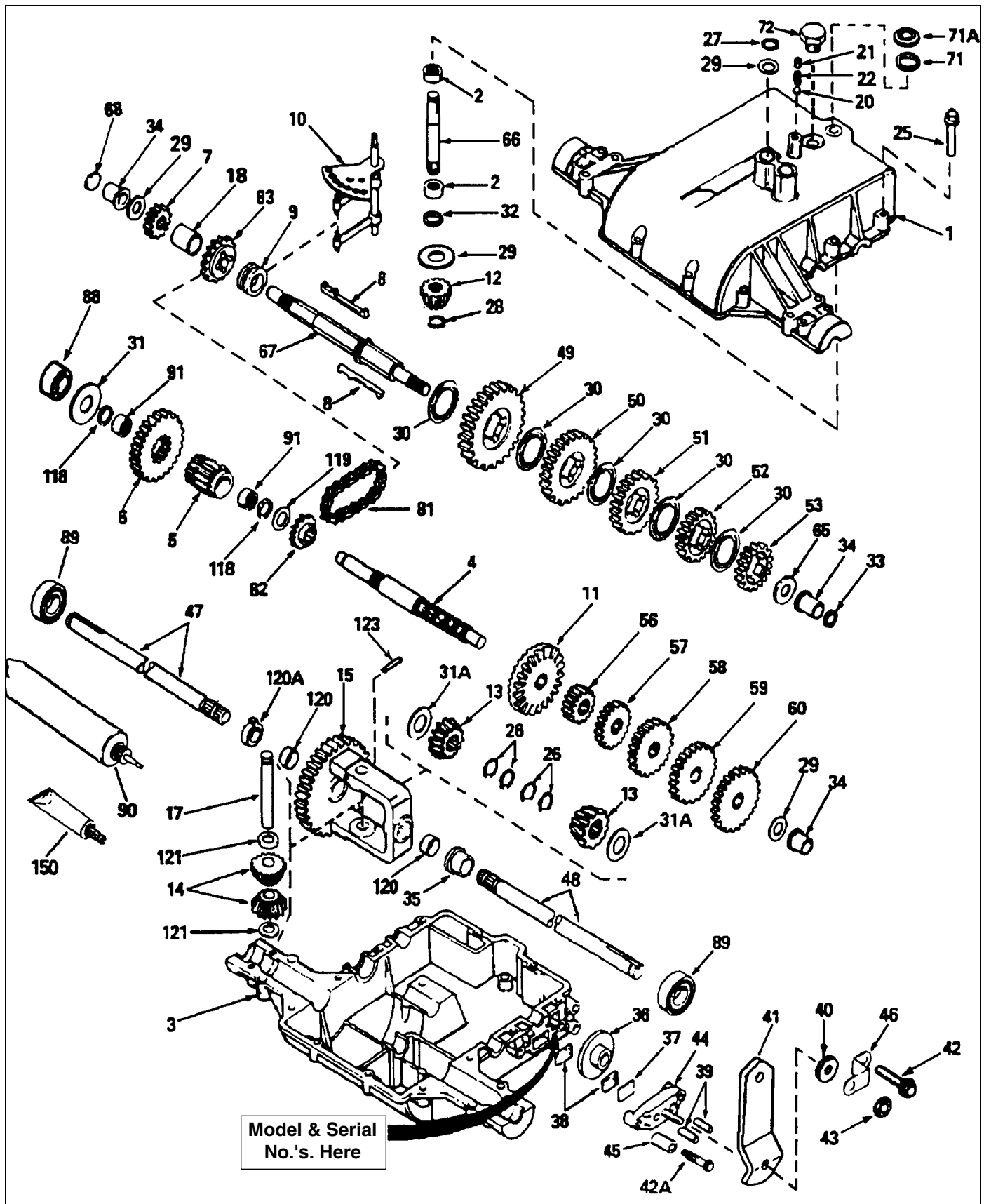


Figure A-2. Peerless 801-059B Five Speed Gear Transaxle Exploded View

1. Transaxle Cover
2. Bearing, Needle
3. Transaxle Case
4. Countershaft
5. Output Pinion
6. Output Gear (35 Tooth)
7. Spur Gear (15 Tooth)
8. Shift Key
9. Shift Collar
10. Shift Fork
11. Bevel Gear (42 Tooth)
12. Input Bevel Pinion
13. Bevel Gear (16 Tooth)
14. Bevel Pinion (16 Tooth)
15. Differential Gear Assembly
17. Drive Pin
18. Spacer
20. Ball, 5/16"
21. Set Screw, 3/8-16 x 3/8"
22. Spring
25. Screw, 1/4-20 x 1-1/4"
26. Retaining Ring
27. Retaining Ring
28. Retaining Ring
29. Washer
30. Washer
31. Washer
- 31A. Washer
32. O-Ring
33. Square Cut Ring
34. Flanged Bushing
35. Flanged Bushing
36. Brake Disk
37. Brake Pad Plate
38. Brake Pad
39. Dowel Pin
40. Washer
41. Brake Lever
42. Screw, 1/4-20 x 1-1/4"
42. Screw, 1/4-20 x 2-1/4"
43. Locknut, 5/16-24
44. Brake Pad Holder
45. Spacer
46. Brake Lever Bracket
47. Axle (12-1/2" Long)
48. Axle (14-3/4" Long)
49. Spur Gear (37 Tooth)
50. Spur Gear (30 Tooth)
51. Spur Gear (25 Tooth)
52. Spur Gear (22 Tooth)
53. Spur Gear (20 Tooth)
56. Spur Gear (12 Tooth)
57. Spur Gear (20 Tooth)
58. Spur Gear (25 Tooth)
59. Spur Gear (28 Tooth)
60. Spur Gear (30 Tooth)
65. Washer
66. Input Shaft
67. Shifter & Brake Shaft
68. Disk
71. Square Cut Ring
- 71A. Pushnut, 1/2"
72. Threaded Plug
81. Roller Chain (No. 40, 22 links)
82. Sprocket (10 Tooth)
83. Sprocket (14 Tooth)
88. Ball Bearing
89. Ball Bearing
90. Grease (32 oz. Bentonite)
91. Needle Bearing
118. Square Cut Ring
119. Washer
120. Bushing
121. Washer
123. Roll Pin
150. Gasket Eliminator (Loctite #515)

## 7A Peerless 801 - Notes

## 7A Peerless 801 - Notes

[illegible]

### EATON MODEL 750, 751 HYDROSTATIC TRANSAXLE

#### General Notes

The Eaton models 750 and 751 consist of a radial ball piston pump and two radial ball piston motors. The motors drive double series planetary gear sets which, in turn, drive the axles.

The level of cleanliness maintained while repairing the transaxle could affect its performance. Work in a clean area. Before removing the transaxle from the tractor, steam clean or pressure wash all debris from the surrounding area. After disassembly, wash all parts with clean solvent and blow the parts dry with air. Inspect all mating surfaces. Replace any damaged parts that could cause internal leakage. Do not use emery paper, files, or grinders on finished parts.

!!!!Warning, compressed air is dangerous etc etc etc

To ensure correct installation on the Model 750, the axle housings are marked with the letters A and B. Each side of the housing assembly is also marked with an A or B. The axles on the Model 751 are identical. Make sure the axle housings are correctly assembled with corresponding letters on the housing assembly.

*NOTE: Whenever a transaxle is disassembled, our service policy is to replace all seals. Lubricate the new seals with petroleum jelly (Vaseline) before installation. Use only clean, recommended fluid on the finished surfaces at reassembly.*

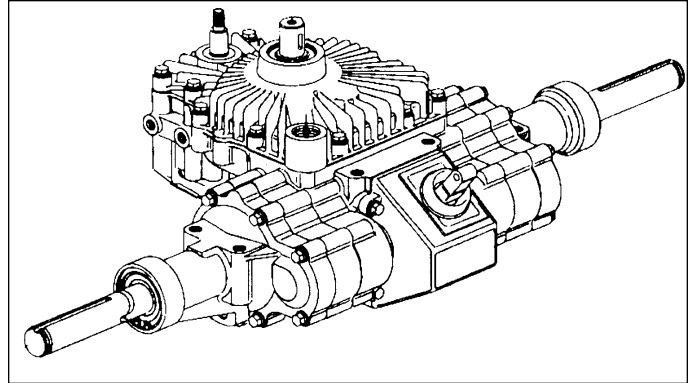


Figure B-1. Eaton Model 750 Hydrostatic Transaxle

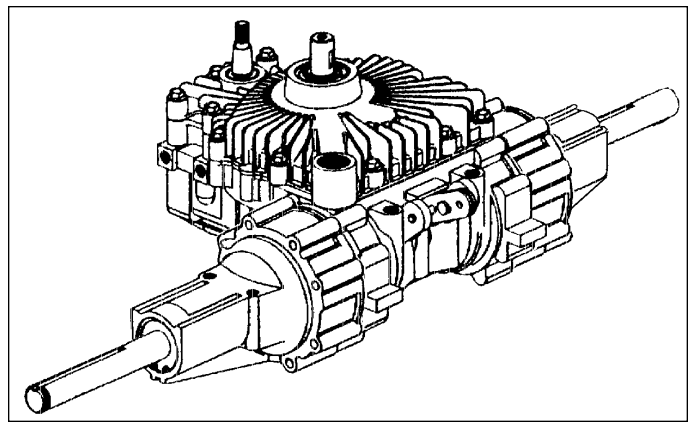


Figure B-2. Eaton Model 751 Hydrostatic Transaxle

## 7 Transmission Repair

7B Eaton 750 / 751

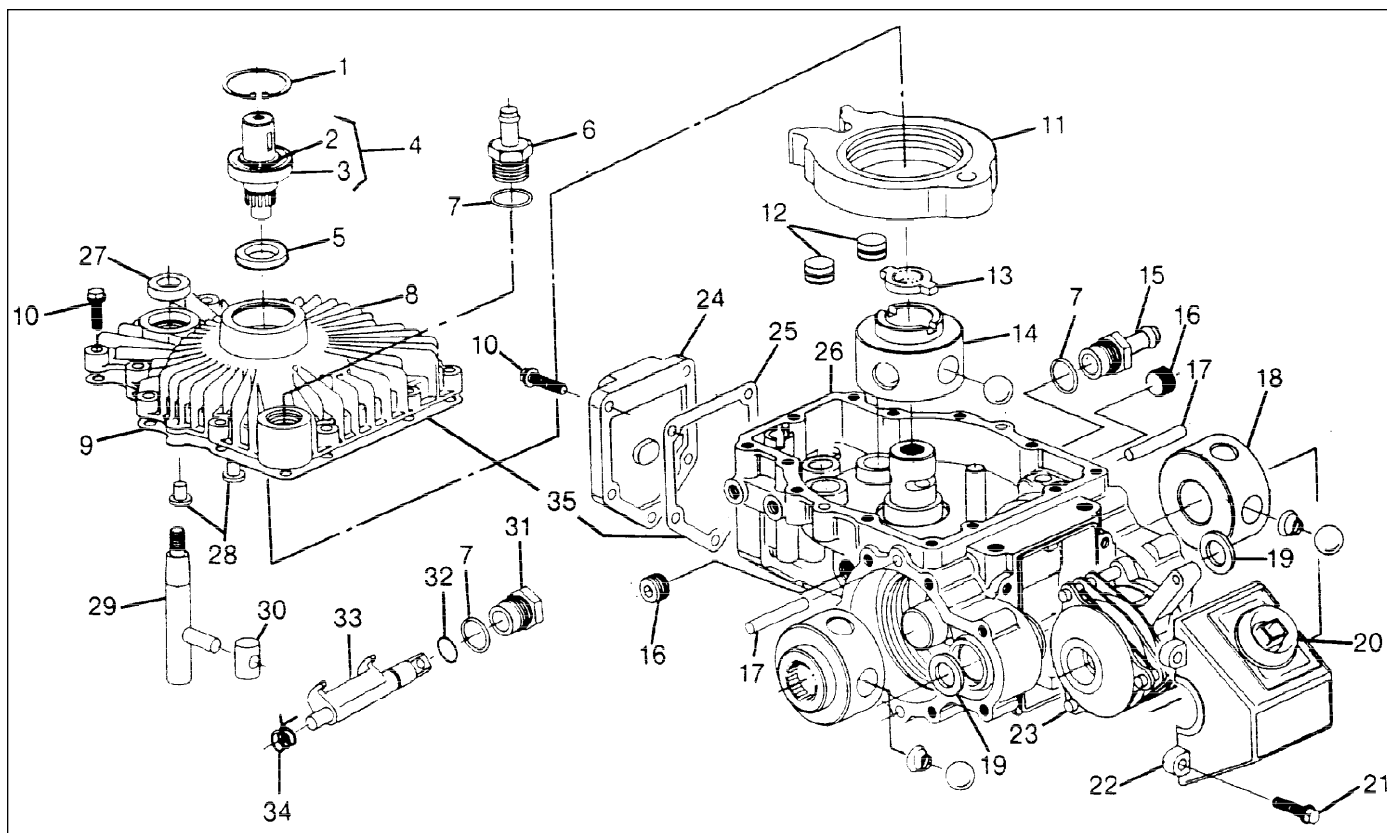
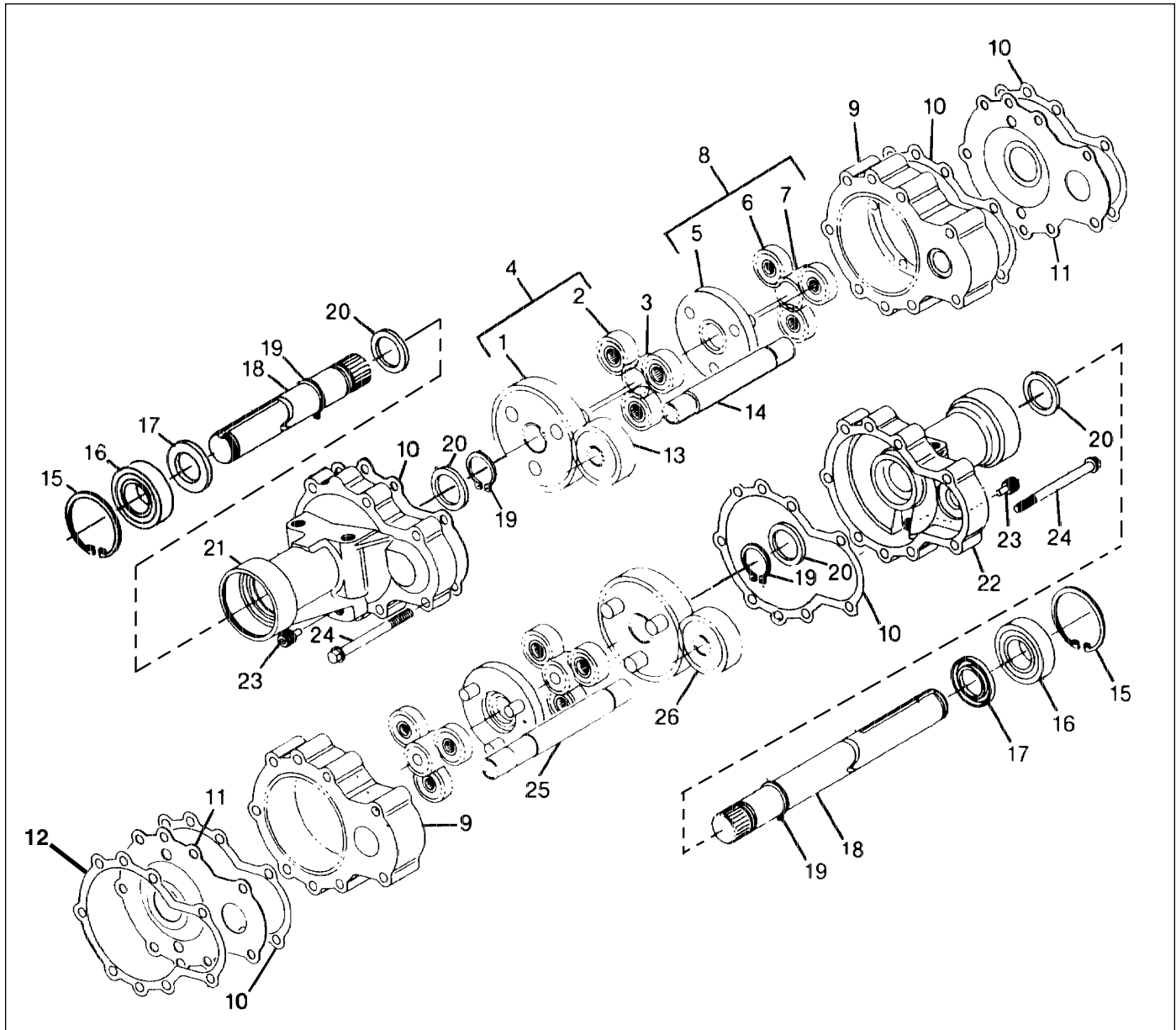


Figure B-3. Eaton 750 Hydrostatic Transaxle

- |                              |   |
|------------------------------|---|
| 1. Ring, Retaining, Internal | 19. Seal, Lip, Radial                       |
| 2. Ring, Retaining, External | 20. Boot, Dust                              |
| 3. Bearing, Input Shaft      | 21. Screw, 1/4"- 20, Self-Tapping           |
| 4. Shaft, Input              | 22. Cover, Brake, Parking                   |
| 5. Seal, Oil                 | 23. Brake Assembly, Parking                 |
| 6. Adapter, Hose, 3/8"       | 24. Cover, Valve                            |
| 7. O-Ring, Fitting           | 25. Gasket, Valve Cover (A)                 |
| 8. Top Cover                 | 26. Housing                                 |
| 9. Gasket, Cover, (A)        | 27. Seal, Oil                               |
| 10. Capscrew, 1/4"- 20       | 28. Button                                  |
| 11. Cam, Ring                | 29. Shaft, Control                          |
| 12. Piston, Quieting         | 30. Insert                                  |
| 13. Drive                    | 31. Fitting                                 |
| 14. Pump, Rotor, Ball        | 32. O-Ring                                  |
| 15. Adapter                  | 33. Dump Valve Bracket                      |
| 16. Plug, Socket Head        | 34. Spring, Dump Valve                      |
| 17. Dowel                    | 35. Kit, Gasket (Includes parts marked "A") |
| 18. Motor, Rotor, Ball       |   |



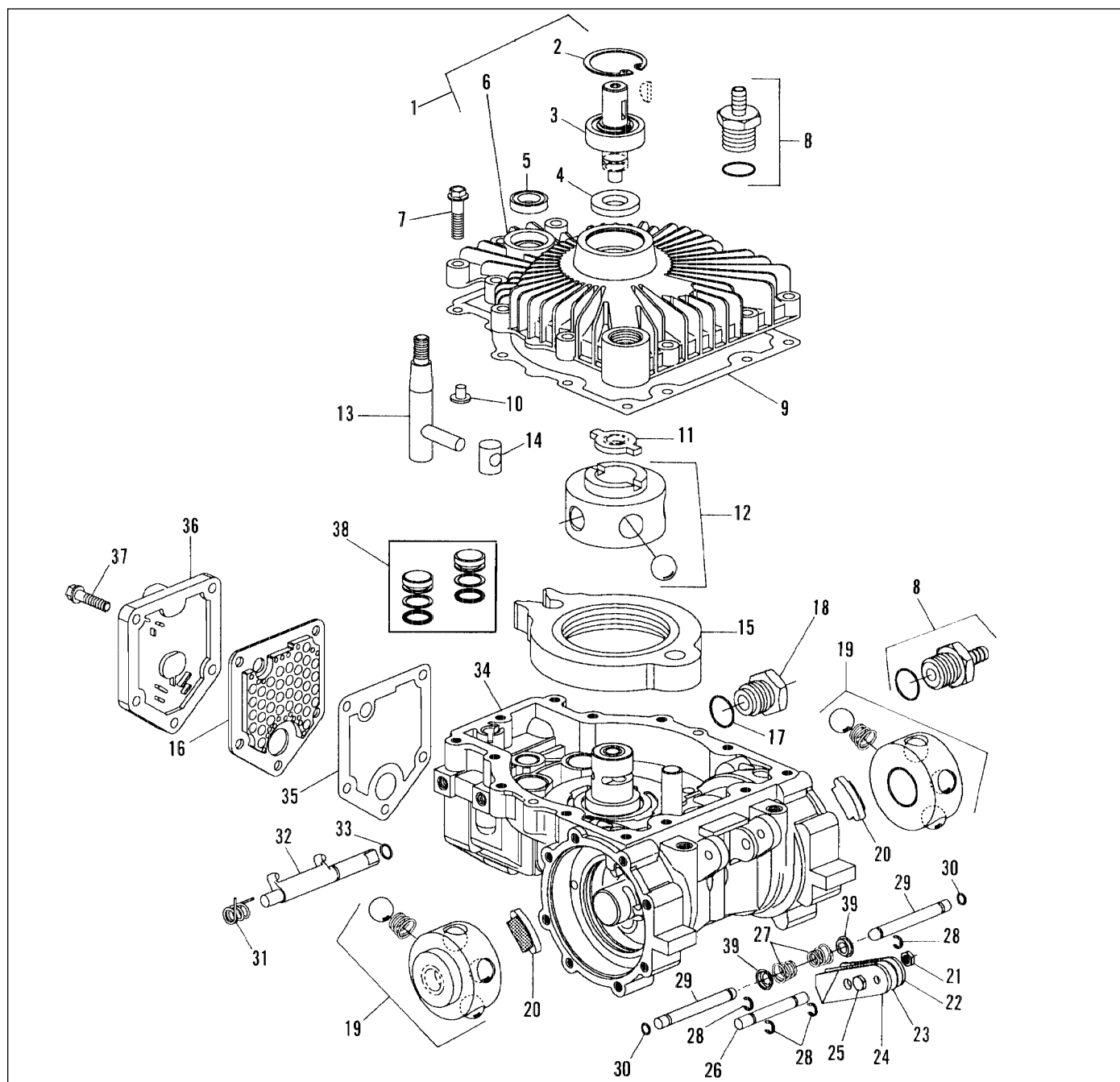


**Figure B-4. Eaton 750 Hydrostatic Transaxle**

- |                              |  |
|------------------------------|--|
| 1. Carrier, Secondary        | 15. Ring, Retaining, Internal            |
| 2. Gear, Planetary           | 16. Bearing, Ball                        |
| 3. Gear, Sun                 | 17. Seal, Radial, Lip                    |
| 4. Assembly, Gear, Planetary | 18. Shaft, Axle                          |
| 5. Carrier, Primary          | 19. Ring, Retaining, External            |
| 6. Gear, Planetary           | 20. Washer, Thrust                       |
| 7. Gear, Sun                 | 21. Housing, Axle, Left                  |
| 8. Assembly, Gear, Planetary | 22. Housing, Axle, Right                 |
| 9. Gear, Ring, 54T           | 23. Plug, Magnetic                       |
| 10. Gasket, Housing, Axle    | 24. Capscrew, Hex, Flange 1/4-20 x 2-3/4 |
| 11. Plate, Wear              | 25. Shaft, Brake                         |
| 12. Gasket, Housing, Axle    | 26. Lock Gear, Differential              |
| 13. Lock Gear, Differential  |  |
| 14. Shaft, Brake             |  |

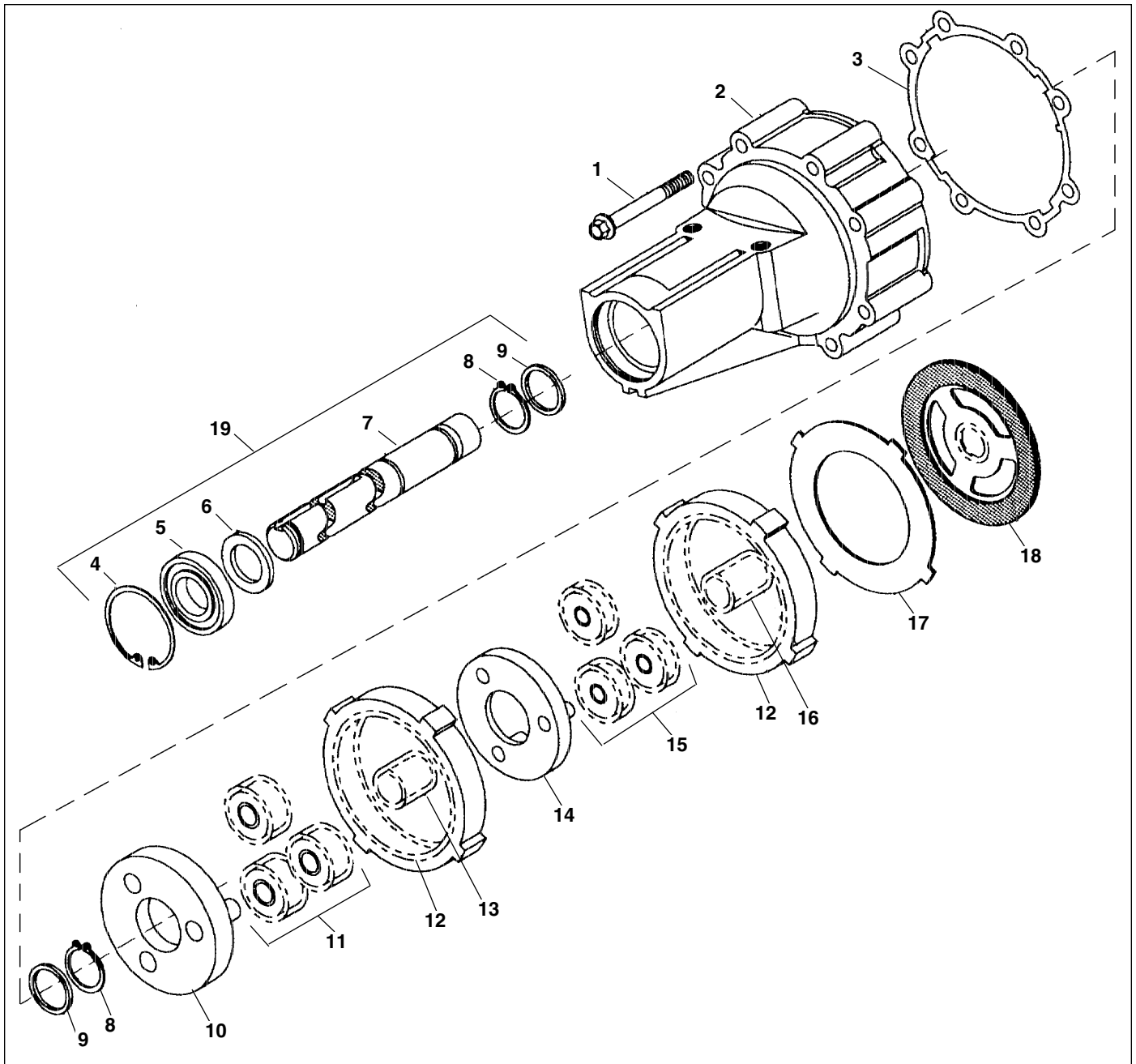
# 7 Transmission Repair

## SECTION 4H. Eaton 750/751 Repair



**Figure B-5. Eaton 751 Hydrostatic Transaxle**

- |                              |                             |                           |
|------------------------------|-----------------------------|---------------------------|
| 1. Assembly, Cover           | 14. Insert                  | 27. Spring, Conical       |
| 2. Ring, Retaining, External | 15. Ring, Cam               | 28. E-Ring                |
| 3. Assembly, Shaft, Input    | 16. Filter, Hydraulic       | 29. Rod, Push             |
| 4. Seal, Input Shaft         | 17. O-Ring                  | 30. Seal, Quad            |
| 5. Seal, Control Shaft       | 18. Fitting                 | 31. Spring, Dump Valve    |
| 6. Cover                     | 19. Motor, Rotor-Ball, 18T  | 32. Bracket, Dump Valve   |
| 7. Screw, Self-Tap, 1-4/20   | 20. Pad, Friction           | 33. O-Ring                |
| 8. Assembly, Fitting         | 21. Nut, Hex, Lock          | 34. Housing               |
| 9. Gasket, Cover             | 22. Lever, Brake, Left Hand | 35. Gasket, Valve Cover   |
| 10. Button                   | 23. Shim                    | 36. Cover, Valve          |
| 11. Drive                    | 24. Lever, Brake, RH        | 37. Capscrew, Hex, 1/4-20 |
| 12. Pump, Rotor-Ball         | 25. Screw, Cap, Hex         | 38. Piston, Quieting      |
| 13. Shaft, Control           | 26. Shaft, Brake            | 39. Base, Spring          |



**Figure B-6. Eaton 751 Hydrostatic Transaxle Axle Assembly**

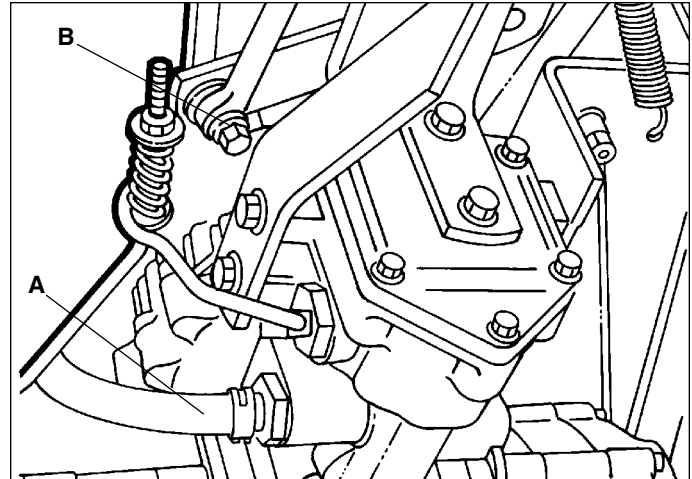
- |                              |   |
|------------------------------|---|
| 1. Screw, 1/4"- 20           | 11. Planet Gear, Second, 18T              |
| 2. Housing, Axle             | 12. Gear, Ring, 54T                       |
| 3. Gasket, Housing, Axle     | 13.. Sun Gear, Second, 18T                |
| 4. Ring, Retaining, Internal | 14. Primary Carrier, 18T                  |
| 5. Bearing, Ball             | 15. Planet Gear, First, 18T               |
| 6. Seal, Radial, Lip         | 16. Sun Gear, First, 18T                  |
| 7. Shaft, Axle               | 17. Plate, Back-Up                        |
| 8. Ring, Retaining, External | 18. Plate, Reaction                       |
| 9. Washer, Thrust            | 19. Housing, Axle (Contains Items 2, 4-9) |
| 10. Carrier, Secondary       |   |

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## Removal

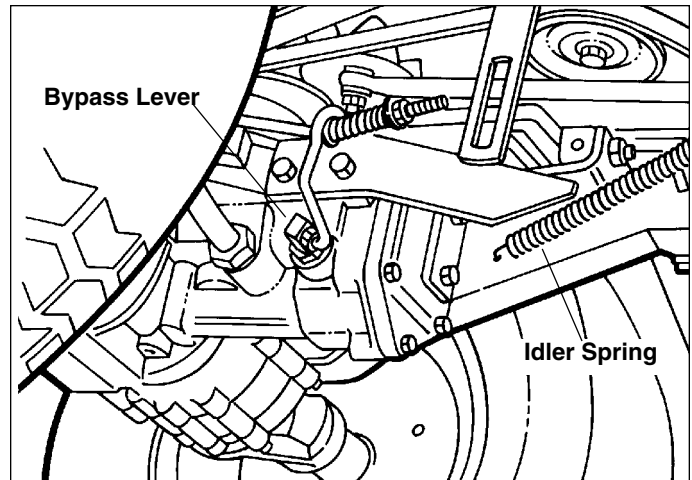
1. Jack up the rear end and remove the rear wheels. (See the Elevating Rear End for Safe Service and Rear Wheel Removal sections)
2. Place a drain pan under the transaxle.
3. Remove the oil intake hose (A) from the right-front of the transaxle and allow the oil to drain.
4. Remove the nut, washer, and bolt (B) holding the shift lever to the bracket.



**Figure B-7. Remove Oil Hose and Shift Linkage**

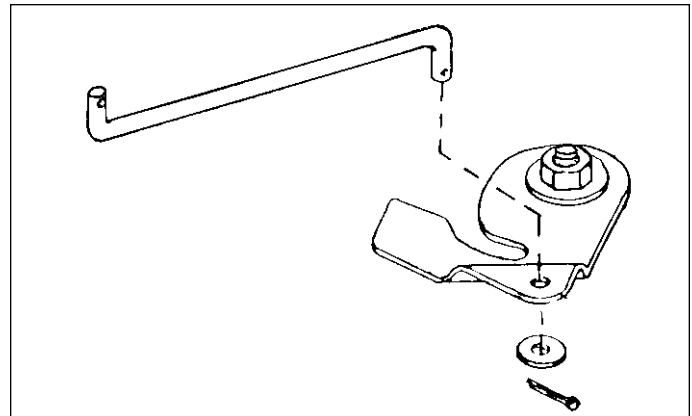
**A. Oil Intake Hose      B. Shift Lever**

5. Remove the nut and washer holding the bypass lever to the transaxle bypass valve shaft.
6. Remove the large idler arm spring from the front of the transaxle mounting bracket.



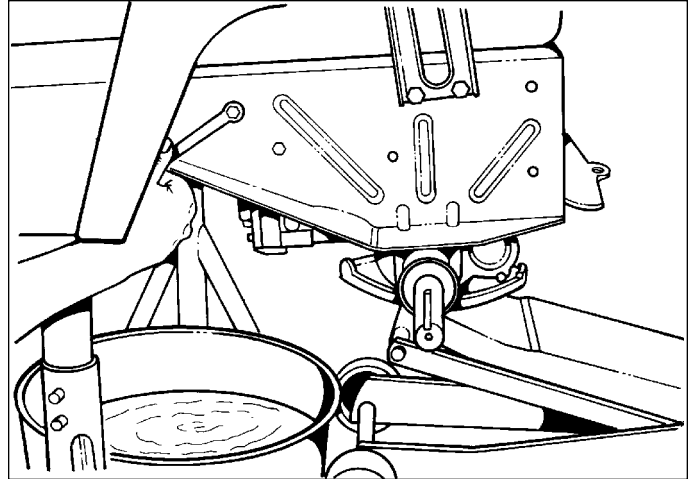
**Figure B-8. Remove Bypass Lever**

7. Remove the neutral-return rod from the neutral-return cam on the top of the transaxle.
8. Unhook the brake return spring from the left rear corner of the frame.



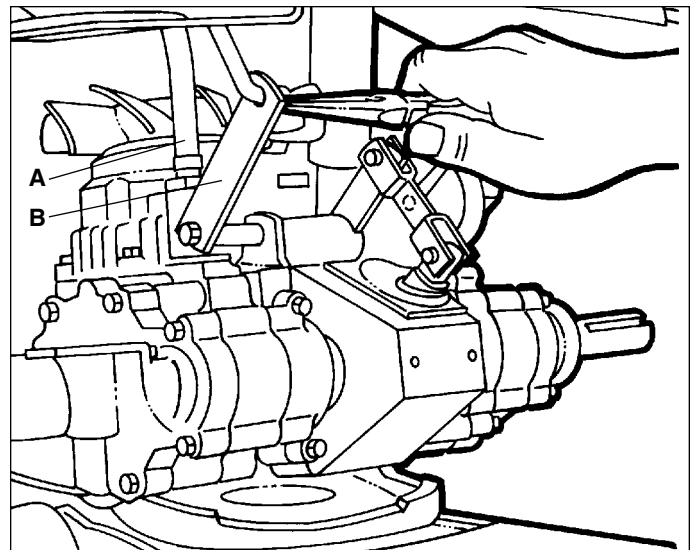
**Figure B-9. Remove Neutral-Return Rod**

9. With a floor jack supporting transaxle, remove the hardware securing the front transaxle support to tractor frame.
10. Remove the capscrews holding the axle supports to side frames.



**Figure B-10. Remove Mounting Bolts**

11. Slowly lower the transaxle from tractor just enough to do the following:
  - Remove hydro drive belt from transaxle drive pulley and fan.
  - Expose and remove the oil return hose from the fitting on top of transaxle.
  - Remove the cotter pin and washer holding the brake rod to brake lever. Remove the rod and lower transaxle to ground.



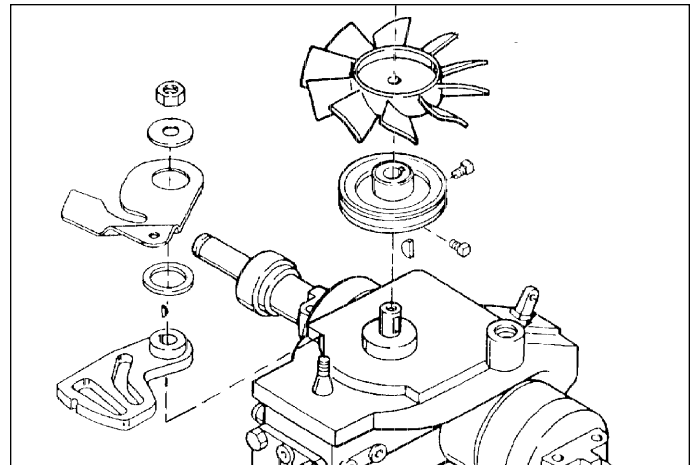
**Figure B-11. Lower Transaxle From Frame**

**A. Oil Return Line**

**B. Brake Lever**

12. Remove the following from the transaxle:

- Brake bracket assembly
- Cooling fan
- Hydro drive pulley
- Front transaxle support
- Hydro cam
- Neutral return cam
- Neutral detent support assembly



**Figure B-12. Remove External Components**

# 7 Transmission Repair

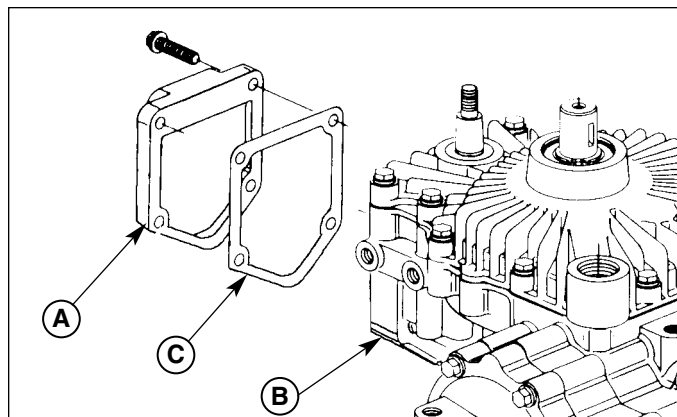
7B Eaton 750 / 751

## Disassembly

1. Turn transaxle upside down and drain case through case drain port.

*Note: Model 751 has a filter located between valve cover (A) and main housing (B). Refer to item 16, Figure B-5 for reference.*

2. Remove capscrews holding valve cover to case. Remove the cover.



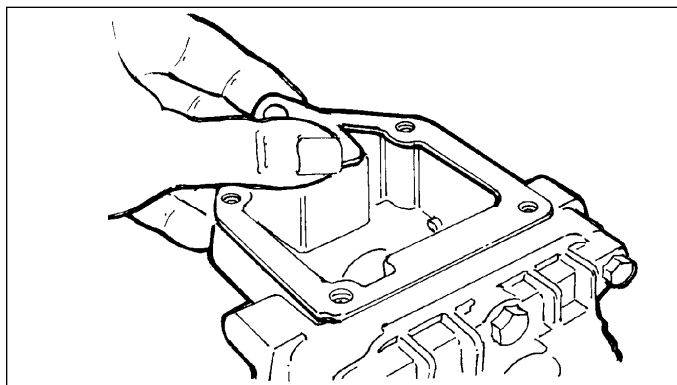
**Figure B-13. Remove Valve Cover**

- A. Valve Cover
- B. Housing
- C. Gasket

3. Remove and discard valve cover gasket.

*NOTE: The gasket may have remained on the cover when removed from housing assembly.*

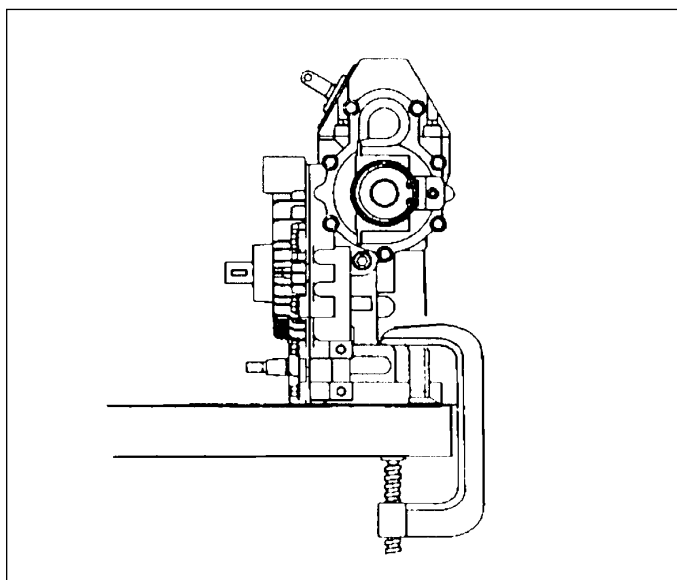
4. On model 750 discard the filter element and replace before reassembly.



**Figure B-14. Remove Valve Plate Gasket**

*NOTE: After the transaxle is drained, it is easier to remove the axle assemblies with the transaxle mounted to a bench as shown. Before securing the transaxle in this position, place a clean shop towel between the housing base surface and the work surface. This towel protects the base sealing surface from possible damage during repositioning. Use a 6" to 8" C-clamp to secure the transaxle to the bench. Be careful not to overtighten the C-clamp when securing the transaxle.*

*NOTE: The following procedure is identical for both left and right axle assemblies. Keep left axle parts and right axle parts separate. (On the model 750 the left hand side is marked "A" and the right hand side is marked "B")*



**Figure B-15. Mount Transmission To Bench**

### Axle Removal (Eaton 750)

1. With the transaxle secured to bench, use a 3/8" wrench to remove the axle mounting capscrews.
2. Carefully remove the axle assembly (up to and including wear plate) from the housing.

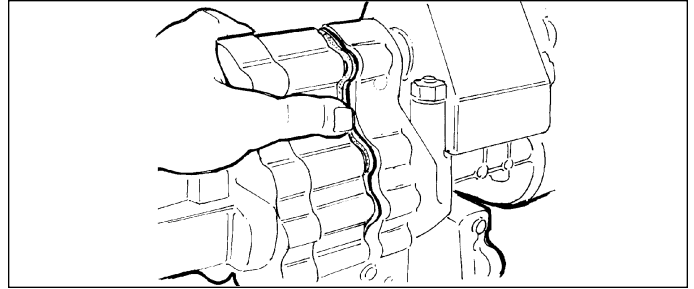


Figure B-16. Remove Axle Assembly & Wear Plate

3. In most cases, the differential shaft will remain in the transaxle housing when the axle is removed. If this occurs, remove the differential shaft at this time.

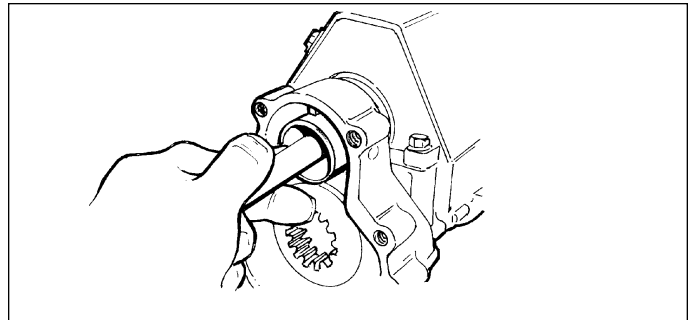


Figure B-17. Remove Differential From Transaxle

**IMPORTANT:** Be extremely careful when removing the motor rotor assemblies. The ball pistons are spring loaded and must remain in their bores because each ball piston is matched to its respective bore.

4. The best way to remove the motor rotor assemblies is to place a separate motor race on top of the existing motor race in the housing assembly. Hold the separate race securely in position. Then, carefully pull the motor rotor assembly outward until the ball pistons are fully engaged in the groove located in the center of the separate race. Carefully remove the rotor assembly and race together as a set, handling the motor rotor assembly only.

**NOTE:** If a separate motor race is not available, a piston ring compressor, a wide rubber band, or differential seal (P/N 121190) may be used to hold the ball pistons in their bores.

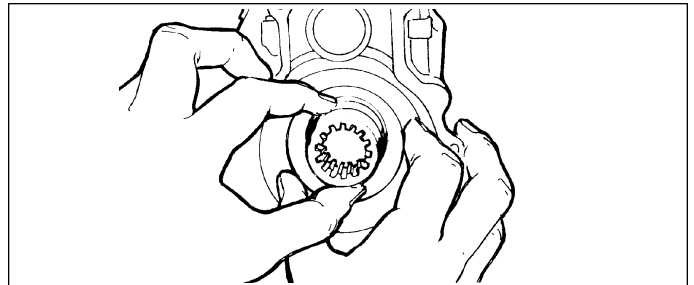


Figure B-18. Remove Motor Assembly

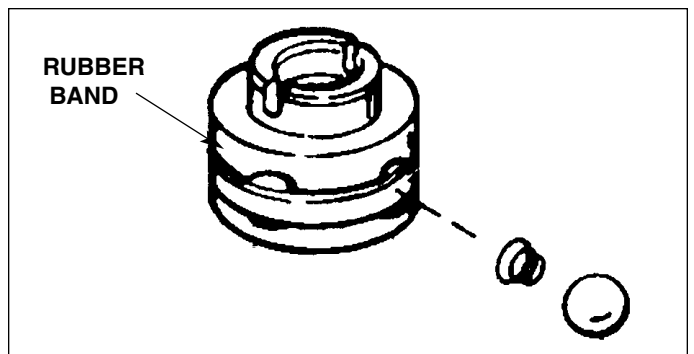


Figure B-19. Motor Balls and Springs



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## Axle Disassembly (Eaton 750)

1. Remove and discard the axle housing gasket from the wear plate.

*NOTE: Gasket may have remained on the transaxle housing during removal of the axle assembly.*

2. Remove the wear plate from the axle assembly

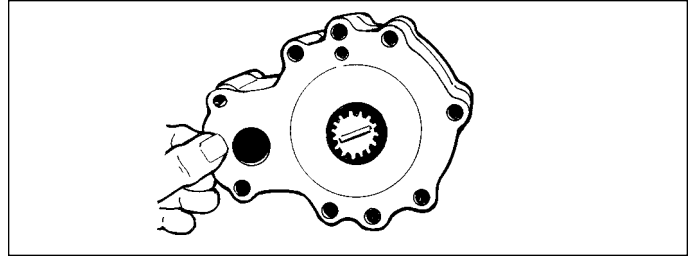


Figure B-20. Remove Gasket and Wear Plate

3. Remove the axle housing gasket from the ring gear assembly and discard.

4. Remove the first sun gear from the primary carrier assembly.

*NOTE: The first sun gear may or may not have remained in the motor rotor during removal of the axle assembly.*

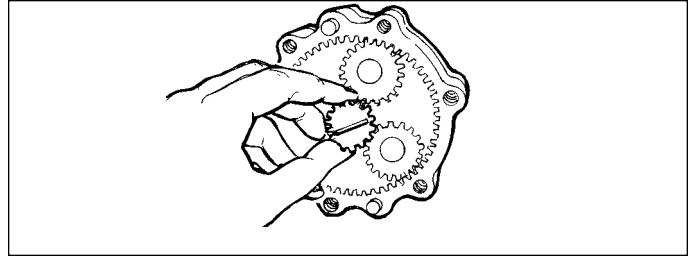


Figure B-21. Remove Gasket and First Sun Gear

5. Remove the primary carrier assembly from the ring gear assembly.

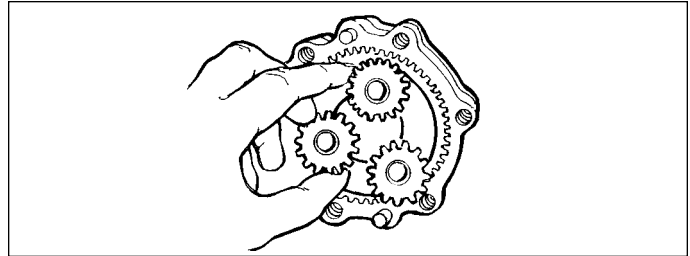


Figure B-22. Remove Primary Carrier Assembly

6. Remove the second sun gear from the secondary carrier assembly.

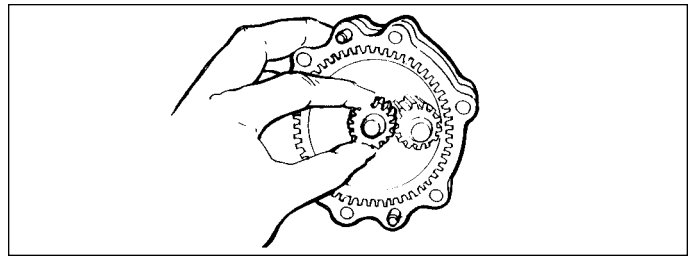


Figure B-23. Remove Second Sun Gear

7. Remove the ring gear assembly from the axle housing.

8. Remove the gasket and dowel pins from the axle housing. Discard gasket.

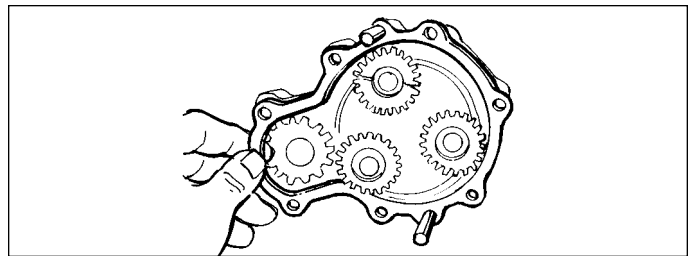
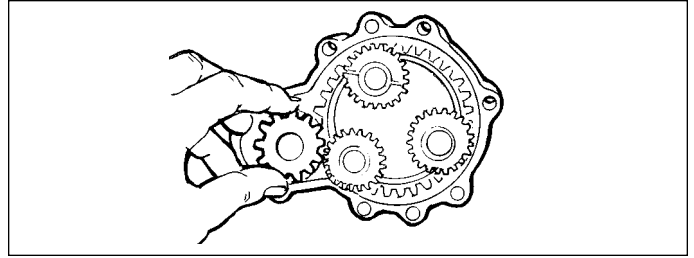


Figure B-24. Remove Axle Housing Gasket and Dowel Pins

9. Remove the brake gear from the axle housing.

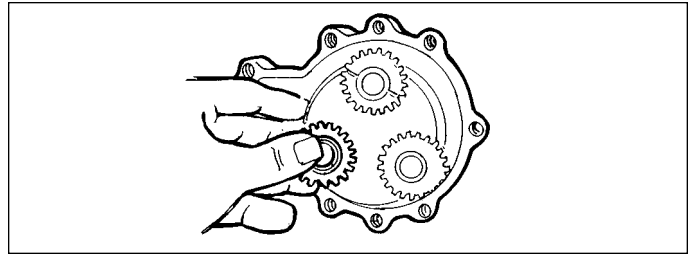
10. Remove the spacer washer from axle housing.

*NOTE: Spacer washer may stick in axle housing due to grease in housing.*



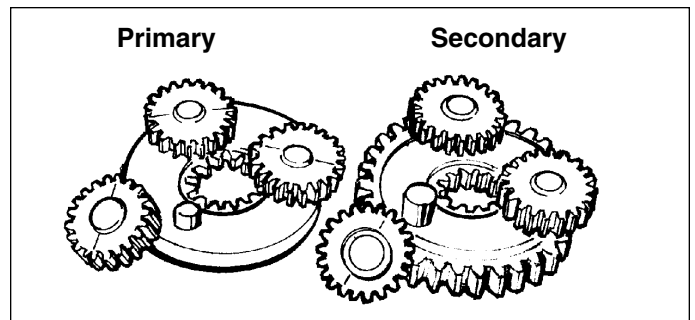
**Figure B-25. Remove Brake Gear**

11. Remove the secondary carrier assembly from the axle shaft.



**Figure B-26. Remove Secondary Carrier Assembly**

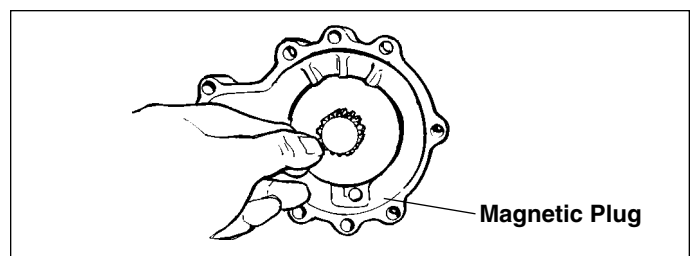
12. Both the primary and secondary carrier assemblies may be disassembled for inspection.



**Figure B-27. Primary and Secondary Carriers**

13. Remove the large thrust washer from the axle housing. (Not used on date code G01J or higher.)

*NOTE: The plug below the large thrust washer is magnetic and can be removed from outside the axle housing using an Allen wrench. Remove this plug for oil and contamination analysis.*



**Figure B-28. Remove Large Thrust Washer**

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14. Reposition the axle housing with the splined end of the axle in the up position. Using No. 4 or 5 external snap ring pliers, remove the retaining ring and thrust washer from the axle shaft.

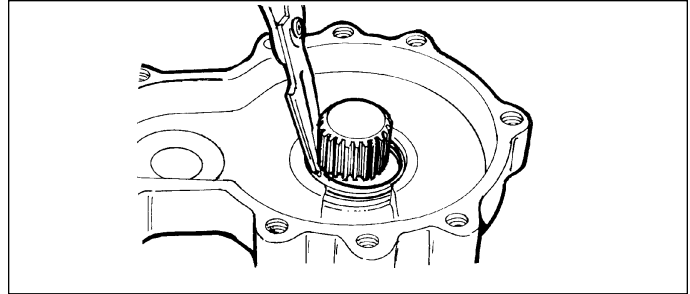


Figure B-29. Remove Snap-Ring and Thrust Washer

15. Reposition the axle housing assembly with the wheel end of the axle in the up position. Using No. 5 or 7 internal snap ring pliers, remove the ball bearing retaining ring from the axle housing.
16. Remove the axle from the axle housing by using a small press or by tapping the splined end of the axle with a plastic faced hammer. This will dislodge the seal and bearing from the axle bore.

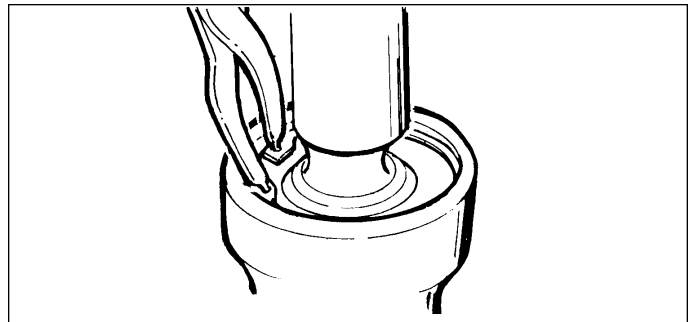


Figure B-30. Remove Axle From Housing

17. After separating the axle from the axle housing, remove the ball bearing, seal and thrust washer from the axle shaft. The thrust washer may have remained in the axle housing during removal of the axle shaft.

*NOTE: The retaining ring remaining on the axle shaft need not be removed.*

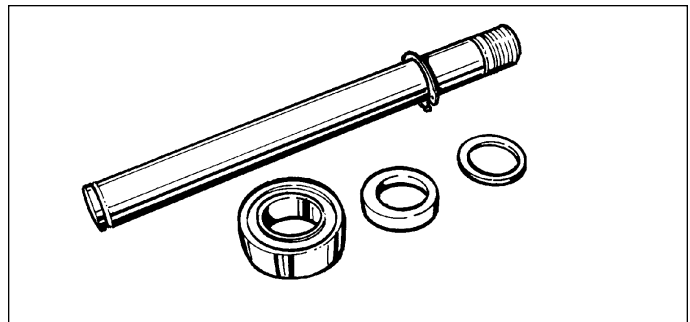


Figure B-31. Disassemble Axle Shaft

### Axle Removal (Eaton 751)

1. With the transaxle secure, use a 3/8 inch wrench to remove the flange screws from one (A-side or B-side) axle housing assembly.
2. After removing the flange screws, carefully remove the axle housing from the transaxle housing .

*Caution: Retain the planetary assemblies in the axle housing assembly during removal.*

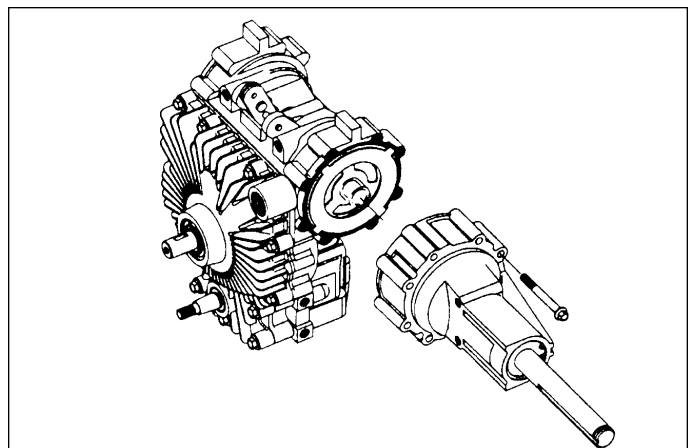


Figure B-32. Remove Axle Housing

### Axle Disassembly (Eaton 751)

1. Carefully position the axle housing assembly on a clean flat surface, then separate axle housing from the planetary assemblies as shown.

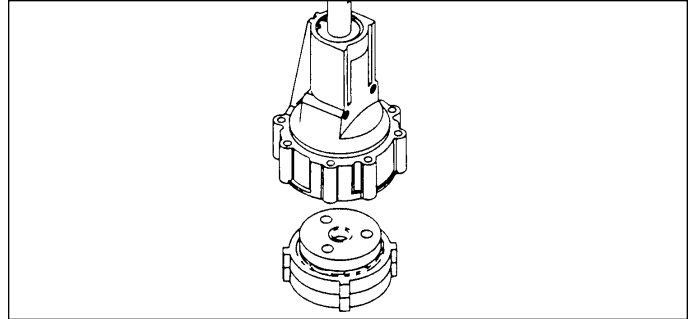


Figure B-33. Remove Planetary Assemblies

2. Position the axle housing assembly with the output end of the axle shaft in the up position. Using No. 5 or 7 internal retaining ring pliers, remove the ball bearing retaining ring from the axle housing.
3. Reposition the axle housing with the splined end of the axle in the up position. Using No. 4 or 5 external retaining ring pliers, remove the retaining ring and thrust washer from the axle shaft.
4. Remove the axle from the axle housing by using a small press or by tapping the splined end of the axle shaft with a plastic faced hammer. This will dislodge the seal and bearing from the axle housing.
5. After separating the axle shaft from the axle housing, remove the ball bearing, seal and thrust washer from the axle shaft. The thrust washer may be in the axle housing.

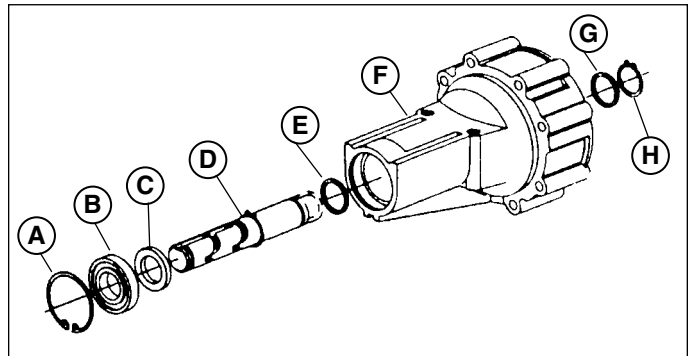


Figure B-34. Disassemble Axle Housing

- |                    |                   |
|--------------------|-------------------|
| A. Retaining Ring  | E. Thrust Washer  |
| B. Ball Bearing    | F. Axle Housing   |
| C. Axle Shaft Seal | G. Thrust Washer  |
| D. Axle Shaft      | H. Retaining Ring |

**NOTE:** The retaining ring remaining on the axle shaft need not be removed.

6. To disassemble the planetary assemblies for inspection and cleaning, first remove the ring gear (from the secondary carrier/planet gears).
7. Next, putting a slight squeeze on the secondary carrier planet gears, remove the three secondary planet gears and carrier.
8. Turn the assembly over and remove the secondary planet gears for inspection and cleaning.
9. Remove the sun gear and remaining ring gear.
10. Again, putting a slight squeeze on the remaining carrier planet gears, remove planet gears and carrier from the backup plate.
11. The planet gears may be removed for inspection and cleaning.

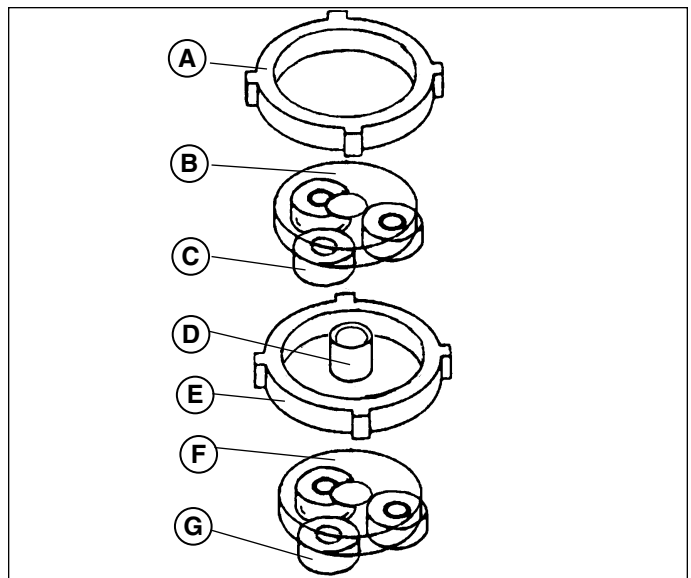


Figure B-35. Disassemble Planetary Gears

- |                           |                         |
|---------------------------|-------------------------|
| A. Ring Gear              | E. Ring Gear            |
| B. Secondary Carrier      | F. Primary Carrier      |
| C. Secondary Planet Gears | G. Primary Planet Gears |
| D. Secondary Sun Gear     |                         |

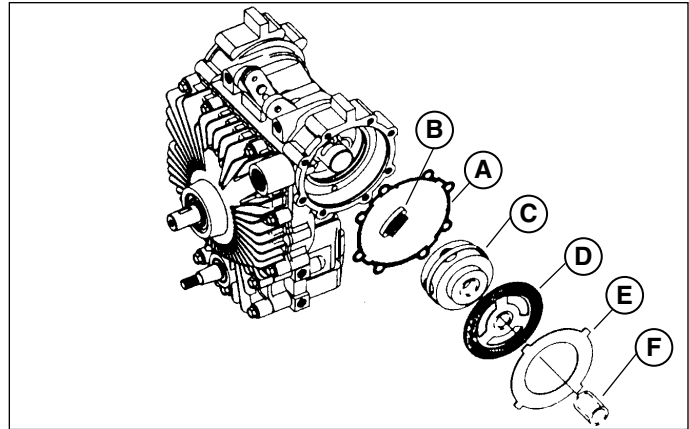
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12. Remove the reaction plate from the primary sun gear.
13. Remove the primary sun gear from the motor rotor assembly.
14. Remove the small friction brake pad assembly from its recessed pocket located in the axle housing.
15. Shown in previous drawing are the three major parts used in the Eaton transaxle wet brake assembly, the friction pad assembly, reaction plate and backup plate. When the brake is applied, the rotating reaction plate is squeezed between the stationary friction pad and the backup plate.
16. Remove the axle housing assembly gasket.

**NOTE:** Gasket may have remained on the axle housing.

17. Normally, any further disassembly of the brake levers, push rods and etc. is not necessary, nor recommended. The brake lever shim, located between the two brake levers, is used to adjust the brake lever movement. This adjustment was made during the initial transaxle assembly.



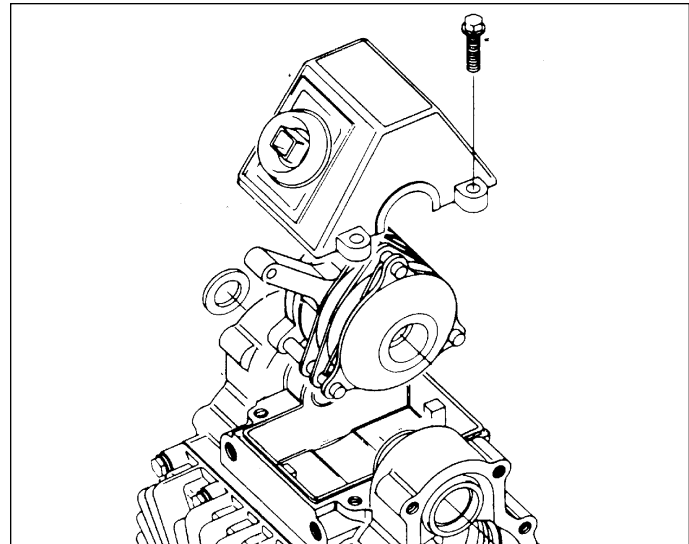
**Figure B-36. Disassemble Motor & Brake Assembly**

- |                        |                            |
|------------------------|----------------------------|
| <b>A. Gasket</b>       | <b>D. Reaction Plate</b>   |
| <b>B. Friction Pad</b> | <b>E. Backup Plate</b>     |
| <b>C. Motor Rotor</b>  | <b>F. Primary Sun Gear</b> |

#### Brake Housing Disassembly (Eaton 750 only)

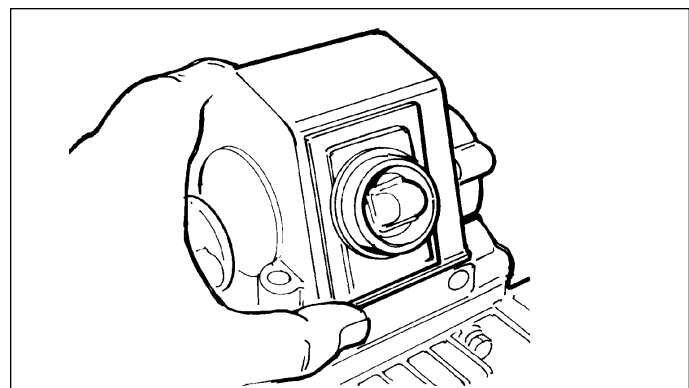
1. Using a 3/8" wrench, remove the four capscrews from the brake cover.

**NOTE:** Make sure you **DO NOT** move the brake lever unnecessarily, especially when it is out of the housing assembly. The parking brake assembly incorporates automatic self-adjusting brakes. Unnecessary activation of the lever may cause the brake to expand and make installation of the assembly very difficult or impossible.



**Figure B-37. Disassemble Brake Housing**

2. Remove the brake cover from the housing assembly.



**Figure B-38. Remove Brake Cover**

3. Remove the brake assembly from the transaxle housing. Total disassembly of the brake is NOT necessary or recommended.

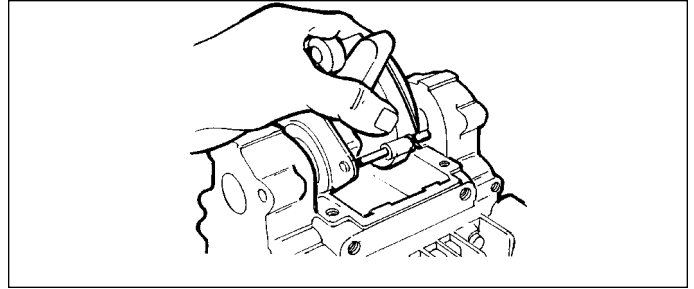


Figure B-39. Remove Brake Assembly

4. The two outside parking brake disks are the only disks that can be removed easily for inspection and cleaning.

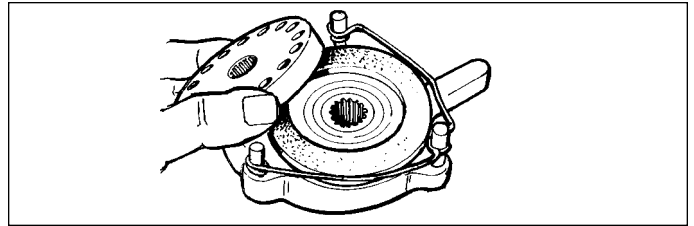


Figure B-40. Remove Brake Disks

### Housing Disassembly (Eaton 750, 751)

1. Reposition the housing assembly. Using a 3/8" wrench, remove the capscrews from the cover assembly.

*NOTE: One of the capscrews is located in the case drain port.*

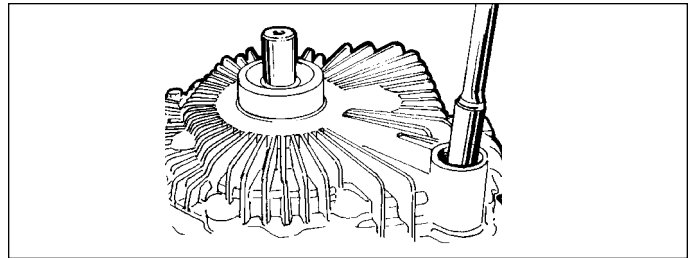


Figure B-41. Remove Capscrews From Cover

2. With all the capscrews removed, carefully separate and remove the cover from the housing assembly.

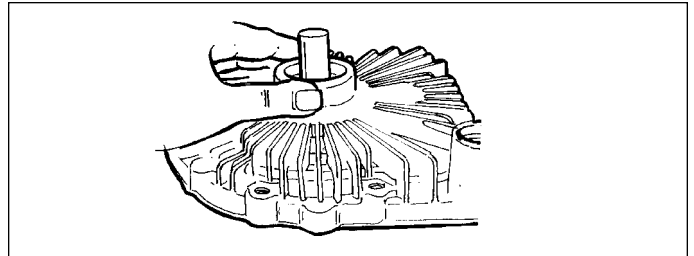


Figure B-42. Remove Cover From Housing

3. Use No. 5 or 7 internal snap ring pliers to remove the input shaft retaining ring from the cover.

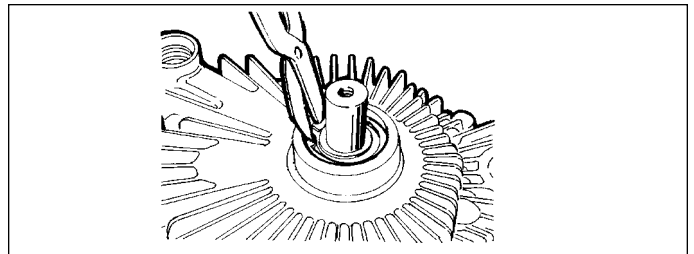
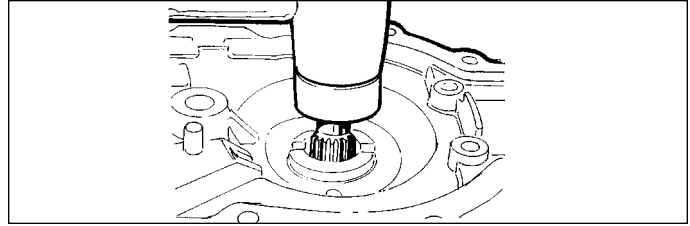


Figure B-43. Remove Input Shaft Retaining Ring

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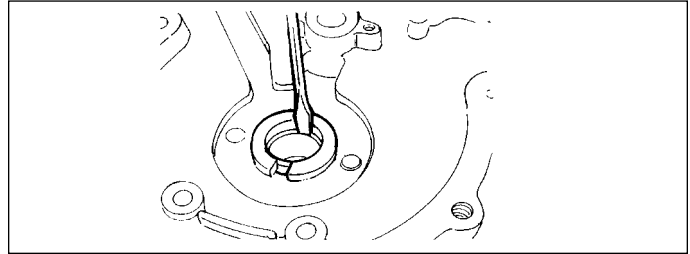
### 7B Eaton 750 / 751

4. Reposition and support the cover with the input shaft in the down position. Use a plastic hammer or arbor press to remove the input shaft assembly from the cover.



**Figure B-44. Remove Input Shaft From Cover**

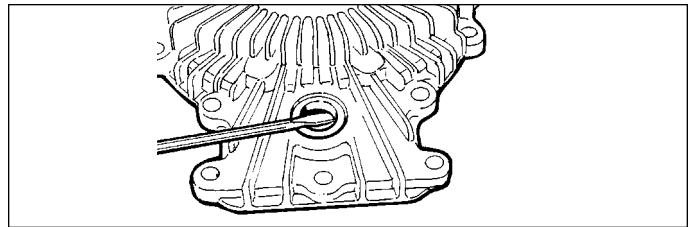
5. Using a screwdriver or similar tool, drive the input shaft seal from the cover.



**Figure B-45. Remove Input Shaft Seal**

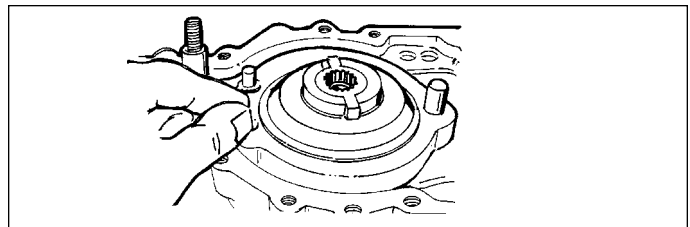
6. To remove the control shaft seal, reposition the cover. Using a small screwdriver or a similar rod, pry the control shaft seal from the cover assembly.
7. Remove the cover gasket from the housing and discard.

*NOTE: The gasket may have remained on the cover when it was removed.*



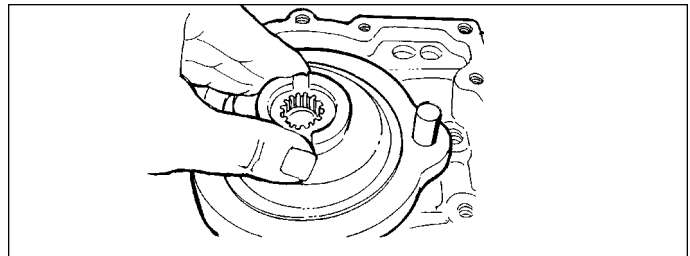
**Figure B-46. Remove Control Shaft Seal**

8. Remove the two buttons from the cam ring assembly.
- NOTE: These buttons may have remained in the cover assembly.*



**Figure B-47 Remove Cam Ring Buttons**

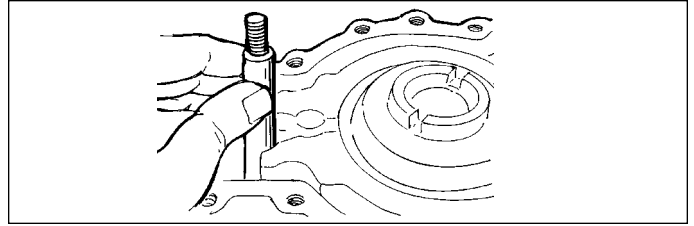
9. Remove the drive from the pump rotor assembly.



**Figure B-48 Remove Pump Drive From Rotor Assy.**

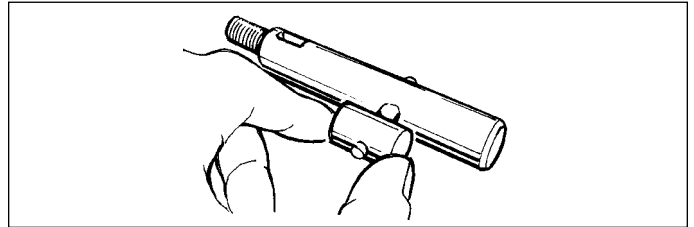


10. Remove the control shaft and insert from the housing and cam ring assembly.



**Figure B-49. Remove Control Shaft and Insert**

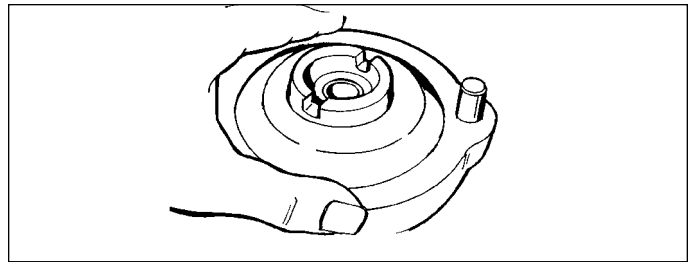
11. Remove the cam ring insert from the control shaft.



**Figure B-50. Remove Insert From Control Shaft**

*NOTE: It is essential that the pump rotor assembly remain intact during handling as each ball piston is matched to its respective bore.*

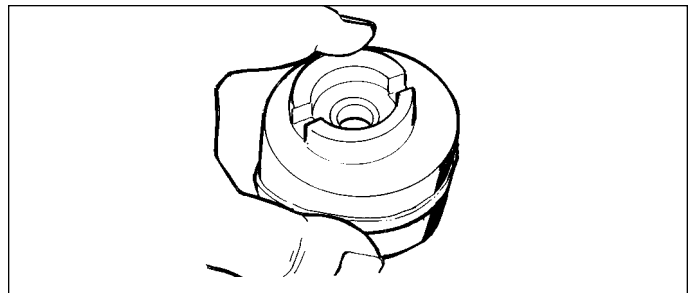
12. Install a wide rubber band around the pump rotor to retain the ball piston in their bores. Remove the cam ring assembly from the housing.



**Figure B-51. Remove Cam Ring Assembly**

13. Carefully remove the pump rotor assembly from the housing, making sure the ball pistons are not dislodged from their bores.

14. Set the pump rotor aside for inspection.

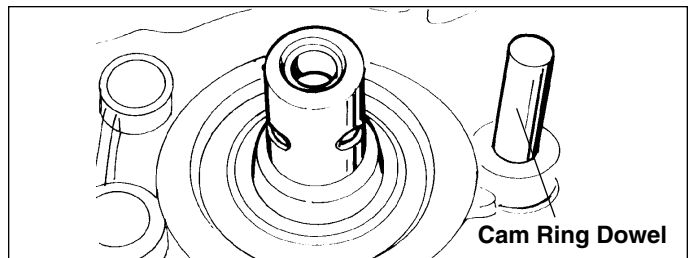


**Figure B-52. Remove Pump Rotor Assembly**

15. The pump and motor journals and cam ring dowel cannot be removed once they have been installed in the housing assembly.

*NOTE: Inspect the pump and motor journals for any irregularities. If any are found, the housing must be replaced as a complete assembly.*

16. In most cases, we do not recommend removal of the dampening pistons for inspection or cleaning. Normal flushing should be all that is required for cleaning.



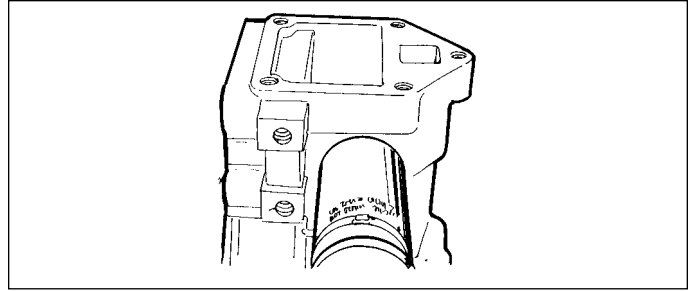
**Figure B-53. Inspect Pump and Motor Journals**

## 7 Transmission Repair

### 7B Eaton 750 / 751

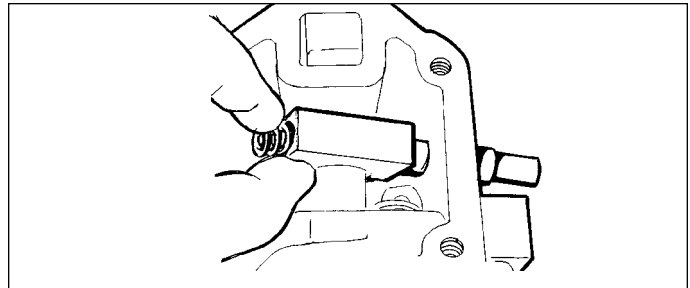
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17. To remove bypass valve assembly, use a 1" wrench to remove the bypass valve nut from the transaxle case.
18. Remove and discard O-ring from bypass valve nut.



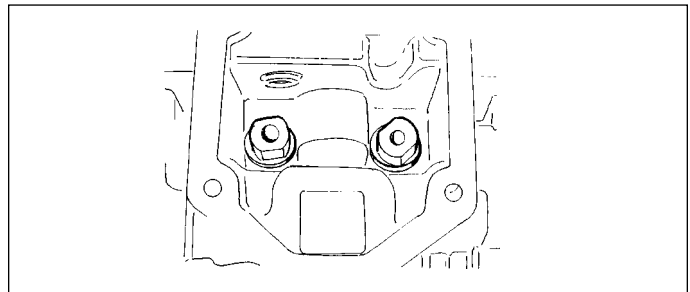
**Figure B-54. Remove Bypass Valve Nut**

19. Remove bypass valve bracket and spring from transaxle case by sliding out valve nut hole and lifting upward.
20. Remove spring from bypass valve bracket.
21. Remove and discard O-ring from bypass valve bracket.



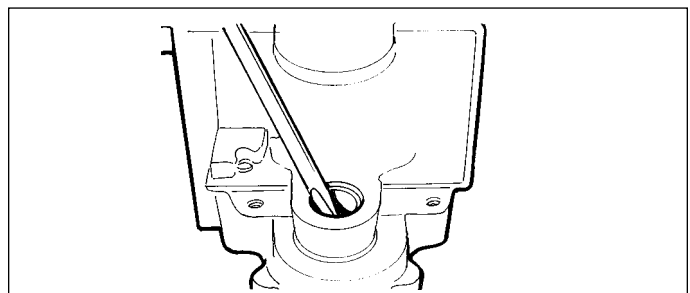
**Figure B-55. Remove Bypass Valve Bracket & Spring**

22. We do not recommend removal of the check valve assemblies for inspection or cleaning; normal flushing should be all that is required to clean the check valves.



**Figure B-56. Check Valve Inspection and Flushing**

23. Reposition the transaxle housing on its side. Using a long drift punch, remove and discard the housing lip seal. Turn housing over and remove opposite lip seal.



**Figure B-57. Remove Left and Right Lip Seals**

### Rotor Disassembly and Inspection

1. Inspect the rotor assemblies in the following manner. Remove the piston balls from the rotor, one at a time, working clockwise from the letter stamped in the rotor face. Place the piston balls in a prepared container.

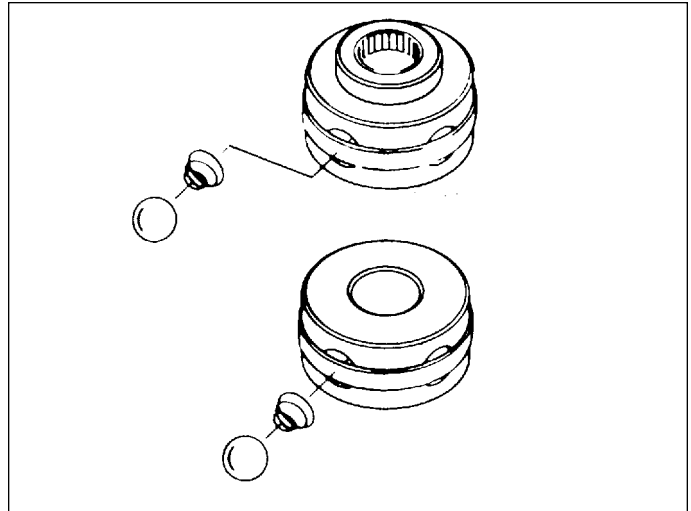
*NOTE: The balls must be replaced in the same bores from which they were removed because they are all select fit. Use a container such as an egg carton or ice cube tray to hold the balls.*

2. Check for broken or collapsed springs in the motor rotor assembly.

Inspect the piston balls. They must be smooth and completely free of any irregularities.

Inspect the rotor bores, rotor bushing and pintle journals for irregularities or excessive clearance. The ball piston to rotor bore clearance is select fit electronically from .0002 to .0006". When irregularities are noted, replace the complete rotor assembly. Individual ball and spring are not serviceable.

Install the piston balls in their matching bores. Hold them in place with a rubber band or separate race.



**Figure B-58. Inspect rotor assemblies**

### General Reassembly Notes

Before reassembling the transaxle, clean all parts and assemblies with clean solvent and blow dry with compressed air. Inspect and replace all scratched or damaged parts. Replace all gaskets, seals and seal rings. Lubricate all seals and seal rings with petroleum jelly (Vaseline) for retention during assembly. Freely lubricate all bearings and finished part surfaces with clean hydraulic fluid to provide lubrication at start-up.

To ensure correct installation, the axle housings are marked with the letters A and B. Each side of the housing assembly is also marked with an A or B. Make sure the axle housings are correctly assembled with the corresponding letters on the housing assembly.

## 7 Transmission Repair

### 7B Eaton 750 / 751

#### Housing Reassembly (Eaton 750, 751)

1. Position the housing assembly on its side. Lubricate and install the housing lip seal with the seal lip pointing outward from the housing. Press or drive the seal into the counterbore. Turn the housing assembly over and repeat the same procedure for the other brake shaft seal.

**NOTE:** Make sure to press only on outer edge of housing lip seal.

2. Lubricate and install O-ring in the groove located on dump valve bracket.

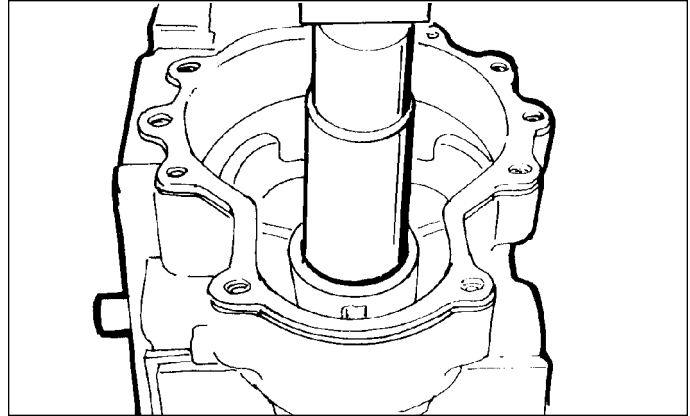


Figure B-59. Install Housing Lip Seal

3. Install the spring on the dump valve bracket with the right angle bend of the spring pointing inward, as shown.
4. Install the spring and dump valve bracket in the transaxle housing.

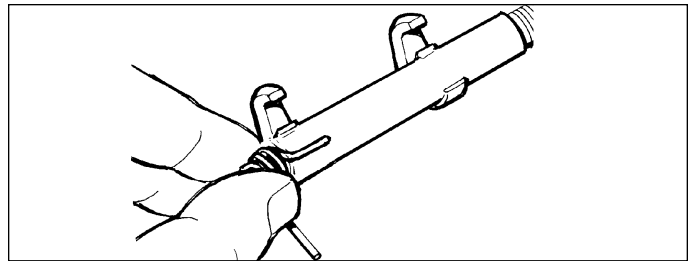


Figure B-60. Install Dump Valve Bracket Spring

5. The spring is properly assembled when the longest leg points toward the check valve assembly.

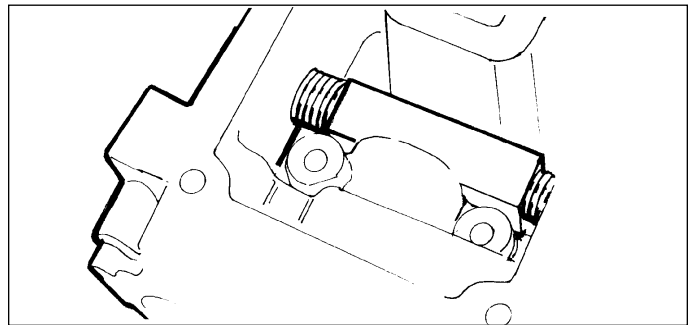


Figure B-61. Bypass Spring Installation

6. Lubricate and install the O-ring around the bypass valve nut.
7. Install the nut over the dump valve bracket, into the housing assembly.

**NOTE:** Make sure you do not damage the bypass valve O-ring during installation.

8. Using a 1" wrench, torque the bypass valve nut to 150 inch pounds.

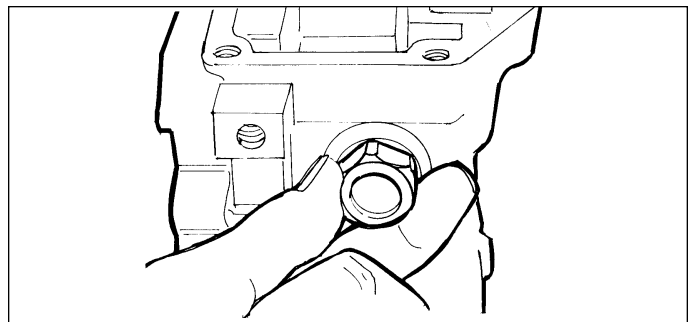
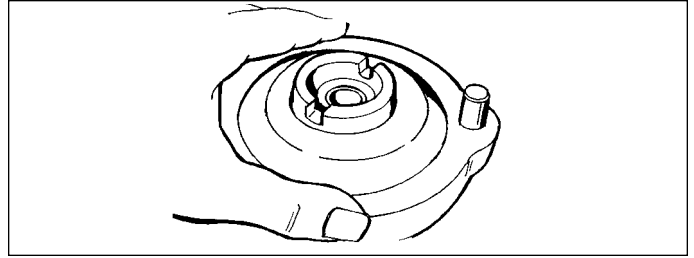


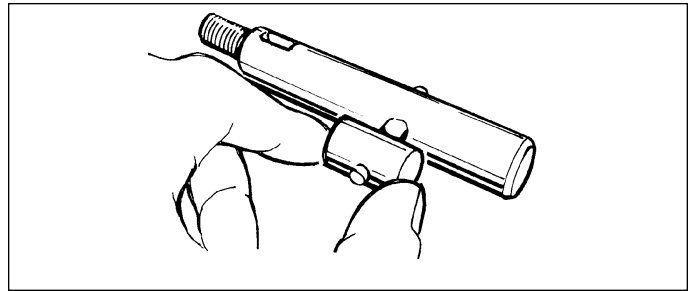
Figure B-62. Install Bypass Valve Nut

9. Install the pump and cam ring assembly in the transaxle housing with the flush side of the cam ring facing outward. Remove the rubber band from the pump rotor assembly.



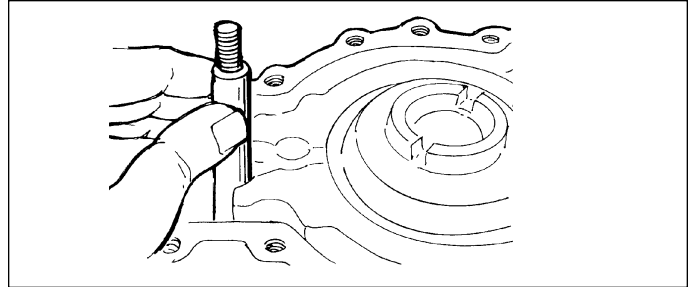
**Figure B-63. Install Pump and Cam Ring Assembly**

10. Install the cam ring insert on the control shaft pivot dowel.



**Figure B-64. Install Cam Ring Insert**

11. Install the control shaft assembly, first aligning the cam ring insert with the cam ring assembly, and then with the housing assembly.

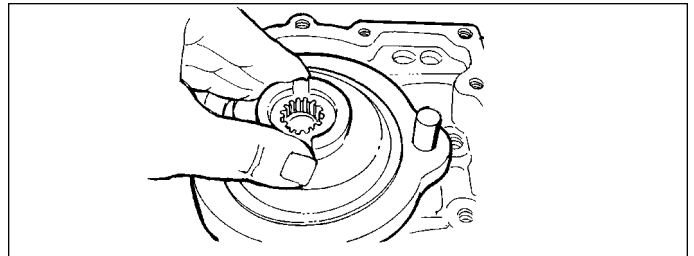


**Figure B-65. Install Control Shaft Assembly**

12. Install the drive pin in the pump rotor assembly, as shown.

*NOTE: An alternate method is to install the drive pin on the end of input shaft, and secure with petroleum jelly.*

13. To align pump rotor, turn input shaft until gear teeth align.



**Figure B-66. Install Drive Pin and Align Pump Rotor**

# 7 Transmission Repair

7B Eaton 750 / 751

## Cover Reassembly (Eaton 750, 751)

1. Lubricate and install the control shaft oil seal with the seal lip pointing inward. Press or drive the seal into the seal counterbore.

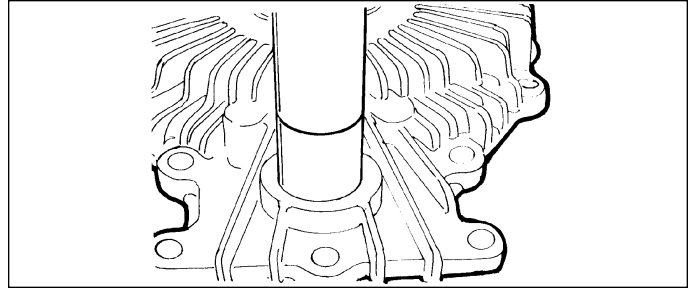


Figure B-67. Install Control Shaft Oil Seal

2. Lubricate and install the input shaft seal with the seal lip pointing inward. Press or drive the seal into the counterbore.
3. Press or drive the input shaft assembly into the cover.

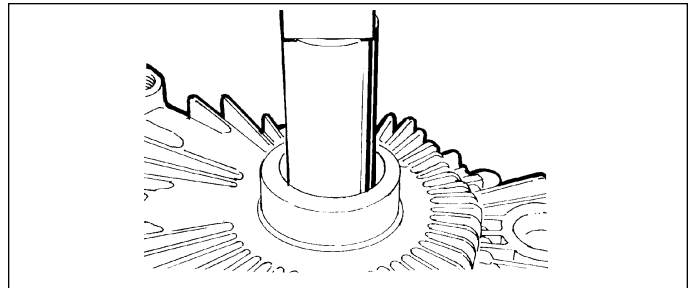


Figure B-68. Install Input Shaft Seal

4. Install the input shaft assembly retaining ring, making sure it is firmly seated in the retaining ring groove.

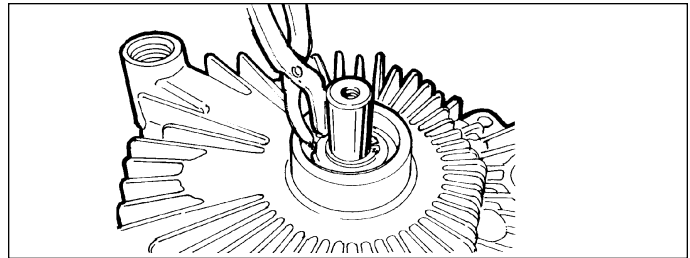


Figure B-69. Install Retaining Ring

5. To help retain the buttons during assembly, apply a small amount of petroleum jelly (Vaseline) to them. Install the buttons in the holes located in the cover assembly.

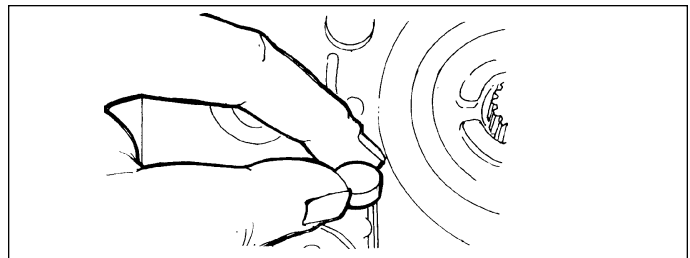


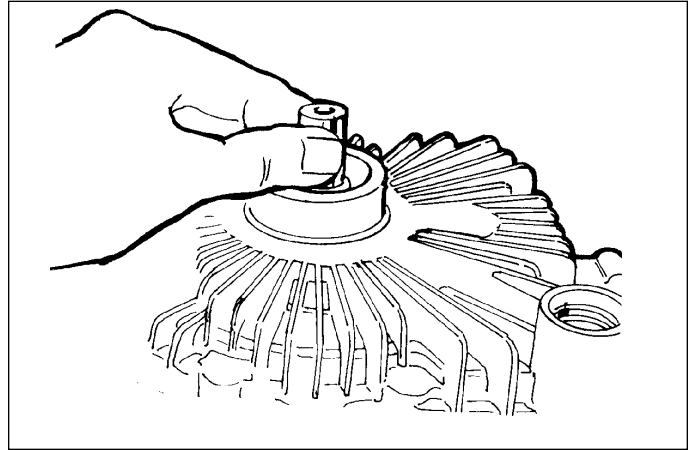
Figure B-70. Install Alignment Buttons

6. Install a new cover gasket on the transaxle housing.
7. Install the cover assembly by carefully aligning it with the control shaft, cam ring pivot dowel and pump rotor drive.

*NOTE: An alternate method is to turn cover and transaxle housing sideways and slide together.*

8. After engaging the control shaft and pivot dowel in the cover assembly, carefully rotate the input shaft to engage the pump rotor drive. When all mating parts are aligned and engaged, the cover assembly should fall into position on the housing assembly.
9. Install the capscrews in the cover assembly and torque to 105 inch pounds.

*Note: Capscrews must be carefully threaded into aluminum housing to prevent additional threads from being cut. Rotate capscrews counter-clockwise to align threads.*

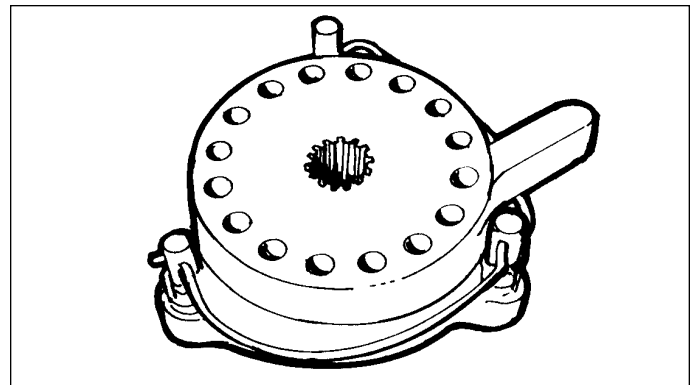


**Figure B-71. Install Cover On Transaxle Housing**

### Axle Installation (Eaton 750)

1. Before installing the parking brake assembly, make sure the brake is in the unlocked position.

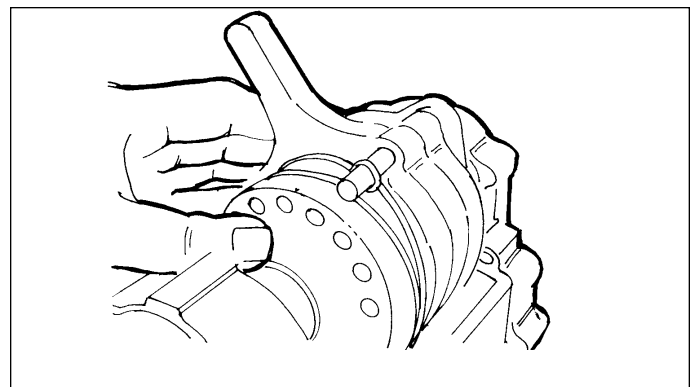
*NOTE: Make sure you DO NOT move the parking brake lever on 750 transaxle, especially when it is out of the transaxle housing. The parking brake incorporates automatic self-adjusting brakes. Activation of the lever may cause the brake to expand and make installation of the assembly very difficult or impossible.*



**Figure B-72. Assemble Parking Brake Assembly**

2. Install the parking brake assembly into the transaxle housing. Align it with the four (4) notches cast in the housing assembly.

*NOTE: Make sure the parking brake handle is pointing or leaning towards the cover side of the transaxle housing.*



**Figure B-73. Install Parking Brake Assembly**



## 7 Transmission Repair

### 7B Eaton 750 / 751

3. To aid in correct installation of the axle housings on the transaxle, the transaxle and axle assemblies are marked with an A and B (only necessary on Model 750). The B side of the transaxle must be assembled first. There are two different brake shaft lengths that are used in the axle housing assemblies. The shorter shaft is always used in the A axle housing. The longer shaft is always used in the B axle housing assembly.

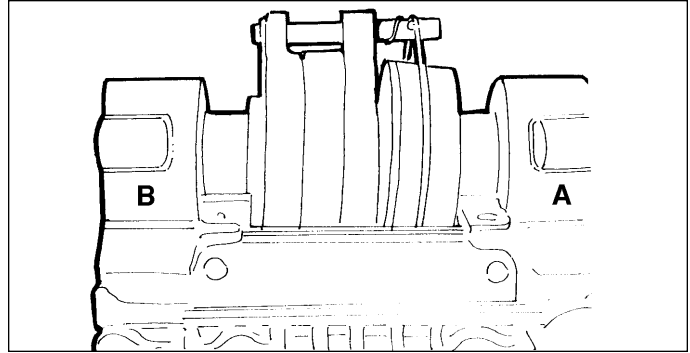


Figure B-74. Axle Shaft Installation

4. Apply a small amount of petroleum jelly to the lip of the transaxle housing seal. Carefully install the longer of the two brake shafts into the B side of the transaxle housing.

**NOTE:** Make sure the lip of the transaxle seal is not damaged during installation.

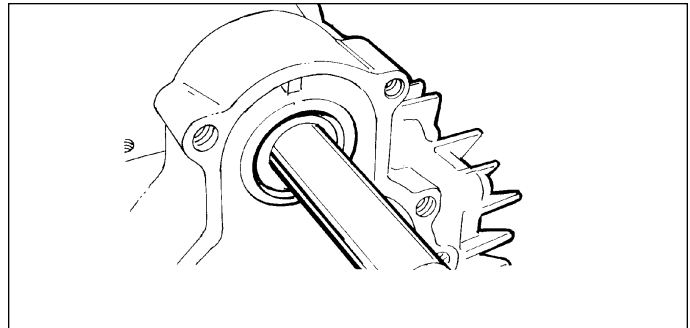


Figure B-75. Install Brake Shaft Into Transaxle

5. Engage the brake shaft splines into the parking brake assembly by aligning and holding the inner disk and thrust bearing with one hand, and rotating the brake shaft slightly with the other hand. Install the other brake shaft.

**NOTE:** If properly installed, both brake shafts should turn independently and each shaft will rotate one brake disc.

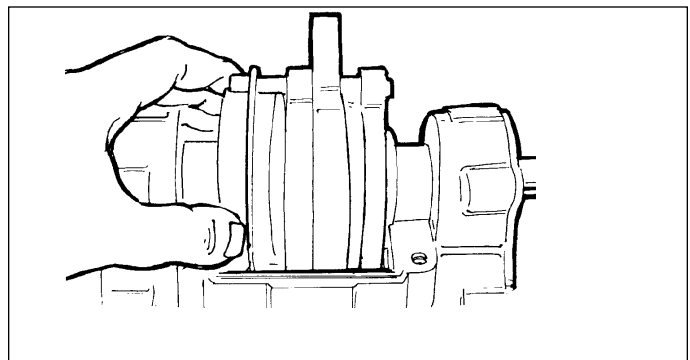
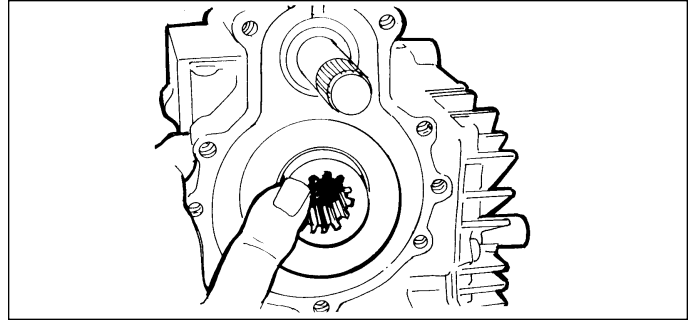


Figure B-76. Engage brake shaft with the park brake

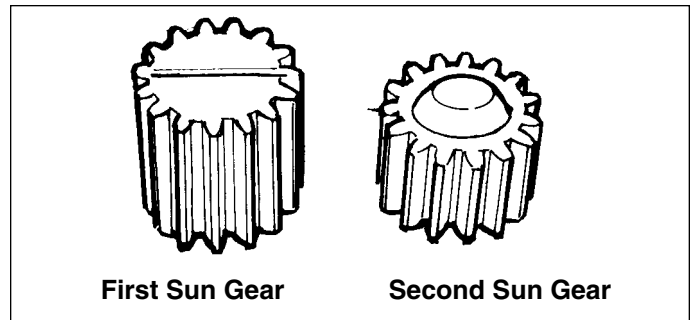
6. Carefully install the motor rotor assembly onto the motor journal inside the transaxle housing.

*NOTE: If a rubber band was used to retain the ball pistons, remove it at this time.*



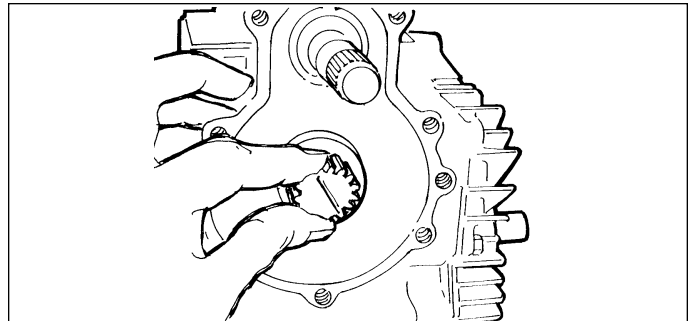
**Figure B-77. Install Motor Rotor Assembly**

7. The first sun gear is longer than the second sun gear.



**Figure B-78. First and Second Sun Gears**

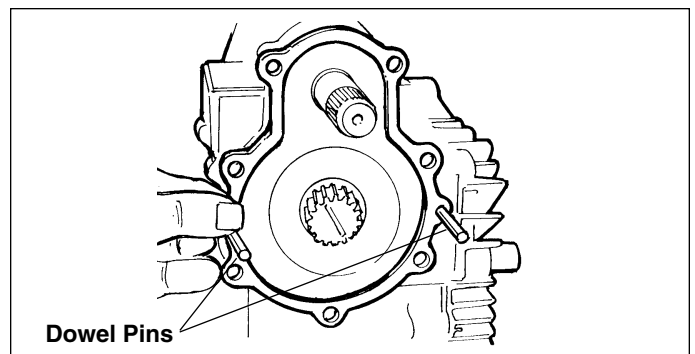
8. Install the first sun gear into the motor rotor assembly.



**Figure B-79. First Sun Gear Installation**

9. Install the two dowel pins and the gasket on the transaxle housing.

*NOTE: There are three identical gaskets used on the transaxle housing.*

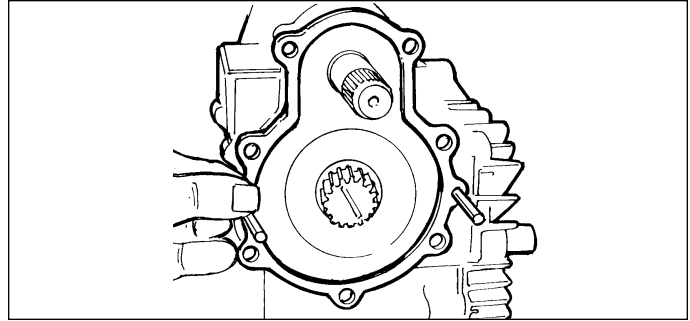


**Figure B-80. Dowel Pins and Gasket Installation**

## 7 Transmission Repair

### 7B Eaton 750 / 751

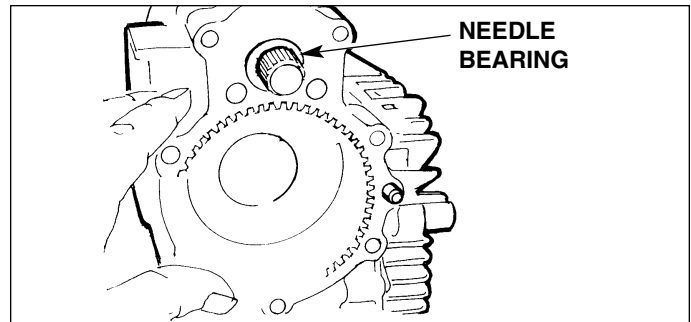
10. Install the wear plate, bowed side toward the motor rotor assembly, aligning it with the two dowels.
11. Install the second of three gaskets on the wear plate, aligning it with the dowels.



**Figure B-81. Install Gasket and Wear Plate**

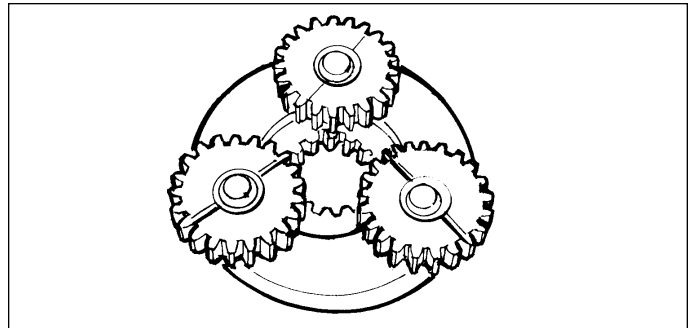
12. Install the ring gear assembly on the transaxle housing, aligning it with the brake shaft and dowels.

*NOTE: The two ring gear assemblies are identical and can be installed on either side of the housing assembly. However, when installing the ring gear assembly, the side with the needle bearing must face the axle housing assembly (toward outside, as shown) for additional support.*



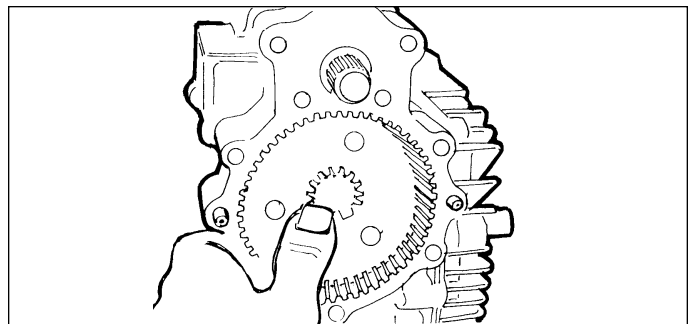
**Figure B-82. Install Ring Gear Assembly**

13. Lubricate and assemble the three planetary gears on the primary carrier assembly.



**Figure B-83. Assemble Primary Carrier Assembly**

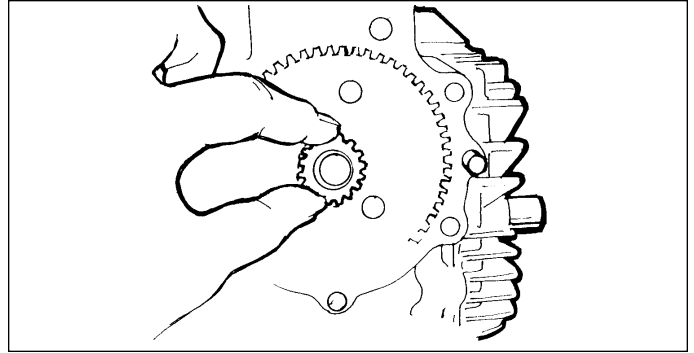
14. Install the primary carrier assembly into the ring gear assembly by aligning and engaging it with the previously installed sun gear.



**Figure B-84. Install Primary Carrier Assembly**

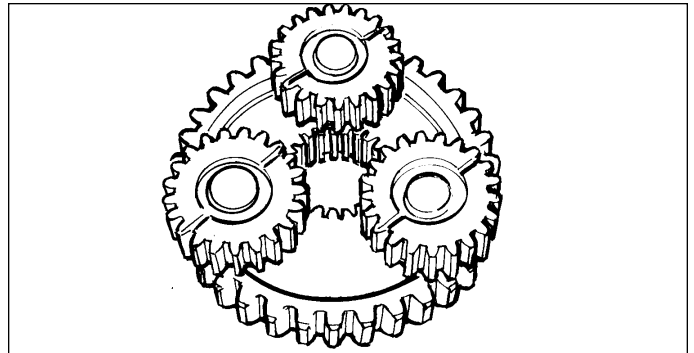
15. Install the second sun gear in the primary carrier assembly.

*NOTE: The convex or pointed end of the second sun gear must point inward toward the housing assembly.*



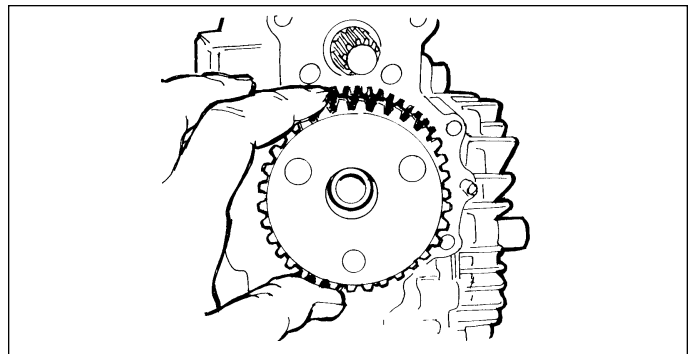
**Figure B-85. Install Second Sun Gear**

16. Lubricate and assemble the three planetary gears on the secondary carrier assembly.



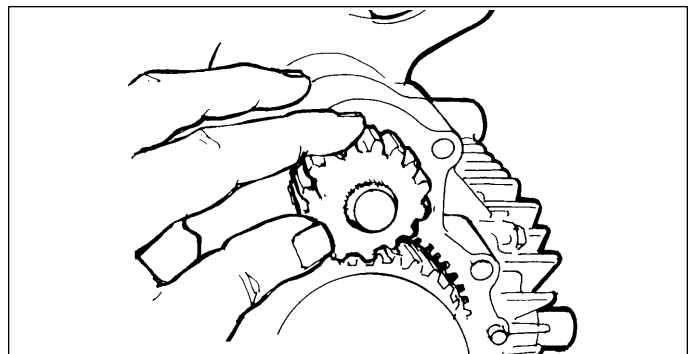
**Figure B-86. Assemble Secondary Carrier Assembly**

17. Install the secondary carrier, aligning and engaging the three planetary gears with the ring gear assembly and second sun gear.



**Figure B-87. Install Secondary Carrier Assembly**

18. Install the brake gear on the shaft.



**Figure B-88. Install Brake Gear**

## 7 Transmission Repair

### 7B Eaton 750 / 751

19. For retention during assembly, apply a small amount of petroleum jelly (Vaseline) to the spacer. Install the spacer on the shaft and brake gear. (Not used on date code G01J or higher.)
20. Install the third and final gasket on the ring gear assembly.

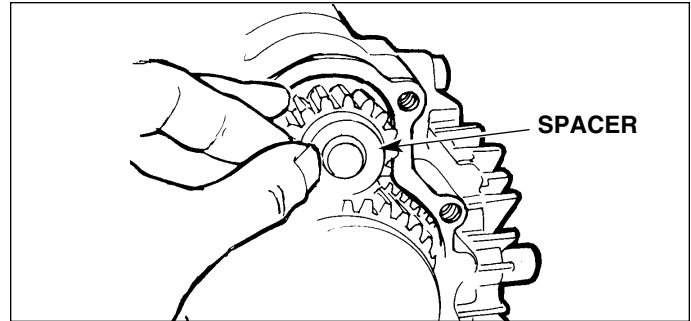


Figure B-89. Install Spacer and Gasket

### Axle Housing Reassembly (Eaton 750)

1. Lubricate and install the axle shaft and thrust washers in the axle housing.

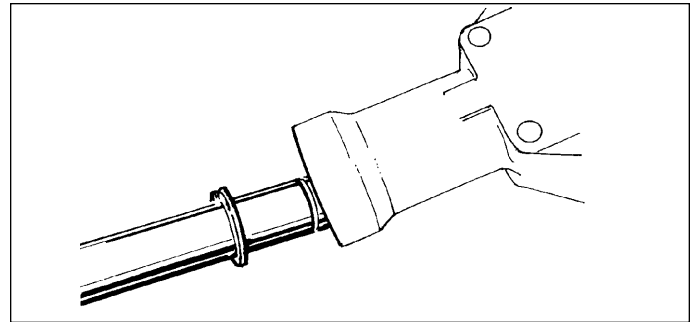


Figure B-90. Install Axle Shaft and Thrust Washers

2. Position the axle housing assembly with the axle pointing downward. Install the inner thrust washer and axle shaft retaining ring.

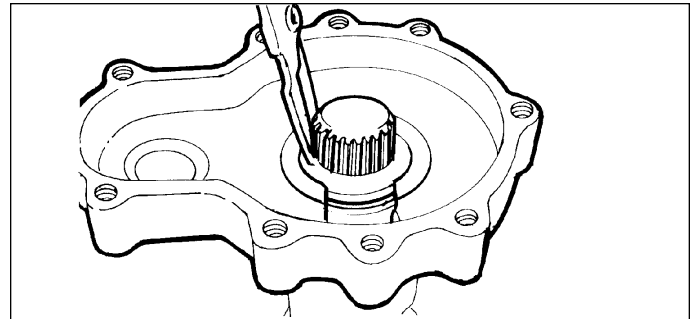


Figure B-91. Install Thrust Washer & Retaining Ring

3. Reposition the axle assembly with the output end pointing upward. Protecting the lip of the axle seal from the snap ring groove and keyway, lubricate and install the seal with the lip pointing inward towards the axle housing.
4. Using a piece of tubing (1-1/2" O.D. x 6" long), press or drive the seal into the counterbore.

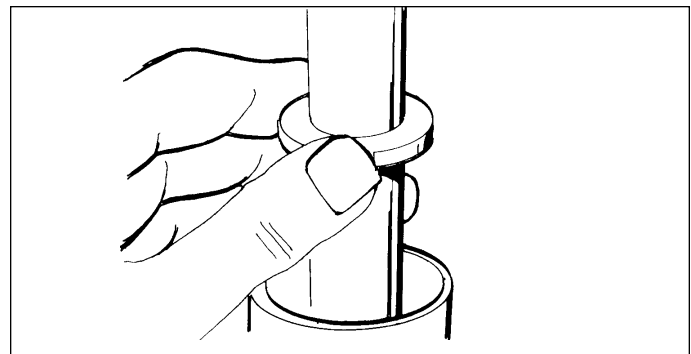
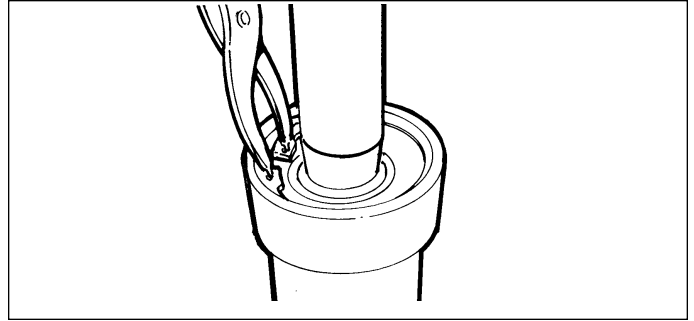


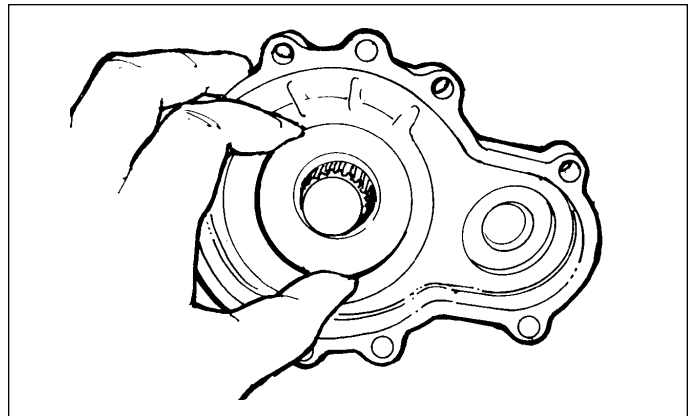
Figure B-92. Install Axle Seal

5. Install the sealed ball bearing over the axle shaft, into the counterbore. Using a pair of No. 5 or 7 internal snap ring pliers, install the ball bearing retaining ring in the axle housing.



**Figure B-93. Install Retaining Ring**

6. Reposition the axle housing assembly and install the large thrust washer on the axle shaft. (Not used on date code G01J or higher.)



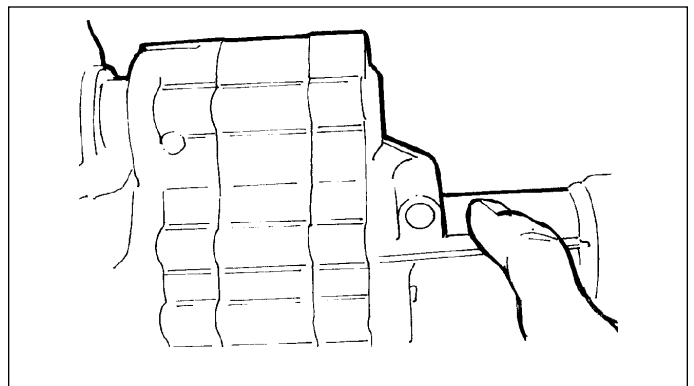
**Figure B-94. Install Thrust Washer On Axle Shaft**

7. Install the B axle assembly, aligning and engaging the axle shaft with the secondary carrier assembly.

*NOTE: To aid in installation, the axle housings are marked with the letters A and B. Each side of the housing assembly is also marked with an A or B. Make sure the axle housings are correctly assembled with the corresponding letters on the housing assembly.*

8. After installing the axle housing, install the capscrews in the housing and torque them to 125 inch pounds.

*NOTE: Repeat the same assembly steps for the other axle.*



**Figure B-95. Install Axle Housing On Transaxle**

## 7 Transmission Repair

### 7B Eaton 750 / 751

9. Reposition the transaxle assembly and install the brake cover by inserting the brake lever through the dust boot.
10. Install the self-tapping capscrews in the brake cover and tighten them until snug.

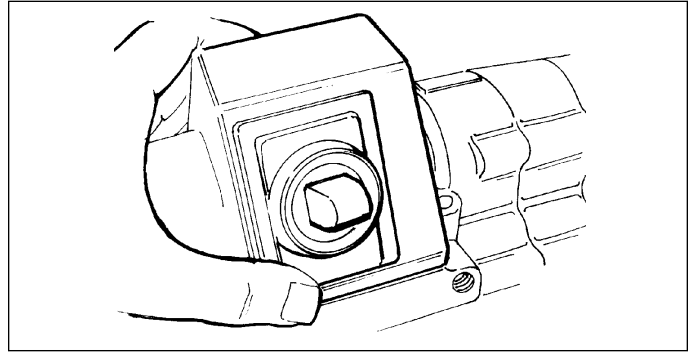


Figure B-96. Install Brake Housing Cover

### Axle Housing Reassembly (Eaton 751)

1. Lubricate and install the thrust washer in the axle housing.
2. Lubricate and install the axle shaft into the axle housing.
3. Reposition the axle housing with the output end of axle pointing downward. Install the inner thrust washer and axle shaft retaining ring.

**IMPORTANT:** *The round-cornered side (die-rolled) side of the retaining ring must point toward the axle housing.*

4. Reposition the axle housing with the output end pointing upward. Protecting the lip of the axle seal from the retaining ring groove and keyway, lubricate and install the seal with the lip pointing inward towards the axle housing.
5. Using a piece of pipe or hydraulic tubing 1.5" (38 mm) O.D. x 6" (150mm) long, press the seal into the counterbore.
6. Using a piece of pipe or hydraulic tubing 1.125" (29 mm) O.D. x 6" (150 mm) long, press the ball bearing over the axle shaft and into the axle housing.
7. Using a pair of No. 5 or 7 internal retaining ring pliers, install the ball bearing retaining ring in the axle housing.

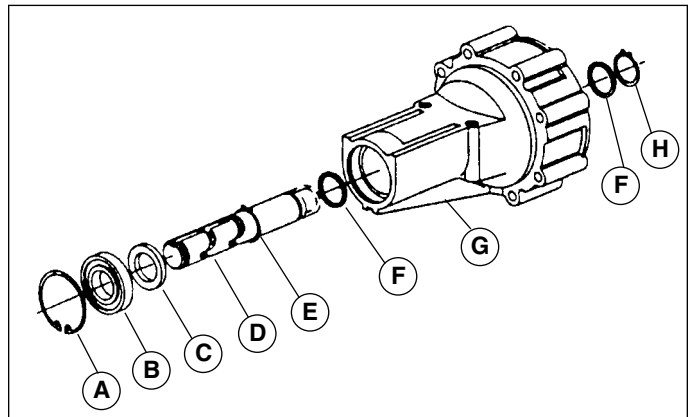


Figure B-97. Assemble Axle Assembly

- |                    |                   |
|--------------------|-------------------|
| A. Retaining Ring  | E. Retaining Ring |
| B. Ball Bearing    | F. Thrust Washer  |
| C. Radial Lip Seal | G. Axle Housing   |
| D. Axle Shaft      | H. Retaining Ring |



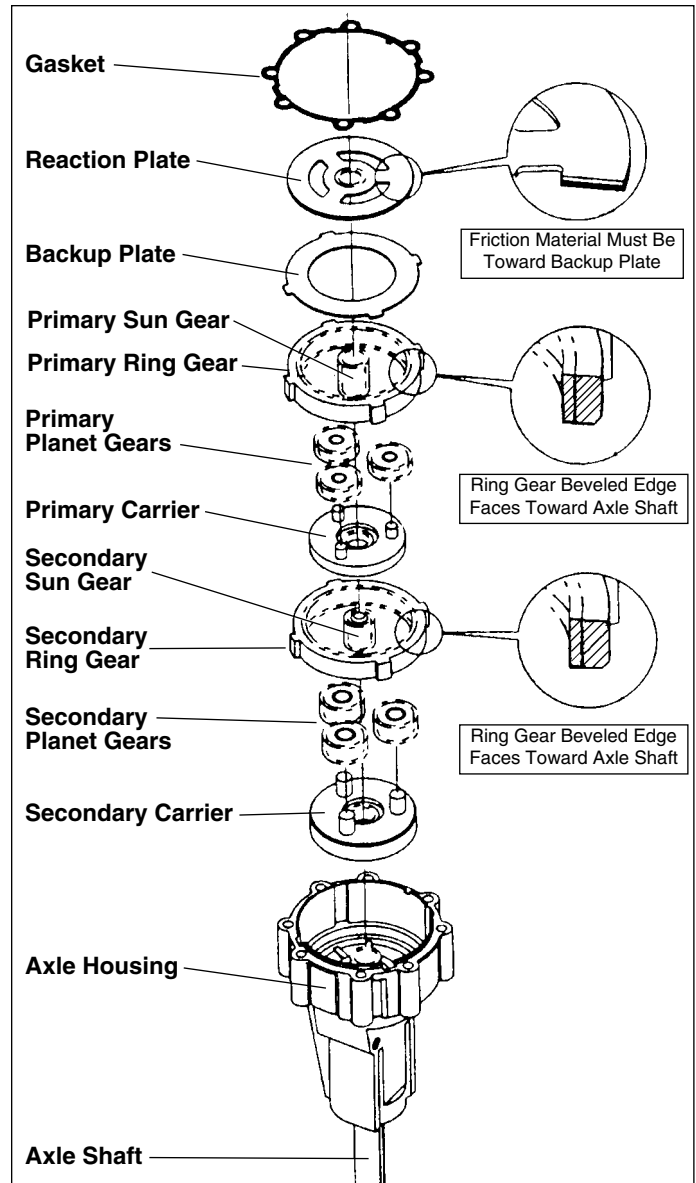
8. Lubricate and assemble the three secondary planet gears on the secondary carrier.
9. Aligning the splines, install the secondary carrier assembly on the splined end of the axle shaft located in the housing assembly.
10. Please note that one side of each ring gear has a bevel on one side. This bevel side of the ring gear must be toward the output end of the axle shaft.
11. Install one of the two ring gears into the axle housing.
12. Rotate the secondary planet gears to align with the secondary ring gear teeth.

**NOTE:** When ring gear is in alignment, it will drop into place.

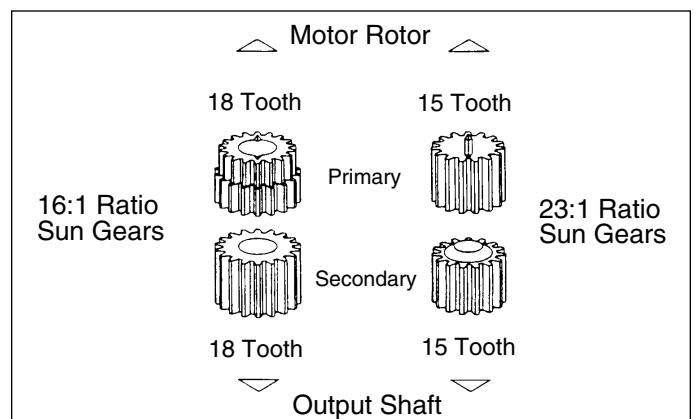
13. Shown here are the first and second sun gears for 16:1 and 23:1 gear ratios.
14. Install the secondary sun gear into the secondary planetary assembly.
15. Lubricate and assemble the three planetary gears on the primary carrier assembly.
16. Aligning the splines, install the primary carrier assembly on the secondary sun gear.
17. Install the next ring gear into the axle housing. Install by aligning the ears on the outside of the ring gear with the notches in the housing assembly.

**NOTE:** Rotate the primary carrier assembly and the ring gear will fall into position.

18. Install the primary sun gear into the primary planetary assembly.
19. Lubricate and install the backup plate in the axle housing assembly. Install by aligning the ears with the notches in the axle housing.
20. Aligning the splines, install the reaction plate on the primary sun gear (friction material must be toward backup plate).
21. Aligning the screw holes and notches, install the axle housing gasket on the axle housing assembly.



**Figure B-98. Assembling Axle**



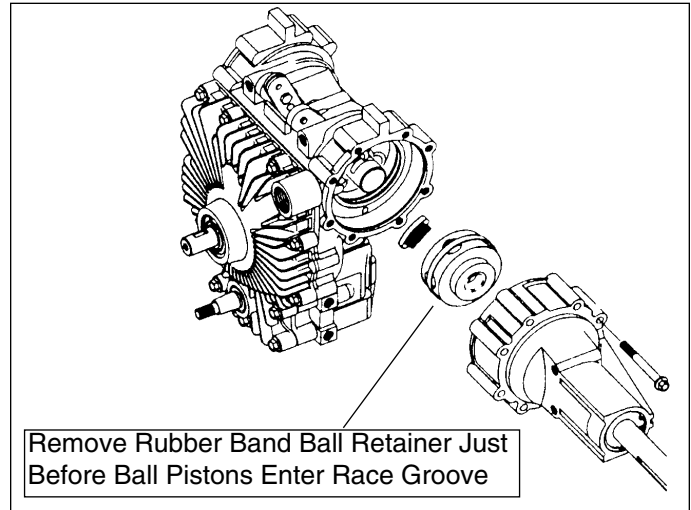
**Figure B-99. First And Second Sun Gears**

## 7 Transmission Repair

### 7B Eaton 750 / 751

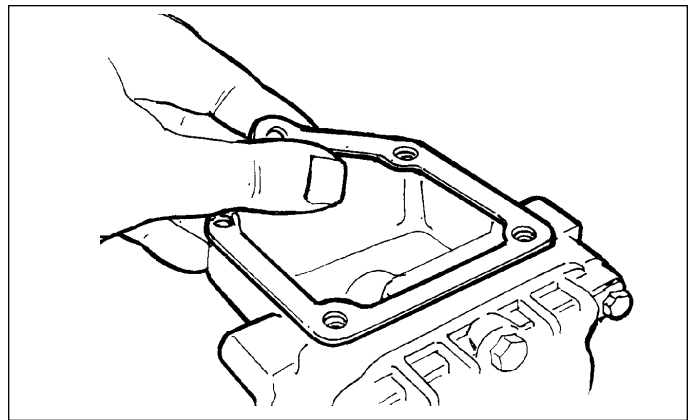
22. Reposition and clamp the transaxle housing to the bench. Install the motor rotor assembly.
23. Install the friction brake pad into its recess located in the housing assembly.
24. Carefully retain the planetary assemblies in position. Install the axle housing assembly on the housing assembly.
25. Install the axle housing flange screws and torque to 125 lb-in. (14 Nm).

Repeat the above assembly steps for the other axle.



**Figure B-100. Install Axle Housing On Transaxle**

26. Reposition the transaxle and install the gasket, internal filter and valve cover (position metal side of filter toward housing and gasket).
27. Aligning the screw holes, install five (5) flange screws.
28. Torque screws to 125 lb-in. (14 Nm) in a cross pattern.

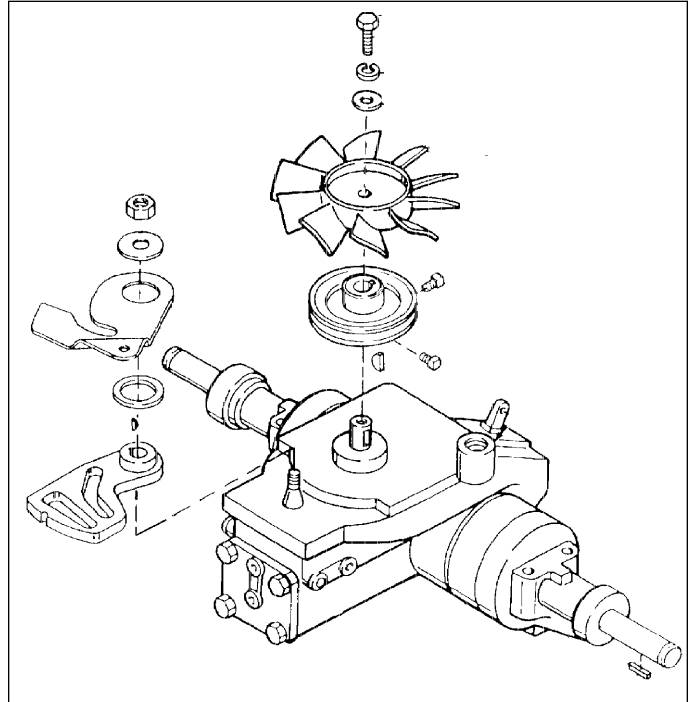


**Figure 4H 101. Install Gasket and Valve Cover**

### Installation

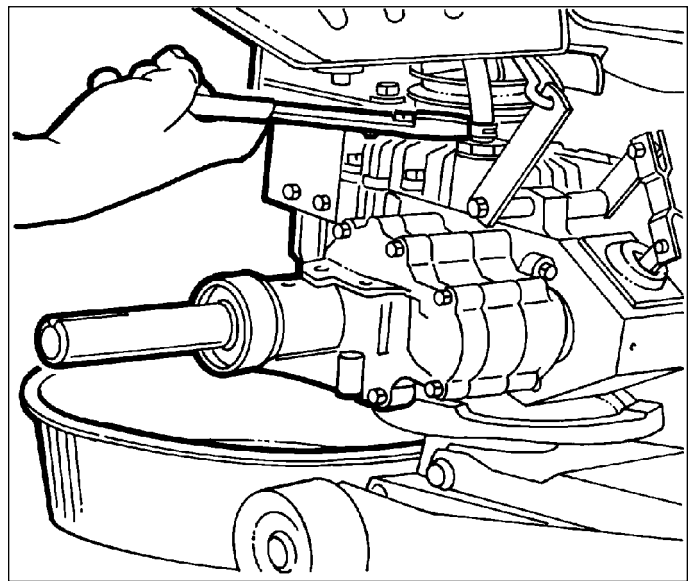
1. Install the brake lever bracket assembly and the front transmission support assembly. Apply locktite to both sets of capscrews and torque to 13-18 lb-ft.
2. Install the input pulley and key and secure with the two setscrews.
3. Install the cooling fan with locktite on the capscrew.
4. Install the hydro cam and key over the tapered control shaft. Install the cam spacer, neutral return cam, flat washer and nut. Torque the nut to 15-20 lb-ft.

*Note: At this time the transaxle should be filled with SAE 10W-30 weight motor oil through the return port hole. Cover the opening until the hose is installed. Capacity is 69 oz.*



**Figure B-102 Install External Transaxle Components**

5. Place the transaxle on a floor jack and raise just high enough into the frame to install the following:
  - Oil return hose to fitting on top of transaxle
  - Brake rod to brake lever
  - Route drive belt through blades of hydro fan and onto input pulley.
6. Raise the transmission fully into the frame. Install and tighten the axle mounting bolts to 23-27 lb-ft.. Secure the front transmission support and torque to 13-18 ft lb.

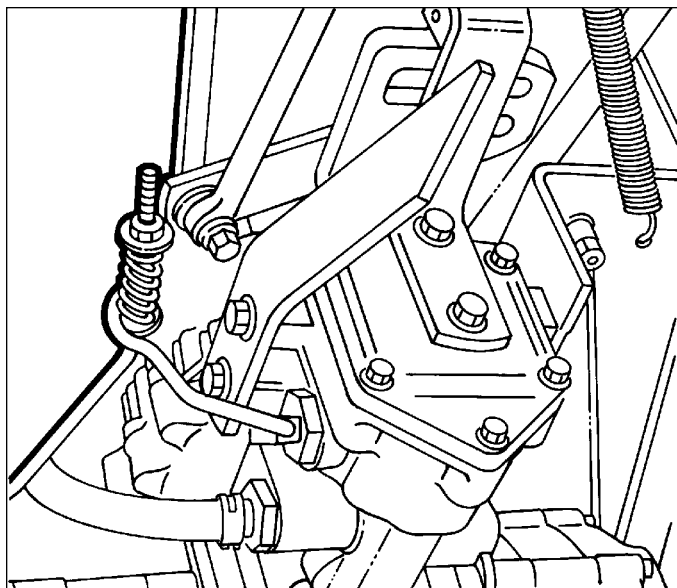


**Figure B-103 Raise Transaxle Into Tractor**

## 7 Transmission Repair

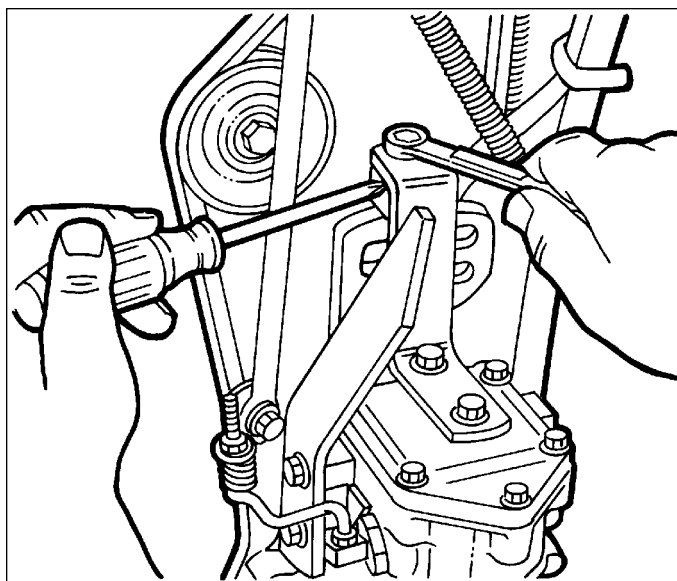
### 7B Eaton 750 / 751

7. Hook one end of the brake return spring onto the brake rod, and the other end onto the double nut cap-screw in the left rear corner of the frame.
8. Connect the neutral return rod into the neutral return cam and secure with a cotter pin.
9. Hook the drive spring between the idler pivot and the front transmission support.
10. Assemble the shift rod to the speed control lever. Leave the hardware loose for the neutral adjustment to be performed later.
11. Connect the bypass valve lever to the bypass valve shaft.
12. Install the oil intake hose on the intake fitting located on the front right of the transaxle and secure with a hose clamp.
13. Purge the air from the transaxle. Refer to Section 2, "Purging Air From Transaxle".



**Figure B-104 Install External Transaxle Components**

14. Check for proper neutral adjustment. Refer to Section 2, "Neutral Adjustments".
15. Check the brake adjustment. With the foot pedal in the up position, turn the adjusting nut in until it just contacts the brake rod spring without compressing it. Refer to Section 2C, Figure 2C-38, for reference.
16. Check the hydro oil level. Oil should be up to the "cold full" line approximately 1/4" from the bottom of the reservoir. Top off as needed using a good grade of SAE 30 weight engine oil. Run the transmission for a while to test and recheck the oil level.
17. Test drive the tractor to assure proper function of the transmission and all safety devices.



**Figure B-105 Adjusting Neutral Position**

## TUFF TORQ K60 HYDROSTATIC TRANSAXLE

### General

The Tuff Torq model K60 consists of an axial piston design pump and motor. Both utilize spherical nosed pistons rotating against angled swash plates. The motor drives a pinion shaft, which drives the final differential gear, and rear axles.

The level of cleanliness maintained while repairing the transaxle could affect its performance. Work in a clean area. Before removing transaxle from tractor, steam clean or pressure wash all debris from surrounding area. After disassembly, wash all parts with clean solvent and blow parts dry with compressed air.

Inspect all mating surfaces. Replace any damaged parts that could cause internal leakage. Do not use emery paper, files, or grinders on finished parts.

*NOTE: Whenever a transaxle is disassembled, our service policy is to replace all seals. Lubricate the new seals with petroleum jelly before installation. Use only clean, recommended fluid on the finished surfaces at reassembly.*

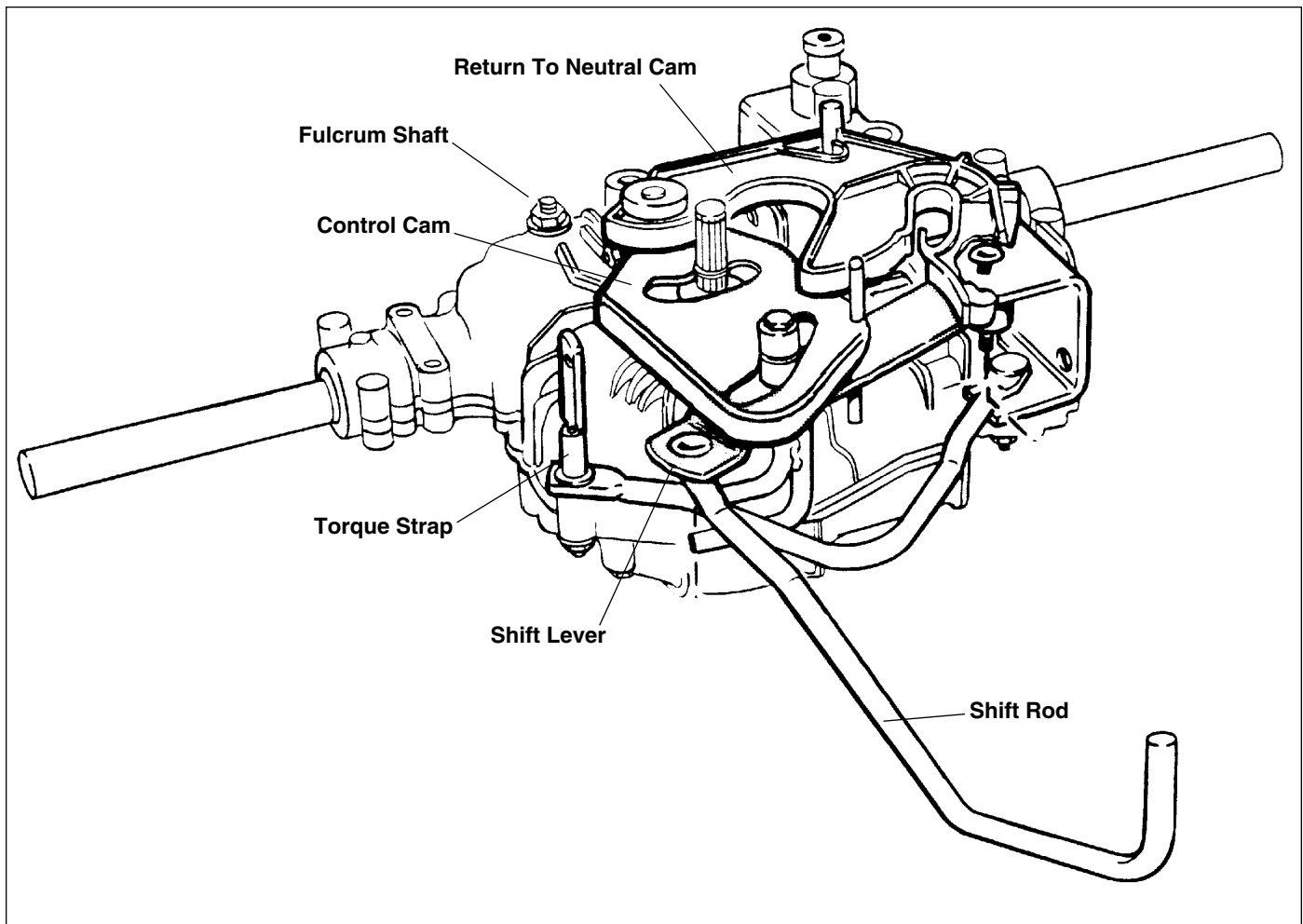


Figure C-1. Tuff Torq K60 Hydrostatic Transmission

# 7 Transmission Repair

7C Tuff Torq K60

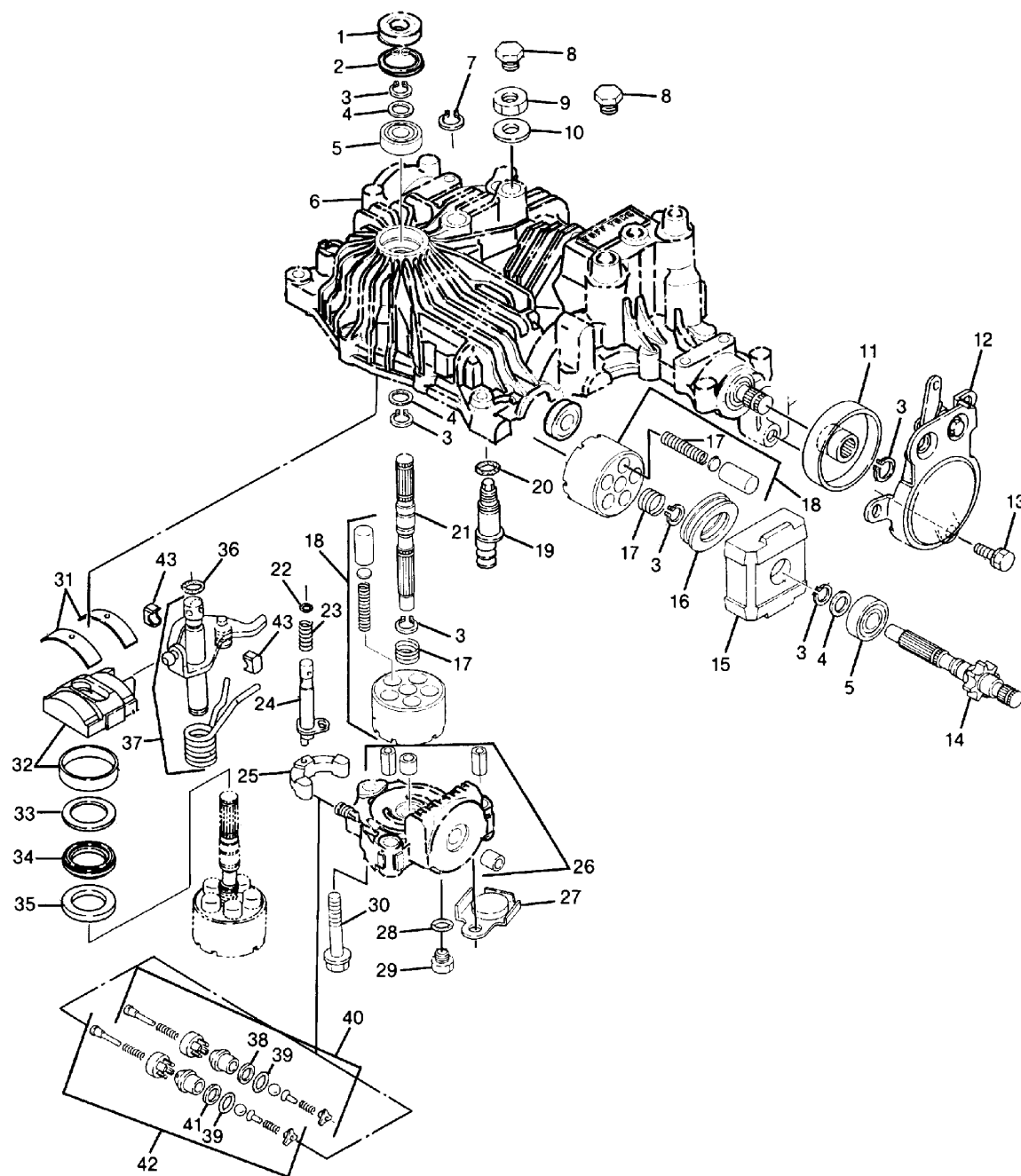
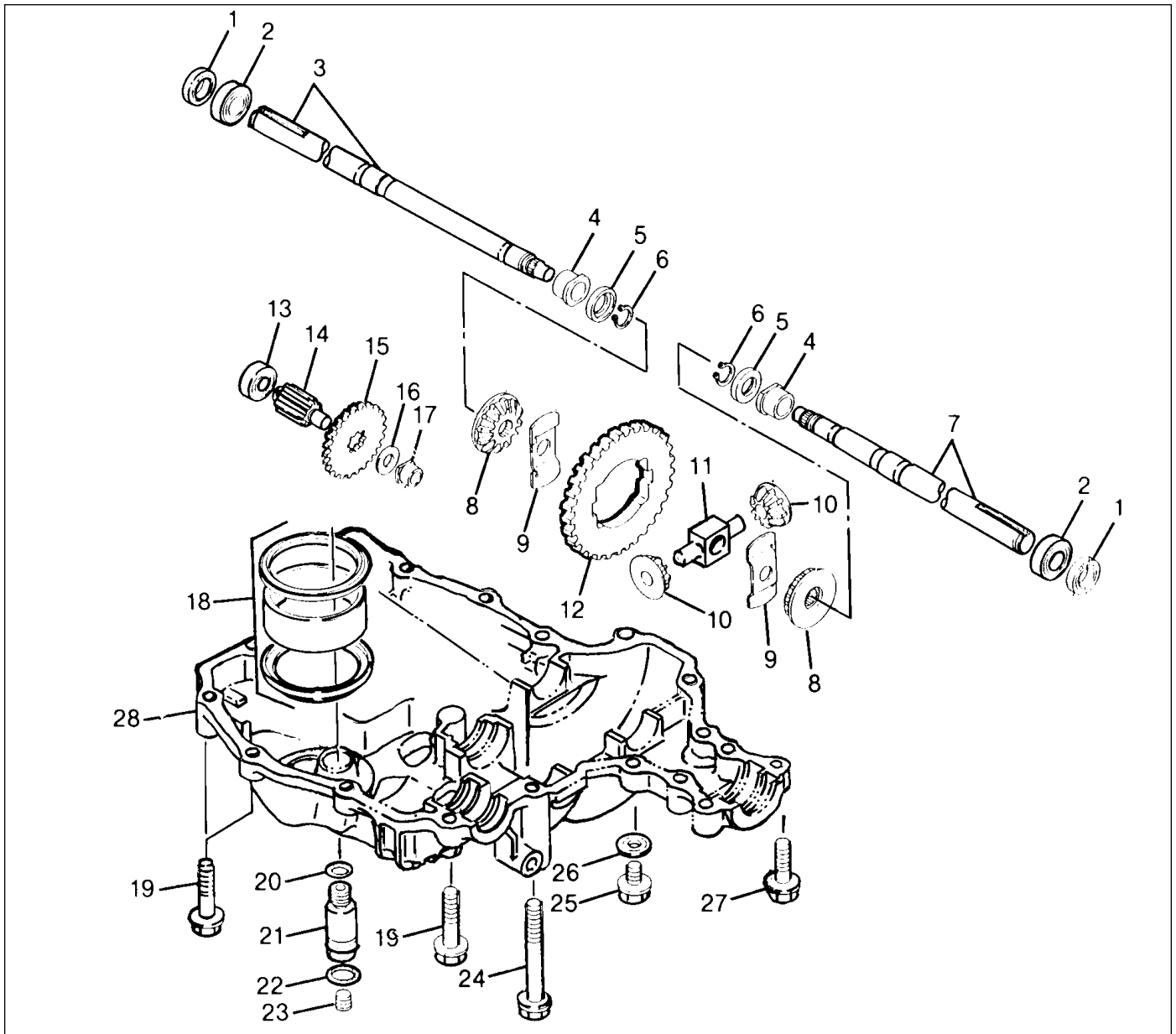


Figure C-2. Broadmoor Tuff Torq K60 Hydrostatic Transaxle

- |                          |                              |                          |                          |
|--------------------------|------------------------------|--------------------------|--------------------------|
| 1. Seal                  | 12. Assembly, Brake          | 23. Spring               | 34. Bearing, Thrust      |
| 2. Ring, Retaining, Int. | 13. Capscrew                 | 24. Shaft, Valve, Bypass | 35. Plate, Thrust        |
| 3. Ring, Retaining, Ext  | 14. Shaft, Motor             | 25. Arm, Valve, Bypass   | 36. Packing              |
| 4. Washer                | 15. Retainer, Thrust Bearing | 26. Case, Center         | 37. Assy. Shaft, Control |
| 5. Bearing               | 16. Bearing, Thrust          | 27. Magnet               | 38. Ring, Backup         |
| 6. Assembly, Cover, Top  | 17. Spring                   | 28. Packing              | 39. Packing              |
| 7. Ring, Retaining, Ext. | 18. Assembly, Cylinder       | 29. Plug, 1/4"           | 40. Valve, Bypass, Fwd.  |
| 8. Cap, Sealing          | 19. Fulcrum                  | 30. Bolt                 | 41. Ring, Backup         |
| 9. Nut                   | 20. Packing                  | 31. Bearing, Thrust      | 42. Valve, Bypass, Rev.  |
| 10. Washer               | 21. Shaft, Pump              | 32. Plate, Swash         | 43. Assy., Block, Pivot  |
| 11. Drum, Brake          | 22. Packing                  | 33. Plate, Thrust        |                          |



**Figure C-3. Tuff Torq K60 Hydrostatic Transaxle**

- |                          |                           |
|--------------------------|---------------------------|
| 1. Seal                  | 15. Gear                  |
| 2. Bearing               | 16. Washer                |
| 3. Shaft, Axle, Right    | 17. Bushing               |
| 4. Bushing               | 18. Assembly, Filter, Oil |
| 5. Collar                | 19. Screw, Self-Tapping   |
| 6. Ring, Retaining       | 20. Packing               |
| 7. Shaft, Axle, Left     | 21. Connector             |
| 8. Gear, Differential    | 22. Packing               |
| 9. Washer, Thrust        | 23. Plug                  |
| 10. Pinion               | 24. Bolt                  |
| 11. Shaft, Pinion        | 25. Bolt                  |
| 12. Gear                 | 26. Washer, Seal          |
| 13. Bearing              | 27. Screw, Self-Tapping   |
| 14. Shaft, Pinion, Final | 28. Housing, Lower        |



## 7 Transmission Repair

7C Tuff Torq K60

### TUFF TORQ K60 HYDROSTATIC TRANSMISSION REPAIR

#### Removal

1. Place drain pan under transmission. Remove drain plug at bottom of differential housing. Replace seal washer on drain plug before reinstalling.
2. Remove the seat deck. (See Seat Deck Removal)
3. Elevate the rear end. (See Elevating Rear End for Safe Service)
4. Remove the rear wheels. (See Rear Wheel Removal)

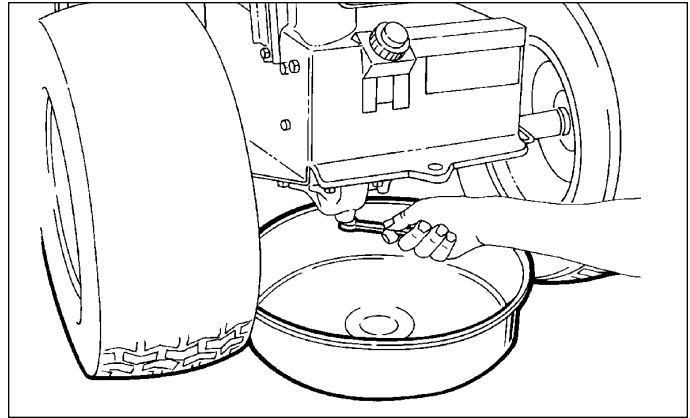


Figure C-4. Draining Transaxle

5. Loosen the seat supports and slide the fuel tank forward.

*NOTE: The fuel line does not have to be disconnected.*

6. Remove the fan from the input shaft pulley.

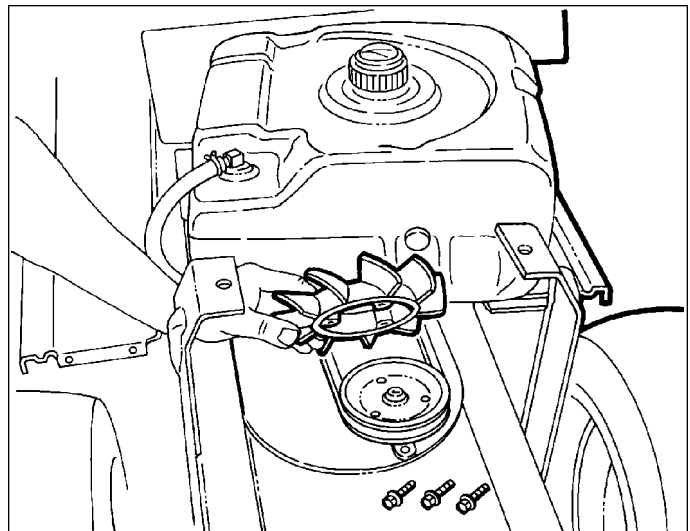
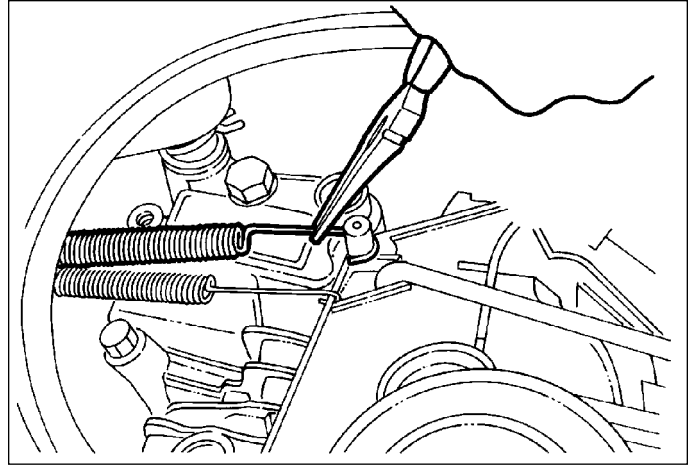


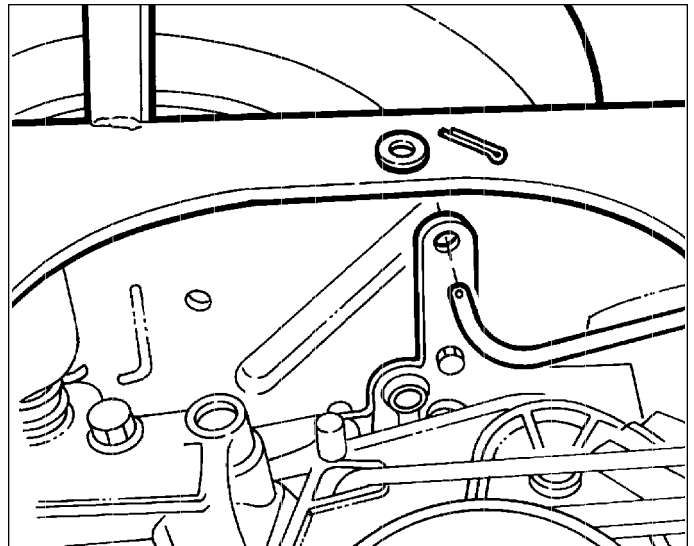
Figure C-5. Moving Fuel Tank Forward, and Removing Input Shaft Fan.

9. Remove the springs from the rear of the cam assembly. (There may be one or two springs.)



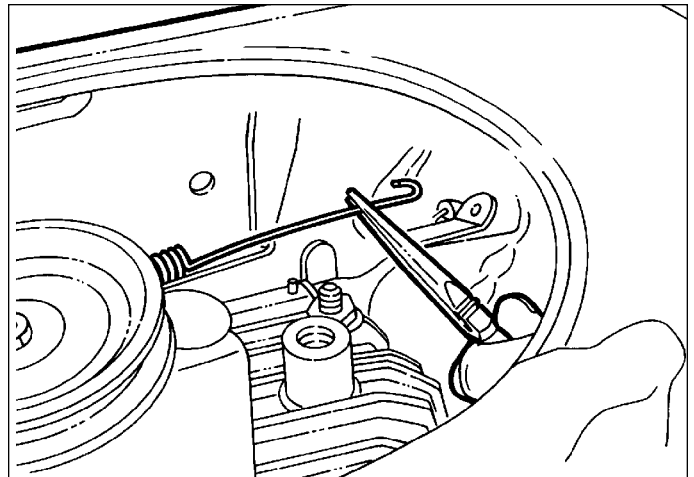
**Figure C-6. Remove Cam Springs**

10. Remove the cotter pin and washer from the end of the brake rod. Disconnect the brake rod from the brake assembly.



**Figure C-7. Disconnect Brake Rod**

11. Remove the spring from the free wheel lever.



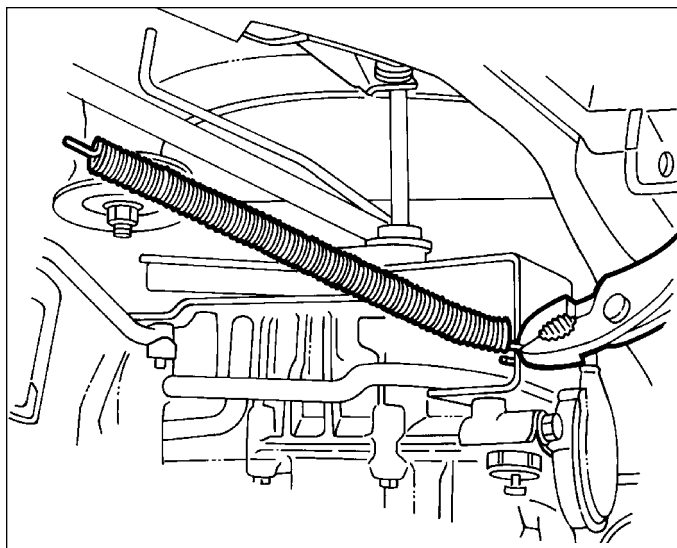
**Figure C-8. Remove Free Wheel Lever Spring**

## 7 Transmission Repair

### 7C Tuff Torq K60

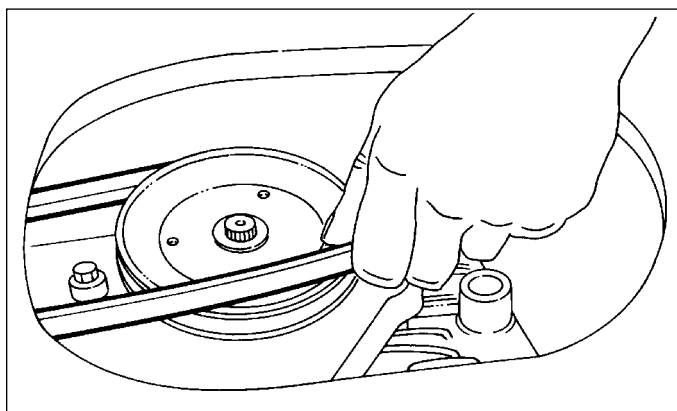
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12. Remove the drive spring from the hydro support.



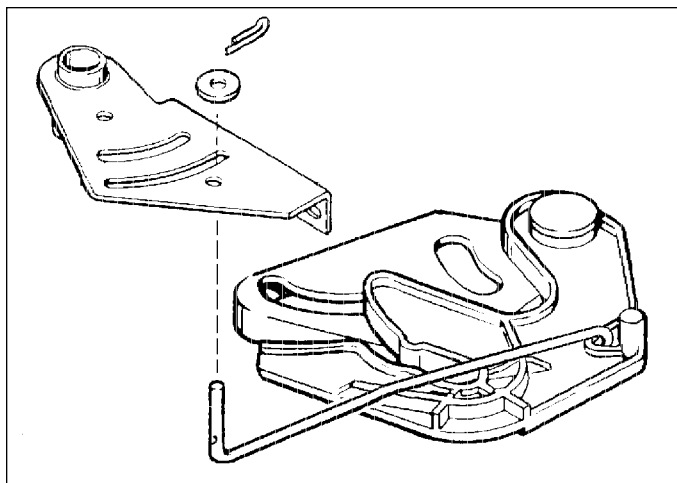
**Figure C-9. Remove Hydro Support Drive Spring**

13. Remove the hydro drive belt.



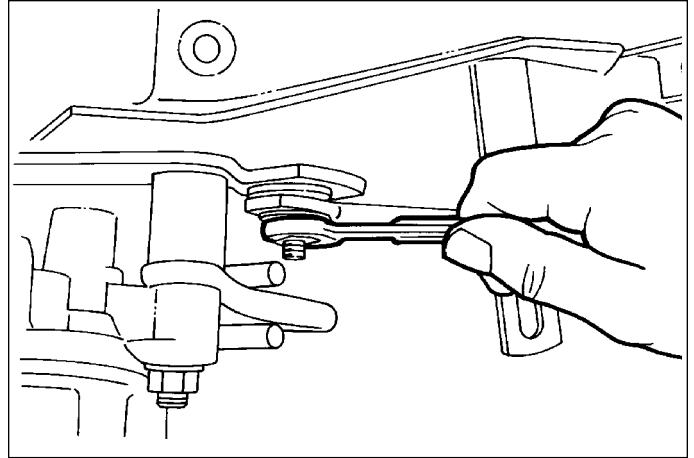
**Figure C-10. Remove Hydro Drive Belt**

14. Remove the cotter pin and washer holding the neutral return rod to the actuator assembly.



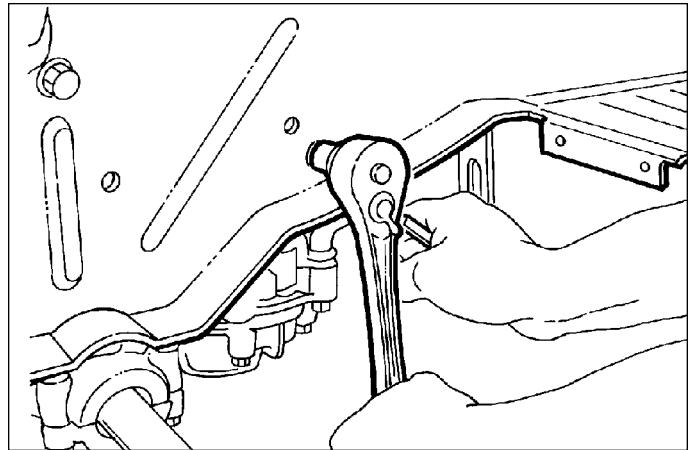
**Figure C-11. Remove Neutral Rod Lever**

15. Remove the bolt from the shift control rod.



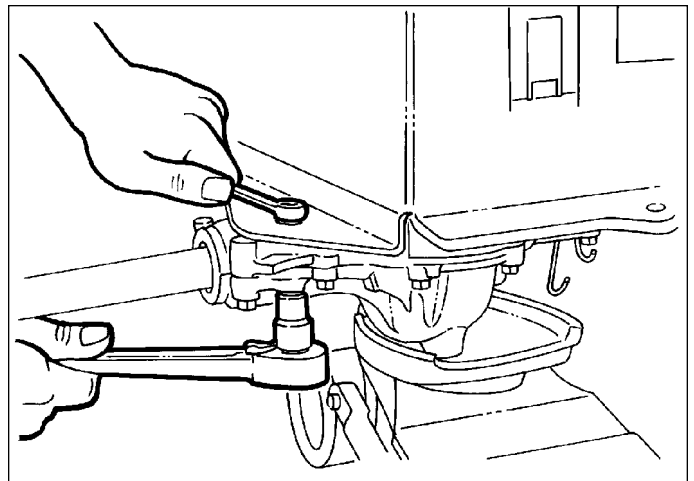
**Figure C-12. Remove Shift Control Rod Bolt**

16. Remove the capscrew from the torque strap.



**Figure C-13. Remove Torque Strap**

17. Position a jack under the transaxle. Remove the capscrews from each side of the axle assembly holding the transaxle to the frame.



**Figure C-14. Remove Mounting Capscrews**

## 7 Transmission Repair

### 7C Tuff Torq K60

18. Remove the cap from the expansion chamber reservoir to clear the frame. Slowly lower the jack to remove the transaxle from the frame. Once removed, replace the cap.

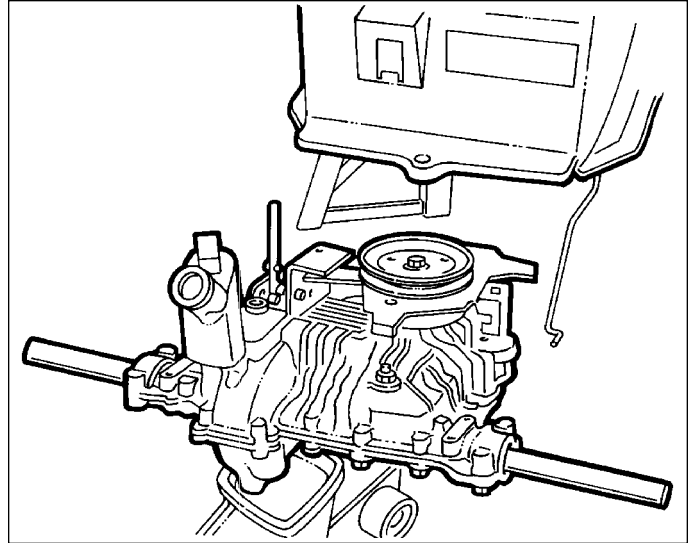


Figure C-15. Remove Transaxle From Frame

19. Remove the pulley, cam assembly, and support rods.

*NOTE: When reinstalling input pulley, new setscrews must be used. The setscrews have a special soft end and cannot be reused.*

*NOTE: Early models do not have a snap ring retaining the top of the pulley used by later models. For either model, install a snap ring during reassembly.*

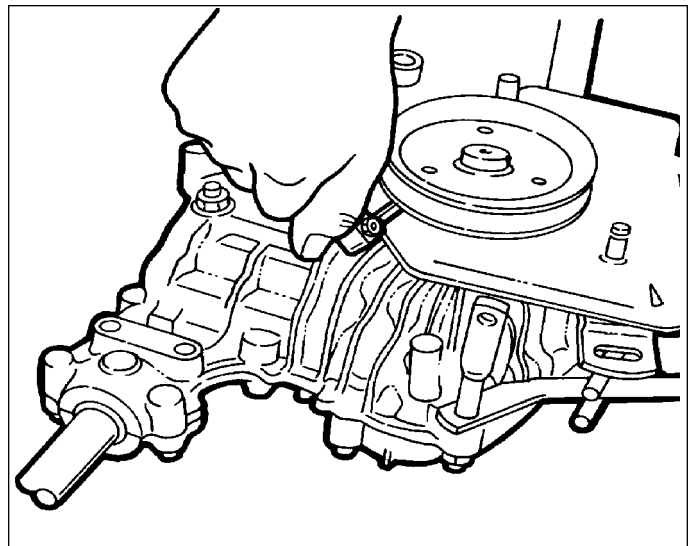
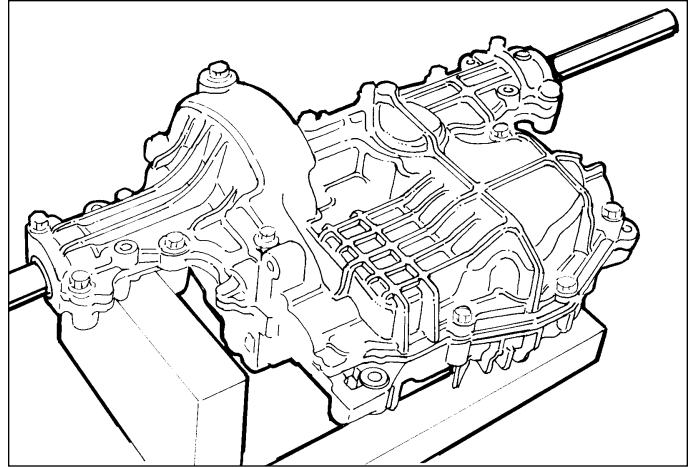


Figure C-16. Remove Pulley, Cam Assembly, Rods

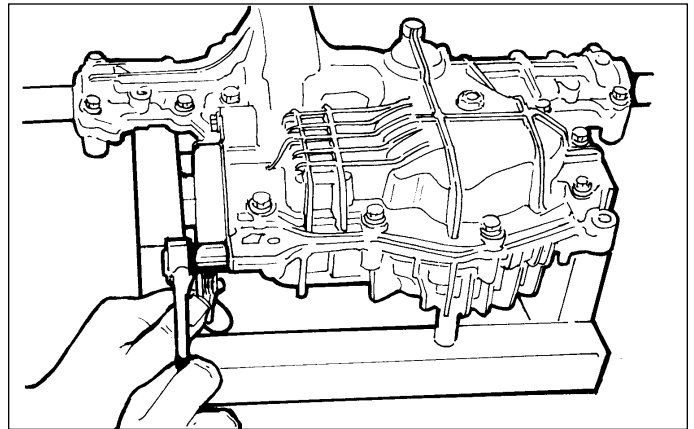
### Disassembly

1. Remove expansion chamber reservoir from the transaxle housing. Turn the transaxle upside down and support on a suitable stand.



**Figure C-17. Place Transaxle Upside Down In Fixture**

2. Remove the three bolts holding the brake cover to the transmission housing.

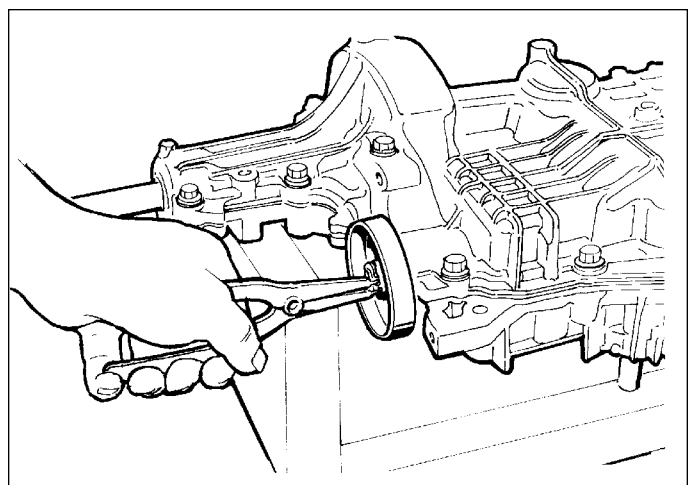


**Figure C-18. Brake Cover Removal**

3. Remove the snap-ring and brake drum from the motor shaft.
4. Inspect the brake assembly and brake drum for wear or damage. Replace if excessive wear of any part is noted.

*NOTE: The brake drum and brake assembly must be free of oil and dust. If oil is present on brake components, the seal on the motor shaft may be suspect. Replace the seal if oil leakage is evident at the shaft seal.*

*NOTE: The brake band and brake cover are serviced as an assembly.*



**Figure C-19. Brake Drum Removal**

## 7 Transmission Repair

### 7C Tuff Torq K60

5. Remove the nineteen case bolts from the bottom of the transaxle.

**NOTE:** There are three different lengths of capscrews used to hold the transaxle halves together. There is also a center capscrew that must be removed. Refer to Figure C-25.

6. Separate the transaxle case halves by carefully prying the case halves apart with pry bars at the pry points.

**NOTE:** Sealant will make separation of the case halves difficult. Do not damage the case halves with pry bars. Before using unnecessary force, make sure all mounting bolts have been removed.

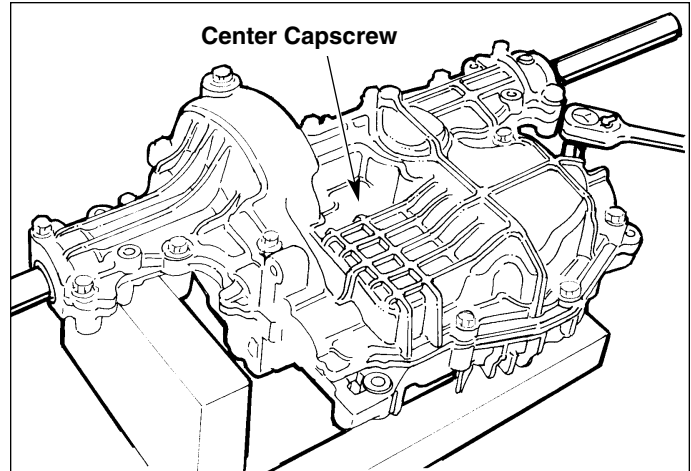


Figure C-20. Remove Case Bolts

7. Carefully lift the case half from the transaxle assembly.

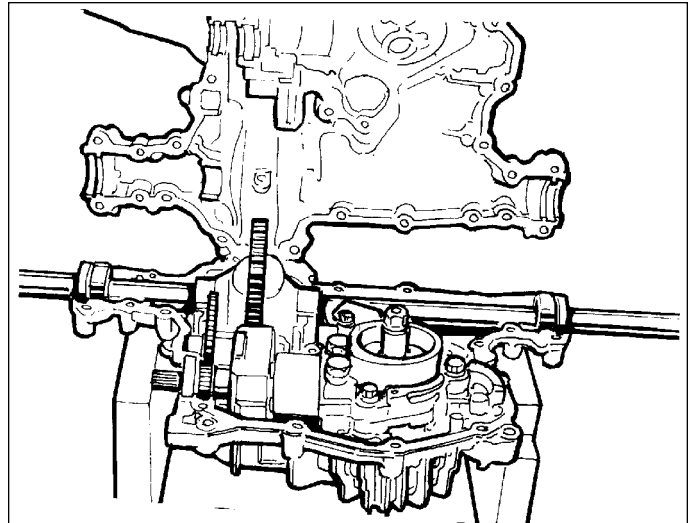


Figure C-21. Remove Case Half

8. Remove filter and two seals from center case. The filter should be replaced for reassembly.

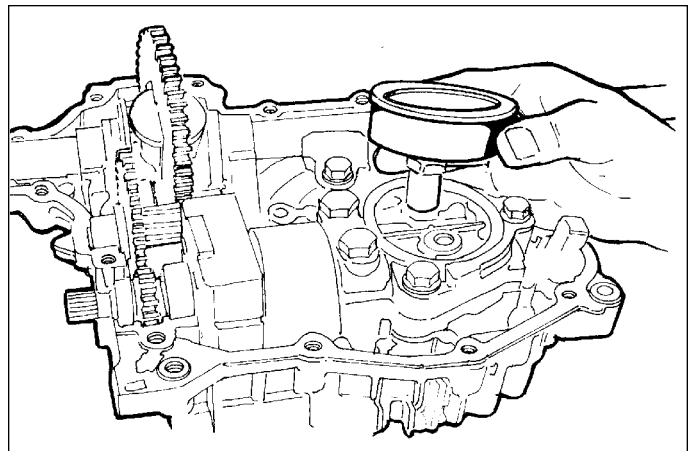
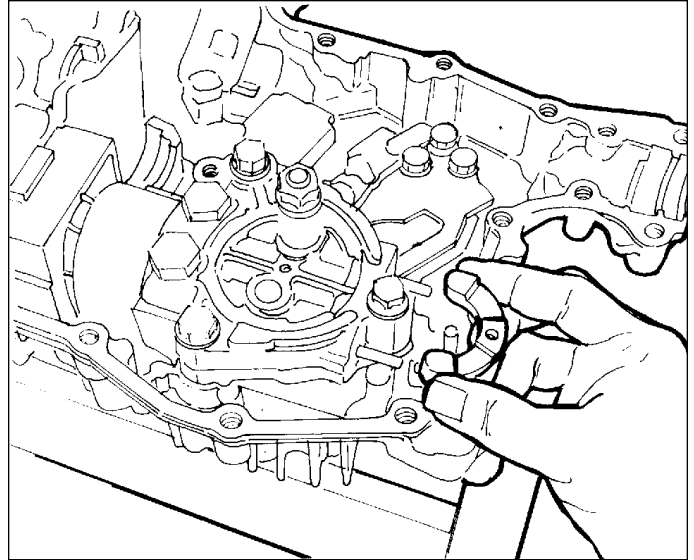


Figure C-22. Remove Filter

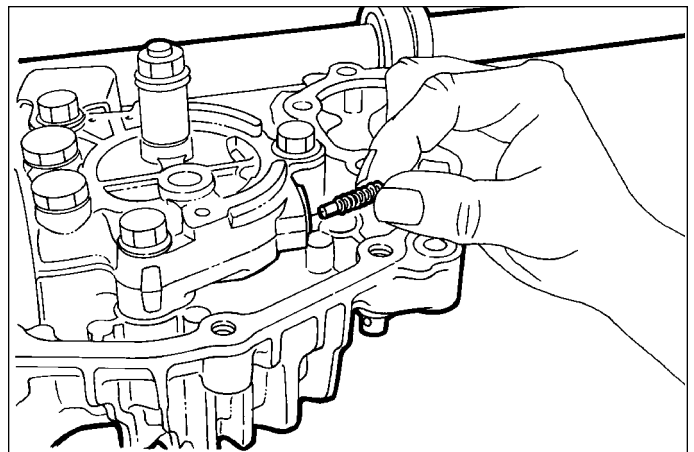


9. Remove the pivot arm from the bypass shaft.



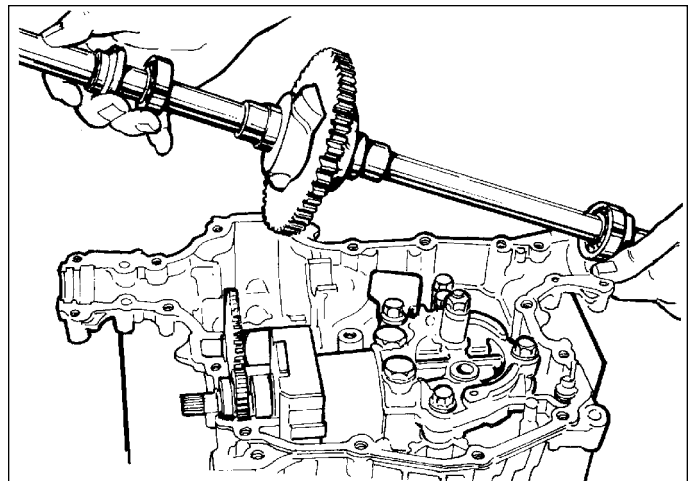
**Figure C-23. Remove Pivot Arm**

10. Remove the two push pins, springs and valves from the center case.



**Figure C-24. Remove Bypass Pins and Springs**

11. Remove the axle shaft assembly and differential gear assembly.



**Figure C-25. Remove Axle and Differential**

## 7 Transmission Repair

### 7C Tuff Torq K60

12. Remove the final pinion assembly.

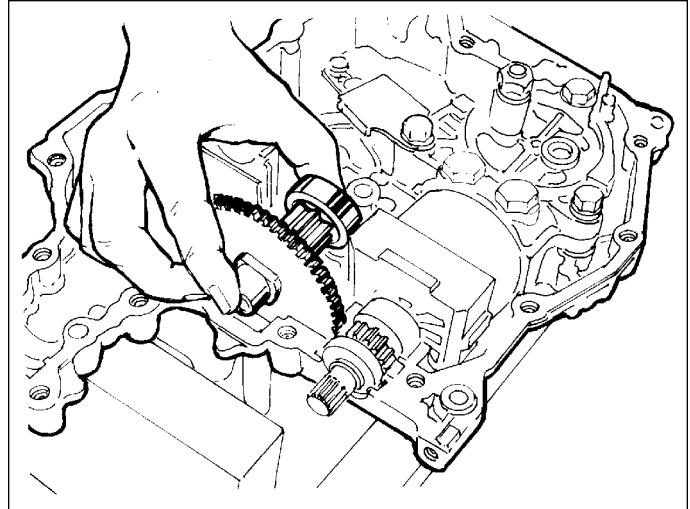


Figure C-26. Remove Final Pinion Assembly

13. Remove the three capscrews and magnet from the center case assembly.

*NOTE: Clean the magnet by blowing clean with compressed air. Eye protection must be worn when using compressed air to prevent personal injury.*

*NOTE: Use care when removing the center case to prevent damage to the center case and the cylinder blocks.*

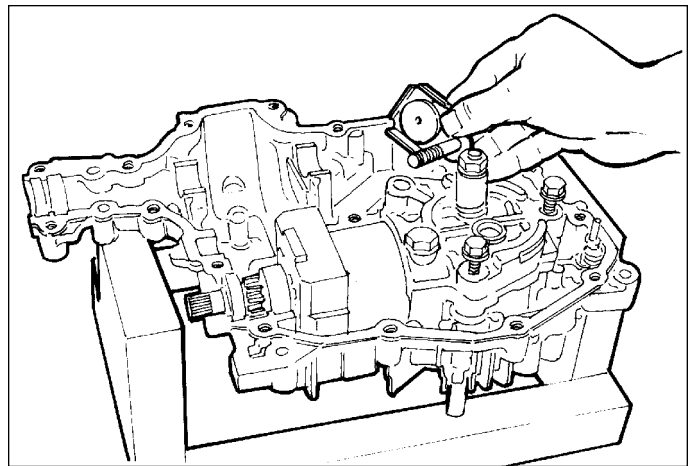


Figure C-27. Remove Center Case Capscrews

14. Slowly and carefully begin to pry center case assembly, cylinder block, and motor shaft up from transaxle housing. The piston assembly is spring loaded and must be held firmly to prevent damage.

*NOTE: Use caution not to damage cylinder block or center case. If either is damaged, center case, pump cylinder block and motor cylinder block should be replaced as a set.*

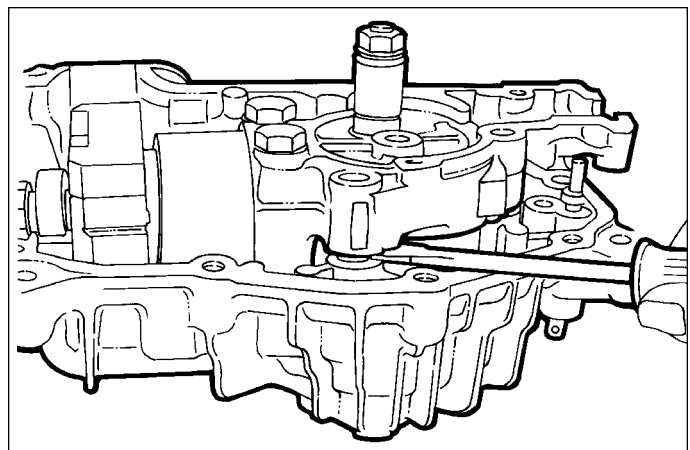
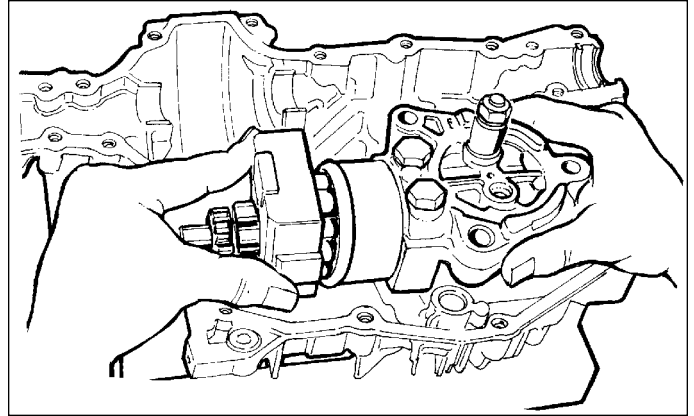


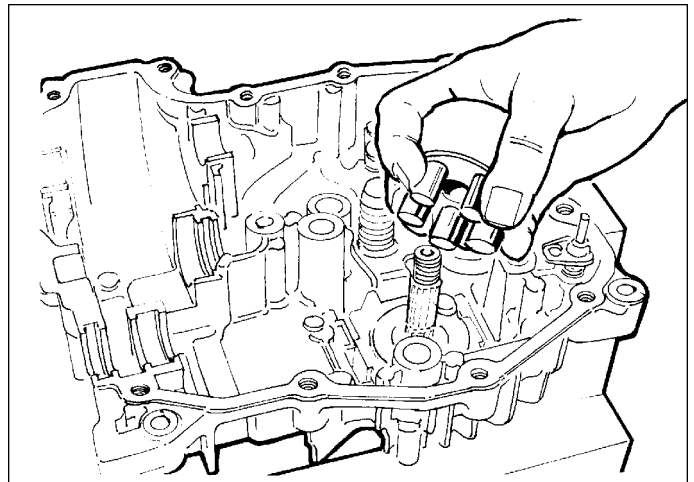
Figure C-28. Pry Center Case Upward

15. Remove the motor shaft assembly and the center case sub-assembly.



**Figure C-29. Remove Center Case Assembly**

16. While holding pistons into pump cylinder block with your fingers, remove the cylinder block from the pump input shaft.



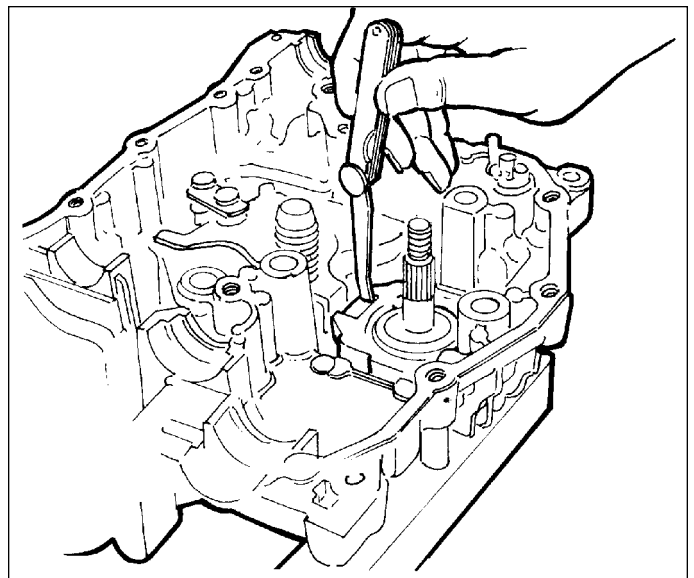
**Figure C-30. Remove Pump Cylinder Block**

17. Using a feeler gauge, measure the clearance between the swash plate and the shift blocks.

Clearance: 0–0.008" (0–0.2 mm)

Wear limit: 0.012" (0.3 mm)

*Note: An excess amount of clearance at these points can make it difficult or impossible to adjust neutral.*



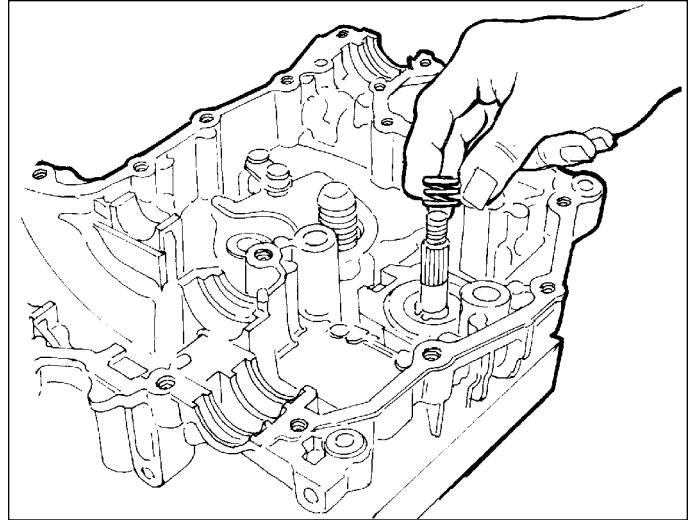
**Figure C-31. Measure Shift Block Clearance**

## 7 Transmission Repair

### 7C Tuff Torq K60

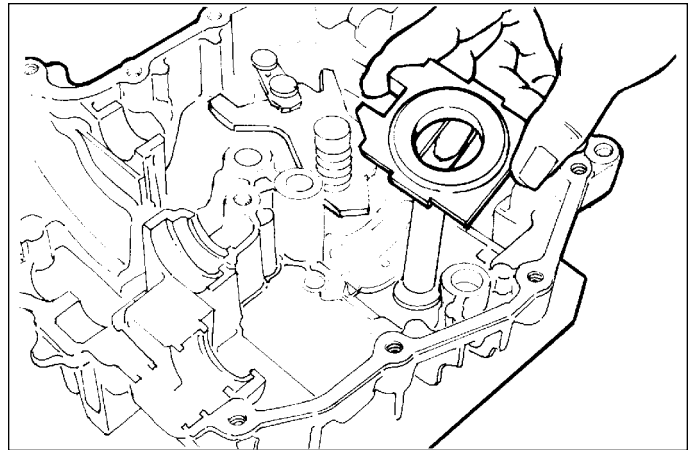
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18. Remove the spring and retaining ring from the input shaft.



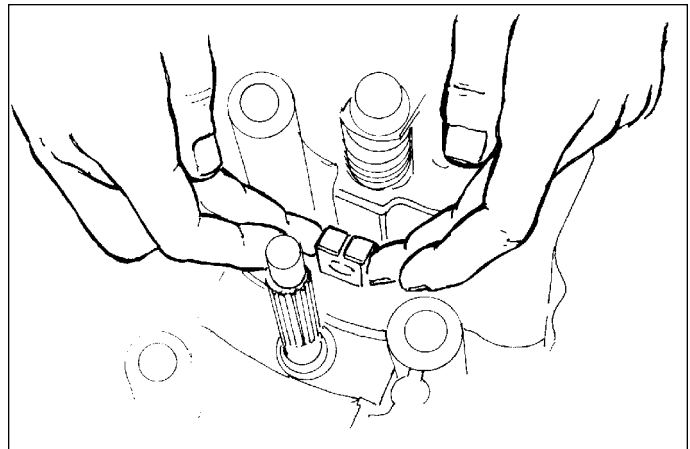
**Figure C-32. Remove Pump Spring**

19. Remove the swash plate assembly.  
20. Inspect swash plate assembly for wear or damage. Replace if required.



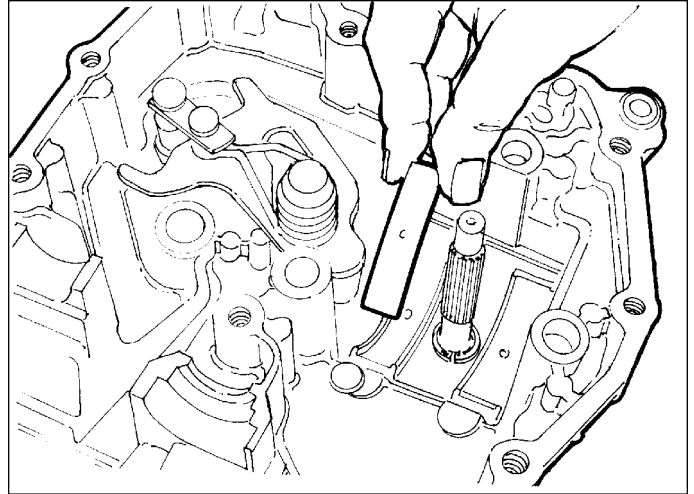
**Figure C-33. Remove Swash Plate**

21. Remove the two shift blocks from the control shaft.  
22. Inspect the shift blocks for wear or damage. Replace if necessary.



**Figure C-34 Remove Shift Blocks**

23. Remove the two swash plate bearings from the housing.



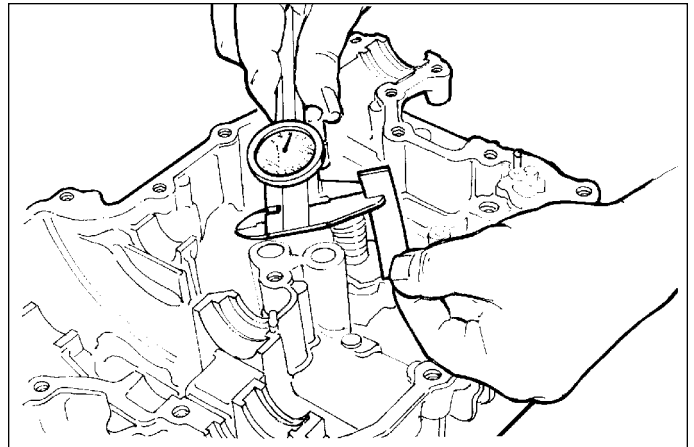
**Figure C-35. Remove Swash Plate Bearings**

24. Inspect the swash plate bearings for wear or scoring.

25. Measure the thickness of the bearings:

Thickness: 1.45–1.55 mm (.057–.061")

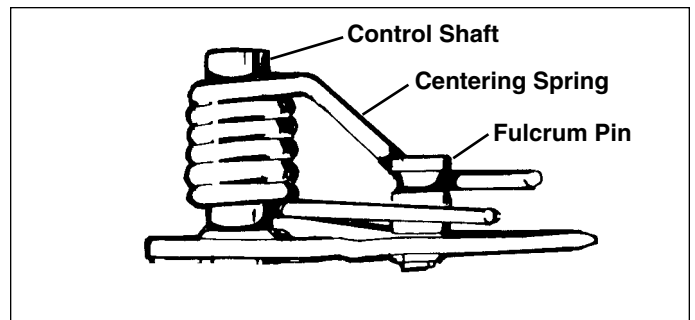
Minimum thickness: 1.30 mm (.051")



**Figure C-36. Inspect Swash Plate Bearings**

26. Unhook the control shaft centering spring from the fulcrum pin.

27. Remove the centering spring from the control shaft.



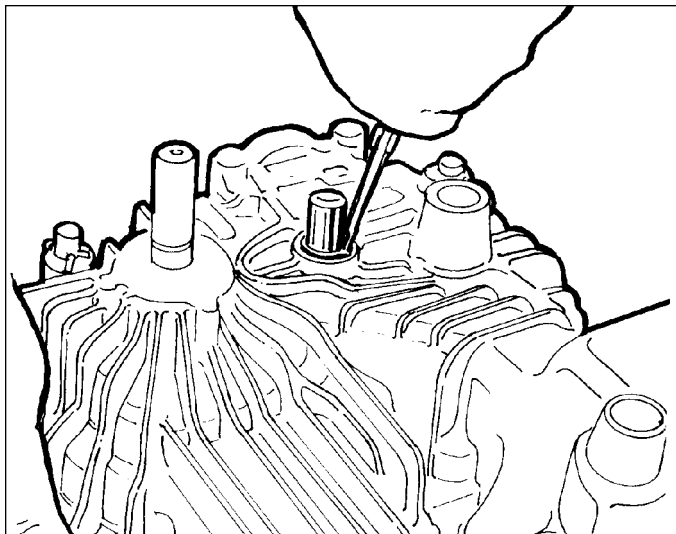
**Figure C-37. Remove Centering Spring**

## 7 Transmission Repair

### 7C Tuff Torq K60

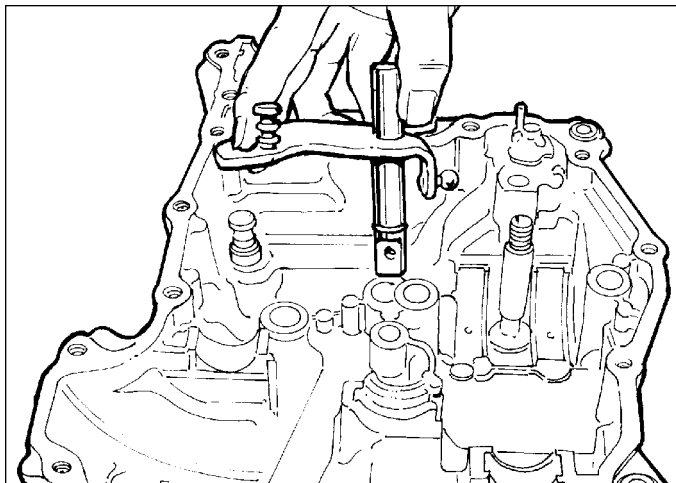
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27. Turn the transaxle case over and remove the retaining ring on the control shaft.



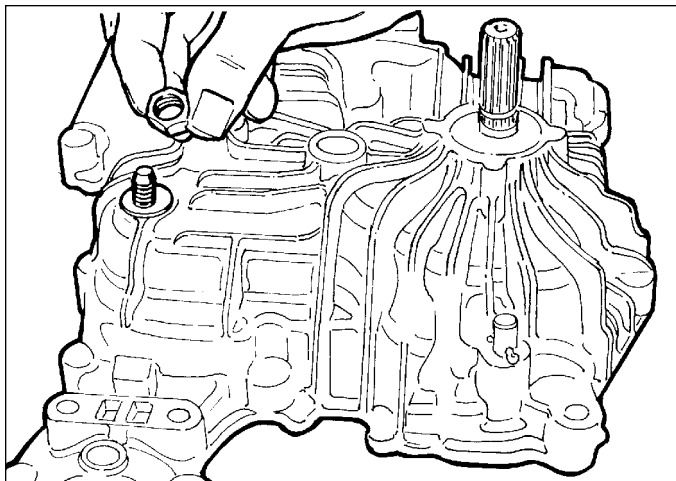
**Figure C-38. Remove Control Shaft Retaining Ring**

28. Remove the control shaft from the case.



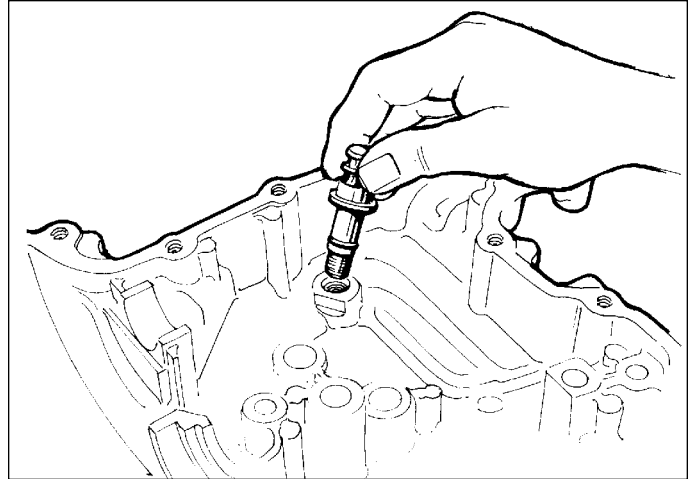
**Figure C-39. Remove Control Shaft**

29. Remove the fulcrum pin nut and washer.



**Figure C-40. Remove Fulcrum Pin Nut and Washer**

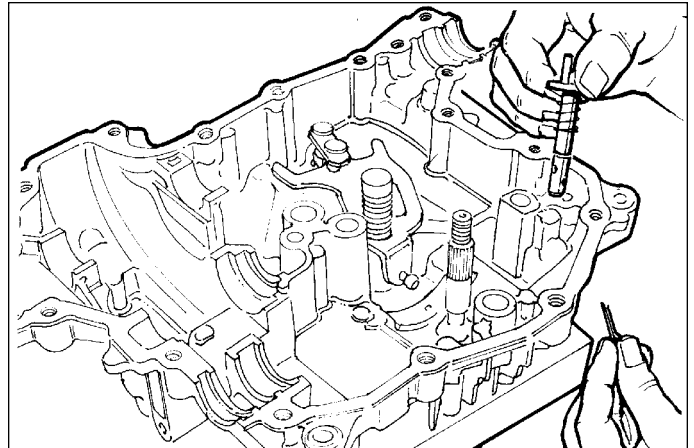
30. Remove the fulcrum pin from the transaxle case.



**Figure C-41. Remove Fulcrum Pin From Case.**

31. Remove the cotter key from the bypass shaft.

32. Remove the bypass shaft and spring from the transaxle case.

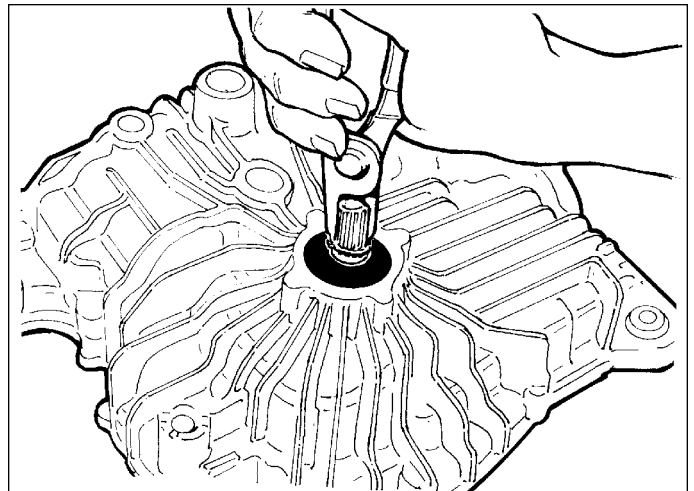


**Figure C-42. Remove Bypass Shaft**

33. Remove the small retaining ring from the input shaft (above case seal).

34. Remove the input shaft seal using care not to damage the transaxle case.

36. Remove the large retaining ring (under seal) holding the shaft bearing in place.



**Figure C-43. Remove Retaining Rings and Seal**



## 7 Transmission Repair

### 7C Tuff Torq K60

37. Remove the input shaft and bearing from the case.

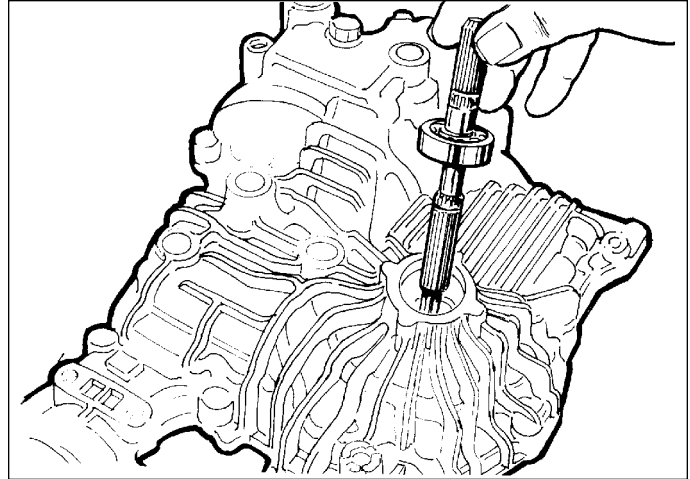


Figure C-44. Remove Input Shaft

38. Remove the retaining ring and washer from each side of the input shaft bearing

39. Press the bearing off of the input shaft. Inspect the splines and bearing surface for damage.

40. Replace needed parts and reassemble as follows:

- Install one retaining ring and washer.
- Press bearing down to the washer.
- Install other washer and retaining ring.

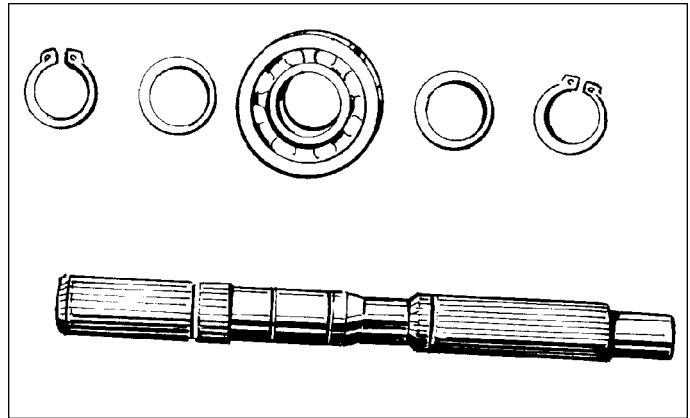


Figure C-45. Disassemble Input Shaft

41. Remove the bearing, bushing, washer and final shaft gear from the pinion shaft previously removed from the transaxle.

**NOTE:** It is normal for the gear to have some play on the pinion shaft.

42. Inspect and measure the bearing, bushing, washer, gear and final pinion shaft for wear or damage. Replace if necessary:

Bushing ID: 0.593–0.596" (15.05–15.13 mm)

Shaft OD: 0.589–0.590" (14.97–14.99 mm)

Clearance: 0.002–0.006" (0.06–0.16 mm)

Clearance (Max): 0.020" (0.5 mm)

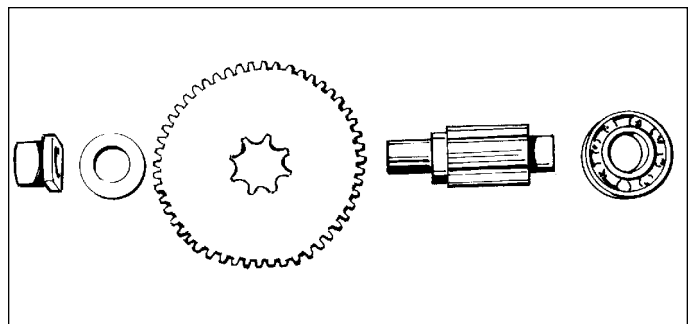
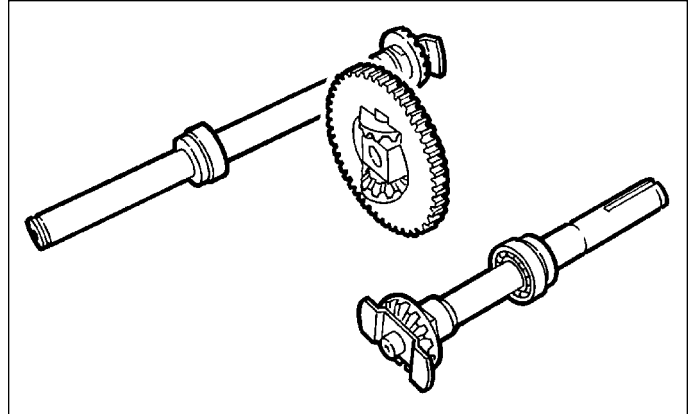


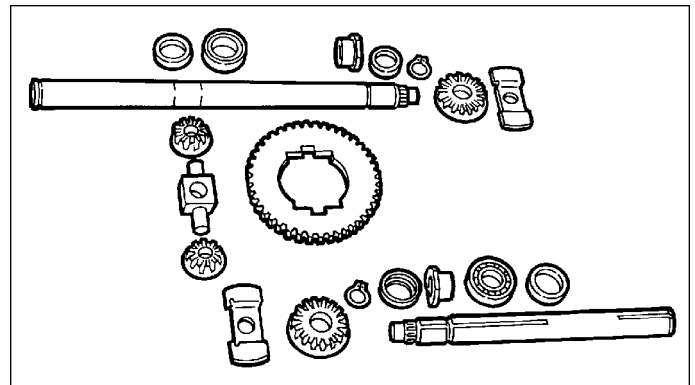
Figure C-46. Inspect Pinion Shaft

43. Remove the left and right axle shaft assemblies from the differential pinion gear assembly.
44. Inspect the differential gears and thrust washers for wear or damage.



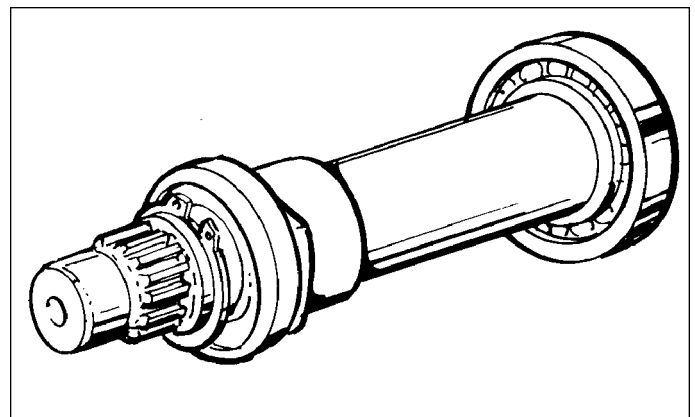
**Figure C-47. Remove Differential Gear Assemblies**

45. Remove the differential pinion shaft and two differential pinion gears from the inside large axle gear.
46. Inspect the differential pinion gears and shaft for wear or damage.
47. Measure the pinion shaft and gears. Replace worn parts as needed:
  - Pinion Gear ID: 0.589–0.590" (14.96–14.99 mm)
  - Pinion Shaft OD: 0.592–0.593" (15.03–15.06 mm)
  - Clearance: 0.002–0.004" (0.04–0.10 mm)
  - Clearance (Max): 0.012" (0.5 mm)



**Figure C-48. Differential Disassembly**

48. Remove the snap-ring from the axle shaft. Remove the collar, bushing, bearing and seal from each axle shaft.
49. Inspect all parts for wear or damage. Replace if required:
  - Axle Bushing ID: 22.06–22.15 mm (0.868–0.872")
  - Axle Shaft OD: 21.98–22.00 mm (0.865–0.866")
  - Clearance: 0.06–0.17 mm (0.002–0.007")
  - Clearance (Max): 0.5 mm (0.020")
50. Replace seal for assembly.



**Figure C-49. Axle Shaft Disassembly**

## 7 Transmission Repair

### 7C Tuff Torq K60

51. Remove the center case from motor shaft.

*NOTE: Use care when removing the center case to prevent damage to the center case and cylinder blocks.*

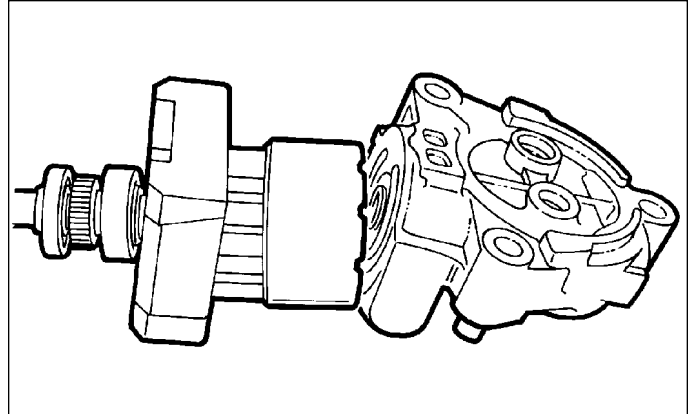


Figure C-50. Remove Center Case

52. Remove the two sleeves, back-up rings, packings, balls, ball holders, springs, and retainers from the center case. Keep all the parts in proper order and do not switch parts side to side.

*NOTE: If the bypass valve components cannot be removed, flushing the components will be sufficient cleaning.*

*NOTE: Be careful not to damage the cylinder block or center case. If either is damaged the center case, pump cylinder block and motor cylinder block should be replaced as a set.*

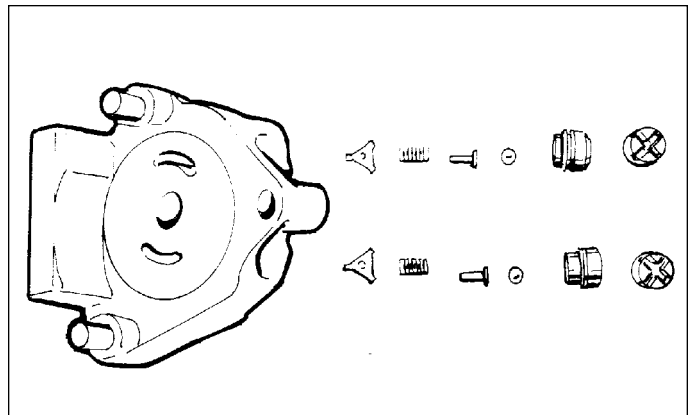


Figure C-51. Remove Bypass Valve Components

53. Inspect the center case for wear or damage.

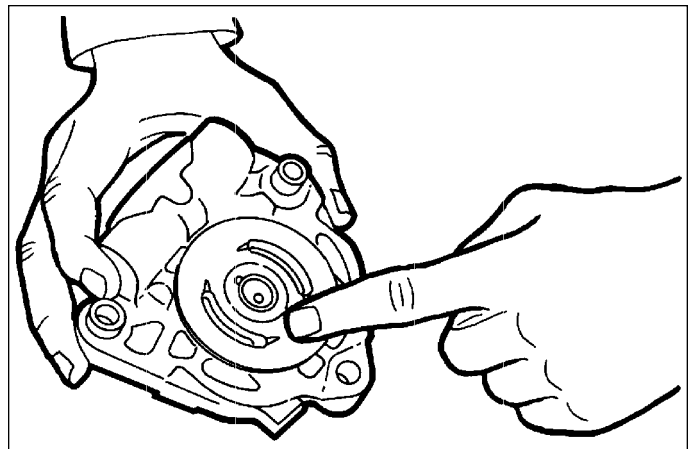


Figure C-52. Inspect Center Case

54. Remove the motor cylinder block assembly from the motor shaft.

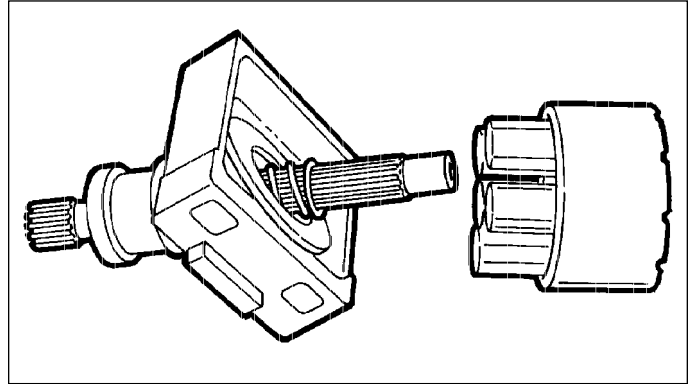


Figure C-53. Remove Motor Cylinder Block

55. Remove the five pistons, washers, and springs from the motor cylinder block.
56. Inspect the cylinder block and pistons for wear or damage. Replace if necessary.

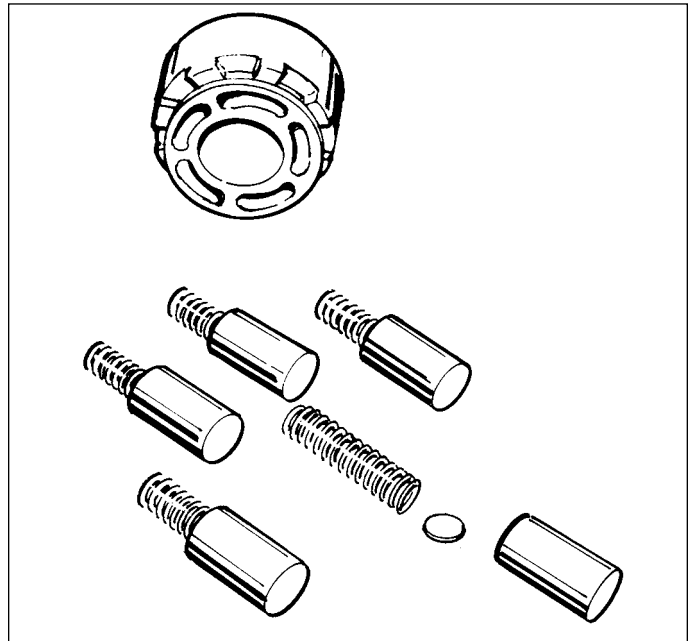


Figure C-54. Disassemble Motor Cylinder Block

## 7 Transmission Repair

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56. Remove the spring from the motor shaft.
57. Remove the thrust ball bearing assembly. Inspect the bearing for wear or damage.
58. Remove the snap-ring, washer, bearing and seal from the motor shaft. Replace seal before assembly.
59. Inspect the motor shaft for wear or damage. Replace if necessary.

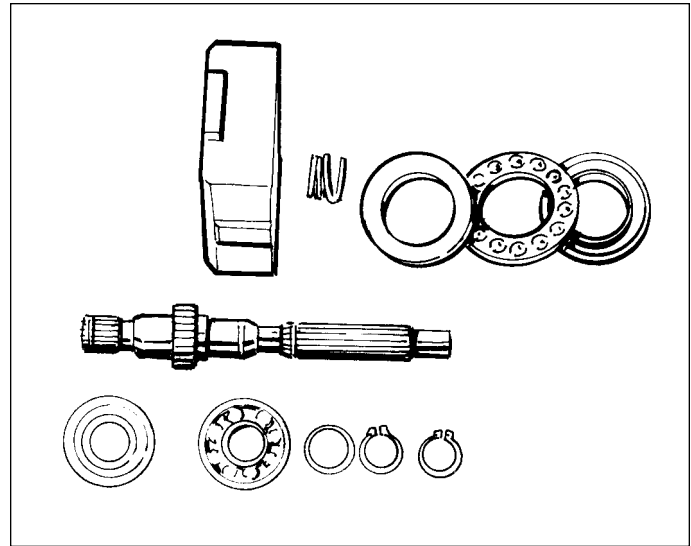


Figure C-55. Disassemble Motor Shaft

60. Remove the five pistons, washers and springs from the pump cylinder block.
61. Inspect the cylinder block and pistons for wear or damage. Replace if necessary.

**NOTE:** Be careful not to damage the cylinder block or the center case. If either is damaged, the center case, pump cylinder block and motor cylinder block should be replaced as a set.

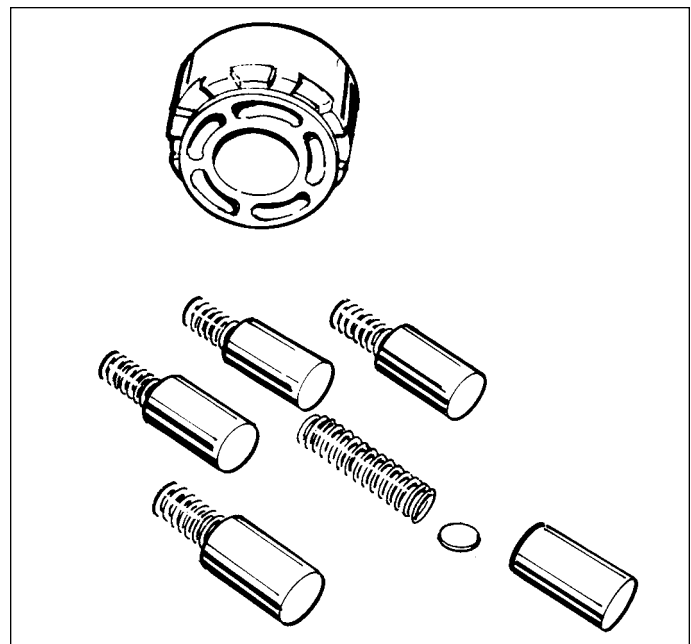


Figure C-56. Disassemble Pump Cylinder Block

#### Assembly

1. Apply the grease to two sealing caps and install the caps into the upper case.
2. Apply grease and install new packing on the 9/16" plug. Install the plug into case.

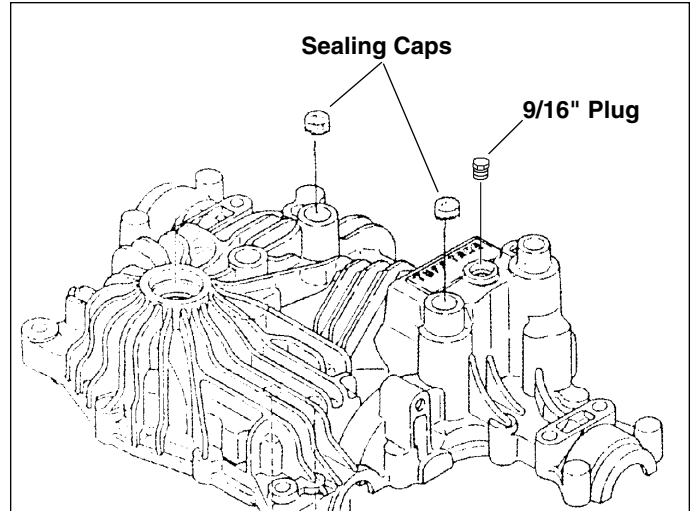


Figure C-57. Install Sealing Caps

3. Install the new packing and spring to by-pass shaft.

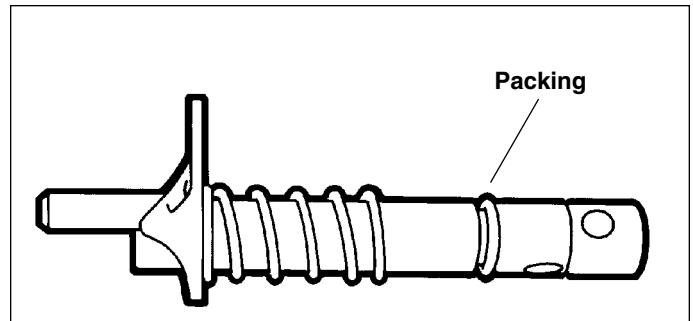


Figure C-58. Bypass Shaft Packing and Spring

4. Apply grease to the packing and shaft and install into the transaxle case.

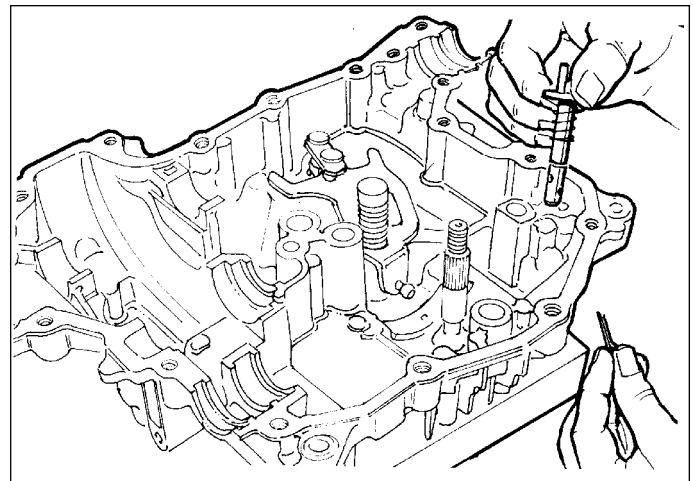
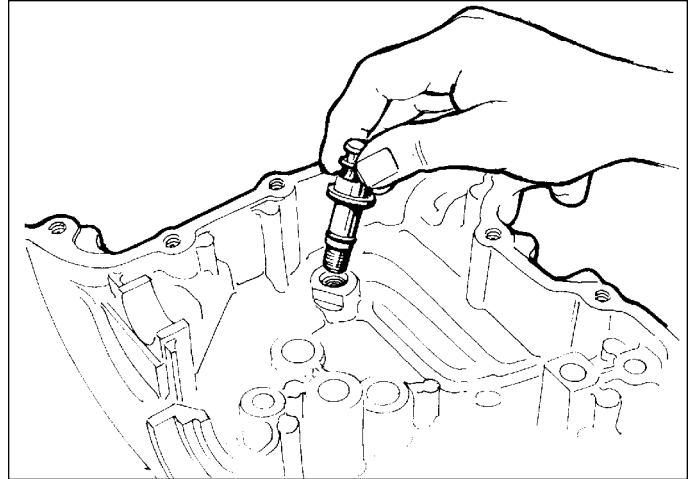


Figure C-59. Install By-Pass Shaft

## 7 Transmission Repair

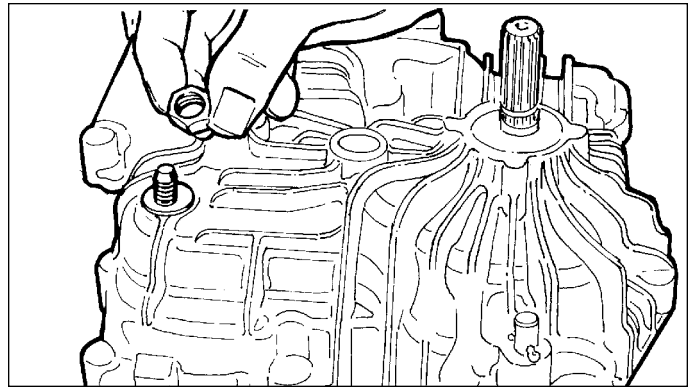
### 7C Tuff Torq K60

5. Apply grease to the fulcrum arm and install new packing.
6. Install the fulcrum arm into the case.



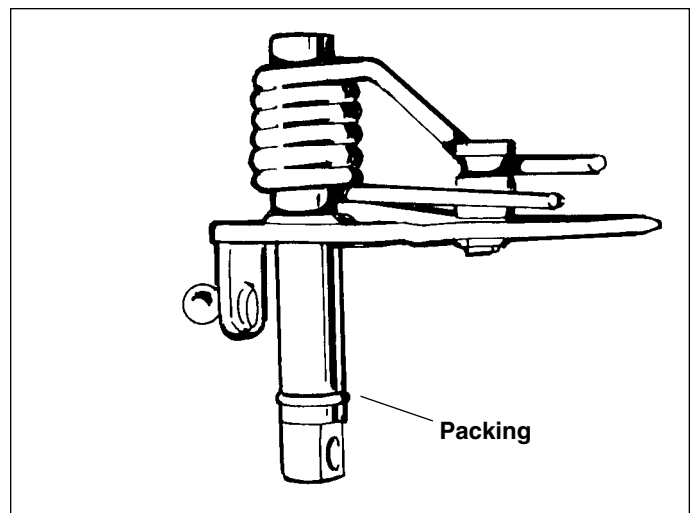
**Figure C-60. Install Fulcrum Arm**

7. Install the washer and nut on the fulcrum shaft. Snug the nut but do not tighten at this point.



**Figure C-61. Install Fulcrum Washer and Nut**

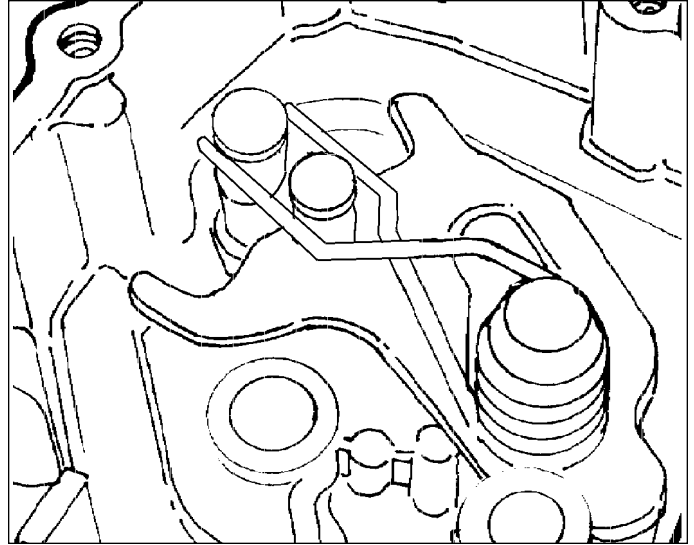
8. Apply grease to the control shaft and install new packing.
9. Install the torsion spring as shown, and install the control shaft into the transaxle case.
10. Install the retaining ring on the control shaft on the outside of transaxle



**Figure C-62. Install Packing and Spring**

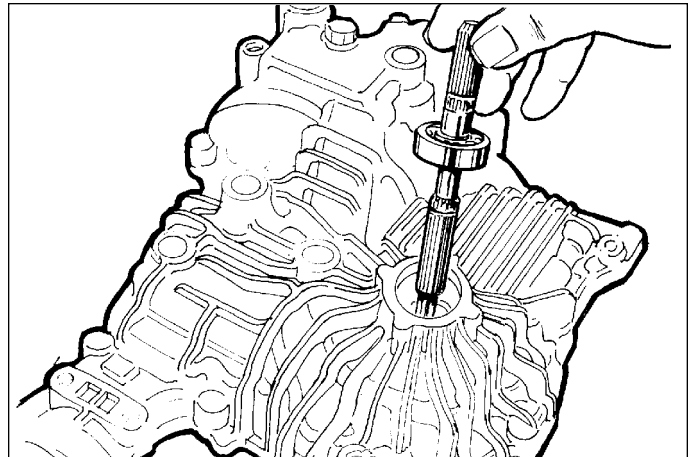


11. Spread the torsion spring out over the fulcrum pin as shown.



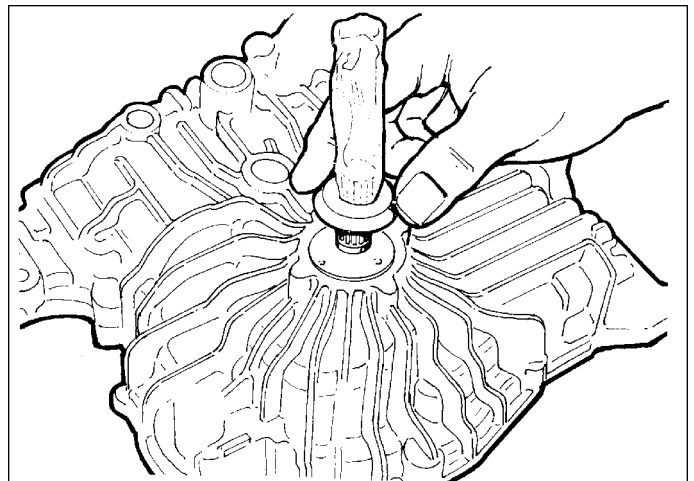
**Figure C-63. Install Torsion Spring**

12. Install the input shaft into the transaxle case, and secure with a retaining ring.



**Figure C-64. Install Input Shaft in Case**

13. Wrap tape over the splines of input shaft. Apply grease to the shaft, tape, and lip of the input shaft seal.
14. Install the seal over the tape using care not to damage the lip of seal. Drive the seal into housing applying force only to the outside edge of the seal.



**Figure C-65. Install Input Shaft Seal**

## 7 Transmission Repair

### 7C Tuff Torq K60

15. Install the swash plate bushings into the transaxle case. Apply transmission fluid generously to the bushings when installed.

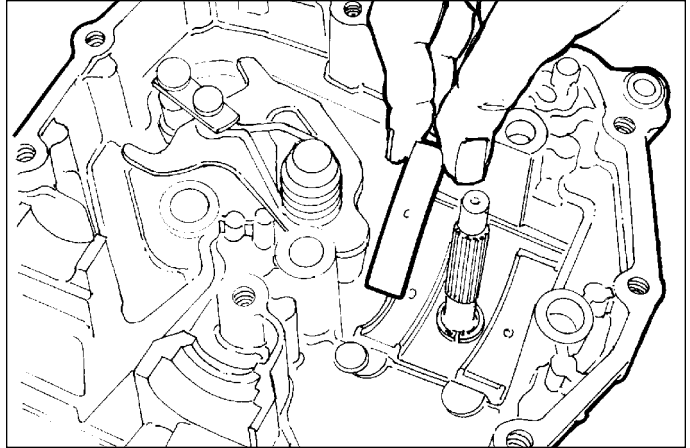


Figure C-66. Install Swash Plate Bushing

16. Apply petroleum jelly to the inside of the shift blocks and install the blocks on the control shaft.

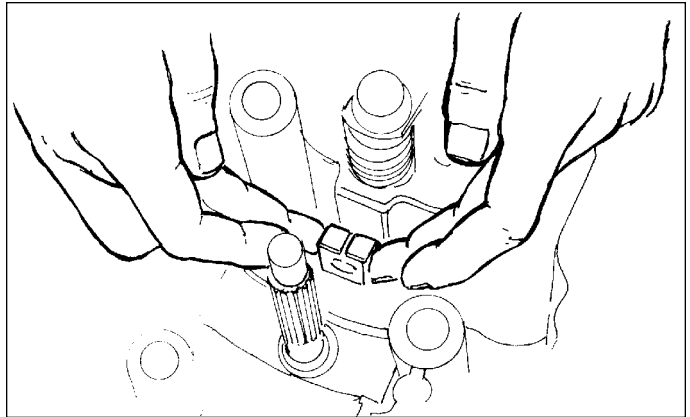


Figure C-67. Install Shift Blocks

17. Install the thrust bearing into the swash plate as shown. Apply transmission oil generously to all parts.

*NOTE: Be sure to install the thin race first inside the fixed swash plate.*

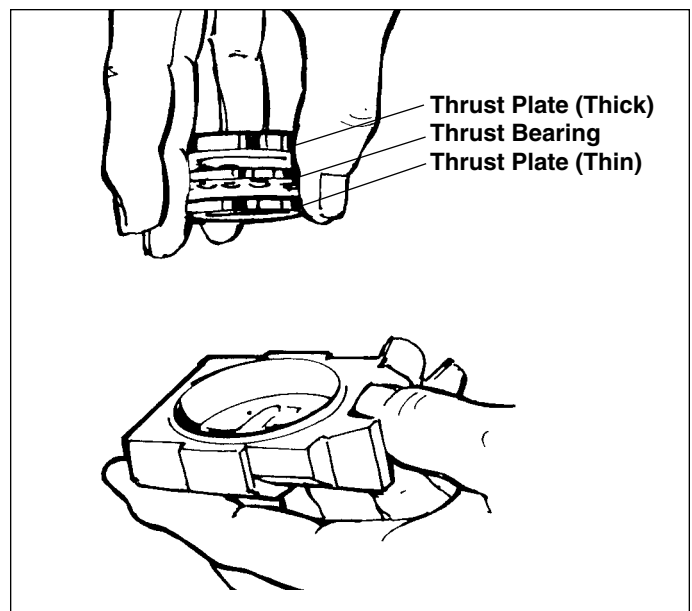
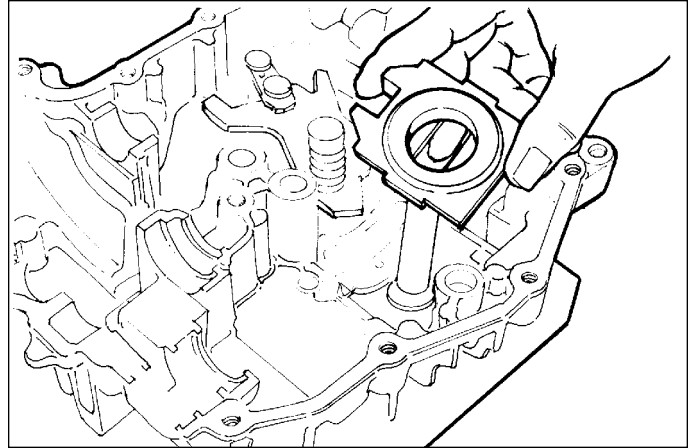


Figure C-68. Install Thrust Plate

18. Install the swash plate over the pump shaft and set into the case on the swash plate bushings. Be sure to align the shift blocks in the groove of the swash plate. Apply transmission oil to all parts.



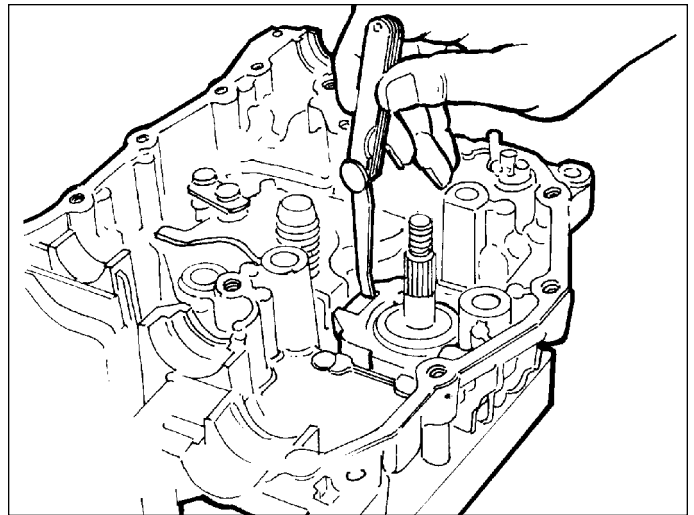
**Figure C-69. Install Swash Plate**

19. Using a feeler gauge, check the clearance between the shift blocks and the swash plate.

Clearance: 0–0.008" (0–0.20 mm)

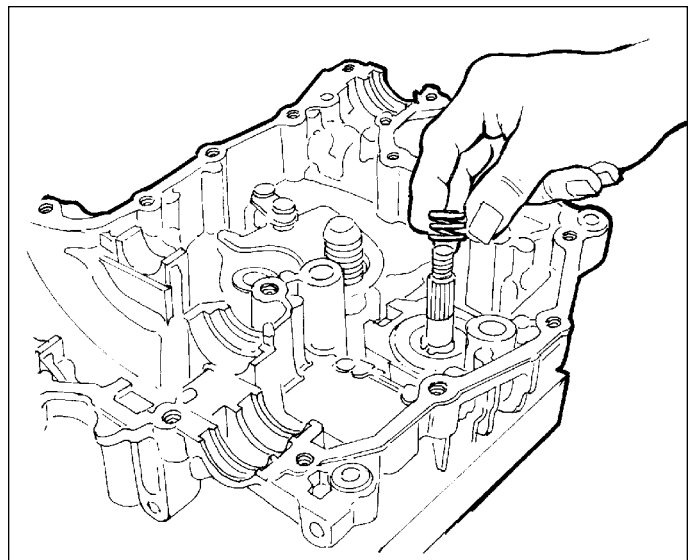
Clearance (max.): 0.012" (0.3 mm)

An excess amount of clearance at these points can make it difficult or impossible to adjust neutral.



**Figure C-70. Measure Shift Blocks Clearance**

20. Install the retaining ring on the input shaft.  
21. Install the pump spring on the input shaft.



**Figure C-71. Install Retaining Ring and Spring**

## 7 Transmission Repair

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22. Clean, lubricate and install the five springs, washers and pistons in the pump cylinder block. The pistons can be installed in any of the ports of the cylinder block.

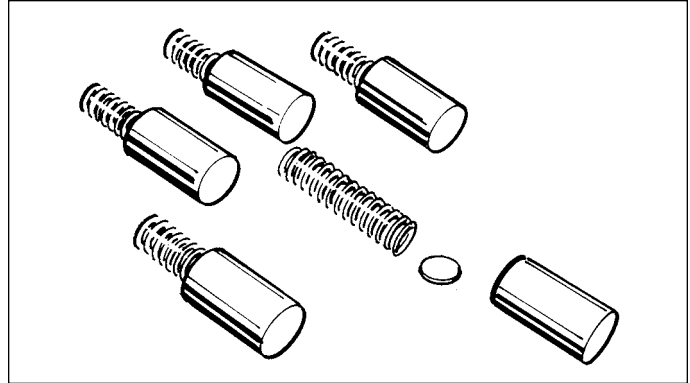


Figure C-72. Install Pump Pistons In Cylinder Block

23. Install the cylinder block onto input shaft with the pistons making contact with the thrust bearing retainer. Make sure the pistons do not fall out of the block and become damaged during installation.
24. Apply clean transmission fluid to all assembled parts.

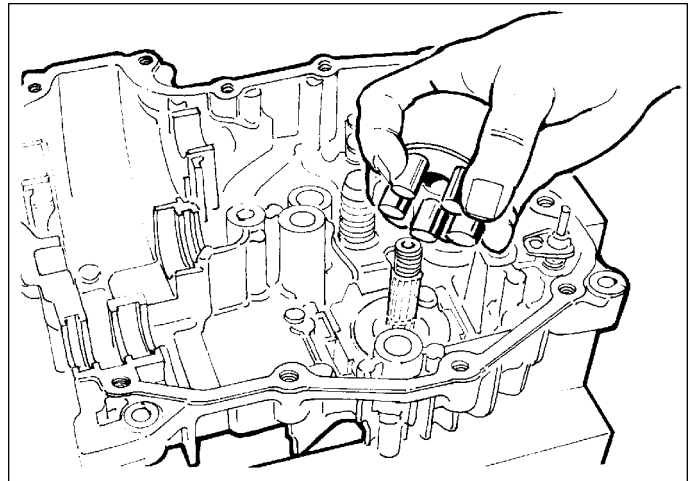


Figure C-73. Install Pump Cylinder Assembly Onto Input Shaft

25. If the motor shaft bearings were removed, install the bearing, washer, and retaining rings, on the shaft.
26. Apply grease to the lip of the new seal and install on the shaft.

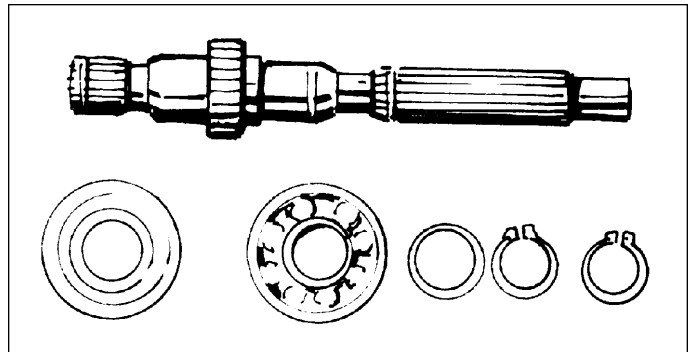
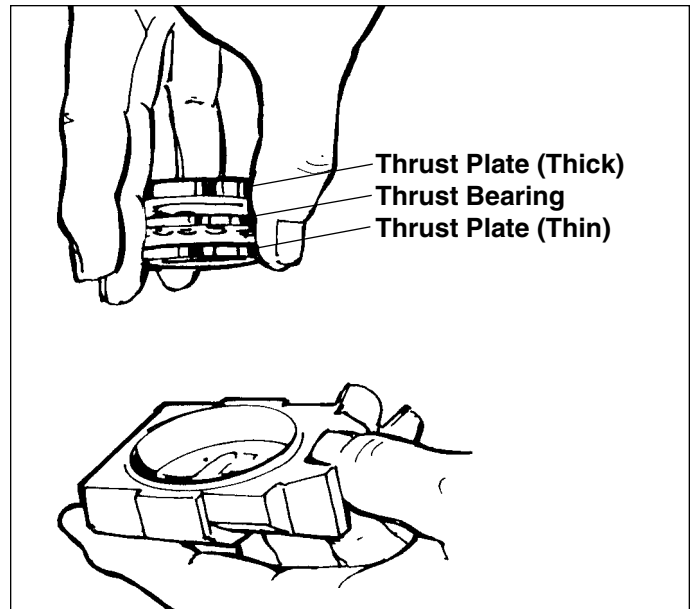


Figure C-74. Assemble Pump Shaft

27. Apply clean transmission fluid to the motor thrust bearings and retainer.
28. Assemble three pieces of thrust bearing, and install into retainer.

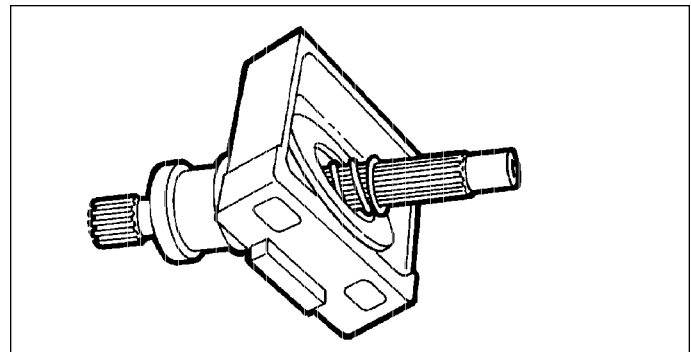
*NOTE: Install thin race first inside swash plate.*



**Figure C-75. Assembly Thrust Bearings**

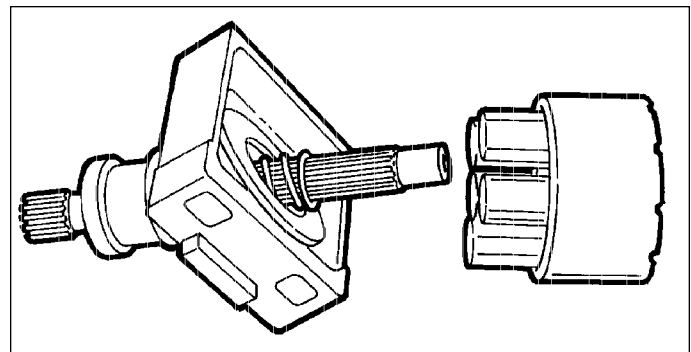
*NOTE: Install the motor shaft retainer rings if not previously installed.*

29. Install the motor shaft through the retainer.
30. Install the motor shaft spring.



**Figure C-76. Install Motor Shaft Through Retainer**

31. Clean and apply clean transmission fluid to the motor piston components.
32. Install the five springs, washers, and pistons to the motor cylinder block.
33. Install the motor cylinder block on the motor shaft. Be sure pistons do not fall out of the block and become damaged during installation.



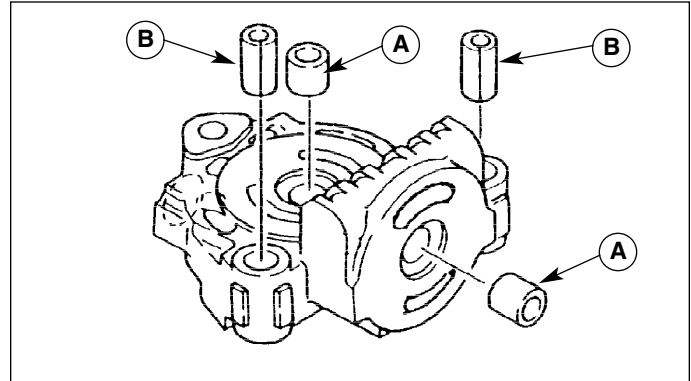
**Figure C-77. Install Motor Cylinder Block on Shaft**

## 7 Transmission Repair

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34. If the center case motor and pump shaft bushings were worn or damaged, install new bushings and center case. Bushings are serviced with the center case and are not available separately.

35. Install new dowel pins in the center case as shown.



**Figure C-78 Install Center Case Bushings**

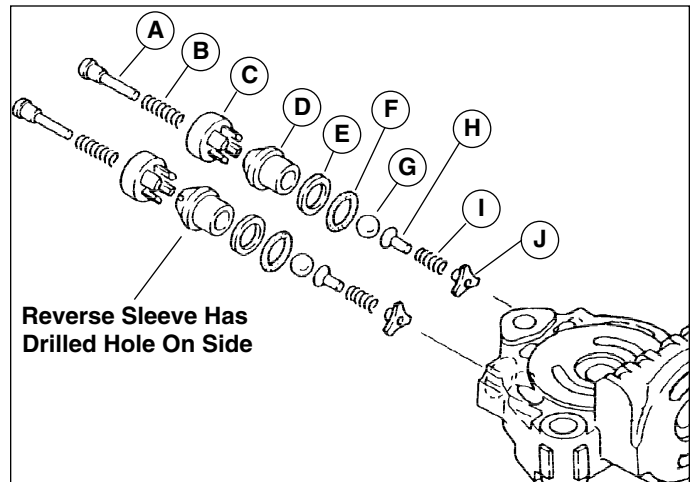
- A. Bushings**
- B. Dowel Pins**

36. Apply grease to packings. Apply clean transmission fluid to all other parts before assembly.

37. Install two guides, light duty springs, ball retainers, balls, new packings, back-up rings and sleeves in center case. Seat the sleeves firmly into the center case. Parts A,B, and C may be left off until after center case is installed.

*NOTE: Do not switch the forward and reverse sleeves as reverse sleeve has a drilled orifice.*

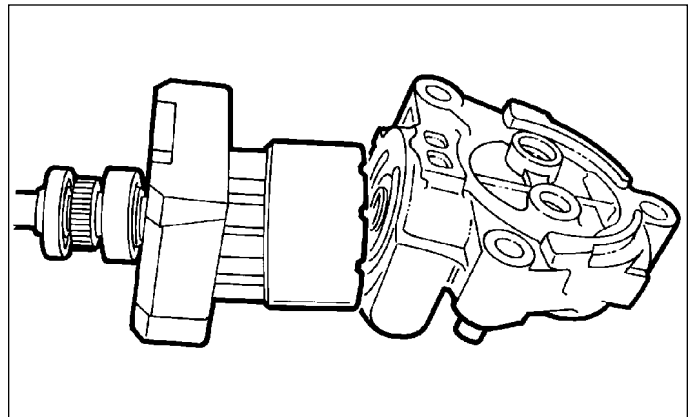
*NOTE: Check the check ball movement after assembly.*



**Figure C-79. Install Bypass Valve Assembly**

- |                         |                               |
|-------------------------|-------------------------------|
| <b>A. Push Pin</b>      | <b>F. Packing</b>             |
| <b>B. Spring (Firm)</b> | <b>G. Ball</b>                |
| <b>C. Valve Cap</b>     | <b>H. Ball Retainer</b>       |
| <b>D. Sleeve</b>        | <b>I. Spring (Light Duty)</b> |
| <b>E. Back-Up Ring</b>  | <b>J. Guide</b>               |

38. Apply clean transmission fluid to the motor assembly and install the motor shaft and piston assembly into the center case.



**Figure C-80. Install Motor Shaft Into Center Case**

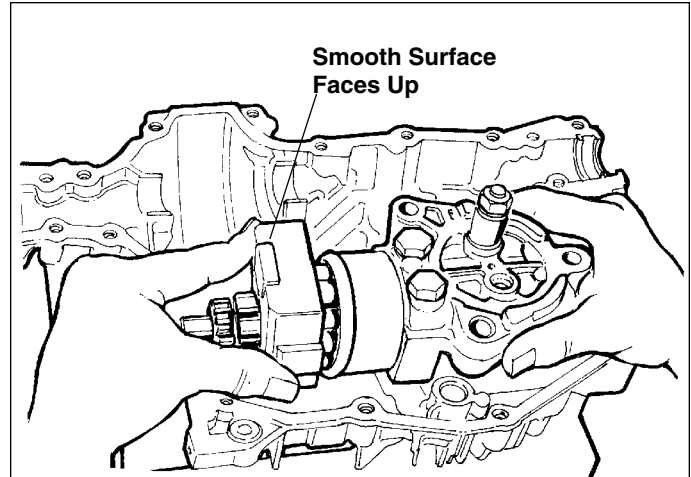
**NOTE:** Use extreme care while installing the motor and center case assembly into the upper case. Do not damage the motor or pump contacting surfaces. Apply clean transmission oil to all surfaces (except outside of seal) before installation.

39. Install the center case assembly into the upper transaxle case as follows.

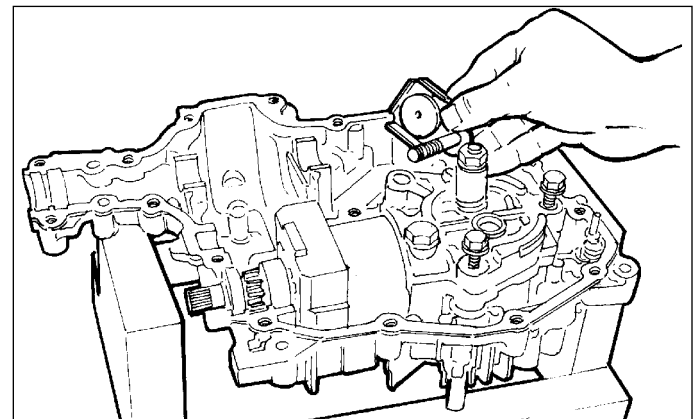
- Apply silicone sealer into the double groove of the upper transaxle case where the motor shaft seal installs.
- Turn the motor swash plate so that the smooth surface faces up. The side with the two recesses should be facing down at this point.

*Note: If this is installed incorrectly, the transmission controls will be reversed and complete disassembly will be required to correct.*

- Simultaneously compress the springs of both the motor and pump cylinder blocks
- Align the pump cylinder block with the splines of the input shaft
- Align the ball bearing of the motor shaft with the bearing bore in the transaxle case.
- Align the motor shaft seal with the bore in the case.
- Drop the dowel pins from the center case into the alignment holes of the transaxle case.



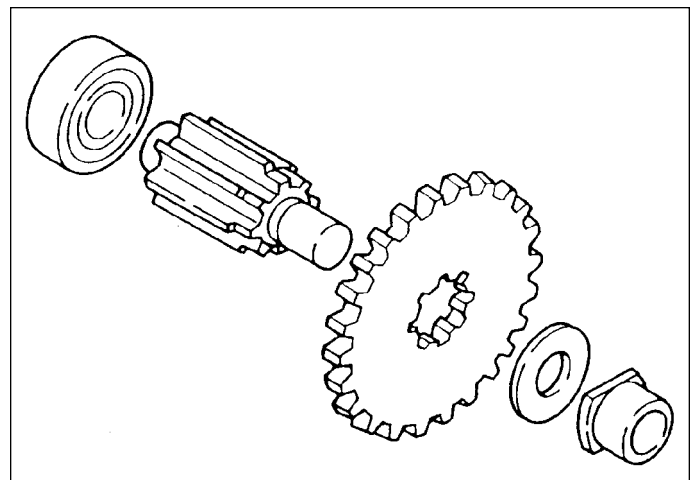
**Figure C-81 Install Center Case**



**Figure C-82. Install Center Case Capscrews**

41. Press bearing on final pinion shaft.

42. Install gear, washer, and bushing to final pinion shaft.



**Figure C-83. Assemble Final Pinion Shaft**



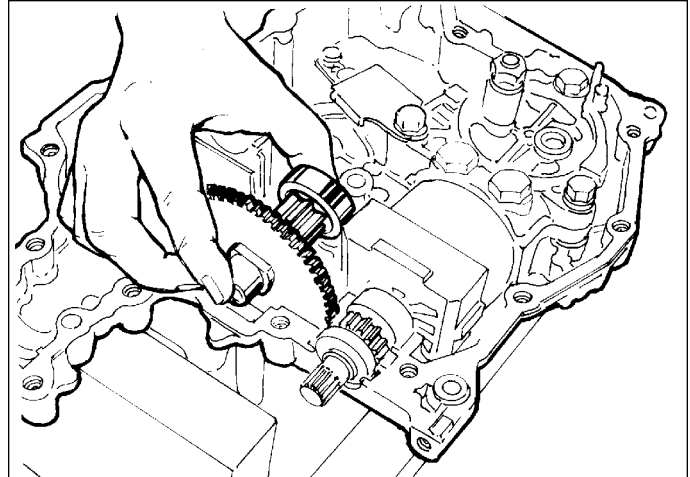
## 7 Transmission Repair

### 7C Tuff Torq K60

43. Install the final pinion shaft into the transaxle case.

*NOTE: Be sure flats of final pinion shaft bushing are facing up and down when seated into case.*

*NOTE: The large gear will have a bit of side-to-side wobble; this is normal. The bevel teeth on the large gear may face either direction.*

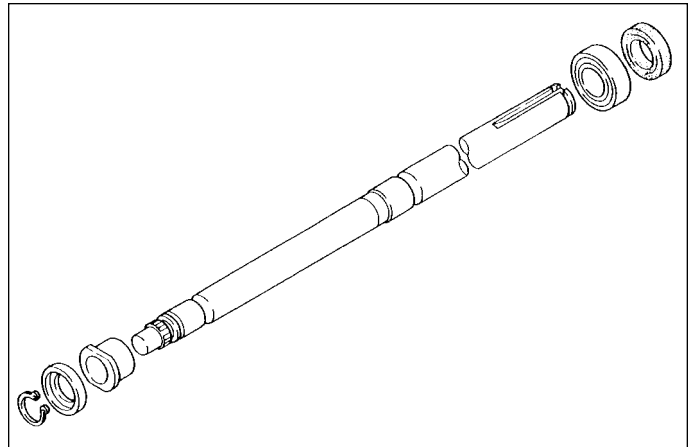


**Figure C-84. Install Final Pinion Shaft**

44. Install the new seals and bearings on the left and right axle shafts (right axle shown).

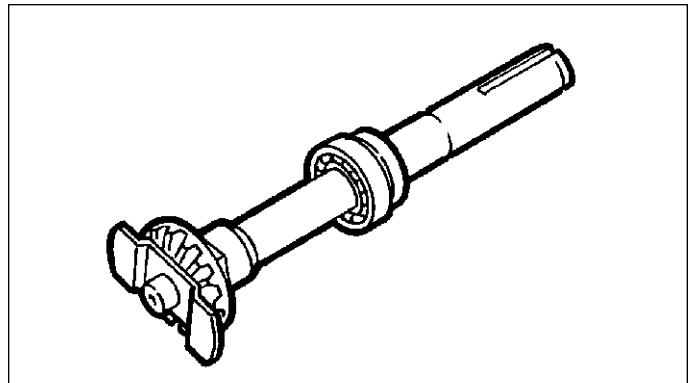
*NOTE: Apply grease to the lip of the seal, and install from the smaller end of the axle shaft.*

45. Install the bushing, collar (stepped notch of collar faces center of transaxle), and retaining ring to left and right axle shafts.



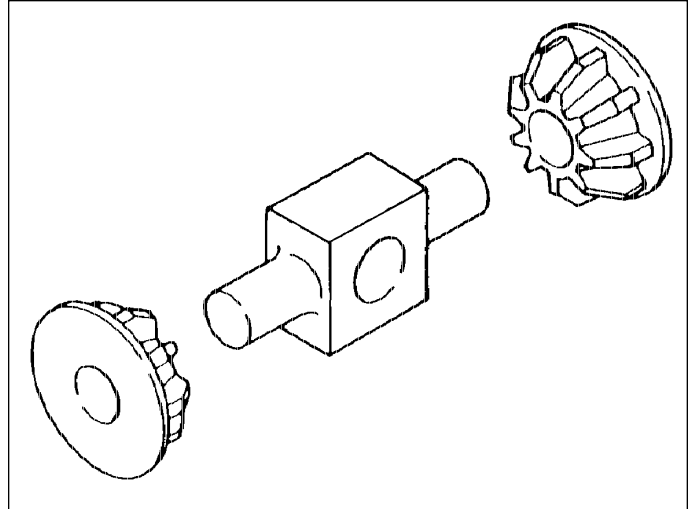
**Figure C-85. Assemble Axle Shaft**

46. Install the differential gear and thrust washer to the left and right axle shafts.



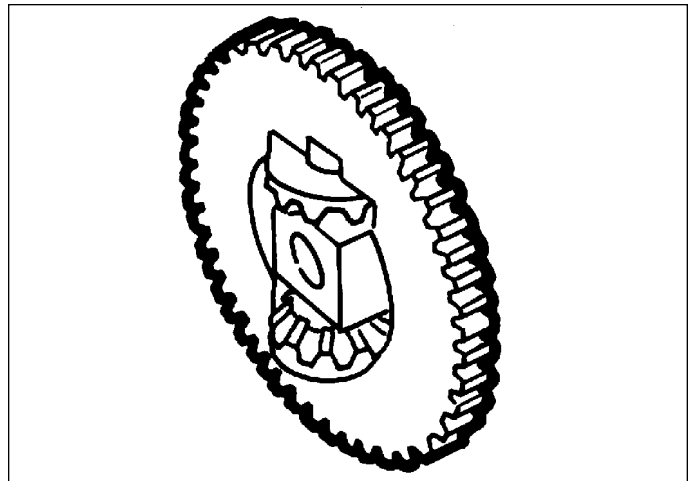
**Figure C-86. Install Differential Gear and Washer**

47. Install the two differential pinions to the pinion shaft.



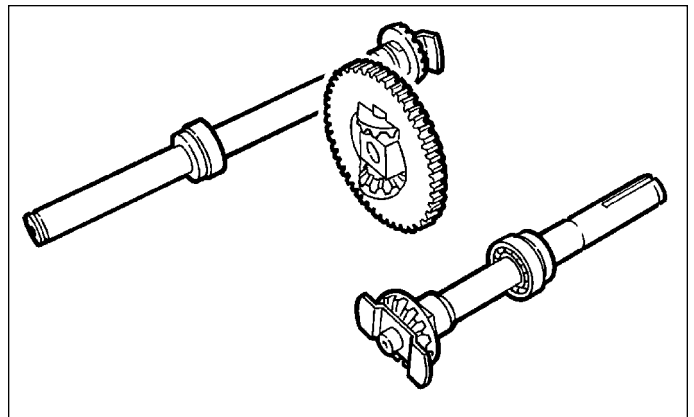
**Figure C-87. Install Pinion Gears**

48. Install the pinion assembly into the center of the axle gear.



**Figure C-88. Assemble Pinion Gears**

49. Install the assembled axle shafts to the differential gear assembly. Stand one axle on end to assemble the differential. If the differential does not rotate freely, check the position of the thrust washers.

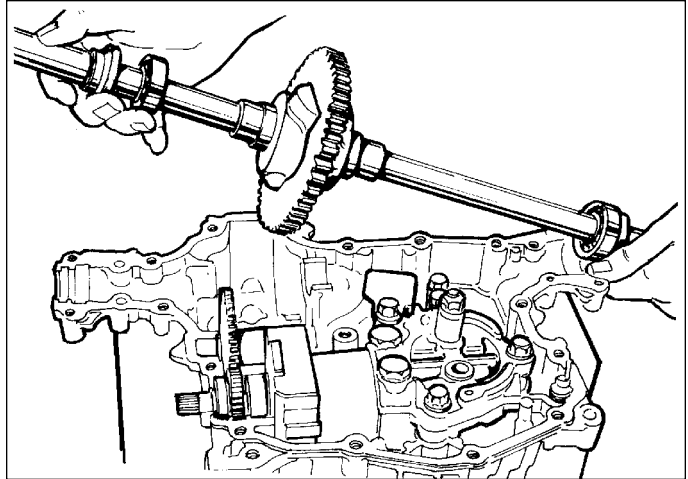


**Figure C-89. Assemble Axles to Gear**

## 7 Transmission Repair

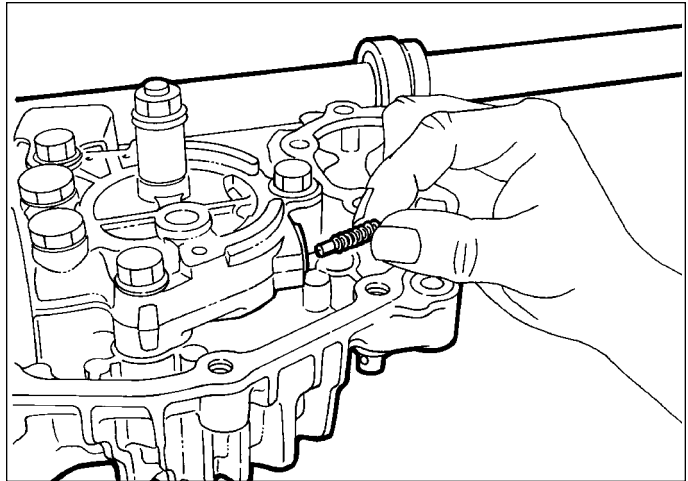
### 7C Tuff Torq K60

50. Apply silicone sealant in double grooves of transaxle case bore where left and right axle seals contact case.
51. Install axle assembly into transaxle case being sure seals and bearings drop into proper bores in case.
52. Turn bushings on left and right axle shafts so that machined flats are facing up and down to match flats on transaxle case. Turn the axle by hand to make sure all gears turn properly.



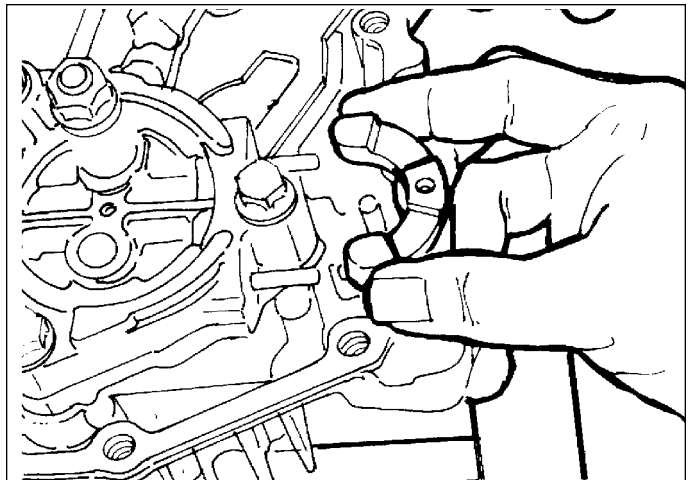
**Figure C-90. Install Axle In Transaxle Case**

53. Install bypass valves, caps, pins and springs if not previously done.



**Figure C-91. Install Bypass Valve**

54. Install bypass arm on pin on bypass shaft. Check for free movement of arm and pins into pump.



**Figure C-92. Install Bypass Arm**

57. Apply clean transmission fluid to the filter and filter seals. Install seals on the filter and install the filter in the groove of the center case.

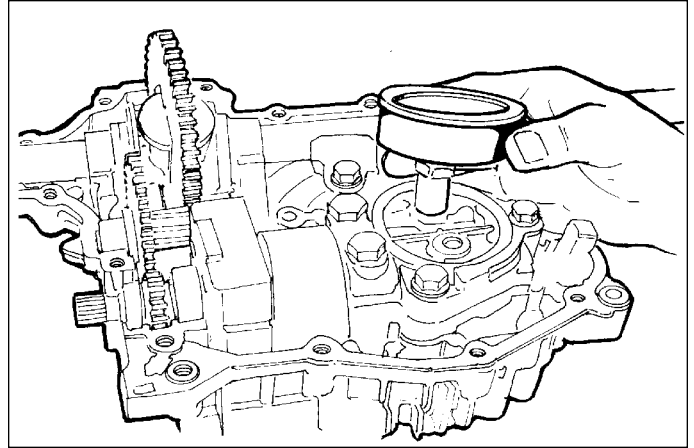


Figure C-93. Install Filter and Seals

58. Apply silicone sealant to the lower half of the transaxle case being sure of the following:

- Case half is clean of all old sealant and oil.
- Sealant is applied to inside edge of mating flange at bolt holes.
- Sealant is applied to double grooves of machined bores where left and right axle seals and final pinion shaft seal contacts case.
- Sealant is applied around bolt hole located in center of transaxle case.

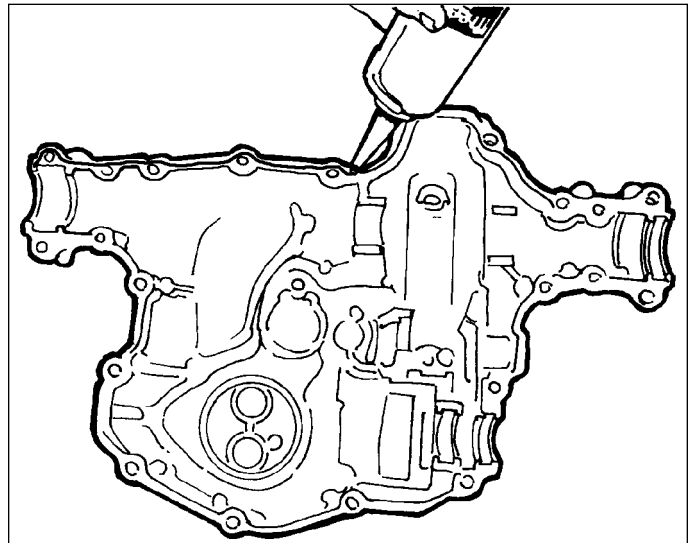


Figure C-94. Apply Sealant To Case

**NOTE:** Before installing the case cover, recheck the bushings on the axle shafts and final pinion shaft to make sure machined flats are facing the flat face of the case.

59. Install the lower case on the upper case.
60. Install nineteen capscrews in the transaxle case. Rotate the capscrews backwards to index the cap-screw's threads with the existing threads in the case to prevent cutting new threads. Start the capscrews by hand. Do not forget the center capscrew. Torque the capscrews starting from center and working outward.

#### Transaxle Case Torque:

**New Case: 20–23 ft-lb.**

**Used Case: 16–18 ft-lb.**

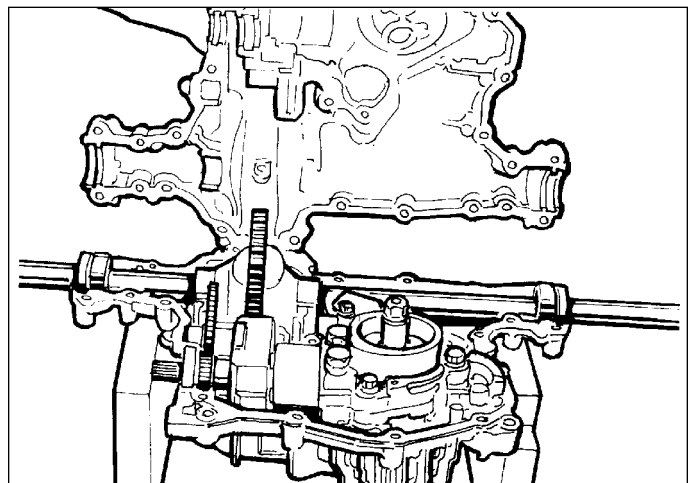


Figure C-95. Install Lower Case On Upper Case

## 7 Transmission Repair

### 7C Tuff Torq K60

61. Install a new seal on the transaxle drain plug and install the plug into the case.

**Drain Plug Torque: 9–12 lb-ft.**

62. Clean oil from the brake shaft and install the brake drum and snap ring. See Figure C–103.

63. Install the brake assembly with three capscrews and washers.

**Brake Mounting Capscrews Torque: 16–21 lb-ft.**

64. Install the control lever cam plate.

**Control Shaft Capscrew Torque: 70–80 in-lbs.**

65. Install the input shaft pulley bottom retaining ring, pulley, top retaining ring, and setscrew.

**Pulley Setscrew Torque: 90–100 in-lbs.**

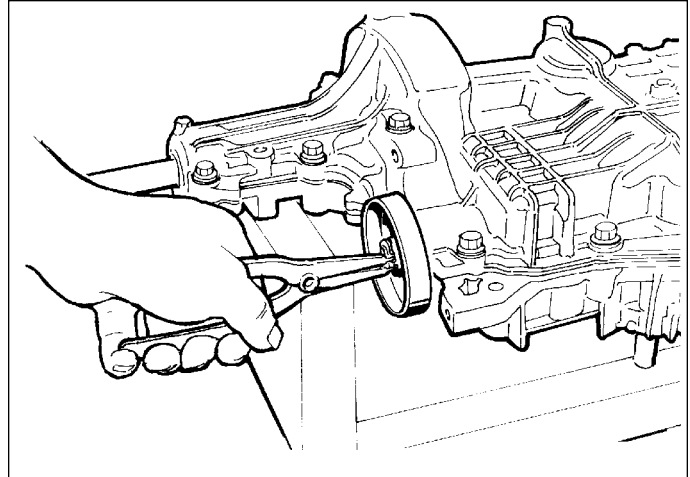


Figure C–96. Install Brake Drum

66. Install the expansion chamber, connector hose, spring clips, reservoir, and cap.

67. Remove the air vent cap (Figure C–104) and slowly pour SAE 10W-30 motor oil into the the expansion chamber until oil comes out of the vent.

68. Replace the vent cap and fill the expansion chamber to the “Full Cold” mark.

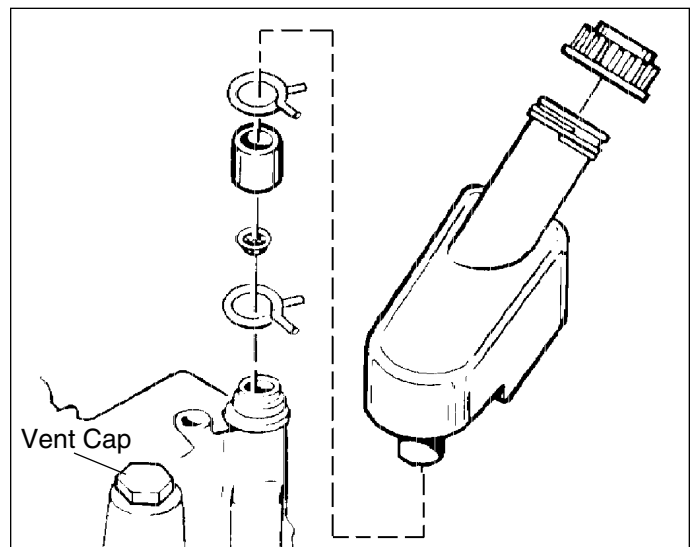


Figure C–97. Install Expansion Chamber

#### Installation

1. Place the transaxle on a floor jack. Remove the expansion chamber cap and center the transaxle under the rear of the frame.
2. Connect the return to neutral linkage to the cam plate as the transaxle is raised into tractor.

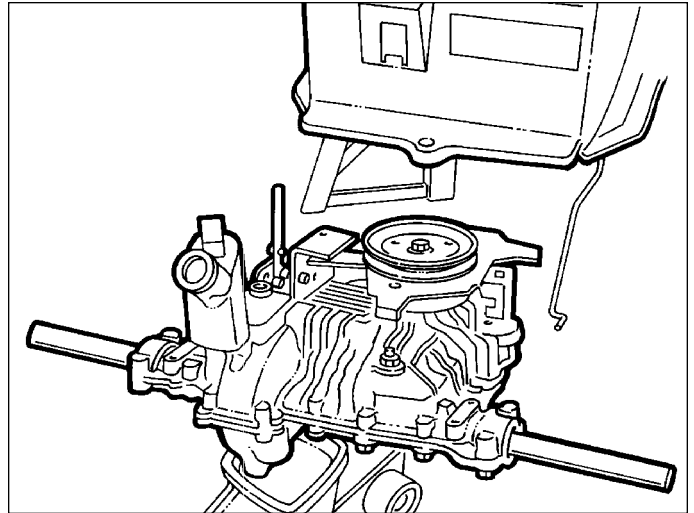


Figure C-98. Install Transaxle To Frame

3. Install the four mounting capscrews and nuts.

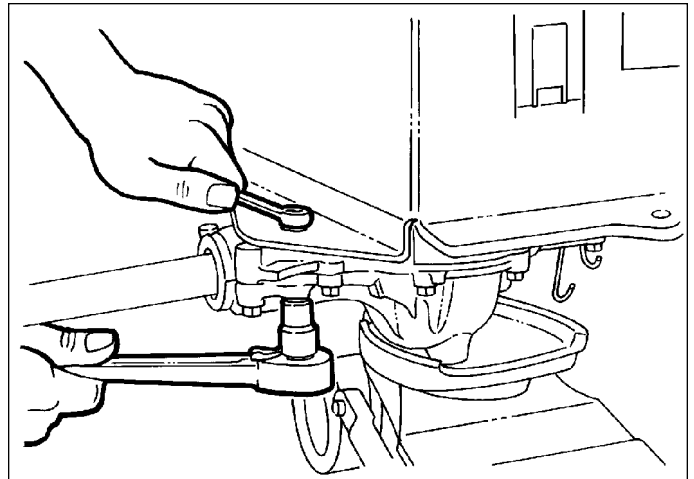


Figure C-99. Install Mounting Capscrews

4. Install following components:

- torque strap
- free wheel lever spring
- shift control rod
- hydro drive belt
- brake rod
- control cam return spring
- neutral return rod
- hydro drive spring
- input shaft fan
- rear wheels

5. Purge air from the transmission. See "Purging Air from Transaxle"

## 7C Tuff Torq K60 - Notes

[illegible]



## HYDRO-GEAR 310-0750 & 310-0800

### General

The Hydro Gear 0750/0800 uses a 10cc variable displacement pump and a 21cc fixed displacement motor. The variable pump features a cradle swashplate with direct-proportional displacement control. Reversing the tilt of the swashplate reverses the flow of oil to the motor, which changes the direction of motor rotation.

The pump and motor are of the axial piston design, and both have spherical nosed pistons which are held against a thrust race by internal compression springs.

The fluid supply for the hydrostatic transaxle is contained within the housing and drawn through an integral filter before entering the pump. Two check valves are used to direct excess flow to the low pressure side of the loop.

**IMPORTANT: Cleanliness is a primary means of assuring satisfactory life on new or repaired units. Cleaning parts by using a solvent wash and air drying is usually adequate. As with any precision equipment, all parts must be kept free of foreign materials and chemicals.**

- Protect all exposed sealing surfaces and open cavities from damage and foreign material.
- Prior to removing and disassembling the transaxle, the tractor should be steam cleaned or blown with compressed air before beginning any repairs.
- It is recommended that all seals be replaced before transaxle is reassembled. Lightly lubricate all seals with a clean petroleum jelly prior to assembly.
- After the transaxle is removed from the tractor, remove all external components such as the brake arm, brake actuating pins, control arm, cooling fan, input pulley, and frame mounting hardware before separating the case halves.

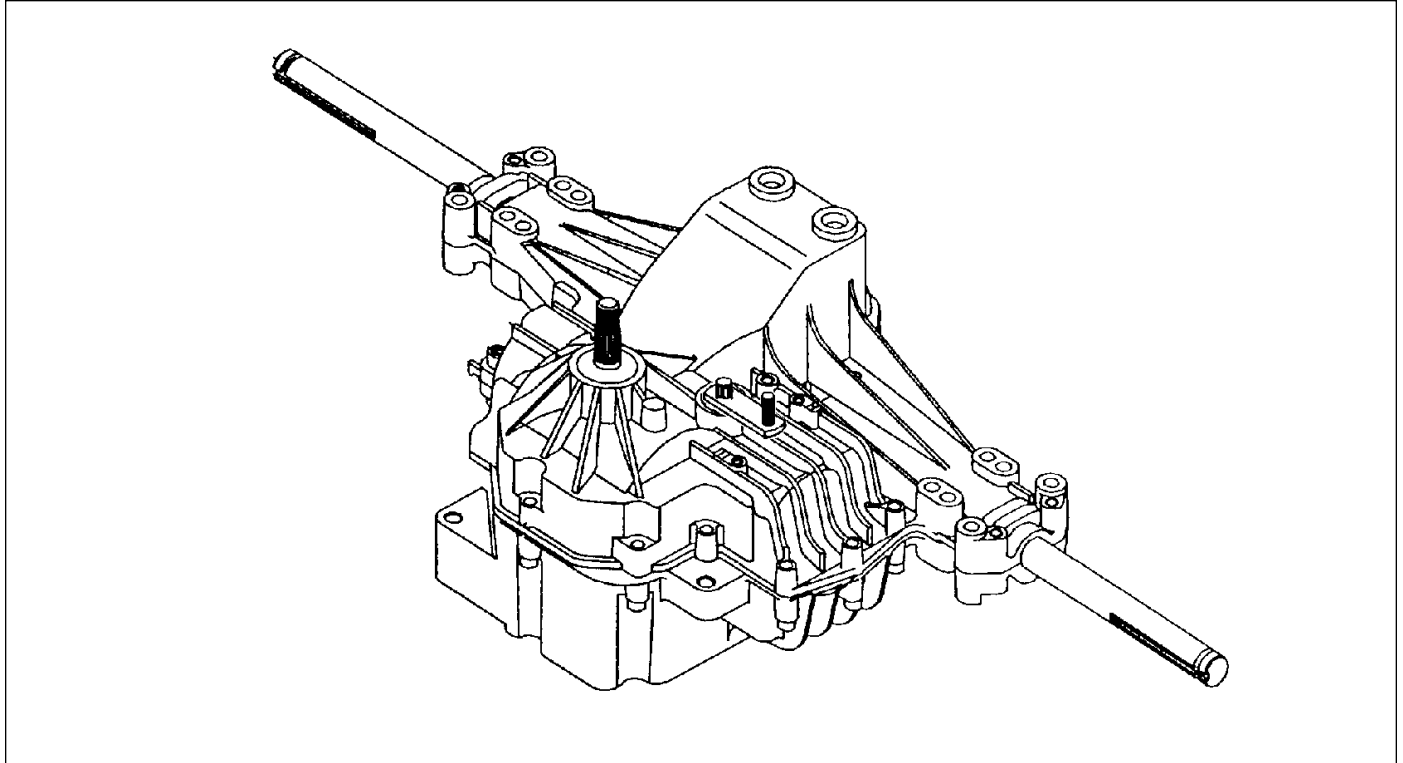


Figure D-1 Hydro-Gear Model 0750/0800 Hydrostatic Transaxle

## 7 Transmission Repair

7D Hydro-Gear 0750 / 0800

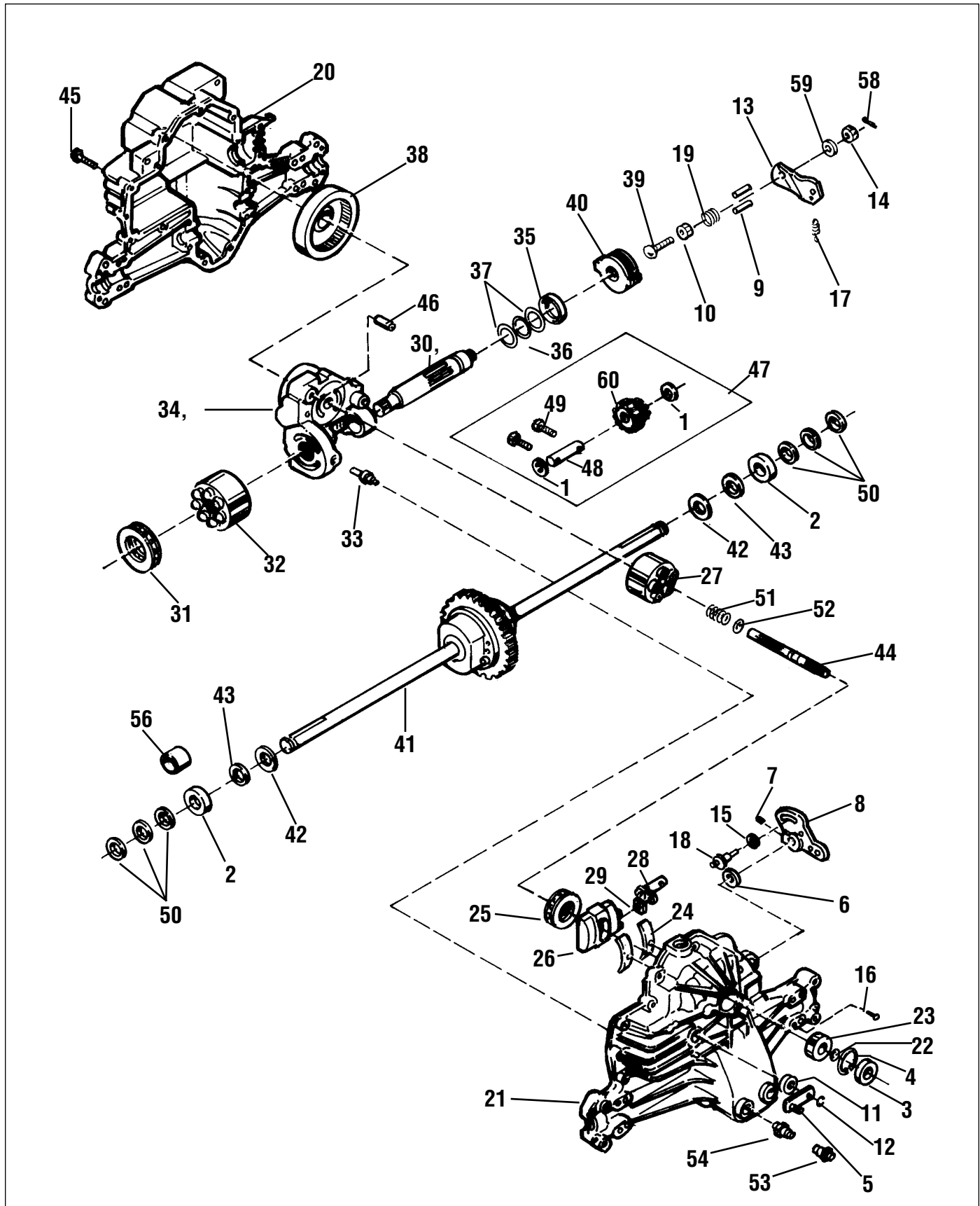


Figure D-2 Hydro Gear Model 750 Hydrostatic Transaxle

<b>Ref.</b>	<b>Qt.</b>	<b>Description</b>	<b>Ref.</b>	<b>Qt.</b>	<b>Description</b>
1	2	WASHER, 7/16 x 1 x 1/2	32	1	BLOCK, Cylinder
2	2	BALL BEARING (Model 311-0800)	33	1	ACTUATOR, Bypass
3	1	SEAL, Lip	34	1	CENTER SECTION ASSY. (Model 311-0800)
4	1	RETAINING RING	35	1	SEAL, Lip
5	1	ARM, Bypass	36	1	RETAINING RING
6	1	SEAL, Lip	37	2	WASHER, 17/64 x 23/64 x 1
7	1	SETSCREW	38	1	ELEMENT, Oil Filter
8	1	ARM, Control	39	1	BOLT, 5/16-18 x 1-3/4
9	2	PIN, Actuating	40	4	BRAKE ROTOR/STATOR KIT
10	1	NUT, Hex, Lock, 5/16-24	41	1	DIFFERENTIAL ASSY.
11	1	SEAL, Lip	42	2	WASHER, 3/4 X 1-1/2 X 1/32
12	1	RETAINING RING	43	2	SEAL, 3/4 X 1-1/4 X 1/4
13	1	ARM, Actuating	44	1	SHAFT, Input
14	1	CASTLE NUT, 5/16-24	45	21	BOLT, 1/4-20 x 1-3/8
15	1	PUCK, Dampener	46	2	PIN, 1/2 O.D. x 7/16 I.D. x 3/4
16	1	DRIVE PIN	47	1	JACK SHAFT/PINION GEAR ASSY. (Incl. Ref. Nos. 1, 48, 49 & 60)
17	1	SPRING, Extension	48	1	JACK SHAFT
18	1	STUD, 5/16-24	49	2	CAPSCREW, 6 mm x 13/64
19	1	SPRING, Compression	50	6	SEAL, Wiper
20	1	HOUSING, Lower	51	1	SPRING, Block
21	1	HOUSING, Upper	52	1	WASHER, Block Thrust
22	1	RING, Wire	53	1	VENT CAP ASSY.
23	1	BALL BEARING, Shaft	54	1	FITTING & O-RING ASSY.
24	2	BEARING, Cradle	55	1	SHAFT, Motor (Model 311-0750)
25	1	BEARING, Thrust	56	2	SLEEVE BEARING (Model 311-0750)
26	1	SWASHPLATE	57	1	CENTER SECTION ASSY. (Model 311-0750)
27	1	BLOCK, Cylinder	58	1	COTTER PIN
28	1	ARM, Trunnion	59	1	WASHER, 7/16 x 7/8 x 51/64
29	1	GUIDE, Slot	60	1	PINION GEAR (See Ref. No. 47)
30	1	SHAFT, Motor (Model 311-0800)			
31	1	BEARING, Thrust			

# 7 Transmission Repair

7D Hydro-Gear 0750 / 0800

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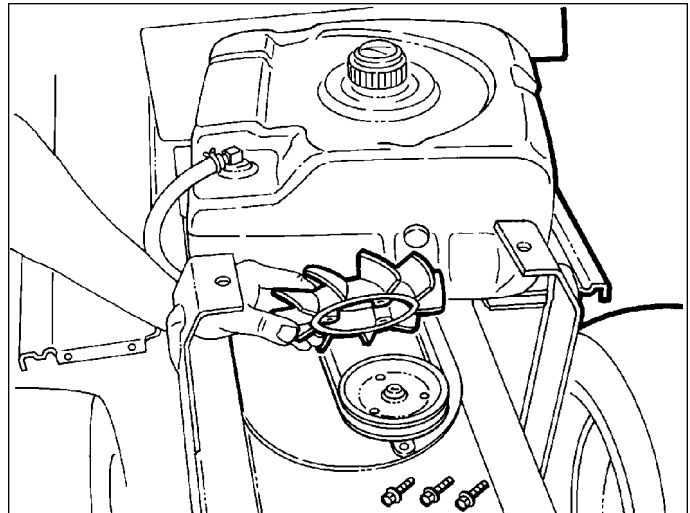
## Removal

1. Remove the seat deck. (See Seat Deck Removal)
2. Elevate the rear end. (See Elevating Rear End for Safe Service)
3. Remove the rear wheels. (See Rear Wheel Removal)

4. Loosen the seat supports and slide the fuel tank forward.

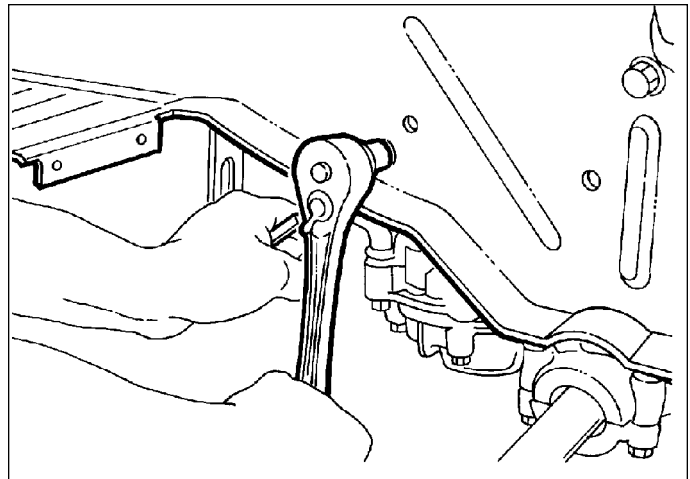
*NOTE: The fuel line does not have to be disconnected.*

5. Remove the fan from the input shaft pulley.



**Figure D-3. Moving Fuel Tank Forward, and Removing Input Shaft Fan.**

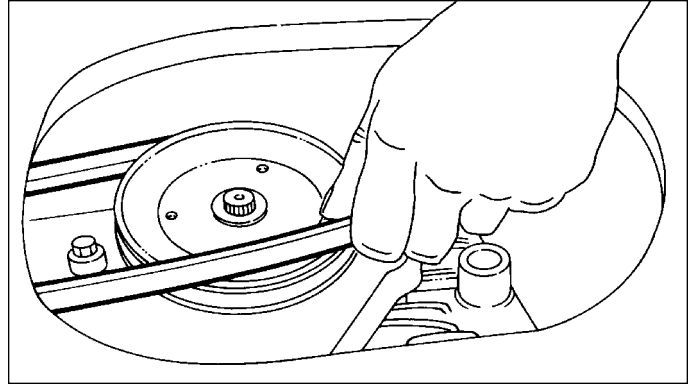
8. Remove the belt guide bolt and left mounting strap from the left side of the frame.



**Figure D-4. Removing Belt Guide**

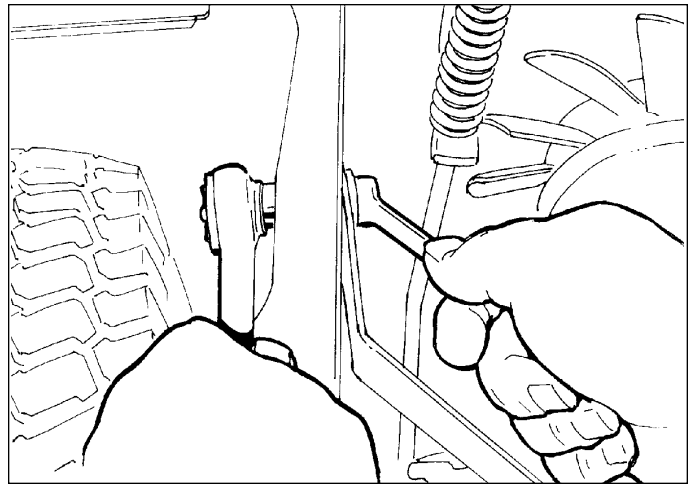
9. Lift the drive belt from the input shaft pulley.

*NOTE: It may be necessary to remove the belt from the clutch pulley to slacken the belt before removing it from the input shaft pulley.*



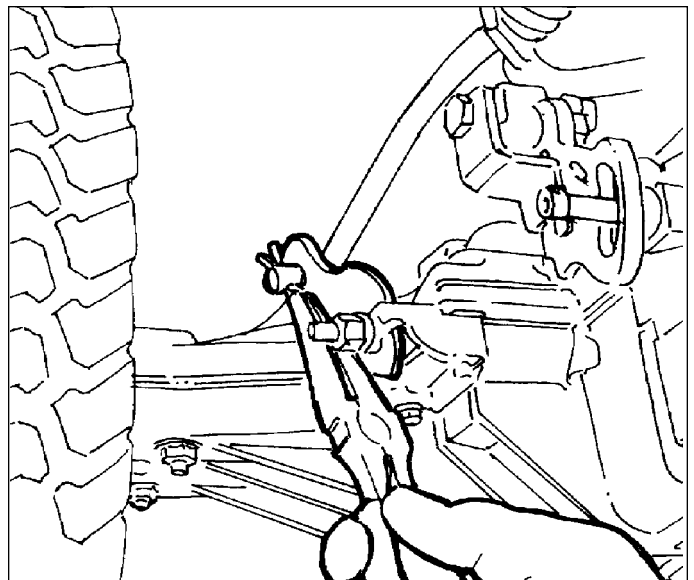
**Figure D-5 Remove Hydro Belt**

10. Remove the torque strap mounting bolt from the right side of the frame.



**Figure D-6. Remove Torque Strap**

11. Release the parking brake. Remove the cotter key and washer holding the brake rod to the transaxle brake lever.
12. Remove the nut, lock washer, flat washer, spacer, and bolt, holding the shift rod to the control lever on transaxle.



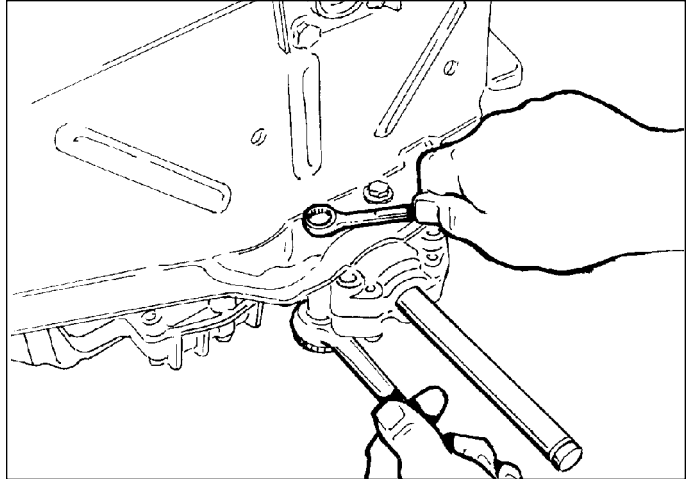
**Figure D-7 Remove Brake Rod**

## 7 Transmission Repair

7D Hydro-Gear 0750 / 0800

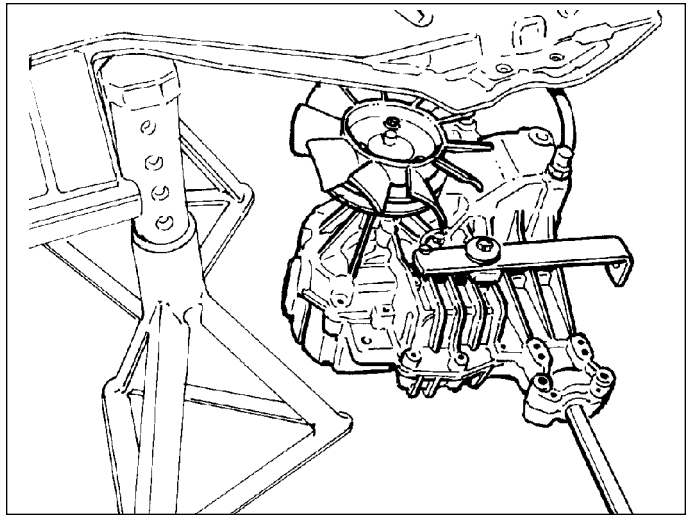
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13. Place a jack under the transaxle. Remove the axle mounting bolts from the left and right side of the frame.



**Figure D-8 Remove Mounting Bolts**

14. Lower the transaxle to ground making sure that the mounting straps and linkages clear the frame.



**Figure D-9 Remove Transaxle**

- 15 Remove all external components from transaxle case:

- Brake Arm
- Brake Actuating Pins
- Hydrostatic Control Arm
- Cooling Fan (if not previously done)
- Input Shaft Pulley
- Bypass Valve Actuating Lever
- Case Vent Hose
- Frame Mounting Hardware

## Disassembly

1. Drain transaxle oil by removing the breather hose assembly and positioning the transaxle so the breather port is at lowest point of transaxle to allow oil to drain thoroughly.
2. Remove the nut (A, Figure D-10) securing the brake arm and remove the brake arm.

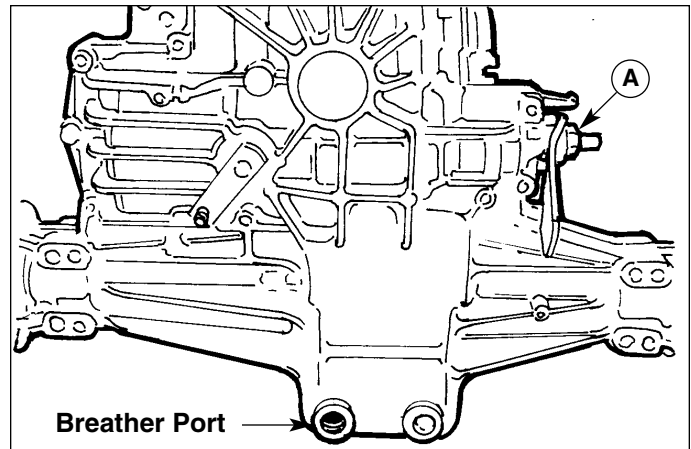


Figure D-10. Drain Oil From Breather Port  
A. Brake Arm Nut

3. Position the transaxle upside down and secure it to the bench to provide access to the twenty housing assembly cap screws.
4. Remove the capscrews.

*NOTE: Prior to October 27, 1993, a 3/16" drive internal hex head cap screw was used. At the time, a change was made to an "E-8" external drive "Torx" cap screw.*

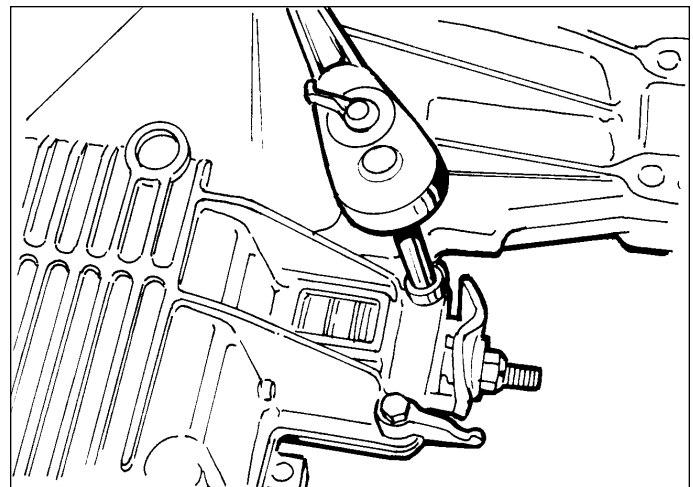


Figure D-11. Remove Housing Assembly Bolts

5. Separate the two housing halves by applying pressure with two large straight blade screwdrivers. Use caution to prevent damage to the mating sealing surfaces as you separate the two halves.

*NOTE: The sealant will make the two halves difficult to separate.*

6. Remove the bottom case half from transaxle. All components should remain in the top case half.

**CAUTION: The axle/differential assembly may stick as the lower housing is being lifted off the upper housing.**

7. Inspect the lower case half for damage. Inspect the axle journal bearing pockets for excessive wear. Inspect the brake rotor/stator pocket for excessive wear.

*NOTE: Prior to reassembly, the lower housing must be thoroughly cleaned and all the old sealant must be removed.*

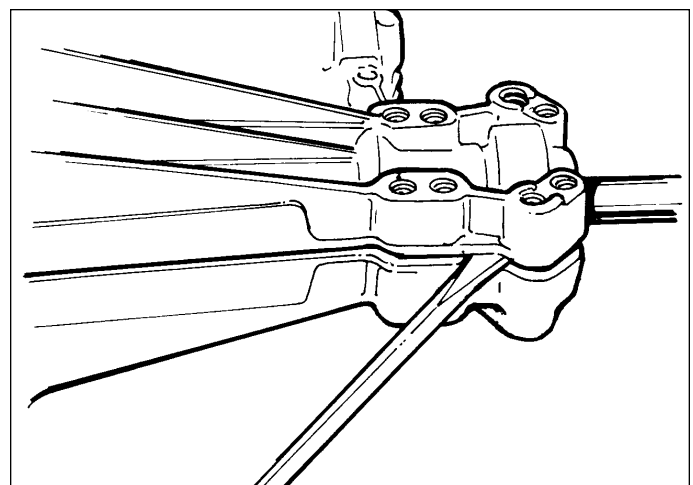


Figure D-12. Separate Housing Halves



## 7 Transmission Repair

### 7D Hydro-Gear 0750 / 0800

8. Lift the axle/differential assembly out of the upper housing.

*NOTE: It will be necessary to remove any burrs or rust from the axle ends prior to the removal of the two bronze bearings. Burns and rust will damage the bearings.*

*NOTE: The 0800 model uses ball bearings to support the axle shaft. Ball bearings can be used in the 0750 if desired.*

9. Remove the two bronze journal bearings, four lip seals and two flat washers from the axle ends.

*NOTE: The lip seals must not be re-used during reassembly.*

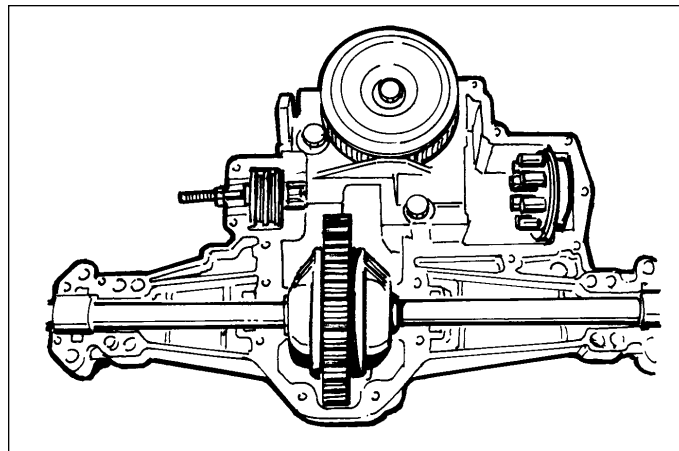


Figure D-13. Components In Upper Housing

10. Model 0750: Inspect the bronze bearings for excessive wear. The bearings should be 0.754" to 0.756".

Model 0800: Inspect the ball bearings for excessive play.

11. Inspect the axle ends for damage or excessive wear. The axle ends should be 0.749" to 0.750".

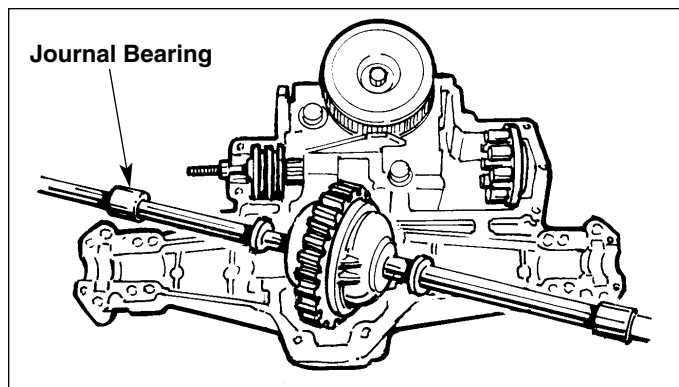


Figure D-14. Remove Axle / Differential Assembly

12. Inspect the differential bevel gears by rotating the axle ends.
13. Inspect the final drive gear teeth for excessive wear or damage.
14. Check the differential assembly screws for proper torque. They should be torqued to 12-14 ft. lbs.
15. Inspect the journal bearings inside the differential housing for excessive wear by feeling the shafts for an unreasonable amount of play.
16. If excessive wear or damage has been found, the complete assembly must be replaced.

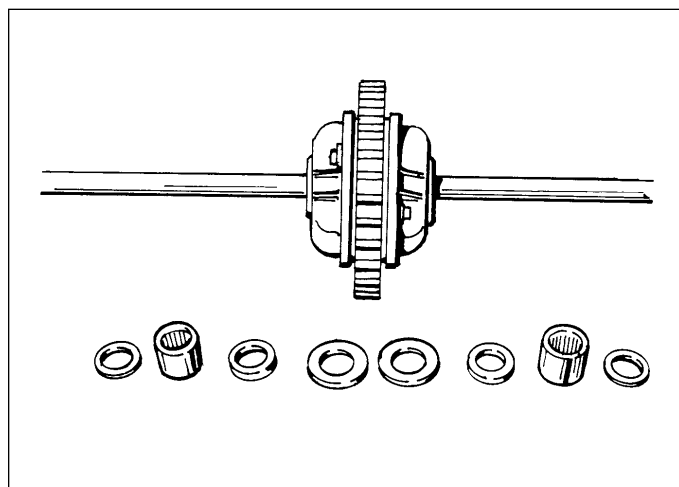


Figure D-15. Axle / Differential Components

17. Remove the brake rotors and stators by sliding one at a time off the end of the splined motor shaft.
18. Inspect each side of both rotors for excessive wear or damage.
19. Inspect the rotor's internal splines for excessive wear or damage.
20. Replace rotors and stators as a complete kit if excessive wear or damage is found. Inspect all other mating parts.

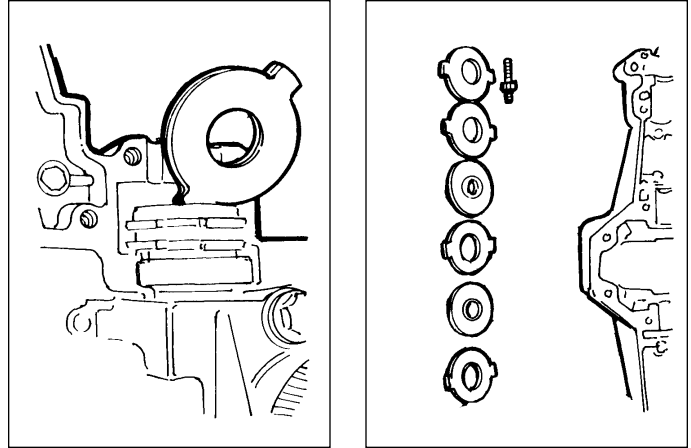


Figure D-16. Remove / Inspect Brake Rotors

21. Remove the oil filter. After inspecting the filter for unusual particles that it may have trapped, dispose of it properly and replace it with a new oil filter during reassembly.

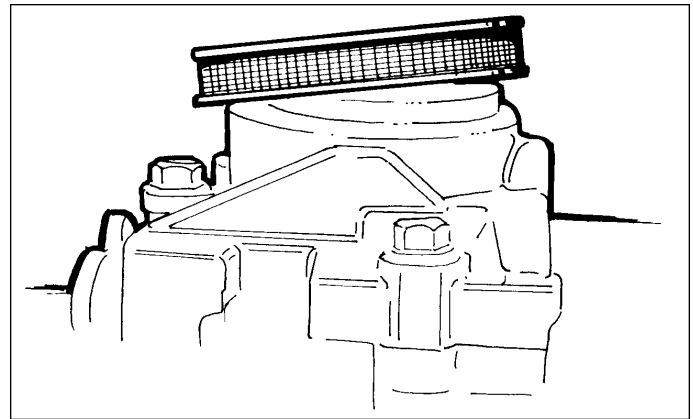


Figure D-17. Remove Oil Filter

22. Using a 9/16" socket, remove the three assembly bolts retaining the center section in the upper housing. The bolts are Lock-tite-ed in and may require the use of a breaker bar to loosen.

**CAUTION: The pump and motor piston springs may push the center section assembly out of position while you remove these bolts.**

23. Remove the center section assembly from the housing. The pump block assembly should remain in the upper housing on the input shaft, but may stick to the center section.

- 23a Check the check valve plate bolt torque, but **do not remove**. Two styles of check plates have been used, one has three bolts while the other has four. The plate with four bolts should be torqued to 170 to 240 in-lbs., while the plate with three bolts should be torqued to 135 to 185 in-lbs..

*NOTE: The model 0800 has no check valve plate.*

**CAUTION: The aligning pins, motor shaft, bypass plate, pump block and motor block assemblies are NOT retained to the center section or the upper housing and may become separated from the assembly during removal.**

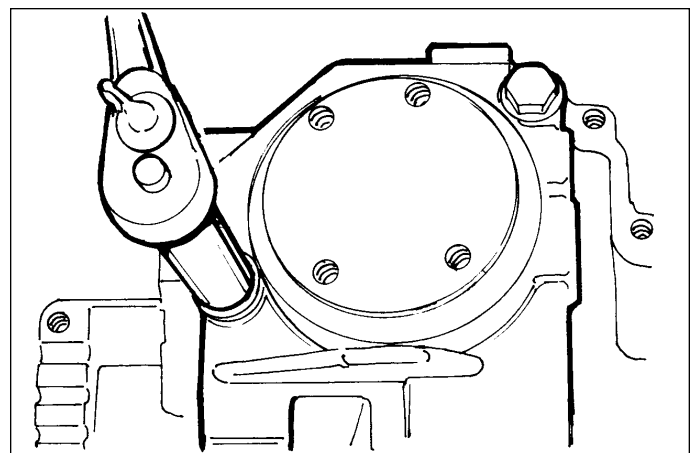


Figure D-18. Remove Center Section Assembly

## 7 Transmission Repair

7D Hydro-Gear 0750 / 0800

24. Remove the motor block assembly from the motor shaft and inspect for unusual wear or damage. The pistons should fit with very little side clearance in the block bores, but must slide freely.

*NOTE: The correct bore diameter for the block is 0.6776" to 0.6784" and the pistons should be 0.6767" to 0.6770".*

25. Remove the motor shaft, washers and bypass plate from the center section and inspect for unusual wear or damage.

*NOTE: Be careful not to loose the bypass plate*

26. Inspect the center section running surfaces for unusual wear or damage.

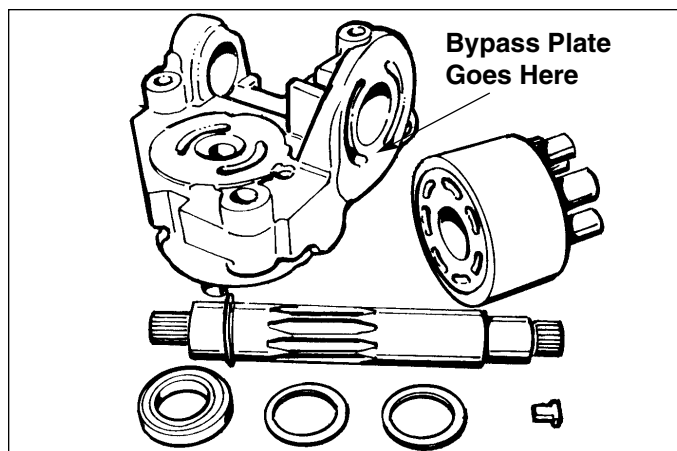


Figure D-19. Center Section / Motor Shaft

27. Remove the pump block assembly, block thrust washer and spring from the input shaft and inspect for unusual wear or damage. The pistons should fit with very little side clearance in the block bores, but must slide freely.

*NOTE: The correct bore diameter for the block is 0.6295" to 0.6303" and the pistons should be 0.6288" to 0.6291".*

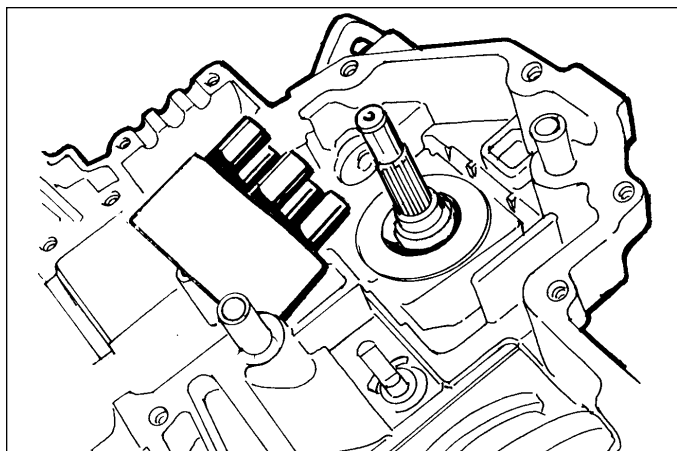


Figure D-20. Remove Pump Block Assembly

28. Remove the two internal hex head cap screws retaining the jackshaft to the housing with a 5 mm hex wrench and remove the jack shaft/pinion gear assembly from the housing.

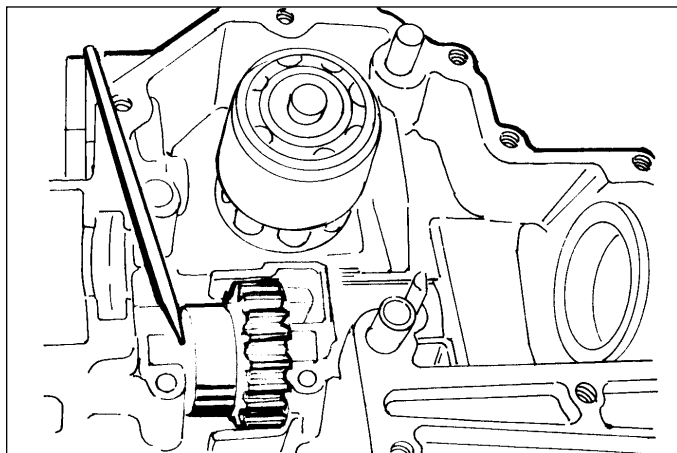
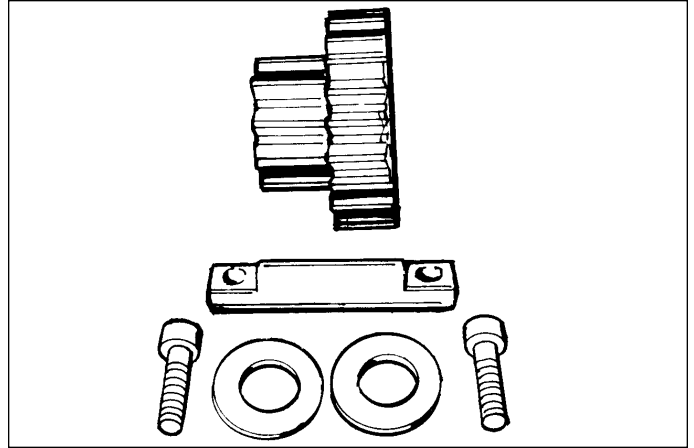


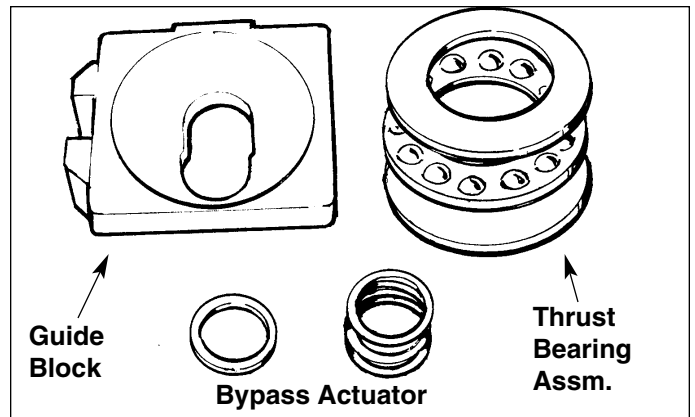
Figure D-21. Remove Jackshaft / Pinion Gear Assy.

29. Inspect the jackshaft running surface for excessive wear or damage. The jackshaft should be 0.4986" to 0.4996".
30. Inspect the pinion gear bore for excessive wear or damage. The bore should be 0.5014" to 0.5024".
31. Inspect the pinion gear teeth for excessive wear or damage.
32. If excessive wear or damage was found, the complete assembly should be replaced.



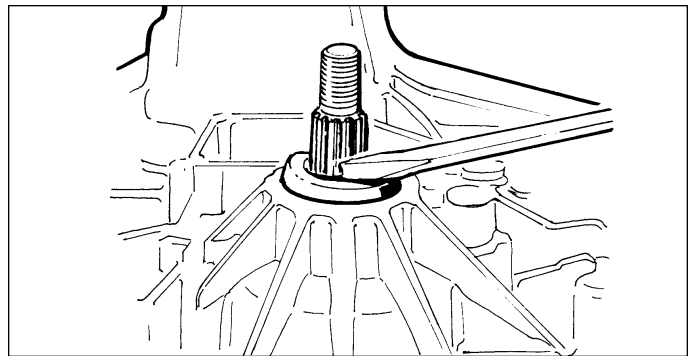
**Figure D-22. Jack Shaft/Pinion Gear Components**

33. Remove the motor thrust bearing assembly, swash-plate kit and cradle bearings from the housing and inspect for unusual wear or damage.
34. Remove the slot guide block from the displacement control shaft.
35. Remove the bypass actuator from the housing.

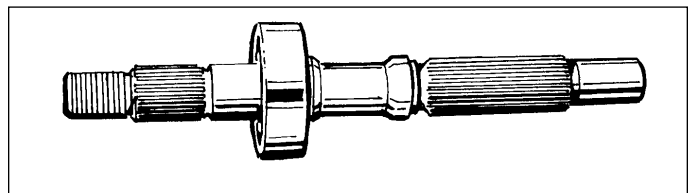


**Figure D-23. Swashplate & Thrust Bearing Assembly**

36. Reposition the housing and remove the input shaft lip seal from the housing bore. A hook type tool may be used to pry the seal out. Care must be taken to avoid damage to the housing bore, shaft sealing surface or bearing. Once removed, the seal is not to be reused.
37. Remove the input shaft bearing retaining ring.
38. Remove the pump and input shaft assembly from the transaxle housing.
39. Inspect the shaft and bearing for unusual wear or damage.
40. Reposition the housing and remove the displacement control shaft and lip seal.
41. Inspect the housing for damage.



**Figure D-24. Remove Input Shaft Seal**



**Figure D-25. Pump Input Shaft Assembly**

# 7 Transmission Repair

7D Hydro-Gear 0750 / 0800

## Assembly

### Important Notes:

All parts should be thoroughly cleaned in a suitable solvent. All sealant material **MUST** be removed from the housing halves prior to reassembly.

Inspect all parts for damage, nicks or unusual wear patterns. Replace all parts having unusual, excessive wear or discoloration.

Inspect the sealing surfaces, bearing surfaces and shaft spline. Polish the sealing areas on the shafts, if necessary. Replace any worn or damaged parts.

The running surfaces of the cylinder blocks **MUST** be flat and free from scratches. If scratches or wear are found on the running surface of the cylinder block or center section, polish or replace the parts. When polishing these surfaces, up to 0.0004 in. may be removed. If this is not sufficient to obtain a flat surface free of scratches, the part should be replaced.

Clean and lightly oil parts prior to assembly of the transaxle.



### WARNING

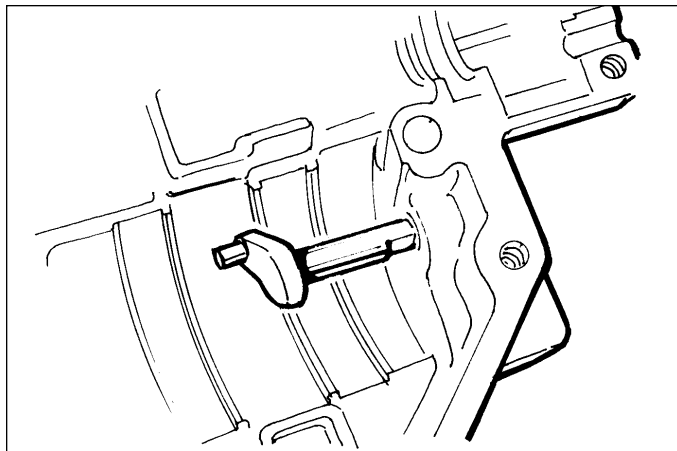
**Most parts have critical tight tolerance surfaces. Care must be exercised to prevent damage to these surfaces during assembly. Protect exposed surfaces, openings and ports from damage or foreign material.**

*NOTE: Be sure to torque all threaded parts to the recommended torque levels and replace all o-rings and shaft seals.*

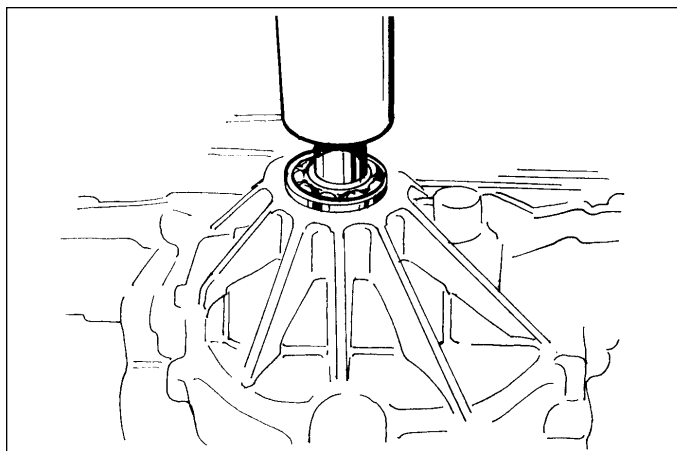
1. Install the displacement control shaft. See Figure D-26.
2. Install the pump input shaft assembly and retaining ring into the housing. See Figure D-27.
3. Install the pump shaft lip seal.
4. Reposition the upper housing and install the swashplate cradle bearings.
5. Install the slot guide block onto the displacement control shaft.
6. Install the swashplate assembly into the housing. The slot on the swashplate must engage the slot guide block on the displacement control shaft. Use a tool such as a screwdriver to hold the guide block in position while installing the swashplate.

*NOTE: Be sure the thick race of the pump thrust bearing is toward the pistons.*

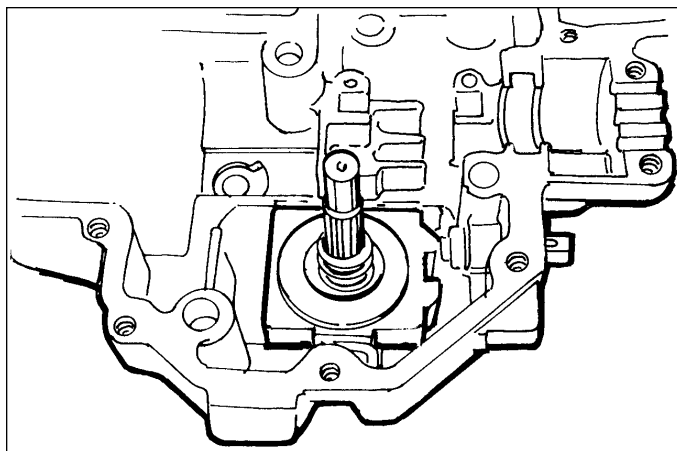
7. Install the thrust washer and pump block spring onto the pump shaft.



**Figure D-26. Install Displacement Control Shaft**



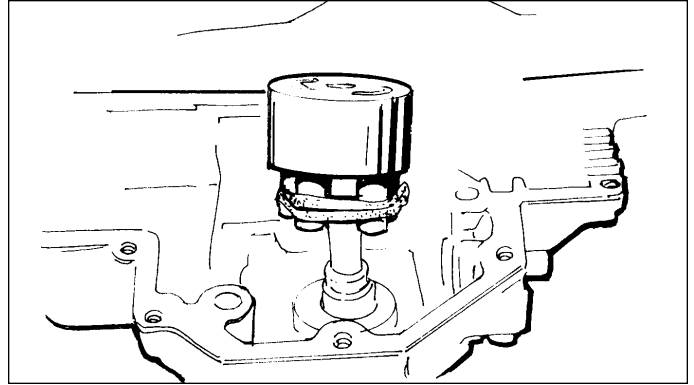
**Figure D-27. Install Pump Shaft Assembly**



**Figure D-28. Swashplate Installation**

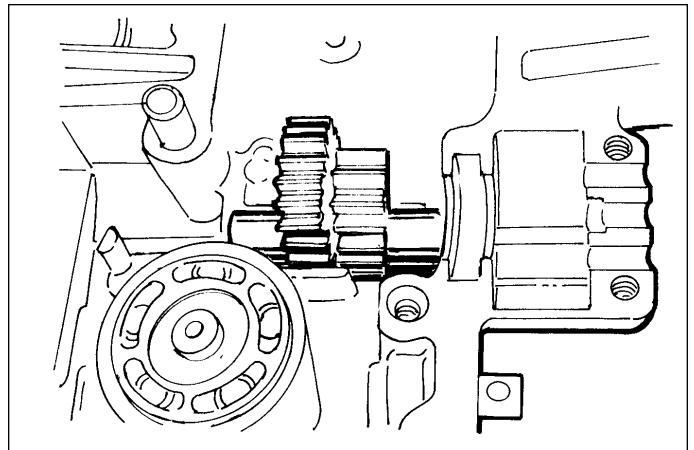
*NOTE: To simplify the installation of the pump block, wrap a rubber band snugly around the pistons. This is intended to hold the pistons in their bores as the block kit is handled during installation.*

8. With the swashplate in the neutral (0 angle) position, lubricate the running surfaces and install the cylinder block assembly onto the pump input shaft. Make sure the splines engage properly.



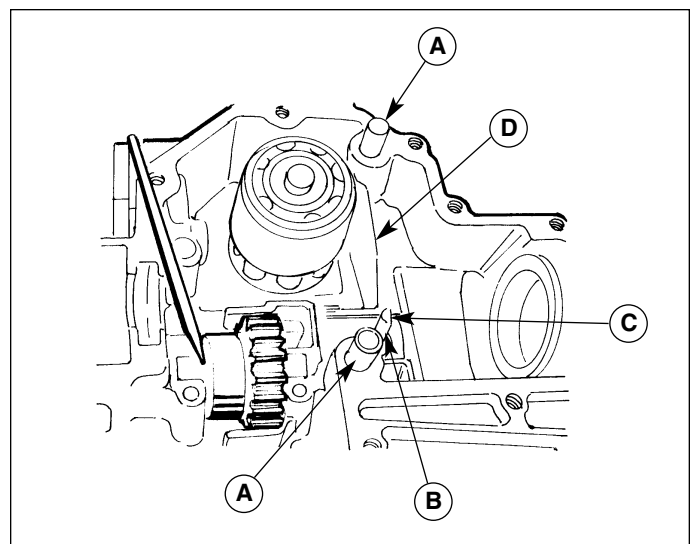
**Figure D-29. Cylinder Block Kit with Rubber Band**

9. Install the pinion gear and washers onto the jackshaft. Install the jackshaft assembly into the housing and torque the bolts to **120 in. lbs. to 170 in. lbs.** Use Loc-Tite solution on the bolts.



**Figure D-30. Jackshaft Assembly Installation**

10. Install the aligning pins (A, Figure D-31) and the bypass actuator into transaxle housing. Align the straight edge (C) of the bypass actuator (B) with the casing boss (D) or the bypass plate will be damaged.



**Figure D-31. Install Aligning Pins & Bypass Actuator**  
**A. Alignment Pins**      **C. Straight Edge**  
**B. Bypass Actuator**      **D. Casing Boss**



## 7 Transmission Repair

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11. Install the washers and a new lip seal onto the motor shaft. Install one washer on each side of the retaining ring.
12. Install the motor shaft into the center section.

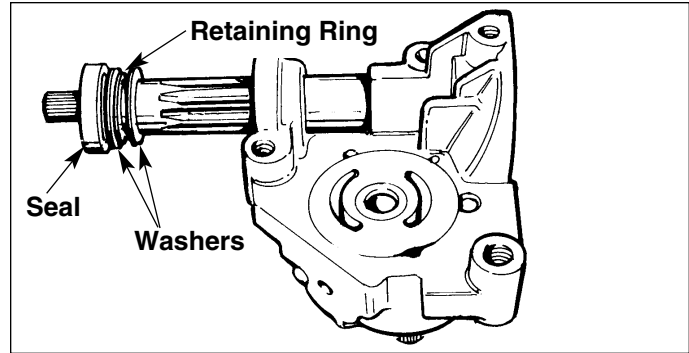


Figure D-32. Install Motor Shaft

13. Install the bypass plate (small end first) into the center section.

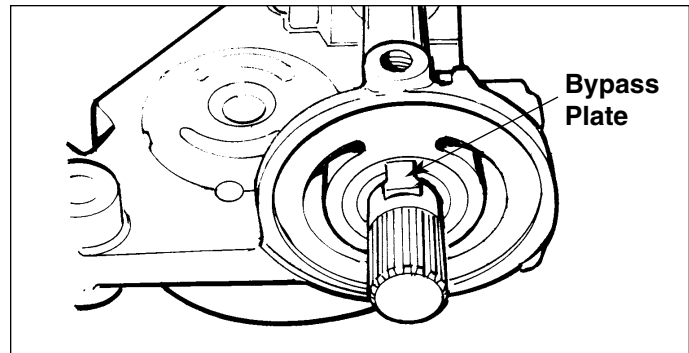


Figure D-33. Install Bypass Plate

14. Lubricate the running faces and install the motor block kit onto the motor shaft.

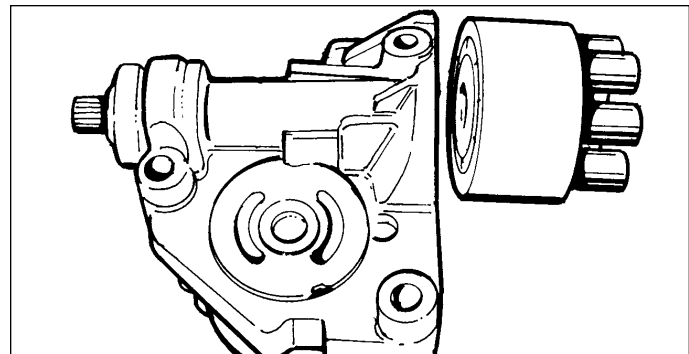


Figure D-34. Install Motor Block Kit

15. Position the washers and seal and install the center section assembly onto the aligning pins and pump input shaft.

*Note: Be sure the center section is completely seated by hand. Do not pull the section down with the cap-screws. If the center section cannot be pushed down by hand, remove the center section and check the alignment of the bypass actuator; otherwise damage to the bypass plate will occur.*

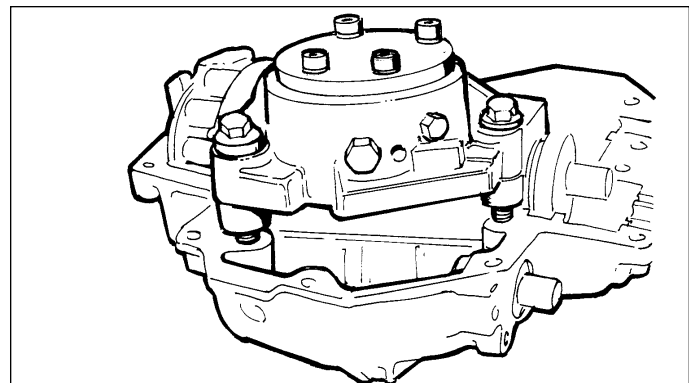
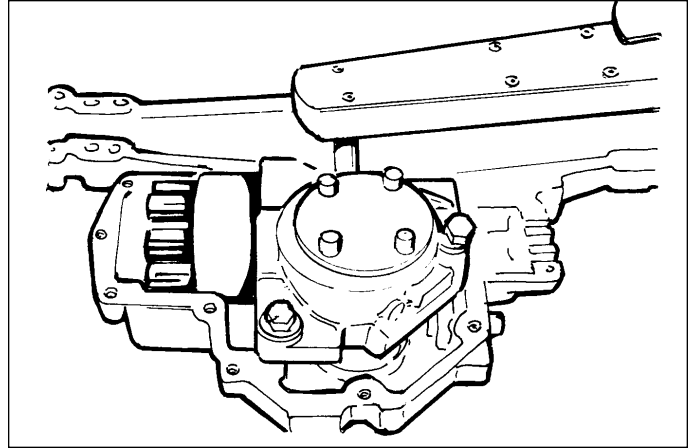


Figure D-35. Position Center Section Assembly



16. Insert the three assembly bolts into the center section and press the center section down onto the aligning pins and pump input shaft until it is seated on mounting bosses. While holding the center section in position, torque the bolts evenly from 525 in-lbs. to 700 in-lbs..

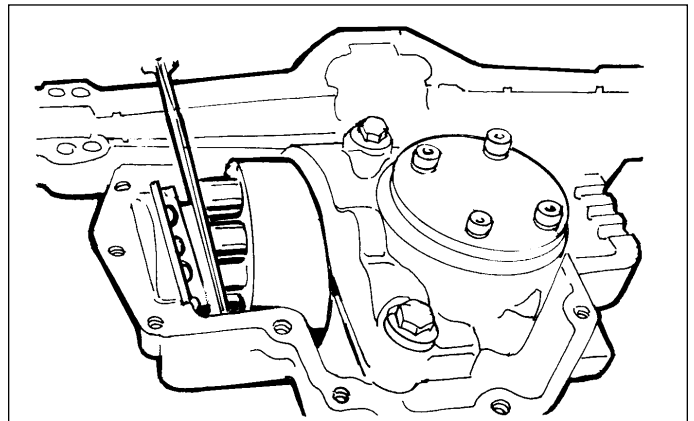
*NOTE: Treat the bolts with Loc-Tite solution.*



**Figure D-36. Install Center Section Assembly**

17. Install the motor thrust bearing (with the thicker race towards the pistons) by compressing the piston springs and sliding the bearing assembly into place.

*NOTE: Use a wide, thick putty knife (or equivalent) to compress the pistons and allow the bearing to be installed.*

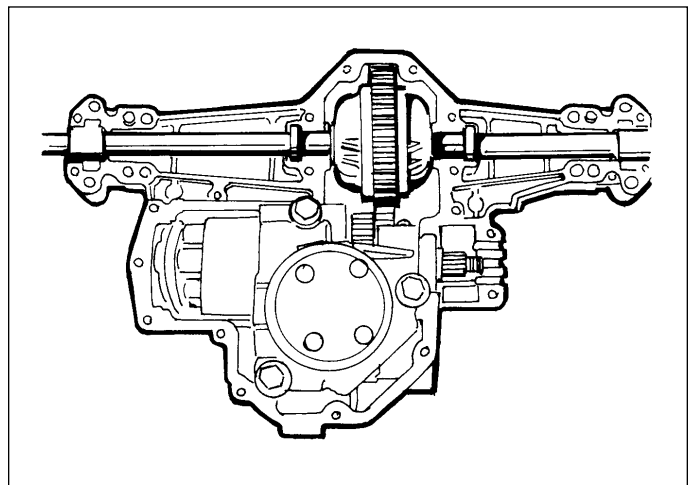


**Figure D-37. Install Motor Thrust Bearing**

18. Fill the axle pockets of the upper housing with Chemplus grease--part number 1714286 (Inside of bearing location.)

*NOTE: Do not overfill, and wipe off any excess grease or sealant will not cure properly.*

19. Install the washers and seals onto the differential/axle assembly and align them for installation.  
20. Install the differential/axle assembly into the housing.  
21. Install a new filter onto the center section/check valve plate.



**Figure D-38. Install Differential / Axle Assembly**

## 7 Transmission Repair

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22. To install brake disks, first install a stator, then a rotor (hub to inside), then a stator, then a rotor (hub to inside), then two stators. See Figure D-43

23. Install the brake bolt (with nut) into the upper housing.

At this time make sure the pump and motor rotate freely.

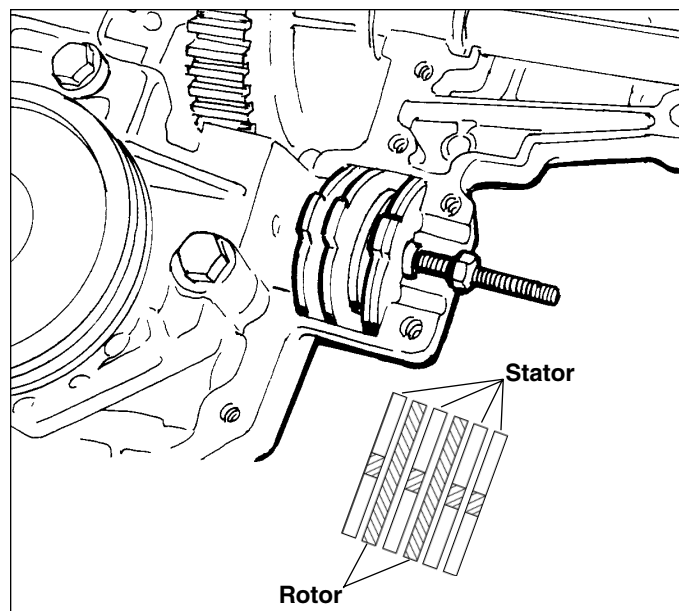


Figure D-39. Install Brake Components

24. Apply sealant as shown in the example.

*NOTE: The drawing may not be the same as the original factory sealant application, but is the currently recommended pattern. Apply sparingly.*

*NOTE: Sealant must be of good quality, oil and heat resistant such as RTV or silicon.*

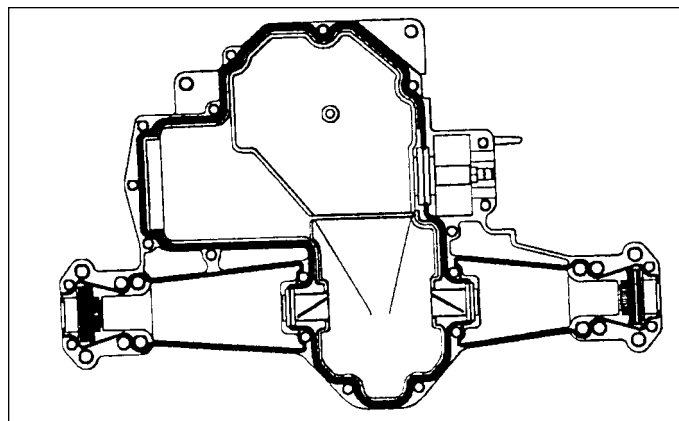


Figure D-40. Sealant Application

25. Position the lower housing on the upper housing and secure with capscrews. Torque capscrews to **135-165 in-lbs.** in the sequence shown in Figure D-45.

26. Wipe off all excess sealant from the seam of the housings.

27. Check the bypass actuator and axle shafts for freedom of movement. The axle shafts should not lock up but may be tight. The bypass actuator shaft must rotate freely.

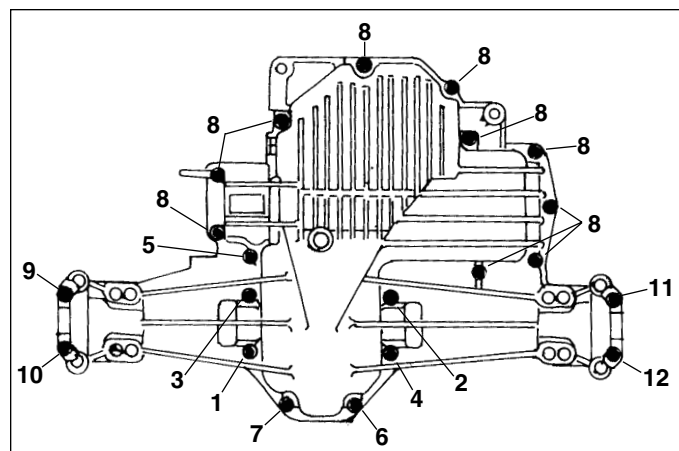


Figure D-41. Bolt Torque Sequence

28. Torque the retaining nut on the brake nut to **120–185 in-lbs.**
29. Install the brake pins into case and brake arm onto brake bolt.
30. Install the slotted bracket onto brake bolt with the slot aligned over the tab on transaxle.
31. Install washer and brake adjustment nut.

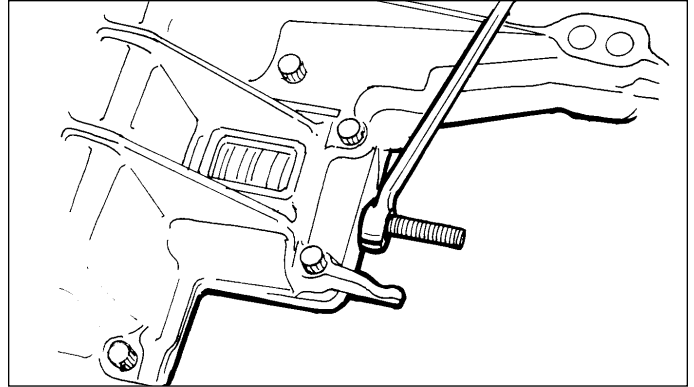


Figure D-42. Tighten Brake Bolt Nut

*Note: Two versions of the brake retainer nuts have been used. Early production employed “Nylock” type nuts, while current production is using a castellated nut with a cotter pin for retainment. Regardless of the type of nuts used, the adjustment procedure is the same.*

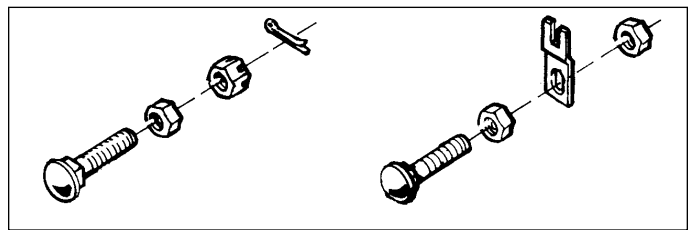


Figure D-43. Brake Retainer Nut Variations

32. Install the bypass actuator shaft and control shaft seals by applying petroleum jelly to lip of seal, and wrapping the sharp edge of shaft with plastic tape. Press the seal into case using a driver which only applies force to the outside edge of the seal.
33. Install the bypass valve actuator arm and retaining ring, on the bypass shaft. Use care to avoid over-extending the retaining ring.
34. Install the bypass valve linkage arm on top of transaxle case. Torque the mounting capscrew to **80–100 in-lbs.**
35. Install the hydro control arm on control shaft and secure with a setscrew.

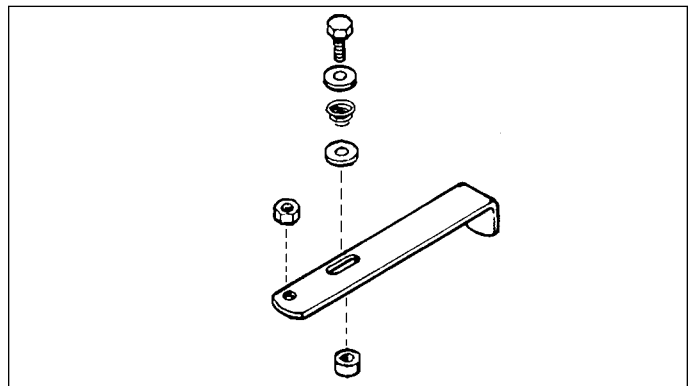


Figure D-44 Install Bypass Valve Control Linkage

35. The parking brake was initially set at a specific running clearance of .025” to .030” between the discs. To check the clearance of the brakes in your transaxle, rotate the brake lever until it contacts the case (fully off position). Place a feeler gage between the two outer discs. If the clearance is not correct, make the necessary change with the brake adjustment nut.
36. Install brake bolt cotter pin if equipped.

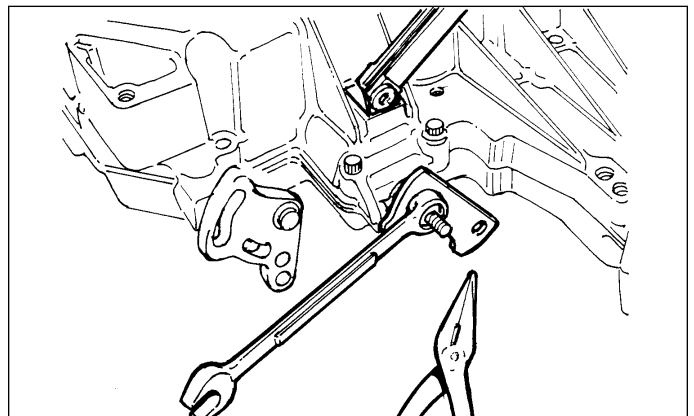


Figure D-45. Brake Adjustment

## 7 Transmission Repair

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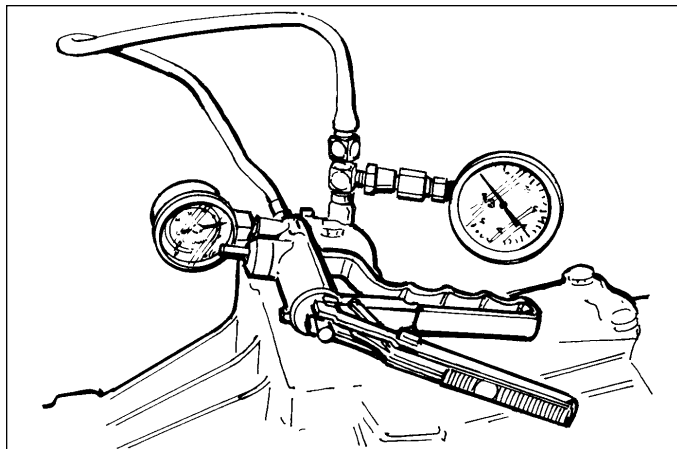
If you have the necessary equipment the transmission manufacturer suggests performing the following test:

37. Prior to adding oil to the transaxle, it is recommended that you test for leaks. This may be performed with a small hand pump or by using compressed air and a regulator. Do not allow more than 10 PSI to be applied or seal damage may occur. To locate a leak, apply a soap mixture around the housing seam and at all lip seals. Do not submerge unit or the brake will be damaged.
38. Fill the transaxle with 2-1/2 quarts (80 ounces) of SAE 20W-50 oil.
39. It is recommended that the unit be purged prior to installing into the vehicle frame. The following is the suggested purging procedures for repaired transaxles.
40. Spin the input shaft in a clockwise direction at 1000-1500 RPM. This may be performed in a drill press (or equivalent).
41. Engage (actuate) the bypass valve.
42. Stroke the control lever forward for five seconds and then reverse for five seconds. Do this three times in each direction.
43. Return the control lever to neutral.
44. Disengage the bypass.
45. Stroke the control lever forward for five seconds and then reverse for five seconds. Do this three times in each direction.

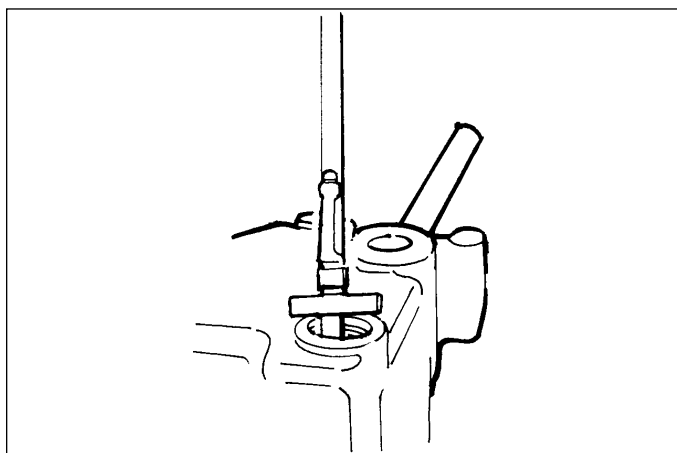
**NOTE:** It may be necessary to repeat these steps in the vehicle to fully purge the transaxle. See Sec. 2 Purging Air from Transaxle.

Check the oil level after fully purging the unit of air. It should be between 1" and 1.25" from the top of the housing.

After installing the transaxle, make sure all linkages and actuators are functioning properly.



**Figure D-46. Test For Leaks**

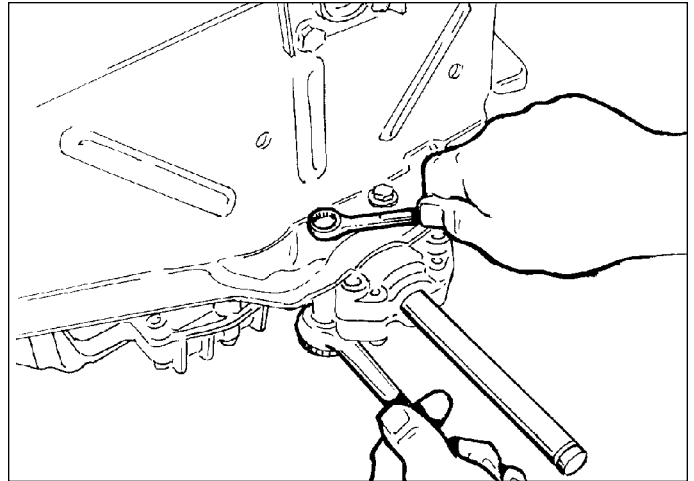


**Figure D-47. Check Oil Level**

## Installation

1. Install the input shaft pulley, lock washer, and nut. Torque to **80–100 in-lbs.**
2. Install the transaxle case vent hose.
3. Install the left and right mounting straps on the front of the transaxle case.
4. Place transaxle on a floor jack and position under the tractor. Raise the transaxle up into the tractor while guiding the mounting straps and vent hose into position.
5. Install the axle mounting bolts to frame.
6. Install the hydro drive belt on the input pulley. Check the belt routing through the pivot plate idlers.
7. Install the hydro belt guide/bolt through the left mounting bracket and frame. Adjust the double nut on the guide/bolt so the belt cannot be removed from the pulley.
8. Install the following components using standard torque values:
  - Right transaxle mounting strap
  - Brake rod and cotter key
  - Hydro control rod
  - Hydro fan
  - Fuel tank
  - Rear fender
  - Operator's seat wiring harness
9. Lower tractor to ground and run to purge air from pump. (See Sec. 2 Purging Air from Transaxle) Recheck oil level after shutdown.

**NOTE:** Oil level should be checked from the vent hose opening with the plastic fitting removed from the case. Oil level should be 1" to 1-1/4" below the top of the vent hole threads.



**Figure D-48. Install Transaxle Mounting Bolts**

## 7 Transmission Repair

## 7D Hydro-Gear 0750 / 0800 - Notes

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SECTION 8. MOWER DECK REPAIR



# 8 Mower Deck Repair

## 38" Deck & Arbors

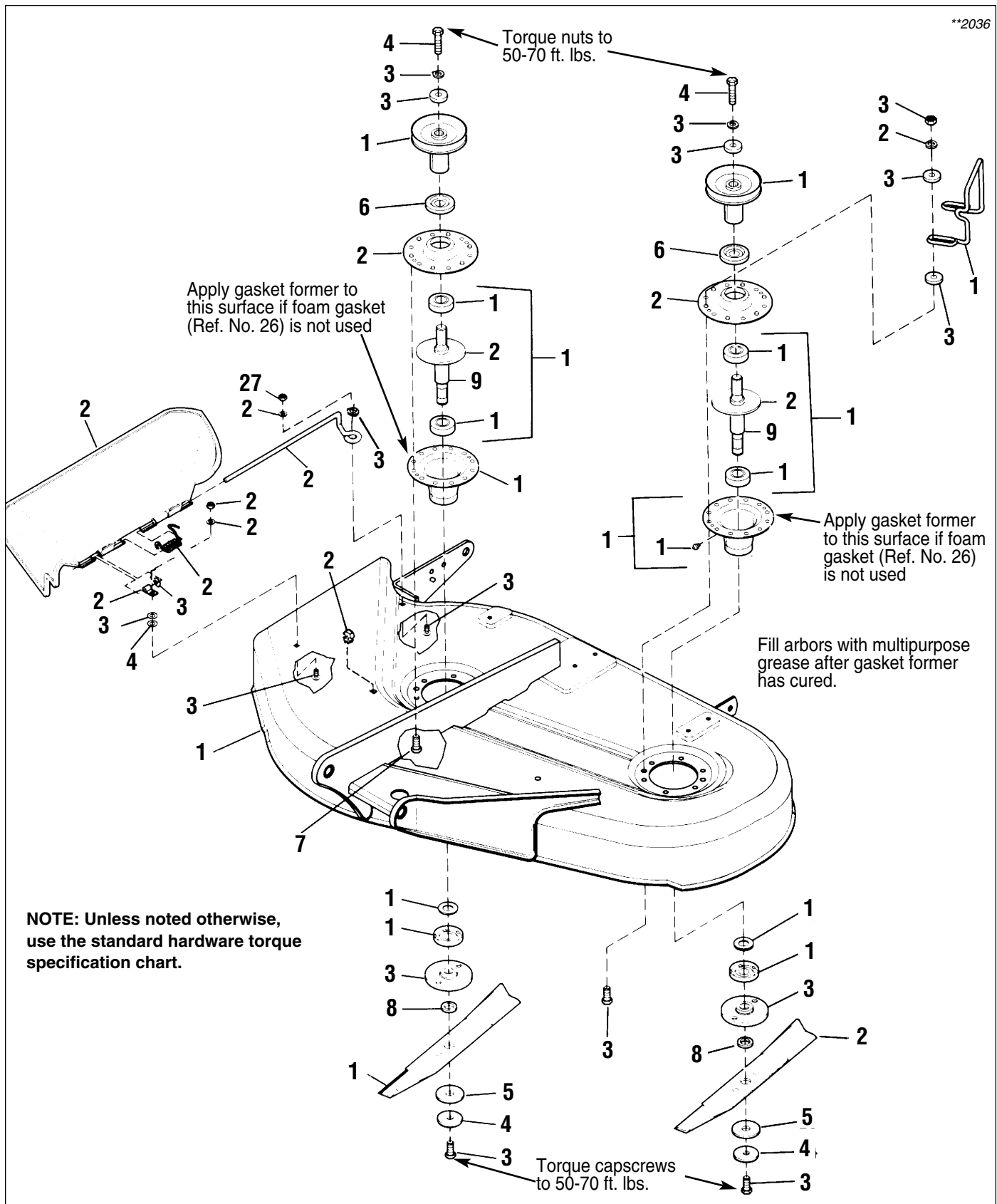


Figure 1. 38" Mower Deck - Deck, Arbors & Blades

### 38" Mower Deck - Deck & Arbors

Ref.	Qt.	Description	Ref.	Qt.	Description
1	4	BEARING	21	1	CLAMP
2	2	HOUSING, Arbor, Top	22	1	SPRING
3	2	ADAPTER, Blade	23	1	PLUG, Hole
4	2	WASHER, Spring	24	1	DEFLECTOR, Plastic
5	2	WASHER, Spline	25	1	ROD, Deflector, Front
6	2	SHIELD, Grass, Upper	26	2	GASKET, Foam
7	8	SCREW, Hex, Taptite, 5/16 x 3/4	27	2	NUT, Hex, 1/4-20
8	2	COLLAR, Mower Arbor	28	2	LOCKWASHER, 1/4
9	2	ARBOR SHAFT KIT (Incl. Ref. No. 8)	29	4	LOCKWASHER, 5/16
10	2	ARBOR SHAFT ASSY. (Incl. Ref. Nos. 1 & 9)	30	4	NUT, Hex, 5/16-18
11	1	MOWER HOUSING ASSY	31	2	LOCKWASHER, 7/16
12	2	SHIELD, Grass, Lower	32	1	WASHER, Plain, 5/16
13	2	WASHER, Shim	33	4	WASHER, Flat, 5/16
14	2	HOUSING ASSY., Arbor, Bottom (Incl. Ref. Nos. 19 & 26)	34	2	CAPSCREW, Hex Hd., 7/16-14 x 1
15	2	GUIDE, Upstop, Belt	35	4	WASHER, Flat
16	1	BLADE, Mower, 22-1/4	36	4	SCREW, Hex, Taptite, 5/16 x 1-1/2
17	1	PULLEY ASSY., 4-1/4" O.D., LH	37	2	CARRIAGE BOLT, 1/4-20 x 7/8
18	1	PULLEY ASSY., 6" O.D., RH	38	2	WASHER, Plain
19	2	GREASE FITTING	39	2	WASHER, Plain
20	1	BLADE, Mower, 16-1/8	40	1	NUT, Push On
			41	2	CAPSCREW, Hex Hd., 7/16-14 x 3-1/4

## 8 Mower Deck Repair

### 38" Clutch & Support

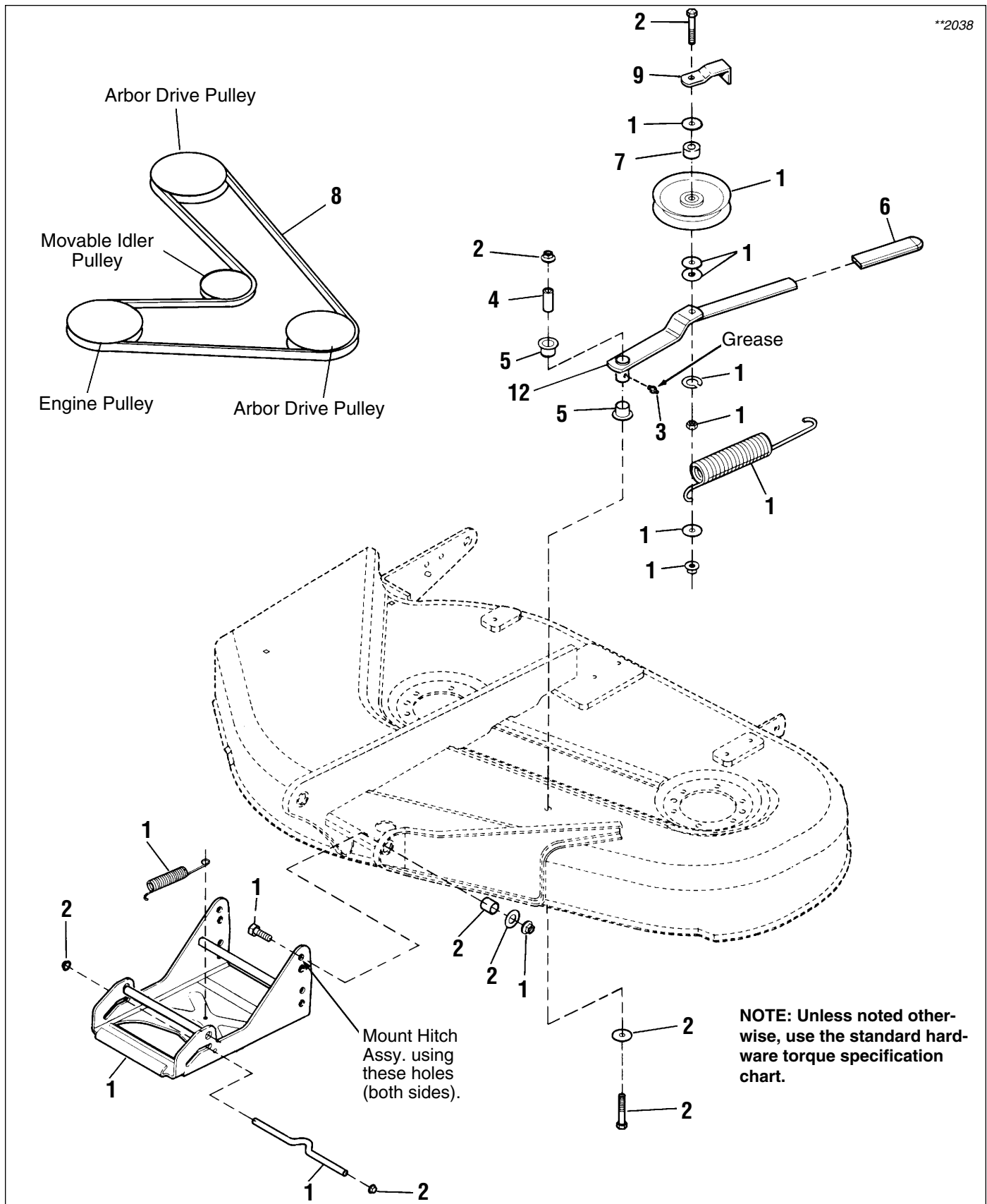


Figure 2. 38" Mower Deck - Clutch & Support

**38" Mower Deck - Clutch & Support**

<b>Ref.</b>	<b>Qt.</b>	<b>Description</b>	<b>Ref.</b>	<b>Qt.</b>	<b>Description</b>
1	1	SPRING	13	1	HITCH ASSY.
2	2	SPACER	14	1	SPRING
3	1	FITTING, Grease	15	1	NUT, Hex, Full, 3/8-16
4	1	SPACER	16	1	LOCKWASHER, 3/8
5	2	BUSHING	17	3	NUT, Hex, Lock, 3/8-16
6	1	GRIP, Lever	18	2	CAPSCREW, Hex, 3/8-16 x 1-1/2
7	1	SPACER	19	4	WASHER, Plain
8	1	V-BELT	20	1	WASHER
9	1	GUARD, Belt	21	2	WASHER, Plain, 3/8 I.D.
10	1	IDLER PULLEY (Incl. Ref. No. 7)	22	2	CAPSCREW, Hex Hd., 3/8-16 x 2-3/4
11	1	ROD, Latch	23	1	NUT, Hex, Flange, 2-Way Lock, 3/8-16
12	1	CLUTCH LEVER ASSY. (Incl. Ref. Nos. 3 & 5)	24	2	NUT, Push On, 3/8

# 8 Mower Deck Repair

## Height Adjustment & Rollers

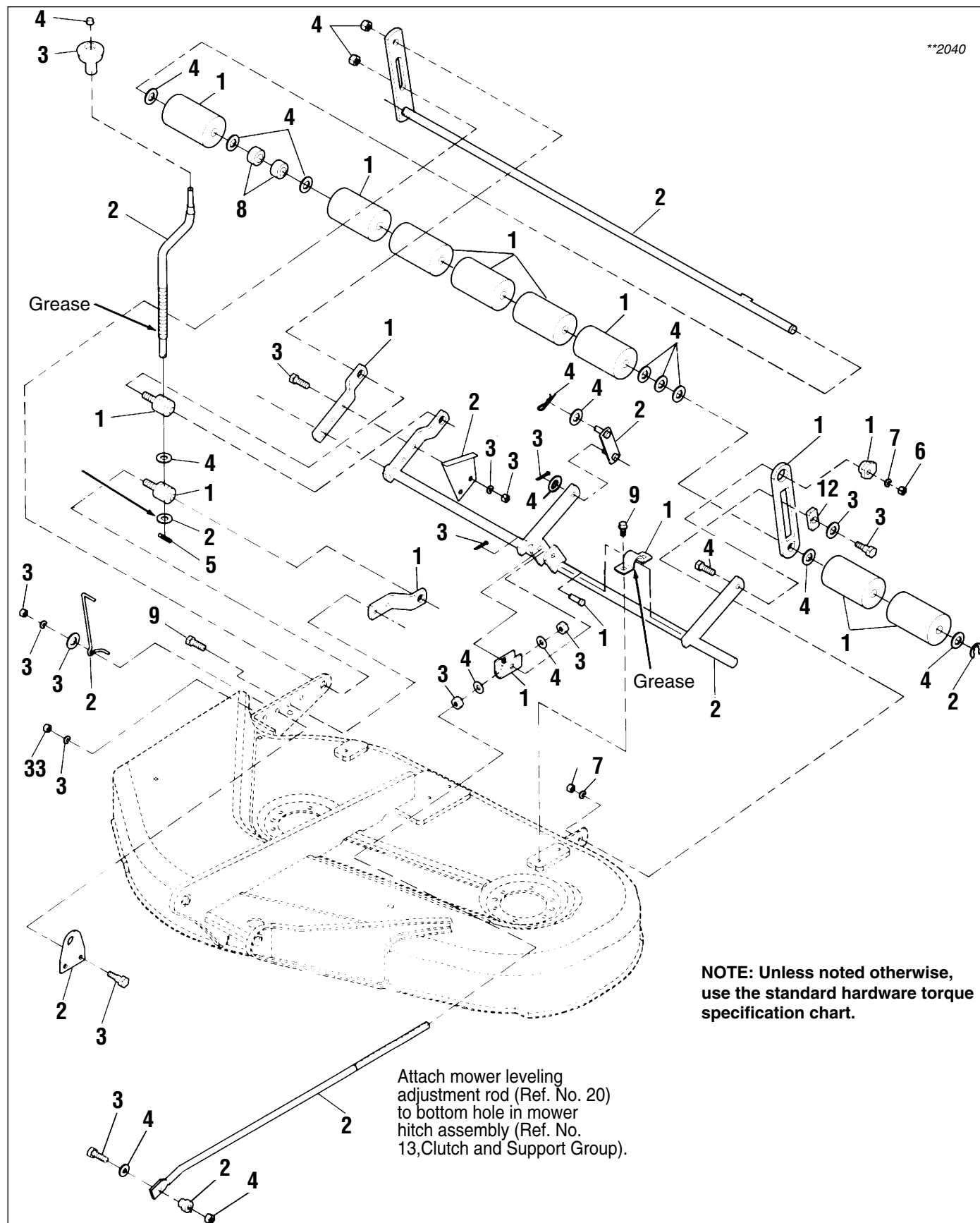


Figure 3. 38" Mower Deck - Height Adjustment & Rollers

### 38" Mower Deck - Height Adjustment & Rollers

Ref.	Qt.	Description	Ref.	Qt.	Description
1	1	PIN, Clevis	24	1	INDICATOR, Cutting Height
2	1	RING, Retaining	25	1	PLATE, Support
3	1	BOLT, Shoulder, 3/8-16	26	1	BRACKET, Cutting Height
4	1	CLIP, Pin, Safety	27	1	LINK ASSY., Lift
5	1	PIN, Roll, 1"	28	1	SHAFT ASSY., Roller
6	2	NUT, Hex Hd., 3/8-16	29	1	SPACER
7	2	LOCKWASHER, 3/8	30	1	KNOB
8	2	SPACER	31	2	NUT, Hex, Jam, 1/2-13
9	6	SCREW, Hex, Taptite, 5/16 x 3/4	32	4	LOCKWASHER, 5/16
10	2	STRAP, Mower Arm Assy.	33	4	NUT, Hex, 5/16-18
11	8	ROLLER	34	1	COTTER PIN
12	1	SLIDE	35	1	COTTER PIN
13	1	BAR, Roller	36	1	WASHER, Flat, 5/16
14	1	STRAP, Trunnion Retainer	37	4	CAPSCREW, Hex Hd., 5/16-18 x 1-1/4
15	1	TRUNNION	38	1	CAPSCREW, Hex Hd., 3/8-16 x 1-3/4
16	1	NUT, Adjustor	39	1	WASHER, Plain, 1/2
17	1	ARM, Rear, Mower, RH	40	8	WASHER, Plain, 41/64 x 1-1/4
18	1	TRUNNION	41	3	WASHER, Plain, 13/32
19	1	TRUNNION, Threaded	42	1	NUT, Hex, Whizlock, 3/8-16
20	1	ROD, Adjustment	43	2	NUT, Hex, Flange, Lock, 1/2-13
21	1	CRANK, Cutting Height	44	1	CARRIAGE BOLT, 3/8-16 x 1-1/2
22	1	WASHER, Detent	45	1	PAL NUT
23	1	ARM ASSY., Mower	46	3	WASHER, 33/64

# 8 Mower Deck Repair

## 44" Deck & Arbors

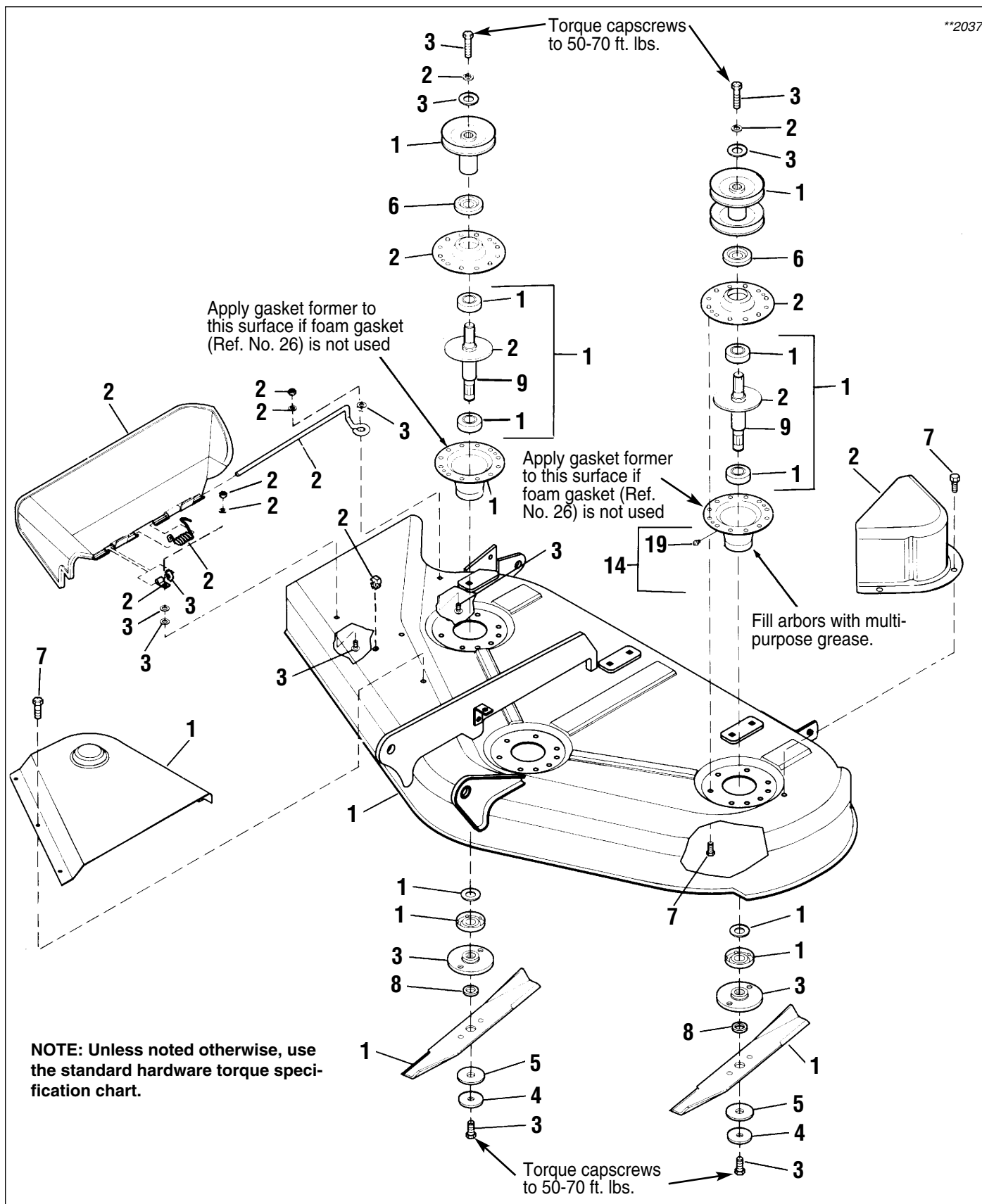


Figure 4. 44" Mower Deck - Housing, Arbors & Blades

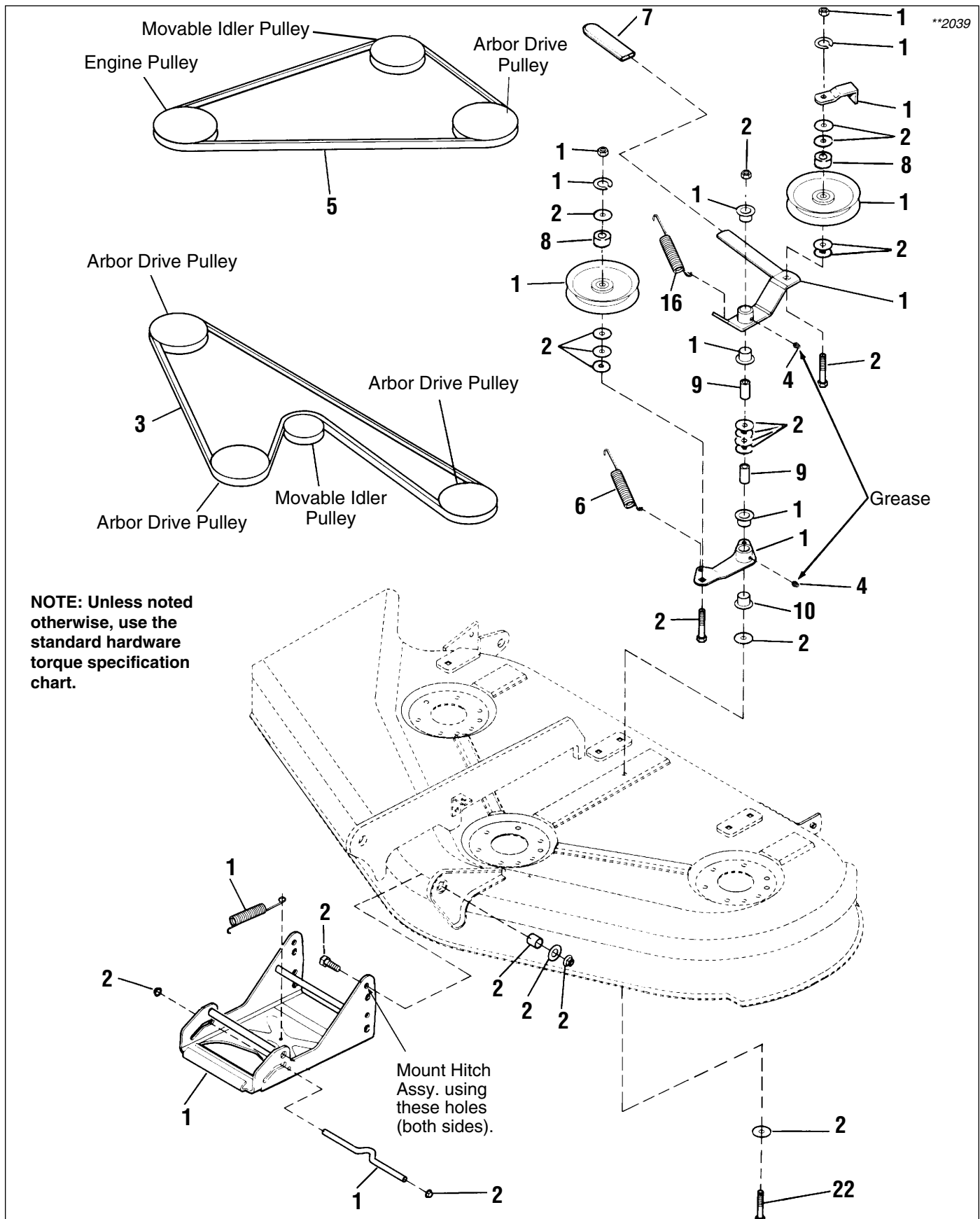


### 44" Mower Deck - Deck & Arbors

Ref.	Qt.	Description	Ref.	Qt.	Description
1	6	BEARING	20	1	COVER, Arbor
2	3	HOUSING, Arbor, Top	21	1	CLAMP
3	3	ADAPTER, Blade	22	1	SPRING
4	3	WASHER, Spring	23	1	PLUG, Hole
5	3	WASHER, Spline	24	1	DEFLECTOR, Plastic
6	3	SHIELD, Grass, Upper	25	1	ROD, Deflector, Front
7	25	SCREW, Hex, Taptite, 5/16-18 x 3/4	26	3	GASKET, Foam
8	3	COLLAR, Mower Arbor	27	2	NUT, Hex, 1/4-20
9	3	ARBOR SHAFT KIT (Includes Ref. No. 8)	28	2	LOCKWASHER, 1/4
10	3	ARBOR SHAFT ASSY. (Incl. Ref. Nos. 1, 8 & 9)	29	3	LOCKWASHER, 7/16
11	1	MOWER HOUSING ASSY.	30	1	WASHER, Plain, 5/16
12	3	SHIELD, Grass, Bottom	31	2	CAPSCREW, Hex Hd., 7/16-14 x 1-1/4
13	3	WASHER, Shim	32	3	CAPSCREW, Hex Hd., 7/16-14 x 1
14	3	HOUSING ASSY., Arbor, Bottom (Incl. Ref. Nos. 19 & 26)	33	2	CARRIAGE BOLT, 1/4-20 x 7/8
15	1	COVER, Arbor	34	3	WASHER, Plain
16	3	BLADE, Mower	35	2	WASHER, Plain
17	1	PULLEY ASSY.	36	1	NUT, Push On
18	2	PULLEY ASSY., Deck Drive	37	1	CAPSCREW, Hex Hd., 7/16-14 x 3-1/2
19	3	GREASE FITTING			

# 8 Mower Deck Repair

## 44" Clutch & Support



**44" Mower Deck - Clutch & Support**

<b>Ref.</b>	<b>Qt.</b>	<b>Description</b>	<b>Ref.</b>	<b>Qt.</b>	<b>Description</b>
1	1	SPRING	16	1	SPRING
2	2	SPACER	17	1	ROD, Latch
3	1	V-BELT, Arbor Drive	18	2	NUT, Hex, 3/8-16
4	2	GREASE FITTING	19	3	LOCKWASHER, 3/8
5	1	V-BELT, Mower Drive	20	2	NUT, Hex, Lock, 3/8-16
6	1	SPRING	21	2	CAPSCREW, Hex Hd., 3/8-16 x 1-1/2
7	1	GRIP, Lever	22	1	CAPSCREW, Hex Hd., 3/8-16 x 3-1/2
8	2	SPACER	23	2	WASHER
9	2	SPACER	24	14	WASHER, 5/16
10	4	BUSHING	25	1	NUT, Hex, Flange, Two-Way Lock, 3/8-16
11	1	IDLER, Stop	26	1	CARRIAGE BOLT, 3/8-16 x 1-1/2
12	2	PULLEY, Idler (Includes Ref. No. 8)	27	2	NUT, Push On (used on early model Latch Rod, Ref. No. 17)
13	1	LEVER ASSY, Idler (Incl. Qty. 1, Ref. No. 3; Qty 2, Ref. No. 10)	28	1	CARRIAGE BOLT, 3/8-16 x 2
14	1	LEVER ASSY., Idler Arm (Incl. Qty. 1, Ref. No. 3; Qty 2, Ref. No. 10)			
15	1	HITCH ASSY.			

# 8 Mower Deck Repair

## 44" Height Adjustment & Rollers

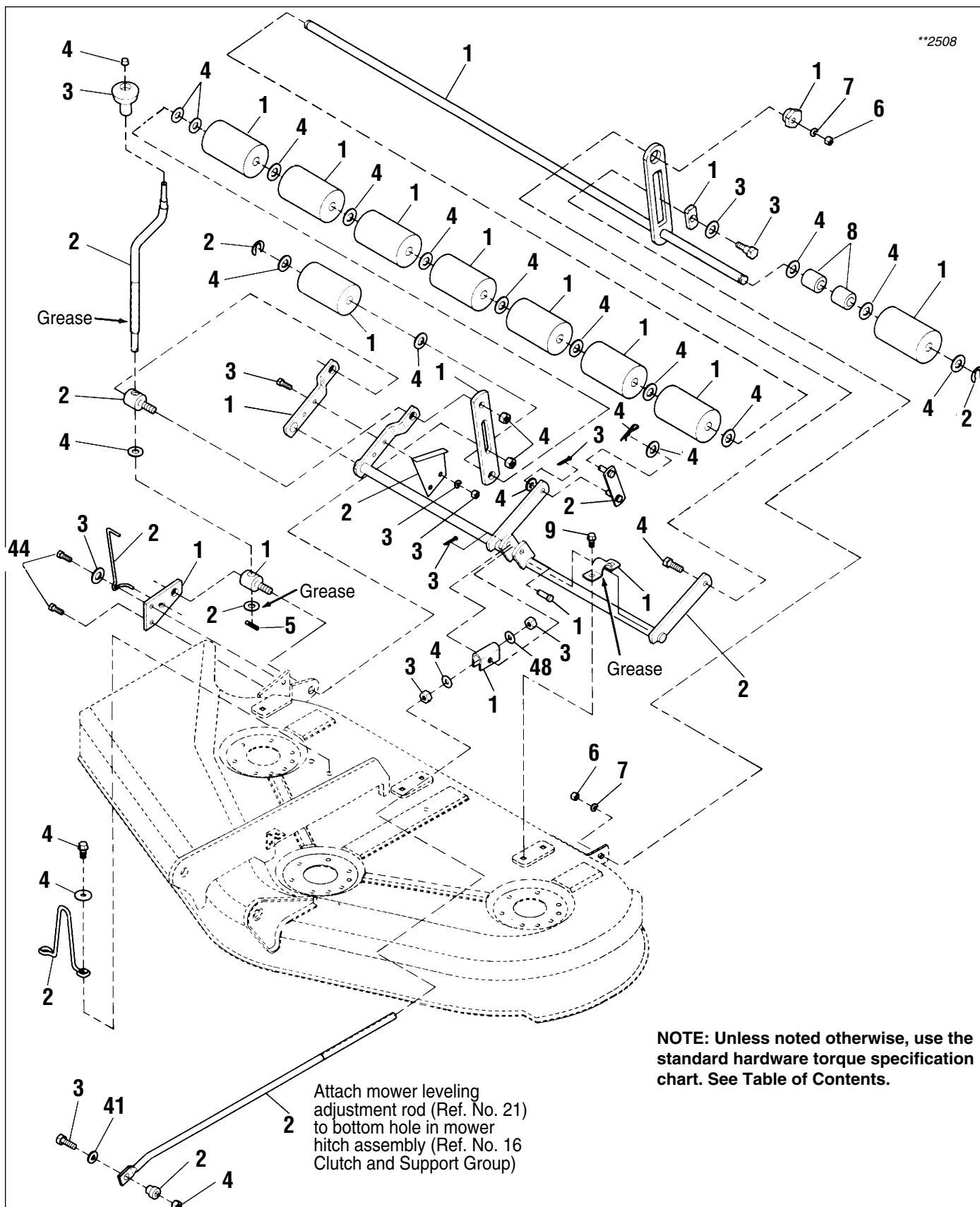


Figure 6. 44" Mower Deck - Height Adjustment & Rollers

## 8 Mower Deck Repair

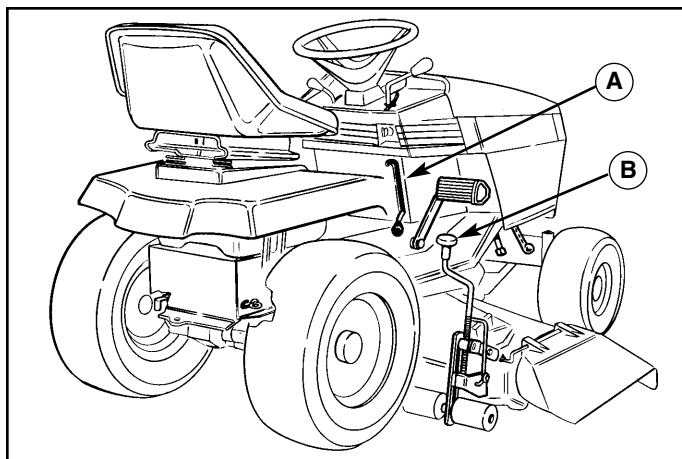
### 44" Height Adjustment & Rollers

#### 44" Mower Deck - Height Adjustment & Rollers

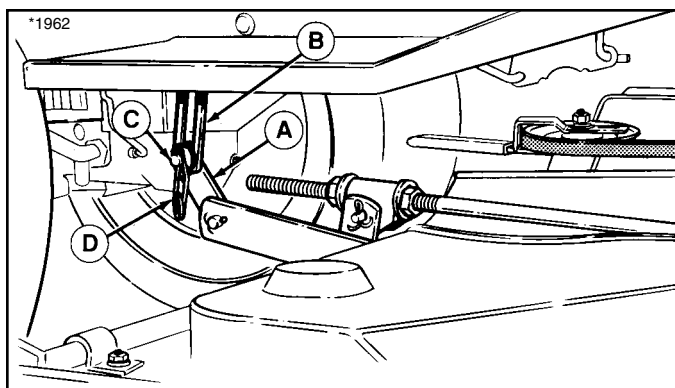
Ref.	Qt.	Description	Ref.	Qt.	Description
1	1	PIN, Clevis	25	1	ARM ASSY., Mower
2	2	RING, Retaining	26	1	INDICATOR, Cutting Height
3	1	BOLT, Shoulder, 3/8-16	27	1	BRACKET, Cutting Height
4	1	CLIP, Pin, Safety	28	1	LINK ASSY, Lift
5	1	PIN, Roll, 1" Long	29	1	SPACER
6	2	NUT, Hex, 3/8-16	30	1	KNOB, Height Crank
7	2	LOCKWASHER	31	2	NUT, Hex, Jam, 1/2-13
8	2	SPACER	32	2	LOCKWASHER, 5/16
9	6	SCREW, Hex, Taptite, 5/16 x 3/4	33	2	NUT, Hex, 5/16-18
10	3	STRAP, Mower Arm Assy.	34	1	COTTER PIN
11	9	ROLLER	35	1	COTTER PIN
12	1	SLIDE	36	1	WASHER, Flat, 5/16
13	1	SHAFT ASSY., Roller, 44" (Incl. Ref. Nos. 2, 8 & 46)	37	2	CAPSCREW, Hex, 5/16-18 x 1-1/4
14	1	BAR, Roller	38	1	CAPSCREW, Hex, 3/8-16 x 1-3/4
15	1	PLATE, Mower Support	39	1	WASHER, Plain, 1/2
16	1	TRUNNION	40	12	WASHER, Plain, 1-1/4
17	1	NUT, Adjuster	41	5	WASHER, Plain
18	1	ARM, Rear, Mower, RH	42	1	NUT, Hex, Whizlock, 3/8-16
19	1	TRUNNION	43	2	NUT, Hex, Flange, Lock, 1/2-13
20	1	TRUNNION, Threaded	44	4	SCREW, Taptite, 5/16 x 1
21	1	ROD, Adjustment	45	1	CARRIAGE BOLT, 3/8-16 x 1-1/2
22	1	CRANK, Cutting Height	46	2	WASHER, 5/8 x 1-1/4 x 1/16
23	1	WASHER, Detent	47	1	PAL NUT
24	1	UP-STOP, Mower	48	3	WASHER, 33/64

# 8 Mower Deck Repair

## Mower Removal



**Figure 7. Raising & Lowering Mower**  
A. Mower Lift Lever      B. Mower Height Adjuster



**Figure 8. Lift Arms**  
(Viewed from underneath right side of tractor)  
A. Mower Lift Arm      C. Flat Washer  
B. Tractor Lift Arm      D. Safety Clip

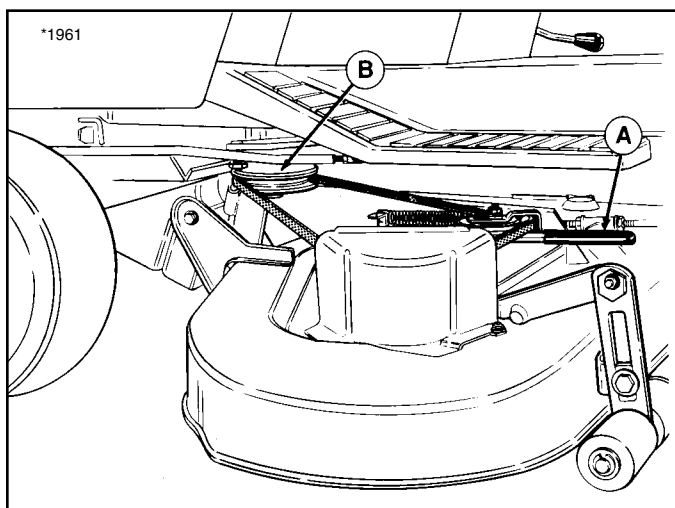
## MOWER DECK REPAIR

### **WARNING**

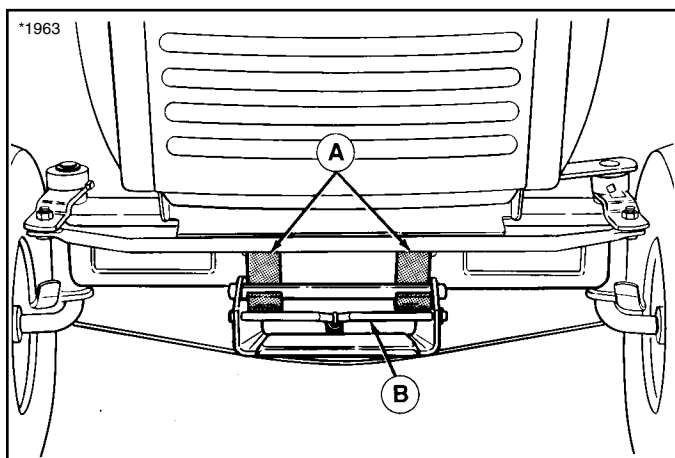
Stop engine and remove key. Do not engage PTO until mower is completely installed and operator is seated.

### Mower Removal & Installation

1. Park tractor on a hard, level surface such as a concrete floor. Turn off PTO switch and engine, remove the key and apply parking brake.
2. Place mower in the lowest cutting position using the mower height adjuster (B, Figure 7).
3. Place the mower lift lever (A, Figure 7) in the lowest position.
4. Disconnect the mower lift arm from the tractor lift arm (Figure 8). Re-install washer and safety clip on mower lift arm for storage.
5. Pull/Push back on spring-loaded idler arm (A, Figure 9) and remove the belt from the PTO pulley.
6. Turn wheels straight ahead. Pull back on spring-loaded lever (B, Figure 4) and lift mower hitch off of the tractor brackets.
7. Turn wheels fully left, and slide mower deck out the right side of the tractor.
8. To install the deck, follow the removal instructions in reverse order.



**Figure 9. Installing Belt**  
A. Idler Arm      B. PTO Pulley

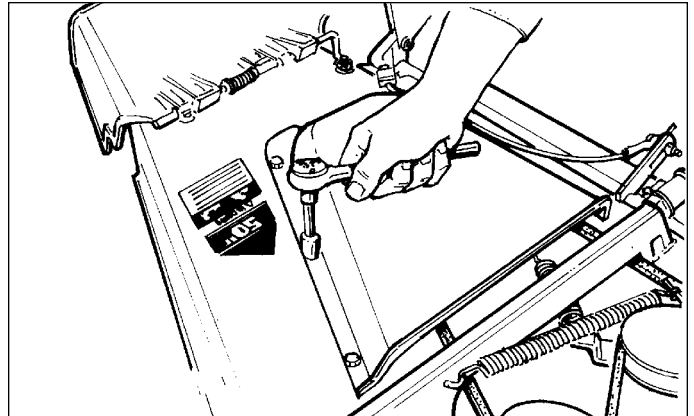


**Figure 10. Mower Hitch**  
A. Tractor Hitch Brackets  
B. Spring-Loaded Lever

### ARBOR REPAIR

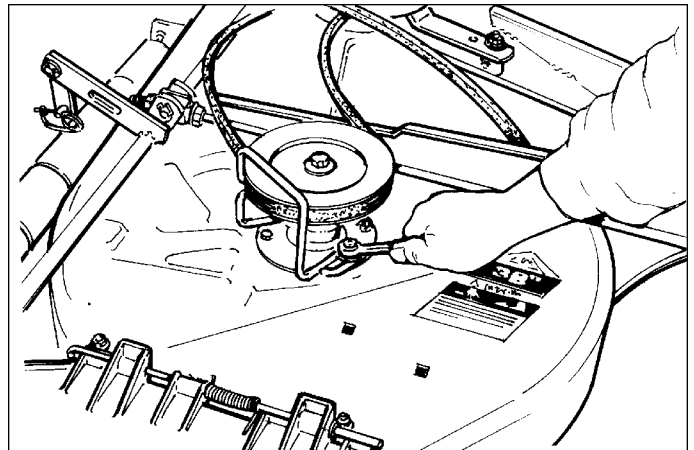
*NOTE: Spindles on the 38" and 44" mower decks are interchangeable.*

1. Remove the mower deck (see Mower Deck Removal and Installation).
2. Remove the belt guards as required to access arbors.



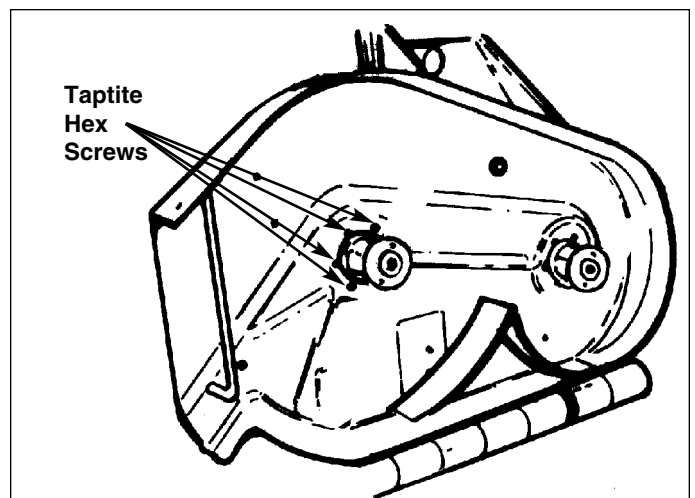
**Figure 11. Remove Belt Guard (44" Deck Pictured)**

3. Remove the belt guides as required to access arbors.
4. Remove mower drive belt.
5. Remove mower blade on Spindle to be rebuilt. See Mower Blade Service.



**Figure 12. Remove Belt Guides**

6. From the bottom of mower deck, remove the six Taptite hex screws retaining the spindle flange to the mower deck. Note the positions of the longer Taptite hexscrews used to mount the belt guides.



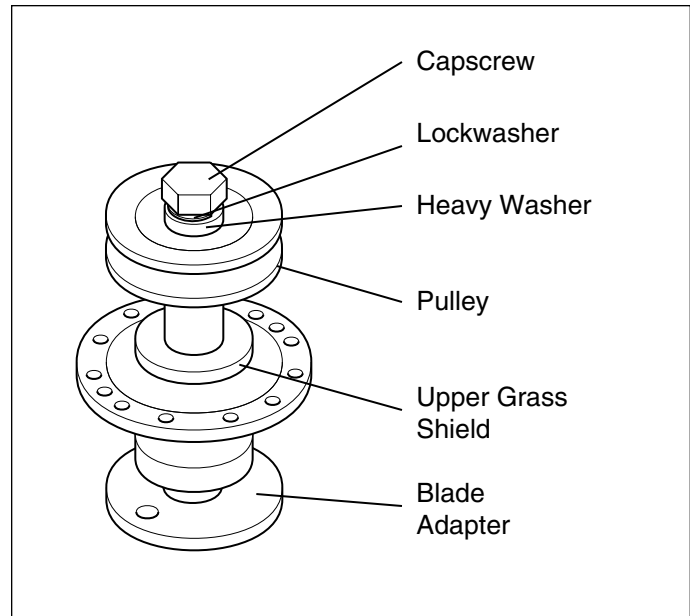
**Figure 13. Spindle Removal (38" Deck Shown)**



## 8 Mower Deck Repair

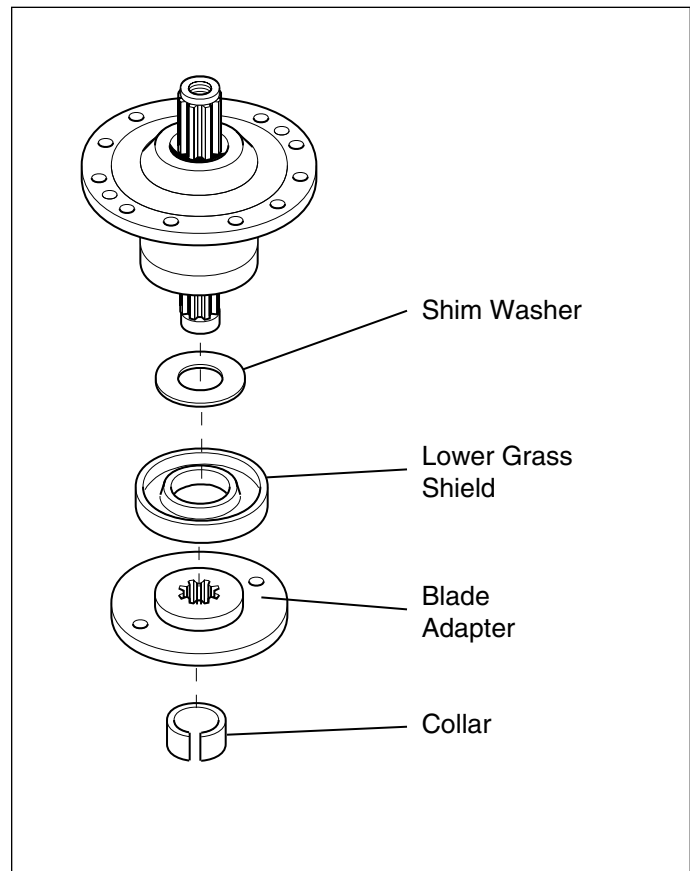
### Arbor Repair

7. Remove the arbor assembly from the deck.
8. Grip the blade adapter in a soft jaw vise. Remove the cap screw securing the drive pulley to blade shaft.
9. Remove the cap screw, lock washer, heavy washer, pulley and upper grass shield.



**Figure 14. Drive Pulley Removal**

11. Remove the arbor from the vise. Using a small screw driver remove the collar from the blade end of the arbor shaft.
12. Remove the blade adapter, lower grass shield, and shim washer from the blade end of the arbor shaft.



**Figure 15. Blade Adapter Removal**

12. Using a pair of small screwdrivers, pry apart the upper and lower arbor housings.

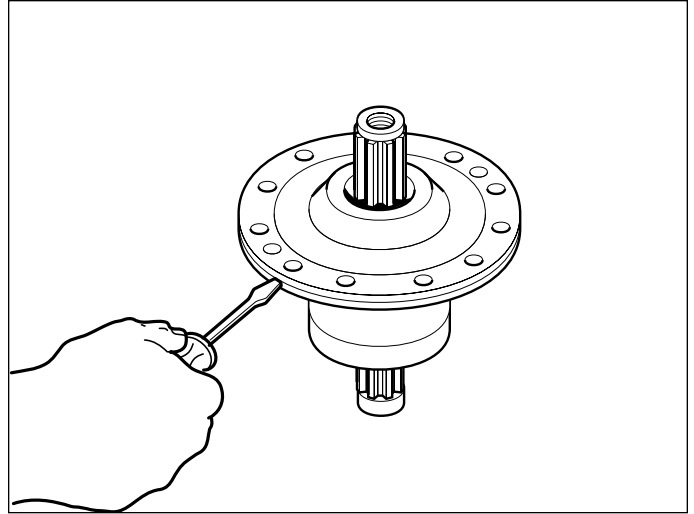


Figure 16. Split Arbor Housing

13. Remove the arbor shaft assembly from the lower housing.
14. Support the inner race of the bearing, and using a soft face hammer, drive the shaft from the bearing. Repeat with other bearing.

*NOTE: If the bearing is seized onto the shaft, more force can be applied by inserting a punch down the bolt hole of the shaft and driving with a ballpeen hammer.*

15. Remove the foam gasket.
16. Inspect the arbor shaft for damaged splines and damage to the bearing race area. Replace if damaged. If the bearings are not a press fit on the shaft, replace the shaft.

### ARBOR ASSEMBLY

1. While supporting bearing's inner race, drive the shaft into the bearing until it seats on the shoulder of the shaft.
15. Install the arbor assembly into the lower housing. Pack the housing with multipurpose grease.

*NOTE: Clean all excess grease off the mating flange area.*

*NOTE: Be sure to replace the foam gasket. If a replacement gasket is not used, seal the lower and upper housings with RTV or silicon sealer.*

16. Install the upper housing onto the lower housing assembly, align the pins, and clamp together. Check the shaft for smooth, easy rotation of bearings.

*NOTE: New bearings will feel stiff but will still rotate smoothly.*

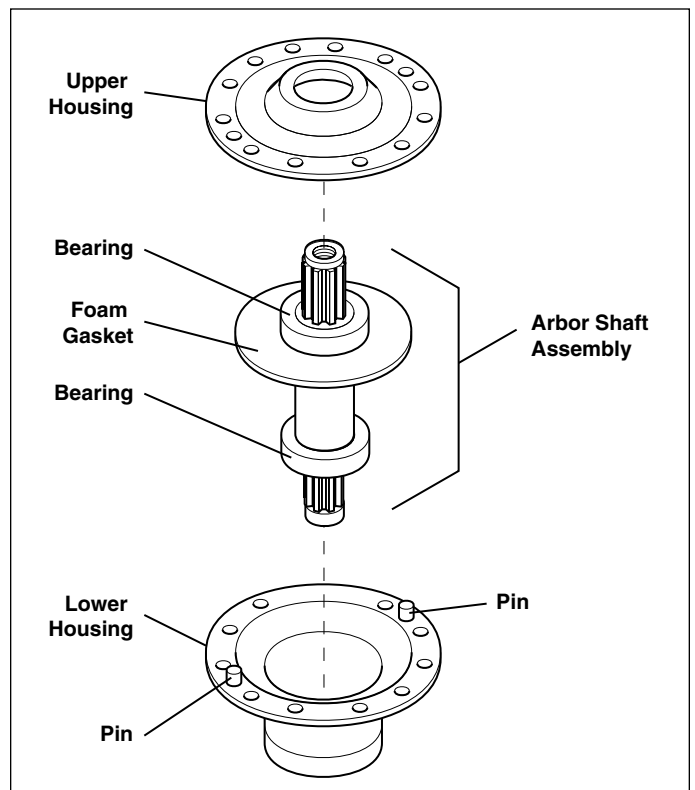


Figure 17. Install Arbor In Housing

## 8 Mower Deck Repair

### Arbor / Pulley Repair

17. Assemble the shim washer, lower grass shield, and blade adapter on the blade end of the arbor shaft. Secure with the collar.

*NOTE: The blade end of the arbor shaft has recessed spines to hold the collar.*

18. Assemble the upper grass shield and pulley on top of the arbor shaft. Secure with the heavy washer, lock washer and capscrew. Torque to **50-70 ft. lbs.**

19. Install the arbor assembly in the mower deck. (See removal steps #1-3) Secure with six Taptite hex screws placing the two longer screws (used to secure the belt guide) in the locations noted during removal.

20. Install belt, guides, and guards. See Figures 5-10.

21. Install blade. See Mower Blade Service.

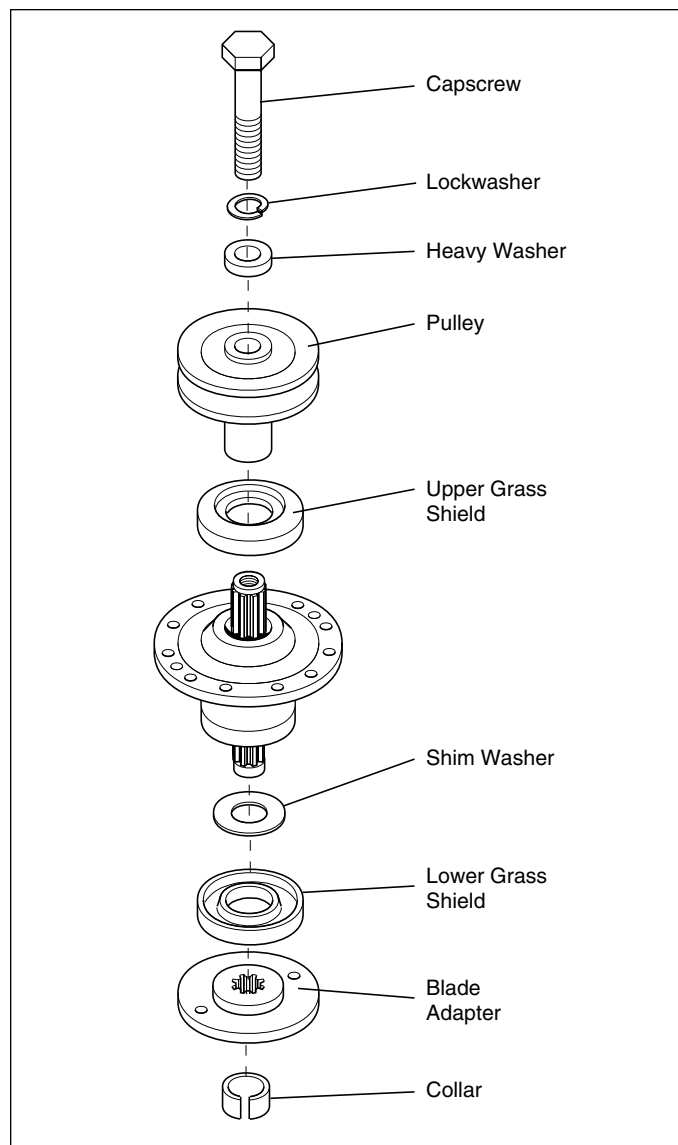


Figure 18. Arbor and Housing Assembly

### IDLER PULLEY REPAIR

Refer to Figures 2 and 5 for assembly diagrams.

1. Remove mower deck (see Mower Removal and Installation).
4. Remove the nut and capscrew securing the idler pulley to the clutch lever.
2. *NOTE: Note the location and quantity of spacers and washers above and below Idler when removing the capscrew. Also note the position of the belt guide.*
3. Place the new Idler assembly on the clutch lever and secure with the capscrew and nut. Make sure the the correct quantity of washers/spacers are placed above and below the pulley.
4. Align the belt guide to its original position.

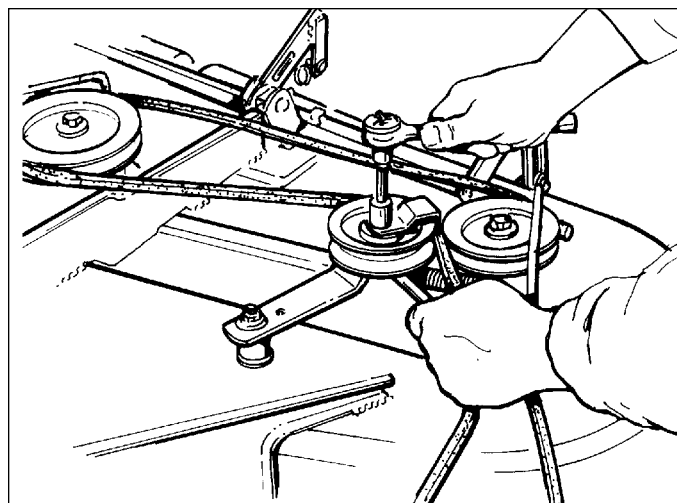


Figure 19. Idler Removal